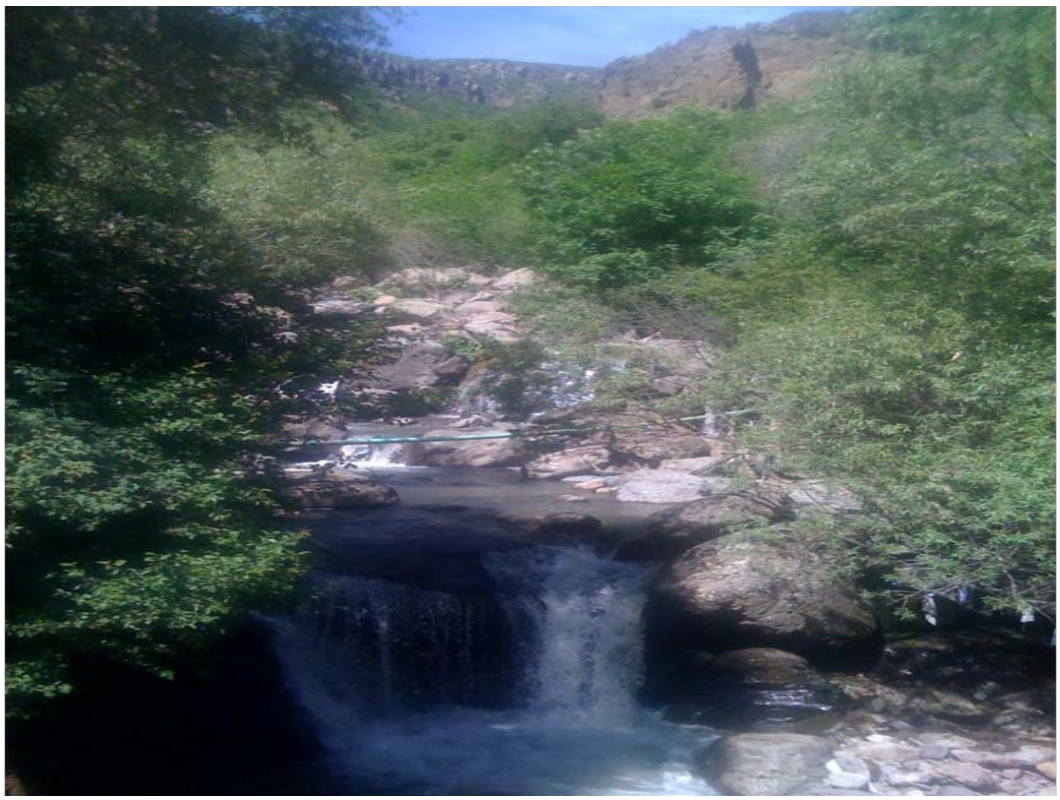
REPUBLIC OF ARMENIA

WATER SECTOR NOTE

Report No.: 61317-AM



May 2011

Sustainable Development Department
Europe and Central Asia Region

THE WORLD BANK

CURRENCY EQUIVALENTS
(Exchange Rate Effective as of May 11, 2011)

Currency Unit	AMD
US$ 1.00	360
AMD 1.00	0.0028

WEIGHTS AND MEASURES
Metric System

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AMD	Armenian Drams (currency)
AWSC	Armenian Water and Sewerage Company
Capex	Capital expenditure program
CJSC	Closed Joint Stock company – Armenian company form
EBRD	European Bank for Reconstruction and Development
GOA	Government of Armenia
IFI	International Financial Institution
IMF	International Monetary Fund
KfW	Kreditanstalt fur Wiederaufbau
Lease	PPP Lease Arrangement for water and sanitation services
MC	Management Contract
MWWP2	Municipal Water Supply and Wastewater Project
MWSSSP	ADB Municipal Water Supply and Sanitation Sector Project
MVV	Private Operator for the Three Regional Utilities Management Contract
NRW	Non Revenue Water
O&M	Operations and Maintenance
Opex	Operating Expenditure
PMU	Project Management Unit
PPIC	Performance Payment Incentive Compensation indicators under the Management Contract
PPP	Public Private Partnership
PSP	Private Sector Participation
PSRC	Public Services Regulatory Commission
Saur	Private Operator managing the AWSC Water and Waste water services under a Management Contract
SCWS	State Committee of Water Systems
USAID	States Agency for International Development
Veolia	International Private Operator, owner of Yerevan Djur
YWSC	Yerevan Water and Sewerage Company
YWWP	Yerevan Water Supply and Wastewater Project
Yerevan Djur	Private Operator Company managing the Yerevan Water and Waste Water services under a Lease Agreement

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REPUBLIC OF ARMENIA
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Table of Contents

EXECUTIVE SUMMARY 8

Figure 1-2: Proposed Sequence of Priorities 14

1 INTRODUCTION 19

2 STATE OF THE WATER SECTOR 22

2.1 Geography & Economy 22
2.2 Water Resources 22
2.3 Provision of Water & Wastewater Services 25

3 KEY CHALLENGES AFFECTING DEVELOPMENT OF THE SECTOR 38

3.1 Technical issues 38
3.2 Commercial Issues and Financial Sustainability 43
3.3 Legal, Institutional and Regulatory Issues 50
3.4 PPP in the Sector and Future Development 51
3.5 Institutional Issues for PPP in Armenia 56

4 POLICY OPTIONS & RECOMMENDATIONS 58

4.1 Sector Issues 58
4.2 Tariff Options 60
4.3 PPP Options 67
4.4 AWSC: Issues and Specific Immediate Actions 69
4.5 Village Water Supplies 72

5 CONCLUSION 74

Annex 1: Tariff Simulations 77

Annex 2: Analysis of the Average Tariff Option for Combined AWSC+3 Regional Utilities (Nor Akunq, Lori & Shirak) Scenario 81

Annex 3: Performance Based NRW Contracts 86

Annex 4: SAUR Meter Study: What are we actually measuring? 93

Annex 5: Indicators & Financial Details for Yerevan Djur (Veolia) & AWSC (Saur) 95

Annex 6: Transaction Adviser – Scope of Works 101

Annex 7: Proposed Capital Investment Plan (US$100 million) for AWSC Service Area and Expected Results 105

Annex 8: SCWS views on 560 Communities not serviced by Water Supply and Sanitation Companies 112

Annex 9: Gdansk Case Study: The impact from Management and Lease/Affermage Contracts 114

Annex 10: Armenian Water and Sewerage CJSC 119

Annex 11: Map of the Republic of Armenia 121

Tables, Figures and Boxes

Tables:

Table 1-1: Key Issues 20
Table 2-1: Performance Measures – Yerevan Djur Lease Contract 27
Table 2-2: Performance Measures – AWSC Management Contract 28
Table 2-3: Performance Measures – 3 Regional Utilities Management Contract 29
Table 2-4: Estimates of Potential Areas of Losses 32
Table 2-5: Current Committed Capital Investment Program for the Sector 34
Table 3-1: Yerevan Djur – Estimates of Long Term Investment Needs 48
Table 3-2: Yerevan Djur - Short Term 'Emergency' Investment Needs 49
Table 3-3: Yerevan Djur - Planned Performance Improvements from US$ 74-79 million 'Emergency' Investment 49
Table 3-4: Lease Contracts – Key Elements 53

Figures:

Figure 1-1-1**:** Key Prioritized Policy Recommendations 14
Figure 2-1 Triangular Relations in Service Delivery 25
Figure 2-2 Current Management Arrangements – Armenia Water Sector 26
Figure 2-3: Yerevan Djur Continuity of Supply 2010 28
Figure 2-4: Contractual Framework for Yerevan Djur 36
Figure 2-5: Contractual Framework for AWSC 37
Figure 3-1: Asset Management 42
Figure 3-2: Some Key Issues Related to Financial Sustainability 43
Figure 3-3: Financial Sustainability- Assessing Affordability of Service Standards, Tariffs & Subsidies 44
Figure 3-4: Financial Sustainability - Balancing Tariffs, Subsidies and Costs 45
Figure 3-5: Armenia Tariffs Currently Lower than Others in the Region 45
Figure 3-6: Financial Needs & Maintenance Categories 47
Figure 3-7: Potential Future Investment Needs 48
Figure 3-8: Key Elements of PPP Contract Types 52
Figure 4-1: Tariff Sustainability 61
Figure 4-2: Base Case (Reference) Scenario 64
Figure 4-3: Positive Free Cash Flow Scenario 65
Figure 4-4: Cumulative Free Cash Flow for Scenario 2 66
Figure 4-5: Base Case Scenario in Case of Later Transition from MC to Lease Agreement 67
Figure 4-6: Timeline for PPP Arrangements in Armenia Water Sector 69

Boxes:

Box 3-1: The difference between a lease and an affermage contract: not just semantics 51
Box 3-2: Hybrid Contracts 55
Box 3-3: Examples of Hybrid Arrangements 56
Box 4-1: Proposal for Meter Renewal - Yerevan 59
Box 4-2: Evolution of Water Tariffs in Several PPPs 60
Box 5-1: Sustainability of Service 76

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The Policy Note was completed under the technical advice of Manuel Marino (Water Program Team Leader) and the guidance of ECSSD Management, including Wael Zakout (Sector Manager, Urban and Water) and Peter Thomson (Sector Director).

EXECUTIVE SUMMARY

1. Introduction

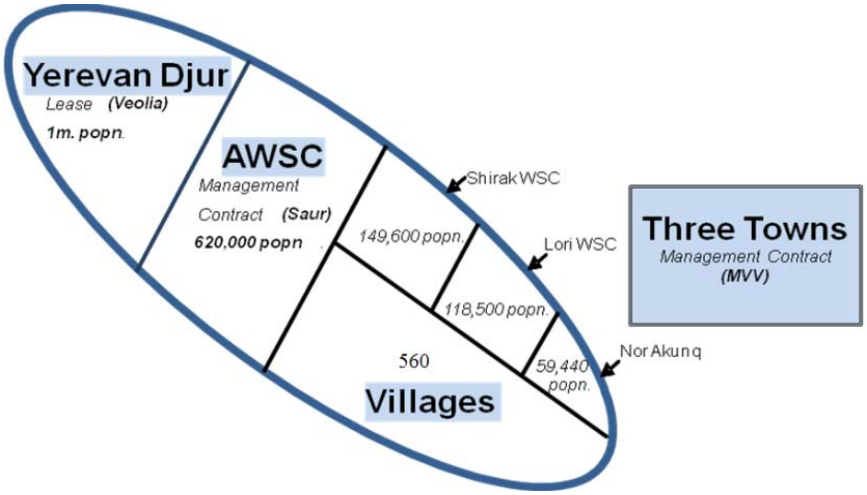
1 **The Government of Armenia (GOA) has a progressive policy for supporting development of water and wastewater services to the country's 3.1million population.** Armenia was originally faced with increasing demand, deteriorating assets and dilapidated infrastructure, which resulted in a steadily decreasing and costly provision of service. Huge investment efforts have been made during the Soviet period in order to provide modern drinking water and wastewater services to all domestic and professional, urban and rural users. However, in a context where the price of electricity was almost zero and water resources considered as unlimited, water flows and volumes were not metered at any stage of the hydraulic process and facilities and infrastructure have been designed to take into account large domestic consumption standards. The customers had almost universal service. The difference between real needs and design capacity adding on to the lack of repairs, renewal and maintenance during many years resulted in water leakage, wastage and misuse, both in the public networks and in households.

2 **For many years after the collapse of the Soviet economy, most of the water supply and sanitation systems in Armenia were in serious state of disrepair**. Despite an abundance of water in the country, for almost all Armenians, water was available for only a few hours a day. Over the past decade GoA has strived to improve access, reliability and quality of the drinking water and its infrastructure with increased use of public-private partnerships (PPPs), which have changed the way it manages the sector and brought about improvements in quality and service to customers.

3 **Currently the majority of the population of Armenia is served by three water and wastewater utilities under PPP arrangements:**

- Yerevan Djur – serving 1 million population under a Lease Arrangement with Veolia;
- Armenia Water and Sewerage Company (AWSC) – serving 0.62 million population under a Management Contract with SAUR; and
- 3 Regional Utilities (Nor Akunq, Lori and Shirak) - serving 0.32 million population under a Management Contract with MVV.

- Additionally there are 560 villages outside these utility areas, served by arrangements that vary by each individual community.



4 **The Water Sector has improved but still has a long way to go.** After decades without water in some areas, continuity of supply has improved dramatically. In the AWSC area, for example, continuity has risen from 4.2 hours a day to 14 hours or more on average. These improvements in service have been achieved through the effective implementation by private sector operators of investment programs financed by the state and IFIs, with the aim of improving operating efficiency and making effective use of limited resources. Although the water resource balance in many parts of the country has improved since the 1980s, and 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 Armenia remains poor. AWSC's management contract (MC) is coming to halt by the end of 2013. The subsequent PPP arrangements for AWSC are at a crucial point, with various options including moving from the current Management Contract into a Lease Contract with an international private operator.

5 **PPP Contract alone cannot resolve all sectoral challenges.** The state of the infrastructure and assets is still very poor, with a need for major investments to bring it up to a reasonable condition as well as for expansion of service. Tariff, the main source of revenue, is currently inadequate, not even sufficient to achieve the level of recovery of routine Operation and Maintenance (O&M) costs. The need to manage a system with high levels of Non Revenue Water (with potential technical losses estimated as much as 40-45% out of total losses of 85%) diverts scarce resources from system improvement. The high level of water loss also has operational and financial costs. Customer service is patchy, making it difficult to justify increases in tariffs. Significant investment is still needed, however, to reduce excessive amounts of unaccounted for water, rehabilitate poor water and wastewater infrastructure, and continue institutional and financial capacity building. The disparities are more acute between urban and rural areas. The shortcomings in the system can only be remedied through rehabilitation of water systems with well established prioritizations and the adoption of regulatory and institutional changes.

6 **The GOA has asked the World Bank to conduct this analysis of the water supply service provision in Armenia in order to determine high priority sector reform actions and**

the best PPP structuring option for the AWSC. Since GOA's decision on how to proceed depends not only on AWSC's setup, but also on a broader sector-wide strategic approach to water supply, this Policy Note (Note) reviews the existing situation for integrated water management in Armenia, with the objectives of a) providing guidance on improving levels of service, b) ensuring long term sustainability of the sector, and c) maintaining affordability of services to users towards cost recovery of operations. The Note analyses current sector performance and issues involved in establishing a practical water supply service provision. The recommendations are focused on providing specific sector policy options for effective management of water services to meet GOA's development objectives.

7 **This Note does not cover other water sector aspects**, such as affordability/willingness to pay analysis, long-term tariff policy, institutional reforms, detailed wastewater and sewerage analysis including environmental impact, detailed water resources and irrigation analysis. Furthermore, the issue of water supply to the 560 villages outside the AWSCs area and is not fully developed in this Note.

2. Sector overview and main challenges

8 **Armenia enjoys relatively abundant water resources** given the limited volumes required for drinking water supply. Total water resources average 10.2 billion m3 per year, of which only about 2.4 billion are used for drinking water. With dramatic reduction of industrial and agricultural activities after independence, water resources are not presently endangered.

9 **Over the last ten years, Armenia has recorded significant legislative and institutional achievements in terms of water resources management and protection,** the main direction of which was introduction and application of the principles of integrated water resources management (IWRM) in the country. This has been supported by a number of initiatives in cooperation with international institutions including the World Bank.

10 **Currently, the water sector reforms are aimed to decentralize the water resources management functions.** This is with the objective of more efficient integrated management of water resources at basin level for the benefit of individual water users as well as for the overall best use of resources at national and regional level.

11 **The water resources for potable as well as irrigation water supplies are, in general, abundant and mainly consist of ground and spring water.** Out of 120 water supply systems, some 107 rely on ground or spring water with the remaining 13 drawing water from streams. Water sources are reasonably well protected with only rare cases of contamination or bacterial pollution being reported. Likewise, only few water shortages during periods of drought turned out to be severe.

12 **Demands on water production are considered to be high because of the high levels of Non Revenue Water (NRW).** The level of NRW, i.e. technical losses plus commercial losses, is at one of the highest global levels (up to 85%). The reduction of levels of NRW has not been taken as a main performance measure under the present PPP contracts, possibly given the availability of water resource. Whilst Armenia may not suffer resource constraints in the short-term, given the forces of climate changes, this is not considered good practice for long-term effectiveness and sustainability. Issues related to NRW include:

- Lack of accurate measurement, at both domestic and system wide level, means that the actual level of NRW are unknown and are only in 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; and
- Approximately 40-45% is estimated to be through 'technical losses' such as leakage due to the poor condition of the existing infrastructure networks.

13 **Tariff levels are very low and consequently there are insufficient funds to adequately deal with asset rehabilitation.** Notionally, tariffs should aim at O&M cost recovery, with mechanisms for adjustment for varying economic conditions. Tariff levels in Armenia, at around AMD 200/m^3 (US$0.55/$m^3$), appear low in relation to regional or international norms (where typical examples are around AMD 400/m^3), although current median monthly household expenditure is below typical affordability threshold norms (e.g. tariffs should be set at approximately 4% of household median income according to the Global Partnership on Output Based Aid affordability measure). Furthermore, although some tariff cost 'pass throughs' have been allowed by the Regulator, these are often delayed and their approval is acrimonious. Even when current restrictions on tariff are beginning to impact the maintenance levels and 'economic equilibrium' of operating entities, there is reluctance to increase cost recovery through further increases to tariff levels.

14 **Tariff policy must ensure sector's long-term sustainability.** A quantitative analysis of different tariff policies highlights the need to address key related issues immediately. Namely, achieving long-term financial sustainability in 2022[1], while keeping tariffs constant for 3 years, will require a tariff increase of 33% in 2014[2]. Even if nominal values are used, this should take into account the fact that tariffs have not historically increased in line with inflation. In addition, GOA will have to contribute a significant level of subsidies from budget (over AMD 2 billion in 2012) between 2011 and 2013 to cover the existing debt, asset replacement and other costs not covered by the tariffs.

15 **Specifically, AWSC has had to reduce regular maintenance expenditures by some 50% to improve the financial performance,** since the existing tariff levels do not allow for full cost recovery. For example, each year around 200 water meters need to be replaced, but due to shortage in revenues, AWSC was not able to replace any of them in 2010. Same happened with chlorine equipment and reservoir buildings for which no maintenance was done. AWSC was forced to reduce the expenditures for electrical systems and pumps from a required AMD 120 million to AMD 95 million. Likewise, the replacement and maintenance of pipes and fittings was reduced from a required AMD 120 million to AMD 70 million. Notably, the debt service for the above mentioned programs has not been part of the operating expenditures.

[1] Financial sustainability is defined as utilities able to cover its costs, repay debt and replace depreciated assets. The year 2022 was chosen in the assumption that this would be the first year for debt servicing of a $100 million investment package (which subsequent analysis shows as immediate to short-term investment needs) financed through IFIs loans with an 8-10 year grace period. Tariff would increase at a constant pace unless a specific action is taken (such as maintaining the tariff constant for a few years or re-allocating the net income to tariff subsidies).
[2] Nominal Tariff

16 **Improvements in continuity of water supply can only happen with increased investments in infrastructure.** Under the current management and lease contracts, the main Performance Indicator that is used to measure improvement in the level of service is the Continuity of Supply. To be able to operate and guarantee service targets that are included in the performance plan of the lease, the lessee needs to know the resources that will be available for investments and the estimated scope of such investments. Initial estimates indicate that short to medium term investment requirements (2011-2015) could account for about US$ 179 million, equivalent, (needs US$ 79 million in Yerevan and US$ 100 million in AWSC).

17 **The skills brought by an experienced operator will ensure that the existing system is brought to the maximum possible operating efficiency, but this cannot increase above system constraints without an adequate investment program.** No PPP scheme can achieve performance improvements without investments needed for adequate system rehabilitation, upgrading and expansion. This is additional to funding for materials, equipment, management and labor to carry out activities to ensure improvements to existing infrastructure and O&M. There is a need for a well defined investment program to support the activities of the PPP operator, if private sector is to achieve the proposed performance improvement.

3. PPP Structuring in Water Supply

18 **The use of PPP in the water and wastewater sector in Armenia has been an example of good progressive sector development**. Private sector participation is increasingly seen by the Armenian government as a key component of sector reform strategies. The public-private participation schemes that were successfully implemented in several of the country's water utilities yielded very good results for the development of the sector and made Armenia one of the few countries in the region with such a successful PPP experience. The first PPP model was established at Yerevan water utility as a Management Contract. The arrangement was chosen to do some initial investment and to develop enough detailed information on the existing utility's parameters and performance. Once this basic data was known, a greater degree of risk could be transferred to the Private Sector by requiring them to take commercial risk (billing collection risk) and some limited investment in the form of working capital. Thus, a lease type contract structure was developed. In the subsequent Lease Contract the Operator (Veolia) took on increased collection risk as well as providing management expertise, carrying out operation and maintenance, and management of the capital works program. The contract is proceeding satisfactorily, meeting program targets.

19 **Following the success of the Yerevan PPP program, and applying lessons learnt, Management Contracts were let for AWSC (SAUR)** and most recently for the 3 Regional Utilities (MVV). AWSC is performing well, and through implementation under the MC arrangement, an increased understanding of service and cost issues has been obtained. AWSC's contract is now coming to the end of its contract period.

4. PPP Structuring Recommendations and Key Actions

20 **The Note recommends AWSC migrates from the current management contract to an enhanced management contract (2011-2013) leading to a lease contract afterwards.** The

current AWSC MC will be extended for another two years until end 2013. The 3 Regional Utilities management contract ends in 2012, which could also be extended until end of 2013. The intention, taking the example of the Yerevan PPP development, is to transform these management contracts into a lease contract by end of 2013. The experience with Yerevan shows that the Lease Contract provides a proven and effective step from the Management Contract. The use of a Lease would be the logical next stage of development of both AWSC, possibly together with the 3 Regional Utilities. Specific actions can be taken to enhance the proposed extension to the AWSC management contract as detailed below. Other forms of PPP, such as a full concession, would not appear to be viable given the fact that the Operator would be required to fund its investment solely through the tariff revenues, which as note above are not yet enough. Given the massive investment backlog and the existing gap for full cost recovery tariffs, this option was not considered further.

21 **AWSC's transformation will be affected by the pace of sector reform.** Two scenarios for such transitions have been analyzed, one by end of 2013 and the second by 2015. The first implication of delaying the transition is the amount of subsidies required for the period until tariffs are brought to a cost recovery level, and the second one is the tariff increase itself. The analysis showed that in the case of an earlier transition to a Lease contract, both the required level of subsidies and the tariff increase are lower. The average amount of subsidies in this case amounted to around AMD 1,739 million per year, compared to AMD 1,851 million per year in the case of a later transition[3]. The tariff increase required to reach financial sustainability in 10 years was 34% in the case of an earlier transition, as compared to a 40% increase for a later transition. These differences result from the fact that the Lease Contract will bring efficiency gains[4] and the sooner these gains are achieved, the smoother the transition towards cost recovery tariffs will be.

22 Key policy recommendations and proposed sequence of prioritized actions are presented in Figure 1 and the table below. These are presented under four building blocks:

a. Legal and policy actions for improving the water sector in the medium term (2-5 years);

b. Actions related to the extension of the AWSC MC;

c. Additional performance tasks to be included in AWSC enhanced MC extension; and

d. Actions towards achieving overall sustainability of the sector, particularly related to the proposed move of AWSC into a Lease Contract.

[3] Investment levels are only indicative and based on several assumptions (including the need to account for replacement of depreciated assets).

[4] It must be remembered that under the lease contract the operator remuneration derives from its ability to collect revenue from customers. For the purposes of modeling, we have assumed that the operator remuneration will be 10% of the revenue collected from customers.

Figure 1-1-1**:** Key Prioritized Policy Recommendations

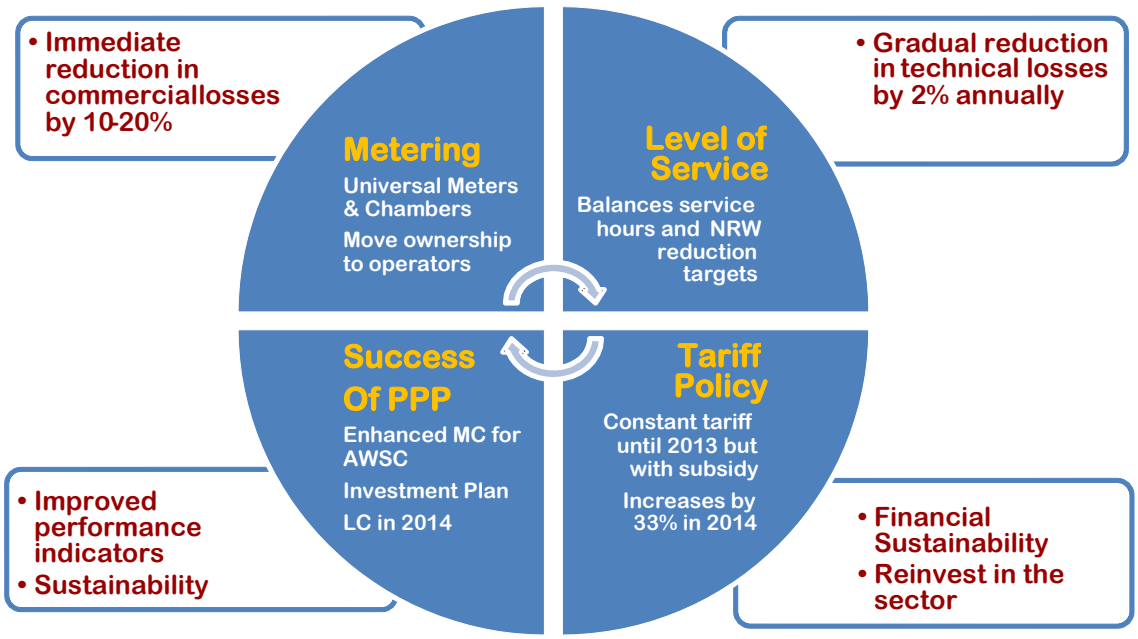
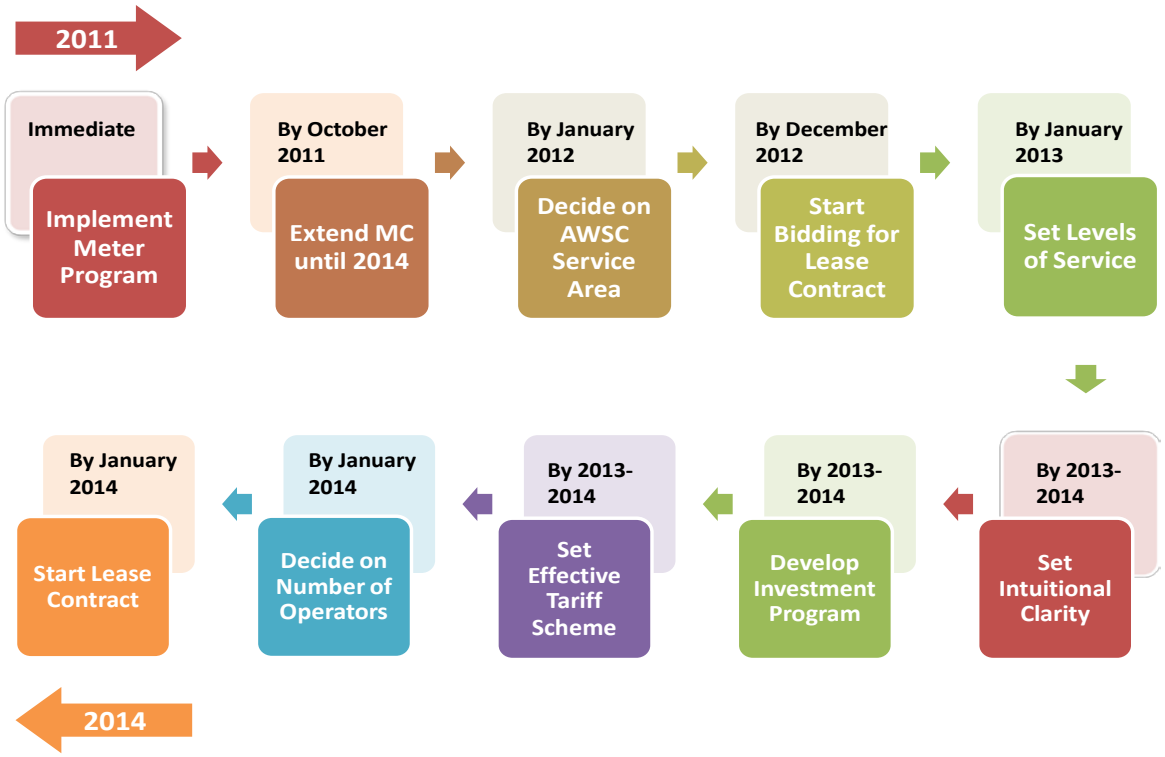


Figure 1-2: **Proposed Sequence of Priorities**



Area	Recommendation/Action
Legal and policy actions for improving the water sector in the medium term (2-3 years)	
Metering	Immediate implementation of a sustainable program to improve metering across the utility service area is to include: • Ownership and management of meters and chambers to be transferred to Operators; • Operators to have the legal right to lock and control chambers of meters.
Level of Service	*Countrywide*: The target for continuity of supply should be progressive, with the aim of reaching 24 hour supply for the whole country in 2022, with associated guaranteed minimum quality and pressure targets. Targets of 16 to 18 hours per day average (varying for specific urban and rural areas) should be established for AWSC, associated with a minimum level of 8 hours per day continuity for individual areas, and a regular schedule of supply maintained.
Tariff	*National vs. regional tariffs:* Whilst it is recommended that there is a national policy on tariff setting, it is not proposed that there should be a single national tariff level at this time. If there is a single national tariff level, there will need to be cross subsidies between areas, and this would raise practical and potential political difficulties. Whilst the <u>average</u> tariff will be lower, in some cities and towns (e.g. Yerevan), tariffs will need to increase despite lower operating costs. It is proposed to leave tariff on a regional basis as is currently applied. It would be practical to consider consolidation of operation of similar areas (i.e. AWSC and 3 Regional Utilities) to obtain efficiency through economies of scale, with expected reduction of management and operating costs. However, this could be achieved without use of a single regional tariff for the combined area, which might pose problems of acceptance by those towns currently on a lower tariff. An effective tariff mechanism is to be established under the LC to give an adequate and affordable revenue stream starting from 2014, and that will: • Define and take into account any program of subsidies;

Area	Recommendation/Action
	• Allow defined level of cost recovery; • Include for servicing debt (noting the end to existing debt grace periods particularly for AWSC); • Be 'tapered' to meet affordability and social acceptability criteria; and Allow for effective and sufficient future adjustment to ensure financial sustainability.
Investment Program	Immediate development of a short to medium term investment program (US$ 100 million) to provide necessary infrastructure improvements, linked to providing improvements in service and operating efficiency. This will be focused on improved flow measurement, performance improvement through reduction in NRW (proposed at 2% per year) and an element of associated infrastructure rehabilitation and expansion.
Actions related to the extension of the AWSC MC	
AWSC Management Contract term	Extend current contract until end of 2013.
Number of Operators	It is advisable to have more than one operator/LCs in the country to avoid economic monopoly. This will also allow for benchmarking comparison and increase direct competition in the market.
Development of Lease Contract	Take into account recommendations made in this Note and start international bidding process by end-2012 for a Lessee to start in January 2014.
Extension of AWSC service area under the Lease Contract	The future potential addition to the AWSC Lease Contract of the 3 Regional Utilities that lie within its geographical area would bring major advantages related to economies of scale, as well as improving overall level of financial flows, and making use of common management and operational resources. Provision should be made in the contract to allow for this future possibility.
Additional performance tasks to be included in AWSC enhanced MC extension	
• Preparation of a Detailed Investment Plan, which includes a roadmap to cover all villages in the country and defines rationale for prioritized investments; • Creation of a Business Plan and a joint annual business plan review process; • Additional key Performance Indicators during the period of extension, aligned with the proposed investment plan; • Creation of an Asset Management and Maintenance Plan, which includes specific requirements for the creation of district metering areas, relevant sectorization of the	

Area	Recommendation/Action
network, as well as specific maintenance planning and execution; and • Implementation of about US$100 million capital investment provided by the state and IFIs.	
Overall sustainability of the sector, particularly related to AWSC LC	
Choice of PPP arrangement	The Lease Contract is a proven and effective step for utility development once a Management Contract has successfully established the technical, operational and commercial base data. Other forms of PPP, such as a full concession contract, were not considered viable given the current conditions of the sector.
Investment Plan	This needs to be adequate to ensure that the Operators can produce the required improvements in service. Investment program needs to balance works that will improve operational effectiveness (e.g. improving flow measurement, sectorization) as well as capital works for expansion or rehabilitation of existing infrastructure. Preparation of the investment plan can be based on proposals by the current PPP MC Operator, who is naturally better positioned with knowledge to assess the investment needs and plan for their implementation. It would be advisable for this plan to be reviewed and finalized by an independent advisor to the Government to avoid any potential conflict of interest with the current operator.
Operating capital	There is a need for the lessee to bring operating capital. The Lease Contract needs to ensure that repayment of this capital in a reasonable time frame is feasible. The tariff and revenue streams have to reflect this; otherwise the economic viability of the contract may become strained.
Service area	The Lease Contract should allow for future expansion of the service area, allowing potentials for provision of services to villages that are not currently in the service area.
Meters	Ensure ownership and responsibility for meters by the Operator (best practice), as well as potential for maintenance of systems within property boundaries.
Accounting	Clarity of accounting standards required e.g. assets depreciation and tax particularly in relation to the PPP contracts: • This has implications on the payment of VAT on unpaid billed amounts and on investments made by the operator and transferred upon completion to the Government. Armenia has recently adopted a law which requires companies with turnover over AMD 100 million (around US$ 250,000) to follow International Financial Reporting Standards (IFRS) starting 2011. Yerevan Djur has shifting to such a new system

Area	Recommendation/Action
	of financial management. Any new Lease Contract for AWSC should also adopt the IFRS.
Institutional	A clearer definition of roles and responsibilities is needed for more effective water management, particularly at the boundary between National and Municipal level, to ensure a clear and effective approach to allow the PPP Operators to carry out their contractual responsibilities in the most effective way. Other required actions include: • Strengthening of the Regulator to provide clarity on tariff levels, setting and subsidy management; • Use of independent technical and financial audits: This is a key safeguard in the current institutional arrangements, and as such should be maintained; • A clear process of Monitoring needs to be maintained

5. Next steps

23 In order to achieve all actions suggested under the four building blocks of sector reforms, the Note recommends the following as the next steps to be observed by the GOA with support of partner donors:

- Appointment of a specialist transaction adviser to support the GOA in the most effective way throughout the design and negotiation processed of enhanced Management Contract and Lease Contract. The requested grant from PPIAF may fund such advisory service.
- Ensure that a comprehensive set of lessons learnt from the Yerevan Lease contract are integrated in the new design of the Lease Contract, including inter alia bidding process, contract management, lease fee, key performance indicators, etc.
- Maximize the use of input, experience and data for project development from the incumbent Operator under the Management Contract. They will have particular detailed insight that should be drawn upon.
- Establish a sound financial model – review and adapt the AWSC proposed model as appropriate.
- Establish practical levels of service to be adopted, e.g. establish a balance among service continuity, secured pressure, flow measurement and NRW reduction.
- Develop an appropriate capital works program, within local sector capacity, and with a defined approach to funding.
- Establish a defined approach to tariff setting, subsidy management, depreciation, and cost recovery and debt repayment. Review existing institutional arrangements for tariff setting and ensure long term viability. Design and negotiate the Lease Contract using the recommendations above.

1 INTRODUCTION

1 The Government of Armenia (GOA) has a progressive policy for supporting development of water and wastewater services to the country's 3.1million population. Armenia was originally faced with increasing demand, deteriorating assets and dilapidated infrastructure, which resulted in a steadily decreasing and costly provision of service. Over the last decade the GOA, with increased use of Private – Private Partnership (PPP), has made changes to management of the sector, with an associated investment program that has resulted to some planned improvements to services.

2 Currently the majority of the population of Armenia is served by three water and wastewater utilities under PPP arrangements:

- Yerevan Djur – serving 1 million population under a Lease Arrangement with Veolia;
- AWSC (Armenia Water and Sewerage Company) – serving 0.62 million population under a Management Contract with SAUR; and
- 3 Regional Utilities (Nor Akunq, Lori and Shirak) - serving 0.32 million population under a Management Contract with MVV.
- Additionally there are 560 villages outside these utility areas, served by arrangements that vary by each individual community.

Achievements

3 The PPP approach has shown success. After decades without water in some areas, continuity of supply has improved dramatically. In the AWSC area, for example, continuity has risen from 4.2 hours a day to 14 hours or more on average. These improvements in service have been 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.

Challenges

4 The current situation is that arrangements for providing water and wastewater services under the existing Management Contract (MC) for a regional utility (AWSC) are coming to an end, and there is a need for an informed decision on how to proceed. The deteriorating asset base requires further investment. Tariff, a potential source of revenue, is currently inadequate, not even sufficient to achieve the level of recovery of routine Operation and Maintenance (O&M) costs.

5 The state of the infrastructure and assets is still very poor, with a need for major investment to bring it up to a reasonable condition as well as for expansion of service. The poor asset state and increased utilization of existing old pipe-work and infrastructure have, in turn, led to system stress and more emergencies to deal with. The need to manage a leaking system (with

potential technical losses estimated as much as 45% out of total losses of 85%) diverts scarce resources from system improvement, and the high level of water loss has operational and financial costs. The limitations on financial resources, resulting in limited maintenance, lead to a continuing deterioration in the pipe-work systems. There is little accurate measurement of water flows in the systems and major investment is needed for metering and pressure loggers to determine actual consumption by customers and for better system management.

Table 1-1: **Key Issues**

Issue	Status
Coverage	Relatively high level of water connections. Wastewater: Only in few major urban areas, and only basic mechanical treatment. No secondary level treatment throughout the country. Unhygienic sanitation conditions in rural areas.
Continuity of supply	Varies, but generally has increased successfully under PPP. Yerevan has improved from an average 17.4 hours/day to 21.5 hours AWSC has improved from an average of 6 hours/day to 14-16 hours Further potential for improvement as planned
Resource	Generally abundant. Some areas of restriction nationally.
Financial	Under PPP models, collections are exceptionally high, i.e. up to 96% (international sector comparison).
State of assets/Capital Investment	Extremely poor, massive under investment in rehabilitation, renewal and expansion.
Water Losses (Non Revenue Water- NRW)	70% to 85% - extremely high by all international standards. [Note: reduction of NRW has not been specific part of PPP contracts]
Water Tariff	Generally below cost recovery (AMD 811 M subsidy p/a to ARM Water Co). Wastewater: Small proportion of real cost. Current tariff level is insufficient to cover O&M costs and much less investment costs. Tariff levels are well below comparable regional international values.
Management efficiency	Urban areas: PPP bringing improvements Village sector: needs strategy

6 Key challenges facing the sector, particularly related to AWSC, include:

- There is an existing subsidy of AMD 811 million /year that the GOA intends to phase out in 2011 according to the MTF.
- The grace periods for existing debts are coming to an end in 2011 - 2013 and the challenge will be how AWSC will service these debts.
- The system has a major need for further capital investment, even if the decision is made just to maintain the existing system or to expand by a limited amount.

7 At the request of the GOA, this World Bank Policy Note (the Note) reviews the existing situation for Water Management in Armenia, with the objectives of providing guidance on improving levels of service, ensuring long term sustainability of the sector, and maintaining affordability of services to users. The Note reviews current sector performance, considers issues involved in establishing a practical water sector strategy and is focused on providing sector policy options for effective development of water and wastewater services to meet GOA development objectives.

8 The Note focuses on the provision of water and wastewater services to towns and villages through the main water utilities. Other water sector aspects, such as water resources and irrigation are looked at only as far as they impinge on this focus area. If required it is considered that these issues will be dealt with separately. Similarly the position of water supplies to the 560 villages outside the main water utility areas is a complex issue that is considered better dealt with in through a separate study.

9 The PPP arrangements for AWSC are currently at a crucial point, with various options including moving from the current Management Contract with an international private operator into a Lease Contract. The Note assesses some key issues arising from this, and the steps that can be taken immediately in the medium term and same addition in the extended MC.

2 STATE OF THE WATER SECTOR

2.1 Geography & Economy

10 Armenia is a mountainous country in the Southern Caucasus area, bordering Turkey, Georgia, Azerbaijan, and Iran. It has a population of about 3.1 million, with about 38.0% rural and 62.0% urban distribution.

11 Armenia has sustained economic reforms leading to significant improvements on its income levels over the past decade and a half. Growth advanced 12% on average between 2001 and mid-2008, driven by an increased inflow of remittances and foreign investments, high commodity prices, the transition rebound and strong reform efforts. This, and improved social service provision, led to a sharp drop in poverty from over half of the population in 1999 to about 23.5% in 2008. Key items among the various reforms undertaken are land privatization in early 1990s, establishment of a sound regulatory framework for the banking system, and unbundling and the attraction of private capital into a number of infrastructure sectors, including water and energy.

12 The global financial crisis hit Armenia severely despite swift Government response. Actual outcomes of 2009 indicate that the economy contracted by 14.2% while poverty rose by nearly 5% age points and the fiscal deficit increased to about 8 % of GDP deteriorating the debt profile to 34% of GDP. The economic contraction was mostly due to fall in remittances (by about 35%), decline in exports (by about 33%) and the collapse in commodity prices. Construction activity – a key engine of growth of the past several years – fell significantly (by 54%), leading to significant job losses. The government responded with a significant stimulus package (the fiscal deficit expanded by about 5% of GDP) focused on safeguarding key social programs, increasing public investments with a view to short-term job creation, and providing credit and guarantee facilities for private enterprises.

2.2 Water Resources

Integrated Water Resource Management

13 Over the last ten years the Republic of Armenia has recorded significant legislative and institutional achievements in terms of water resources management and protection, the main direction of which was introduction and application of the principles of integrated water resources management (IWRM) in the country. This has been supported by a number of initiatives in cooperation with international institutions[5] including the World Bank[6.]

[5] Including: the World Bank (WB), United State Agency for International Development (USAID), United Nations Development Program (UNDP), Global Environmental Facility (GEF), European Union (EU) Technical Assistance to Commonwealth of Independent States countries (TACIS), EU Water Initiative (EUWI), United Nations Economic Commission for Europe (UNECE).

14 Currently the water sector reforms are in the process of decentralization of the water resources management functions[7]. This is with the aim of more efficient integrated management of water resources at basin level for the benefit of individual water users as well as for the overall best use of resources at national and regional level.

Legal Reforms

15 The adoption of the Water Code of Armenia on June 4, 2002 was an important step in water sector reform. The Code contains the idea of integrated river basin planning, promotes the allocation of water resources based on supply rather than demand, creates a basis for establishment of the state water cadastre (SWC), requires issue of water use permits based on actual information, and provides for an economic approach to management of water resources.

16 The Water Code has been supported by establishment of a large number of regulations and byelaws.

17 Recent laws related to sector improvement include the 2005 Law on Fundamental Provisions of the National Water Policy having a long-term development concept for strategic use and protection of water resources and water systems, leading to application of river basin management in Armenia.

18 The 2006 Law on the National Water Program has the goal of development of measures aimed at satisfying the needs of the population and economy, ecological sustainability, and formation, use and protection of strategic and national water reserves.

Current Reforms and IWRM Strengthening

19 The National Water Program established in 2006 established comprehensive legal and institutional reforms of water sector in Armenia, including those related to IWRM principles.

20 The GOA has a continuing program of sector development, and suggested areas for further reform[8] particularly related to IWRM include: improving coherence and consistency among laws, regulation, by-laws and decrees adopted by the Government or water sector agencies and developing the laws in the field of water resources; technical and institutional strengthening of institutions and agencies related to water resource management and coordination and cooperation between agencies, particularly in relation to data collection and dissemination; further development of River Basin Management principles, institutions and practice.

Water Resources for Water and Wastewater Services

21 The main focus of this note is on the provision of water and waste water services for towns and villages, and we do not here consider the water resources situation related to other water uses, such as irrigation or regional inter basin transfers.

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[6] "Integrated Water Resources Management" project 1999 - 2000

[7] Armenia policy brief on reforms in water resource sector: UNECE National Water Policy Dialogue.

[8] Armenia policy brief on reforms in water resource sector: UNECE National Water Policy Dialogue.

22 The adequacy of water resources is not a major issue for water and waste water services in Armenia; generally there is an adequacy of resource throughout the country, with some limitations in a few areas. Estimates show potential water resources of 10.2 billion m^3 per year in average, of which 2.4 billion m^3 is used for drinking water.

23 Armenia is endowed with an abundance of water resources and of all water supplied about 98% comes from groundwater and/or springs with remaining %age from surface water, mainly streams. The ground and spring waters are of satisfactory quality for potable use, and as treatment only chlorination/disinfection is generally required for these. For urban as well as rural areas the water sources are, in general, adequate for present and mid to long term future water demand.

24 Studies have been carried for long term effects of climate change on water resources, but the expected effects are generally for the periods outside the scope of the current paper (developing assessments of resource vulnerability from 2030 onward).[9]

25 The water resources for potable as well as irrigation water supplies are, in general, abundant and mainly consist of ground and spring water. Out of 120 water supply systems some 107 rely on ground or spring water with remaining 13 drawing water from streams. For these 13 water supply systems conventional water treatment plants are in place, while for the remaining water supply systems disinfection only, mainly through chlorination, is required. The water sources are quite well protected, and only rare cases of contamination or bacterial pollution have been reported. Likewise, only in a few cases have water shortages during periods of drought turned out to be severe. In the current situation demands on water production are considered to be high because of the high levels of Non Revenue Water (NRW), as will be described later. With the planned increase in operational efficiency the demand on available water resources will in the future gradually decline. In conclusion, steps to be taken for improvements in water supply will have a positive effect on available water resources, thus water scarcity or non-availability overall will generally not be an issue in the foreseeable future.

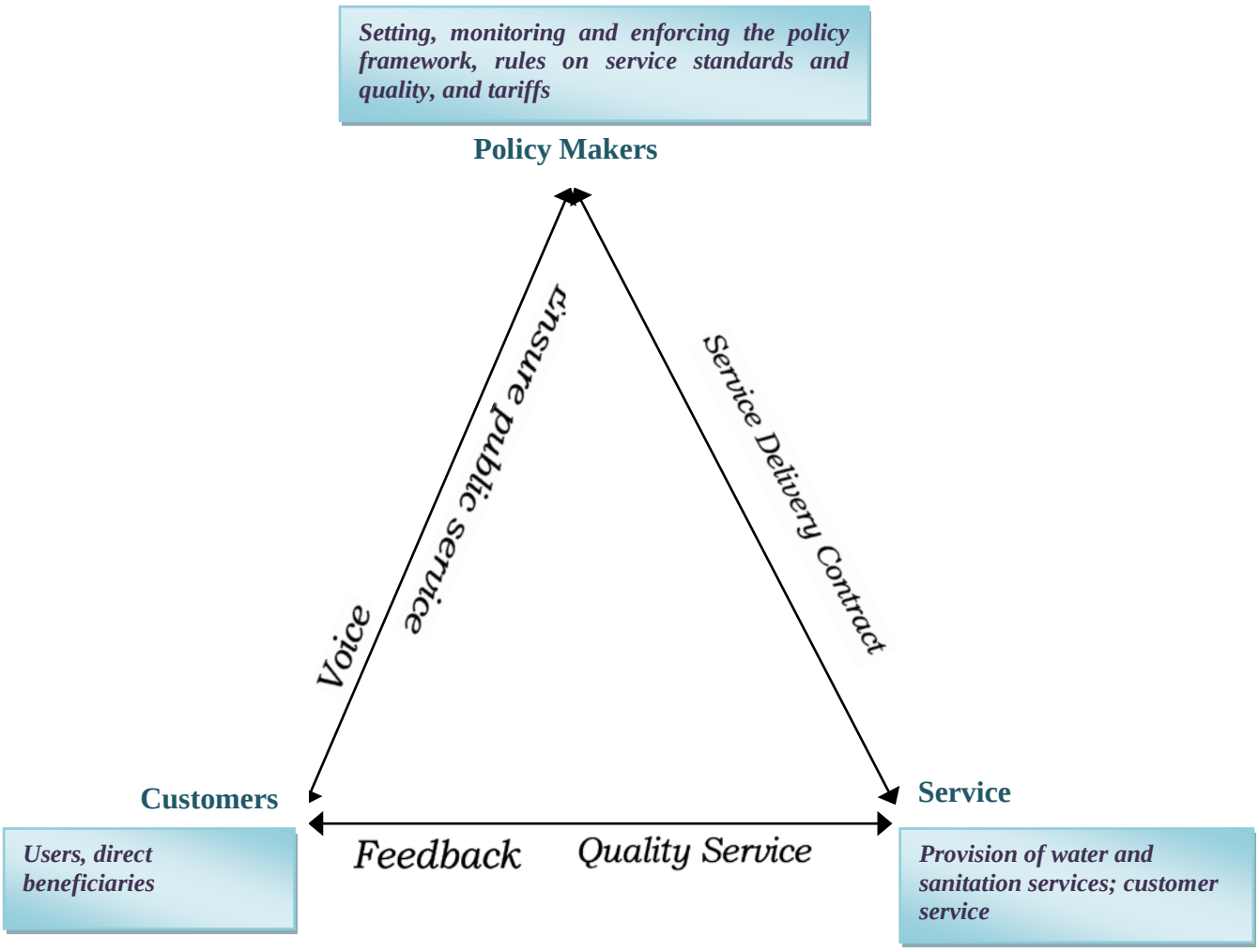
26 In terms of efficiency, the operators generally maximize use of the most economic sources first – e.g. gravity fed supplies or sources that require little or minimal pumping.

[9] UNDP/GEF "Enabling Activities for the Preparation of Armenia's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)" project an analytical study was conducted in 2008-2009,

2.3 Provision of Water & Wastewater Services

27 The delivery of services requires strong relationships of accountability between the actors in the service delivery chain. The delivery of public services involves at least two relationships of accountability. First, clients as citizens have to hold policymakers or politicians accountable for allocating resources towards these services. Second, policymakers in turn need to hold the service providers accountable for delivering the service.

Figure 2-1 Triangular Relations in Service Delivery

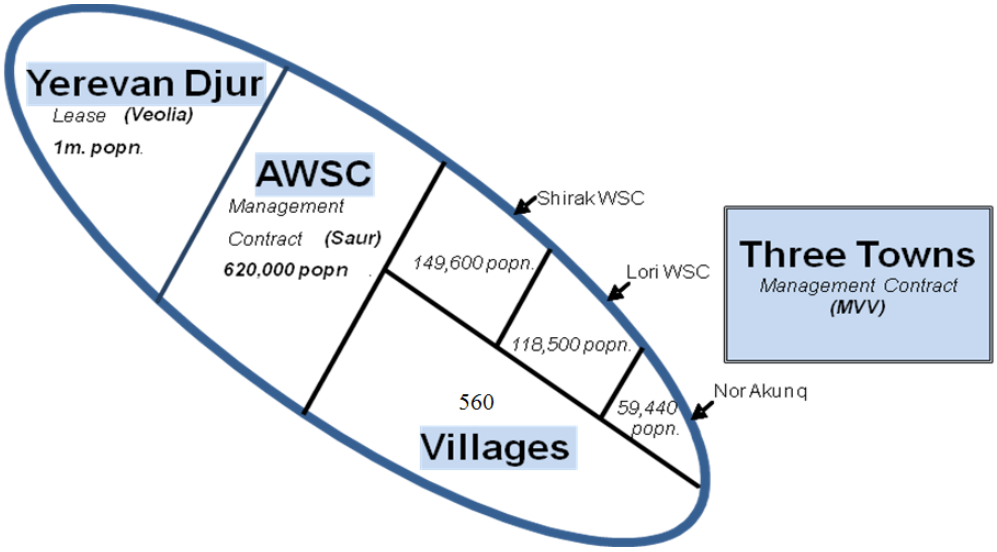


28 The water and wastewater sector in Armenia has shown a progressive and increasing level of performance. The majority of the 3.1 million population is served by three major utilities, each with some form of Private Sector Participation (PPP). The utilities are:

- Yerevan Djur – serving 1 million population under a Lease Arrangement with Veolia;
- AWSC (Armenia Water and Sewerage Company) – serving 0.62 million population under a Management Contract with SAUR; and
- 3 Regional Utilities (Nor Akunq, Lori and Shirak) - serving 0.32 million population under a Management Contract with MVV.
- Additionally there are 560 villages outside these utility areas, served by arrangements that vary by each individual community.

29 These utilities serve towns and some villages in their service areas.

Figure 2-2 Current Management Arrangements – Armenia Water Sector



30 In addition to the three main utilities there are 560 villages that are outside these arrangements, with provision of services to these villages being through a variety of community or individual arrangements. The focus of this Note is on the three main utilities, but some thought has also been given to the issues related to development of services for the villages.

31 Whilst the Note looks at this in some depth, the review of the current situation for the three main utilities can be summarized as follows:

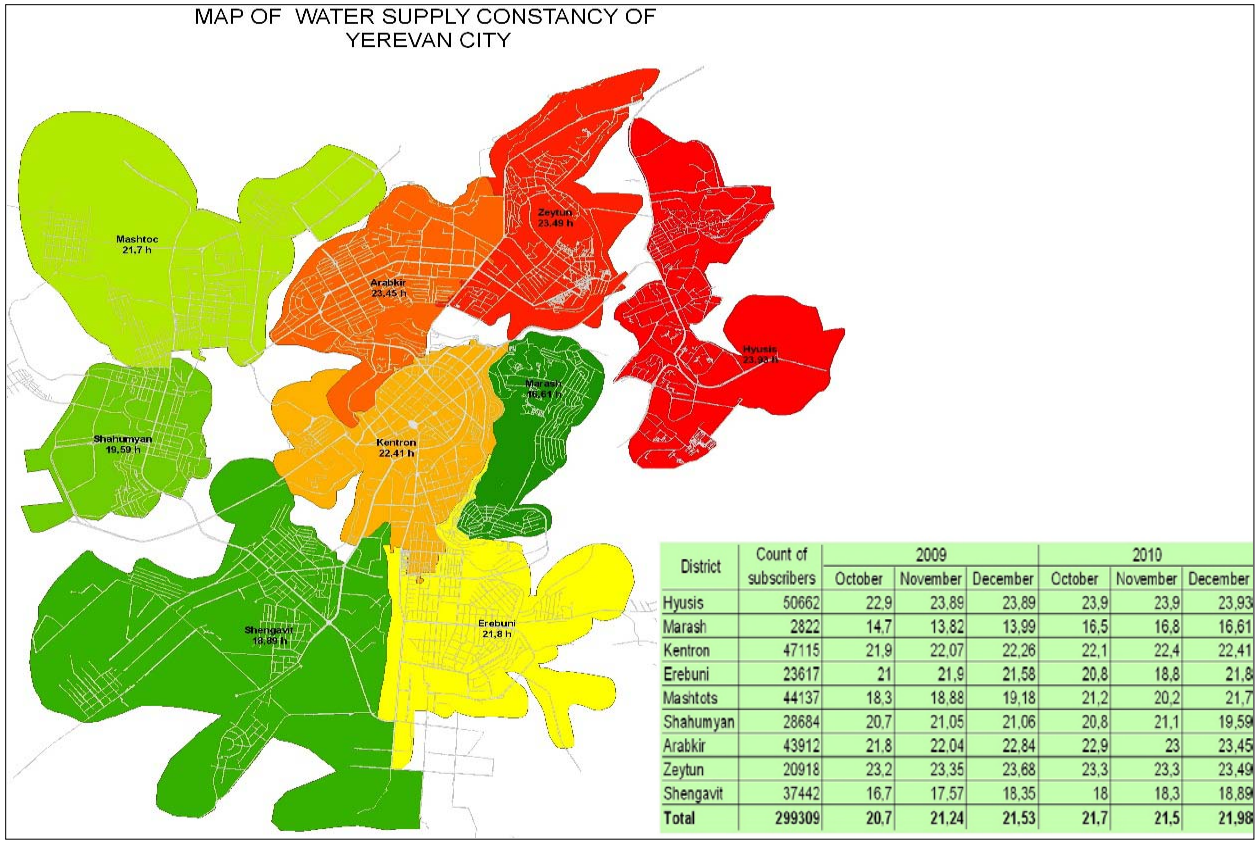
Table 2-1 Performance Measures – Yerevan Djur Lease Contract

Performance Measure	Unit	One year before Private Sector Involvement, /2000/	At the end of the Management Contract /2005/	Results under Lease Contract (Veolia Water) /2009/
Water Supply Duration	Hours (daily average)	4-6	18.4	20.4
Compliance with water quality requirements	%	94.5	97.2	97.8
Energy Consumption	Million kilowatt-hour	240.3	124.2	109.6
Collection Efficiency	%	21	86	97.6
Installed Water Meters	% of customers	0.8	87	96
Unaccounted for Water	%	72	79	81.1
Quantity of Pressure Measuring Loggers	units	-	33	76
Customers	number			332,750
Personnel	number			1,450

32 Current performance of the Yerevan water supply system, operated by VEOLIA covering Yerevan and 33 adjacent villages, as shown by major performance indicators can be summarized as (first figures or base values refer to the situation in early 2006):

- Water production and water consumption (as measured for metered connections) have changed from 885 to 929 liter per capita and day (l/cd) and from 151 to 140 l/cd respectively. This concludes that Non Revenue Water (NRW) has increased from 83 % to 85 %;
- The duration of water supply has on average increased from 17.4 to 21.5 hours;
- The ratio of water connections provided with water meters has increased from 88 to 97.3 %; and
- The compliance with water quality requirements has increased from 94.5 to 97.8 %.

Figure 2-3: **Yerevan Djur Continuity of Supply 2010**



District	Count of subscribers	2009			2010		
		October	November	December	October	November	December
Hyusis	50662	22,9	23,89	23,89	23,9	23,9	23,93
Marash	2822	14,7	13,82	13,99	16,5	16,8	16,61
Kentron	47115	21,9	22,07	22,26	22,1	22,4	22,41
Erebuni	23617	21	21,9	21,58	20,8	18,8	21,8
Mashtots	44137	18,3	18,88	19,18	21,2	20,2	21,7
Shahumyan	28684	20,7	21,05	21,06	20,8	21,1	19,59
Arabkir	43912	21,8	22,04	22,84	22,9	23	23,45
Zeytun	20918	23,2	23,35	23,68	23,3	23,3	23,49
Shengavit	37442	16,7	17,57	18,35	18	18,3	18,89
Total	**299309**	**20,7**	**21,24**	**21,53**	**21,7**	**21,5**	**21,98**

Table 2-2: **Performance Measures – AWSC Management Contract**

Performance Measure	Unit	2004 Base Year	2010
Water Supply Duration	Hours (Daily Average)	4-6	13.0
Compliance with water quality requirements	%	93.8	99.1
Energy Consumption	Million kilowatt-hour	64.4	46.6
Collection Efficiency	%	48	88
Installed Water Meters	% of customers	40	75.4
Unaccounted for Water	%	74	83.6
Staffing levels	Per 1,000 Connections	9.45	6.7

Performance Measure	Unit	2004 Base Year	2010
Personnel	number		1,700
Customers	(Total) Receiving Monthly Services		(264,000) 170,000

33 Current performance of other urban areas water supply systems for AWSC, operated by SAUR covering 37 urban areas and 268 villages, as shown by major performance indicators can be summarized as (first figures or base values refer to the situation in 2004):

- Water production and water consumption (as measured for metered connections) have in liter per capita and day (l/cd) changed from 668 to 810 l/cd and from 71 to 81 l/cd respectively. This implies that NRW has remained constant at about 89 %;
- The duration of water supply has, on average, increased from 6.0 to 13,0 hours;
- The ratio of water connections provided with water meters has increased from 40.2 to 75.4 %; and
- The compliance with water quality requirements has increased from 93.8 to 99.1%.

Table 2-3: Performance Measures – 3 Regional Utilities Management Contract

Indicators	Utility	Shirak		Lori		Nor Akunq	
	Unit	Before PSP 2005	2009	Before PSP 2005	2009	Before PSP 2003	2009
Water Supply Duration	Hours	4.7	10.2	4	9.5	4	22.3
Compliance with water quality requirements	%	98.1	99.6	88	92	100	100
Energy Consumption	Million kilowatt-hour	0.9	1.2	0.96	0.92	7.2	4.0
Collection Efficiency	%	49	78	58	80	47	97
Installed Water Meters	% of customers	12	50	67	85	20	93
Unaccounted for Water	%	85	77	77	71	87	70

34 Current performance by 3 Regional Utilities covering respectively Armavir and 9 villages, Gyumri and 36 villages, and Vanadzor and 16 villages, as shown by major performance indicators (average values), can be summarized as follows (with reference to 2005 base figures);

- NRW has decreased from 83 to 75%;
- Duration of water supply has increased from 4.2 to 14.0 hours;
- Ratio of water connections provided with water meters has increased from 32 to 86%; and
- Compliance with water quality requirements has increased from 95.4 to 97.2%.

Villages

35 For village water supplies specific data reflecting service standards and levels are divided between villages connected to an urban water supply system or managed by AWSC operator and those relying on their own independent systems. For those villages connected to an urban water supply system or operated by the AWSC operator it can, broadly, be assumed that the same conditions apply to both urban and rural population. For villages with independent water supply systems it could be concluded that:

- Sources for water supply vary but are mainly based on ground and spring waters and to a minor extent trucked in water;
- Water distribution systems would provide for a blend of service connections and stand/yard post water supplies and would, in general, be in sub-standard conditions;
- Operation and maintenance as well as revenue collections are handled by local village organizations with no outside support of significance being provided; and
- Uncertainty, whether the performance of village water supply systems is up to acceptable standard, particularly, since disinfection is mainly lacking. However, only rare incidences of bacteriological pollution have been reported.

36 Specific data for village water supplies are scarce, and this warrants further study before detailed conclusions on existing village supply situations can be reached

Levels of Service

37 The main measure of levels of service is taken as continuity of supply, expressed in average hours of service for the utility. For Yerevan this has almost reached the contractual target of 21hours per day, whilst AWSC is also, achieving improved results, currently at a weighted average of 13.2 hours per day, with a contract target of 16 hours. The 3 Regional Utilities (Nor Akunq, Lori, & Shirak) management contract has not been long established, but improvements are expected.

38 The PPP Operators also record various other performance indicators on a regular basis. In the case of AWSC there are 22 measured management indicators ranging from %age of individual subscribers billed on metered basis (improvements from 40% at base year to 75.4% in 2010), collection ratio (improvements from 47.09% to 88.0%), and electricity cost as a %age of revenue collected in appropriate systems (reduction from 72.6% down to 32.2%). Similar levels

of improvement are noted in all recorded indicators. The accurate breakdown of different elements of Non Revenue Water (NRW)are difficult to arrive at because of lack of accurate metering, but are assessed generally at over 70 to 80%, but in Yerevan the current estimates show commercial losses at about 17% and technical losses around 68%

Wastewater

39 Connections to wastewater collection systems are only available in the main urban centers, with only limited primary treatment and no secondary treatment. Characteristics of wastewater collection/disposal services and coverage for urban areas include:

- Only Yerevan has a well extended wastewater collection system with a connection rate of about 96%. The wastewater is discharged into the Hrazdan River at 8 outlet points after no or pre-treatment only. Previously constructed primary and secondary wastewater treatment works are dysfunctional/non-operational, but are now proposed to be rehabilitated to, in a first phase, the level of primary treatment;
- In other urban areas waste water collection systems have been extended for a total coverage of 70 - 80%. There are 12 old treatment plants concentrated in 4 urban areas but these can all be assessed as not functioning. Presently, 3 treatment plants for primary treatment only are planned for construction and collection systems will be rehabilitated or extended in another 2 urban areas (around lake Sevan);
- The wastewater is mainly discharged untreated into surface water courses with outlets into lakes; and
- Population in urban and rural areas not connected to a wastewater collection system typically relies on use of on-site facilities consisting of septic tanks and soak-aways or other arrangements such as latrines still prevalent in rural areas.

40 The sanitary and environmental conditions caused by on-site facilities and discharges of untreated wastewater into water streams cannot currently be assessed to any degree of accuracy because of lack of data.

Non Revenue Water (NRW)

41 The level of NRW, i.e. technical losses plus commercial losses, is at one of the highest global levels (up to 85%). A portion of this is due to the age and very poor state of the physical pipe-work and assets, and the balance is due to commercial losses that include nonpayment, underpayment or theft. The situation is exacerbated by the fact that although efforts have been made to develop more effective source measurement, accurate measurement of flows through the system and consumed by individual customers is not possible with the current set up and metering arrangements. As an example of the impact of the level of NRW, in 2009/2010, an estimated water balance indicates that Yerevan produced 355 M m^3 of raw water but could only collect revenue related to 55 M m^3 of this.

42 Generally, there is a lack of detailed analysis of the factors influencing levels of NRW. However, the PPP operators have built up their own assessments of possible causes of NRW for management purposes, but it is realized that these need to be corroborated by further detailed study. As an example, illustrating the order of magnitude of different areas of technical and

commercial losses, AWSC's estimates within its own service area are as shown in the following table[10]. Not only does this estimate attempt to divide NRW into Technical and Commercial losses, but it also considers the physical areas of losses i.e. Production & Transmission; Towns & Village networks; Multi Occupancy Buildings and Private Houses.

Table 2-4: **Estimates of Potential Areas of Losses**

AREAS OF LOSSES:	**TECHNICAL LOSSES**		**COMMERCIAL LOSSES**	
	Cause of Loss	***Loss %***	***Cause of Loss***	***Loss %***
PRODUCTION				
	Losses on main pipe	5%	Illegal on the main pipe	10%
	Overflow on the reservoir			
SETTLEMENT (Town or Village)				
	Losses on the network [11]	20%		
BUILDING				
	Permanent flow	10%	Bypass Magnet	10%
	Losses on equipment			
	Water meter reading		2nd, 3rd column (unmetered)	5%
	Accuracy of WM			
PRIVATE HOUSE				
	Permanent flow	10%	Bypass Magnet	10%
	Losses on equipment			
	Water meter reading		Illegal connection in gardens	20%
	Accuracy of WM			
	SUB – TOTAL	***45%***	***SUB-TOTAL***	***55%***

43 Of particular note in this analysis is the conclusion that nearly 65% of the NRW losses are related to buildings and private houses. The amount of loss by meter tampering (generally by use of magnets) is illustrated. Additionally there are cultural (a tendency to leave water running inside the dwelling) and structural (complex internal pipe-work, with often 2nd and 3rd unmetered inlet pipes within the building) issues involved. As a comparison, similar estimates by Veolia[12] put an approximate value of technical losses in buildings of the same order of magnitude, at around 15% of total losses.

[10] Note: These estimates were developed for internal management purposes, and are given here as possible examples of the order of magnitude of the main NRW issues.
[11] No differentiation is made here between technical losses and illegal connections.
[12] Veolia Semiannual report December 2009

44 The PPP managers have put in place areas of sectorization[13] on pipe networks, where measurement and necessary improvements are carried out in specific sectors of the service area. Experience has been gained under two World Bank funded programs, the Yerevan and the Municipal Water Supply and Wastewater projects (YWWP and MWWP2), which in turn have not only achieved the planned system improvements in specific areas, but also has increased understanding of the system condition and operation. This task requires considerable management and labor efforts, which in turn is limited by available revenue and capital investment. One issue is that emergency repair or limited maintenance on its own will not provide dramatic changes in NRW. Similarly, increasing flows (and pressures) in more parts of the system also increases the level of leakage, so positive improvements in service level are having a negative effect on system losses. In any case any effective program of NRW reduction requires not only adequate investment but also effective flow measurement in the system, which it currently lacks.

Metering

45 The current meter stock in Yerevan (apart from specific areas of rehabilitation) is already past its normal working life, although over 95% of connections are metered. The meters are inaccurate, and in any case cannot be relied on for rational results. The meter stock is often of low quality, and prone to tampering and theft. The meters are often of a kind that allows tampering through use of magnets.

46 The Operators have a variety of experiences of installation and potential effective use of meters through their own operational improvements, and through funding programs such as a World Bank program[14] for AWSC, where improvements using sectorization and meter installation showed significant improvement in operational and financial parameters. Various lessons learnt from this experience show that meters are heavily under-measuring, and on average the studied meters only recorded 20% of the actual test flows. Additionally, with further measures, such as transfer of ownership, and management, of domestic meters to the operator, bringing metering outside the dwellings, relocating and rationalizing individual meters for multiple dwelling, and putting meters in security boxes, the level of theft or commercial losses can be drastically reduced. For instance, putting meters in tamper-proof lock boxes has been shown to increase accuracy of flow measurement by 20%.

47 Whilst there are ongoing efforts to replace meter installations from the utilities' limited resources there is a definite need for additional funding for a program of improved flow and pressure measurement throughout the water systems. The benefits of accurate measurement are high, allowing a focus on operational improvements, making customer billing more meaningful and allowing for revenue planning to be made on a more rational basis.

[13] Experience has been gained under two World Bank funded programs, the Yerevan and the Municipal Water Supply and Wastewater projects (YWWP and MWWP 2)

[14] Charentsavan town, 2008 (discussed in more detail in Annex 4 of the Note)

Staffing Productivity

48 With rationalization of the workforce and effective utilization, staffing numbers have reduced in both Yerevan and AWSC under the PPP arrangement e.g. for AWSC from 9.45 personnel per 1,000 subscribers in 2004 to current levels of around 6.7 per 1,000 subscribers (similar reduced levels having been maintained over the last four years. Yerevan has lower staffing levels per 1,000 subscribers, but this is not unexpected due to the more concentrated nature of the service area.

49 Whilst staffing levels vary according to the individual geographical spread of a utility, the age of the infrastructure and level of automation, for instance, these levels of staffing productivity are not unexpected for utilities of this nature, and so overstaffing does not appear to be a major issue.

Financial Performance and Cost Recovery

50 Over the past few years all utility companies have been able to show an improvement in their financial performance. This can be seen by observing the changes in the working ratio, which in the case of AWSC has been reduced from 200% in 2004 to just over 100% in 2010. In case of the Yerevan, the working ratio has improved from 104% in 2004 to 96% in 2009. Commercially the companies are performing reasonably well – billing and collection ratios are at a satisfactory level, with levels in the region of 90%.

51 The performance improvements have been supported by a program of investment in capital works, generally aimed at rehabilitation and renewal of existing infrastructure elements. This has been implemented with the support of a number of IFI's (e.g. ADB, KfW and EBRD) including three World Bank programs. The table 2-5 provides an overview of this assistance.

Table 2-5: Current Committed Capital Investment Program for the Sector

	WB	WB	WB	ADB	KfW	KfW	EBRD
Starting year	2004	1998	2005	2008	2001	2005	2008
Amount (M)	23 + 20 USD	30 USD	20 USD	36 USD	12.8 euro	15.6 euro 7.8euro	7 euro 7 euro
Principal repayment due	2015-2044	2008-2032	2015-2044	2016-2039	2010-2041	2015-2044	2010-2022
Project	Municipal water and wastewater project - MWWP	Municipal Development Project – MDP	Yerevan Water and Wastewater Project - YWWP	Water supply and sanitation sector project	Communal Infrastructure Project 1 – WSS in Armavir	Communal Infrastructure Project 1 – WSS in Shirak and Lori	Lake Sevan Environmental Project
	AWSC	**Yerevan**	**Yerevan**	**AWSC**	**3 Towns**	**3 Towns**	**AWSC**

52 However, in order to improve the financial performance, the companies have had to reduce the regular maintenance expenditures by some 50%, since the existing tariff levels didn't allow for full cost recovery. For example, each year around 200 water meters for the control of production, need to be replaced, but due to shortage in revenue, the utilities were not able to replace any of them in 2010. Same happened with chlorine equipment and reservoir buildings for which no maintenance was done. The companies were forced to reduce the expenditures for electrical systems and pumps from a required AMD 120 million to AMD 95 million, and replacement and maintenance of pipes and fittings was reduced from required AMD 120 million to AMD 70 million. Notably, the debt service for the above mentioned programs has not been part of the operating expenditures.

53 The Yerevan lease operates within current tariff revenues i.e. without direct subsidy, whilst the AWSC Management Contract has a subsidy of 811 million AMD per year, and the management fees are paid separately.

Institutional Structure/Framework

54 The assets and overall authority relating to use of resources and provision of water and waste water services is held by the GOA, with the State Committee for Water and Sewerage (SCWS) having general oversight for sector management and operation. The SCWS has responsibility for establishing the various PPP arrangements and maintains a function of continuing project management for all of them, and for development of new long term arrangements.

55 While other state entities have responsibility for ensuring compliance with environmental and other regulatory issues, the National Public Regulatory Commission (NPRC) has responsibility for economic regulation and ensuring compliance with tariff setting in the water sector.

56 All three of the main water utilities are managed under PPP arrangements. All of these have common institutional elements. Asset ownership is with the state, and SCWS is involved in managing them all in varying extents. In addition to the economic regulation by the NPRC, the day to day contract compliance of each arrangement is monitored by Project Management Units established by SCWS, with regular audits by independent technical and financial auditors.

57 The two PPP models used are:

- Lease: Yerevan Djur; and
- Management Contracts: AWSC and the Three Regional Utilities (Nor Akunq, Lori, and Shirak).

58 While discussion of main PPP issues is covered in later sections, an outline of the key institutional characteristics of these arrangements is presented here.

Yerevan Djur

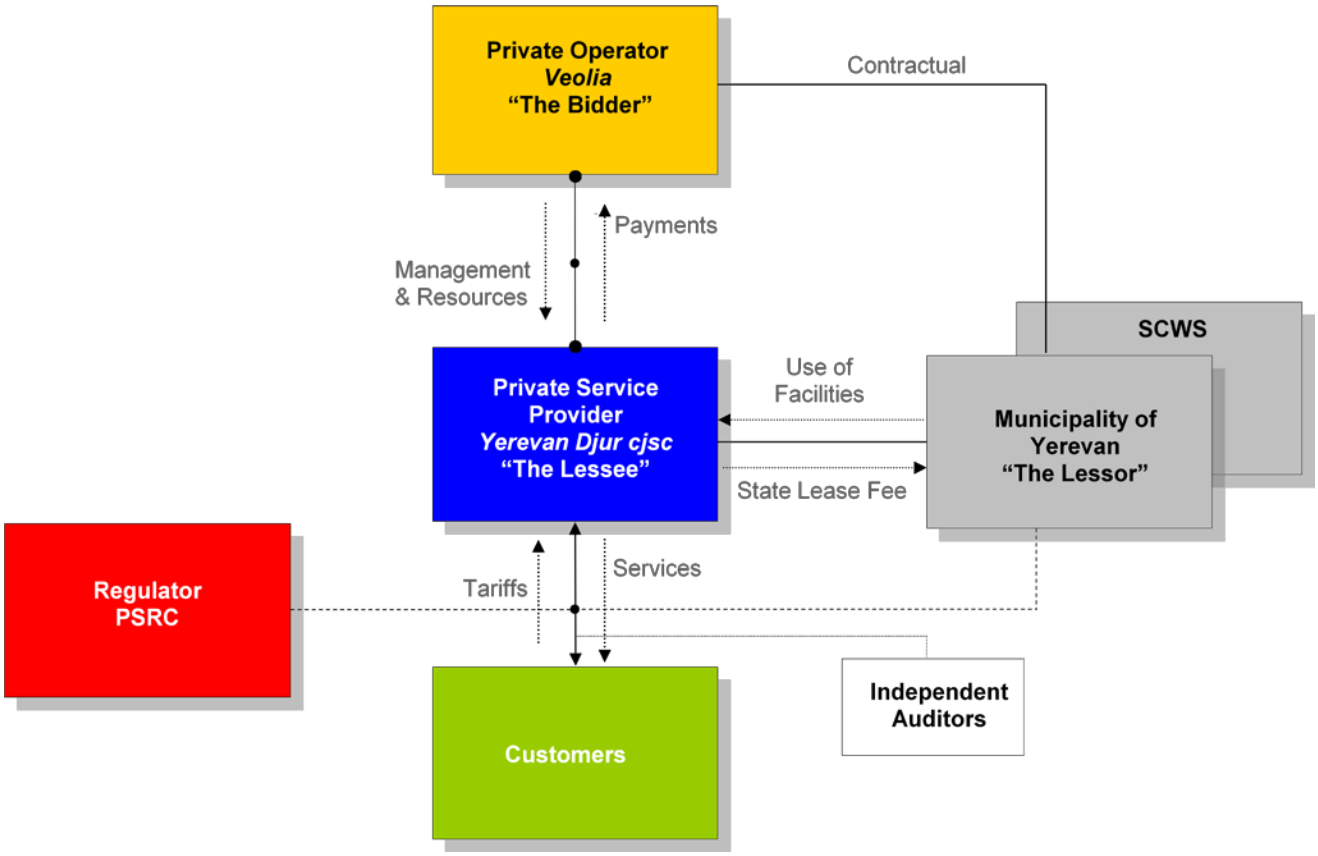
59 This is established as a 10 year Lease contract, with the contractor Veolia.

60 This arrangement was initially set up with the GOA / SCWS as the lessor. Now the day to day management oversight has been transferred to the Municipality of Yerevan, with the contract

amended to show the Municipality as the Lessor. The overall responsibility for assets and sector development remains with the SCWS, and project monitoring is carried out by the Municipal Project Monitoring Unit.

61 The PPP Contractor, Veolia, has established a local company, Yerevan Djur, which manages and operates the assets under the Lease agreement; including responsibility for collection risk. It also manages the construction of the investment program, as part of its duties under the Lease:

Figure 2-4: Contractual Framework for Yerevan Djur



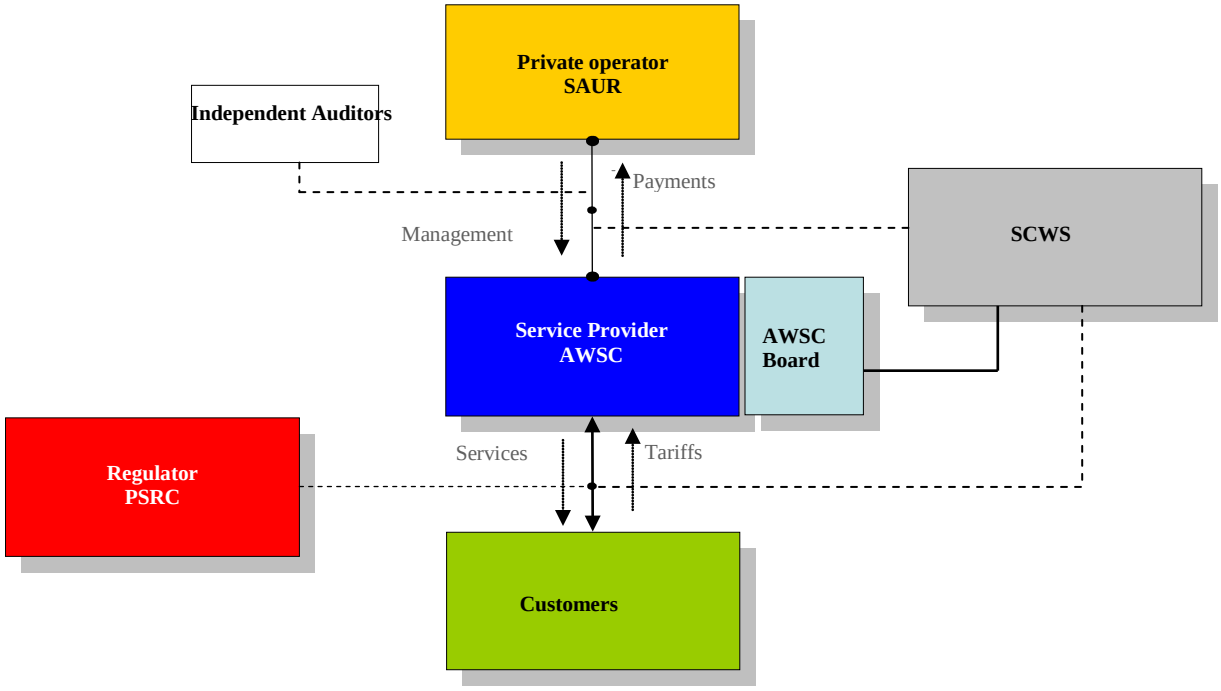
62 Responsibility for developing and funding the necessary capital investment program remains with the GOA.

AWSC

63 AWSC is a state water company, with established operating board, employees and facilities. These are managed by a private PPP operator, SAUR, under a Management Contract arrangement, on a fee basis. The PPP operator also manages the construction of the investment program, as part of its duties under the Management Contract.

64 The overall responsibility for assets and sector development remains with the SCWS, and project monitoring is carried out by the Project Monitoring Unit.

Figure 2-5: Contractual Framework for AWSC



65 Responsibility for developing and funding the necessary capital investment program remains with the GOA.

66 This was originally a 5 year contract, that will be extended further until development of a long term arrangement (e.g. a Lease) can be agreed. It is proposed that the current arrangement be extended until December 2011, with current consideration being given to the possibility of further extension to 2014.

The Three Regional Utilities

67 The Three Regional Utilities (Nor Akunq, Lori, and Shirak) water and waste water services, previously operated as three municipal entities, have been re-established and operated under single Management Contract, by the PPP operator, MVV.

68 The institutional arrangements are in many ways similar to that for the AWSC, but with the involvement of the Municipalities at Board and overall management level together with SCWS. The overall responsibility for assets and sector development remains with the SCWS, and project monitoring is carried out by the Project Monitoring Unit.

69 Responsibility for developing and funding the necessary capital investment program remains with the GOA. Current capital works funding is with support of KfW, the German bi-lateral development agency.

70 This is a 5 year contract that is currently planned to end, unless extended, in 2012.

3 KEY CHALLENGES AFFECTING DEVELOPMENT OF THE SECTOR

There are several issues presenting in the sector. These can be divided into four main areas: i) Technical, ii) Commercial & Financial, iii) Regulatory & Institutional and iv) PPP related Issues

3.1 Technical issues

Water Resources

71 The amount of available water resources is not a limiting factor in the short to medium term. Currently steps are taken by the water operators to improve efficiency of water systems, and this in turn results in potential reduction in abstraction from water sources. As an example Yerevan Djur has a progressive program to optimize abstraction, and to use the most energy efficient resources. It is clear that this trend should continue, through the performance improvement measures planned for the sector, as discussed below, and this will have a positive effect on available water resources, thus water scarcity or non-availability overall will generally not be an issue in the foreseeable future.

72 In the search for operational efficiency and reduction of energy costs, the operators generally maximize use of the most economic sources first; e.g. gravity fed supplies or sources that require little or minimal pumping.

Expansion of Services

73 Coverage for domestic potable water is already high, with the main measure of expansion of services being improvement of continuity of supply to existing customers. There is a continuing dialogue by the main utilities with villages currently not served in or near the utility area, and a variety of services (from technical assistance, provision of bulk water supply or full distribution services) are offered as appropriate.

74 As an example of the potential of one area of expansion being followed by AWSC, the Management Contractor, SAUR determined that during summer months many small plot farmers were obtaining water from the system though illegal connections. AWSC met this need by sale of large containers of water to these small plot farmers.

Levels of Service

75 Under the current management and lease contracts the main measure of level of service used as a Key Performance Indicator is the ‘Continuity of Supply’. This is measured as the average daily hours of full supply (as compared to the full 24 hour supply). The initial long term goal was to have each area eventually reach 24 hours supply, in the long term, but with lower intermediate goals during the life of the individual PSP contracts.

For example:

- Yerevan Djur target is 95% continuity by year 10 of the current contract with current levels reached of 83% (i.e. 19 hours in Year 4 of the contract);
- AWSC target is 16 hrs by 2011; current level 13.2 hours.

76 However, the improvement of continuity of supply can only come together with increased investment in rehabilitation of the existing infrastructure. As discussed later, it is now it is not wise for the investment to be driven solely by this single measure, as other demands on limited funds need to be taken into account to ensure long term system effectiveness and infrastructure sustainability.

77 So in this regard, there is a need to consider a reduced medium target for increase of continuity of supply, since a 24 hour supply across the whole region may not be affordable.

78 Additionally although the 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 or community types. A company such as AWSC has a large spread of urban and village supplies, where infrastructure condition varies from rehabilitated to very poor. The level of existing continuity of supply also varies accordingly. There is a strong case for having different targets for continuity of supply according to individual towns or regions, allowing investment to be focused accordingly.

79 Service targets for water quality are established and being met. As rehabilitation of the network proceeds, and the amount of time that pipes are left at lower pressure reduces (i.e. reducing the effects of potential infiltration), the management of quality targets will improve.

Wastewater

80 Current schemes have limited programs for expansion of sewer systems. The high investment costs for wastewater treatment and disposal mean that this is a part of the development that will only be addressed once the major investments on the water systems have been established. This is not explicitly dealt as a major issue in the current or proposed contracts.

81 Village wastewater collection and disposal can be considered as communities that have either house connection to some form of wastewater collection system and those that rely on on-site wastewater disposal (e.g. through latrines and septic tanks). For more effective service provision, there may be scope for connection of existing or embryo village disposals system to existing utility systems, where practical. Additionally, the effectiveness of on-site systems would be improved through provision of an adequate service for regular emptying of septic tanks, as part of their satisfactory operation

Non Revenue Water (NRW)

82 The reduction of levels of NRW has not been taken as a main performance measure under the PPP contracts, possibly given the general ready availability of water resource. However, as described previously, the exceptionally high levels of estimated NRW are some of the highest encountered internationally.

83 Whilst it may be possible to operate currently with such high levels of what is also called revealingly 'Non Revenue Water', this is not considered acceptable for long term utility effectiveness and sustainability. Issues to be considered include:

- Lack of accurate measurement means that in any case the actual level of NRW is only an order of magnitude.
- Approximately 50% is estimated[15] to be through the 'commercial losses', including theft , illegal connections or inaccurate billing, yet without adequate measurement it is not possible to effectively manage this.
- Approximately 50% is estimated to be through 'technical losses' such as leakage or ineffective measurement, primarily due to the poor condition of the existing infrastructure.

84 The NRW can further include unmetered water used at stand posts, fountains and hydrants, which in turn may not be paid for either by consumers or the communities.

85 An added complication to the planned management of NRW, is that level of NRW often appears to be affected or increased through improved metering, since actual consumption levels often prove to be less than what is assumed (through normative use of water) for non-metered consumption. This has in turn a potential impact on future demand estimates and revenue levels.

86 From the preliminary assessments (e.g. World Bank programs YWWP and MWWP2, as well as PPP operators' own estimates[16]) whilst the poor condition of the infrastructure is a major contributing factor to NRW levels, the losses related to the arrangements within buildings and private houses may contribute to as much as 50 to 65% of the overall losses. Much of this is difficult for the utility to control, given the existing structural arrangements for metering and supply within the property boundaries. Effective management of these massive losses within the property boundaries could be carried out by transfer of responsibility for operation and maintenance of the systems within the property boundary to the PPP operators. However this in turn would require an increased level of funding and capital investment, together with appropriate changes in legal authority, in order for the operators to be able to carry out these duties.

87 For the main water systems, reduction of NRW through the use of rehabilitation and sectorization has high priority, but to be fully effective it has been shown that it should be carried out in conjunction with the moving of water meters and provision of meter chambers at property border lines. Additionally, a systematic approach (and associated investment) needs to be developed for regulating water pressure within the pipe systems to support the objective to reduce losses and increase hours of water supply. Presently, under ongoing programs on sectorization, the available funds can only cover urgent requirements, and continuing investment will be needed to reap the full benefits of distribution system rehabilitation and replacement.

88 It is seen that an increase in level of services can in fact have a negative effect on water losses, with NRW being shown to increase with extended duration of service delivery and higher pressure in the existing distribution systems that have yet to be rehabilitated. As an example of

[15] Both Yerevan Djur and AWSC are attempting to make such estimates, but lack of comprehensive measurement has hindered a fully detailed assessment.
[16] As AWSC estimates of losses in Part I

this, in Armavir, for instance, about 70% of the distribution system has been replaced, and water supply duration has increased to 22.3 hours and yet NRW has only decreased from 87 to 70%. This is in part due to the effects of increased duration of water supply and lack of pressure regulation, but is also an indication of the remaining high levels of commercial losses.

89 Overall, this 'Non Revenue Water' is a cost to the utility, both in production and operating costs as well as being an indication of the difficulty of managing the system in the most effective manner, or of being able to ensure that customers receive the services that they pay for. Anecdotal evidence shows some customers have paid for levels of service that they do not receive in order to stay connected, whilst others clearly do not pay through illegal connection or other under-billing, adding a cost to those that do pay.

Metering

90 The current meter stock in Yerevan (apart from specific areas of rehabilitation) is already past its normal working life. The meters are inaccurate, and in any case cannot be relied on for rational results. The meter stock is often of low quality, and prone to tampering and theft. The meters are often of a kind that allows tampering through use of magnets.

91 The Operators have a variety of experiences of installation and potential effective use of meters through their own operational improvements, and through funding programs such as a World Bank program[17] for AWSC, where improvements using sectorization and meter installation showed significant improvement in operational and financial parameters. Various lessons learnt from this experience show that meters are heavily under-measuring, and on average the studied meters only recorded 20% of the actual test flows. Additionally, with further measures, such as transfer of ownership, and management, of domestic meters to the operator, bringing metering outside the dwellings, relocating and rationalizing individual meters for multiple dwelling, and putting meters in security boxes, the level of theft or commercial losses can be drastically reduced. For instance, putting meters in tamper-proof lock boxes has been shown to increase accuracy of flow measurement by 20%.

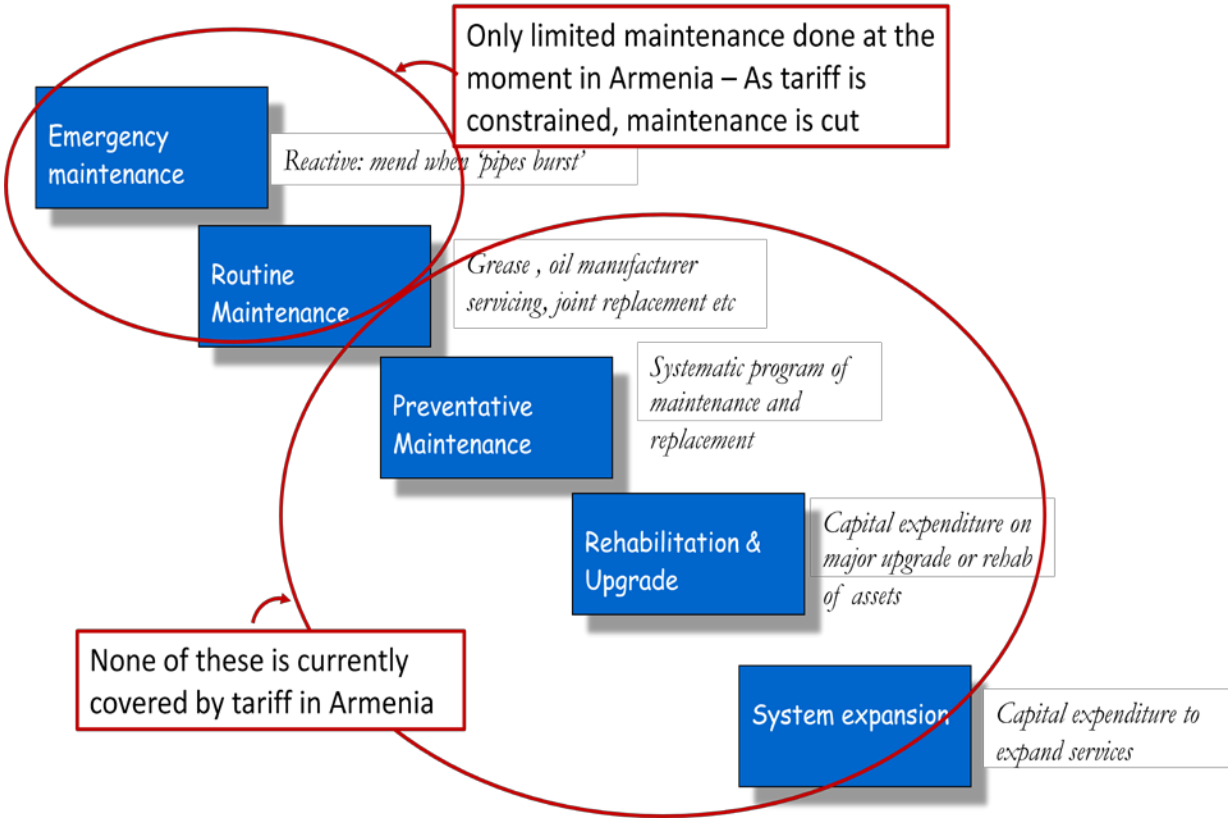
92 Whilst there are ongoing efforts to replace meter installations from the utilities' limited resources there is a definite need for additional funding for a program of improved flow and pressure measurement throughout the water systems. The benefits of accurate measurement are high, allowing a focus on operational improvements, making customer billing more meaningful and allowing for revenue planning to be made on a more rational basis.

Asset Management

93 The current contracts are supported by investment programs linked to achievement of main scheme objectives, of which the major service level is increased continuity of supply. However, the original asset condition is poor, as evidenced, for example by the high levels of leakage and heavy levels of bursts, and much management time and operational resources are taken up with dealing with emergency issues, and keeping the aged system working.

[17] Charentsavan town, 2008

Figure 3-1: Asset Management

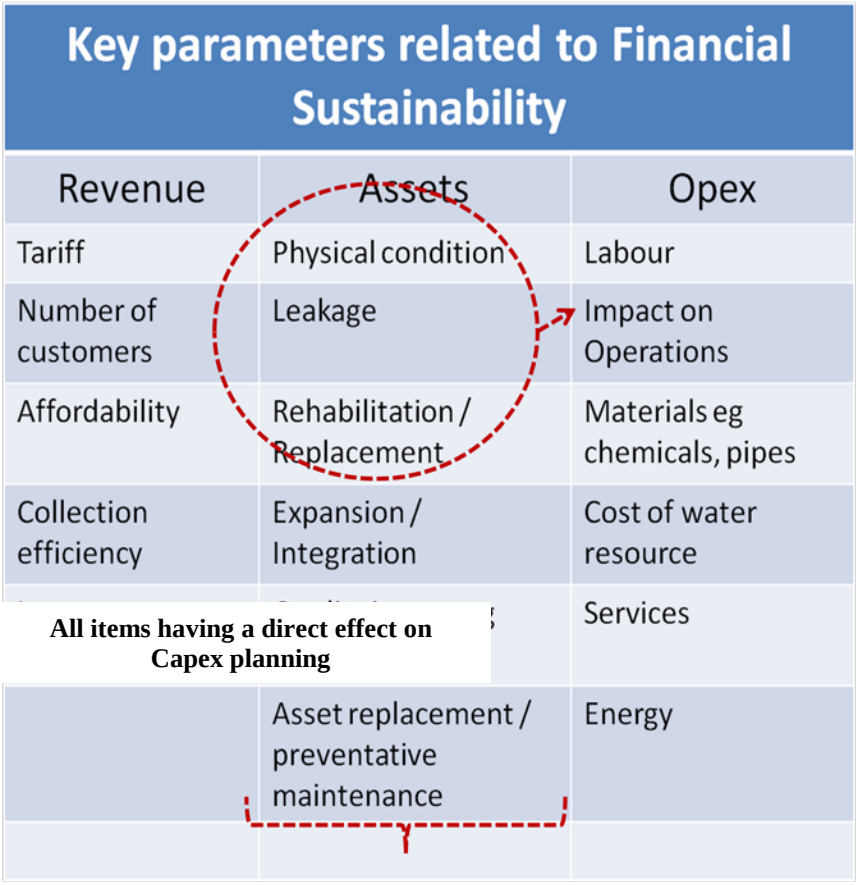


94 The development of a full asset management approach is constrained by low tariff revenues. As a result, as shown in above Figure, currently only the first two asset management steps, emergency maintenance and 50% of routine maintenance, can be carried out with the existing levels of tariff revenue. There are no funds for true preventative maintenance, while rehabilitation and replacement works are only carried out as part of the established capital program.

95 Service levels (e.g. continuity of supply) can be maintained with current efforts, but only as long as asset state doesn't deteriorate further. However, given tariff constraints even less money each year is being put into maintenance and the asset performance will further deteriorate, with leakage, road bursts, possible pollution and more need for emergency work. Much of the equipment and particularly metering has exceeded its viable life.

3.2 Commercial Issues and Financial Sustainability

Figure 3-2: Some Key Issues Related to Financial Sustainability

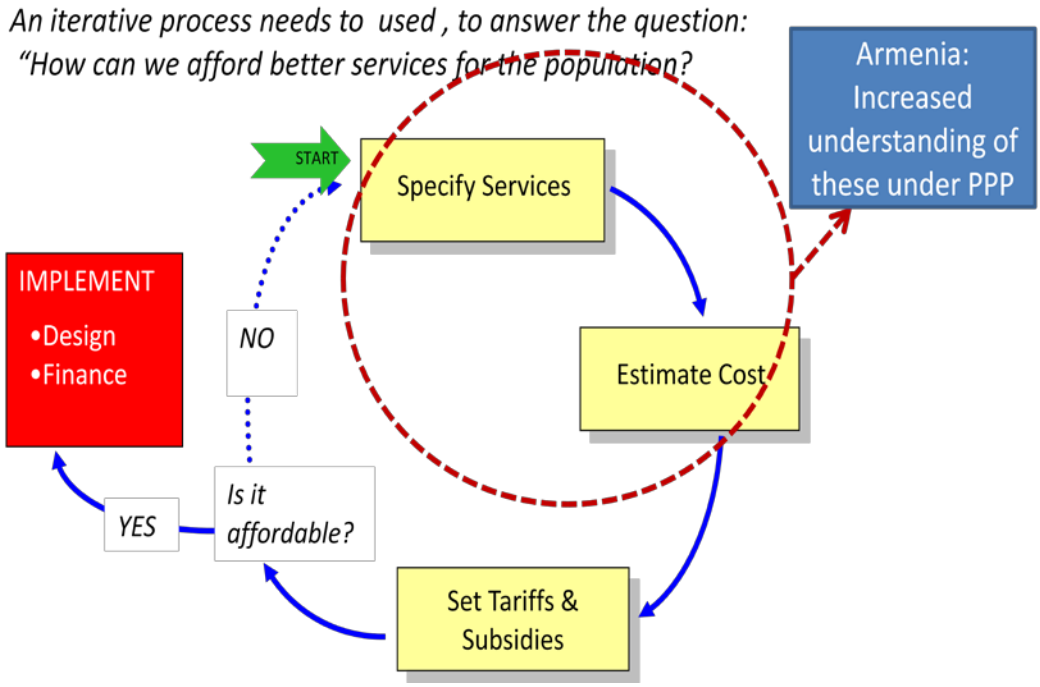


All items having a direct effect on Capex planning

96 Figure 3-2 illustrates some of the key parameters affecting financial sustainability of the water and waste water sector. The three main sector components, Revenue, Assets and Operating Costs are interlinked, and in turn have influence on the needs for Capital Investment. This relationship is developed in more detail in the following section but, as illustration of this interlinked nature, the figure shows two examples:

- Physical condition and the program of maintenance have a direct influence on the operating costs, as does the required level of service.
- State of assets, as well as other issues such as affordability and the proposed service levels, have a direct influence on the Capital Investment planning.

Figure 3-3: Financial Sustainability- Assessing Affordability of Service Standards, Tariffs & Subsidies

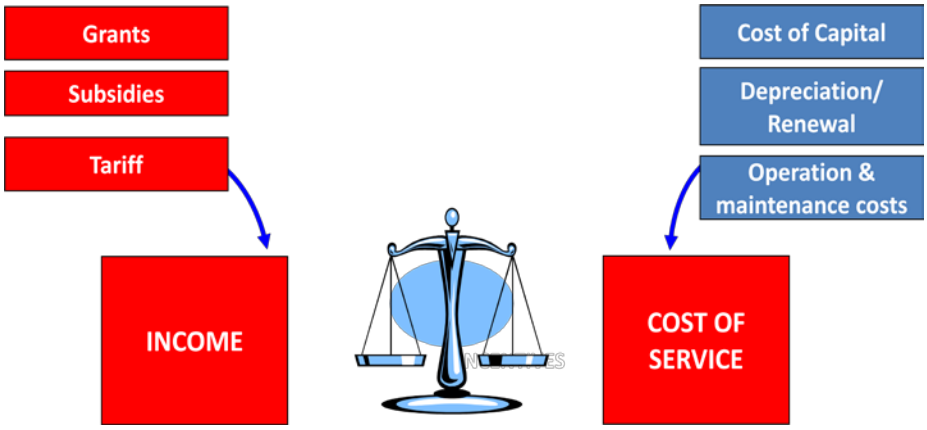


97 Notionally tariffs are aimed at O&M cost recovery, with mechanisms for adjustment for varying economic conditions. Each utility has a different tariff structure based on utility cost, and within the 3 Regional Utilities each one has its own tariff level. Yerevan, for example, with a concentrated urban distribution, can be expected to have lower unit operating costs than AWSC with its more varied and wider service area. It is also related to type of source, and Nor Akunq, with gravity supply, has a tariff level less than for the other two towns, which have pumped supplies.

98 Under the PPP development, increased understanding has been obtained of implications of different levels of service provision on associated costs, and now the utilities are increasingly better able to predict effects on costs and levels of service of proposed investments.

Figure 3-4: Financial Sustainability - Balancing Tariffs, Subsidies and Costs

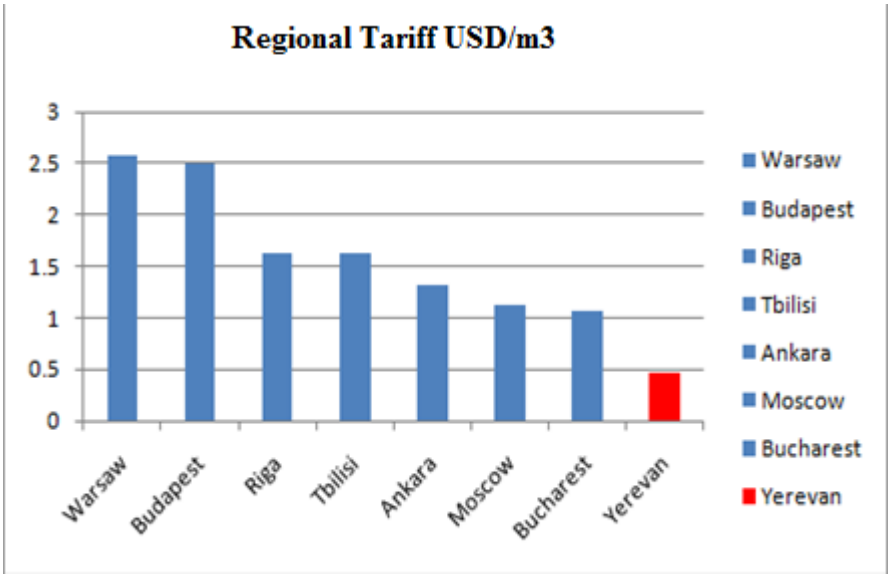
"To be sustainable: Tariffs+ Subsidies = Total Cost of Service"



99 In addition to service, coverage and quality costs, the tariff needs to cover annual cash needs of the utility, costs of capital and financial ratios required by lenders (e.g. debt repayment rates), and costs of provision for depreciation and future renewal, as well as environmental or social costs that the government decides should be borne by the utility. If revenues do not balance the full costs, then subsidies have to be applied and managed, or a different, more affordable level of service provided instead.

100 In the MC's, the management costs are not included in current tariffs. When the MC terms finish this will need to be recovered by a tariff increases under the new lease contracts.

Figure 3-5: Armenia Tariffs Currently Lower than Others in the Region



101 Tariff levels, at around AMD 200/m^3, appear low in relation to regional or international norms (where typical examples are around AMD 400/m^3), although current median monthly household expenditure is below typical affordability threshold norms (e.g. the 4% GPOBA affordability measure). Furthermore, although some tariff cost 'pass throughs' have been allowed by the Regulator, these are often delayed and their approval acrimonious. Accordingly, current restrictions on tariff are beginning to impact the maintenance levels and 'economic equilibrium' of operating entities. However, there is reluctance to increase cost recovery through further increases to tariff levels.

"The typical cost of water for one month for a family in the AWSC area can be seen as equivalent to 3 packs of cigarettes"

102 Finally, the grace period for some of the existing water sector loans will be over in 2014, and arrangements will have to be made for repayment. This will have heavy tariff implications and no current provision has been made for a stepped increase to avoid a tariff shock. Moreover, political interference has meant that although a tariff increase has been allowed for Yerevan Water, a portion of this is being paid directly by the Municipality, further adding to the problems of the sector and customer awareness and responsibility for consumption.

Revenue Collection

103 Revenue collections are extremely high when compared against international and regional experience, demonstrating good utility efficiency. However, generally billing is based on flow volumes, and as noted earlier, currently it is almost impossible to obtain accurate measures of consumption because of the poor state of the metering. As a result there is no clear indication of whether customers are paying for actual water volumes received. With this constraint there is a major difficulty in establishing rational measurement linking potential revenue collection to actual consumption, which will remain until effective measurement systems are in place.

Fiscal Constraint

104 The current economic conditions, IMF requirements and the increasing fiscal constraints on the GOA have placed considerable restrictions on Government borrowing. The water sector relies heavily on public sector funding and borrowing from the international community and IFIs for its heavy capital investment program. This could result in a virtual hold on the possibility of new loans, which will impact heavily on investment proposed for the sector, particularly the new improvement programs proposed for AWSC and the three Regional Utilities over the next few years. Notably, next year's national budget does not envisage any separate budget line item for the sector. Planned service improvements and expansion would have to be delayed.

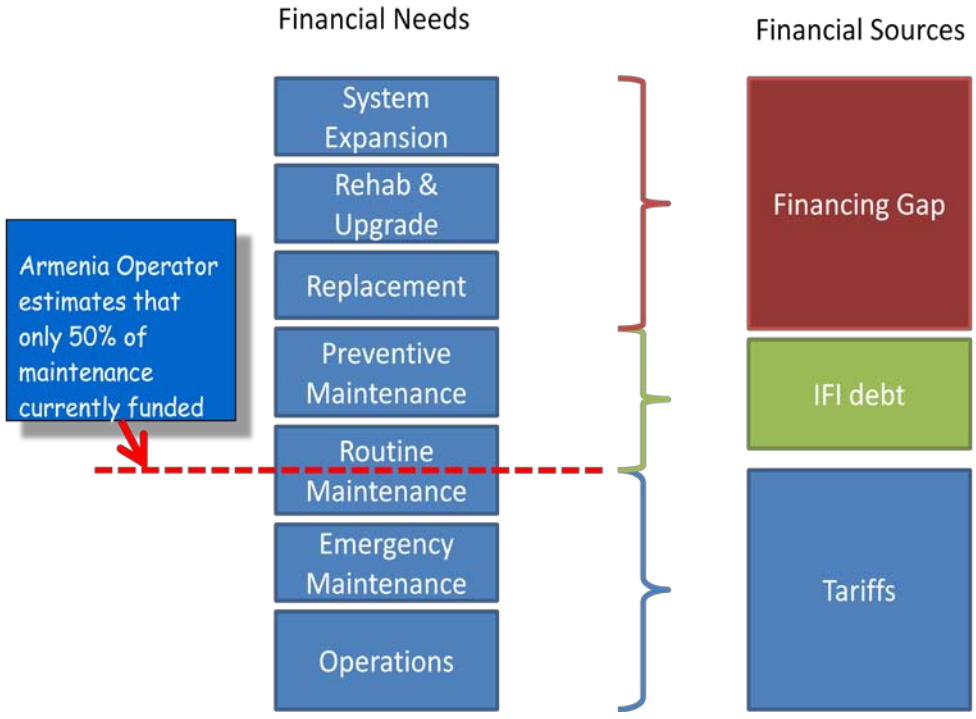
Sector Investment Needs

105 The proposed investment programs are linked particularly to improving sector efficiency. To be able to operate and guarantee service targets included in the performance plan of the lease, the lessee needs to know the resources that will be available for investments and the estimated scope of such investments. Initial estimates indicate that short to medium term investment

requirements could account for about US$ 179 million, equivalent, in the coming 5 years (with investment needs in Yerevan being around US$ 79 million, and for AWSC US$ 100 million). Of all the current investments planned, only Lori and Shirak (of the 3 Regional Utilities), through the proposed KfW loan, envisage full asset replacement.

Figure 3-6: Financial Needs & Maintenance Categories

Preventive maintenance and necessary investment are currently not funded



106 This is a key issue. The skills brought by an experienced operator will ensure that the existing system is brought to the maximum operating efficiency possible, but this cannot increase above current system constraints without an adequate investment program. No PPP scheme can achieve performance improvements without adequate funding for materials, equipment and management and labor to carry out activities to ensure improvements to existing infrastructure and operations and maintenance. This is additional to investments need for rehabilitation, upgrade and expansion. There is a need for a well defined investment program to support the activities of the PPP operator, if he is to achieve the proposed performance improvement.

Figure 3-7: Potential Future Investment Needs

The table below shows estimates by for future long term investment needs for improvements to the water systems. These are long term investments to bring the system to the proposed service standards, and improvements in infrastructure condition accordingly. These investment needs are based on detailed review of current and future requirements. An example of the long term investment elements assessed for the Yerevan Djur Lease arrangement is given in the following table:

Table 3-1: Yerevan Djur – Estimates of Long Term Investment Needs

TOTAL Investment needs (2011-2020): USD 600 million
(Note: includes USD 74-79 million 'Emergency' investment, detailed separately)

- Water meters: 20 mln USD
- Rehabilitation of feeders: (Arzakhan, Arzni 2ph, Aparan): 60 mln USD
- Rehabilitation and protection of sanitary zones: 20 mln USD
- Rehabilitation of potable water distribution networks: 105 mln USD
- Rehabilitation of internal networks: 20 mln USD
- Rehabilitation of sewage networks: 80 mln USD
- Extension of distribution networks: 20 mln USD
- Extension of sewage and raining networks: 30 mln USD
- Aeratsia treatment plant 2 phase: 55 mln USD
- Rehabilitation of reservoirs: 35 mln USD
- Reservoirs, new construction: 20 mln USD
- Villages sewage system: 40 mln USD
- Water system general control center: 7 mln USD
- Water meter laboratory: 3 mln USD
- Modernization of chlorination system: 11 mln USD

107 The practical investment needs for the next 5 years are limited by:

- Funding constraints (e.g. availability of funds from IFI's)
- Capacity of the sector and the
- Affordability

108 Of these the limiting constraint appears to be the capacity of the sector to implement the investment. For example for the proposed AWSC contract it is considered that the capacity of the sector to implement works limits the planned improvements to US$15 to US$20 million per year. An example of the requirements for such an 'Emergency' short term investment program for Yerevan Djur, together with their planned performance improvements are given in the following tables:

Table 3-2: Yerevan Djur - Short Term 'Emergency' Investment Needs

'Emergency' Investment Needs: USD 74-79 million

- Water supply distribution networks: 7 mln
- Sewage networks inside village (environment pollution): 6,5 mln
- Sewage networks Yerevan (environment pollution): 4 mln
- Arzni feeder rehabilitation :12 mln
- Internal networks buildings: 5 mln
- Nork networks: 6 mln
- Hydrants system installation: 2 mln
- Connection rehabilitation and replacement in individual houses: 6 mln
- Chlorination system update: 1 mln
- Potable networks in village: 0,5 mln
- Replacement of 200 boosters: 1,5 mln
- Replacement pump at Araratian: 1,5 mln
- Sanitary zone in sources: 6 mln
- Reservoir rehabilitation: 10 mln
- Charentzavan- Yerevan collector rehabilitation: 5mln

Table 3-3: Yerevan Djur - Planned Performance Improvements from US$ 74-79 million 'Emergency' Investment

Performance Targets in relation with 'Emergency' Investment

(US$ 74-79 mln)

- Constancy of supply: 97%
- Losses: 70%
- Energy saving: annual rate 45 millions of KWH (50% of economy)
- Reliability of the networks
- Improvement of environmental protection (sewage collection)
- Water quality insurance
- Customer services improvement (quality of service)

3.3 Legal, Institutional and Regulatory Issues

Legal Issues

109 The existing Water Code provides a supporting framework for PPP arrangements in the water and wastewater sector by allowing for:

- PPP options and sets out basic principles for water management;
- Subsidy of tariff and fading out of subsidies;
- Customer contracts; and
- Permitting for discharge of wastewater.

110 However, from the experience with PPP arrangements there are areas where sector could benefit from strengthening of the code or for other legal arrangements, such as:

- Provision to be included to specifically ensure the principle of "cost recovery" i.e. it is insufficient to have provisions that only allow the gap to be covered through subsidies;
- Use of subsidies needs to be made explicit in the context of a PPP arrangements;
- To specifically allow for amortization (depreciation); and
- Ownership, responsibility or control of in-boundary meters and pipe-work (including provisions for equipment standards or supply): provision to allow transfer to operator.

111 Additionally, there should be an investigation of the potential use of abstraction charges for water utility development e.g. linkage to the Law on Fundamental Principles of National Water Policy (2005).

Institutional Issues

112 The approach to use PPP has been successful, with a progressive development from Management Contract to Lease, and with continuing sector improvement. The State Water Committee has been effective in fulfilling its role of developing sector policy and its implementation as manager of the sector. Recently the role of Lessor of the Yerevan lease has been transferred to the City of Yerevan, with some added complication since the current contract still remains with the State Water Committee. The overlap of responsibilities of national and municipality levels needs better definition, including some mechanism for ensuring that national policy objectives are being met. For the 560 villages there are management and regulatory difficulties because of limited available information, and lack of clarity on institutional relationships.

Regulatory Issues

113 The national regulator, PSRC, has a national remit for water and wastewater services (both towns and villages), with the main role being to administer implementation of tariffs. There

are two areas of potential regulatory weakness: this arrangement is only achieving a limited outcome, since PSRC is currently only regulating cost (monitoring and applying formulae set out in the contract) and not applying full 'economic' regulation, nor undertaking a customer advocacy role. Additionally, PSRC is not fully independent, with tariff levels, although established by PSRC, being subject to political intervention. The role of the regulator in the application of external subsidies is not clearly defined (for example in relation to municipal subsides such as those proposed by the City of Yerevan).

3.4 PPP in the Sector and Future Development

114 The use of PPP in the water and wastewater sector in Armenia has been an example of good progressive sector development. The development of Yerevan city water utility was first established as a Management Contract. That was used to do some initial investment and to develop enough detailed information on the existing utility parameters and performance to allow development of a major investment program and sufficient definition to allow for successful bidding for a Lease contract. In the lease contract the Operator (Veolia) took on increased collection risk as well as providing management expertise and carrying out operation and maintenance, as well as management of the capital works program. The contract is proceeding well, meeting program and targets.

115 Following the success of the Yerevan PPP program, and applying lessons learnt, Management Contracts were let for AWSC (SAUR) and most recently for the 3 Regional Utilities (Nor Akunq, Lori, and Shirak) (MVV). AWSC is performing well, and through management under the MC arrangement an increased understanding of Service and Cost Issues has been obtained, and it is now coming to the end of its contract period, with possible extension, as previously noted. Based on current experience and improvements in utility performance, the PPP operator has developed suggestions for future development, levels of service and capital works and investment program, with suggestions for development of an appropriate tariff structure to achieve financial viability. All of which it is believed can be successfully applied under the next stage of PPP development (either MC or Lease).

Key Elements of PPP Contract Types

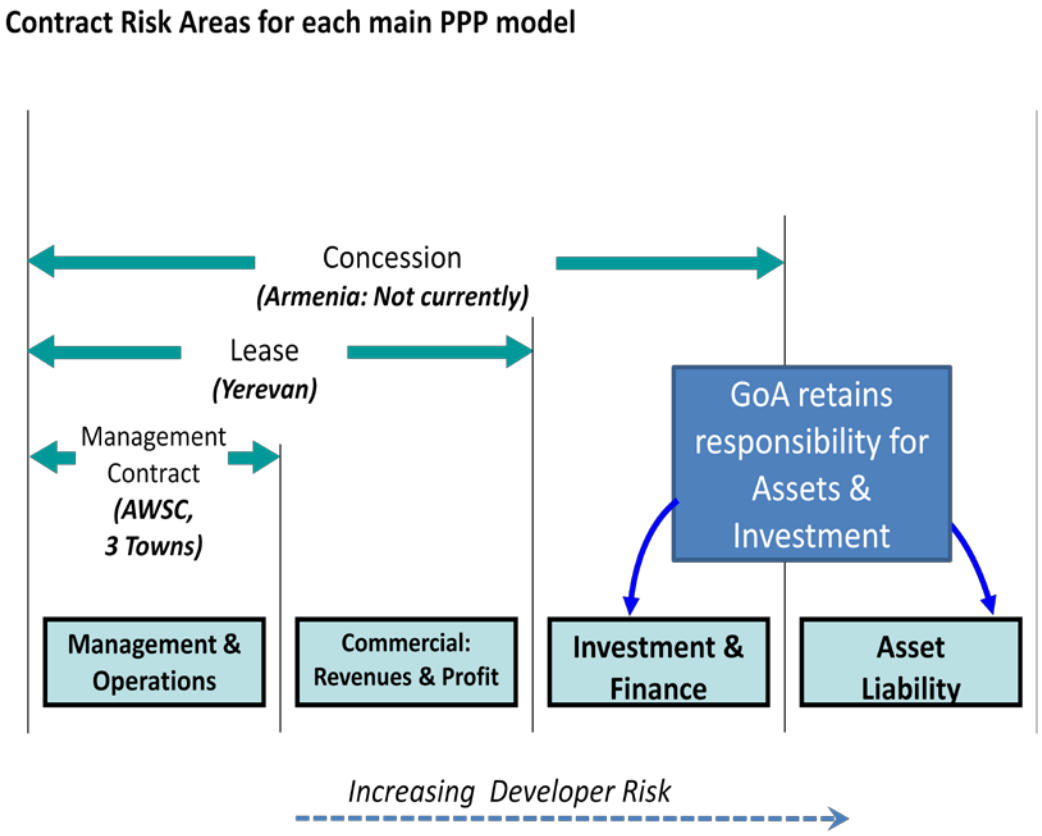
Box 3-1: The difference between a lease and an affermage contract: not just semantics

Under an affermage-lease, responsibility for operating and maintaining existing assets, plus commercial and management responsibilities, pass to the operator. The contracting authority retains responsibility for new investment. The risk transferred from the contracting authority to the operator is usually significant, but depends on the details of the contract and, in particular, the way the operator's remuneration is determined. Under an affermage, the tariff-adjustment rules that matter most are those applying to the operator's tariff (or affermage fee). Under a lease, the operator gets the customer tariff minus a lease payment, so the tariff adjustment rules that matter most are those that apply to the customer tariff.

In a ***lease contract***, the private operator collects the tariff from customers, pays the public leasing authority a fixed lease fee, to contribute to the CAPEX and service the debt, and retains the difference to cover its own costs. In an ***affermage contract***, the private operator usually retains an agreed %age of the collections and pays the difference to the public owner of the contract. In both cases, the private operator assumes the considerable risks of providing water to meet demand, of billing and collecting water sold, and of controlling the level of operation and maintenance costs at a level sufficient to maintain the infrastructure in good operating order. In both cases the private operator is paid out of collection of user charges; this puts considerably more pressure on him to perform.

116 Here, the basic differences between the Management Contract and Lease PPP forms are reviewed briefly in order to consider the main issues in development for Management Contract to Lease.

Figure 3-8: Key Elements of PPP Contract Types



117 The main difference in the two forms of PPP arrangement is the levels of risk taken by each PPP operator.

118 Under the Management Contract (e.g. AWSC and the Three Regional Utilities) the PPP Operator takes the Management and Operations risk. He is paid a fee, and in the case of Armenia, an element of the fee is fixed against contractual requirements and in addition there is an incentive element only paid for performance against additional standards. The PPP Operator also provides services for management of the construction program – which makes sense as it allows some control over works that will directly affect his ability to make the planned performance improvements.

119 Under the Lease contract the PPP Operator takes on all the responsibilities and risks of the Management contractor, but takes on additional commercial risks. In this he takes on the risk

of being able to make adequate collection and revenue generations. He has to ensure that the revenue that he can generate is not only sufficient to cover the operating and maintenance costs and other financial costs of the utility (e.g. debt servicing, depreciation etc), but he also has to generate enough income to ensure that his own costs and profits can be met.

120 Clearly before a PPP operator will take the risks associated with a Lease contract, the utility has to be a good and established situation, with adequate information available on the utility. Additionally there has to be a clear indication of the potential for the planned system improvements and the application of the associated tariff, the resulting demand levels and potential revenue collections. The existence of an already successful Management Contract, that has generated the required information and experience, is an important basis for a PPP Operator to be prepared to take the additional risks involved under a Lease contract.

121 It should be noted that under both the MC and the Lease contracts the ownership of assets and the responsibility for development and funding of an adequate Capital Works program remains the responsibility of the GOA. This is an important element in the success of both arrangements. Without an adequate and timely funding program that supports the necessary capital works program, the PPP Operator will not be able to provide his contractual obligations for improvements in service levels, and the associated management and operational performance improvements.

122 The following figure lists in more detail some of the key responsibilities of both Government and PPP Operator under a Lease agreement. While all the responsibilities are important, some have a particular effect on potential utility effectiveness, and these are ringed in red on the diagram.

Table 3-4: Lease Contracts – Key Elements

Operator	**Public Sector**
Use of assets to provide services	Provides assets
Use of collected income (all or part)	Allows use of income by Operator
Management and operation of system	Provides tariff structure to sustain contract
Pays fee for use of system	Use of fee to be decided by Public Sector
Maintenance, based on asset mgmt. plan	
Billing and collection (on behalf of Public Sector)	Sets legal & institutional framework *(e.g. tariff setting, disconnection policy, metering)*
Manages construction program	Provides funding for capital plan
Achieving Levels of Service	Sets and monitors Levels of Service

Improvements in Efficiency	Sets and monitors

Successful Development of the Lease Structure

123 The Lease structure is a proven and effective step for utility development once a Management Contract has successfully established the viability of the utility. Drawing on the experiences of the Yerevan lease, as well as experience elsewhere, we can look at some key issues affecting the development of an effective new lease contract.

Tariff

124 The Tariff needs to be adequate to carry out services in the long term, with a robust, clear and defined method of dealing with future change. Ideally any subsidies should be of a temporary nature. Recognition needs to be given in tariff setting and adjustment to the contractual needs of the PPP operator, for instance dealing with operating capital. The tariff needs to be clearly defined, with planned level of cost recovery and how maintenance and depreciation will be dealt with to ensure long term viability.

Investment Plan

125 This needs to be adequate to ensure that the PPP Operator can produce the required improvements in service. The plan requires to be clearly defined before the contract is established (in terms of scope, timing and source of funds). The investment program needs to balance works that will improve operational effectiveness (e.g. improving flow measurement, sectorization) as well as capital works for expansion or rehabilitation of existing infrastructure:

- To be able to operate and guarantee service targets included in the performance plan of the lease, the lessee needs to know the resources that will be available for investments and the estimated scope of such investments. The Government should consider undertake to such investments (and the guarantee for financing) in an investment plan that should be part of the lease contract; and
- Preparation of the investment plan can be based on proposals by the current PPP MC Operator, who is naturally better positioned to assess the investment needs and plan their implementation. It would be advisable for this plan to be reviewed and finalized by an independent advisor to the Government to avoid any potential conflict of interest with the current operator.

Operating Capital

126 There is a need for the lessee to bring operating capital. The contract needs to ensure that repayment of this capital in a reasonable time frame is feasible. The tariff and revenue streams have to reflect this or the economic viability of the contract can become strained.

Service Area

127 The contract should allow for future expansion of the service area, in this case allowing potential for provision of services to communities not currently in the service area.

Meters

128 Ownership and responsibility for meters by Operator (best practice) as well as potential for control and maintenance of systems within property boundaries.

Accounting

129 Clarity of accounting standards required e.g. depreciation, tax particularly in relation to the PPP contracts:

- This has implications on the payment of VAT on unpaid billed amounts and on investments made by the operator and transferred upon completion to the Government. Armenia has recently adopted a law which requires companies with turnover over AMD 100M (around US$ 250K) to follow International Financial Reporting Standards (IFRS) starting 2011. Yerevan Djur is shifting to such a new system of financial management (process to be completed during 2010), and any new Lease Contract for AWSC should also adopt the IFRS.

Box 3-2: Hybrid Contracts

Various types of customized risk-sharing arrangements are possible. These could include:

A "management contract plus" arrangement, in which the performance-related element of the management contract is so substantial as to transfer real risk. For example, the management contract might provide substantial bonuses, but have these only paid if the operator succeeds in increasing the operating cash-flow of the utility by more than the amount of the bonus. If the bonuses were large, operators might be willing to risk providing some inputs in addition to those paid for by the fixed fee, if this was necessary to improve the utility's performance by enough to secure the bonus.

An "affermage-lease plus" arrangement. Under a standard affermage-lease the contracting authority retains full responsibility for undertaking and financing new investment. However, it may be desirable to transfer some responsibility for investment to the operator. For example, the operator is usually better placed to manage construction of new assets. Contracting authorities may also wish to share other investment-related risks and responsibilities, particularly those relating to financing, with the operator. Mechanisms for sharing responsibility for new investment include:

- *Limited investment targets for the operator*. For example, the operator could be given responsibility for extending service coverage to poor areas, or peri-urban neighborhoods, while the contracting authority retains responsibility for other investments.
- *Co-financing*. Co-financing agreements between the operator and the contracting authority, or a development agency, under which investment and finance costs and risks would be shared.
- *Sharing investment responsibility between the parties*. An affermage-lease contract can include responsibility for some investments (such as network extensions).

Box 3-3: Examples of Hybrid Arrangements

Amman Jordan: Sharing risk through performance payments. Water distribution and wastewater collection services in Amman, Jordan, are subject to a management contract. Under the contract the operator, LEMA, receives a fixed fee plus a performance-related bonus. The level of this payment depends on the change in operating revenues and operating and maintenance costs from year to year. LEMA benefits from performance improvements, but faces penalties if it fails to achieve improvements. This has the effect of sharing some risks with the operator. Although a pure management contract, it has been extended several times and with each adjustment, more and more risk has been shifted to the contractor, which is more like a hybrid.

Cartagena Colombia: Sharing responsibility for investment. In 1995 the Colombian government entered into an affermage-lease for water and sanitation services in Cartagena. The operator, ACUACAR, initially was responsible for operation and maintenance of the system, asset rehabilitation, and investments necessary to meet two specific output-based performance targets (increased collection rates and reduced unaccounted for water). Soon after the contract was signed, it became apparent that there would not be sufficient funds to cover the investments required to meet the performance targets. As a result, ACUACAR secured loans from the World Bank and the Inter-American Development Bank, to implement an investment plan. This plan also included new investments outside ACUACAR's original obligations, particularly focused on increasing coverage in poor areas of the city. New loan agreement contracts between ACUACAR, the municipality, and the funding agencies expanded ACUACAR's responsibilities to include investment, and introduced a wider range of output and input based performance targets.

3.5 Institutional Issues for PPP in Armenia

130 In Section 2.3 we noted the current Institutional framework for PPP. From current experience some key issues can affect the most effective operation of the PPP Arrangements. Whilst individual issues are discussed elsewhere, we note them here:

- Clearer definition of roles and responsibilities is needed for more effective project management, particularly at the boundary between National and Municipal level, to ensure a clear and effective approach to allow the PPP Operator to carry out his contractual responsibilities in the most effective way;
- Tariff setting and subsidy management;
- Use of independent audit: This is a key safeguard in the current institutional arrangements, and as such should be maintained; and
- Clear process of Project Monitoring needs to be maintained.

131 Situations change over the life of long term service contracts such as the PPP lease contracts. Not all of these situations can be envisaged at the stage of contract drafting. There is a need for some potential flexibility of these institutional arrangements to accommodate such changes when they arise. There is also a need to maintain a collaborative approach with the PPP Operator, not only to find solutions to problems arising from changes in the project

‘environment’, but also to take advantage of potential beneficial arrangements that may be developed in collaboration with the PPP Operator.

4 POLICY OPTIONS & RECOMMENDATIONS

4.1 Sector Issues

Levels of Service

132 The current major level of service measure is "Continuity of Supply". However, as discussed in following sections, 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 reduction in NRW.

133 It is recommended that increased, balanced, emphasis is given to investment for activities related to reduction of NRW. Activities already identified, and being implemented with some success, include:

a) Sectorization of the distribution systems, enabling identification of areas/water mains with high water leakages and through pressure regulation the possibility to maintain reduced water pressure in the pipeline networks. The latter also enables increased duration of water supply. Sectorization would lead to prioritizations to be established regarding rehabilitation/replacement of distribution mains on short as well as on long term basis;

b) Moving of water meters from inside houses to be installed in secured chambers to be located just outside property border lines. This will not obviate "illegal" connections on connection lines but such water use will be recorded and charged for;

c) Specification, supply and operation and maintenance of meters and associated equipment to be in the control of the PPP operator;

d) Rehabilitation of inside pipeline systems in multi-apartment buildings, as proved to be justified, with possible relocation of water meters to one site at the entrance level with the meters to be protected to avoid tampering; and

e) To find and legalize illegal connections.

134 The PPP operators have made their own proposals along these lines. Yerevan Djur has produced[18] a proposal for a program necessary for meter replacement within their utility, and a summary is given here to show the issues involved:

[18] Yerevan Djur – Interim Report June 2010

Box 4-1: Proposal for Meter Renewal - Yerevan

- The property of the water meters has to be transferred to the water sector (to be included into the assets).
- The choice of new meters types has to be done by Yerevan Djur.
- It is necessary to get investment to replace water meters at the expiration of their dead line (investment for supply and installation).
    - Supply: about USD 10 M
    - Installation around USD 11 M (including 20,000 anti-freeze manholes to be installed at the border of private house land)
- Maintenance of the water meters should be done by Yerevan Djur.
    - Cost around 24 AMD/m^3 of billed water (will assume the possibility to replace water meters when they will reach their deadline limit)
- Cost of maintenance and investment could be supported by the customers through the tariff (spreading the cost over time).

Source: Yerevan Djur – Interim Report June 2010

135 To support these activities some changes to current legislation should be made to allow Utilities a higher level of responsibility for operation and maintenance of pipe-work and metering within the building line, as well as the ability for the PPP operator to own or ensure adequate standards are applied for these meters and materials.

Investment

136 The main sector objective is to provide an acceptable level of service to the population. However noting that each level of service has a cost it is necessary to determine what is an affordable level of service. The current main measure is to establish an increased continuity of supply. The planned investment programs in the short to medium term will need to continue to support this, but in the longer term the decision will need to be taken whether the aim of 24 hrs service for all is too expensive, or whether investment is better used in other areas, such as metering, asset management and replacement.

137 The overall long term investment needs of the sector are high. Our assessment proposes establishing an immediate investment program (say US$ 100 million over five years), particularly to support the proposed AWSC Lease arrangement, for system improvement, but aimed to maximize immediate impact on performance and efficiency improvements. Whilst a higher amount of investment (say up to US$ 400 million in the 5 year period) might be desirable, the actual proposed amount is arrived at after considering the sector capacity.

IFI Coordination

138 Recognizing the investment needs that have been identified, World Bank is to propose funding of a specific element of this immediate investment for the proposed AWSC lease, and to

aid in co-ordination of other IFIs and bilateral funding agencies to optimize the use of funds for the sector.

4.2 Tariff Options

Overview

Should there be a National Tariff? What improvements to Tariff structure/approach

139 Whilst it is recommended that there is a national policy on tariff setting, it is not proposed that there should be a single national tariff level at this time. If there is a single national tariff level, there will need to be cross subsidies between areas, and this would raise practical and potential political difficulties. Whilst the average tariff will be lower, in some of the towns (e.g. Yerevan) tariffs will need to increase despite lower operating costs. It is proposed to leave tariff on regional basis as currently. It would be practical to consider consolidation of operation of similar areas (i.e. AWSC and 3 Regional Utilities) to obtain efficiency through economies of scale, with expected reduction of management and operating costs. However, this could be achieved without use of a single regional tariff for the combined area, which might pose problems of acceptance by those towns currently on a lower tariff.

Box 4-2: Evolution of Water Tariffs in Several PPPs

The **Senegal** affermage (serving 4.7 million people) started in 1996, and incorporated specific contractual targets and penalties to increase the operator's incentives to perform efficiently. The public asset-holding company proved efficient in implementing the investment program to rehabilitate and expand the systems, and over a decade, improved access to piped water in urban areas jumped from 81 percent to almost full coverage. The number of residential customers went up from 217,000 to 375,000 people. The connection ratio went up from 58% to 76% and is now the highest in Western Africa.

In **Niger** (serving 1.8 million people), the affermage started in 2000, and its performance in improving access has been fair. The investment program during the first years of the PPP was more focused toward rehabilitation of existing assets than on expanding access. About 450,000 people gained access to piped water, but the coverage figures improved only marginally: the improved access and connection ratios went up from 65 percent to 68 percent and from 31 percent to 40 percent, respectively.

In Senegal, the average tariff declined in real terms until the 2006 tariff adjustment, when it was raised by 15 percent, back to its pre- PPP level. But Senegal's social tariff was left untouched; in 2007, the poor households that had gained access to a connection thanks to the reform, and whose consumption was within the social lifeline of 6 cubic meters per month, were still paying an average tariff lower than the pre-PPP level. In Niger, the average tariff went up, albeit moderately. The tariff was raised in the fourth year of the contract to increase the revenue flow for the public asset-holding company and improve the self-financing capacity of the sector; the remuneration of the private operator was not changed. As in Senegal, this increase left the social tranche untouched, so the tariff paid by poor households remained below the pre-PPP level.

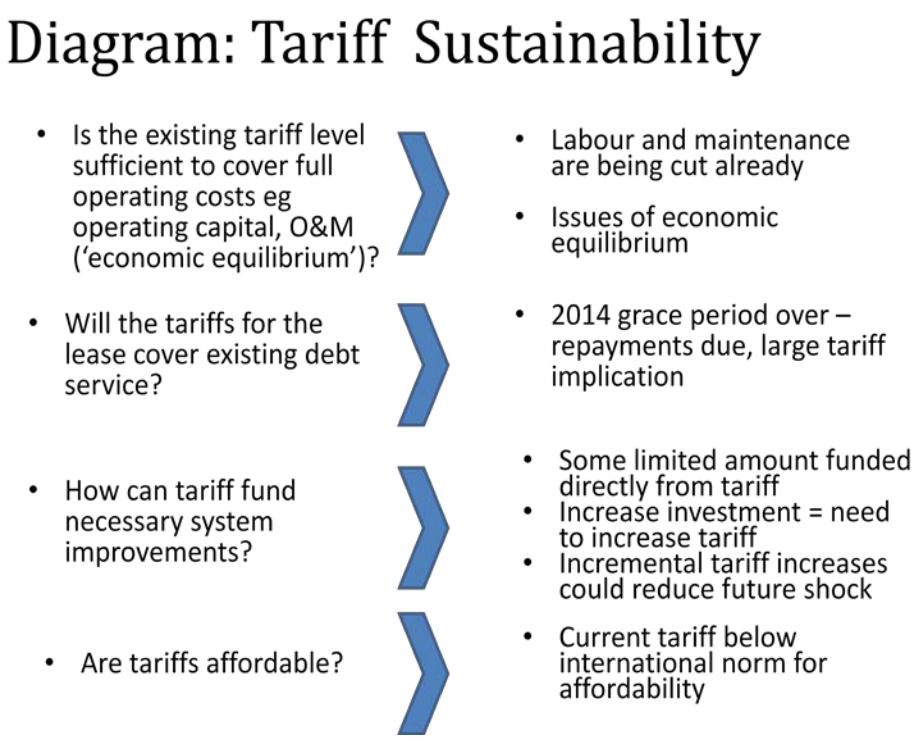
Source: PPPs for Urban Water utilities: A Review of Experiences in Developing Country, Philippe Marin 2009

140 The form and structure of tariffs remains to be determined in some detail as part of the national water policy. For full sector sustainability the long term plan should be for a tariff to achieve substantial cost recovery but in the first instance should aim to achieve cost recovery of at least Operation and Maintenance, and then eventually replacement (depreciation) and Investment costs. To achieve this it is proposed that there be planned annual incremental increases (e.g. 10 -15%) rather than major increases at longer intervals.

141 The goal of 100% continuity of supply is not achievable, or desirable in the short term, because it would not be practical or possible to make the major and costly investments necessary to achieve this goal in this time scale. This is not just a matter of the potential effect on customer prices in the short term, but the actual investment is limited by the sector capacity for annual investment. Additionally, other possible investment actions taken now (e.g. increased metering, maintenance and renewal investment, reduction in NRW) would lay the ground work for the long term operational, financial and physical stability of the sector. In this respect, whilst the long term goal of 24 hour/100% continuity could remain during the total life of the proposed AWSC lease, lower time-bound intermediate goals should be considered and these can also be varied according to individual population centers and local circumstances.

142 In the short term, improvements in flow measurement will help ensure that the tariff is applied in a fair and equitable manner. In the long term, it is recommended that ways of transition to a block tariff structure should be investigated. This is recommended to replace the current low and flat tariff, giving a basic fixed amount at lowest rate to guarantee an affordable essential supply, with an increasing rate for higher consumptions. This would not differentiate between large and residential customers, and would introduce a counter-incentive to excessive demand.

Figure 4-1: Tariff Sustainability



The Note presents various Tariff Scenarios for discussion of key issues, using the following assumptions:

- An allowance for depreciation is included (about 2% of 2010 operating expenditure);
- Management cost (estimated) of AMD 500 million p/a;
- Existing loans of US$ 88 million for AWSC (from WB, ADB and EBRD) being serviced starting 2010;
- Debt servicing for new investment of US$100 M split as US$20 M p/a over next 5 years with 8 years grace period and interest payment starting in 2012 (principal repayments only as of year 2020); and
- Inflation is applied to the scenario (nominal price). The model determine the tariff requirement based on a given cost structure (adjusted by inflation).

Modeling of Tariff and Investment Scenarios

143 A financial model was developed to test the impact of a few investment scenarios on the tariff levels to ensure long-term sustainability. The assumptions used are based on the existing financial situation of AWSC and the financial and operational impact of several investment scenarios. These scenarios were based on a set of common assumptions and principles for calculation of the required tariff levels. This analysis is done for illustrative purposes only[19].

144 Main assumptions are:

- Tariff increase calculated to cover all expenses in 2020 (operating, debt servicing, minimum depreciation, management costs);
- 2020 chosen as year for new investment debt servicing of principal;
- The initial tariff used is AMD 180 (i.e. 2010 level) and is kept at this level until 2014;
- Efficiency gains:
  - A reduction in water losses of 2% is assumed, starting at year 2012;
  - Billing and collection improvement of 15% is assumed starting at year; and
  - Decrease in OPEX of 2% is assumed starting in year 2013 until 2017.
- Water losses/unaccounted for water are assumed 87%. The model uses one single number for losses, which includes both technical and non-technical losses;
- Billing and collection efficiency: 2010 Collection rate for AWSC is assumed at 88%. The model also assumes an improvement of 15% in bill collection, through increased accuracy and enhancement of meters;

[19] Please note that the modeling scenarios are only for illustrative purposes only. Numbers presented here are based on several assumptions that can be confirmed only with a more thorough analysis. However, the analysis is precise enough to allow the Government to make high level policy decisions in relation to tariff policy. The analysis is not recommending any specific tariff level

- Depreciation is assumed at 9% of the collected revenues;
- Inflation: Expenses are adjusted for inflation, using a rate of 4%, which according to IMF is the last 10 year average;
- New debt: New loan of US$100 million with 20 years maturity, 10 years grace period, 0.75% interest rate, and 0.50% commitment fee. Both interest and principal repayment start at year 2022;
- Operator's fee: The model assumes both a management fee and lease fee payment. The management fee of AMD 500 million is used until 2012 and thereafter for new a [lease agreement] the fee payment is envisaged to be linked to the collection efficiency of the operator i.e. 10% of the collected revenues onwards from 2012.

145 The scenarios modeled seek to illustrate the effect on tariff of various policy decisions. These are not intended at this stage to give an exact tariff amount and should be considered for illustrative purposes only. A detailed tariff model will be required once the relevant policy decisions have been taken and more precision obtained regarding the investment plan. Furthermore it must be clarified that the tariff levels are developed on the basis of minimum investment scenarios.

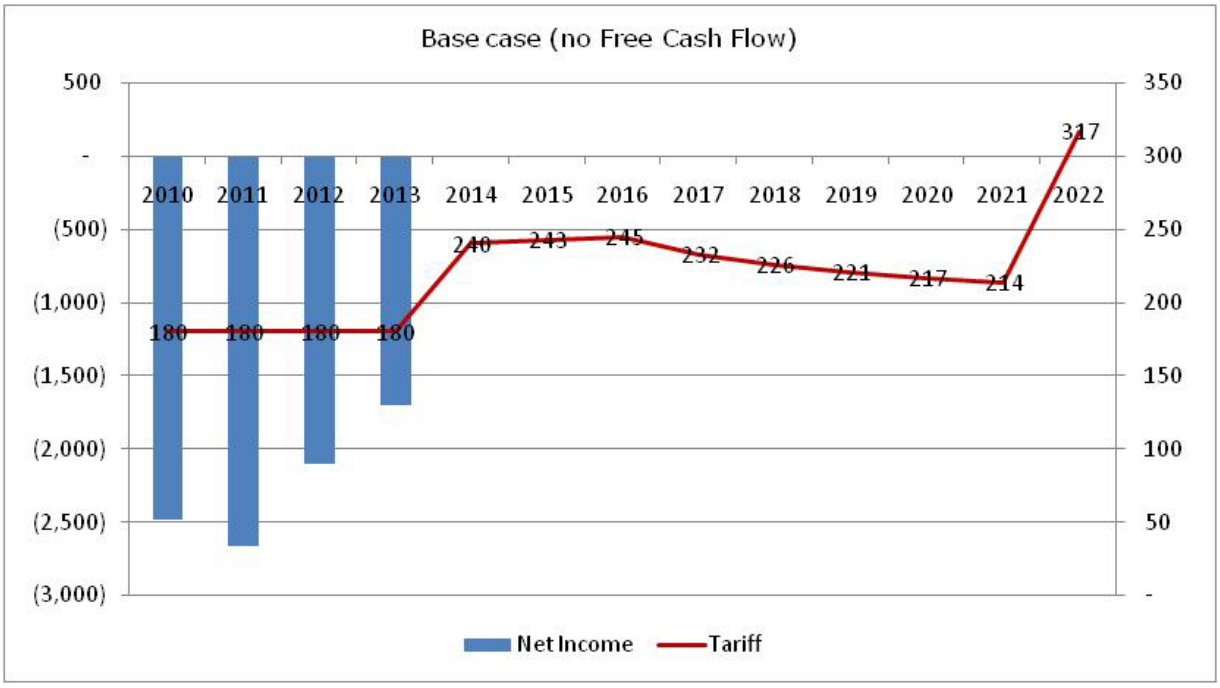
146 The Bank team has carried out a comprehensive review of tariff analysis, using two approaches: (i) assuming gradual increase of tariffs, and (ii) deferring the tariff increase. These models are presented in Annex 1, in addition to the Scenarios presented below. Furthermore, Annex 2 presents the analysis of the average tariff option for combined AWSC+3 Regional Utilities (Nor Akunq, Lori & Shirak).

Scenario 1:

147 The purpose of the base case scenario is to find a tariff level that will facilitate a long-term financial sustainability of the combined utility, by allowing the utility company to cover all its operational expenses as well as debt service, while bringing net income to zero.

148 The chart below shows the level of tariff for AWSC. As illustrated by the chart, in the first three years, the tariff shows an increase (34%, 1%, 0.8% respectively) after which it starts decreasing as a result of efficiency gains (improved collections, more accurate billing etc). The jump in the tariff of 48.4% in year 2022 is due to the fact that the servicing of the new debt begins. As mentioned in the assumptions, both interest and principal repayment start in this year.

Figure 4-2: Base Case (Reference) Scenario

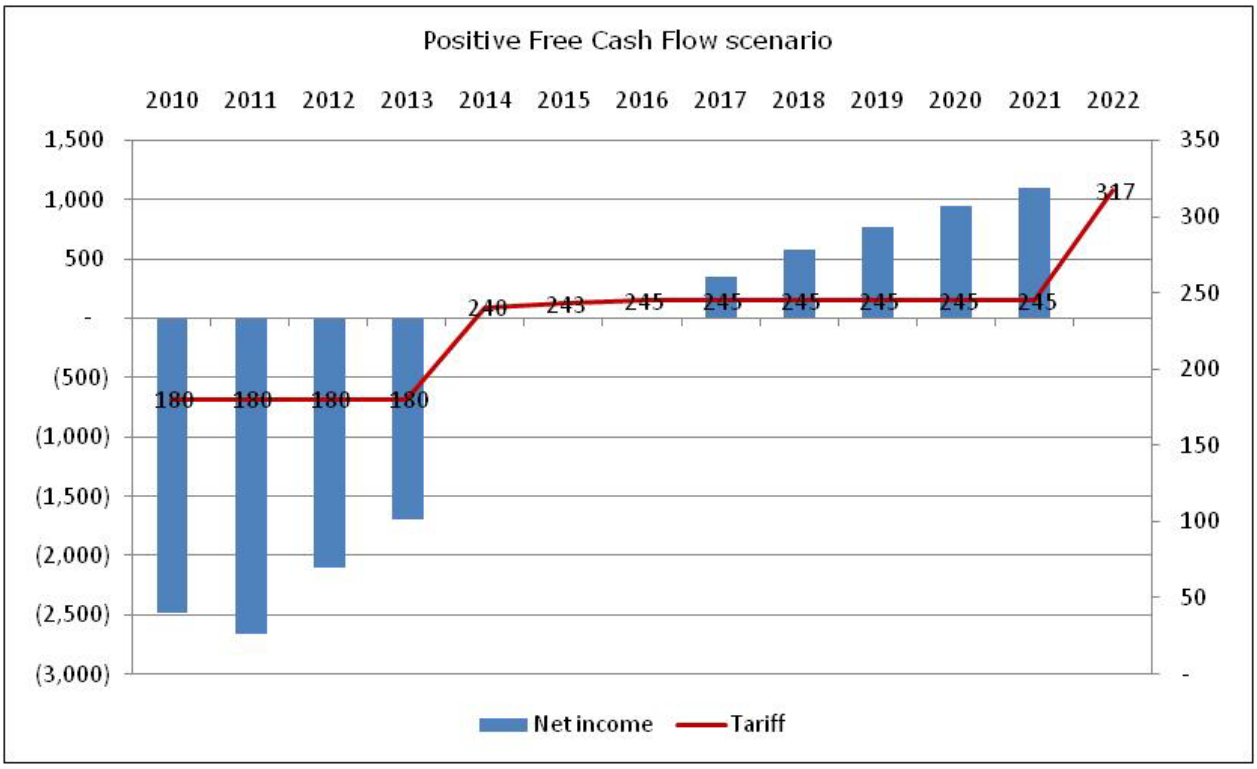


149 In this scenario it can be noted that from 2017 there appears to be a reduction in the tariff requirement. We do not advise for Government to consider this reduction as it is better to achieve an earlier breakeven and start building free cash flow for the utility. This is modeled in the scenario 2.

Scenario 2:

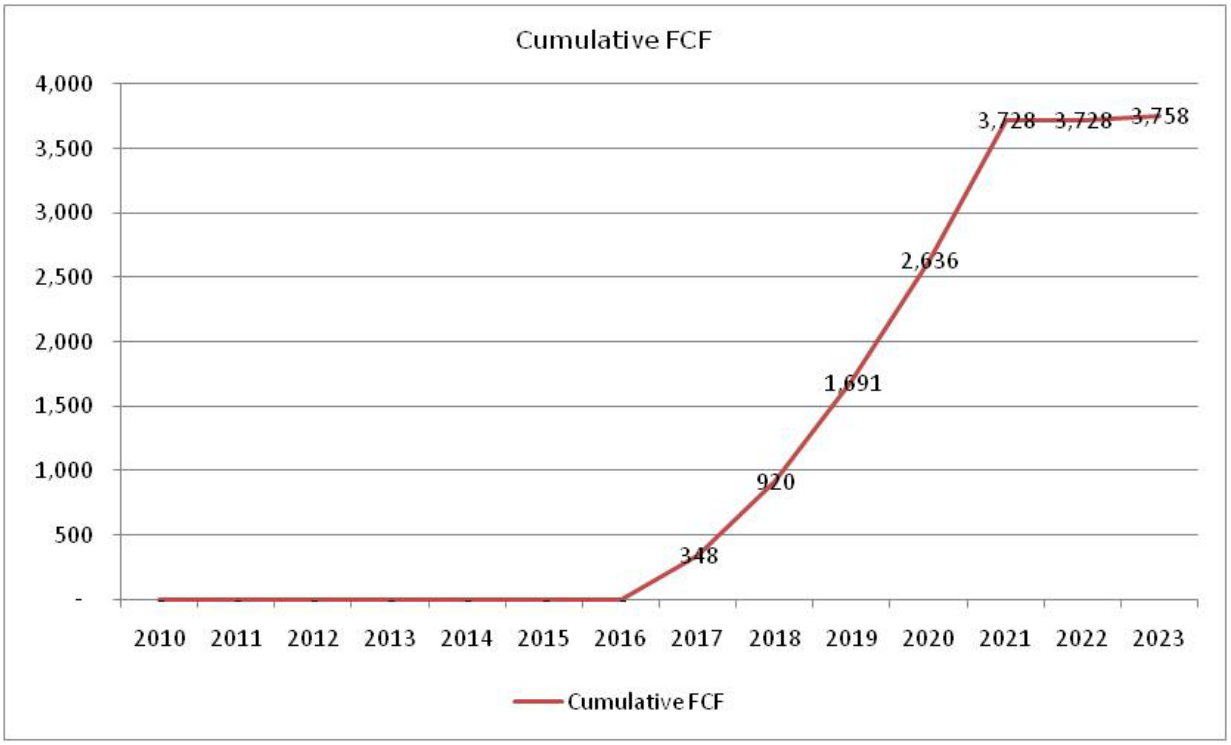
150 Under this scenario, the analysis looks at the changes in free cash flow if the tariff level is held constant after the breakeven point (i.e. year 2016), and increases only in year 2022. The tariff increase in year 2022 is 30%, which is lower compared to base case scenario.

Figure 4-3: Positive Free Cash Flow Scenario



151 It is worth noting that this option results in the generation of free cash flow starting in 2017. Under normal circumstance would be used for further investments and improvements. However, due to the low level of tariff since 2010, water utility companies have been forced to cut significantly their regular operations and maintenance costs such as maintenance and replacement of equipments, staff number, staff costs, etc. This low level of tariff has created in effect a shortfall of O&M expenditures that would need to be covered by the additional free cash flow generated in 2017.

Figure 4-4: Cumulative Free Cash Flow for Scenario 2



Scenario 3:

152 Furthermore, another analysis of these two scenarios was conducted under an assumption that the transition from MC to Lease agreement will be delayed until year 2015. This analysis also implies that the efficiency gains achieved through Lease agreement are delayed as well, such as:

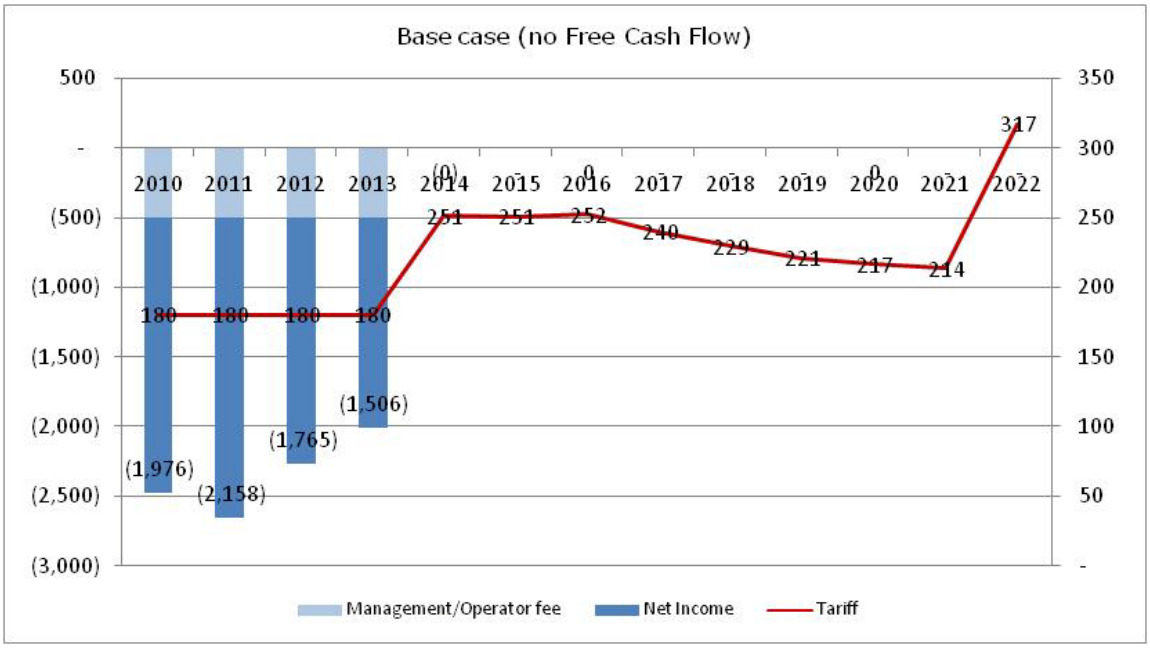
- Billing and collection improvement of 10% is assumed to start at year 2012 (instead of 15%), and reaching 15% improvement only in 2015.
- Decrease in OPEX of 2% is delayed, starting in year 2015 until 2019.

The analysis showed two main implications of delaying the transition (see Figure 4-5). The first one is the amount of subsidies required for the period until tariffs are brought to a cost recovery level, and the second one is the tariff increase itself. In the case of an earlier transition to a Lease contract, both the required level of subsidies and the tariff increase are lower. The average amount of subsidies in this case amounted to around AMD 1,739 million per year, compared to AMD 1,851 million per year in the case of a later transition[20]. The tariff increase required to reach financial sustainability in 10 years was 34% in the case of an earlier transition (AMD 240),

[20] Investment levels are only indicative and based on several assumptions (including the need to account for replacement of depreciated assets).

as compared to a 40% increase for a later transition (AMD 251). These differences result from the fact that the Lease contract will bring efficiency gains[21] and the sooner these gains are achieved the smoother the transition towards cost recovery tariffs will be.

Figure 4-5: Base Case Scenario in Case of Later Transition from MC to Lease Agreement



4.3 PPP Options

Is a lease contract the most appropriate PPP model?

153 The development of Yerevan city water utility was first established as a Management Contract. The arrangement was chosen to do some initial investment (funded by GoA) and to develop enough detailed information on the existing utility's parameters and performance. Once this basic data was known, a greater degree of risk could be transferred to the Private Sector by requiring them to take commercial risk (billing collection risk) and some limited investment in the form of working capital. Thus, a lease type contract structure was developed. In the subsequent Lease Contract the Operator (Veolia) took on increased collection risk as well as providing management expertise, carrying out operation and maintenance, and management of the capital works program. The contract is proceeding satisfactorily, meeting program and targets.

154 The experience with Yerevan shows that the Lease structure provides a proven and effective step from the Management Contract, and the use of a Lease would be the logical next stage of development of both AWSC and the 3 Regional Utilities (Nor Akunq, Lori & Shirak)

[21] It must be remembered that under the lease contract the operator remuneration derives from its ability to collect revenue from customers. For the purposes of modeling, we have assumed that the operator remuneration will be 10% of the revenue collected from customers.

when the current MC contracts come to an end. Other forms of PPP, such as a full concession contract, would not appear to be viable given the fact that the Operator would be required to fund its investment solely through the revenue it is able to collect from tariffs. Given the massive investment backlog, and the existing gap for full cost recovery tariffs, this option was not considered further.

155 The opportunity should be taken to consider strengthening the pre-qualification and bidding process with some strengthening of contractual and accounting issues building on lessons learnt. Building on past experience there needs to be clarity of the focus and adequacy of the investment program based on changing needs and responsibilities to ensure planned operational and service targets can be achieved. The role of the lease in achieving major water loss reductions and effective asset management should be strengthened as an addition to the existing continuity of supply measures.[22]

Should we have a single PPP Operator for the whole country?

156 Although this is possible, the complexities of establishing a single Operator appear to outweigh possible benefits of economies of scale. The existence of two or more operators offers positive competition versus the monopoly of a single operator. There is also the practical aspect of the difficulty in timing based on combination with or early termination of the existing Yerevan Lease contract, which still has some 5 years to go (until 2016). Consideration would need to be given to the position of the incumbents, whether through negotiation or open bidding, and how the transition would be made without disruption of the sector.

Fiscal Considerations

157 Given the current fiscal constraints, and potential limitations on investment funding, support to the water sector should continue to be among GOA priorities. Until full cost recovery from tariff is economically viable there remains a need for need for clear and explicit management of subsidies to the sector.

Asset Management Considerations

158 Despite the resilience of the sector, the extremely poor state of the assets and the lack of investment and maintenance will pose major operational and financial problems in the near future unless action is taken. This needs to be addressed proactively and progressively through investment in a sustained program of NRW reduction (both technical and administrative), for example a progressive policy aimed at achieving, say, 2% per year reduction. This would need to be linked with investment in a planned and sustained long term program of maintenance, rehabilitation and expansion of assets. NRW is discussed in more detail in Annex 3. Through this progressive and incremental approach, potential costly delays and tariff shock will be avoided.

[22] Annex 5 provides an example of scope of work for a Specialist Transaction Adviser to illustrate the potential areas of support that might be offered in helping to develop the proposed AWSC PPP arrangement

4.4 AWSC: Issues and Specific Immediate Actions

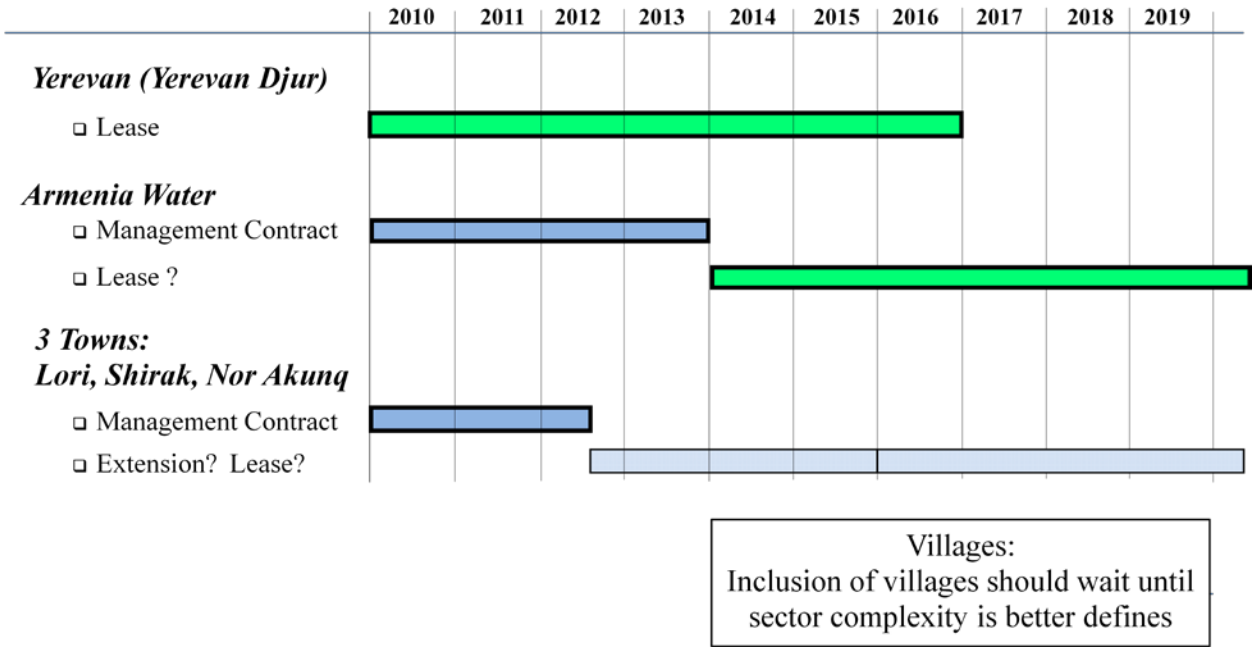
Timing for Introduction of New AWSC Lease Contract

159 The current AWSC MC has been extended for a further year until end 2011. The 3 Regional Utilities (Nor Akunq, Lori, and Shirak) MC contract ends shortly after this (in 2012).The intention, taking the example of the Yerevan PPP development is to transform this to a lease contract through open bidding. This also presents a window of opportunity to potentially combine the 3 Regional Utilities within the AWSC lease. This would offer several benefits, the main one is that being within the general AWSC area, and integration would offer economies of scale, as well as improving overall level of financial flows, and making use of common management and operational resources. In any case, although it would be tailored to the AWSC experience, the lease structure and development will benefit from the experiences from the Yerevan Lease.

160 Decisions have still to be taken on various key issues, including contract form, whether to include the 3 Regional Utilities, and the associated (and affordable) investment program.

161 Given the complexity of the situation, inclusion of villages into any future lease arrangement should wait until sector details can be better defined. However, the lease structure should be flexible enough to allow for inclusion of villages should future conditions allow

Figure 4-6: Timeline for PPP Arrangements in Armenia Water Sector



Immediate Actions

162 A number of immediate actions are recommended:

- *Service Area:* Proceed with development of a lease contract for the existing AWSC area. Provision should be made in the contract conditions to allow the potential for future expansion of the Lease area to include the 3 Regional Utilities (Nor Akunq, Lori & Shirak), when that Management Contract comes to an end.
- *Contract Detail:* The contract for the Lease to be developed learning lessons from the existing Yerevan Lease, adapted from experience specifically obtained under the MC contract. Various points to be considered including:
  - Specific amendments to deal with current law and accounting practice;
  - Specify operator investment (level of operating capital) & repayment;
  - Requirement for business plan (e.g. outlining business approach, how to deal with asset planning, investment etc);
  - Requirement for full asset management plan, typically after 3-5yrs (condition survey and investment management);
  - Clarify procedure for asset transfer (fixed and moveable) on termination;
  - Adoption of International Accounting procedures for lease contracts;
  - Dealing with VAT on unpaid billed amounts and taxation on investments made by the operator.
- *Additional Services:* specific provision to be made to allow the Lease operator to engage in provision of additional services for customers and the community (e.g. through establishing unit pricing). These could, for instance, include work on plumbing inside property boundaries, or work on drainage systems and pipe-work for instance. It is envisaged that this would not be included in the water and wastewater tariff, but would allow other methods of operator remuneration.
- *Dealing with Village Supplies:* The contract to maintain flexibility for potential expansion of services to villages in the geographical service area not currently connected. As at present continue to offer services varying from technical support, bulk water supplies or full water services, on a negotiated basis.
- *Performance Indicators:* Bid and contract emphasis is to be on provision of increased levels of service. However it should be considered that the indicator for continuity of supply, currently a main performance indicator, should be pursued only up to an affordable limit (i.e. some appropriate level less than 24 hours a day). Additionally, two other key indicators should be included:
  - *Improved Determination of System Condition and Flows:* This is required to compensate for the fact that lack of information on accurate system flows is hindering effective commercial and operational analysis, and major decisions are having to be made on inadequate information
  - *Reduction of Unaccounted for Water:* This is required since the current extremely poor state of the system assets together with the massive associated losses is imposing major stress on the system as well as major difficulties of management of the system and operation and maintenance

- *Bidding/Contractor Selection:* That the current GOA bid team to be supplemented by a PPP specialist with Transaction experience to assist in the Lease procurement, either for negotiation or through competition. Propose that additional funding be sought for this specialist support.

Particular Immediate Actions

163 The following immediate actions, in line with the recommended actions for AWSC, are proposed for the whole water sector as having positive and immediate effect:

- *Level of Service:* The target for continuity of supply should be progressive, with the aim of 24 hour supply for the whole country in 2022, with associated guaranteed minimum quality and pressure targets. For the term of the AWSC contract realistic and progressive targets of 16 to 18 hours per day average (varying for specific urban and rural areas) should be established, associated with a minimum level of 8 hours per day continuity for individual areas, and a regular schedule of supply maintained.
- *Investment Program:* Immediate development of a short term investment program (say US$100million) to provide necessary infrastructure improvements, linked to providing improvements in service and operating efficiency. This will be focused on improved flow measurement, performance improvement through reduction in NRW (proposed at 2% per year) and an element of associated infrastructure rehabilitation and expansion.
- *Tariff:* An effective tariff mechanism to be established that will give an adequate and affordable revenue stream, that will:
  - Define and take into account any program of subsidies;
  - Allow defined level of cost recovery;
  - Include for servicing debt (noting the end to existing debt grace periods);
  - Be ‘tapered’ to meet affordability and social acceptability criteria; and
  - Allow for effective and sufficient future adjustment to ensure financial sustainability.

164 Additionally, there should be action on key supporting issues including:

- *Metering*: Immediate implementation of a sustainable program to improve metering across the utility service area. This to include funding for program of provision and replacement of metering equipment and associated equipment, infrastructure amendment and meter security. Ownership or management of meters and chambers to be transferred to Operators, and at a minimum the Operators to have the legal right to lock and control chambers. Immediate action is possible, and this will require legislative changes; and
- *Number of Operators*: It is advisable to have more than one operator in the country. This will allow for benchmarking comparison and increase direct competition in the market. However the future potential addition to the AWSC lease contract of the 3 Regional Utilities (Nor Akunq, Lori & Shirak) that lie within its geographical area

would bring major advantages related to economies of scale, and the contract should allow for this future possibility.

Approach to Establishing the Lease Contract for AWSC

165 In summary, a comprehensive and focused approach to development of the Lease contract for AWSC is proposed, which it is recommended should include the following key issues, at minimum:

- Appointment of a specialist transaction adviser[23] to support the GOA and their local advisers through the development process in the most effective way;
- Ensure that a comprehensive set of lessons learnt from the Yerevan Lease contract are integrated in the new design of the contract from various perspectives including inter alia bidding process, contract management, lease fee, key performance indicators, etc;
- Maximize the use of input, experience and data for project development from the incumbent Operator under the Management Contract. They will have particular detailed insight that should be drawn upon;
- Establish a sound financial model – review and adapt the AWSC proposed model as appropriate;
- Establish levels of service to be adopted (e.g. establish balance of continuity, flow measurement and NRW reduction);
- Develop an appropriate capital works program, within local sector capacity, and with a defined approach to funding;
- Establish a defined approach to Tariff setting, subsidy management, depreciation, and cost recovery and debt repayment. Review existing institutional arrangements for tariff setting and review to ensure long term viability; and
- Negotiate or establish a lease contract using the recommendations noted above.

4.5 Village Water Supplies

166 The issue of water supplies to the 560 independent villages is not the main subject of this paper. However, with a total population of around 1.1 million in small communities throughout Armenia being served by widely varied quality and types of institutional, operational and technical arrangements, this is a neglected area of the sector that would benefit from a coordinated approach to development.

167 Specific data are scarce in spite of a number of studies that have been carried out and some pilot projects being executed. A brief summary of the existing situation in 560 villages and the needs are provided by the SCWS in Annex 8.

168 To establish the basis for effective development of this part of the sector, a full review of current situation and needs would be required, coordinating existing work and studies and

[23] An example of potential tasks and responsibilities for a Transaction Adviser are given in Annex 6

supplementing with field surveys to obtain a full picture of the current situation. This work would include assessment of the current institutional and operational arrangements, current asset status and investment needs. From this work a range of investment strategies would be developed, with proposal for a range of institutional and financing models that could be adapted by individual community. This review of Village Water Supplies should also look at the necessary support needed for the national institutions that have the task of facilitating this area of sector development.

169 In the short term the five existing water utilities should be encouraged to expand the current ad-hoc improvement of village water supplies in their area. This is currently carried out on a case by case basis through negotiated provision of services to interested villages through a variety of ways of providing water services. These range from direct incorporation into the Utility service area, provision of technical support to the villages or provision of bulk supplies. Whilst not seen as superseding the need for a comprehensive policy for Village Water supplies, this does produce potential improvement for a number of communities, but limited by the capacity of the current Utility arrangements.

5 CONCLUSION

170 Effective asset management is the key to achieving overall effectiveness of the sector. Continuing deterioration of assets will increase future costs of providing services unless the focus of approach on asset management is used to drive long term efficiency in the sector in terms of levels of service, investment needs and associated tariff.

171 Private participation offers a proven approach to increased sector effectiveness but will not change the need to cover O&M, depreciation and financial costs. The source of financing sector development ultimately depends on funding from the taxpayers and customers. Private investment can be considered but it is more expensive than IFI or other public borrowing.

172 Whilst options for the exact timing for transition to the AWSC Lease Contract are currently under consideration (for example the potential further extension of the current Management Contract from 2011 to 2014), it is recommended that a properly planned course of decisions and actions need to continue to be commenced and implemented to ensure that this transition is smooth and effective. Delay of the actual transition to the Lease should not mean delay in establishing the key elements recommended for sector development, as they will be required under either PPP regime.

173 Within the policy issues and recommendations given in this Note a number of actions should be considered a priority:

- *Transition to Lease Contract:* Agreement and development of a program for transition to the AWSC Lease contract.
- *Level of Service:* The target for continuity of supply should be progressive, with the aim of 24 hour supply for the whole country in 2022, with associated guaranteed minimum quality and pressure targets. For the term of the AWSC contract realistic and progressive targets of 16 to 18 hours per day average (varying for specific urban and rural areas) should be established, associated with a minimum level of 8 hours per day continuity for individual areas, and a regular schedule of supply maintained.
- *Investment Program:* Immediate development of a short term investment program (say US$ 100million) to provide necessary infrastructure improvements, linked to providing improvements in service and operating efficiency. This will be focused on improved flow measurement, performance improvement through reduction in NRW (proposed at 2% per year) and an element of associated infrastructure rehabilitation and expansion.
- *Tariff:* An effective tariff mechanism to be established that will give an adequate and affordable revenue stream, that will:
    - Define and take into account any program of subsidies.
    - Allow defined level of cost recovery.
    - Include for servicing debt (noting the end to existing debt grace periods).

- Be ‘tapered’ to meet affordability and social acceptability criteria.
- Allow for effective and sufficient future adjustment to ensure financial sustainability.

174 Additionally, there should be action on key supporting issues including:

- *Metering*: Immediate implementation of a sustainable program to improve metering across the utility service area. This to include funding for program of provision and replacement of metering equipment and associated equipment, infrastructure amendment and meter security. Ownership or management of meters and chambers to be transferred to Operators, and at a minimum the Operators to have the legal right to lock and control chambers. Immediate action is possible, and this will require legislative changes.
- *Development of the Lease Contract:* Taking account of recommendations given in this Note.
- *Developing the approach to the number of Operators*: It is advisable to have more than one operator in the country. This will allow for benchmarking comparison and increase direct competition in the market. The future potential addition to the AWSC lease contract of the 3 Regional Utilities (Nor Akunq, Lori & Shirak) that lie within its geographical area would bring major advantages related to economies of scale.

175 This work should be supported by a program of relevant studies and technical assistance, including the proposed support by a Transaction Advisory Specialist, assistance on tariff design and tariff setting, development of an agreed financial model, review of proposed levels of service and assessment of investment needs and development of an investment program.

176 Whilst not the main subject of this current review, the situation of the 560 villages needs to be addressed and warrants further detailed review of most effective way of dealing with provision of services. In the interim the continuing incremental involvement of villages with the three main utilities, by incorporation into service areas or other provision of services should continue, as and when appropriate.

Sustainability

177 If the right improvements are made to the water sector, through the proposed lease arrangements, the improvements to infrastructure and sector management will create a stable and sustainable sector with adequate Levels of Service to the population and offer a path to a possible future transition of greater liability transfer to the private sector, for example through a future concession.

Box 5-1: Sustainability of Service

In the World Bank study sustainability of service has been measured by two financial indicators: the collection ratio and the financial working ratio, i.e., the ratio of cash operating costs to cash collections. It must be noted that the working ratio decreases as the result of a combination of tariff increases, better collections and control of operating costs.

- ***Collection ratio***. The collection ratio has increased in all eight documented cases, and reached almost 100% (and even beyond if arrears are also collected) in three cases (Amman, Gdansk and Senegal).

- ***Working ratio***. The working ratio has decreased significantly in six of the eight cases documented. In Gdansk, the data provided on the revenue refer to the share of the tariff retained by the operator and not to the total revenue including the share transferred to the owner of the contract; therefore a meaningful working ratio could not be calculated. Data were not available for Gaza. In three cases (Amman, Cartagena and Zambia) the customer tariff actually decreased since the private operator mobilized while the inverse of the working ratio increased as a result of improved collections and reduced operating costs. In the three other cases, customer tariff did increase but the inverse of the working ratio increase faster, again indicating efficiency gains.

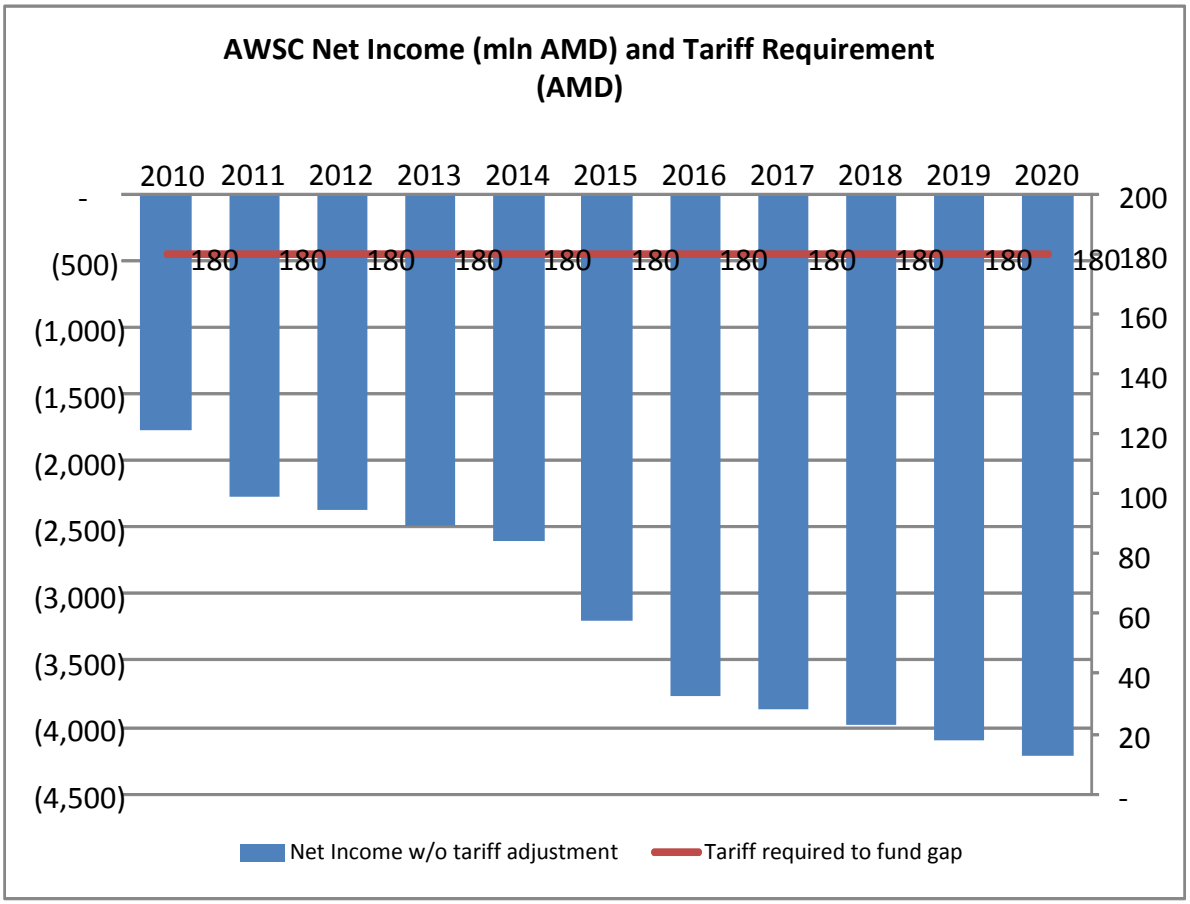
Annex 1: Tariff Simulations

In analyzing various models, four scenarios have been modeled:

1. Base case – no investment
2. Investment only from heavy tariff increase
3. Investment of US$ 100 M with single tariff increase deferred until 2014
4. Investment of US$ 100 M with progressive tariff increase

<u>Scenario 1:</u> 'Unsustainable' Base Scenario
(Debt Servicing Plus Minimum Depreciation)

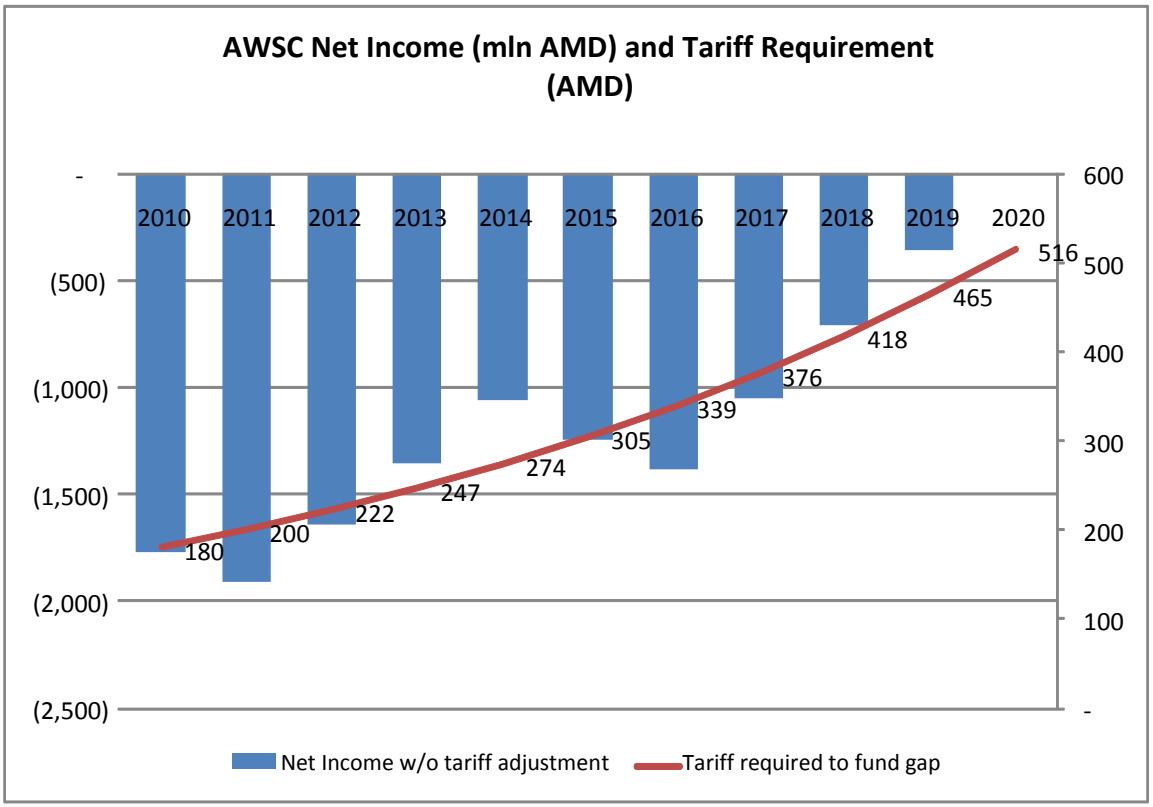
Figure A - 1



No Tariff increase results in massive deficit, and continuing deterioration of systems and infrastructure

<u>Scenario 2:</u> 'Funding from Tariff'

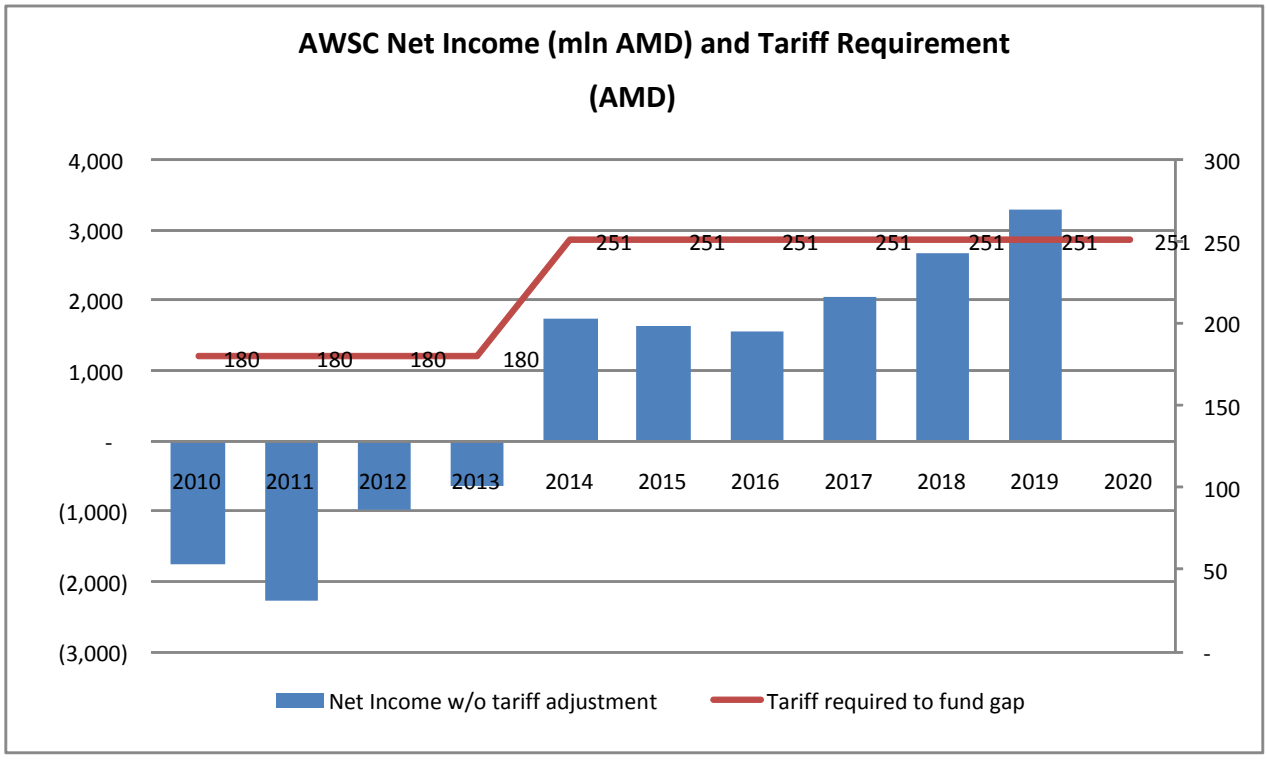
Figure A-2



Tariff increase of 11% pa has affordability constraints. Continuous Government investment is needed over next 10 years.

Scenario 3: 'Deferred Action: Potential Tariff Shock'

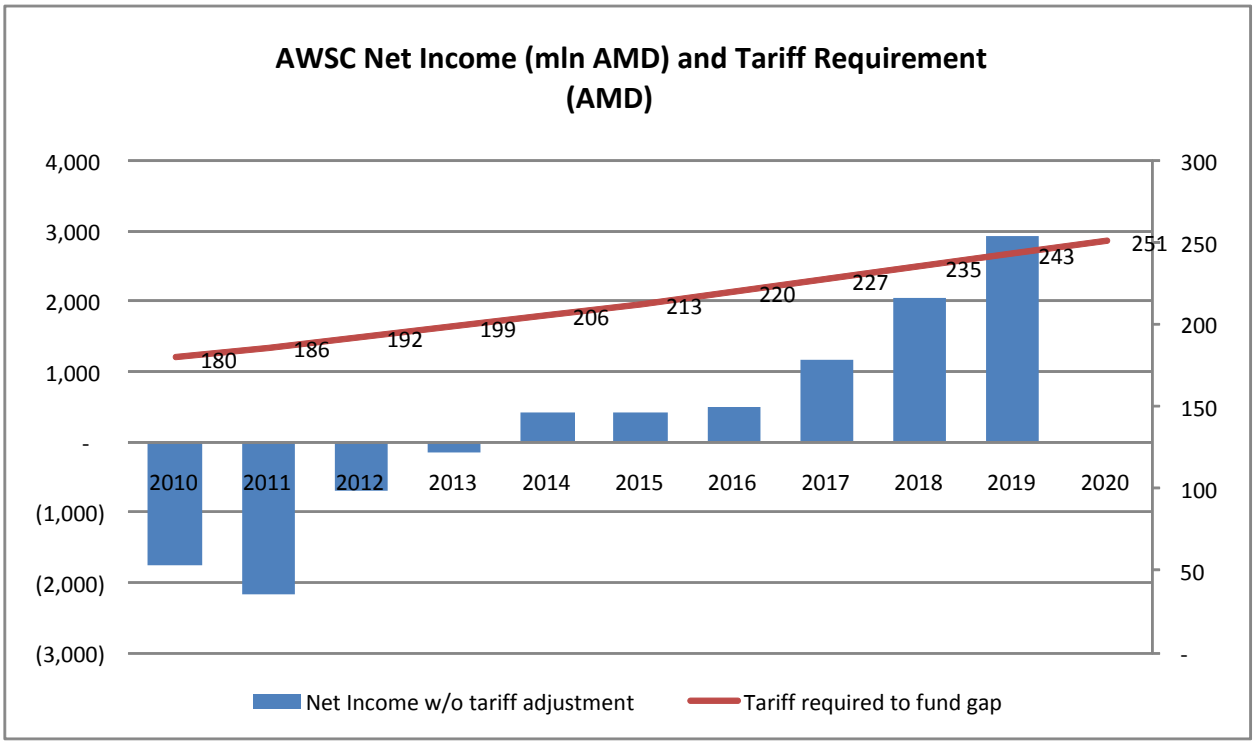
Figure A-3: Delayed single tariff increase with Investment to match Service Quality



<u>Scenario 4:</u> 'Progressive Increase: Avoid Tariff Shock'

Constant Increase from AMD 180 with Investment

Figure A-4: Avoiding Tariff Shocks



This model estimates gradual increase of 3% pa. The scenario is politically more acceptable. It assumes gradual phase-out of Government subsidy.

Annex 2: Analysis of the Average Tariff Option for Combined AWSC+3 Regional Utilities (Nor Akunq, Lori & Shirak) Scenario

In order to gain a better understanding on the benefits that this merger would bring, an analysis of the tariff implications was undertaken.

The analysis has been done on the premise of seeking to ensure that the combined utility (AWSC and 3 Regional Utilities) achieves a breakeven point as quickly as possible. The breakeven point is defined as the moment free cash flow (profit) after debt servicing and other expenses is zero. We have analyzed three scenarios, which are:

1) The base case (reference) scenario, which shows the minimum tariff needed to cover all the expenses and debt.
2) Tariff level is held constant after the breakeven point (i.e. year 2015).

Note: While the analysis focuses on the level of average tariff, it should be noted that the average tariff (i.e. the combined AWSC and 3 Regional Utilities) is used only for a reference purpose. Clearly an average tariff combining both AWSC and the 3 Regional Utilities is not desirable as it would increase the tariff for the 3 Regional Utilities to an unaffordable level. Decision making should be done based on the individual level of the tariffs for AWSC and 3 Regional Utilities.

Furthermore it must be noted that the scenarios that have been modeled involve a number of assumptions (detailed below), but that these are to cover the concessional financing that is being sought by Government mainly through the IBRD loan. However, the fact that a breakeven position can be achieved around year 2015-2016 would imply that the combined company could in fact consider undertaking some other critical investment activities.

Assumptions

The analysis assumes the merger between AWSC and 3 Regional Utilities is done on year 2013. Other assumptions used for this analysis are as follows:

Tariff: The initial tariff used is a AMD 167, which is the weighted average of existing 2010 level tariffs for 3 Regional Utilities and AWSC, AMD127 and AMD180, respectively.

Efficiency Gains:

- A reduction in water losses of 2% is assumed, starting at year 2012 for AWSC and 2013 for 3 Regional Utilities (i.e. after merger) until 2020.
- Billing and collection improvement of 15% is assumed starting at year 2012 for AWSC and 2013 for 3 Regional Utilities.
- Decrease in OPEX of 3% is assumed starting in year 2013 until 2017.

Water Losses/Unaccounted for Water:

The model assumes one single number for losses, which includes both technical and non-technical losses. For AWSC losses are assumed to be 87%. Whereas for 3 Regional Utilities, the

model uses the weighted average of losses of 76% (using 2010 estimated amount of water production and water supplied).

Billing and Collection Efficiency:

- 2010 Collection rate for AWSC is assumed at 88%, while for the 3 Regional Utilities (Nor Akunq, Lori & Shirak) the model uses the weighted average of 66%. [The collection rate for 3 Regional Utilities is derived using the amount of water supplied, and the amount of water for which the revenues were collected (i.e. income/existing tariff)]. The model assumes an improvement of 15% in bill collection, through increased accuracy and enhancement of meters. The improvements start on year 2012 for AWSC and 2013 for 3 Regional Utilities.

Depreciation: The model assumes a depreciation of 9% of the collected revenues for AWSC and 2% for the 3 Regional Utilities.

Inflation: Expenses are adjusted for inflation, using a rate of 4%, which according to IMF is the last 10 year average.

New Debt: New loan of US$100 million with 20 years maturity, 10 years grace period, 0.75% interest rate, and 0.50% commitment fee. Both interest and principal repayment start at year 2022.

Operator's Fee: The model assumes both a management fee and lease fee payment. The management fee of AMD 500 million is until 2013 (i.e. merger year) and thereafter a lease fee payment is envisaged that is linked to the collection efficiency of the operator i.e. 10% of the collected revenues onwards from 2013.

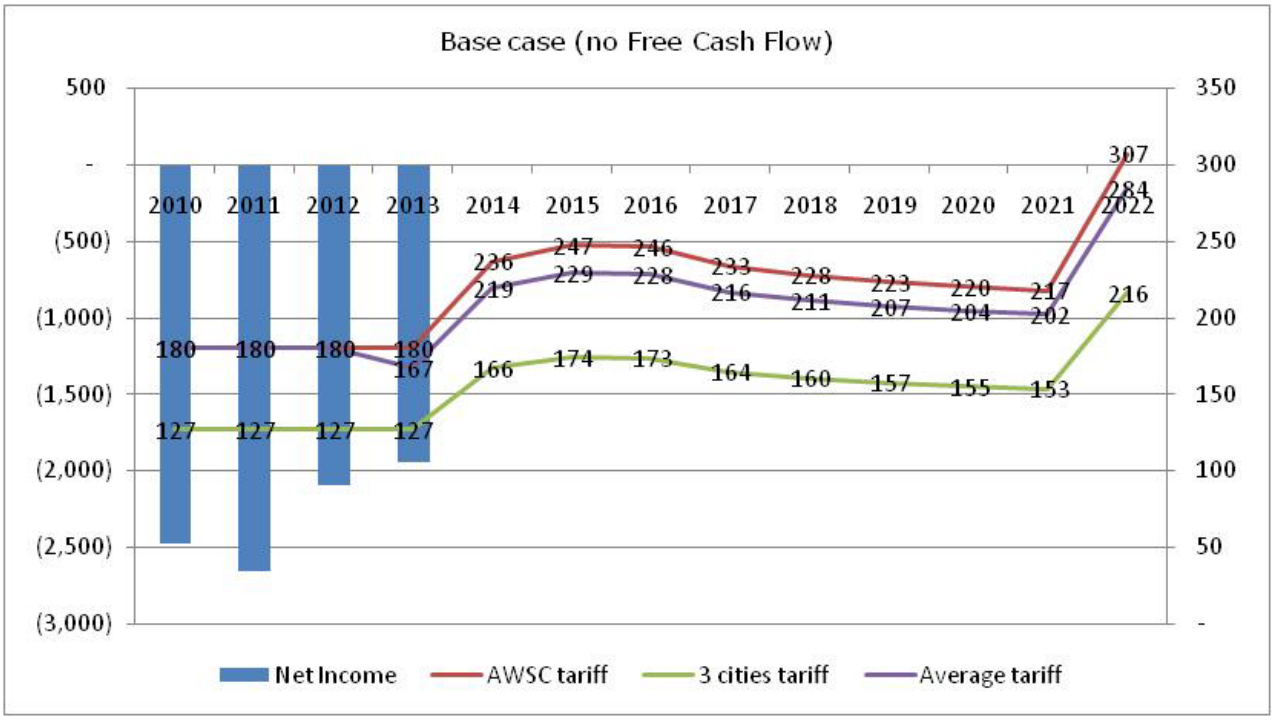
Analysis

Scenario 1: The purpose of the base case scenario is to find a tariff level that will facilitate a long-term financial sustainability of the combined utility, by allowing the utility company to cover all its operational expenses as well as debt service, while bringing net income to zero.

The chart below shows the level of tariff for AWSC, 3 Regional Utilities, and the average one. The net income in the first three years represents only the AWSC, whereas the net income starting at year 2013 onwards is a representation of the merged AWSC and 3 Regional Utilities option.

As illustrated by the chart below, in the first two years after the merger, the tariff shows an increase (31% and 5%, respectively) after which it starts decreasing as a result of efficiency gains (improved collections, more accurate billing etc). The jump in the tariff of 41% in year 2022 is due to the fact that debt needs to start to be repaid. As mentioned in the assumptions, both interest and principal repayment start in this year.

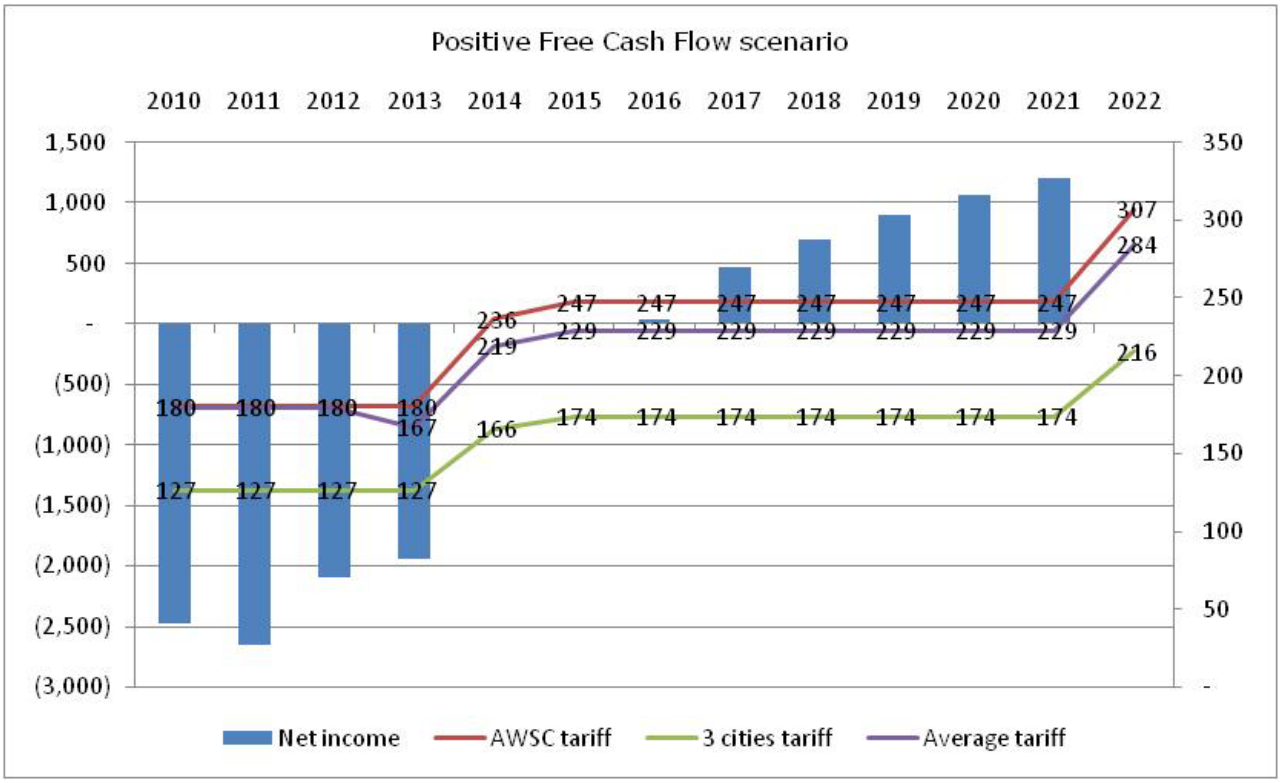
Figure B-1: Base Case (Reference) Scenario



In this scenario it can be noted that from 2017 there appears to be a reduction in the tariff requirement. We do not advise for Government to consider this reduction as it is better to achieve an earlier breakeven and start building free cash flow for the utility. This is modeled in the scenario 2.

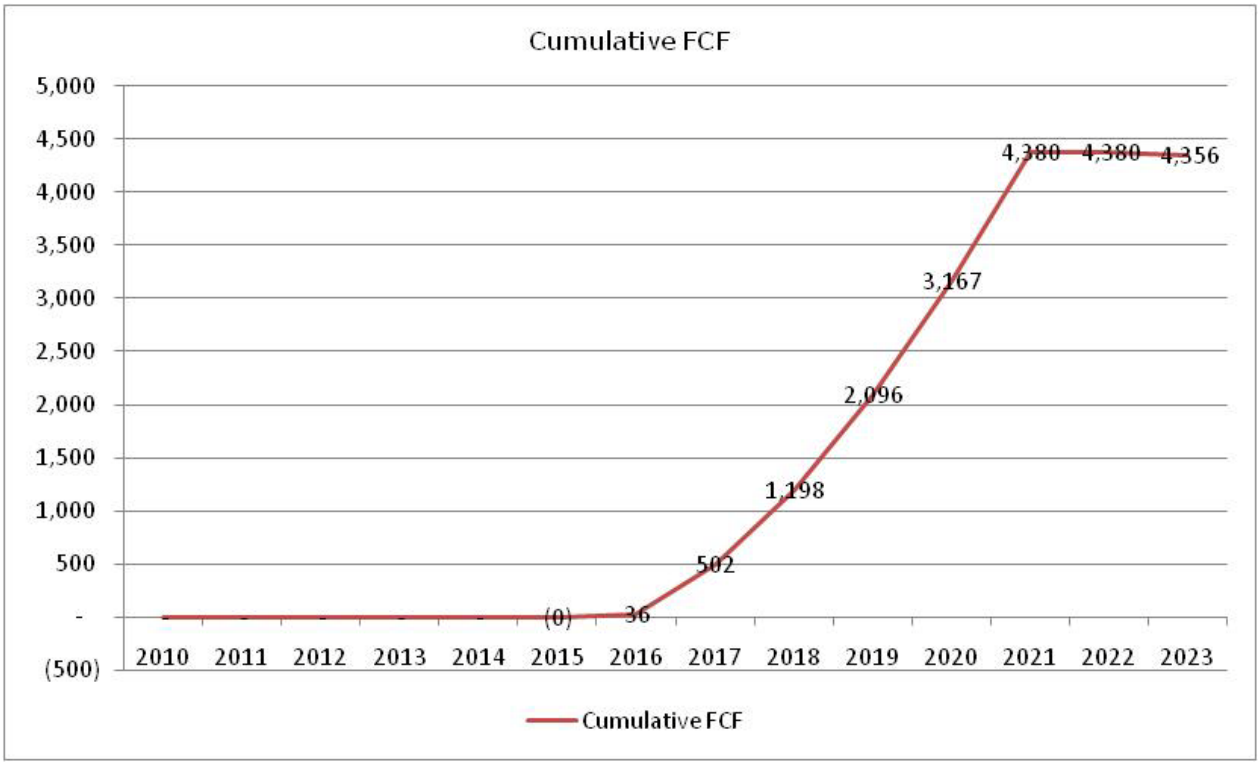
Scenario 2: Under this scenario, the analysis looks at the changes in free cash flow if the tariff level is held constant after the breakeven point (i.e. year 2015), and increases only in year 2022. The tariff increase in year 2022 is 24%, which is much lower compared to base case scenario.

Figure B-2: Positive Free Cash Flow Scenario



As shown in chart B-3 below, this option allows for the generation of free cash flow, which can be used for further investments and improvements.

Figure B-3: Cumulative Free Cash Flow for Scenario 2



Annex 3: Performance Based NRW Contracts

What is NRW?

Also referred to as Non Revenue Water (NRW), NRW is typically defined as the difference between systems input volume and billed, authorized consumption (IWA - International Water Association). The starting point for a utility to quantify, understand and manage its NRW situation is to assess its Water Balance[24; 25] (see table below)

Table C-1: The IWA "Best Practice" Standard Water Balance:

<table>
<tr><td rowspan="7">System Input Volume</td><td rowspan="3">Authorized Consumption</td><td rowspan="2">Billed Authorized Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption</td><td>Unbilled Metered Consumption – free to departments and consumers</td><td rowspan="6">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption – standpipes, fire hydrants etc</td></tr>
<tr><td rowspan="4">Water losses</td><td rowspan="2">'Apparent' or 'Commercial' losses</td><td>Unauthorized Consumption – illegal connections, theft by consumers and water sellers</td></tr>
<tr><td>Customer Metering Inaccuracies – inaccurate meters, data handling errors</td></tr>
<tr><td rowspan="3">'Real', 'physical' or 'technical' losses</td><td>Leakage on Transmission and/or Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer metering</td></tr>
</table>

[24] Assessing non-revenue water and its components: a practical approach, Water 21 August 2003, pp50-51
[25] Nonrevenue Water Management in South Asia: Issues and challenges, WSP 2009

This Table highlights a number of important features of NRW:

- Authorized consumption has two parts: the part that is **billed to customers** (metered and unmetered); and the part that is **not billed** because it is supplied without charge (e.g. to municipal departments and certain customer categories; and because it is supplied to standpipes, fire hydrants, public fountains etc).
- Water losses come in two forms: '**apparent**' or '**commercial**' losses, and '**real**' or '**physical**' losses. Water that is not physically lost, but only apparently lost, includes: water supplied through illegal connections; water stolen for resale; water consumption undercounted by inaccurate meters; and water sales that cannot be invoiced because meter numbers cannot be accurately correlated with customer names and addresses. Physical losses include leaks from reticulation systems (especially service connections); leaks from transmission or distribution mains, and overflow and leaks from service reservoirs. Such leaks typically result from poor workmanship, use of poor materials, and lack of maintenance.

Box C-1: Efficiency of Service

Efficiency of service is measured by the non-revenue water (NRW), the share of connections with operating water meters, and the number of employees per thousand water connections. In five out of the eight cases studied all the three efficiency indicators improved, while in the other three, two out of the three indicators improved. Efficiency of service improved overall, though the extent of improvement varies.

- ***Non revenue water***, which is often an argument used to justify private operation of the water supply service, has decreased in all eight cases as a result of improved bulk and individual metering and/or leak detection and repair by the private operators. But expectations about rapid improvement of NRW have to be carefully managed: obviously, NRW cannot drop overnight with the sole mobilization of a private operator. For the management and lease/affermage contracts documented, NRW dropped more sharply in those cases that either had very high levels before the take-over by the private operator (Barranquilla, Cartagena and Zambia) or where the incentives for the private operator to reduce NRW were particularly high (Barranquilla and Cartagena). NRW can also be expected to drop substantially when the management or lease/affermage contract is implemented in parallel with programs of rehabilitation of distribution networks, and replacement of individual connections, where typically 70 % of the physical leaks can be found. For operations with already relatively low NRW levels (Gdansk and Senegal) further decreases were more difficult to achieve because of the lower cost efficiency from investments in leak detection and repair. The fact that initial expectations in sharper decrease of NRW were not met may have led to the non renewal of some contracts; it seems to have been the case in Amman and even in the Zambian mining townships, where NRW was nevertheless reduced by 25 %age points in about five years.
- ***Metering ratio***. Except in the case of Barranquilla and Zambia, where billing is not systematically made on the basis of metered consumption, the metering ratio has increased significantly. It can be expected that meters will be maintained in good operating order and metering will be more accurate when the operator bears the commercial risk, which is the case in lease/affermage contracts (Antalya and Senegal).
- ***Staffing ratio***. Staffing ratio have decreased in all cases but Gaza and Zambia, but except in the case of Barranquilla (where the operator is company jointly owned by the municipality and a private investor/operator) the total number of staff employed has been reduced mostly by normal attrition. More detailed studies should be carried out to document the evolution of the profile of the staff employed by the operators.

No proper NRW reduction strategy can be planned without the quantification of the water balance components - physical and commercial losses in particular.

Benchmarking the NRW Challenge in Armenia

As reported elsewhere in this Note, NRW in Armenia is in the range 70-85%. This is extremely high by any international comparison. Indeed, a recent World Bank Paper[26] estimated that the average figure for overall NRW levels in the developing world was in the range 40-50 % of water produced, with just over 15% of the 900 utilities on its IBNET database having NRW in excess of 50%.

Why Reduce NRW?

High levels of NRW is one of the major challenges facing water utilities around the world, seriously affecting their financial sustainability through lost revenues and increased costs (operating costs and capital investment). Reducing NRW not only improves financial viability, however, but also has important impacts across a range of stakeholder interests.

Increases Revenues: reducing the commercial losses component of NRW will increase revenues by minimizing the volumes of water supplied to customers that are not paid for, and thereby maximize revenues.

Reduces Operating Costs: Reducing physical losses will reduce the volume of water that is needed to be abstracted, treated and distributed while meeting the same level of customer demand. This will reduce significant variable operating costs such as chemicals and power (pumping).

Reduces Resource and Treatment Capacity Investment: Reducing NRW will make more water available for future growth in demand, thereby reducing the need for major investments in new resources and treatment capacity.

Extends Network Asset Life: optimization of network operation will reduce bursts and leaks, thereby increasing the effective working life of pumps and pipes. The risks of major bursts and network failure will be significantly reduced.

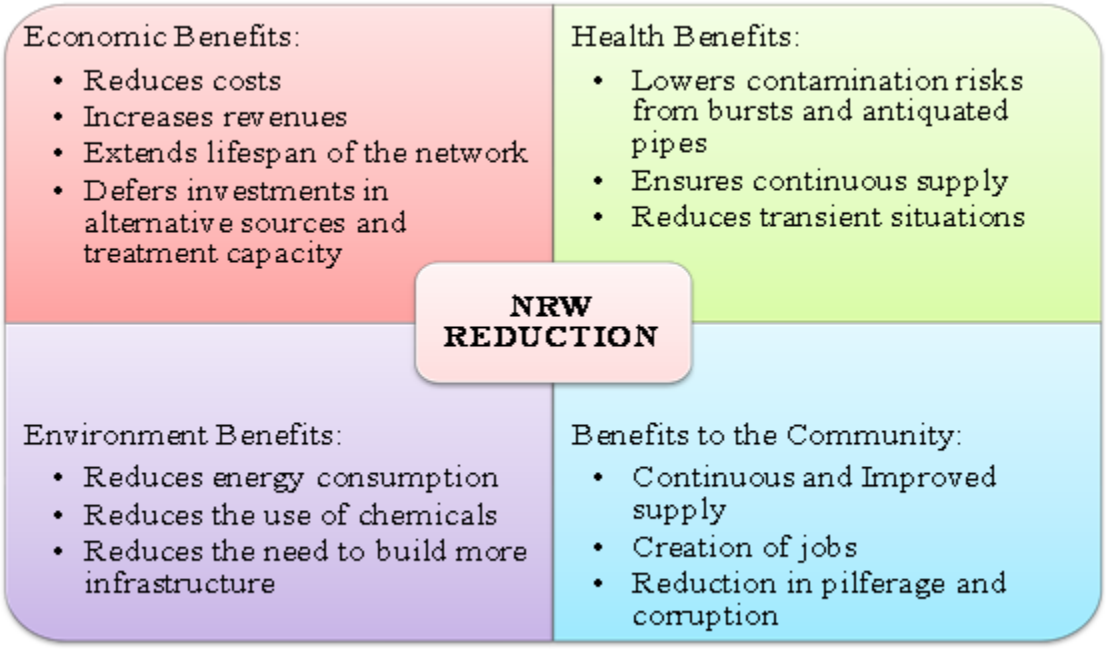
Improved Customer Levels of Service: service continuity and water quality will be improved.

Fairness: would be promoted among customers/users by acting against illegal connections and those who engage in corrupt metering activity e.g. meter tampering, corrupt meter reading.

Economic Growth: more economic growth with new business opportunities would be created for NRW reduction activities, with many jobs created to support labor-intensive leakage reduction activities.

[26] 'The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries'. How the private sector can help: a look at performance-based service contracting. Kingdom, Liemberger & Marin. World Bank 2006

Figure C-1: Reducing NRW is More than Saving Water[27]



The NRW Management Challenge

In spite of these potentially significant benefits, NRW reduction is not a simple matter to implement, and this explains why many utilities fail to address this issue effectively. Not only do new technical approaches have to be adopted, but effective arrangements must be established in the managerial and institutional environment – often requiring attention to some fundamental challenges in the utility. NRW management is not technically difficult, but it is complex. Properly understanding the baseline situation, by developing and calculating a comprehensive water balance, is a critical step in moving toward an effective reduction program.

NRW management also requires a range of skilled staff (managers, professional engineers, street crews, technicians) that is often not widely available. Addressing this issue will require acceptance of these challenges and their consequences – a major initiative will be required to build such capacity. The designer of any NRW program also needs to look carefully at the incentives for the managers and staff of the program, as well as all the parties involved. Any program should ensure that the incentives are properly aligned with the objective of developing an efficient and effective utility that meets the needs of its customers.

[27] Based on presentation: NRW – the Role of the Private Sector by Tami Gaoni-Feldman. World Water Week, August 2009

Outsourcing - Performance Based Contracting for NRW/Leakage Reduction

Classical NRW reduction programs managed by public utilities have tended to rely on separate consultants preparing feasibility studies and preparing design/bidding documents for the procurement of materials, rehabilitation of works, and technical assistance, with the utility then responsible for implementation. Such programs have often proved disappointing in terms of results and efficiency since:

- Many consultants/contractors lack specialized experience.
- Utility implementation is often under-resourced (lack of capacity to implement and coordinate).
- Nobody is accountable ('piecemeal' approach).

As a result there are an increasing number of proponents for outsourcing NRW reduction activities through integrated performance based contracts. Although performance based contracting for leakage reduction and management is still a relatively new concept designed to increase the efficiency and effectiveness of water distribution networks and related operations there are number of high profile examples of the deployment of such contracts: Selangor State (Malaysia), Ho Chi Minh City (Vietnam), Bangalore (India), Sao Paulo (Brazil), Dublin (Ireland) and Bangkok (Thailand).

The concept is to contract a private firm to implement an NRW reduction program with that firm being paid against meeting contractually enforced operational performance measures (in addition to service delivery). In exchange for taking NRW reduction performance risks the private contractor is given enough flexibility and resources to carry out the work according to its best judgment and experience.

After comprehensively quantifying the water balance the utility would let a performance based NRW reduction contract, typically with the following elements:

- DMA establishment works (including DMA design, installation of boundary and pressure reducing valves, and pressure/flow logging).
- Leakage reduction and management services (including leak detection and repair, pressure management, inflow/outflow measurement (baseline measurement and leakage model calibration), meter inspection, and illegal connection detection/reporting).
- Emergency works.
- Technology transfer during maintenance period (utility staff training, technology transfer).

The World Bank, in its Report on performance based NRW contracting (see reference 3) reviewed the structure and performance of a number of such contracts (Bangkok, Selangor, Dublin and Sao Paulo) and summarized a number of important key lessons which should be considered by utilities before entering into such arrangements:

- **Actual Cost and Payback Period for NRW Reduction Activities**: Most of the activities related to reducing commercial losses (e.g. meter replacement, updating

customer database) have quick payback since they require limited investment and rapidly translate into additional revenues. However, the situation is more complex for physical leakage with greater investment being required (e.g. pipe-work rehabilitation or replacement). A figure in the order of US$ 250-300 per cubic meter per day of NRW reduction could be used initially to estimate the required budget for a comprehensive NRW management program and to assess the economically and financially optimum leakage level for the network (where the cost of saving one extra cubic meter equals the actual value of water).

- **Effectiveness of Performance-Based NRW Contracts**: The Bank Study found, despite some contractual weaknesses, that such arrangements can get the job done – provided that resources and incentives are put in place and that the private contractor has sufficient flexibility in the field. Transferring all loss reduction activities and responsibilities to the contractor increased accountability and facilitated better integration and optimization of the various components.
- **Risk Transfer**: Most contracts to date have been "target" contracts (i.e. payment to reach a specific performance threshold) rather than true performance contracts, containing a mix of fixed fees and performance payments. However, they have proved quick to prepare, and delivered major improvements compared with conventional, inefficient approaches.
- **Choosing the Right Leakage Indicator**: Many contracts have been based on measuring leakage reduction in terms of %age of water produced. This has proved fraught with problems due to variations in water production and consumption (including seasonal variations). It is recommended, therefore, to use contract performance indicators calculated in volumetric terms – using simple and objective formulae.
- **Setting Targets -Incentives and the Need for Realism**: Targets need to be set that are realistically, but not too easily, achievable in order to establish an effective incentive framework.
- **Reimbursables – an Expensive Way of Getting Things Done**: Permitting the contractor to charge for civil works on a reimbursement basis (e.g. cost-plus) does not encourage the contractor to reduce quantities and get things done in the most cost effective manner. Better approaches to be considered would be to include leak detection in the contractor's fee or using a classical schedule of rates in the contract for leak repairs and other pipeline installation works.
- **Sustainability**: Ensuring sustainability of NRW reduction gains through appropriate know-how transfer should be an integral element in contract design, along with staff incentivization and management commitment to maintain leakage levels after contract completion.
- **The Problem of Intermittent Supplies**: Quantifying NRW under conditions of intermittent supplies is problematic. Reducing supply hours would lead to a proportional reduction in leakage, but this does not mean that the contractor should be permitted to do this. Conversely, the utility might be able to extend continuity of supply by increasing the water entering the system, but this would likely result in

higher pressures and an increase in leakage – potentially penalizing the contractor and increasing utility operating costs. Finding an acceptable basis for dealing with intermittent supplies will require a thorough assessment of the situation.

Options for Armenia

NRW in Armenia is very high by any standard, resulting in spiraling operating costs, lost revenues, water quality risks, supply interruptions and ultimately the risk of major network failure. As a priority it is recommended that the GOA consider assessing and quantifying its network water balances to better understand the sources and amounts of each NRW component. This will facilitate an evaluation of the economically optimal level of NRW for each network/utility, and development of NRW reduction strategies.

Performance based NRW reduction contracts have been proven to deliver significant improvements in the operational performance of utilities, and have been deployed where deeper forms of PPP (e.g. concession, lease or management contract) are not considered a viable political option. Armenia, however, has already embraced PPP in the water sector, and entered into a number of lease/management contract arrangements. The challenge, therefore, is how best to introduce NRW reduction (to economically optimal levels) into these PPP arrangements. One obvious option would be to modify the current arrangements to include NRW reduction targets and incentives.

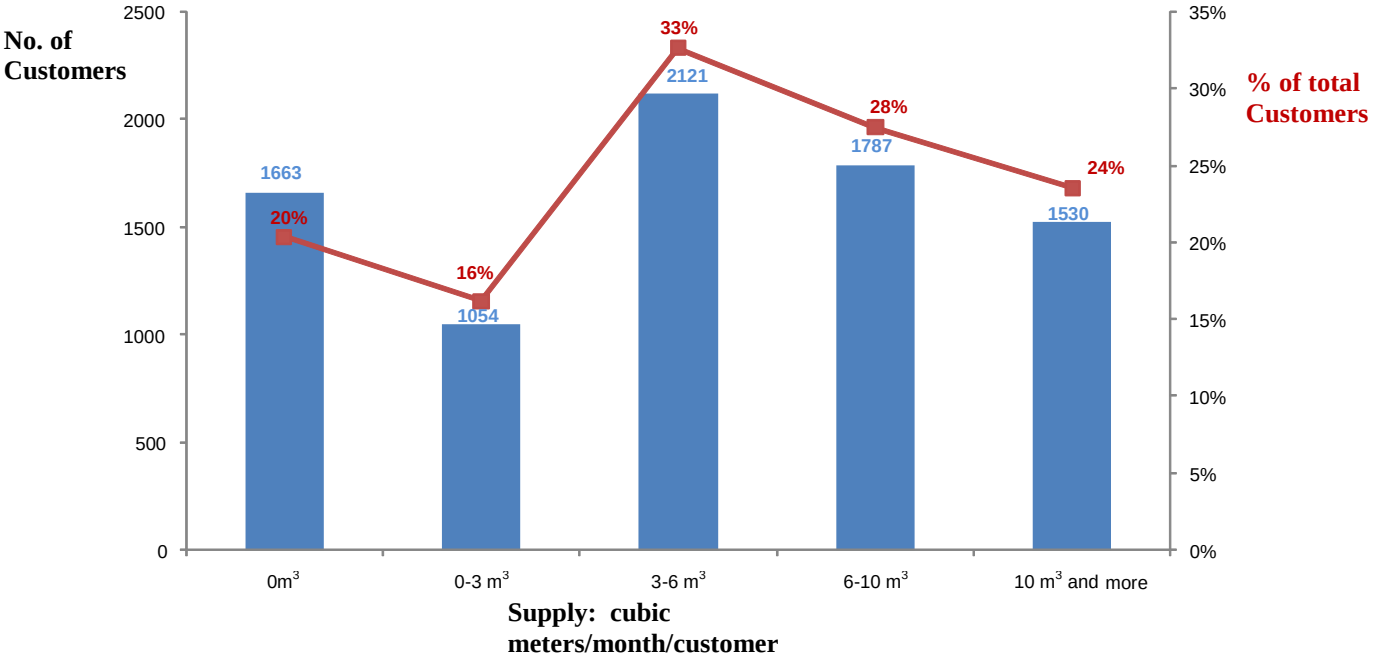
This would require good contract preparation and baseline setting. The Bank could very usefully offer TA funding to undertake this work, including calibration of the water balance and assessment of economically optimal NRW levels/targets. NRW work programs would then need to be fully costed, including likely civil works and meter change programs. Work could also be undertaken to assess the economic value of water saved, including exploring the idea of abstraction charges to capture water resource management costs and subsidies in the cost/revenue structure of the utilities.

Annex 4: SAUR Meter Study: What are we actually measuring?

Analysis of Pilot Project Implemented in Charentsavan Town (August 2008)

A pilot project on water meter testing of resident customers is being implemented in Charentsavan sector of the Company. About 1000 resident customers have been identified with average monthly consumption of about 1-2m^3. The average monthly consumption of resident customers with water meters in "Charentsavan" sector is shown graphically below:

Figure D-1: Analysis of Pilot Project Implemented in Charentsavan Town



All the selected customers have been informed about the project (by memos and local mass media). The water meters of all these customers (installed in the past, and generally of low quality) will be replaced with new high quality water meters by the Company (procured using WB funds). The old water meters are sent to the laboratory of the Company's "Echmiadzin" center for testing.

About 350 water meters (out of a total 1054) have been already replaced and tested in spite of considerable technical difficulties associated with replacing the existing installations. The initial test results of 136 water meters are tabulated:

Number of tested water meters	Compliance with standrts	Non-compliance with standrts	Non-working	Underestimated average monthly water volume (m^3)	Underestimated average monthly water volume per water-meter (m^3)
136	6	109	21	-802,6	7,4m^3

From this we see that difference per customer for monthly volume and monetary amount, because of inaccuracies in the meters, can be as much as 7.4 m^3 volume and, using 140AMD (tariff) per m^3, a cost difference of 1036 AMD.

If we take into consideration that the average monthly consumption recorded by these water meters was about 1.5 m^3 then the correct volume should have been about 9.0 m^3. Moreover, the above mentioned water meters are not anti-magnetic, and have been replaced by anti-magnetic meters, which are less susceptible to misuse.

From this the expected average under measurement for 1000 residential customers will be about 6.0-7.0 thousand m^3 or 850.0-1000.0 thousand AMD (i.e. 6.0 thousand m^3 x 140 AMD). Therefore as a result of broken water meters of residential customers, with average monthly consumption of about 1-2m^3/customer, water is underestimated by 6.0-7.0 thousand m^3 in the "Charentsavan" sector. By extrapolation it is likely that all residential customers with average monthly consumption of about 1-2m^3 will also have the same underestimation of consumption. The number of residential customers with average monthly consumption of about 1-2m^3 is 1,000 in "Charentsavan" sector, while for the whole Company there are 16,500 residential customers. This study only covered 1,000 customers out of the total 16,500 customers receiving 1-2 m^3/month. Clearly this under-measurement is a serious issue and, if similar problems occur (as is likely) with the provision of service to all 100,000 active residential customers, this will have serious implications for the income of the Company.

CONCLUSION

The implication of badly operating and inaccurate meters poses a serious commercial problem for the sound economic performance of the Company. Strong consideration should be given to replacement of meters on a wider scale, with AWSC being supplier and owner of the meters, responsible for long term control and maintenance.

Commercial Director

V. Manandyan

Annex 5: Indicators & Financial Details for Yerevan Djur (Veolia) & AWSC (Saur)

Table E-1: Yerevan Djur Performance Indicators: As of June 1, 2011

Indicator Level	Indicator Name	Data Type	Date	Value
PDO indicator(s)	Increased weighted average of daily hours of drinking water service	Baseline	6/1/2006	19.6
		Current Progress	6/1/2011	21.25
		End of Project Target	12/31/2011	21
	Increased percentage of water samples in compliance with bacteriological safety requirements	Baseline	3/1/2006	93.05 %
		Current Progress	6/1/2011	99.47 %
		End of Project Target	12/31/2011	98 %
	Decreased number of sites in Yerevan Municipality with wastewater discharged into water courses upstream of existing treatment works.	Baseline	6/1/2006	17
		Current Progress	6/1/2011	9
		End of Project Target	12/31/2011	8
Intermediate outcome indicator(s)	Decreased water production (liter per capita per day)	Baseline	3/1/2006	885
		Current Progress	6/1/2011	853
		End of Project Target	12/31/2011	840
	Increased water consumption (liter per capita per day)	Baseline	6/1/2006	151
		Current Progress	6/1/2011	149
		End of Project Target	12/31/2011	140
	Decreased unaccounted for water (percentage of water losses)	Baseline	6/1/2006	86.3%
		Current Progress	6/1/2011	82.52%
		End of Project Target	12/31/2011	82%
	Decreased water production through pumping and gravity supply (ratio)	Baseline	6/1/2006	45%/55%
		Current Progress	6/1/2011	31%/69%
		End of Project Target	12/31/2011	35%/65%

	Increased domestic water metering (as a percentage of domestic subscribers provided with water meters).	Baseline	6/1/2006	89.6%
		Current Progress	6/1/2011	96.8%
		End of Project Target	12/31/2011	96%
	Increased percentage of apartment buildings with water metering (as a percentage all apartment buildings in Yerevan provided with block meters).	Baseline	6/1/2006	
		Current Progress	6/1/2011	95%
		End of Project Target	12/31/2011	96%
	Decreased electricity consumption (increased energy efficiency) (Megawatt hour -MwH).	Baseline	6/1/2006	119*
		Current Progress	6/1/2011	73.3*
		End of Project Target	12/31/2011	94 *

* Cumulative for one year

Table E-2: AWSC Performance Indicators: January-March 2011

	indicators	Unit	Base years	Average 2005	Average 2006	Average 2007	Average 2008	Average 2009	Average 2010	Ith Quarter 2011
1	Weighted average number of daily hours of drinking water service	hours/day	6.04	7.39	9.62	10.98	12.10	13.0	14.0	14.13
2	% of individual subscribers billed on the basis of metered consumption	%	40.2	53.6	57.3	62.5	64.6	73.9	77.2	77.6
3	Weighted average water bacteriological safety compliance	%	93.8	93.8	93.9	96.2	96.6	98.6	98.2	98.8
4	Company working ratio	%	194.9	176.4	138.8	133.8	133.7	106.6	102.4	113.3
5	% of cities with minimal daily hours of services	%	68.1	74.1	80.1	83.9	85.6	80.7	90.1	90.1
6	% of block apartment buildings with individual or common block meter	%	38.6	56.3	61.6	67.5	70.6	76.8	79.9	80.4
7	% of block apartment buildings under contractual agreement with the company	%								
8	Revenue collected on domestic subscribers per registered inhabitant	Drams/month	166	181	242	250	286	396	446	428
9	Collection ratio (excluding budget organizations)	%	47.9	36.2	62.6	72.3	75.9	83.5	89.7	92.7
10	% of subscriber with more than 4 months debt	%	79.5	75.1	76.7	77.8	79.5	78.1	48.9	32.5
11	Average domestic metered consumption per metered registered inhabitant	Liters/cap/day	81	71	75	78	87	87	91	88
12	Average price of m3 metered and billed to domestic subscribers	Drams/m3	100.41	126.80	140.00	140.00	140.00	159.50	179.98	179.78
13	Growth of the total collected revenue (excluding budget organization) from base year	Drams - %	114,568	16.2	46.9	54.8	72.6	119.5	146.2	132.1
14	Ratio of water volume billed on the basis of metering to the total metered and normative billed volume	%	25.0	26.0	47.3	56.2	59.1	64.5	77.8	83.4
15	Average daily production per equivalent registered inhabitant at water catchments levels	Liters/cap/day	668	759	754	790	827	792	742	670
16	Average daily supply to distribution reservoir per equivalent registered inhabitant	Liters/cap/day								
17	Ratio of metered final consumption (m3) to water production at water catchments levels	%	6.8	6.4	7.8	8.1	8.5	9.4	11.6	13.0
18	Working ratio for branches with gravity systems	%	89.7	121.0	97.5	94.5	85.2	65.9	58.0	62.7
19	Working ratio for branches with pumping stations or treatment plants	%	223.3	196.8	155.2	148.9	147.2	115.5	105.0	114.4
20	Electricity cost as % of revenue collected in systems with pumping or treatment plants	%	72.6	63.1	42.6	39.7	39.2	30.8	25.7	27.8
21	Amount of chlorine effectively used per equivalent inhabitant per year	g/cap/year								
22	Total staff per 1000 individual subscribers	u	9.45	8.34	7.15	6.87	6.85	6.9	6.3	6.4
23	Staff and assignment contractors total costs as % of collected revenue	%	70.2	68.9	61.9	61.4	62.2	51.1	49.4	55.5
24	Electricity consumption	kwh/m3	0.43	0.38	0.31	0.30	0.29	0.25	0.23	0.25
25	% of water disinfected	%	60.9	67.8	80.0	90.3	91.2	82.6	78.8	69.7

Table E-3: YEREVAN DJUR (Veolia) Financial Statement June 2010

Yerevan Djur

Financial statements

PROFIT AND LOSS STATEMENT		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Revenues	**ths. AMD**	**4 353 585**	**7 604 763**	**7 954 316**	**7 881 283**	**8 343 826**	**9 730 659**	**10 939 992**	**11 578 317**	**12 027 039**	**12 320 378**	**5 187 478**
OPEX	**ths. AMD**	**-4 545 295**	**-7 139 962**	**-8 314 816**	**-7 531 476**	**-8 193 900**	**-10 137 766**	**-10 022 880**	**-9 882 454**	**-9 674 253**	**-9 120 571**	**-3 885 599**
Electricity	ths. AMD	1 035 230	1 774 191	-1 905 937	-2 012 588	-2 027 640	-1 903 400	-1 723 801	-1 497 472	-1 261 859	-993 803	-299 598
Personnel costs	ths. AMD	-1 427 139	-2 599 805	-2 410 224	-2 953 876	-2 934 083	-2 943 110	-2 942 789	-2 937 702	-2 877 202	-2 780 937	-1 430 822
Lease fee	ths. AMD	-216 213	-148 493	-475 205	-476 257	-477 309	-475 751	-473 322	-470 893	-468 465	-316 859	0
Other operational costs and penalties	ths. AMD	-3 210 309	-5 351 286	-3 002 600	-2 074 273	-2 485 529	-2 430 709	-2 543 354	-2 579 911	-2 617 111	-2 529 095	-1 114 650
Bad debts	ths. AMD	-726 864	-814 570	-520 850	-14 482	-269 339	-344 796	-258 814	-274 059	-284 752	-291 714	-102 060
Costs of new services 1	ths. AMD					0	-1 632 000	-1 664 640	-1 697 933	-1 731 891	-1 766 529	-750 775
Costs of new services 2	ths. AMD					0	-204 000	-208 080	-212 242	-216 486	-220 816	-93 847
Costs of new services 3	ths. AMD					0	-204 000	-208 080	-212 242	-216 486	-220 816	-93 847
EBITDA	**ths. AMD**	**-191 710**	**464 801**	**-360 500**	**349 807**	**149 926**	**-407 107**	**917 112**	**1 695 863**	**2 352 786**	**3 199 808**	**1 301 879**
Depreciation	ths. AMD	-131 413	-208 743	-304 692	-370 642	-379 498	-809 885	-1 046 037	-1 316 227	-1 676 480	-1 805 603	-2 010 119
EBIT	**ths. AMD**	**-323 123**	**256 058**	**-665 192**	**-20 835**	**-229 572**	**-1 216 992**	**-128 925**	**379 636**	**676 306**	**1 394 205**	**-708 240**
Financial result	ths. AMD	91 840	178 529	47 832	-235 179	131 989	-43 251	-63 181	-64 715	-52 837	-27 985	6 263
Profit before tax	**ths. AMD**	**-231 283**	**434 587**	**-617 360**	**-256 014**	**-97 583**	**-1 260 243**	**-192 106**	**314 921**	**623 469**	**1 366 220**	**-701 977**
Income tax	ths. AMD	0	-34 394	17 757	75 472	-21 838	0	0	-48	-195 644	-343 587	0
Net profit	**ths. AMD**	**-231 283**	**400 193**	**-599 603**	**-180 542**	**-119 421**	**-1 260 243**	**-192 106**	**314 873**	**427 825**	**1 022 633**	**-701 977**
check		*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*

		2006	2007	2008	200							
Cash BOP	**ths. AMD**	**0**	**215 692**	**105 700**	**213 100**	**281 653**	**0**	**0**	**0**	**0**	**0**	**0**
Operating cash flows	**ths. AMD**	**-1 595 643**	**532 740**	**324 542**	**-410 004**	**735 956**	**-525 525**	**665 091**	**1 553 834**	**2 045 044**	**2 736 068**	**1 530 644**
- CAPEX	ths. AMD	-1 113 649	-1 665 444	-744 233	-716 003	-784 033	-1 066 820	-1 180 760	-1 080 760	-1 080 760	-858 260	-417 880
- Repayment of Shareholder Loan	ths. AMD	0	-486 223	0	-103 265	-203 217	0	0	-408 359	-911 448	-1 849 823	-629 832
+/- Other (debt and financing)	ths. AMD	2 924 984	1 508 935	527 091	1 297 825	-30 359	1 592 345	515 669	-64 715	-52 837	-27 985	-5 668
Cash EOP	**ths. AMD**	**215 692**	**105 700**	**213 100**	**281 653**	**0**	**0**	**0**	**0**	**0**	**0**	**477 263**
check		*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*	*ok*
Debt outstanding to Veolia	ths. AMD	864 883	422 582	567 969	1 788 233	1 585 016	3 220 612	3 799 462	3 391 103	2 479 655	629 832	0

AWSC: Extracts from Financial Statements of AWSC

The following tables were generated on the basis of accounts received from AWSC by the Independent Auditor, July 2010

Table E-4: Extracts of Revenues and Expenses of AWSC, 2009

Revenues, Expenses		**Year 2009**
Account No.	**Description**	**Amount, 1 000 AMD**
6	**Revenues**	**5,287,038**
61	Operational revenues	4,956,403
62	Non-operational revenues	299,642
64	Revenues from previous year	30,993
611	Operational revenues, services	3,361,814
613	Subsidies received	863,360
614	Other operational revenues	731,229
7	**Expenses**	**13,991,312**
71	Operational expenses	10,406,607
72	Non-operational expenses	2,557,128
74	Expenses from previous year	963,278
75	Profit tax	64,299
711	Operational expenses of sales	3,429,398
712	Commercial expenses	541,446
713	Administration	2,140,474
714	Other operational expenses	4,295,289
7111	Water production and transportation	1,961,258
7112	Distribution of water	877,293
7113	Collection of wastewater	542,604
7114	Treatment of wastewater	48,242
7 minus 6	**Expenses exceeding revenues**	**8,704,274**

Source: AWSC.

Table E-5: Assets of AWSC, 2008 and 2009

No.	Description	Amount, 1,000 AMD	Amount, 1,000 AMD
	Assets	**End of 2008**	**End of 2009**
I	**Non-current assets**		
010	Fixed assets	13,902,910	11,474,036
020	Fixed assets, non-completed	1,607,705	5,873,430
030	Intangible asset	52,852	37,731
040	Investments, shared		
050	Non-current financial assets		
060	Deferred tax assets	-	464,856
070	Other non-current assets	562,956	1,034,696
080	**Total non-current assets**	**16,126,423**	**18,884,749**
II	**Current assets**		
090	Materials	913,139	845,345
100	Animals		
110	Short-life assets	23,897	19,415
120	Work in progress		
130	Products		
140	Goods	191,678	118,858
150	Prepayments	136,989	559,654
160	Debtors	6,388,710	2,888,395
170	Debtors (budget organisations)		595
180	Other debtors	211,334	119,660
190	Current financial assets		
200	Monetary assets	403,743	513,684
210	Other current assets	22,968	24,895
220	**Total current assets**	**8,292,458**	**5,090,501**
230	**Total assets**	**24,418,880**	**23,975,250**

Source: ASWC.

Annex 6: Transaction Adviser – Scope of Works

The following TORs example is given to illustrate the potential areas of support that might be offered by a Specialist Transaction Adviser in helping to develop the proposed AWSC PPP arrangement:

(1) Private Sector Participation (PSP) Situation Review

After initial consultation with the Client, the incumbent Management Contractor (SAUR) and other key stakeholders, the Consultant will develop a situation review outlining the key issues related to effective development of the proposed PPP Lease arrangements. This will be a review of current state of recommendations and previous studies for the proposed Lease contract for AWSC, together with recommendations for implementation:

- A brief appreciation of the current situation.
- An assessment of the key decisions required to be made on key issues to be made including:
  - Program
  - Public/Private risk sharing
  - Service levels, costs and investment and financial viability
  - Tariff, Revenue and subsidy policy
  - Other key issues for success
  - Form of procurement – e.g. Negotiation or Bidding
- Recommendations of an approach for development and finalization of the Lease Arrangement
- Pros and Cons of the inclusion of the 3 Regional Utilities (Nor Akunq, Lori & Shirak) and if appropriate an indicative time plan for its integration into the proposed lease contract.

Note will be taken of the progress made under the existing AWSC Management Contract (MC) together with main potential issues arising for effective development of the Lease Contract. It is anticipated that the Consultant present this review in the form of a presentation with clear recommendations, for decisions to be made by the Client. As appropriate this presentation will have to be made to World Bank and other stakeholders.

The Consultant will organize a Workshop for GOA managers and other decision makers during which the Situation Review will be presented and discussed. The Consultant will make recommendations on the proposed PPP option. Taking account of any adjustments developed as a result of the workshop, the client will give instruction on the approach to development of the Lease arrangement to be used.

(2) Lease Development Program

Following agreement on key issues and decisions to be made, the Consultant will prepare a program for the Lease Development. This will be time bound and include milestones on key decisions, and tasks by the Client and other stakeholders. This Program is to be accompanied by a detailed assessment of those areas of support to be given by the Consultant, and required inputs by the Client and his advisers.

(3) Development of the chosen PPP Lease Arrangement

The Consultant will develop draft contract for the chosen PPP arrangement, based on the Lease contract for Yerevan with a view to development of a new Lease Agreement that will follow World Bank procurement approach, take into account experience gained in Yerevan. In particular this will require a careful and diligent assessment of the Yerevan contract, its shortcoming and proposals for future improvement and incorporation, as appropriate, of best international practice.

Although it is the prerogative of the Consultant to determine the most suitable approach for contract development, it is strongly recommended that the Consultant make use of the Term sheet approach for development and agreement of key contractual principles. These Term Sheets will be presented to the Client and following review and agreement to be used as the basis from which to develop the fully detailed contract form.

To assist in the detailed Lease design, the Consultant will carry out a detailed review of those key issues that need to be determined to further develop the proposed arrangement. These will be used to obtain client understanding and agreement, and to serve as the foundation of future contract procurement. The Consultant to determine the exact content, but these may include (but not be limited to):

a. Overall form , structure, design, details and contract term of the PPP scheme
b. Operation and Maintenance standards
c. Technical standards/approach for equipment or items for operator investment
d. Outline of potential investment and cost requirements for O&M and equipment
e. Risk sharing and responsibilities for public and private sectors
f. Financial assessment of the Lease Arrangement over the life of the contract
g. Performance and payment indicators and method of application
h. Contractual approach, including potential for contract adjustment to meet longer term variations of scheme environment or scheme development (e.g. to adapt to future construction phasing). Include review of legal issues for PSP procurement.
i. Method of monitoring and regulation

This section of the ToR will be used for discussion and agreement on key issues during the course of the project preparation. It is intended to be a practical working document, for reference and development purposes. It will be presented in the form of an overall Scheme Approach Report in bound paper and in electronic versions.

(4) Initial Draft Lease Contract

The Consultant will prepare a detailed Draft Lease Contract. This will be conform to Armenian law, accommodate procurement regulations and be to the standard of international best practice. Agreement on detailed legal issues will be reached with the Client's legal advisers. Detailed work on contract drafting and document production will be carried out by the Client's local advisers, under instruction from the Consultant. This Draft Lease Contract and associated documents will be used by the Client as part of the bidding documents for Procurement either through negotiation or competitive bidding.

Final agreement on contract form will be given by the Client. The Draft PSP Contract will be presented in paper and electronic form.

(5) Private Sector Consultation

A key element of the proposed approach to any PSP development will be consultation with the private sector (including the current MC operator, SAUR) to ensure most effective and realistic development of this PSP Arrangement, through their comments and suggestions for improvement.

This input will be sought in areas related to potential scheme optimization, particularly with regard to matters that will affect long term Operation and Maintenance and among others can include opinion and comment on:

a) Overall scheme design prior to implementation
b) Review of Lease form
c) Acceptable risk levels
d) Levels of Service
e) Level of investment or financing
f) Revenue, Tariff , subsidy and financial viability
g) Operational & technical issues
h) Comments on contractual approach
i) Comment on issues affecting long term scheme effectiveness and scheme viability
j) Likely level of private sector interest in the proposed project, and any issues affecting attractiveness
k) Other issues affecting success

Although this consultation is prior to the formal contract procurement process, the highest levels of transparency and even handedness must be applied in this consultation process.

Regardless of whether the process is an open competitive tender or a negotiated process, the Consultant will keep a written record of all contacts with the private sector on these issues, with comments and suggestions for Lease development.

(6) Support for Operator Selection & Appointment

The Consultant will provide support services to assist the Client in dealing with potential Operators and Operator selection, during the Procurement stage. If Procurement through Competitive Bidding is decided on by the Client after the situation review then additional services would have to be defined, and form the basis of an addition to this current assignment, subject to mutual agreement of terms and conditions.

The Consultant is required to, as part of his Technical and Financial Proposal; clearly identify what additional costs (if any) this would imply. Some of the areas of support that could be the subject of these potential additional services could include support in:

a) Development of Bidding Approach to include advice on development of the chosen Bidding approach;

b) Prequalification to include, as appropriate preparation of an evaluation scheme for short listing PPP contractors, to be agreed with Client; advise on and prepare form of call for Prequalification for publication by the Client; and review and evaluate submissions for Prequalification, for decision on short listing by Client; and

c) Data Room establishment and recommendations on information to potential Bidders.

(7) Bid Evaluation and Negotiation Support

The Consultant will review an evaluation of bids received against the agreed evaluation plan, for review and final decision by the Client. The Consultant should provide support to the Client during any tender negotiation with the successful bidder.

Whilst detailed Client approval for the procurement approach will not be reached until the approval of the Program Review, the following areas of support by the Consultant are envisaged if a negotiated approach is taken with SAUR the incumbent operator,:

- Support to GOA in discussions and negotiations with the operator
- Review and evaluation of Contractor Proposals, with recommendation for GOA
- Revision and final drafting of Lease Agreement.

Annex 7: Proposed Capital Investment Plan (US$100 million) for AWSC Service Area and Expected Results

ADB: Preliminary Investment Plan (70-80% accuracy) for the 2nd "Water Supply and Sanitation Sector Project» envisaged to be implemented by the ADB resources is as follows:
USD 40 mln. is the Loan, USD 10mln is the RA Government co-financing, Total is USD 50 mln.

A. Capital Investment in the WSS, Civil Works: USD 46 mln.

No.	List of the Subprojects	Town	Adjacent villages	Investment Amount, USD
1	Improvement of Aragatsotn Region Settlements Water Supply Systems	Talin	Aruch, Partizak, Nor Amanos, Areg, Baroj, Gyaltho, Hakko, Sorik, Qaraberd	**3,100,000**
2	Improvement of Ararat Region Settlements Water Supply Systems	Vedi, Ararat	Ararat, Aygezard, Verin Artashat, Mrganush, Shahumyan, Azatavan, Baghramyan, Byuravan, Burastan, Dalar, Dimitrov, Nshavan, Vosketaph	**7,100,000**
3	Improvement of Amavir Region Settlements Water Supply Systems	Echmiatsin**	Amberd, Aygeshat, Dasht, Doghs, Lernamerdz, Haythagh, Musaler, Shahumyan	**6,200,000**
4	Improvement of Geharqunik Region Settlements Water Supply Systems	Gavar**, Martuni**	Noaratus, Gandzak, Sarukhan, Karmir Gyuh, Lchashen, Chkalovka, Norashen	**7,400,000**
5	Improvement of Tavush Region Settlements Water Supply Systems	Noyemberyan, Berd	-	**3,200,000**
6	Improvement of Lori Region Settlements Water Supply Systems	Alaverdi, Tashir**, Stepanavan	Arevatsag, Dzynasogh, Mikhaylovka, Dashtadem, Shnoh	**6,400,000**
7	Improvement of Kotayq Region Settlements Water Supply Systems	Hrazdan, Tsahkadzor	Akunq, Artavaz, Hatsavan, Gehadir	**4,500,000**

8	Improvement of Shirak Region Settlements Water Supply Systems	Artik**	Anushavan, Getap, Hovtashen, Mehrashen, Nor Kyanq, Vardaqar, Phanik	**3,600,000**
9	Improvement of Syunik Region Settlements Water Supply Systems	Kapan**, Meghri	Khot, Halidzor, Shinuhayr, Ishxanasar, Spandaryan, Xalaj, Syuniq	**3,700,000**
10	Improvement of Vayots-Dzor Region Settlements Water Supply Systems	Vayq, Jermuk		**800,000**
11	Consulting Services for the Engineering Design, Construction Supervision and Public Outreach Program, which are included in each Subproject as a Capital Investment (about 5% of the Civil Works)			**0**
Sub Total		**17**	**60**	**46,000,000**
B. Management, Institutional Improvements and Special Equipment procurement part of Investment : USD 4 mln.				
1	PMU staff Remuneration, Incremental Costs, other equipment, training for the PMU staff, individual consulting services est.			**4,000,000**
Sub Total				**4,000,000**
Total				**50,000,000**

WB: Preliminary Investment Plan (70-80% accuracy) for the 2nd "Water Supply and Sanitation Sector Project» envisaged to be implemented by the WB resources is as follows:
USD 15 mln. is the Loan, USD 3 mln. is the RA Government co-financing, Total is USD 18 mln.

A. Capital Investment in the WSS and other Civil Works: USD 9.8 mln.

No.	List of the Subprojects	Town*	Adjacent villages	Investment Amount, USD
1	Improvement of Masis Town, Ayntaph village and Region Settlements Water Supply	Masis	Ayntaph	**2,700,000**
2	Improvement of Echmiatsin Town and Region Settlements Water Supply	Echmiatsin**		**2,700,000**
3	Improvement of Artashat Town and Region Settlements Water Supply	Ashtarak	Karin, Karbi, Sasunik, Ohanavan	**2,700,000**
4	Tipical Structures Rehabilitation (Branch office's buildings and DDR's)			**1,500,000**
5	Head Office Rehabilitation			**200,000**
6	Consulting Services for the Engineering Design, Construction Supervision and Public Outreach Program, which are included in each Subproject as a Capital Investment (about 5% of the Civil Works)			**0**

Sub Total		**3**	**5+**	**9,800,000**
B. Management, Institutional Improvements and Special Equipment procurement part of Investment : USD 8.2 mln.				
1	Water Metering Systems			**700,000**
2	Special Equipment, Machinery and IT Equipment			**1,200,000**
3	Automatization of Pumping Stations and DDR's			**500,000**
4	Collection and adjustment of Customer's Database (50%)			**500,000**
5	Inventory of Assets/System (50%)			**500,000**
6	Leasing Contract Preparation			
7	Management Contractor’s Expenses for 2 (two) years			**4,000,000**
8	PMU or AWSC professional staff Remuneration			**300,000**
9	Procurement of Loggers, Water Meters, Coagulators, Quartz, Chlorine and est.			**500,000**
Sub Total				**8,200,000**
Total				**18,000,000**

EBRD: Preliminary Investment Plan (70-80% accuracy) for the 2nd "Water Supply Project» envisaged to be implemented by the EBRD resources is as follows:
about USD 30 mln. (21.1 mln. Euro) is the Loan, about USD 6 mln. (4.2 mln. Euro) is the RA Government co-financing, Total is about USD 35 mln. (25.3 mln. Euro)

A. Capital Investment in the WSS, Civil Works: about USD 34.1 mln. (20 mln. Euro)

No.	List of the Subprojects	Town*	Adjacent villages	Investment Amount, USD
1	Improvement of Ijevan Region Settlements Water Supply Systems	Ijevan		**4,000,000**
2	Improvement of Azatamut village and Region Water Supply Systems		Azatamut	**800,000**
3	Improvement of Dilijan Region Settlements Water Supply Systems	Dilijan		**5,200,000**
4	Improvement of Akhtala Region Settlements Water Supply Systems	Akhtala		**1,000,000**
5	Improvement of Spitak Region Settlements Water Supply Systems	Spitak		**1,800,000**
6	Improvement of Jrashen village and Region Water Supply Systems		Jrashen	**500,000**

7	Improvement of Tashir Region Settlements Water Supply Systems	Tashir**		**2,100,000**
8	Improvement of Artik Region Settlements Water Supply Systems	Artik**		**2,100,000**
9	Improvement of Sevan Region Settlements Water Supply Systems	Sevan		**2,000,000**
10	Improvement of Chambarak Town and Region Settlements Water Supply Systems	Chambarak		**1,200,000**
11	Improvement of Gyavar Region Settlements Water Supply Systems	Gyavar**		**1,600,000**
12	Improvement of Sarukhan village and Region Water Supply Systems		Sarukhan	**800,000**
13	Improvement of Martuni Town and Region Settlements Water Supply Systems	Martuni**		**1,600,000**
14	Improvement of Byurehavan Town and Region Settlements Water Supply Systems	Byurehavan		**800,000**
15	Improvement of Abovyan Town and Region Settlements Water Supply Systems	Abovyan		**1,000,000**
16	Improvement of Kapan Town and Region Settlements Water Supply Systems	Kapan**		**3,800,000**
17	Improvement of Djermuk Town and Region Settlements Water Supply Systems	Djermuk		**3,800,000**
Sub Total		**14**	**3+**	**34,100,000**

B. Management and Institutional Improvements part of Investment : about USD 1.9 mln. (1.1 mln. Euro)				
1	International Company's Consulting Services for Management, Engineering Design, Construction Supervision and Public Outreach Program			**1,900,000**
Sub Total				**1,900,000**
Total				**36,000,000**
Grand Total				**104,000,000**

*** - Towns WSS Rehabilitation Works under the WB and EBRD Subprojects includes also the adjacent Villages, which rehabilitation is also extremely important for the total Water Supply System**
**** - For the Towns, which repeats in the different Donors Lists, the Civil Works for the Rehabilitation of the WSS are exactly different and properly separated**

Annex 8: SCWS views on 560 Communities not serviced by Water Supply and Sanitation Companies

Current Situation

Currently 560 vulnerable communities comprising more than 800 thousand people (around 25% of population of the Republic) are not serviced by the water supply and sanitation companies. Due to lack of financial resources, required technical facilities and lack of maintenance the water supply systems are in a critical state or don't even exist. In some villages water is being taken from joint taps or supplied once per 3-4 days. Furthermore in most of these villages the water is being supplied without disinfection. Only 5% of these communities are connected to centralized sewerage systems. Another problem is that currently drinking and irrigation water systems are not separated.

Starting from 2000 the main support forms of International Financial Institutions were directed to the development of communities covered by the water supply and sanitation companies. By different reasons the aforementioned 560 communities were not covered by these projects. So as a fact there is an inequality between the communities inside and outside water supply company service areas. This situation is becoming even worse and the problem is getting more urgent as the time passes and reforms are being made in communities covered by water companies.

Legal and Institutional Framework

The water sector of the RA is regulated by the Water Code of the RA, the Government decree N 130-N of 22.01.2004 and other legal acts. But the current legal framework doesn't fully regulate the field, e.g. defining tariffs, regulation procedures, usage of water systems etc. Regarding the Institutional framework there is a lack or absence of operational and maintenance bodies. Taking into account the aforementioned the issue of rehabilitation of water supply and sanitation systems is included into the Priorities of Government of the RA for 2011.

Key Issues Requiring Attention

The key issues which need an urgent regulation regarding these communities are the following:

- Researching and making necessary changes in the legal framework, which involves specification of the real water supply requirements and strengthening the implementation mechanisms. It also includes development of participation mechanisms of the Government, local communities and other beneficiaries, development and specification of subsidy approaches etc;
- Development of Institutional Approaches, including formation and development of the appropriate institutions, training of staff, technical support etc;
- Evaluation of investment needs and definition of priorities; and

- Development of concept of sewerage and treatment local systems by using the best practices of other countries.

Annex 9: Gdansk Case Study: **The impact from Management and Lease/Affermage Contracts**

General Background

Gdansk is a historical city on Poland's Baltic coast and the seat of the Union of Baltic Cities; its population is around 500,000. Poland's Gross National Income reached US$ 6,050 per capita in 2004 but is expected to grow faster than the European average following the country's accession to the European Union in 2004. Water supply and sewerage operations in Poland are a municipal responsibility. Polish cities are subject to the policies of the European Union that, among other matters, stipulate that user charges have to cover the full costs of water supply and wastewater services. Poland has signed the Baltic Sea Environment Program whose which has the objective to restore the Baltic Sea to its ecological equilibrium.

Motivation for Private Sector Participation

The driving force behind the City of Gdansk employing a private operator was the fact that Poland faced increasing pressure to comply with the stricter quality standards for potable water and wastewater effluents. The city fathers looking ahead to an eventual membership in the European Union observed the progress in their neighboring countries such as Germany and Sweden and felt the need to contract with a state-of-the-art private operator. To this end they started negotiations in 1991 with the French operator SAUR. Gdansk was the first city in Poland to award such a contract and at the time the risks were not negligible for a private operator. For one thing, water services in Gdansk dated back to the 1860s and sections of the network were older than 100 years. It was uncertain what the replacement needs would be and how these costs would be financed. In addition, the City of Gdansk had some particular objectives:

- The rules and regulations had to be updated to European Union standards;
- The city wanted to undertake a customer survey to determine if the services provided were within the economic means of the population;
- In order to pay for the upgraded services it was decided that tariff revenue would have to increase to cover at least 100 % of costs. It was not certain that a municipal water supply and sewerage department, subject to the political pressure, would be able to meet this challenge.

Contracting Procedures

Negotiations with SAUR lasted two full years and were concluded in 1993 when the City of Gdansk signed a joint venture contract with SAUR. A special company, SAUR Neptun, was created of which SAUR owned 51 % of the shares and the City of Gdansk 49 %. The staff of the city water supply and sewerage department was transferred to the new company. SAUR Neptun's Board of seven members had to make decisions at a

majority of 75 % minimum. The ownership of infrastructure assets and the financing of investment in rehabilitation and expansion remained the responsibility of the City of Gdansk, acting on the recommendations of SAUR Neptun. SAUR, for its part, undertook to operate and maintain the water supply and sewerage infrastructure, supervised all new investment; and set up a modern commercial system, including billings and collections services. SAUR Neptun was to be paid out of collections and to remain profitable throughout the contract period.

By being bound to the joint venture contract, SAUR Neptun was subject to the City Municipal Laws of 1996 that define the requirements for utility services, and commercial and non-commercial rights of the joint venture. It was further obliged to abide by the requirement of the Polish Ministry of Housing on water quality and on protection of the environment. The country's water laws require licenses for the extraction of ground water that supplies 70 % of the water to Gdansk, and on the discharges of treated effluents that end up in the Baltic Sea and, therefore, had to conform to the applicable international conventions.

SAUR Neptun had to contend with a series of deficiencies that were not readily apparent at negotiations. At the time of the take-over, potable water quality was low and the failure rates of the existing infrastructure were high due to the poor operating and maintenance standards. Water pressure was at times so low that water did not reach above the second floor of houses in certain sections of the city. Equally serious, the standards of sewage treatment were deficient and meant that, if continued, Gdansk would breach Poland's international commitments under the Baltic Sea Environment Program.

Evaluation of the Performance of the Private Management Operator

The operating performance is shown in graphs 1 to10 and is summarized below:

- Water supply coverage was maintained at 100%;
- Sewerage coverage was also maintained at 100%; however, the treated effluent standards have risen to conform to European standards;
- Per capita supply was reduced from 295 lcd to 140 lcd and per capita consumption from 230 lcd to 115 lcd. The drop has created financial pressure on the utility and forced tariffs higher to produce the necessary revenue to cover costs. The phenomenon of sharply reduced per capita consumption has been observed in the Baltic countries as well and is expected in all former command economies that have adapted to a market economy with higher efficiency;
- Continuity of water supply was maintained at 24 hours and water pressure was improved;
- The share of samples taken at the treatment plant testing negative for pathogens rose from 96.0 % to 98.5 and 100%;
- The non-revenue water (NRW) dropped from 22 % to 19 %. The slight reduction could be explained by the concurrent sharp reduction in per capita consumption and supply. A certain level of leakage will always remain and

will account for a higher proportion of water production as consumption levels drop;

- The share of water supply accounts with operational water meters rose from 68 % in 2000 to 78 % in 2005;
- Staff productivity improved from about 23 employees per thousand water supply accounts in 1992 to below 20 employees in 2005. The decrease in the staffing ratio was possible through natural attrition as staff retired;
- The collections ratio rose to reach close to 100 % in 2005. The accounts payable decreased from 93 days of billings in 1993 to 36 days in 2000. Bills become due for payment 14 days after they are issued; and
- The financial working ratio (operating costs/cash collections) has been kept at 94 %; however this ratio is not based on the tariff that is paid by customers but on the share of the tariff that is retained by the Operator.

In summary, the Operator has improved ten out of ten performance ratios.

Lessons Learnt

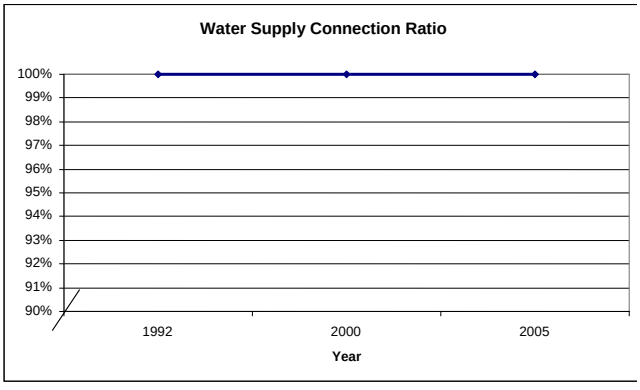
The Gdansk case offers three lessons:

(i) The timely financing of the investment program is critical for the success of management and lease/affermage contracts. It is also essential that the Operator plays a key role in deciding which investment has to be made to improve the service; additionally, it is beneficial to take full advantage of a the efficiency of a private operator to expedite procurement of works and goods financed by the asset holder. In the case of Gdansk, the City took on itself to guarantee adequate financing. This was facilitated by the fact that, at the beginning of the contract, service coverage was already 100 % for both water supply and sewerage. Also as Poland joined the European Union, it gave the City of Gdansk access to concessionary funding to develop its wastewater treatment capacity.

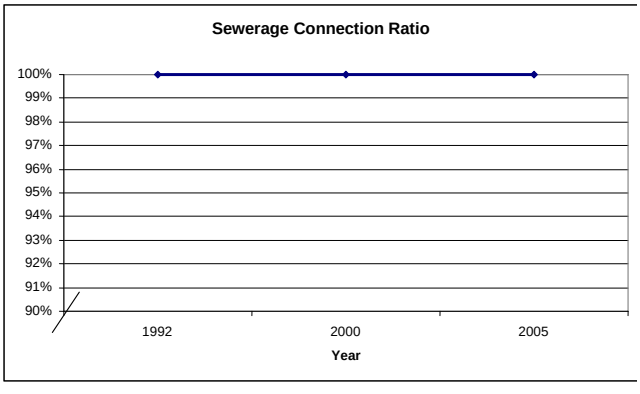
(ii) The drop in per capita consumption observed in Gdansk could be applicable not only to former command economies that adjust to market economic conditions, but also to grossly inefficient utilities in developing countries. The reduction puts upward pressure on tariffs because of the smaller sales volume. On the other hand, the reduction in supply is welcome since it imposes a lower pressure on the environment and on the need to treat wastewater.

(iii) Private sector can best be structured in a win-win framework where both the private and public partners benefit and where the respective partner's incentives are aligned with the improvement of service quality and sustainability. The Gdansk case certainly illustrates this fact: the City of Gdansk contracted with a state-of-the-art operator who in turn found a new market outside its saturated home market.

1. Gdansk



2. Gdansk



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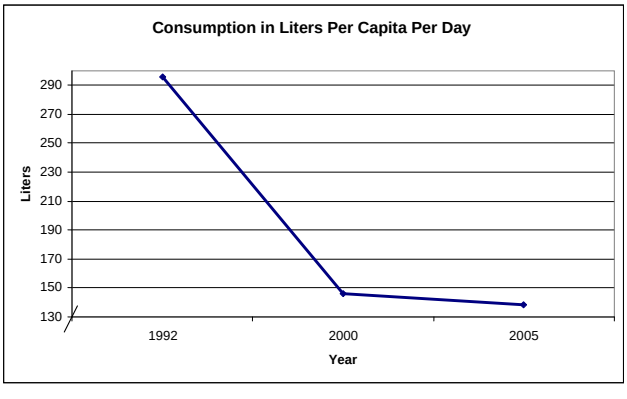

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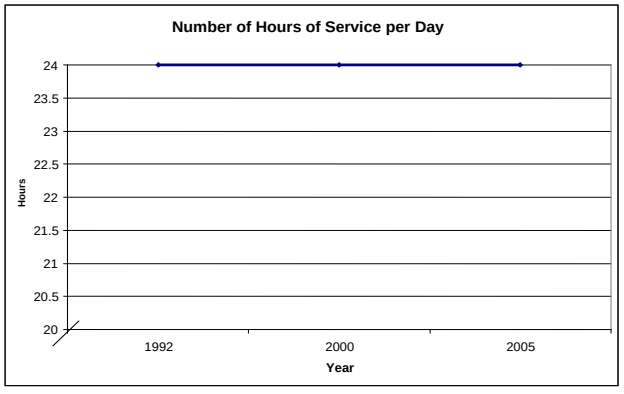

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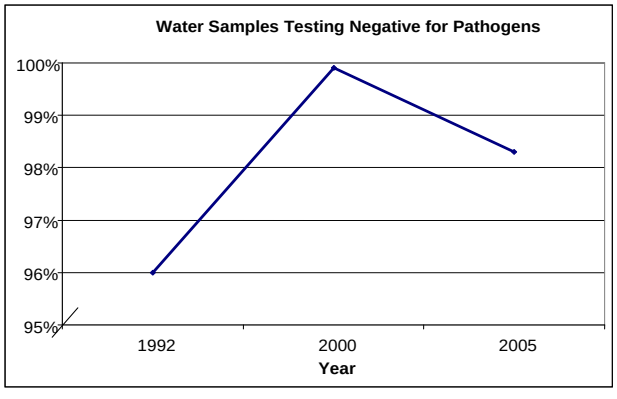

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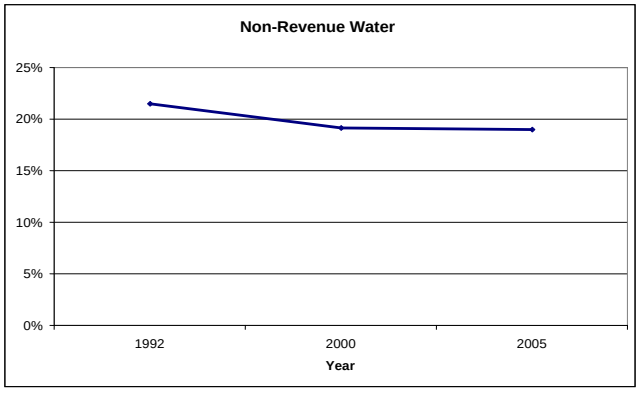
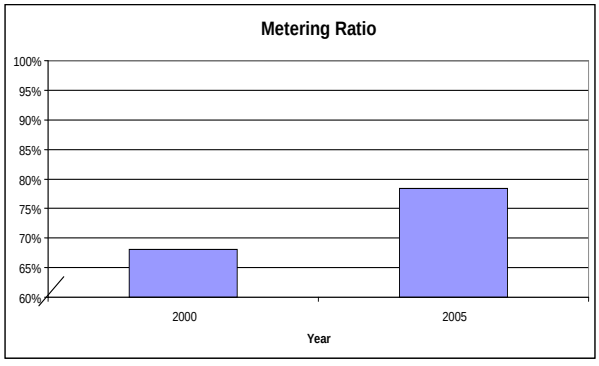
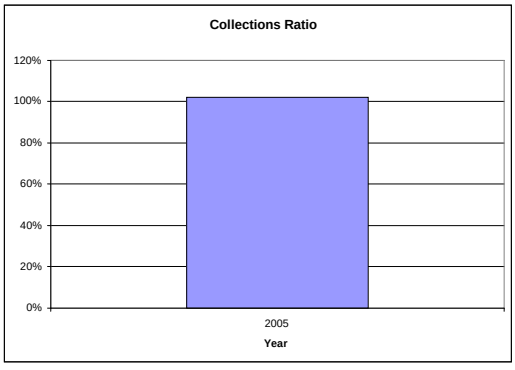


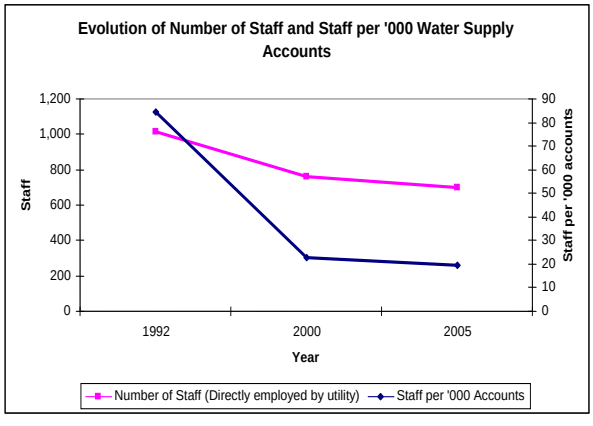
7. Gdansk



9. Gdansk



8. Gdansk



Communication Initiative

Over the past years AWSC has implemented targeted public relations programs, campaigns and pilot projects. The goal of the PR programs was to improve communication with the customers and increase the quality of provided service. All the implemented projects and campaigns were successful due to visible results registered at the end of each year. Many of the implemented projects were conducted jointly with AWSC departments (commercial, exploitation, etc).

Some of the pilot projects/initiatives conducted together with the commercial department had considerable impact on AWSC revenue. These projects varied with their size and shape, they included both published and broadcasted formats.

Certainly, the most successful PR initiative still remains to be the drawing of lots for customers that regularly pay their bills. The idea of rewarding regularly paying customers was initiated by SAUR, AWSC Management Contractor in 2008 and is continuing up till now.

Since October 2008 every four months AWSC organized a drawing of lots and awarded 300.000 AMD (around 1000USD) to four customers who have installed water meters and made payment for the past four months.

Drawing of lots live broadcasting on Armenian Second TV Channel

AWSC General Director presents prizes at award ceremony

However, when this initiative marked its first anniversary in 2009, SAUR, as a Management Contractor added two additional prizes, thus making total 6 prizes (two customers per each of the three AWSC regional branches).

This successful initiative is unique in its form because it stimulates customers to regularly make payments and, what is more important, spreads the word about becoming a good customer.

The results are also visible- at the end of 2010 the number of regularly paying customers increased from 38,000 to 110,000.

AWSC will continue this initiative in 2011. Moreover, to make it more attractive for customers, starting this year there will be 10 prizes which AWSC will award to one customer from each marz/region of Armenia.

Annex 11: Map of the Republic of Armenia