

The Miya Solution – A Technical Guide

Miya is a leading global provider of comprehensive solutions for urban water efficiency. Miya’s solution is based on best-practice methodology developed by the International Water Association (IWA).

Overview

In 1996, the IWA formed the Water Loss Task Force (WLTF). The Task Force was mandated with the task of standardizing the terminology and procedures used to carry out a water balance audit, as well as to develop clear and meaningful performance indicators to assess both the operational and financial performance of a water utility with respect to water loss.

The outputs of the WLTF’s activities involved:

- ◆ A standard water balance using international terminology
- ◆ Performance indicators to assess the functioning of the water utility
- ◆ Strategies for water loss reduction

Many international standards have been developed using the IWA approach to water loss management. In addition, the strategies advocated by the WLTF became the best “practical approach” to reducing water losses in many countries.

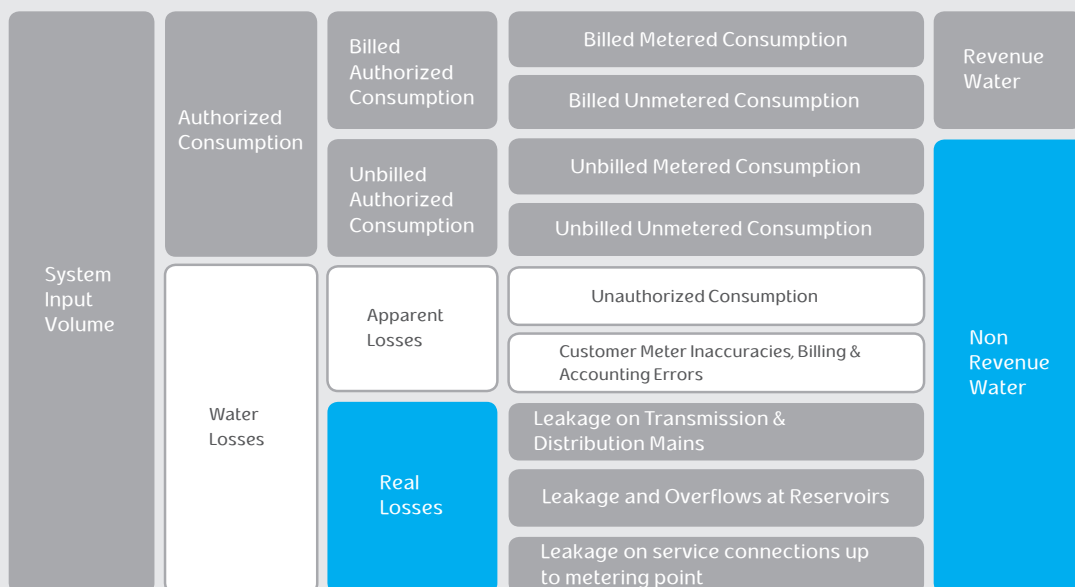
A Standard Water Balance

The major challenge facing water utilities and municipalities is how to deal with high levels of Non-Revenue Water (NRW). NRW is the gap between the amount of water put into the distribution system and the amount of water for which customers are actually billed.

High levels of NRW reflect huge volumes of water being lost through leaks (real/physical losses), water not being invoiced or not being accurately measured (apparent/commercial losses) or both.

A water balance audit details how much of each type of loss is occurring and how much it is costing the water utility. The key concept behind this approach is that water should not be “unaccounted-for”.

In conducting a water balance audit, a quantity is determined for the major components of water consumption and water loss, and a price is placed on each component in order to assess its financial impact on the water utility. A detailed and accurate water balance forms the basis for an effective NRW management strategy.



Strategies for Water Loss Reduction

The 4 Component Approach

The '4-Component' diagram, shown below, is widely used to explain the types of activities that are effective in managing real and apparent losses.

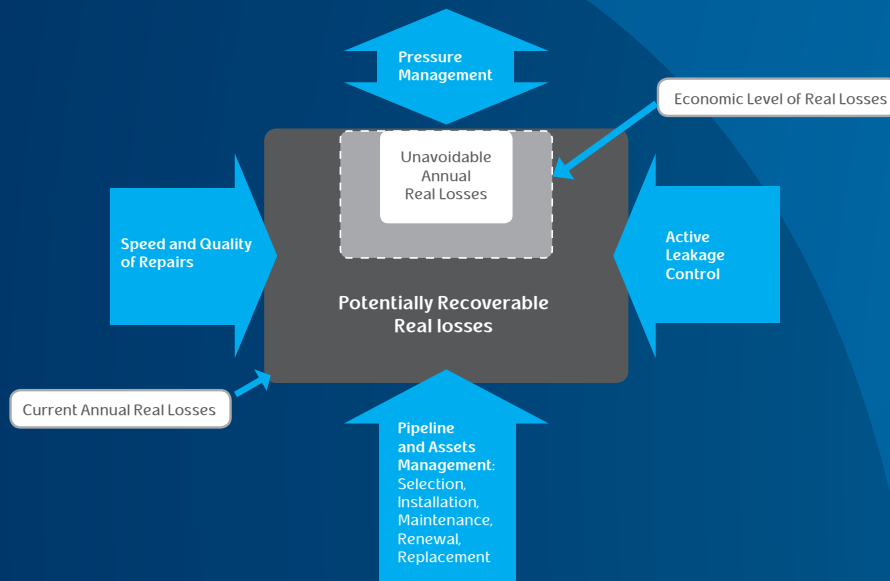
Managing Real Losses

Real losses cannot be completely eliminated. The lowest technically achievable annual volume of real losses – for well-maintained and well-managed systems – is known as Unavoidable Annual Real Losses (UARL). Based on an appropriate combination of all four activities involved in leakage management (shown as arrows in the diagram),

real losses can be kept to a minimum. In modern systems three of these methods have proved themselves to be more cost-effective in the short term than pipeline and asset management:

- Active leakage control
- Improvement of speed and quality of repairs
- Optimization of the pressure management in the system

In systems which were built from poor quality materials or which suffer from substandard installation practices, it is often necessary to consider medium and long term solutions which include pipeline and asset management.



Managing Apparent Losses

The following four components make up the IWA management strategy for apparent loss:

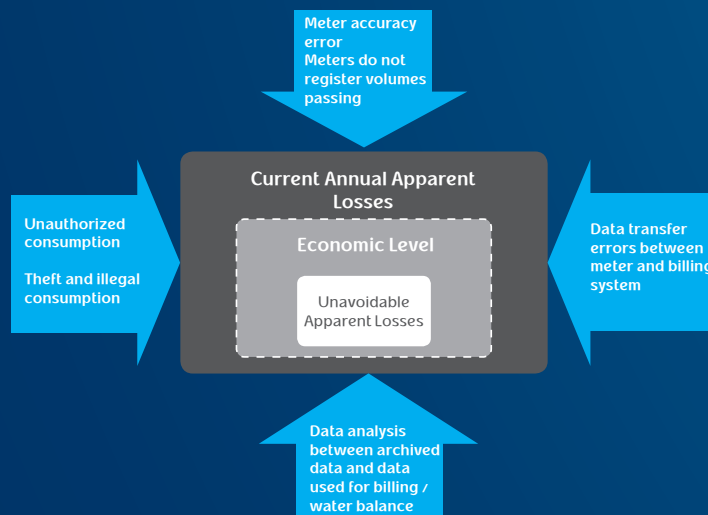
- Customer meter inaccuracies
- Unauthorized consumption, illegal connections, theft and fraud
- Data analysis errors, between archived data and data used for billing
- Data collection and transfer errors between meter and the billing system

Commercial losses should be no more than a few percentiles of authorized consumption. Combating

commercial losses does not require substantial financial resources, but rather demands a firm commitment on the part of the utility management, political will, community support and incentives.

Dealing with all four components in a coordinated fashion will result in reducing the annual quantity of apparent losses to an economic level.

In some cases it is recommended that commercial loss reduction be the first step in an NRW reduction strategy, since it requires a relatively low investment and can result in immediate payback.

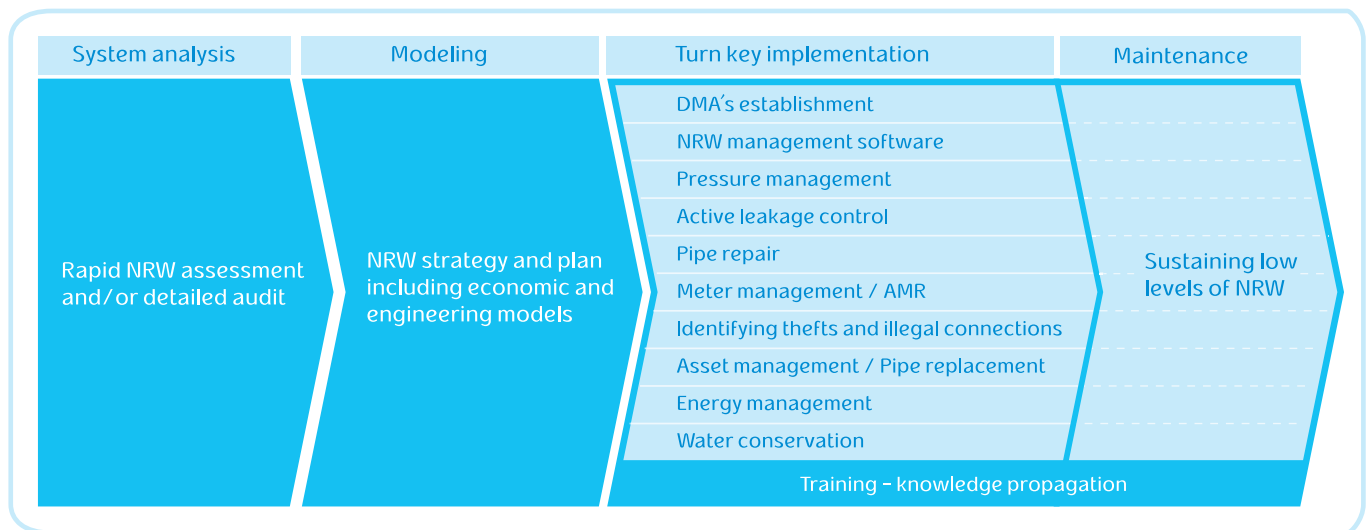


Miya's Scope of Services

Miya offers comprehensive solutions to municipal water utilities in the field of urban water efficiency, through turn key projects – from network audit to full implementation, management and maintenance.

Miya's projects usually include all or some of the following services, as well as additional services that may be required for specific projects:

A typical Miya project flow



Rapid NRW Assessment

Properly understanding the baseline situation is a critical first step in moving toward an effective NRW reduction and management program. The rapid NRW assessment, usually considered as top down, is an initial report that includes an initial crude water balance, water loss performance indicators, NRW problem analysis and an outline of the steps which need to be taken to rectify the situation.

Water Loss Audit

A water loss audit is a detailed and accurate assessment of the water loss status of the water utility. An audit is comprised of a detailed data review and analysis, combined with actual measurements and investigations to determine the level of real and apparent losses and its components. The water loss audit report consists of a detailed water balance, in-depth water loss performance indicators, and a comprehensive problem analysis. It forms an excellent basis for the development of an NRW management strategy.

Development of Short and Long Term NRW Management Strategies

A short term NRW management strategy determines the required managerial and technical changes that must be implemented to best utilize the current system. Once the short term NRW management strategy has been successfully executed, capital intensive projects – such as selective infrastructure replacement – can be put into effect. The goal of this phase is to ensure long term sustainability.

Design and Implementation of Network Zoning and District Metered Areas (DMAs)

Large distribution networks, especially those with poor infrastructures, cannot be managed efficiently without breaking them down into network zones and subzones (DMAs). This is essential in order to obtain a comprehensive understanding of the water consumption and water loss within the various parts of the network. When this information is available appropriate actions can be taken. DMAs will substantially reduce leakage awareness time and are a prerequisite for effective prioritization of leak detection and repair activities.

NRW Management Software

NRW management software provides tools to effectively manage NRW operations. The software tools enable:

- Top down and bottom up analysis of DMA data
- IWA Water balances at the DMA and higher levels
- Prioritizing and managing of leak detection activities
- Area performance reporting and thematic mapping tools
- An asset performance tool for analyzing network asset performance
- A rehabilitation planning tool
- Building and maintaining hydraulic models
- Recording and viewing the status of events occurring in the network.

These software packages interface with a wide range of existing systems including SCADA, logger databases, GIS, CSS, Work Management and billing systems.

Pressure Management

Pressure management is considered the single most beneficial and important leakage reduction activity because of the direct pressure/leakage relationship. Another benefit of pressure management is the reduction in burst frequency and therefore an extension of the asset's lifetime. This involves reducing excess pressures and avoiding pressure fluctuations. Miya group companies have developed and implemented the most advanced pressure management systems available today, and Miya regularly invests in ongoing research and development to improve pressure management solutions and technology.

Active Leakage Control

Invisible leaks account for more than 90% of the total volume of real losses. Small hidden leaks, which often run for years, lose more water than even the most dramatic surface bursts. Active Leakage Control is comprised of well-targeted and properly-managed leak detection activities to locate hidden leaks, communication strategies to encourage the utility's customers to immediately report visible leaks and effective work management to ensure speedy and good quality repairs.

Integrated Customer Meter Management

By introducing good customer meter management – which is usually comprised of condition-specific meter selection, testing, maintenance and replacement – meter under-registration can be kept to a minimum and consequently revenues can be maximized.

AMR

AMR (Auto Meter Reading) / AMI (Advanced Metering Infrastructure) enables frequent and more accurate data transfer of metered information. It enables improved analysis of the status of individual meters, customer leaks and frauds. At the network level, AMR provides tools for enhanced Water Loss analysis, ongoing water balance and identification and localization of bursts. Consequently, AMR improves NRW management at all levels.

Improvement of Meter Reading and Billing Efficiency

Improvement of the flow of information from meter reading to data transfer to the billing process, will lead to a very rapid improvement in billed volume and increased revenues. Apparent losses related to these activities are often underestimated.

Regularization of Illegal Connections

Working hand in hand with the utility to educate its customers in regard to the benefits of a regularized water connection is an important part of water loss management. Where permitted by law, illegal connections, which are often based upon sub-standard materials, should be disconnected.

Energy Management

Miya's holistic program of energy efficiency improvements addresses shortcomings and minimizes the carbon footprint of water. Energy efficiency is achieved by:

- Physical improvement of the network
- Reducing physical losses (leakage) in the system
- Optimizing the operation of the network

Water Conservation

Water conservation is a complimentary activity which is important to decrease water demand. Miya can train utilities and communities to develop water conservation strategies with programs such as:

- Water use profiling
- ICI water audits
- Residential end use analysis
- Verifications of pre/post-replacement savings
- Toilet replacement programs
- Outdoor / peak day assessment
- Other appliances – flow control
- Grey water recycling

Training

It is Miya's mission to propagate knowledge to water utility practitioners, in order to ensure the continuation of best practice Water Loss Management during the project period and even after Miya's service term comes to an end. The sharing and transfer of knowledge is carried out by training the water utility management and staff, maintaining high involvement throughout the process and even integrating with the work teams to ensure that the know-how is used optimally by the utility.

Maintenance

Once the NRW management strategy has been successfully implemented, water losses have been reduced, effective distribution network information has been collected and the water utility has improved its efficiency, Miya offers long term NRW maintenance projects in order to ensure that NRW levels will remain consistently low for the long term.

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