

## Non-Revenue Water

Custom solutions for water utilities to reduce leakage and optimise pipe network management.



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Non-revenue water (NRW) is water that has been produced but cannot be billed. The loss can be the result of leakage or overflow (sometimes referred to as physical losses), theft of water or inaccurate metering (so-called apparent losses), or free use e.g. for firefighting.

Calculations suggest that more than US\$ 14 billion is lost every year by water utilities around the world due to NRW. The World Bank recommends that NRW should be less than 25% of the total water produced, while in many countries NRW is up to 60%. High levels of NRW are detrimental to the financial viability of water utilities and pose an extra burden on paying customers.



*Non-revenue water is a tremendous financial burden to water utilities and their paying customers*

### One integrated solution for non-revenue water management

DHI develops hydraulic models that allow managing the pipe network most efficiently, thereby reducing losses, cutting maintenance costs and increasing the percentage of distributable water. Reproducing the pipe system, the models help to respond to pipe breaks and leaks and optimise pressure control for sustainable leakage reduction. Moreover, DHI's concept provides a unique module that will calculate what level of leakage is economically feasible for the water utility (Economic Level of Leakage; ELL).

## SUMMARY

### Client

Water utilities

### Problem

- High leakage
- Inefficient maintenance of pipe network
- Customer complaints
- Financial losses

### Solution

Hydraulic models identify critical parts of the system and optimise pressure control, including an active and economic leakage management.

### Benefits

- Reduced leakage
- Reduced operation costs
- Increased profits
- Satisfied customers

### DHI offers

- Water loss and leakage assessment (Water Audit)
- Designation of leakage monitoring districts
- Analysis and interpretation of leakage data
- Detection, location and repair of leaks
- Pipework Rehabilitation Plan (PRP)
- Operation and maintenance

### Moreover, DHI's models comprise

- External data collection (SCADA, invoicing, GIS, metering, etc.)
- Performance indicators
- Economic Level of Leakage (ELL)
- Night flow evaluation
- Graphical User Interface (GUI)
- Many other convenient features

Solution Software by DHI provides seamless integration with MIKE URBAN and the modular structure enables integration with asset management, billing and SCADA systems. The integrated structure allows for tailoring of Solutions to meet specific

customer needs. Solution Software provides an open and scalable environment and combined with dedicated customer support ensures sustainable solutions.

## Water Audit: What are we dealing with?

To calculate a water balance, you need to know its components. The Water Audit traces the flow of water from the site of withdrawal through the distribution system and into the customer properties. Thereby, losses become apparent.



Some of the possible various components building up the structure of a Water Audit, following the IWA/AWWA-methodology (adjusted). Within these components, water volumes are tracked, revealing weak spots and losses.

The Water Audit moreover tells us how much of each type of loss occurs and how much it is costing the water utility. DHI's concept provides tools for development and on-line evaluation of the Water Audit according to the IWA/AWWA-method developed jointly by the American Water Works Association (AWWA) and International Water Association (IWA).

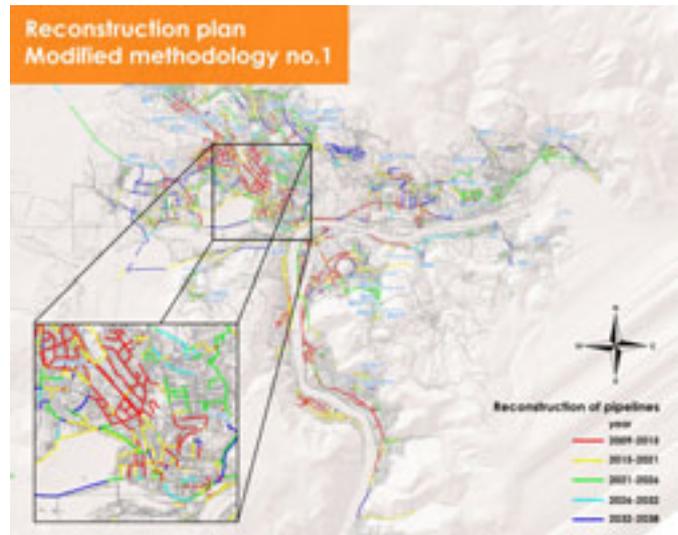
## Minimum Night Flow Monitoring: Where is it happening?

Monitoring water flow in relatively small parts of the distribution network can provide a snapshot of the real losses. This is usually done during night hours, when water consumption is at its minimum and real losses are a higher percentage of total flow. Minimal night consumption in a selected area (e.g. District Meter Area, DMA) is calculated from the type of development and number of house connections. The inflow is then temporarily metered by conducting a drop test in a reservoir or by installing flow meters. Flow changes are recorded while altering the selected area by closing certain valves, thereby isolating individual subsections.

## Pressure control: The right pull

Pressure control is a very effective means of reducing background leakage in distribution networks. Pressure control also reduces the frequency of bursts and generally results in a better service to customers. A well calibrated hydraulic model optimises the pressure

control. It tunes the wide variety of valves available for pressure reduction and maintaining, flow modulation, etc.



The water distribution system of Usti n/L, Czech Republic. The pipe network rehabilitation is part of the leakage management and is one of the most expensive tasks that the water utility needs to address. Advanced DHI modelling techniques help to prioritise and optimise investments.

## General Rehabilitation Plan: Sustainable management

High leakage together with high failure rate is one of the characteristics of deteriorated pipelines. Reconstruction of the water supply network is therefore an essential part of an integrated water loss management plan, especially after exhaustion of other leakage reduction methods.

An economical evaluation of the reconstruction strategy depends on the cost of leaking water and the reconstruction efficiency. The hydraulic model helps to set the right priorities and optimise the reconstruction procedure.



Reducing non-revenue water will benefit all: water utilities, their customers and ultimately also the environment.