Reduction of Water loss in municipal water supply systems
Presentation issues

• Water Balance / What are the components of unaccounted for and real losses

• Ways to reduce the water loss in the water supply systems

• Methods for estimating water loss

• District Metered Area (DMA)
## Water consumption and water loss

<table>
<thead>
<tr>
<th>System Input Volume</th>
<th>Authorised consumption</th>
<th>Billed Authorised consump.</th>
<th>Billed metered consump.</th>
<th>Revenue Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metered input to the network that the utility corporation pays for</td>
<td>Authorised consumption</td>
<td>Billed Authorised consump.</td>
<td>Billed un-metered consum. (building contractors)</td>
<td>Revenue Water</td>
</tr>
<tr>
<td>Water losses</td>
<td>Unbilled Authorised consump.</td>
<td>Unbilled metered consum. (synagogues, churches)</td>
<td>Unbilled un-metered consum. (fire dept, clean lines &amp; pools)</td>
<td>Non Revenue Water</td>
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<td>Water losses</td>
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<td>Unauthorised consumption</td>
<td>Inaccuracy in metering</td>
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<tr>
<td>Real Losses</td>
<td>Leaks from mains</td>
<td>Leaks from connections</td>
<td>Reservoir spillover</td>
<td>Non Revenue Water</td>
</tr>
</tbody>
</table>
Putting it in perspective

Authorised consumption

Water losses

Apparent losses Unaccounted for

Real Losses

Billed metered consumption

Billed unmetered consumption such as building contractors

Unbilled metered consumption (synagogues, churches)

Unbilled unmetered consumption fire dept, clean lines, pools

Unauthorised consumption

Inaccuracy in metering

Leaks from mains

Leaks from connections

Reservoir spillover

The average in Israel 90%

10% 10% 50% ??

10% ? 50% ? 50% ?
The term “unaccounted for”
The total metered water entering the system, minus the total metered water to the consumers, divided by the total metered water entering the system.

**Recommendation:**
- Try to estimate each component
- Reduce the significant components
- Create a unified terminology for the various components
How to reduce water losses

Theoretical

- Pressure Management
- Speed and Quality of Repairs

Economic

- Active Leakage Control
- Pipeline and Assets Management: selection, installation, maintenance, renewal, replacement

Improve the accuracy of measuring
What is ILI
Infrastructure Leakage Index

The relationship between the large (grey) square and the small (dotted) square

ILI = 1 Excellent. We have reached the unavoidable loss.
ILI = 2-4 Good.
ILI = 4 and above There is a lot to improve.

Tell me what’s your ILI? I’ll tell you what are you worth?
Methods for estimating water losses

- Percentages
- ILI
- Loss up to the point of the consumer
- Loss by kilometer of pipeline

Recommended

Examine the various methods used in the world. Determine which methods are best applied to your needs.
Data Accuracy and Data Availability

Current situation (in Israel):
Gathering data from utilities once a year
Publishing the data in September the following year

Is this really acceptable in the 21st Century?

Recommended
- Calculate water losses on a bi-monthly basis and publish the report immediately.
- In A.M.R systems, continuous monitoring and observation.
Measuring pressure in municipal water systems

- We have thousands of points where we measure flow rates
- We have very few points where we measure pressure

Recommended:

Install pressure gauges points with transmitters

What is not measured is not under control!
Dividing the network to District Metering Areas (DMA)

DMA’s are the worldwide new trend — to divide the municipal water network into smaller areas for best locating and controlling water losses.

Is this appropriate for your network?

What is the optimal area for measuring?

How many consumers’ connections per AMR?

How to plan and implement this approach?

How far the network division, lowers the supply reliability?
Additional Points to Consider

Municipal water system pressure - 25-60 meters.
  • Are these numbers “holy”?

Acceptable background leaks as defined by the WLTF --- 250 liters per kilometer per day
  • Can we really accept this number?
ADVANCED MANAGEMENT OF WATER & SEWAGE NETWORKS

DISTRICT METERING AREAS

PRESSURE REDUCTION

CONTINUOUS MONITORING ON WATER QUALITY

ISO 9001; ISO 14001

INDUSTRIAL SEWAGE-QUALITY CONTROL

SEWAGE TERTIARY TREATMENT

WATER LEAKAGE LEVEL BELOW 5%

SEWAGE LEAKAGE DETECTION
ADVANCED MANAGEMENT OF WATER & SEWAGE NETWORKS

A.M.R systems

GIS AND INTEGRATED INFORMATION SYSTEMS
Summary

• Water Balance / What are the components of unaccounted for and real losses

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