Water Distribution Management and reduction of NRW

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Water Distribution a big problem in SE Asia!!!

Many places NRW above 50 %

NRW in Denmark 6,8%, actual loose 1,8 %.

You are really wasting money and fine water!!!
The solution is not a matter of pipe replacement or more bad excuses!!!

Ex. from Malaysia, who at least has done some thing

The average NRW went up with a couple %
To 42 % in the same period???

<table>
<thead>
<tr>
<th>STATES</th>
<th>NRW (%) (2001)</th>
<th>RM (mil.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kedah</td>
<td>43</td>
<td>100</td>
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<tr>
<td>Perlis</td>
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<td>Penang</td>
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<td>Melaka</td>
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<td>20</td>
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<tr>
<td>Labuan</td>
<td>32</td>
<td>14</td>
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<tr>
<td>Total</td>
<td></td>
<td>546</td>
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</tbody>
</table>

It is a matter of better management:
If you introduce some:

**Water Distribution Management system (WDMS)**

- Reduce NRW
- Save energy
- More stable supply
- More safe water quality
We have many years experience from Denmark and projects in East Asia

- Watertech and local companies JV in Vietnam and Thailand.
- From July 2005 also in Malaysia and Philippines.
- Focus on Non Revenue Water and network management.

Mao Ming, China

“Nobody know what is going on in the system”

You need to do some Action and come into Control!!!!

Action = right decisions <-> need good information!

You need as many data from the system as possible

For overview of many data: Databases and GIS!

Statement: What you don’t measure you can’t control!

You need to Separate the system and Measure and use these information in better operation!
**Water Distribution Management Software**

*By VidaGIS and Watertech!*

**Long list of Tools and Action in WDMS:**

- Data collection/databases and GIS
- Network computer model
- Leakage detection and repair
- Leakage database = condition of the system
- Renovation and investment plan
- Split up in DMA’s or LCZ’s or sections
- Instrumentation and telemetry in each DMA
- Monitor new leaks and fight them
- HR development = making awareness

**HR development?**

Making awareness of taking care on all levels in the Water Supply!
WDMS: Pipe Registration System

Functionalities:

- Data importing from billing system
- Meter registration in WDMS:
  age, size, type/class, accuracy
- Ex. List of meters > 7 years old
- Consumption statistics

WDMS: Meter Management System
AQUIS Network model:
A computer model of the system for calculations all over the distribution system:
- Pressure
- Flow
- Water quality and age
- Leakage distribution
- Surge and water hammer

Network Hydraulic Modelling

AQUIS Online Scheduler
- Online network model calculations by use of measurements from all RTU’s
- Flow and pressure alarms

Leak detection applications IFM/NLM
- Leakage detection
- Time series analysis
- Minimum night consumption (NLM)
- Sum up water consumption the last 24 hours (IFM)
- New leakage
- DMZ surveillance and alarms
Benefits in daily operation from AQUIS model:

Control the pressure:
- Reduce leakages
- Reduce energy for pumping
- Customer satisfaction
- Prevent bursts

Better and safe water quality:
- Chlorine content
- Age of the water
- Prevent and control pollutions

Benefits in planning and investments from AQUIS:

Use AQUIS to make the best sections and to monitor leaks.

Minimize new investments
- Expansion of pipe systems
- Pumping stations
- Reservoir capacity

Optimize rehabilitation
- Rehabilitation by need and condition
- Optimize design when rehabilitate
WDMS: Leak Management System

Functionalities:
- Leak registration database
- Water Balance for area and DMZ's. Update automatic
- Performance indicator (liter/service connection/pay).
- Prioritized list of leakage levels for each DMZ
- Updated Flow and Pressure profiles of DMZ's

WDMS: Leak and water balance

IWA Standard Water Balance

DMA Flow Profile
Pressure Management
Always control pressure in relation to consumption!

The VLT Drive maintains a constant pressure in a closed loop
WDMS: Rehabilitation Plan

Functionalities:
- Extension and Renewal planning
- Budget next 5-10-? years
- Design of future pipeline need before rehabilitation

Water Distribution Management Software
Developed by VidaGIS and Watertech

List of primary functionalities in WDMS:
- GIS
- Pipe registration
- Leak management and registration
- Pressure management
- Water meter management
- Rehabilitation Planning
- Costumer report management
- Data communication to data sources (pipe registration, billing etc.)
Thisted Water Supply – a Danish show case

- Thisted Water Supply had a NRW of 34%
- In 1999 Watertech setup a master plan for leakage reduction to 10% in 5 years
- First activity was to build and calibrate AQUIS network models
- Leak detection and repair
Leakage Control Zones in Thisted

- 14 LCZ
- District meters (flow and pressure) has on-line connection to SCADA
- Leakage control data via Internet on-line to Watertech
- After 4 years NRW is reduced to below 10%.

AQUIS applications used in Thisted

- AQUIS Hydraulic/Quality
- AQUIS online scheduler
- Leakage detection
  - NLM og IFM
- Leakage localisation
  - 7SEAS
- Instrument analyser
- AQUireS

*The total installation is running at the Watertech ASP server*
Leakage localisation – 7SEAS

TIP: Illegal tap looks like leakage, but are variable in flow, so go and find them!

Using Internet and our ASP-server you have always updated information and can run AQUIS models and Leak Detection your self or with support from Watertech and partners.

Customer login
We can send you an e-mail when and where you have to look for leakage in your system.

New leakages down to 2 m³/h can be located.

Project in Chun Buri, Thailand

- Chun Bury under PWA
- Produce 24 mill. m³/year
- Our local JV Thai Danwater Ltd. works for PWA through
  - NCNP leakage reduction
  - New Master Flow meters
  - AQUIS network model
  - LCZ/DMA planning and demo
  - Pumping operation and pressure management
  - Manuel leakage detection
  - Leakage repair (PWA)
Chun Buri

- NCNP – No Cure No Pay Project
- Payment every 3 months based on leakage reduction
- Contract period is 3½ year
- First 4 months used for calculation of start level of leakages
  \[ W_t \]
- Calculation of leakage % = \[ \frac{W_t}{W_t - W_f - W_c} \] \times 100

Chun Buri

- Extensive network with lots of loops
- Non Revenue Water 35 % now, should come below 20 %
  - Good economy in reducing NRW – variable production cost is 4 THB per m³ and selling price is around 10 THB per m³
- Pumping operation 24 h full speed – Fill and draw.
Savings in cost from operation make the pay back time
1 - 2 year!

Saving by design for rehab. and expansion pay back
after first big investment !!

We are ready to talk “NO CURE / NO PAY“ finance

Thank you for your attention!