

Water Distribution Management and reduction of NRW

**Managing Director Jens Pedersen,
Watertech Ltd. Denmark.**

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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

Pipe Replacement, Leakage Control and
Treatment Plants Rehabilitation Projects
2001 to 2005

STATES	NRW % (2001)	RM (millions)
Kedah	43	100
Perlis	39	10
Penang	22	15
Perak	37	20
Negri Sembilan	45	42
Melaka	34	85
Trengganu	32	23
Kelantan	46	20
Pahang	43	140
Sabah	62	55
Sarawak	27	20
Labuan	32	16
Total		546

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

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

Water Distribution Management system (WDMS)

- Reduce NRW
- Save energy
- More stabile supply
- More safe water quality

We have many years experience from Denmark and projects in East Asia

- Waternet 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!

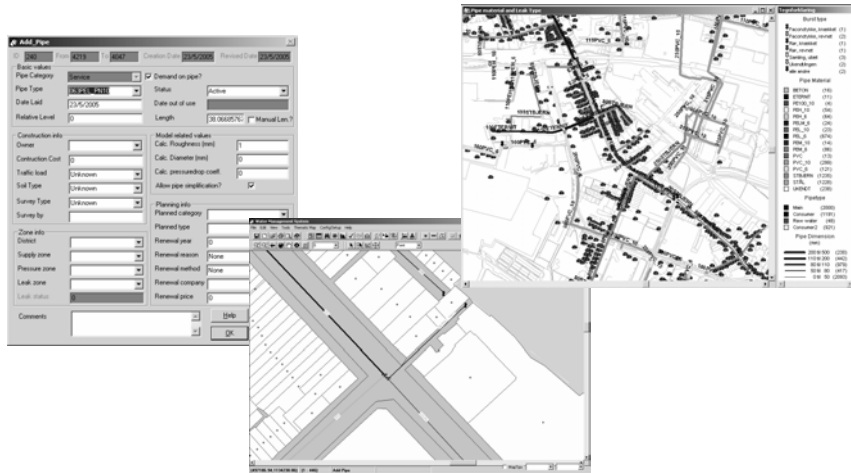
Long list of Tools and Action in WDMS:

- 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



WDMS: Meter Management System

Functionalities:

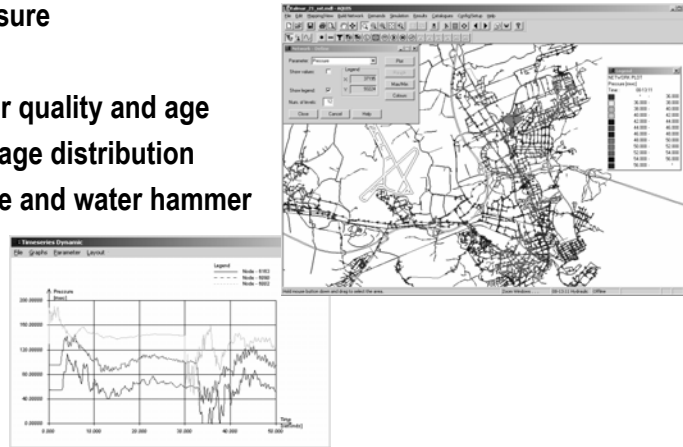
- Data importing from billing system
- Meter registration in WDMS:
age, size, type/class, accuracy
- Meter change report system:
Ex. List of meters > 7 years old
- Consumption statistics



AQUIS Network model:

A computer model of the system for calculations all over the distribution system:

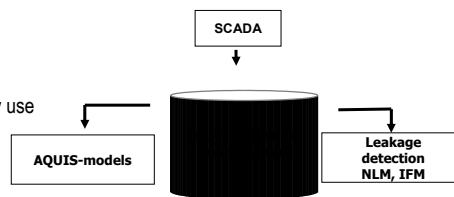
- Pressure
- Flow
- Water quality and age
- Leakage distribution
- Surge and water hammer



Network Hydraulic Modelling

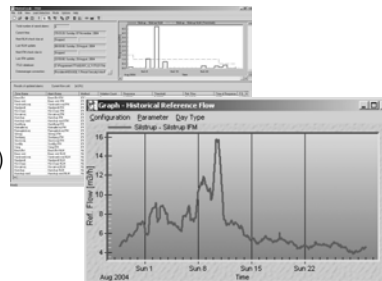
AQUIS Online Scheduler

- Online network model calculations by use measurements from all RTU's
- Flow and pressure alarms



Leak detection applications IFM/NLM

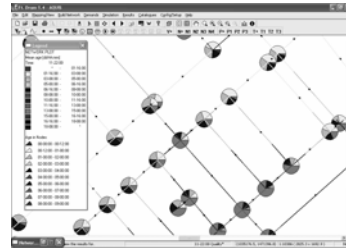
- Leakage detection
- Time series analysis
- Minimum night consumption (NLM)
- Sum up water consumption the last 24 hours (IFM)
- New leakage
- DMZ surveillance and alarms



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

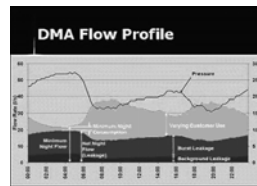
Functionalities:

- 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



IWA Standard Water Balance

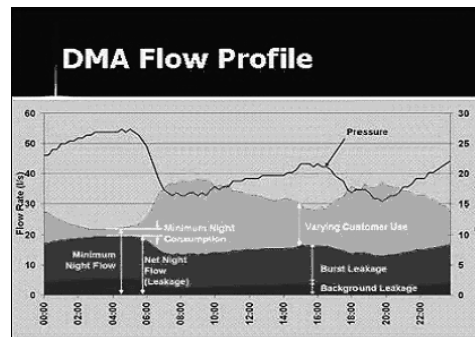
System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
	Unbilled Authorized Consumption	Unbilled Metered Consumption	Unbilled Unmetered Consumption	Non Revenue Water
Water Losses	Apparent Losses	Unauthorized Consumption		
	Real Losses	Customer Meter Inaccuracies and Data Handling Errors		
		Leakage on Transmission and Distribution Mains		
Leakage and Overflows at Storage Tanks		Leakage on Service Connections up to point of Customer Meter		



WDMS: Leak and water balance

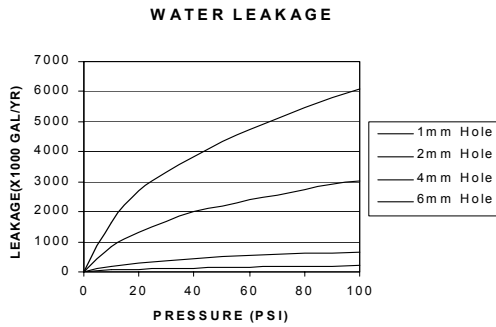
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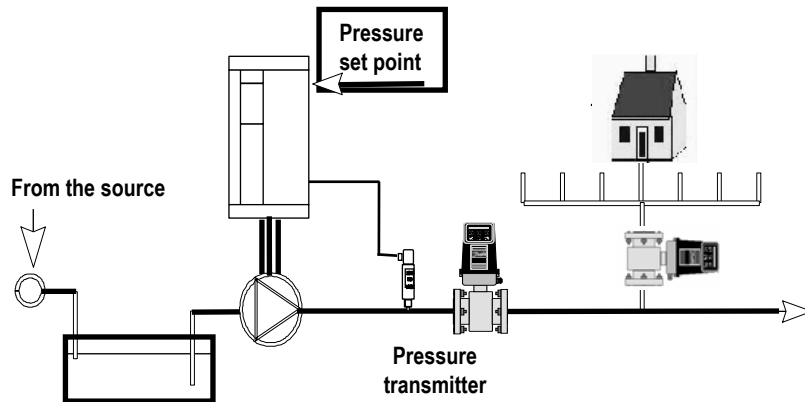


Pressure Management

Always control pressure in relation to consumption!



The VLT Drive maintains a constant pressure in a closed loop



WDMS: Rehabilitation Plan

Functionalities:

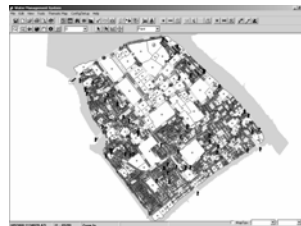
- Extension and Renewal planning
- Budget next 5-10-? years
- Design of future pipeline need before rehabilitation



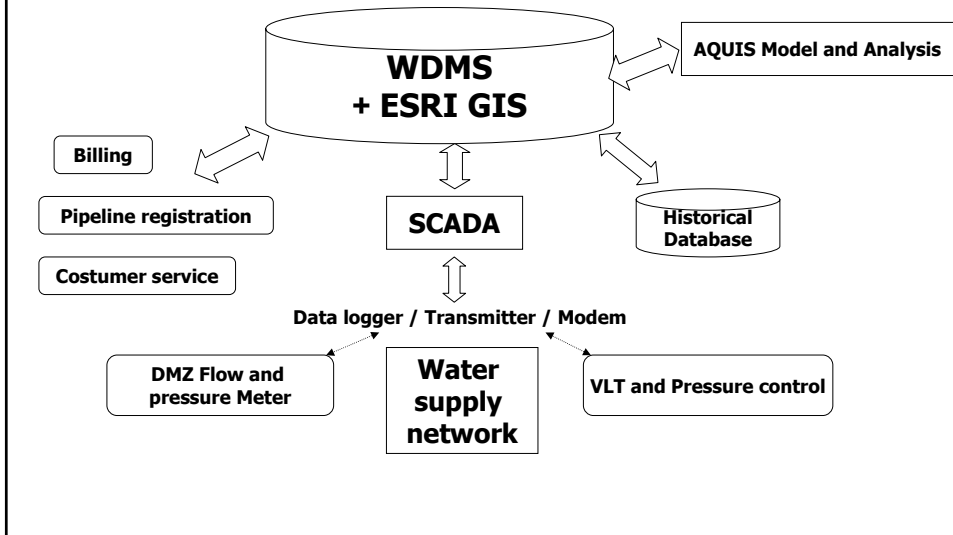
Water Distribution Management Software Developed by VidaGIS and Watertech

List of primary functionalities in WDMS:

- GIS
- Pipe registration
- Leak management and registration
- Pressure management
- Water meter management
- Rehabilitation Planning
- Customer report management
- Data communication to data sources
(pipe registration, billing etc.)



WDMS and GIS: Overall Architecture and communication



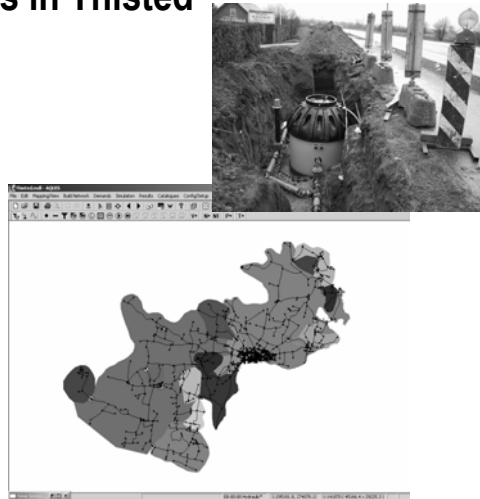
Thisted Water Supply – a Danish show case

- 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 AQIS 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 %.



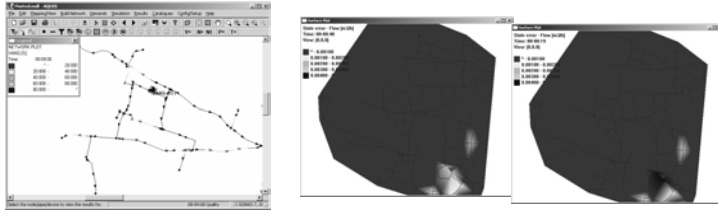
AQUIS applications used in Thisted

- 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

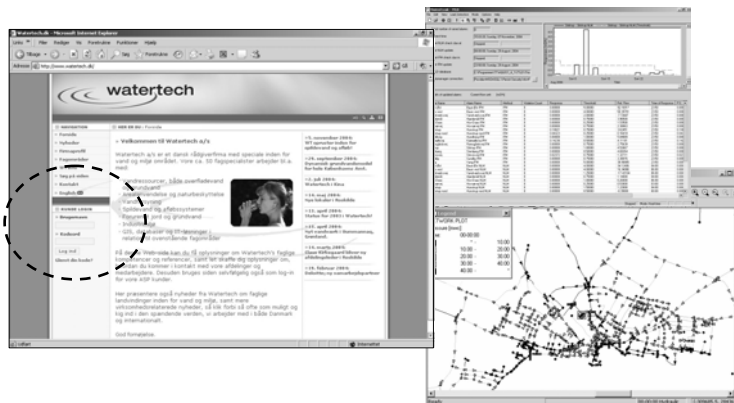
Leakage localisation – 7SEAS



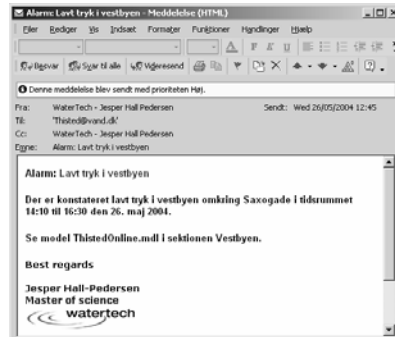
TIP: Illegal tap looks like leakage, but are variable in flow, so go and find them!

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)

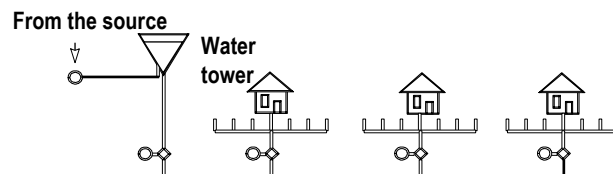


Chun Buri

- 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

$$\text{Calculation of leakage \%} = \frac{W_t}{W_t - W_f - W_c} \times 100$$

- 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!