

# Regional Utility Management Conference



Improving Performance in Emerging Economies  
13-15 May 2015, Tirana, Albania

# The Importance of Metering in Improved Water Utility Performance

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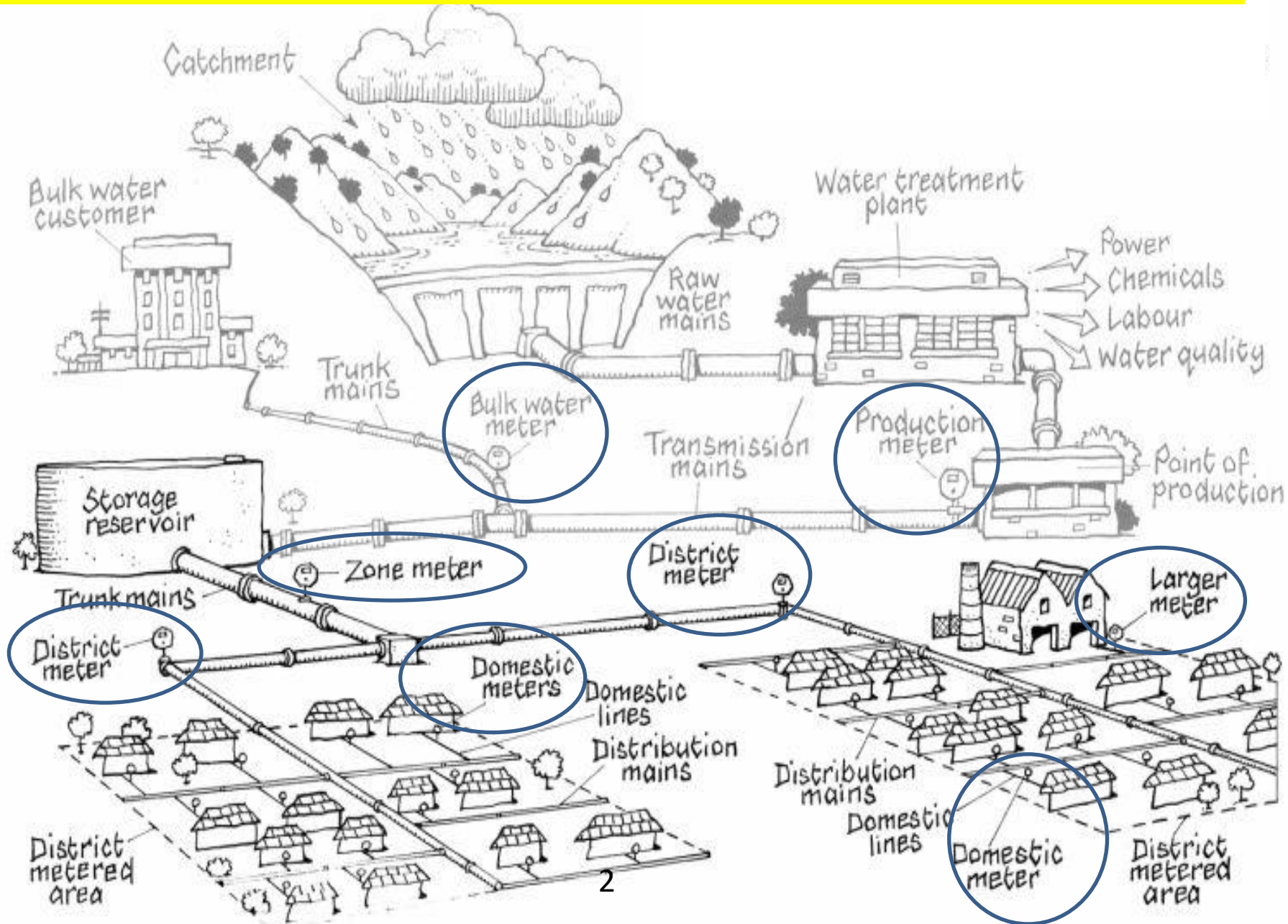
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# Water Networks



# Accounting for Water

**Water is either used or it is lost!**

the first step is to establish how much water is produced and how much is being used



# Accurate and Comprehensive Metering (1)

- It is not possible for water utilities to manage their water resources without knowing **how much water** it is **produced** and **where this water goes**.
- This is where **water meters play a critically important role**:
  - water meters are used to measure **how much raw water** is taken from a resource such as a large dam,
  - how much of this **water leaves the water treatment plant**,
  - how much is **purchased from bulk suppliers** or **sold to other bulk users**,
  - how the **water is distributed** within the water distribution system, and finally,
  - how much of the water is **delivered to individual consumers**.

# Accurate and Comprehensive Metering (2)

- If water meters are **not managed correctly**, it can have a **negative impact on the income** of a water utility.
- Provided **water metering is approached correctly**:
  - it can **increase the net income** of a water utility, and
  - It can **empower staff** to manage the distribution system in the better way.

## Accurate and Comprehensive Metering (3)

- **Water metering** is particularly **important** for water utilities since it forms the **basis for much of their income** through the sale of water to their consumers.
- **In many countries**, there is a **legal requirement** on water utilities **to meter consumers** and **manage water losses** in compliance with legislation and standards.

# Accurate and Comprehensive Metering (4)

- Many countries currently **lack proper water meter management**, with many water utilities and bulk water suppliers not having the capacity to undertake and manage optimal and integrated meter calibration, replacement, reading and information management systems.
- Often the **divided responsibility** between billing and meter management (typical of the institutional arrangements within most water utilities) **results in poor billing, incorrect information capture, and poor maintenance.**

# Why Water Metering (1)

- Water metering is an excellent application of the principle “**to measure, is to know**”, and knowledge of what is happening with the water in a distribution system is the **key to properly managing** this resource.
- Proper application of an integrated water meter management strategy creates a “**win-win**” situation for all parties involved.

# WHY Water Metering (2)

While water metering has many direct and indirect benefits, there are **four fundamental drivers** for a comprehensive metering programme:

- **equity,**
- **water efficiency and losses,**
- **economic benefits, and**
- **system management.**

# Equity

- Comprehensive water metering provides **an equitable basis** for charging consumers based on the amount of **water that they consume**.
- It makes consumers **accountable** for their own water use and **empowers** them to influence how much they pay for this service.
- It allows **cross-subsidisation** to be done fairly, and **needy consumers** to receive a free basic amount of water.

# Water Efficiency and Losses (1)

- Metering shows the value of water to the consumer and creates **strong incentives** for consumers to use water **more efficiently**. In fact, it has been shown that installing water meters in itself **reduces** water consumption.
- Research conducted in the UK shows that the use of water in metered households is **10-15% lower** than in the unmetered ones.
- This difference was found to be **up to 50%** in a Canadian study.

# Water Efficiency and Losses (2)

- When water is particularly scarce, water meters are **essential** for managing **water demand** and ensuring that consumers adhere to **water restrictions**.
- All water networks **lose some water**, but the level of losses has to be **carefully monitored** and managed to avoid them reaching **unacceptably high levels**.
- A well placed **metering system** in the distribution system will also assist in **efficiently identifying** the location of **large leaks**.

# Economic Benefits (1)

- Measured consumption forms the **basis of most water accounts**, and thus affects water utility revenue directly – water meters are the **cash registers** of water suppliers.
- They are essential for effective **revenue management**.
- It follows that a well managed and accurate water meter system **will improve water sales** and thus water utility income.

## Economic Benefits (2)

- Many of the **technical benefits** of water meters, such as accurately measuring water purchases, reducing water losses, and identifying and removing illegal connections also have a **positive impact** on water utility finances.
- **Water tariffs** can be used to **increase water utility income**, cross-subsidise needy consumers and **manage water consumption**.
- However, such a tariffs policy cannot be implemented without a **well established metering system**.

# System Management (1)

- On a technical level, water meters are **indispensable** for knowing **how much water** is distributed and **where it goes**.
- **Bulk water meters** are used to measure water **entering a water supply system**, whether from raw water sources, water treatment plants or bulk water suppliers.
- **Meters** in the distribution network measure **where the water is transported to**, and finally, **consumer meters** are used to measure **how much water is delivered to** each metered consumer in the system.

# System Management (2)

- The data obtained from a good metering system allows management to take **informed decisions** on capital investments, maintenance, staffing and various other aspects of the water supply system.
- The bottom line is that an integrated water meter management system allows a water utility to provide **better services** to the consumers, while at the same time **improving its income**.

# WHY Meter?

- Measure the supply / consumer demand
- Calculate water balance
- Determine water loss areas
- Water is becoming expensive

# Annual Water Balance (m<sup>3</sup>)("Top Down")

Reaching the point of Accountability

<b>System Input Volume</b>	<b>Authorised Consumption</b>	<b>Billed Authorised Consumption</b>	<b>Billed Metered Consumption</b>	<b>Revenue Water</b>
			<b>Billed Unmetered Consumption</b>	
		<b>Unbilled Authorised Consumption</b>	<b>Unbilled Metered Consumption</b>	<b>Non Revenue Water</b>
			<b>Unbilled Unmetered Consumption</b>	
	<b>Commercial Losses</b>	<b>Unauthorized Consumption</b>		
		<b>Customer Meter Inaccuracies</b>		
		<b>Leakage on Transmission &amp; Distribution Mains</b>		
	<b>Water Losses</b>	<b>Physical Losses</b>	<b>Leakage and Overflows at Reservoirs</b>	
			<b>Leakage on Service Connections up to metering point</b>	

# NRW Components – Key Message

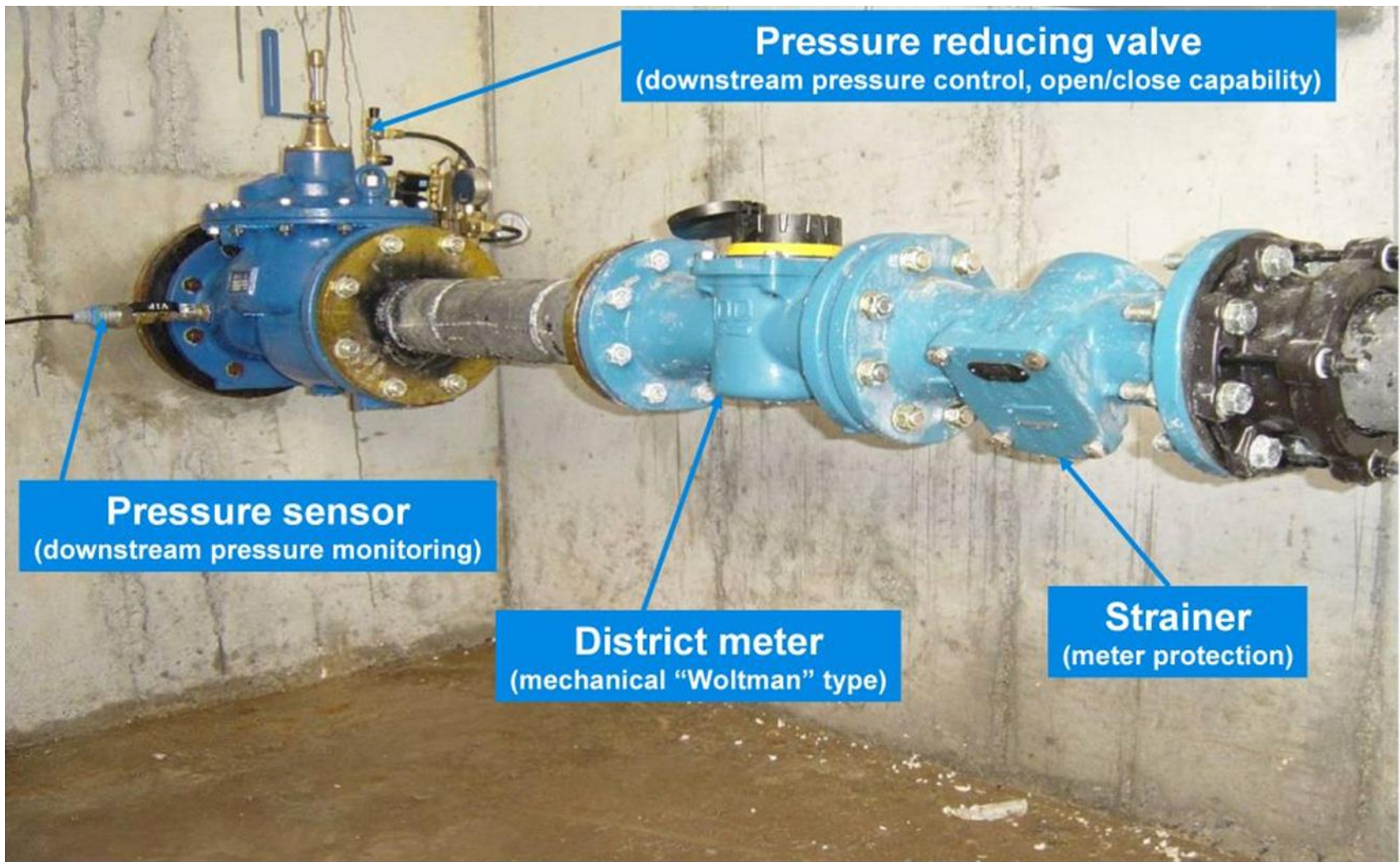
## REDUCING:

- **Unbilled Authorized Consumption** will generate more revenues
- **Commercial Losses** will generate more revenues
- **Physical Losses will:**
  - result in more water being available for consumption or reduce operating costs
  - delay the need for investments in source development

# Metering Requirements

- **Type of meter?**
  - Turbine, Electromagnetic, ultrasonic, volumetric
- **Size of meter?**
  - Range, maximum, minimum flow
- **Installation requirements?**
  - Straight length, power supply, security, strainers, isolating valves
- **Accuracy?**
  - Billing or management purposes
- **Ancillaries?**
  - Loggable, AMR
- **Maintenance?**
  - Availability of spare parts, down time

# Typical Arrangement for a DMA Meter

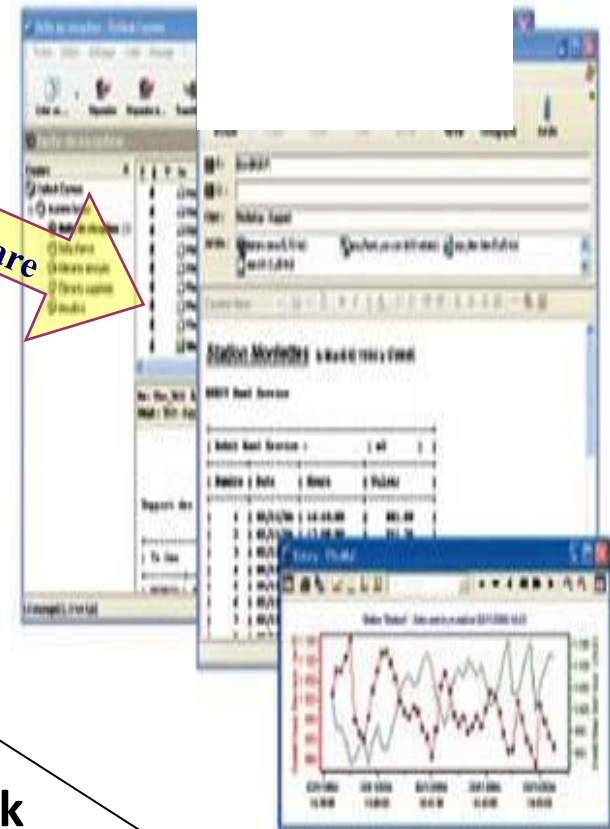


# Continuous Monitoring and Data Transfer

Dedicated Computer  
in Control Room



Operating software



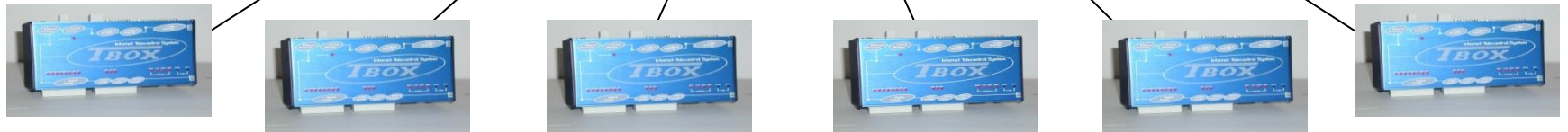
## Data Communication

E-mails / sms sent from each Station  
Alarms sent to Operator's mobile  
phone for:

- High/Low pressure
- High MNF
- No flow
- Low battery status



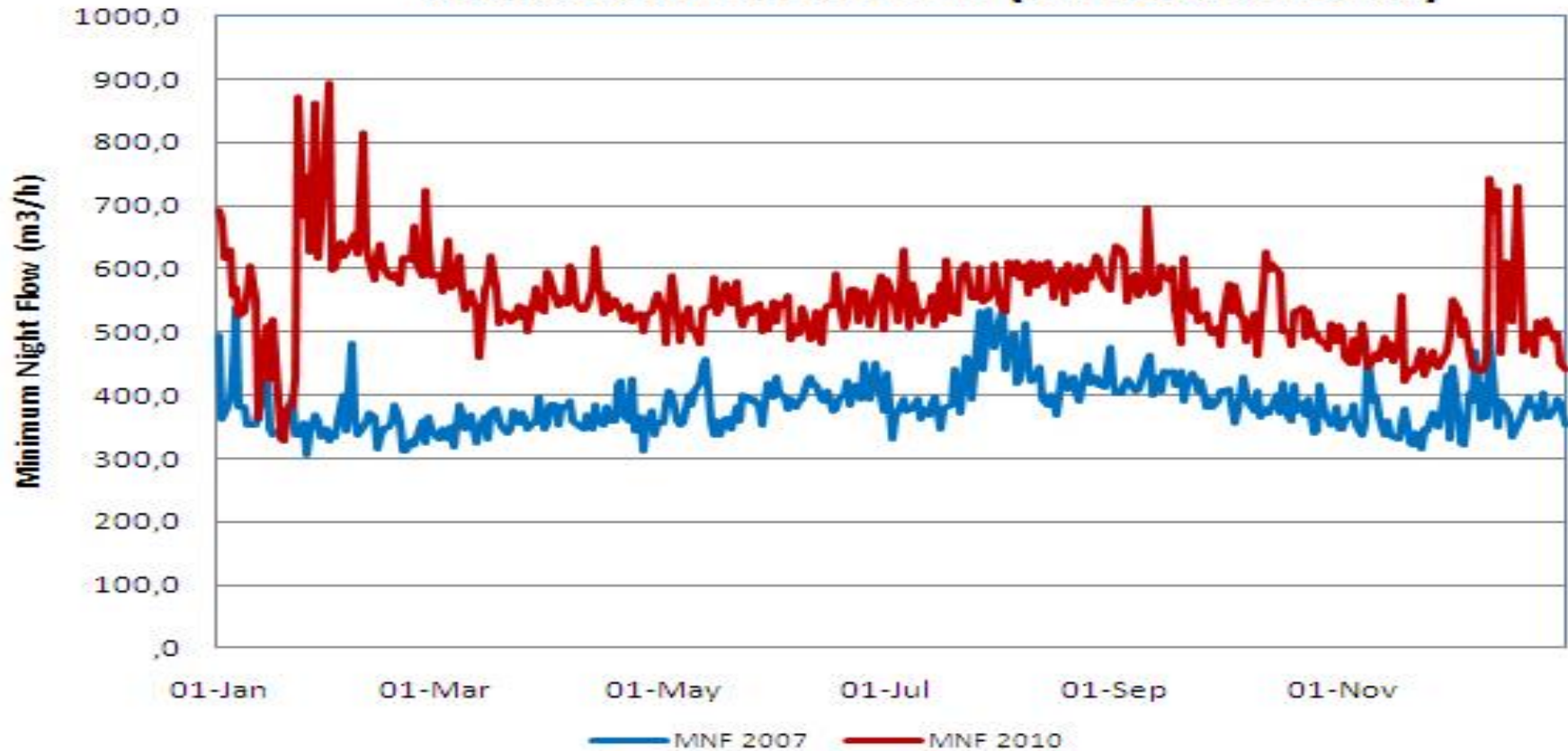
PSTN /GSM / Radio Network



PLC / LOGGERS IN REMOTE LOCATIONS

# Flow Analysis and Trend Monitoring

Minimum Night Flow  
Years 2007 and 2010 (All Reservoirs)



# Continuous Flow Monitoring

## TBox226 - DISTRICT METER 226

Flow226

47.159988

Total226

462.193298

NonReset226

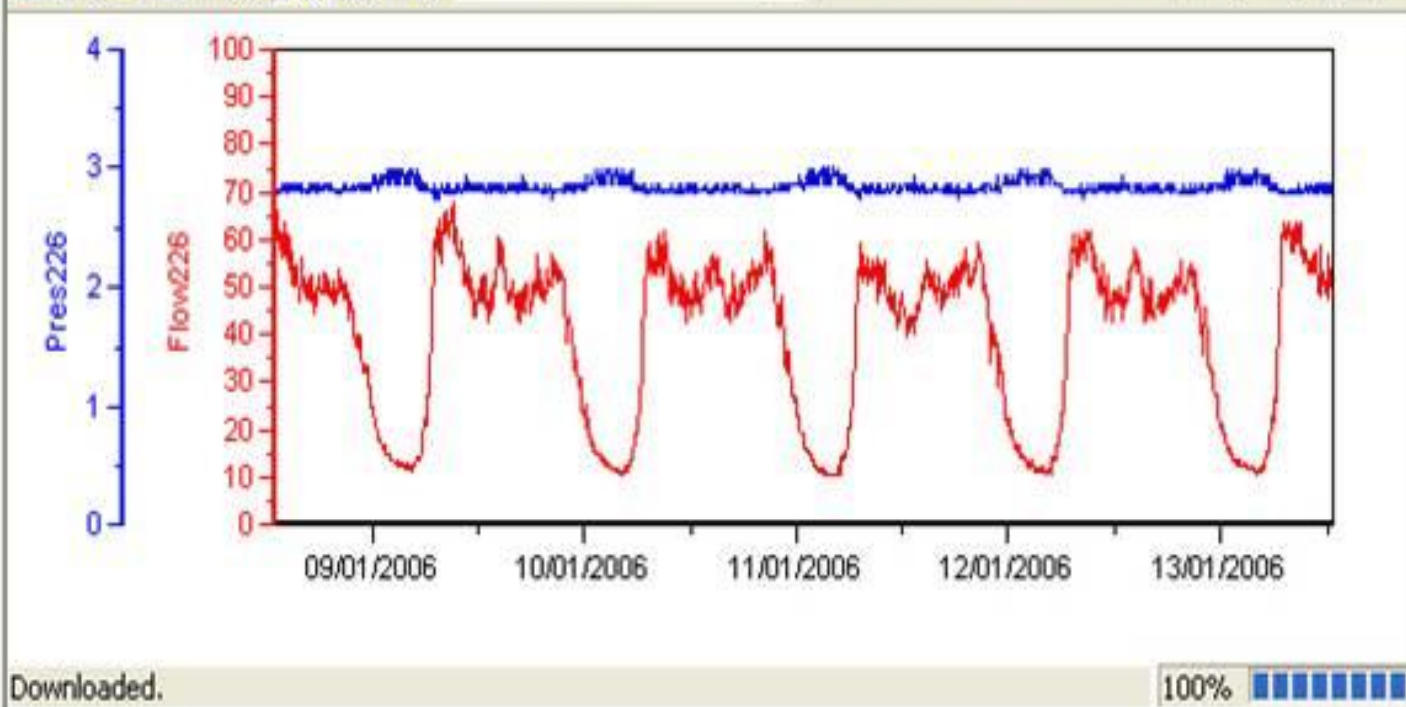
547740.625000

Pressure

2.823529

Navigation toolbar with icons for home, print, copy, zoom, and playback. A dropdown menu shows "No Tracking".

PRV226 CONTROL

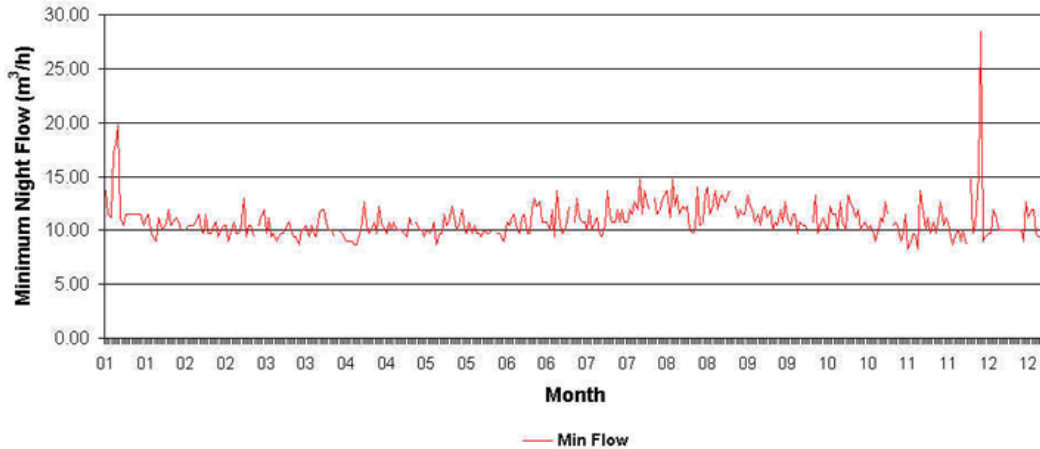


TBox Time - Date  
13:05:39  
1/13/2006

INDEX

# Monitoring of Losses in the Network

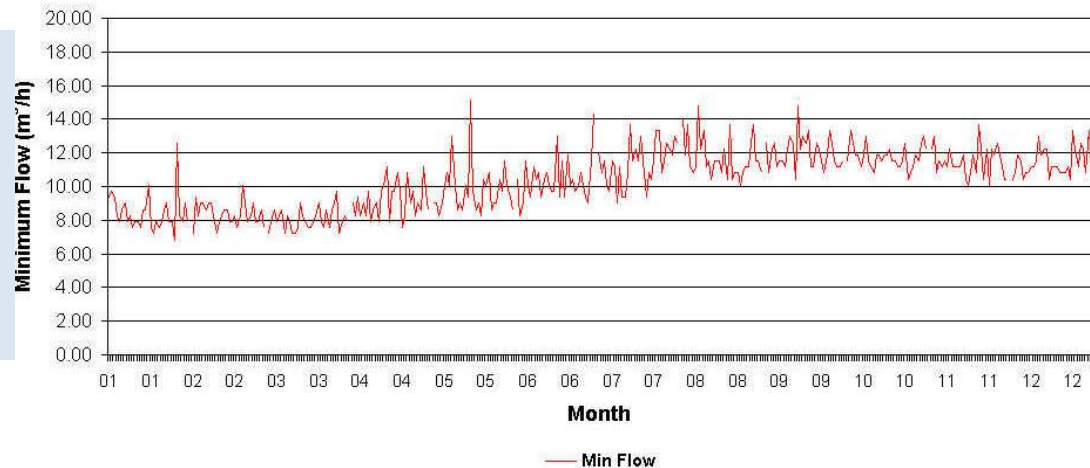
District 227  
Year 2005 Minimum Night Flow



Leakage in the DMA is constant, signifying steady conditions in the network

Leakage in the DMA gradually increasing, signifying increase in the Natural Rate of Rise

District 226  
Year 2005 Minimum Night Flow



# Manual Meter Reading



- Most common practice
- Use of meter readers
- Visual readings
- Manual recording



## Disadvantages:

- Human errors
- Inaccessible meters
- Labour intensive

# Automatic Meter Reading



## Advantages:

- Eliminates estimated consumptions
- Protects against theft and tamper proof
- Improves:
  - billing accuracy / billing cycle
  - data accuracy and reliability
  - accuracy of sales and revenue forecast
  - water balance management
  - water management



### Walk-by



Water meter

Pulse & Transmitter

Handheld & Software

### Drive-by



Water meter

Pulse & Transmitter

Laptop & software

### Fixed Network

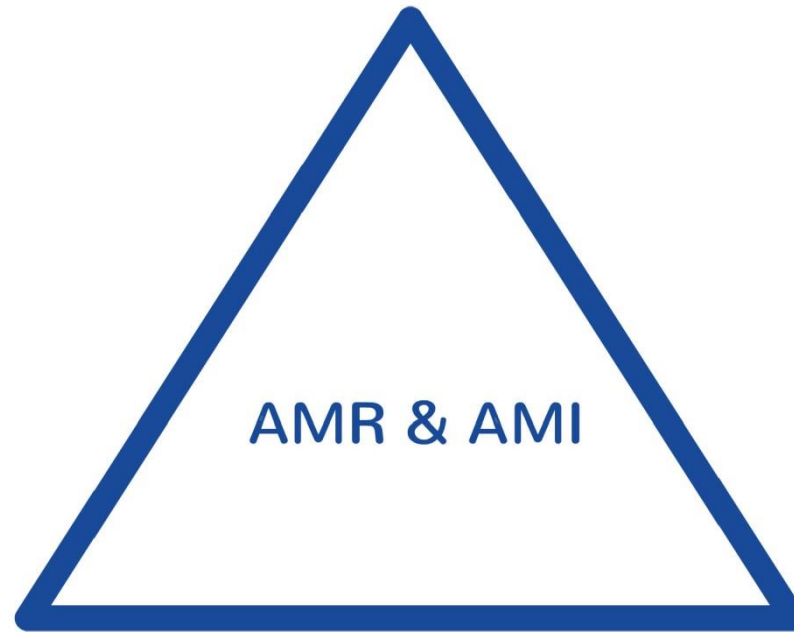


Controller & software

Pulse, transmitter, repeater

Water meter

# Advanced Metering Infrastructure (AMI)



AMI represents the networking technology of fixed network meter systems that go beyond AMR into remote utility management

# Examples – Poor Installation



Insufficient straight pipe – Perfect air trap



Bends in both the horizontal and vertical plane

**Guaranteed inaccuracy!**

# Examples – Poor Meter Management



# Thank you



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