# Managing Water Loss: Strategies for the Assessment, Reduction and Control of Non-Revenue Water (NRW) in Trinidad and Tobago.

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Structure of the Presentation

- NRW in Trinidad and Tobago
- Major Factors contributing to NRW
- Benefits of reducing NRW
- Development of a Water Loss Strategy for Trinidad and Tobago

OCUR
ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Components of Water Balance for a Transmission or Distribution System

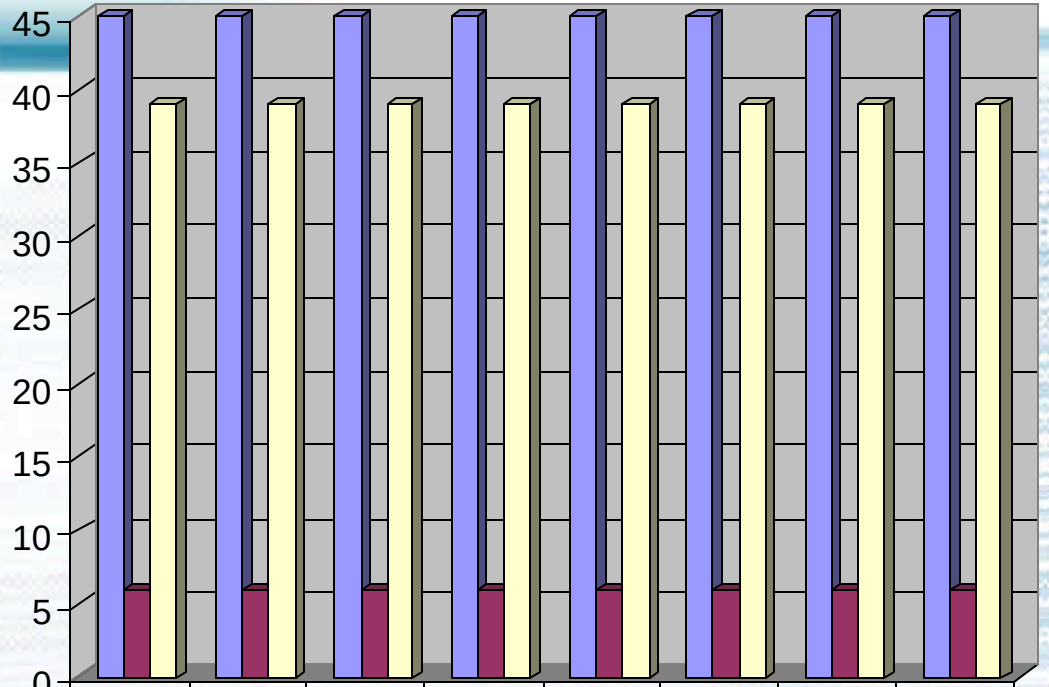
<table>
<tr><td rowspan="8">System Input Volume<br><br>M³/ year</td><td rowspan="3">Authorised Consumption<br><br>M³/year</td><td>Billed Authorised Consumption<br><br>M³/year</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water<br><br>M³/year</td></tr>
<tr><td></td><td>Billed Un-metered Consumption</td></tr>
<tr><td>Unbilled Authorised Consumption<br><br>M³/year</td><td>Unbilled Metered Consumption</td><td rowspan="6">Non-Revenue Water<br><br>M³/year</td></tr>
<tr><td rowspan="5">Water Losses<br><br>M³/year</td><td rowspan="2">Apparent Losses<br><br>M³/year</td><td>Unbilled Unmetered Consumption</td></tr>
<tr><td>Unauthorised Consumption</td></tr>
<tr><td rowspan="3">Real Losses<br><br>M³/year</td><td>Metering Inaccuracies</td></tr>
<tr><td>Leakage on transmission and/or distribution mains</td></tr>
<tr><td>Leakage and overflows at Utility’s storage tanks</td></tr>
<tr><td>Leakage on service connections up to point of customer metering</td></tr>
</table>

*Source: IWA*

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# NRW in Trinidad and Tobago




| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|
| NRW | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| Commercial losses | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Physical losses | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 |

**Best Practice in Developing Countries - < 23%**

**Best Practice in Developed Countries - < 16%**

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Major Factors affecting NRW

- Illegal Connections
- Age of Pipe Network
- Poor Maintenance of Network
- Water Scheduling
- Customer side Leakage
- Absence of coherent strategy for ALC

# Benefits of reducing NRW

***Improvement in Demand Management Policies***

- Continued water loss impacts negatively on the effort to limit demand
- **Economic benefits of reducing NRW**
  - Less money to produce water in terms of chemicals, energy, staff and maintenance
  - Capital costs for expansion works can be deferred
  - Additional income from revenue water is available to the utility for its use
  - Reduced costs to the treatment of wastewater

# Benefits of reducing NRW

## *Public Perception of the Utility*

Outcomes:

- Improved service
- Fewer leaks
- Extension of the distribution system

# Development and Implementation of Water Loss Strategies

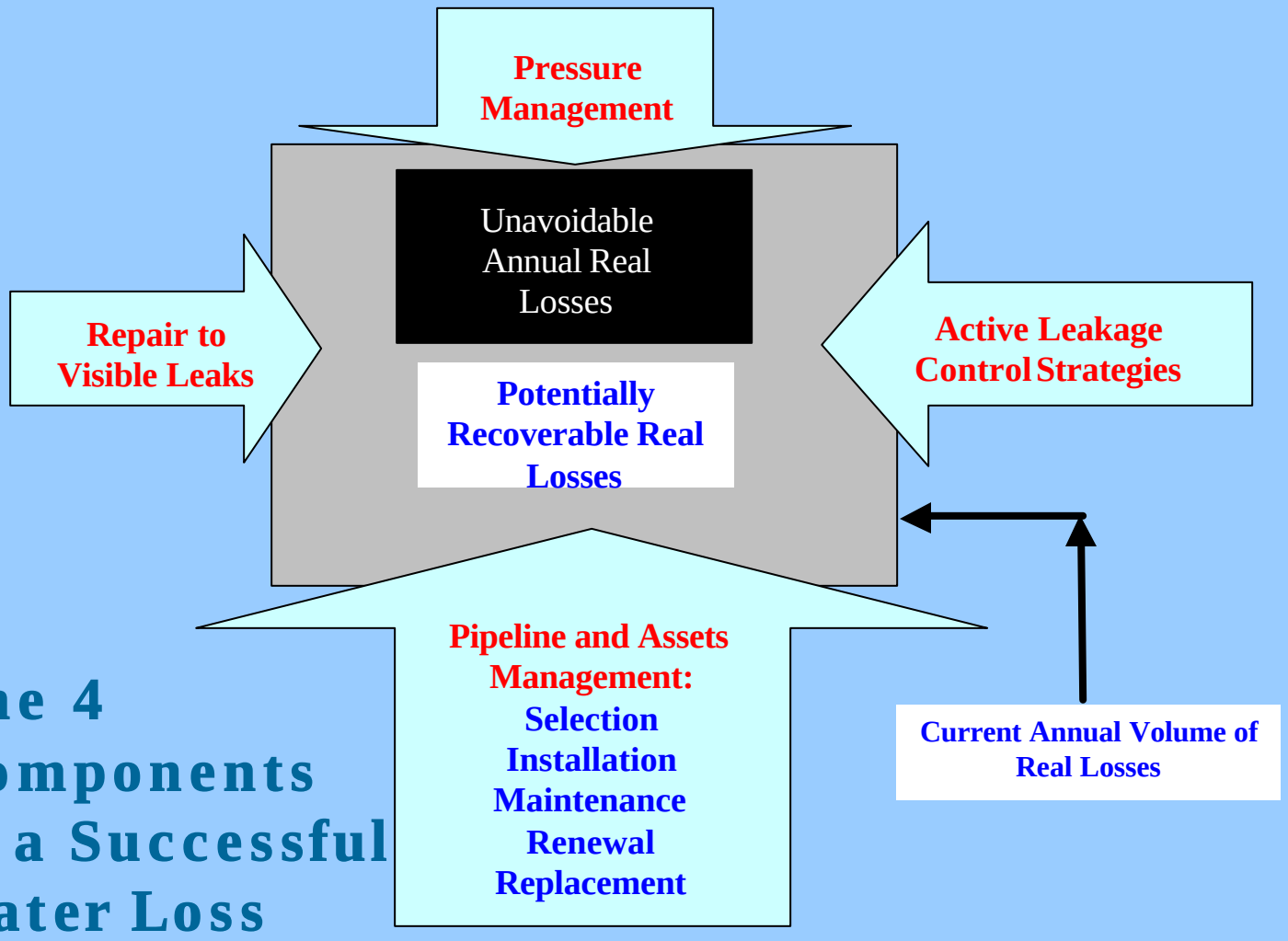
ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Private Sector Involvement

- Use of a NRW performance based contract
- Provides expert help immediately
- Necessary as project management resources and skill not available in house
- Cost effective solution
- Competition within the utility sector
- A limited alternative to full PSP
- Accelerated implementation programme
- Capital investment removed from State

# The 4 Components of a Successful Water Loss Management Policy




*Source: Liemburger*

# Other Major Strategies

- Universal Metering
- Bulk Metering
- Tariff Adjustment
- Improvement to Infrastructure Records
- Telemetry Installation
- Network Analysis.

# Phase 1 – 18 months

## Preparation

- Identification of costs and acquisition of funding for Programme
- Determination and procurement of materials and equipment for Programme
- Establishment of components of water balance, estimation of leakage level and setting of leakage targets

# Phase 1 – 18 months

## Implementation

## Active Leakage Control Strategies

- Repair to visible leaks
- Sounding Programme
- Repair to customer side leakage

# Phase 1 – 18 months

## Implementation

## Support Structures

- Training
- Human Resources
- Transport and Equipment
- Public Education and Information
- IT support

# Phase 1 – 18 months

## Implementation
## Major Strategies

- Universal Metering
- Tariff Setting
- Mains Replacement

# Phase 2 – 42 months

## Implementation

## Active Leakage Control Strategies

- Pressure zoning
- DMA setup
- WWMD setup
- Trunk main leakage
- Reservoir leakage
- Apparent Losses

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Phase 2 – 42 months

## Implementation

## Major Strategies

- Bulk Metering

- Infrastructure Records Update

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Phase 3 – 24 months

## Implementation

## Major Strategies

- Telemetry
- Assets management
- Network Analysis

ORGANISATION OF CARIBBEAN UTILITY REGULATORS

REGULATED INDUSTRIES COMMISSION

# Phase 4 – Ongoing

## Maintenance

## Active Leakage Control Strategies

- Continuous Night Flow Monitoring
- Reassessment of leakage control activities
- Improvement to ELL calculation
- New policy and technology options
- Maintenance of facilities and equipment

# Comparative Costs of Programme

- Trinidad - > TT$ 200M (US$ 32M) over a 10 year period (Bristol Water, 1997)
- State of Selangor, Malaysia - Similar but larger programme. US$ 105M dollars (TT$ 661M) over a period of 9 years (5M population, 13,000km distribution system)
- Port Moresby – 1 year project is being accomplished at a cost of US$ 590,000 (TT$ 3.7M). System supply of 165 Ml/d

# Conclusion

- Water shortages exist
- Conservation of the commodity is of major concern
- Efficacy of the utility is a pressing issue
- Paper an attempt to evaluate and update the local situation
- Proposes solutions for the reduction and control of NRW