6th REGIONAL AFRICAN
WATER
LEAKAGE SUMMIT
2016

DBSA Vulindlela Auditorium, Midrand
Gauteng, South Africa
23 - 24 August 2016

Analysis of municipal water supply systems
Perspectives of the financier

Presented by:
Konstant Bruinette
DBSA: Investment Officer

Participating and supporting organisations :

ONE
DIMENSIONAL
- Often followed

HOLISTIC
APPROACH
- Significant capital requirements
- Additional financing (credit & risk evaluation)

CURRENT
ANALYSIS
APPROACH

WATER BALANCE (IWA)

SYSTEM INPUT VOLUME (corrected for known errors)	AUTHORISED CONSUMPTION	BILLED AUTHORISED CONSUMPTION	Billed Metered Consumption (including water exported)	Revenue Water
			Billed Unmetered Consumption	
		UNBILLED AUTHORISED CONSUMPTION	Unbilled Metered Consumption	Non-Revenue Water (NRW)
			Unbilled Unmetered Consumption	
	WATER LOSSES	APPARENT LOSSES	Unauthorised Consumption	
			Metering Inaccuracies	
		REAL LOSSES	Leakage on Transmission and / or Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to point of Customer metering	

"HOW TO EVALUATE A PROJECT TO REDUCE THE REAL LOSSES & MOTIVATE THE REQUIRED CAPITAL INVESTMENT IF THE QUANTUM OF THE REAL LOSSES IS HIGHLY UNCERTAIN"

THE
MUNICIPAL
DILEMMA

ADDRESSING THE MUNICIPAL DILEMMA
THE PARAMETERS

1. Quantification of **Recoverable Real Losses**
2. Addressing **Recovery Risk**
3. Addressing **Over Consumption**
4. (Pay back) **Risk quantification**

IDENTIFICATION OF REAL LOSSES vs QUANTIFICATION OF REAL LOSSES

Replacement of distribution system would require **quantification of the Real Losses**, as it would play a critical role in the **capital investment** decision.

1 Quantification of **Recoverable Real Losses**

RECOVERABLE REAL LOSSES

BEST PRACTICE ≈ 15%

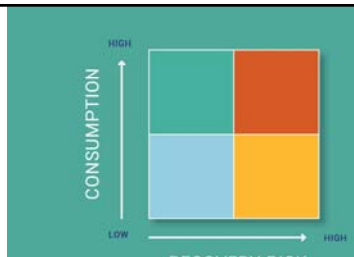
REAL LOSSES

UNAVOIDABLE REAL LOSSES (URL)

RECOVERABLE REAL LOSSES

MOTIVATED FOR FINANCING

2 Addressing **Recovery Risk**



2 Addressing **Recovery Risk**

ECONOMIC COST OF WATER

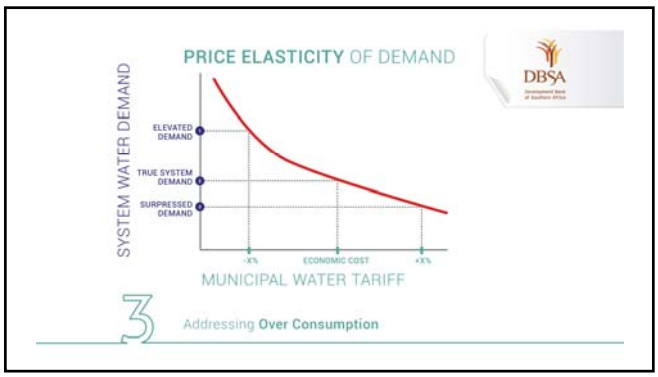
All system **input costs**

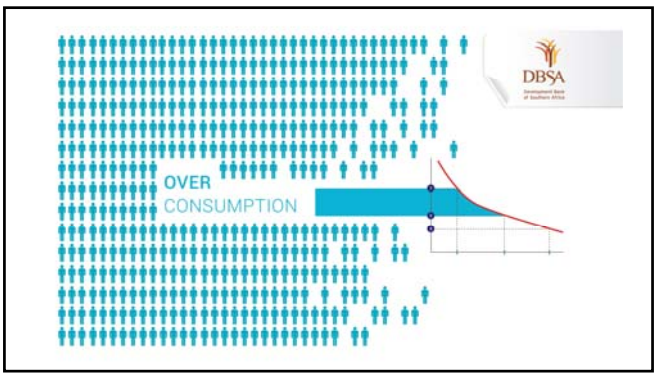
System **operating** and **maintenance**

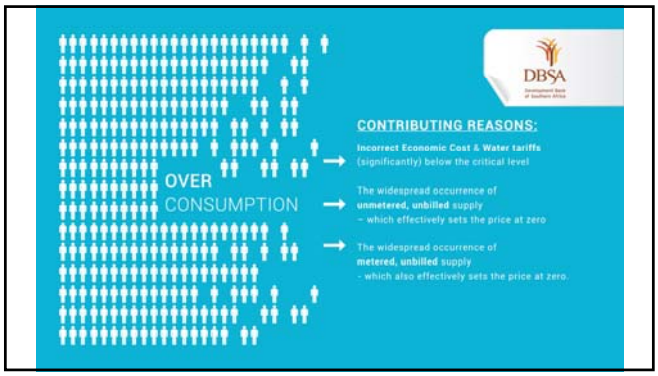
Billing and **collection costs**

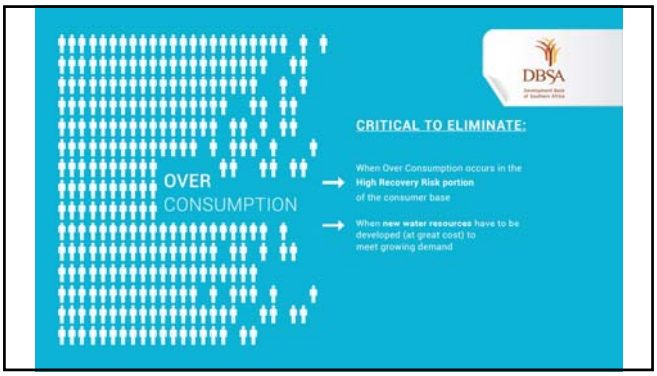
Cost of **capital** as well as a **charge for risk**

3 Addressing **Over Consumption**

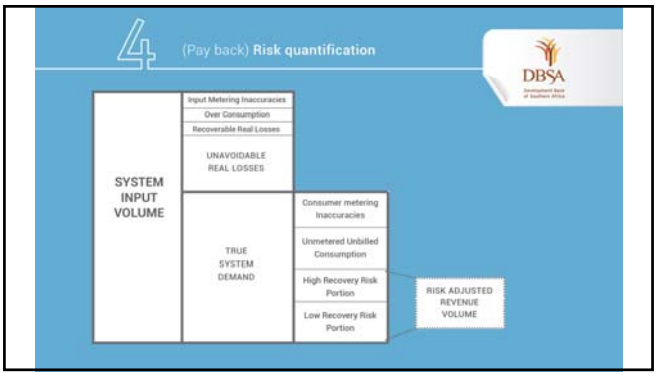

PRICE ELASTICITY OF DEMAND
SYSTEM WATER DEMAND
ELEVATED DEMAND
TRUE SYSTEM DEMAND
SURPRESSED DEMAND
-X%
ECONOMIC COST
+X%
MUNICIPAL WATER TARIFF
3
Addressing Over Consumption

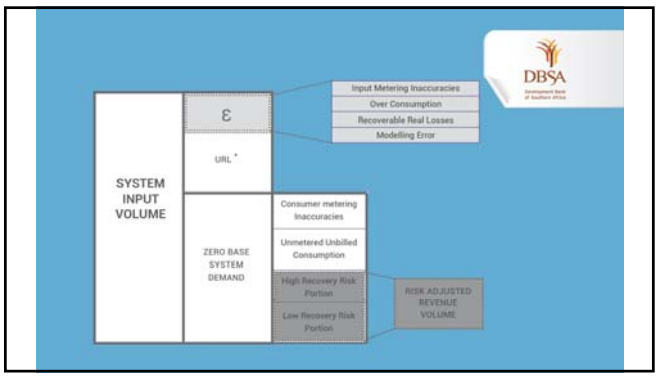

OVER
CONSUMPTION

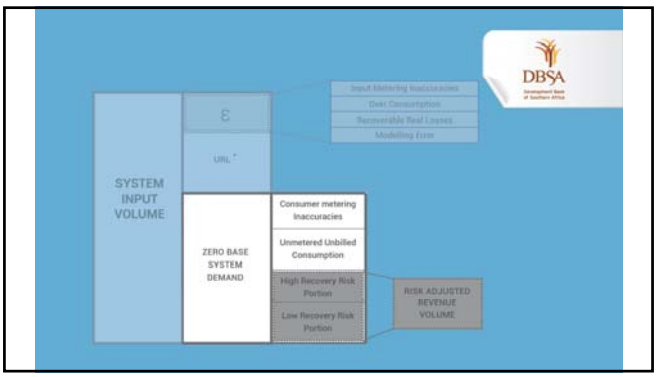

OVER
CONSUMPTION
CONTRIBUTING REASONS:
Incorrect Economic Cost & Water tariffs (significantly) below the critical level
The widespread occurrence of unmetered, unbilled supply – which effectively sets the price at zero
The widespread occurrence of metered, unbilled supply - which also effectively sets the price at zero.


OVER
CONSUMPTION
CRITICAL TO ELIMINATE:
When Over Consumption occurs in the High Recovery Risk portion of the consumer base
When new water resources have to be developed (at great cost) to meet growing demand


AN
ALTERNATIVE
HOLISTIC
APPROACH


4
(Pay back) Risk quantification
SYSTEM INPUT VOLUME
Input Metering Inaccuracies
Over Consumption
Recoverable Real Losses
UNAVOIDABLE REAL LOSSES
TRUE SYSTEM DEMAND
Consumer metering Inaccuracies
Unmetered Unbilled Consumption
High Recovery Risk Portion
Low Recovery Risk Portion
RISK ADJUSTED REVENUE VOLUME


SYSTEM INPUT VOLUME
ε
URL *
ZERO BASE SYSTEM DEMAND
Input Metering Inaccuracies
Over Consumption
Recoverable Real Losses
Modelling Error
Consumer metering Inaccuracies
Unmetered Unbilled Consumption
High Recovery Risk Portion
Low Recovery Risk Portion
RISK ADJUSTED REVENUE VOLUME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Input Metering Inaccuracies
Over Consumption
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Modelling Error
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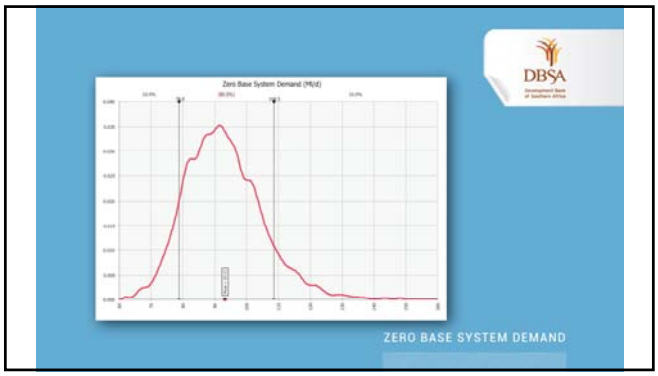
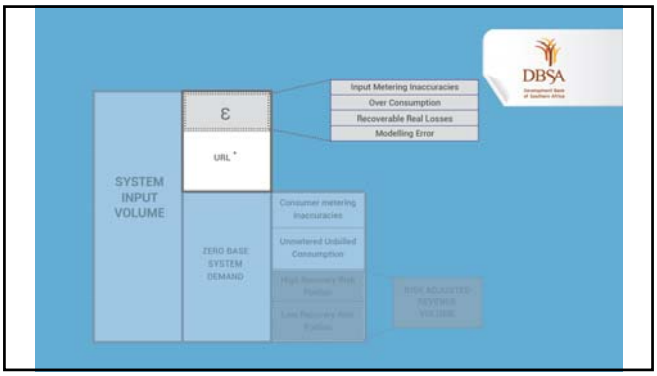
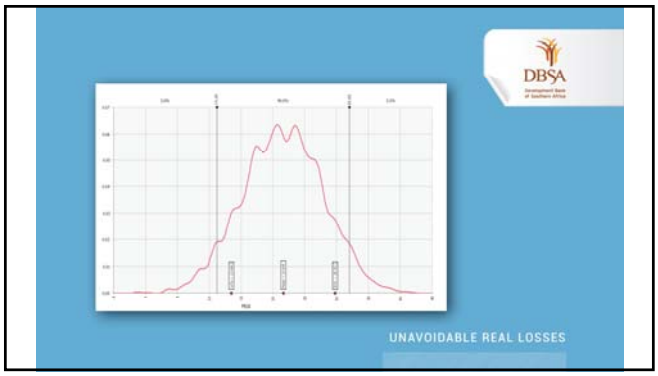
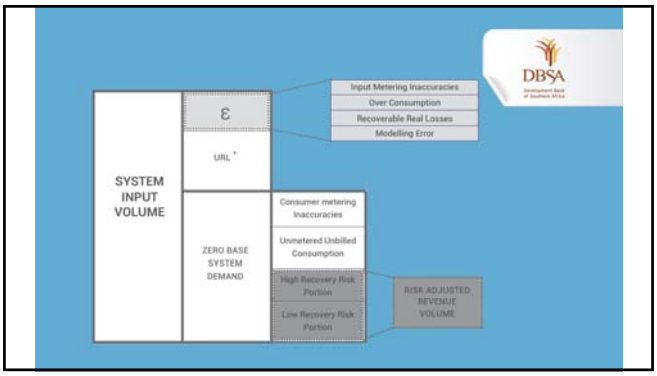
RISK ADJUSTED REVENUE VOLUME


Zero Base System Demand (Ml/d)
ZERO BASE SYSTEM DEMAND


SYSTEM INPUT VOLUME
ε
URL *
ZERO BASE SYSTEM DEMAND
Input Metering Inaccuracies
Over Consumption
Recoverable Real Losses
Modelling Error


UNAVOIDABLE REAL LOSSES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URL *
ZERO BASE SYSTEM DEMAND
Input Metering Inaccuracies
Over Consumption
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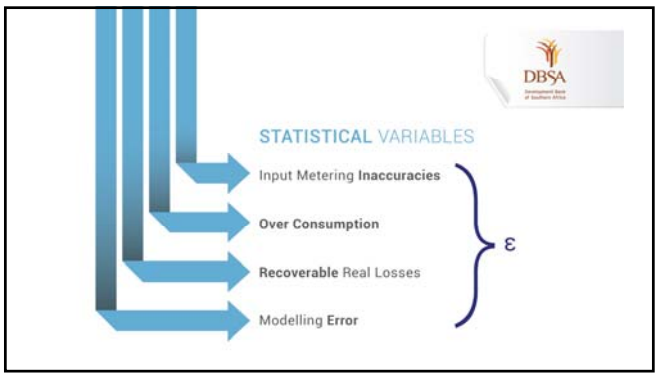
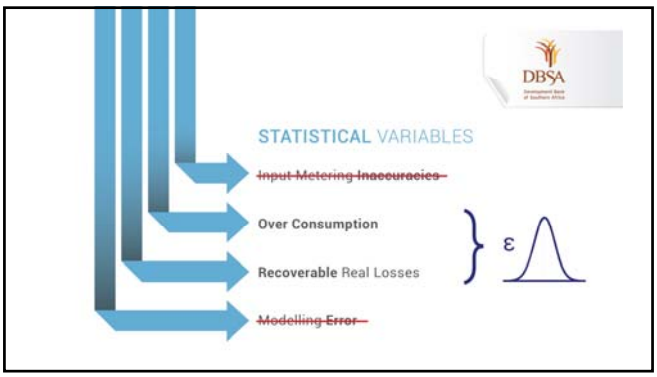
RISK ADJUSTED REVENUE VOLUME


STATISTICAL VARIABLES
Input Metering Inaccuracies
Over Consumption
Recoverable Real Losses
Modelling Error
ε


STATISTICAL VARIABLES
Input Metering Inaccuracies
Over Consumption
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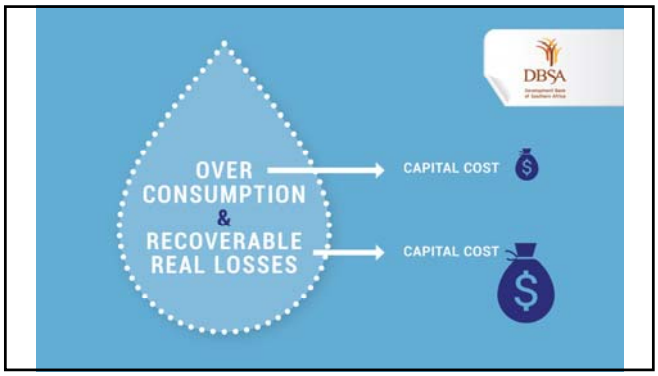
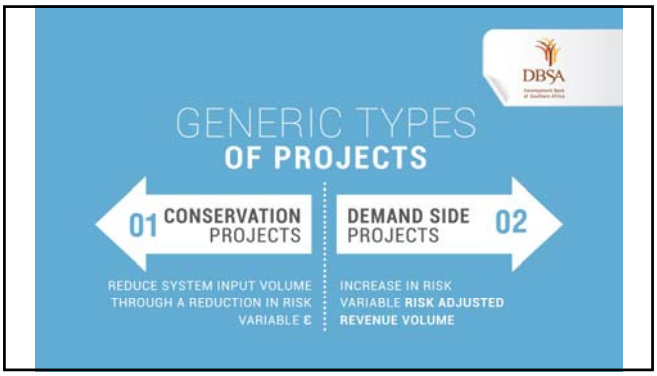
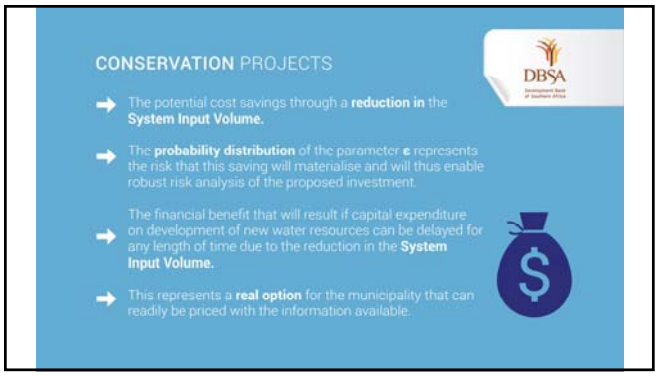
Modelling Error
ε


OVER CONSUMPTION & RECOVERABLE REAL LOSSES
CAPITAL COST
CAPITAL COST

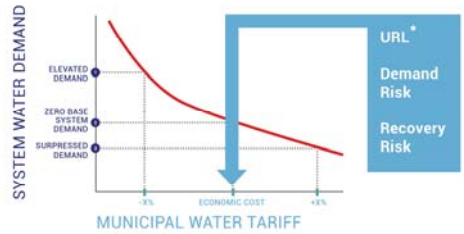

GENERIC TYPES OF PROJECTS
01 CONSERVATION PROJECTS
DEMAND SIDE PROJECTS 02
REDUCE SYSTEM INPUT VOLUME THROUGH A REDUCTION IN RISK VARIABLE ε
INCREASE IN RISK VARIABLE RISK ADJUSTED REVENUE VOLUME


CONSERVATION PROJECTS
The potential cost savings through a reduction in the System Input Volume.
The probability distribution of the parameter ε represents the risk that this saving will materialise and will thus enable robust risk analysis of the proposed investment.
The financial benefit that will result if capital expenditure on development of new water resources can be delayed for any length of time due to the reduction in the System Input Volume.
This represents a real option for the municipality that can readily be priced with the information available.

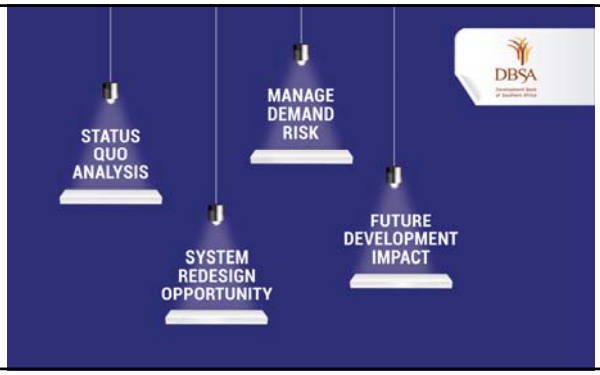

DEMAND PROJECTS
An appropriate increase in the Risk Adjusted Revenue Volume
The associated increase in revenue to the municipality.
MAXIMIZING THE RATIO OF :
THE RISK ADJUSTED REVENUE VOLUME
/ ZERO BASE SYSTEM DEMAND

DEMAND PROJECTS

- Geographical distribution of consumer population **(Recovery risk)**
- **Formulate separate strategies** to:
  - mitigate Recovery Risk
  - minimise Over Consumption in High Recovery Risk areas.
- Adjust overall **system design** to implement the strategies.
- Maintain the **Recovery Ratio** of the municipality above a suitable and appropriate threshold.



WHAT ABOUT THE FUTURE ?



CONCLUDING REMARKS

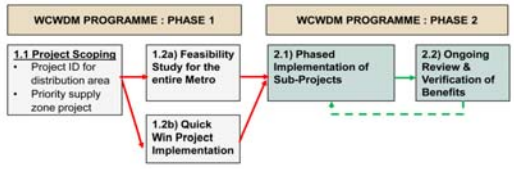
INTEGRATED HOLISTIC APPROACH

- Use of a suitable model to quantify 'Demand Risk'
- Use of a suitable model to estimate the URL
- Consumer base analysis to establish the different 'Recovery Risk' and consumption components
- Quantify the Risk Adjusted Revenue Volume
- Calculate Recovery Ratio of the municipality as a key performance measure signalling the need for intervention
- Calculation of the Economic Cost of water supply
- Adopting an appropriate tariff structure to facilitate and achieve specific strategies (such as eliminating Over Consumption etc.)

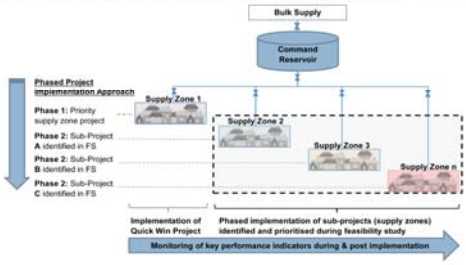
WCWDM PRODUCT OVERVIEW

- It is based on the **following key principles:**
  - The implementation of a holistic WCWDM programme
  - Strong support by management & politicians
  - A phased financing approach against agreed criteria for achievement & maintaining of performance milestones of sub-projects identified in a bankable feasibility study.
  - All sub-projects will be sectorized supply zones that will enable monitoring and verification of benefits.

OUTLINE OF TYPICAL IMPLEMENTATION APPROACH



THE PHASED IMPLEMENTATION APPROACH



WHAT DO WE WANT IN AN APPLICATION?

- **An application should be based on 3 key documents :**
  - Formal application letter from CFO.
  - Municipal strategy document, and
  - A scoping report.
- **The strategy document (or an extract from it) is :**
  - A high level strategy approved bt council.
  - Key to demonstrate political buy-in into some of the critical features of the initiative eg enhanced cost recovery
- **DBSA has developed a detailed terms-of-reference for the conduct of a scoping report**

QUESTIONS & ANSWERS?