Metropolitan Municipality Non-Revenue Water Assessment

3rd Annual African Water Leakage Summit

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Water Services: Directorate Planning and Information

20 to 23 August 2013

Contents

- Background
- Metro Status quo
- Trends
- Water balance calculations
- Challenges
- Summary and conclusions

BACKGROUND

Objectives

- To assess metro non-revenue water/water loss status quo and trends in metropolitan municipalities
- To assess progress made in achieving DWA reconciliation strategy and Presidential targets
- To identify key challenges
- To review water balance calculations

MODIFIED IWA WATER BALANCE

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Free basic Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorised Consumption	Unbilled Metered Consumption	
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorised Consumption	Non Revenue Water
			Customer Meter Inaccuracies	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Storage Tanks	
			Leakage on Service Connections up to point of Customer Meter	

Presidential Target

- In his 2010 State of the Nation Address, His Excellency JG Zuma, President of the Republic of South Africa stated: *"We are not a water rich country. Yet we still lose a lot of water through leaking pipes and inadequate infrastructure. We will be putting in place measures to reduce our water loss by half by 2014".*
  - What is the baseline the sector should be measured against?
  - What is meant by "halving water losses by 2014"?
  - What is a "political" target?
- The Presidential water loss reduction target focuses on the water loss (i.e. input volume less authorised consumption) component of the IWA water balance, but *makes no mention of reducing input volume or NRW.*

The Reconciliation Strategy Target

- The DWA water balance reconciliation strategies seek, *in a scientific manner*, to reconcile future (municipal) water requirements with available water resources over the next 20-30 years.
- WC/WDM has been identified as a key intervention to reduce the input volume and the need for additional new sources.
- The reconciliation strategies focus on the reduction of the system input volume . The strategies **do not** specify **water loss or NRW targets**.

Why the Metros?

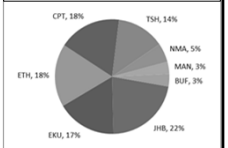
Because the metros:

- Provide water to approximately 20.3 million people or 40% of the population.
- Utilise approximately 2.1 billion m^3/annum or 46% of the total urban water use.
- They generate 80% of the country's GDP.
- They must have water security and be financially viable.

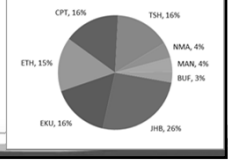
Study area

1. City of Johannesburg
2. Ekurhuleni
3. eThekwini
4. City Of Cape Town
5. City of Tshwane
6. Nelson Mandela Bay
7. Mangaung
8. Buffalo City

Population distribution



Demand distribution

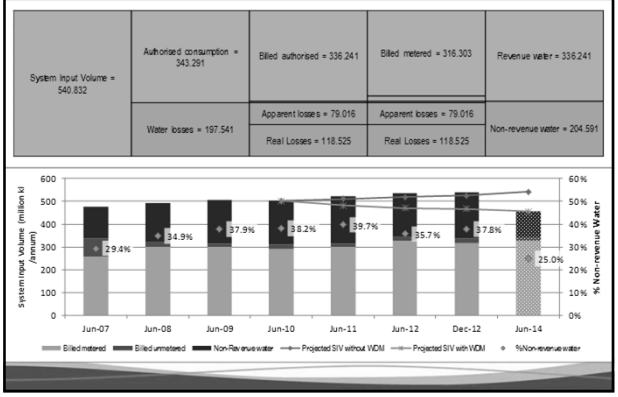


Main Sources of Information

- DWA survey of metros (Dec 2012);
- The SALGA Benchmarking initiative (Jun 2012);
- State of Non-revenue Water in South Africa (09/10 data)(WRC, TT 522); Aug 2012;
- The DWA Regulatory Performance Measurement System (RPMS)
- The Western Cape Water Supply System – Reconciliation Strategy Study (Jun 2007 and updates).
- Vaal River System Large Bulk Water Supply Reconciliation Strategy (DWA, 2007 and updates).
- Water Reconciliation Strategy Study for the KwaZulu-Natal Coastal Metropolitan Areas (DWA, 2009 and updates).
- Algoa Water Supply System: Reconciliation Strategy (Nov 2010 and updates).
- Development of a Reconciliation Strategy for the Amatole Bulk Water Supply System (March 2008 and updates).
- Water Reconciliation Strategy Study for the Large Bulk Water Supply Systems: Greater Bloemfontein Area – Interventions report (June 2012 and updates)

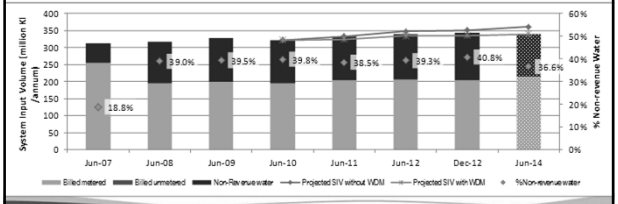
METRO STATUS

City of Johannesburg



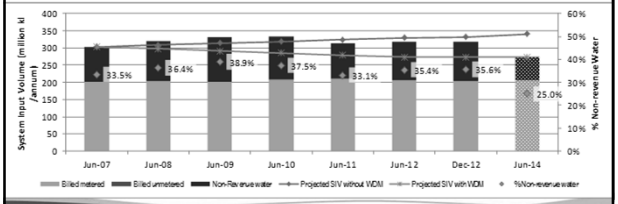
Ekurhuleni

System Input Volume = 344.435	Authorised consumption = 234.905	Billed authorised = 203.797	Billed metered = 203.797	Revenue water = 203.797
		Unbilled authorised = 31.108	Unbilled metered = 31.108	
	Water losses = 109.530	Apparent losses = 52.575	Apparent losses = 52.575	Non-revenue water = 140.638
		Real Losses = 56.956	Real Losses = 56.956	



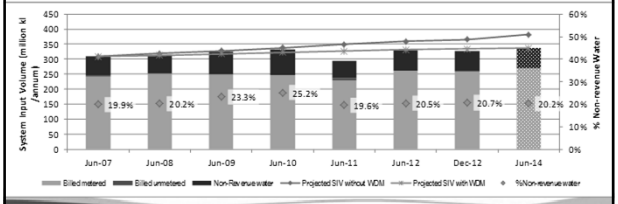
eThekwini

System Input Volume = 318.064	Authorised consumption = 205.924	Billed authorised = 204.715	Billed metered = 204.715	Revenue water = 204.715
		Apparent losses = 30.782	Apparent losses = 30.782	
	Water losses = 112.140	Real Losses = 81.358	Real Losses = 81.358	Non-revenue water = 113.349



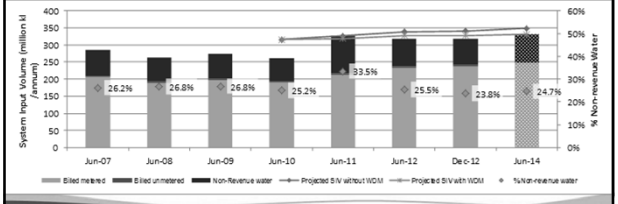
City of Cape Town

System Input Volume = 327.302	Authorised consumption = 277.452	Billed authorised = 259.547	Billed metered = 259.547	Revenue water = 259.547
		Unbilled authorised = 17.905	Unbilled metered = 17.905	
	Water losses = 49.850	Apparent losses = 20.091	Apparent losses = 20.091	Non-revenue water = 67.755
		Real Losses = 29.759	Real Losses = 29.759	



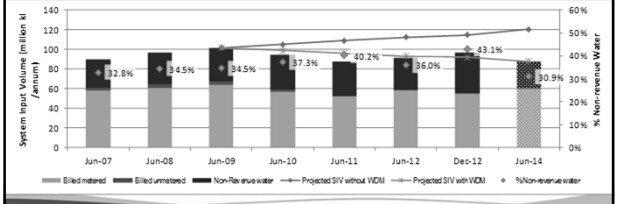
City of Tshwane

System Input Volume = 317.379	Authorised consumption = 244.750	Billed authorised = 241.807	Billed metered = 235.931	Revenue water = 241.807
		Apparent losses = 14.526	Apparent losses = 14.526	
	Water losses = 72.629	Real Losses = 58.103	Real Losses = 58.103	Non-revenue water = 75.571



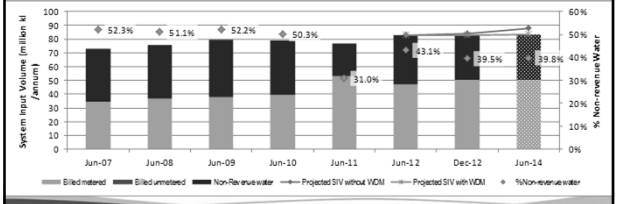
Nelson Mandela Bay

System Input Volume = 96.756	Authorised consumption = 65.451	Billed authorised = 55.099	Billed metered = 54.466	Revenue water = 55.099
		Unbilled authorised = 10.352	Unbilled metered = 9.719	
	Water losses = 31.305	Apparent losses = 6.261	Unbilled metered = 0.633 Apparent losses = 6.261	Non-revenue water = 41.657
		Real Losses = 25.044	Real Losses = 25.044	

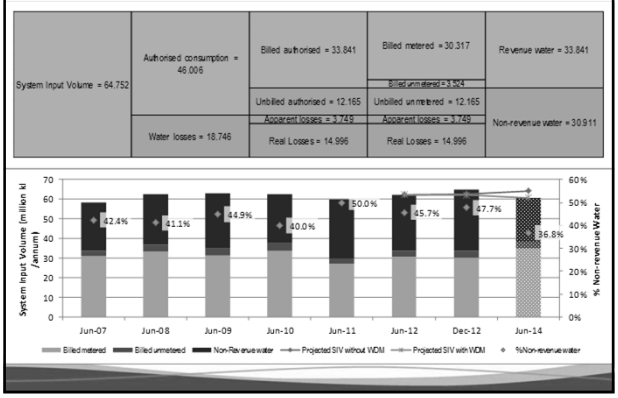


Mangaung

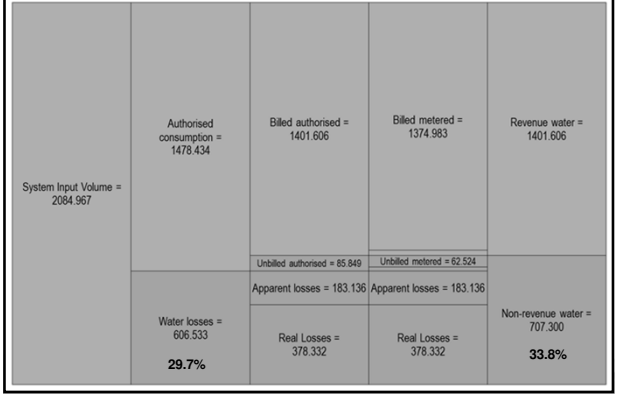
System Input Volume = 83.108	Authorised consumption = 53.398	Billed authorised = 50.282	Billed metered = 50.282	Revenue water = 50.282
		Unbilled authorised = 3.116	Unbilled metered = 3.116	
	Water losses = 29.710	Apparent losses = 5.942	Apparent losses = 5.942	Non-revenue water = 32.826
		Real Losses = 23.768	Real Losses = 23.768	



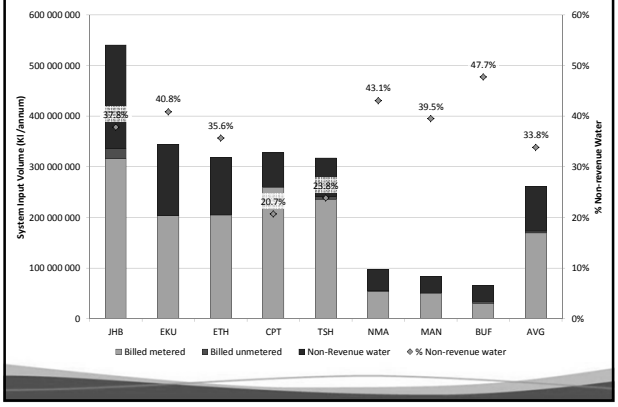
Buffalo City



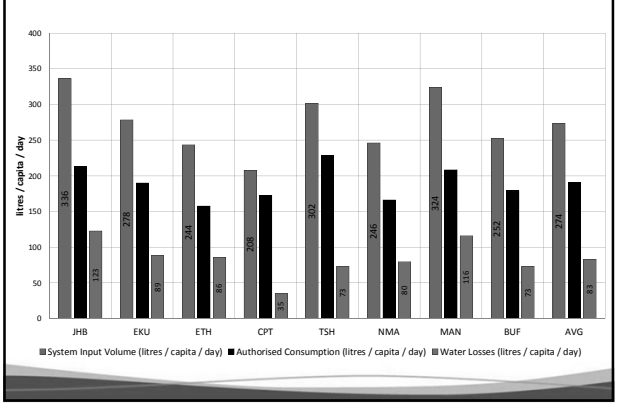
Metro IWA Water Balance (Dec 2012)



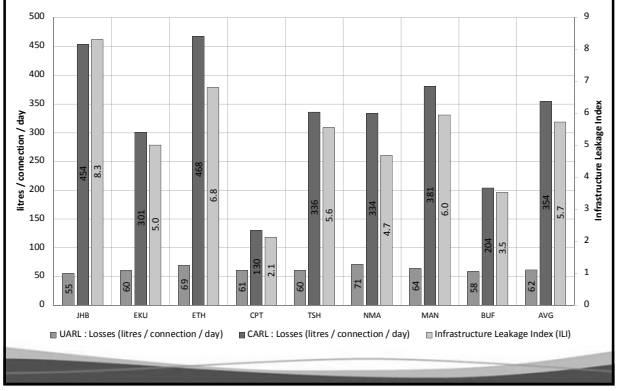
Non-revenue water (Dec 2012)



Population Unit Consumption (litres / capita /day)

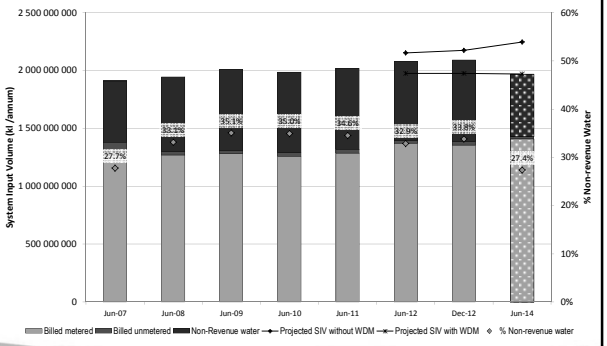


Infrastructure Leakage Index (ILI)

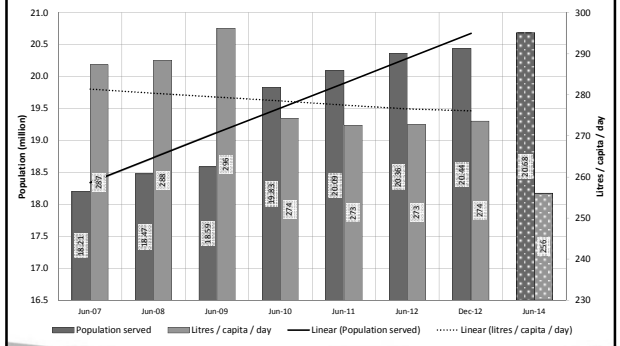


TRENDS

Non-revenue water



Population versus System Input Volume (litres / capita /day)



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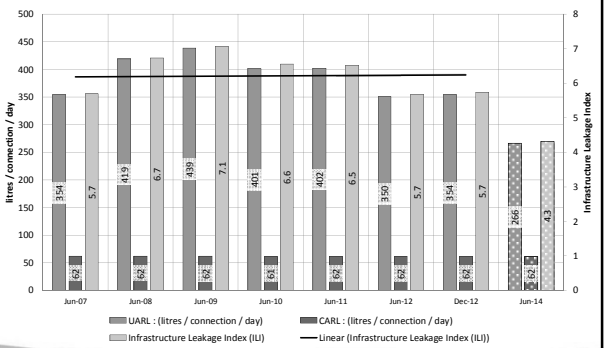
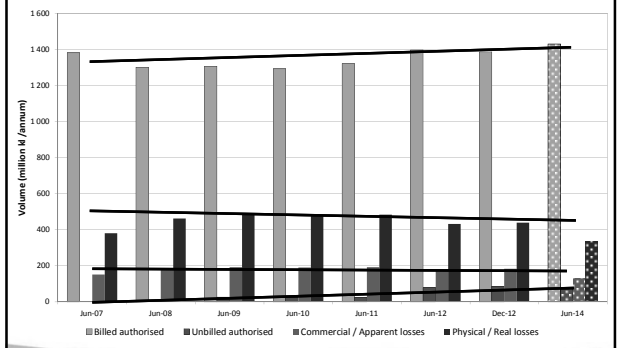
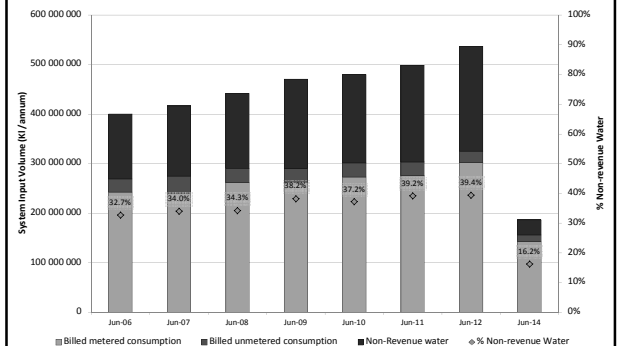


Water Balance Components

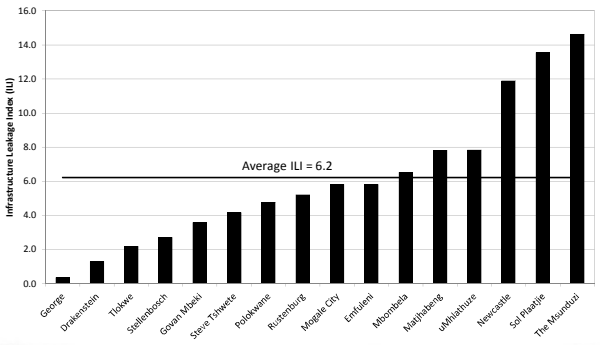


SECONDARY CITIES

Secondary City NRW Trend



Secondary City ILI Distribution



WATER BALANCE CALCULATIONS

MODIFIED IWA WATER BALANCE

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Free basic Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorised Consumption	Unbilled Metered Consumption	
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorised Consumption	Non Revenue Water
			Customer Meter Inaccuracies	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Storage Tanks	
			Leakage on Service Connections up to point of Customer Meter	

Water Balance Calculation - issues

- *Exported water is included in System Input Volume?*
  - *Recommendation: Exported water should be considered billed metered consumption.*
  - *Treat like any other billed metered consumer.*
  - *Exclude this from ℓ/c/d and m^3/conn/month*
- The amount recorded as 'Free Basic Water' under Billed Authorised Consumption?
  - *Recommendation: FBW should be consumption billed at a zero rate.*
  - *Billed metered consumption (usually) includes FBW.*

Water Balance Calculations….

- *Where should water used for fire hydrants, sewer flushing etc. be recorded?*
  - *Recommendation: As unbilled unmetered consumption.*
- *Where should intra-departmental use be recorded?*
  - *Recommendation: As billed consumption if billed, otherwise as unbilled consumption.*
- *What is considered to 'metered'?*
  - *Recommendation: If input volume is metered and checked against FBW consumption – at least!*

CHALLENGES

Challenges

- A lack of political support at mayor and councillor levels
- Poor communication between technical and financial units
- Poor Planning
- Insufficient budget allocation
- Poor metering and billing systems
- Low levels of revenue generation
- Supply Chain Management issues
- Inappropriate technical solutions
- Lack of community acceptance or support
- Lack of skills, poorly trained and apathetic staff
- Water insecurity

SUMMARY AND CONCLUSIONS

Conclusions

- Most metros will not achieve their 2014 water loss/non-revenue water targets – which is of major economic concern;
- The presidential target of halving water losses by 2014 will not be achieved.
- Reporting standards have improved, but the differing interpretation of certain critical water loss components must be resolved;
- The water loss trend has improved from 678million m3/a in 2009 to 621 million m3/a in 2012);

Conclusions….

- Physical losses have reduced over the last three years from 485 million m3/a to 438million m3/a;
- Unbilled consumption is increasing (26 million m3 in 2009 to 85 million m3 in 2012).
- System input volume unit consumption peaked at 296 ℓ/c/d (2009) but has reduced to 274 ℓ/c/d (2012);
- Authorised per capita consumption has reduced slightly – from 196 ℓ/c/d (2009) to 190 ℓ/c/d in (2012);
- Non-revenue for metros and secondary cities is valued at almost R 6.6 billion;

Conclusions….

- Large metros have an average of 2.1 households / connection while the smaller metros have an average of 1.2 households/connection.
- The average ILI for all metros is 5.6;
- With an ILI of 7.8, the City of Johannesburg has the highest potential for water savings;
- The City of Johannesburg is by far the largest metro with 26% of the total metropolitan water demand;
- The five largest metros (JHB, EKU, ETK, TSH, CPT) account for 89% of the total metropolitan water demand;

Recommendations

Municipalities should:

- continue to increase their efforts to achieve the scientific targets set by the DWA reconciliation strategies to ensure water security;
- continue to increase their efforts to reduce water losses as it impacts on security of water supply;
- continue to increase their efforts to reduce NRW because high levels of NRW impact on own revenue generation, financial viability, and water use efficiency.

Recommendations….

- Increased political support and commitment is required to ensure payment for services rendered, leaks on private properties are repaired, effective prosecution of illegal water connections and theft of municipal property;
- Better municipal planning and project prioritization is required to ensure appropriate budgetary allocations for NRW are available;
- Appropriately qualified municipal staff should be appointed, trained, and motivated;
- Supply chain problems should be resolved;

Recommendations….

- Water loss reduction targets need to be continually reviewed and adjusted.
- On-going monitoring and reporting of Metro NRW performance by DWA is critical;
- On-going provision of mentorship to DWA Regional Offices by DWA HQ is critical;
- On-going technical support by DWA to Metros is critical;
- Metro asset management needs to be improved to ensure greater sustainability of water supply services

Thank you

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA