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# THE IMPACT OF CONSUMER BILLING ON NON-REVENUE WATER

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**ABSTRACT**



Our country is changing rapidly and so is the on-going relationship between our Government and the citizens they serve. Global pressures, declining water availability, economic uncertainties, restricted budgets, shortage of new water resources, aging infrastructure and increasing protests by citizens for service delivery have never been greater.

Recent legislation is forcing municipalities to report on their Non-Revenue Water and physical losses.

While the technical managers know the status of water meters and physical losses they have no control over the billed volumes.

Non-Revenue Water is the difference between system input and the sum of the billed volumes of individual consumers. This paper will provide pointers for water managers to know about billing. These include meter estimates, unmetered connections, unlinked meters and stuck meters.

**INTRODUCTION**

Traditionally, water managers did not concern themselves with meter reading and billing issues as this was the function of the staff of the treasurer’s/financial department. Recent legislation has made it imperative that water managers have to engage with their counterparts as poor meter reading, revenue collection, debtors control enforcement have a direct impact on Non-Revenue Water.

Non-Revenue Water is the difference between system input volume and the sum of the billed volumes of individual consumers. This is illustrated below.

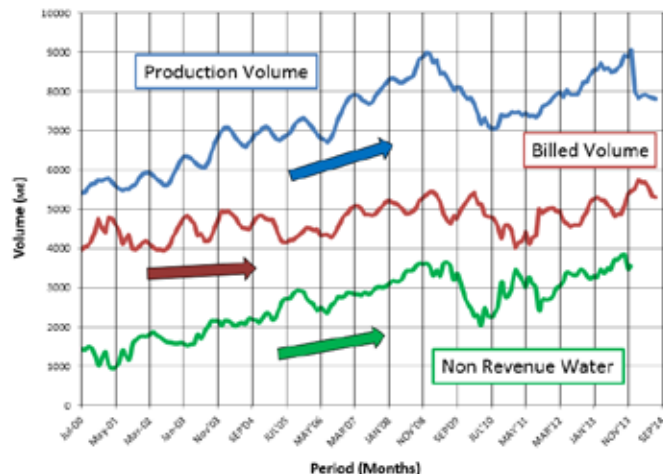


Figure 1: Graph indicates increasing Non-Revenue Water

Non-Revenue Water (NRW) is water that has been produced and is “lost” before it reaches the customer. Losses can be real losses (through leaks, sometimes also referred to as physical losses) or apparent losses (for example through theft or metering inaccuracies).

Non-Revenue Water targets are normally included in service level agreements of water managers and thereby impacts directly on performance of the manager. The water managers must engage with their financial counterparts to improve efficiency, improve billing volumes and reduce Non-Revenue Water. High levels of NRW are detrimental to the financial viability of the municipality, as well to the quality of water itself.

The International Water Association (IWA) has developed methodology to assess the various components of NRW. Accordingly NRW has the following components:

- Unbilled authorized consumption
- Apparent losses (water theft and metering inaccuracies)
- Real losses (from transmission mains, storage facilities, distribution mains or service connections)

In many municipalities the breakdown of NRW is unknown and difficult to establish, there is thus a need to perform audits (bulk meter audits and customer surveys).

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Revenue Water	
			Billed Unmetered Consumption		
	Water Losses (UAW)	Unbilled Authorised Consumption		Unbilled Metered Consumption	Non Revenue Water (NRW)
				Unbilled Unmetered Consumption	
		Apparent Losses		Unauthorised Consumption	
				Customer Meter Inaccuracies	
Real Losses		Leakage on Transmission & Distribution Mains			
		Leakage on Overflows at Storage Tanks			
		Leakage on Services Connections up to point of Customer Meter			

Figure 2: IWA Water Balance Table

**2. BENEFITS OF REDUCING NON-REVENUE WATER**

- Assists in improved billing revenue and optimization of capital investments;
- NRW is an indicator of water utilities’ operating efficiency, therefore an investigation will assist in determining the level of operating efficiency for the Water Service Authority;
- Water utilities reduce illegal connections, thereby creating greater fairness between users and achieve a fair water balance;
- More efficient and sustainable utilities improve customer service and reputation;
- New business opportunities create more jobs;
- Increased knowledge of the water distribution system;
- Compliance with legislation.

**3. LEGISLATION**

There is substantial modern legislation and regulations guiding and instructing Municipalities on all aspects regarding water conservation and demand management. The following legislation impacts on Non-Revenue Water and reporting on water losses:

- 1. National Water Services Regulation Strategy:** The Government introduced the National Water Services Regulation Strategy in 2011 to ensure compliance, regulation and accountability by Water Services

- Authorities in the provision of Water Services. Various performance measures are required to be monitored by Water Services Authorities
- Water Services Development Plan: A WC/WDM Strategy is a requirement of the Water Services Development Plan (WSDP). In addition to reporting on services, DWS will not fund any water conservation/water demand management project unless a strategy and a business plan are in place.
  - Blue Drop and No Drop Certification Programme: DWS have introduced an incentive-based regulation for the Blue Drop and No Drop Certification Programme. The objective is to get Municipalities to improve on drinking water quality management, and reduce Non-Revenue Water. The IWA water balance table has been adopted for reporting Non-Revenue water on a monthly and annual basis.
  - Auditor General: The National Water Audit (Section 2 (h) (iii)) requires the WSA to prepare WC/WDM strategies in order to achieve more efficient use of water. MFMA Circular 67 states: "Municipalities are required to ensure appropriate measurement and reporting of all water losses as per the national targets, and to ensure a common understanding and alignment between Technical and Financial Departments on water loss issues."
  - Regulatory Performance Measurement System (RPMS): The RPMS is a tool used by the regulator (DWS) to measure performance against key performance indicators to determine performance trends with the intention of promoting best practice in the sector. The system measures activities according to the eleven regulatory KPI's set out in the National Water Services Regulation Strategy.
  - National Development Plan: The National Development Plan has set the following target: "Reduce water demand in urban areas to 15 percent below business-as-usual scenario by 2030."
  - Municipal Financial Management Act: Credit control, reporting on water losses, and awareness on wastage.
  - National Water Resource Strategy - Water Sector Priority Focus Areas: 2013 - 2018
    - Achieving equity, including Water Allocation Reform;
    - Water conservation and water demand management;
    - Institutional establishment and Governance;
    - Compliance monitoring and enforcement;
    - Planning, infrastructure development and operation and maintenance of water resources infrastructure.
  - Regulations relating to compulsory National Standards and Measures to Conserve Water
    - Section 10: Water services audit as a component of the WSDP: - must include quantity and different levels of services provided to different consumers.
    - Section 11: Water and effluent balance analysis and determination of water losses: - determine quantity of unaccounted for water.

Figure 3: Consolidated billing (Courtesy of Hydro-Comp Ent)

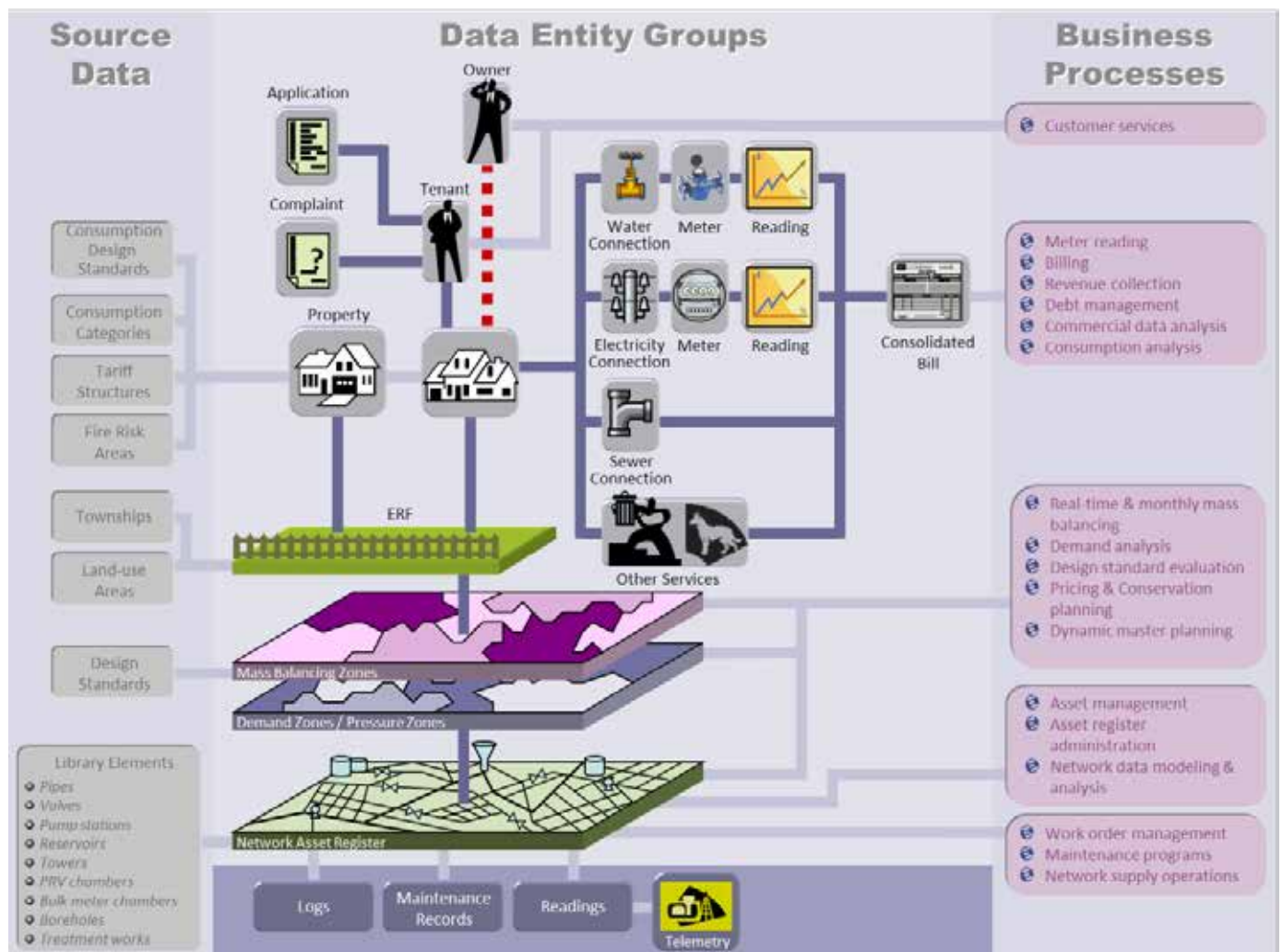




Figure 4: Data model

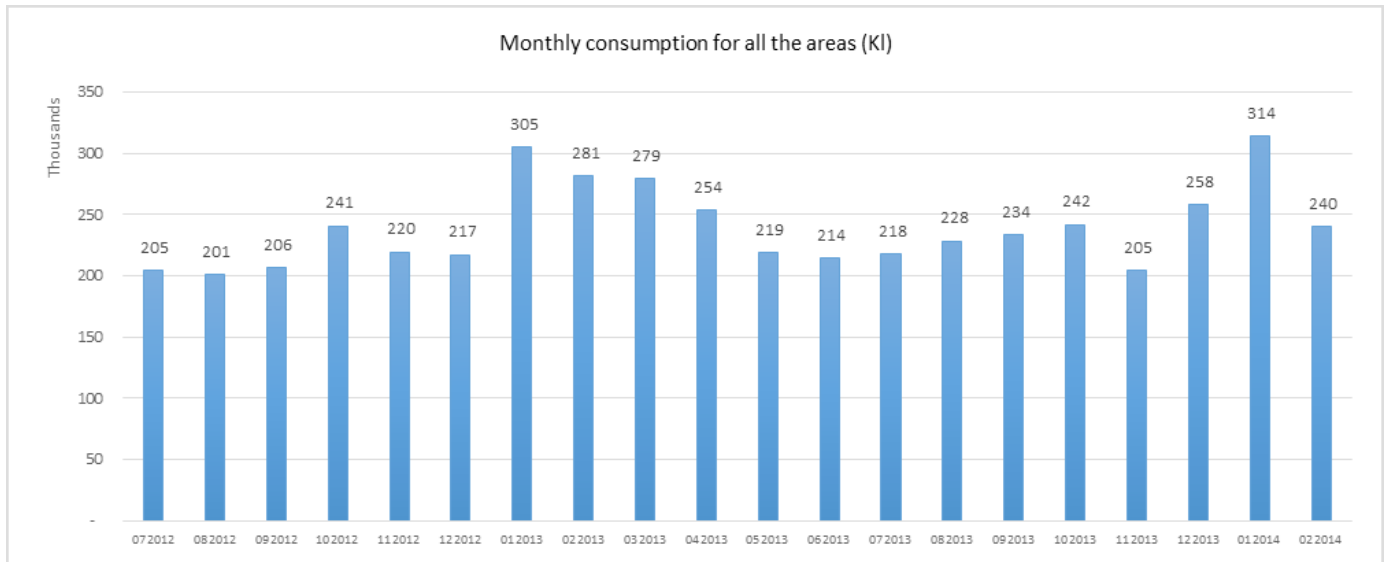


Figure 5: Fluctuating monthly billing volumes

10. Municipal Systems Act - Chapter 9 Credit Control and Management, Clause 95 states:
- 95. In relation to the levying of rates and other taxes by the Municipality and the 5 charging of fees for municipal services, the Municipality must, within its financial and administrative capacity-
  - (d) where the consumption of services has to be measured, take reasonable steps to ensure that consumption by individual consumers of services is measured through accurate and verifiable metering systems.

### FACTORS THAT INFLUENCE BILLING VOLUMES

#### 4.1 Billing

“Billing” means invoicing on a municipal account to an account holder of an amount or amounts payable for assessment rates, metered services, other municipal charges, levies, fees, fines, taxes, or any other amount or amounts payable arising from any other liability or obligation.

#### 4.2 Account information

Diagram 4 illustrates the account information kept by the finance department and used for billing.

Any breaks in any of the links of the above model results in:

- Lost revenue to the municipality;
- Lost water demands for the hydraulic model (NRW) which is populated from the billing information;
- Inconvenience to the customer.

There is much legislation on billing procedures including the local revenue bylaws, Municipal Systems Act, Trade Metrology Act and the Prescription Act. A water account means nothing if the meter information is incorrect or if the meter information reflects the incorrect property. The water account must reflect the erf no or the property description of the Surveyor-General’s database.

#### 4.3 Commercial data analysis

There is a need to continuously verify and update the consumer information. Some of the key exceptions include:

- Connections with no meters;
- Meters with no readings;
- Confirmation of high consumer details and meter information;
- Stuck meters with no reason logged;
- Abnormal cases/exceptions (e.g. high use indigent consumers, consumptions more than accepted averages, etc.);
- Oversized/undersized meters;
- General customer information missing such as erf no.

#### 4.4 Meter reading

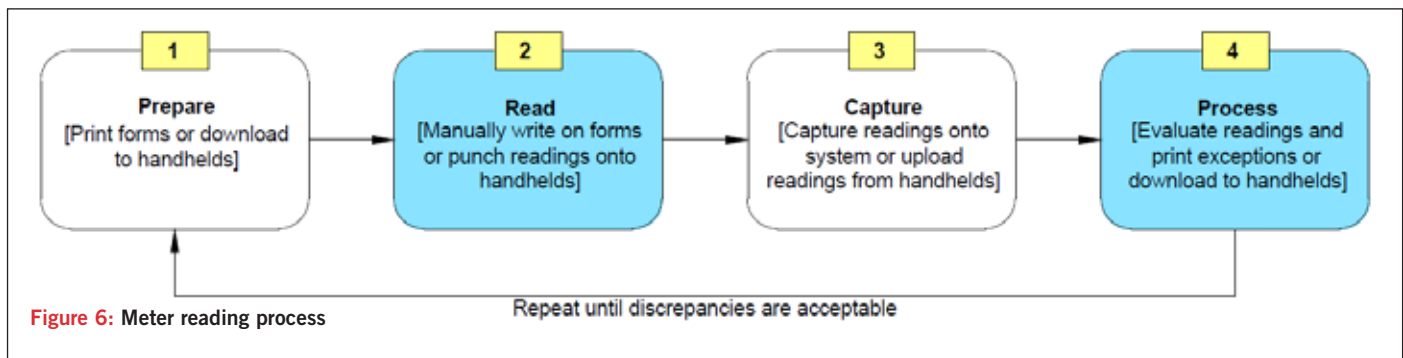
Efficient and accurate meter reading is essential to sound financial management in billing. One incorrect reading can result in a lengthy administrative process involving man-hours, check readings to be done, correspondence and customer despondency and ultimately non-payment. Normally there are four methods to undertake meter readings.

These are:

- Manual reading in a book or meter reading sheet;
- Hand-held terminals that have consumer information already in the terminal;
- Meter reading through a smart phone with suitable apps. This tool is extremely useful for obtaining live data, GPS co-ordinates and taking photographs of the meter and the reading;
- Automatic meter reading (AMR) normally by a drive-by vehicle.

This is illustrated below

Meter reading can also be outsourced to an external service provider. If meter reading is outsourced to a service provider it is important that the scope of work is clearly defined, targets are set and that service providers are competent to undertake the work.



#### 4.4.1 Estimate Readings

Where the finance department is unable to obtain a meter reading, an estimate is calculated and the consumer is charged, based on the volume calculated. Due to different situations the calculation can become complex and not relative to a consumer's consumption. The revenue bylaw and the water bylaw provide some rules for determining estimates. An estimate is straight forward if a reading is not obtained in a particular month, but if readings are estimated continuously, then it becomes important that a check system is in place as to the reason and that action is taken to remedy the situation.

If a check reading is obtained, the meter reader must be disciplined if a municipal employee. If the meter reading system is outsourced, action must be taken against the service provider. Meter readers are normally paid per reading and are therefore reluctant to make the extra effort to obtain a reading when it is easy to punch in a code such as meter covered, inaccessible, gate locked, illegible.

#### 4.4.2 Meters that reflect zero consumption

There are valid reasons why meters show zero consumption. Typical reasons would be when a domestic consumer is away for a few months on holiday or business. A meter that supplies fire supply to an industrial consumer would not reflect any consumption unless the industry does checks on fire flow.

There are many cases that the meter reflects no consumption but water is consumed. This is where the meter has become defective and needs to be replaced. Old water meters tend to under read and will eventually fail. Meters need to be replaced between every 8 to 10 years.

A list of these meters must be sent to the engineering department for replacement.

#### 4.4.3 Meter Installation Details

All meters that are installed have important information such as date of installation, erf no of property, serial no of meter, installation reading, consumer category and for larger meters a multiplication factor.

Likewise when a meter is removed, information such as date of removal, serial no of meter, removal reading is required to reflect on the next account. The technical department is normally responsible for meter installations and removals. It is vital that this information is provided to the finance department timeously. There is nothing worse for a meter reader than to arrive at a property and see a 'foreign meter' installed.

#### 4.5 Indigent consumers exceeding the basic service level

The basic service level is defined as the following:

- 25 litres/person per day;
- 6 kℓ/month per household;
- Maximum walking distance of 200 m to a communal standpipe;

- A minimum flow rate of 10 litres/minute.

The minimum of 6 kℓ/month is designed for a yard tap. It is insufficient when the consumer has waterborne sanitation.

How is revenue collected when the minimum consumption is exceeded? This is one of the largest challenges facing municipalities. The revenue by-laws include a section of credit control, which spells out the procedures to follow. Normally the municipality writes this debt off or installs flow restrictors, which is ineffective. This problem has a massive impact on revenue for the water service.

The correct approach is to implement good governance. Good governance in water usage is as follows:

- Applicable and updated bylaws, council policies and administrative procedures. It is essential to include procedures how consumers can pay off arrears;
- Awareness and education of consumers;
- Water accounts that are simple to understand and reach the customers;
- Enforcement of the credit control procedures in terms of the bylaw;
- Strong support from political leadership. Without this requirement the credit control system will not be effective.

#### CONCLUSION

The Water Manager must have input into billing information as it impacts directly on the water service operating budget and Non-Revenue Water; Non-Revenue Water is an institutional function. There must be close and regular liaison between the technical and financial departments; There are various sub-sections of both departments that need to co-ordinate their activities and provide information; It is essential that the water service have either teams, in-house or through a service provider, that undertake on-site verification and replace faulty meters;

Meter reading is a very important function that must be well managed. Meter reading success is linked directly to revenue collection and there is high risk involved. A number of municipalities have moved this function from the finance department to the technical department;

Enforcement of the revenue and water services bylaws is essential part of good governance;

A number of KPI's such as monthly estimates, still meters, billing volumes, billed volumes written off must be tracked monthly and reported to the relevant portfolio committee.

#### REFERENCES

- DWS, Guideline for the preparation of an IWA Water balance and Water losses, August 2014.
- R McKenzie et al, 2012, The State of Non-Revenue Water in South Africa (2012), TT522/12, WRC.