Prepaid Water in Windhoek: Case Study

Overview
Windhoek, the capital of Namibia, has a population of about 340,000 people, of whom about 20 percent live in informal settlements (Photo 1). The Windhoek City Council (WCC) started piloting prepaid meters in 1998, following a rapid growth in informal settlements after independence in 1990. Prepaid meters are used exclusively on communal standpipes, and serve about 20,000 households. On average, about 25 to 30 households share each meter.

Despite their high capital and running costs, the WCC sees prepaid standpipes as the best option for people using communal standpipes. They believe that such meters on standpipes offer customers the fairest way of collecting payment from a shared standpipe, and they discourage water wastage. Both of these issues carry particular weight in Windhoek because the city is located in an arid region with low rainfall and high water tariffs. Water tariffs are high because water is piped in from three small rivers 70 km away, and then blended with up to 25 percent recycled water.

Lessons
A slow cautious approach to piloting installation and building management capacity is necessary when innovating with an unproven technology and without funding support.

Delays in restoring a supply that users have paid for invite vandalism. With this in mind, the WCC aims for a response time of less than one hour.

Organize customers and issue tokens according to settlement area or ward, with applications for tokens count signed by the head of the area. This improves local accountability around responsible use and reduces vandalism.

Build in-house capacity to maintain and repair the prepaid meters. External service providers are expensive, and are not always able to respond with the level of urgency that customers need.

Build a database that tracks call-outs and the type of faults logged for each meter so that their maintenance and spares needs can be managed better.

Why prepaid meters were introduced
There have been three major motivations for Windhoek venturing into the use of prepaid systems.

Conservation is important as Namibia is a highly arid country. Windhoek and other councils have been investing substantial time and resources over the years in seeking to minimize water wastage in an arid environment, and ensure that standpipe taps are not left running. Prepaid meters are seen as a potentially effective way to raise awareness of the challenges of conservation among customers.

In Windhoek, the water department also sought ways to reduce conflict over payment between people using a shared standpipe when some use more water than others but all are charged the same amount, while some don’t pay at all. WCC says that residents ask for prepaid rather than conventional standpipes, as they say this is fairer.
Improving collection of payments has been a consideration, as payment collected from a group of users is often not paid over to the municipality, and the supply is then disconnected.

Implementation and management
Windhoek City Council was one of the early pioneers of prepaid standpipes, and worked closely with several suppliers from the late 1990s to develop and refine the prepaid meters in use today.

The water section within the Department of Infrastructure, Water, and Technical Services is responsible for prepaid meter installations, repairs, and maintenance. Staff in this unit work closely with the Community Development division of the municipality to address user training, get feedback on performance, and convene quarterly public meetings (or more frequently if required) to address problems. The Finance Department is responsible for managing sales and revenue.

Internal management of prepayment has been strengthened considerably by the appointment of a dedicated manager of prepaid metering within the water section, who is supported by two technicians who do repairs and maintenance.

WCC’s water department is exploring the feasibility of introducing prepaid meters on individual connections. There is growing customer demand for this to minimize disconnection for arrears and as an alternative to questionable bills. It sees a Standard Transfer Specification (STS)-compliant system as the only option worth pursuing, because of its vending and interoperability benefits. But the WCC is currently reluctant, because it uses the threat of disconnection of water as a credit management tool. Customer payments for municipal rates and service charges are allocated last to water, and nonpayment of any portion of the municipal bill can result in water cut-offs.

Service delivery performance
WCC aims for a service standard of a prepaid standpipe within 50 meters, serving not more than 25 households per standpipe. It currently comes close to this in authorized formal settlements, but struggles to meet demand in unplanned and unauthorized informal settlements. Windhoek has 24/7 water supply and a steady 2 bars of water pressure, so performance is not impacted by interrupted supplies or low water pressure.

Among the same type of meter, the incidence of faults and battery life is related directly to the intensity of use. Diaphragms and batteries fail more frequently as usage intensity rises, typically in unauthorized informal settlements with few water points.
Over 15 years, WCC has used different permutations of prepaid meters from three different manufacturers in the hope of finding one that offers reliable service at an affordable price. WCC moved away from one early supplier because their after-sales service was poor and increasingly expensive.

Another type, installed at scale in 2010, was removed within 18 months, after a host of problems the manufacturer was unable to rectify (no water, free water, vending problems, software problems, data losses, etc). One senior staff member described that option as “just an expensive tap.” A version of the same meter was installed on several yard connections on a trial basis, but there were repeated failures. Customer feedback was allegedly very positive as this meter supplied mainly free water. This make of meter was not repairable locally and had to be sent back to the supplier. WCC calculated that the cost of maintenance would be prohibitive beyond the guarantee period, and opted to replace them all.

In their place, WCC installed a prepaid meter that cost as much as the meter it replaced, but offered better reliability. Critically, it was repairable locally and spares, although expensive, were available.

Analysis of Windhoek’s call-out logs indicates that even this more reliable meter carries a substantial maintenance burden. The records detail 1,135 call-outs over a 10-month period in 2012–2013, which represent nearly 2 call-outs per meter per year. Most meters are three years old or newer. The most common problems were software errors, valve faults, and low battery power (Figure 1).

![Figure 0. Analysis of prepaid meter faults requiring replacement parts, Windhoek](image)

Two-thirds of call outs required replacement of parts, and of those, 63 percent involved the valve—either a seal, a diaphragm, or the entire latch valve. Replacement of the parts shown in Figure 1 cost WCC about USD 30,000. In addition, WCC replaces the batteries proactively every 18 months, and more frequently when individual batteries fail earlier. In areas of dense settlement and intensive use, batteries fail after as little as three months.
Despite their high capital and running costs, WCC remains convinced that prepaid standpipes are the best available option for supplying water from communal standpipe and managing waste. “We have stuck with them because we don’t have an alternative,” said the head of the Water Department. “We’re not 100 percent yet, but we’re getting there.”

**Vending**

Credit vending in Windhoek has been simplified to just one proprietary system. Customers can charge their iButtons at one of three municipal offices during office hours.

> The WCC has bought several handheld devices to offer customers more options, especially after hours, and aims to engage private vendors. These have not yet been put into use, mainly because the WCC is still assessing how best to pay vendors commission on credit sales. Windhoek’s water tariffs are already high, reflecting its cost structure, and the Council is unsure how to set the commission in a way that it is fair both to customers and vendors.

**Monitoring**

Technicians inspect each meter once a month, and check its performance using a programmed management key. All call-out logs are filed, and the management team has started building a database to track performance of meters over time. This is a recent development. The previous type of meter used lost data each time the software was reset and each time it was repaired, so it was not possible to track consumption over time.

**Finance, funding, and revenue**

Apart from a once-off Nam $20 million (about USD 2 million) capital grant from the Namibian government, WCC does not receive or provide subsidies for its prepayment system.

Prepaid customers pay about USD 1.9 per kiloliter, or about USD 0.038 per 20-liter container (Photo 2). This is not a subsidized tariff, and is equivalent to the middle block of the rising block tariff that customers pay on individual connections, but without the availability charge.

WCC believes that it is possible to recover costs over the long-run, now that they have found a system they believe can serve them over a longer period without needing to be replaced at frequent intervals.

**Summary**

Despite variable performance in the type of prepaid meters used, Windhoek City Council has persisted with prepaid communal standpipes because it believes these are the best option...
available for managing supply and collecting payment from communal standpipes. It offers a rapid response capability, and officials say that there is good acceptance of the technology by customers, despite high tariffs and inconvenient vending options. Windhoek has proceeded cautiously, and believes it now has a technology and management system that works well enough to deliver long-term rewards.