GreenCape

Industry brief
03/2018

Why making your **business water resilient** makes financial sense

Main insights

Businesses are investing in water efficiency solutions and alternative water sources due to the drought. However, there are solutions that will make financial sense even when the drought is over and tariffs have been relaxed. Investing in water efficiency and alternative water sources can reduce your business's reliance on municipal water by up to 70% and in some instances save 60% in water related business costs.

- The current drought is the 'new normal' and water will be a scarce future resource.
- Under either the current (strict) tariffs or relaxed tariffs, it makes business sense to invest in solutions that improve water efficiency and provide alternative water sources.

This brief highlights:

- The wide range of water efficiency and alternative water sources solutions available to businesses – the choice of which would depend on cost and complexity, and the size and type of business.
- The estimated cost of solutions, water savings and financial payback periods of different types of interventions using two restriction tariff levels (Level 1 and Level 6, L1 and L6 hereafter)*.

*Per kilolitre (kl) cost assumptions: L1 - consumption (R26.20), sanitation (R20.47); L6 - consumption (R52.61), sanitation (R44.56).

The brief presents modelled scenarios for three business contexts: (1) a medium-sized office, (2) a medium-sized manufacturing facility and (3) a large manufacturing facility. The solutions are selected along a water resilience framework, illustrated below.

Figure 1: Solutions businesses can explore to be drought resilient

1. Understand water uses and risks	2. Reduce consumption	3. Re-use outside water	4. Find an alternative water supply
• Water audits • Meter and monitor, (incl. leak detection) • Water quality requirements (fit-for-purpose) • Set water targets	• Efficient processes and behaviour • Efficient fittings and technologies • Efficient cooling systems	• Use of greywater • Treat water for re-use • Divert water for re-use	• Ground water production • Rainwater/Stormwater harvesting • Use of treated municipal effluent

Increasing cost and complexity

1) Medium-sized office

- **Context:** office of 200 people using 5 kl of water per day
- **Solutions:** smart water meters, retrofit taps and toilet units and harvest rainwater.
- **Other potential options:** ground water extraction

Smart water meters
A basic smart metering solution is enough to provide a comprehensive consumption report, which can help offices identify leakages and track water use. For this modelled scenario, we assumed that 1 main meter and 1 sub-meter would be installed. We also assumed that the office would achieve a 5% reduction in consumption after installing the meters through better awareness or the elimination of leaks. (Research suggests that 15% is a typical saving with some offices achieving 70%).

Retrofitting taps and toilets
Taps and toilets use approximately 50% of all water in office buildings and retrofitting is an excellent opportunity and easy way to save. For this scenario, we based the retrofitting costs on 20 taps, 10 toilet cisterns and 4 urinals.

Rainwater harvesting
Harvesting rainwater is the most financially viable alternative water source solution for most office-type businesses. For this scenario, we assumed a storage capacity of 40 kl, average monthly rainfall patterns for Cape Town, a standard roof size of 2000 sqm, and rainwater to be used for flushing (and possibly irrigation). The model showed that in the rainy months (April – August), toilets can be flushed using only rainwater from the harvesting system.

Table 1:
Cost of solutions and savings for a medium-sized office

Solution	Cost	Reduction in municipal water usage (per solution)	Net Savings per year (Level 1 restrictions)	Net Savings per year (Level 6 restrictions)
Metering	R14 900	5%	R2 250	R8 000
Tap and toilet retrofits	R23 300	39%	R18 700	R43 200
Rainwater harvesting	R166 500	44%	R35 300	R84 400

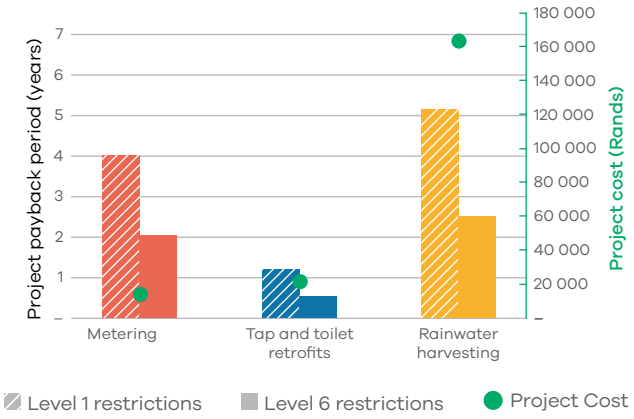

Figure 2: Selected water solutions with costs and payback periods: medium-sized office

Key takeaways
- All solutions pay for themselves in under six years under L1 and L6 tariffs.
- Tap and toilet retrofits payback periods are 6 months (L6) and 1 year (L1).
- Rainwater harvesting can provide greater savings and a shorter payback period if the site gets more rainfall than the average for Cape Town.
- Smart meters in this context take longer to pay back (2 years, both L1 and L6) but larger offices that use more water could pay back meters in less than a year.

Case study
JG Afrika reduced their water consumption by 67% through awareness and water efficiency measures and achieved cumulative savings of R33 424.

2) Medium-sized inorganic manufacturing facility

- **Context:** textile company using 200 kl of water per day.
- **Solutions:** smart water meters, inorganic effluent reuse, treating municipal effluent to potable standards, and rainwater harvesting.
- **Other potential solutions:** retrofitting taps and toilets and groundwater production (see medium-sized office).

Smart water meters
Since industrial sites have more complex reticulation systems and larger land areas, smart metering solutions are more complex and expensive relative to office-type buildings. For this scenario, we assumed that 2 main meters and 4 sub-meters would be needed and that a 5% reduction in consumption would be achieved after installation of the smart water meters.

Reusing inorganic effluent
There are many solutions for the reuse of industrial wastewater depending on the quality of wastewater and the intended purpose of use. The scenario modelled here is for the full-scale treatment of inorganic effluent to potable standards [1]. The data shown in Figure 3 assumes 70% water recovery from the treatment of the inorganic effluent.

Treating municipal effluent to potable standards
For textile manufacturing companies or similar industries that do not have to adhere to very strict health and safety standards when it comes to their process water, upgrading treated effluent to potable standards presents a viable option as an alternative water source. The cost of purchasing municipal treated effluent varies depending on the municipality. In the City of Cape Town, treated effluent costs R6.79/kl (including VAT). For this scenario, we assumed 100 kl/day production capacity (i.e. 50% of the facility's consumption).

Harvesting rainwater
Given the large roof areas of industrial facilities, rainwater harvesting is a viable option for most manufacturing plants and is a 'low hanging fruit' for accessing an alternative water source. For this scenario, we assumed a roof size of 20 000 sqm, storage capacity of 400 kl and that rainwater would be used for toilet flushing and industrial processes that do not need high water quality.

Table 2:
Cost of solutions and savings for a medium-sized manufacturing facility

Solution	Cost	Reduction in municipal water usage (per solution)	Net Savings per year (Level 1 restrictions)	Net Savings per year (Level 6 restrictions)
Smart water metering	R156 000	5%	R145 000	R330 000
Inorganic effluent reuse	R4 060 000[2]	70%	R1 213 000	R3 770 000
Treated effluent	R2 102 000	50%	R883 000	R2 713 000
Rainwater harvesting	R2 260 000	44%	R353 000	R 844 000

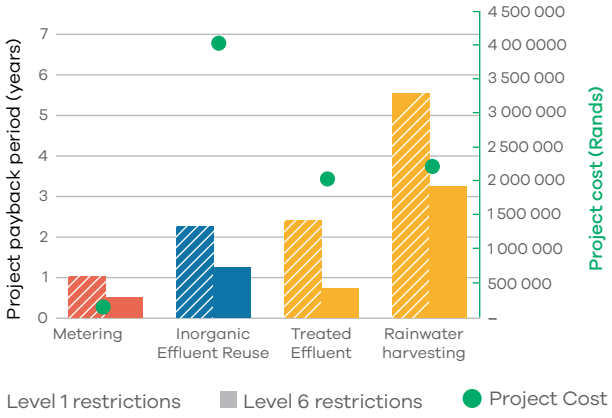

Figure 3: Selected water solutions, costs and payback periods: medium-sized manufacturing facililty

Key takeaways
- All solutions can be paid back in less than six years under both L1 and L6 restrictions.
- The best business case is for smart metering, with a payback period of 1 year (under L1) and 6 months (under L6).

Case study
ACA Threads managed to reduce their water consumption by 70% between 2012 and 2017 through equipment automation and process adaptation and managed to achieve R1.9 million annual savings.

1 It was assumed that the effluent would not contain any metals or toxic elements
2 The capital cost includes the cost of evaporation ponds needed for brine handling.

3) Large organic manufacturing facility

- **Context:** food and beverage company using 1 000 kl/day.
- **Solutions:** smart water meters, reuse of organic effluent and boreholes.
- **Other potential solutions:** see previous two scenarios

Smart water meters
Large manufacturing facilities have relatively high water consumption and larger land areas. The capital costs for implementing smart water metering are therefore higher, but so is the potential for water savings. We assumed 4 main meters and 8 sub-meters would be needed, and that a 5% reduction in consumption would be achieved after installation of smart water meters.

Reusing organic effluent
The costs to treat and reuse the wastewater vary widely, are site specific and subject to change depending on the effluent characteristics. For the modelled solution we assumed the use of anaerobic digesters and used a 70% water recovery rate. We assumed that the final reduced volume discharged would not have organic loads exceeding the maximum allowed limits and that the sludge from the anaerobic digester will be dried and taken to a landfill[3].

Boreholes
Most high water users opt to invest in boreholes to secure an alternative water source. We assumed a 200kl/day groundwater production capacity. The capital costs presented include costs for consulting and drilling, water treatment and brine handling (the groundwater quality was modelled as saline).

Table 3:
Cost of solutions and savings for a large food and beverage facility

Solution	Cost	Reduction in municipal water usage (per solution)	Net Savings per year (Level 1 restrictions)	Net Savings per year (Level 6 restrictions)
Metering	R430 000	5%	R730 000	R1 644 000
Organic effluent reuse	R60 000 000	70%	R7 070 000	R23 800 000
Groundwater production	R3 616 000[4]	20%	R1 500 000	R5 200 000

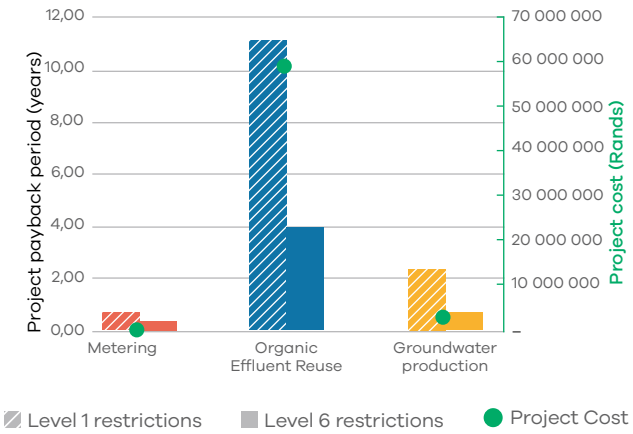

Figure 4: Selected water solutions, costs and payback periods: medium-sized manufacturing context

Key takeaways
- Organic effluent reuse is the most expensive and have the longest payback period, but can save the most water.
- The costs of treating organic effluent for reuse are very site specific.

Case study
Quality beverages reduced their water use by 27% through a staff water-saving campaign and by reusing water from bottle rinsing processes. They achieved cumulative savings of R870 000 from 2016 to 2017.

3 The costs for handling the waste sludge have not been included in the financial model.
4 Included in the capital cost is the cost of the evaporation ponds needed for the handling of the brine remaining after treatment.

Next Steps
For more information and support, contact GreenCape's water sector desk: water@greencape.co.za or call 021 811 0250.

Additional resources on improving water resilience are available from: https://www.greencape.co.za/content/focusarea/drought-business-support

Author: Bridget Fundikwa

*The analysis presented in this industry brief is generated from a financial model of water efficiency and alternative water sources projects. The information used to generate the model was sourced from an in-house database of water technologies gathered through engagement with technology providers, desktop research and expert engagements.

CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD