

When do you know we are in deep trouble?

When municipalities start trumpeting their colossal failures as successes....

Part 1

By Tian Claassens

Recently I received an e-mail containing a media release (dated 4 November) of the City of Cape Town: **City's reuse of effluent takes pressure off dams**. The headline further stated that: *"In order to save water, the City of Cape Town is reusing over 6% of the effluent that passes through its treatment works, for irrigation and industrial purposes. This in line with a commitment to the sustainable management of this precious resource."* The media release went on to extoll the fact that while only a 4.75% reuse figure was targeted the significant figure of 6.31% was achieved. This media release obviously was accompanied by a lot of cheering and backslapping. With the looming drought staring us in the face, water conservation is of course a critical matter and deserves the headlines it is given these days. But, is this really a case of super performance by the City of Cape Town? Or is it rather masquerading a colossal failure as a success story?

To answer this question, let us put it all into context. The City of Cape Town consumes about 1 000 mega litres (1 mega litre = 1 million litres) of potable water daily. There are three standards for potable water prescribed by the SABS. The City of Cape Town, like most other water authorities, targets to produce potable water of a standard better than SABS Class II. To produce its potable water most of the city's 'raw' water comes from inland resources such as Theewaterskloof dam (Villiersdorp) and Voëlvelei dam (Paarl). These (and other) dams form part of the overall Western Cape Water Supply System, which also supplies other towns and municipal areas as well as irrigation farmers. Raw water quality from the different sources varies considerably with some sources (such as Theewaterskloof dam) characterised by high silt content. Silt is a collection of fine material that is difficult to remove from the raw water and makes production of potable water (Class II) more expensive.

Of the total volume of potable water consumed, about 65% (thus 650 mega litres) flows back through the sewage system of the city. Some of this sewage is discharged directly to sea through sea outfalls such as located at Mouillepoint. The majority of the sewage is treated by the City of Cape Town in various sewage treatment works spread across the cape flats. The licensing requirements of these sewage treatment works (as set by the National Department of Water and Sanitation) are quite stringent and require the sewage to be treated to a relatively high standard of purity. At the

licensed standard of purity, this purified effluent is often of a better quality than raw water abstracted from the various sources. Once it is so treated what does the City of Cape Town do with this large volume of purified water? It dumps it into the sea. Yes, read that again, this water is dumped into the sea. That is apart from the 6.31% that is reused and was the reason for the trumpet fanfare of the media release.

Let us analyse this further - 6.31% of the effluent is less than 40 mega litres a day. Do we really believe that 40 mega litres a day will make a difference in times of drought when overall consumption is more than 1 000 mega litres per day? What we should focus on here is not the paltry volume of effluent that is reused but rather the stark reality of the vast volume of purified water that is dumped into the sea. Given South Africa's classification as a dry country, how can one describe this wastage of a scarce and valuable resource? To my mind it can only be described as madness. Is this really what is deemed to be sustainable by the City of Cape Town? Or do they perhaps have a long-term target set at the magical figure of 10%? No, that can never be and should no longer be tolerated. Any reuse figure less than at least 80% in the current circumstances should be considered an utter failure and enduring madness.

The question is then: can 80% be achieved and if so how? The simple answer to this question is yes. Purified effluent can be treated further ("polished" in layman's terms) to enhance its quality further and then pumped from the cape flats back to some of the dams from where the raw water originated. It is interesting to note that some of the key infrastructure to achieve this already exists. In the dams, this purified and polished effluent will mix with the fresh water and will be available for abstraction again. Some of it will thus find its way back into the water treatment processes of the City of Cape Town where potable water is produced. This process is termed "indirect reuse". Indirect reuse has been applied in various inland regions of our country for decades. Cities such as Johannesburg and Pretoria have significant volumes of reuse in their potable water and significant percentages (much higher than 6%!) of their effluent are re-used by others. With prevailing drought conditions in California and Australia, indirect reuse has become the prominent mode of water reuse. Indirect reuse offer a number of significant advantages over other water reuse models: (i) economies of scale enhance the financial viability of schemes, (ii) overall water use efficiency is enhanced significantly and (iii) economic diversification and growth.

In the City of Cape Town's case the economy of scale is easy to understand – building the required infrastructure to reuse 500 mega litres per day will be significantly cheaper (on a per kilo litre basis) than reusing 40 mega litres per day.

Similarly the overall water use efficiency is easy to understand. Currently, Cape Town's water use efficiency is $40/1000 = 4\%$. If 500 mega litres per day are reused its water use efficiency would be $500/1000 = 50\%$. But it is the 3rd benefit listed above that is not always understood or immediately recognised. If 500 mega litres of Cape Town's effluent is reused through the indirect reuse model it would imply that the overall yield of the Western Cape Water Supply System would increase by (nearly) 500 mega litres a day. To put this figure in context, note that the town of Newcastle, the 3rd largest town in KwaZulu-Natal, consumes roughly 100 mega litres per day. Thus, 500 mega litres a day is a massive volume of water, which will become available to address water shortages in other areas such as Saldanha Bay, for new industries or for irrigation. Depending on the specific water allocation, 500 mega litres a day could be used to develop between 10 000 hectares and 20 000 hectares for irrigation – think of the impact this could have on emerging farmers and agricultural output in the Western Cape.

What would you say if told that a proposal to implement such a large-scale, indirect reuse scheme was presented to the City of Cape Town more than 10 years ago? The pilot phase of that scheme would be for 200 mega litres per day. And yet, they trumpet a paltry 40 mega litres per day....

But this is still not the end. There was one more line in the media release that caught my eye: *“This water is much cheaper than potable water and the City of Cape Town actively promotes its use in order to conserve Cape Town's limited potable water supply”*. If your paradigm is that this treated effluent is just waste and therefore it is worthless, then any price you get for it is indeed a bonus. This is obviously the paradigm of the City of Cape Town. But, if your paradigm is rather that significant cost was incurred to: (i) bring the raw water between 50km and 100km to Cape Town, (ii) then to treat it to potable standard, (iii) then to reticulate it to consumers and collect their sewage effluent and then (iv) to treat it again to the licensed standard for treated effluent – all against the background that fresh water is a scarce resource - then surely this water must have significant value? Some may argue that the costs I listed above have all been recouped from the consumers and therefore the water does not have any (remaining) value. But that is not the test for value that should be applied.

The test for value that should be applied is this: once all Cape Town's existing resources are fully utilised and a new dam and pipeline etc. has to be built to bring additional raw water to Cape Town and its treatment works, what will this 'new' raw water cost? The short answer to this question is: in all likelihood way more than the

current cost of potable water. That then is the value of the treated effluent, which the City of Cape Town is selling for “*much cheaper than potable water*” and dumping into the sea. The last bit of bad news from the media release: “*a 230km treated effluent pipe network conveys this water to customers*”. I get the sinking feeling that at the price this water is sold, they are not even recouping the cost of this pipe network.

What all of this tells me, is that there is a complete inability to conduct appropriate and classical financial analysis of projects or new investments to determine their financial feasibility before the investments are committed. I will deal more with that in Part II.

All of this brings me back to the title and my question: When do you know that we are in deep trouble? When you read the media release of the City of Cape Town of 4 November 2015 that is.