

Misguided technology choices throwing fat in municipal fire



Inappropriate technology choices made by ill-informed local authorities could further harm the already beleaguered South African municipal wastewater treatment sector and the efforts of the Department of Water Affairs (DWA) Green Drop programme. This is one of the findings of a newly published investigation, funded by the Water Research Commission (WRC), into the drivers of wastewater technology selection in municipalities. Lani van Vuuren reports.

Poor wastewater treatment not only threatens the health of surrounding communities, but also the ability of South Africa's receiving water systems to continue supporting people and ecosystems. It is not only the management, operation and maintenance aspects of wastewater treatment that are of importance to ensure performance, but perhaps more importantly, what kind of wastewater technology is implemented in the first place, and whether this technology suits the municipality which will be responsible for managing it. The WRC project assessed the appropriateness of the technology choices of a selected number of municipalities compared

to the current ability of the municipalities to implement and administer their choices.

A total of 18 representative wastewater treatment plants were selected for the study. The selection was aimed at representing the sector as best possible, and various criteria were used to choose the works, including the full spectrum of discharge options, a spread that represent vulnerable versus capacitated municipalities, vulnerable versus less vulnerable receiving environments, and technology type of the wastewater treatment plants, among others. According to project leader Dr Marlene Van der Merwe-Botha, Director of Water Group Holdings,

the project was quite challenging as it touched on subject matter of a sensitive and controversial nature, with diverse opinions held by the various sector players. "The use of an unyielding scientific approach assisted to an extent in removing a subjective stance," she tells *the Water Wheel*.

OUT WITH THE SIMPLE IN WITH THE COMPLEX

The results indicate a general trend towards the replacement of low- to medium-level technologies (such as oxidation pond systems) with more sophisticated wastewater treatment technologies. Activated sludge plants (a more sophisticated wastewater treatment technology), for example, are set to increase from a current percentage of 61% to around 78% of municipal wastewater works in future. Opting for higher-level technologies is not inappropriate per se, bar the fact that not all municipalities are equipped to sustainably manage such advanced systems,

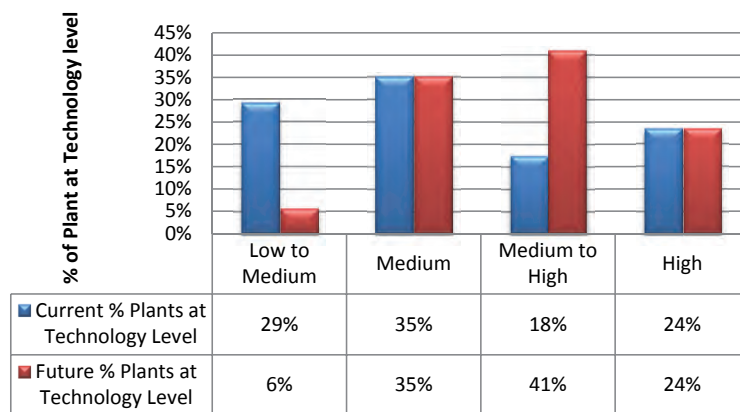
specifically with regard to skills and financial resource availability.

Among the main concerns raised by the WRC study is the identification of the trend for these very advanced technologies to be pushed as 'preferred solutions' in especially small towns and villages without full analysis of the long-term sustainability of the technology choice. Key issues being ignored include aspects of affordability, operations and maintenance, energy requirements and the human capacity and competencies required to manage these systems.

"These decisions are made against an already beleaguered environment delaying the very symptoms that are causing wastewater treatment plant failure," notes WRC Executive Manager: Water Use and Waste Management, Jay Bhagwan. "If the issue of inappropriate technology choices by local authorities is not addressed as a matter of urgency, it is going to put greater pressure on the country and the fiscus due to rising costs of energy and materials, underscored by the poor revenue base which already exists in most of these small municipalities."

Inappropriate technology choices can lead to a barrage of challenges, such as infrastructure failure, discharge of untreated or poor quality effluent, increased burden on the municipal budget, frustration of operators and maintenance crew, and even prosecution of individuals and reputational damage to the municipal entity.

"During the study we observed a tendency for local authorities to select very advanced treatment processes in the place of failing existing systems. Such advanced technologies are often seen as a silver bullet to cure a municipality's wastewater treatment woes," notes Bhagwan. "By not addressing management, operations and management issues which caused the initial wastewater treatment failure in the first place, municipalities are setting themselves up for repeated failure no matter what kind of technology they implement."



Left: Technology level trends of known planned upgrades.

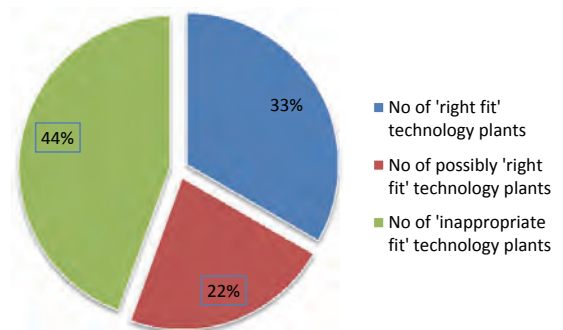
Below: Appropriateness ('right fit') of level of technology regarding the particular circumstance of operations and sustainability of the municipality.

Adds WRC Research Manager, Dr Valerie Naidoo: "Simply put, a municipality that is unable to manage a [simpler] pond or biofilter configuration to a level of excellence will be equally unable to manage [more technically difficult] activated sludge and biological nutrient removal configurations or combinations thereof."

In evaluating the technology choices of the sample of representative municipalities, the WRC study scrutinised aspects such as sensitivity of the receiving natural resource, legal requirements, capacity of the municipality to operate the system, as well as the availability of funding to operate and maintain the technology. Of the 18 wastewater treatment plants assessed, 8 plants (44%) may have opted for less suitable technologies when considering their resource base, capacity to manage and effluent quality requirements.

When applying the 44% statistic to a comparative national base (consisting of 850 municipal plants) there could be more than 370 wastewater treatment plants in the country where inappropriate technologies have been implemented. This number is significant enough to support further investigation and measures to mitigate this as a key risk to sustainable and improved performance in the municipal wastewater services sector, the final report points out.

The WRC project team found that in only a few cases were alternative options investigated before



a technology choice was made. No information was provided as to cost comparisons between options. More often than not it was (often incorrectly) assumed that the municipality had the resources to sustainably operate the new or upgraded plant. In addition, few municipalities prioritised green economics in their decision-making process (e.g. the beneficial use of waste products).

Although not stated directly in any of the documents scrutinised, it is further suspected that socio-environmental requirements, as reflected by the Department of Water Affairs' wastewater treatment plant authorisation process, place municipalities in situations where they are under pressure to select technological

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While some municipalities have the technical and financial capability to successfully manage high-technology wastewater treatment works, many local authorities do not.



options which are not financially or operationally sustainable.

“This blind drive towards achieving uniform compliance for wastewater discharge is not solving the problem, but is fuelling a greater disaster in the making,” says Bhagwan.

A call is made to regulators to take a holistic and strategic view of the implementation of the proposed wastewater treatment technologies based on the sustainability of the business of wastewater services, and to adopt design principles appropriate to the rural and/or small municipalities, providing leadership through their sector support and approval units.

OVER-RELIANCE ON CONSULTANTS

It is recognised that in a complex field, such as municipal wastewater treatment, consultants have an invaluable role and contribution to make as specialists and advisors. While competent municipalities generally use consultants within this context with optimal results, municipalities with little to no technical skills have generally become over-reliant on consultants – often blindly following their advice. This leaves municipalities vulnerable and at risk of being exploited,

thus leading to the implementation of inappropriate (and usually more expensive) technology options.

From the study it has become apparent that in a number of cases, especially in smaller municipalities, the technology decision is driven by the consultant rather than being undertaken jointly by an investigative team of municipal officers and consultants. In some cases, investigations into the range of technologies available are not done at all. As a result of budget constraints or supply-chain management policies within municipalities, competitive tendering is often weighted towards price rather than technical proficiency or experience, often forcing consulting firms to cut price by using existing designs that may not be tailored around the specific municipal circumstance.

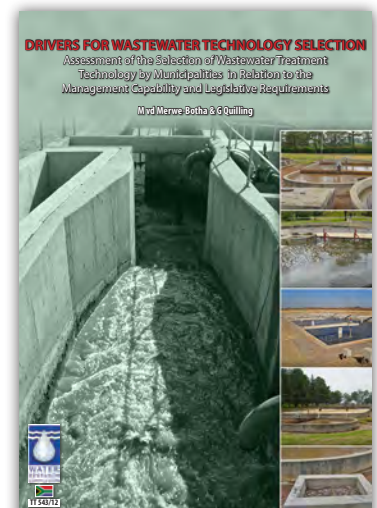
This over-reliance on consultants by local authorities is considered unhealthy, especially as these private companies are not held accountable when systems fail (they are only held accountable for the design). “As long as financial instruments, such as the Municipal Infrastructure Grant and other grant programmes, do not tighten performance evaluation criteria, weak municipalities will continue to be exploited by those unscrupulous practitioners who work towards short-term gain rather than

long-term sustainable solutions,” notes Bhagwan.

The report concludes with specific recommendations assigned to the relevant role-players to work towards a future that embraces and promotes responsible and appropriate technology choices that will sustain service delivery, public health and the environment in the long run. It is hoped that this snapshot view of the issues involved in technology drivers and choices will go a long way towards raising awareness in the sector.

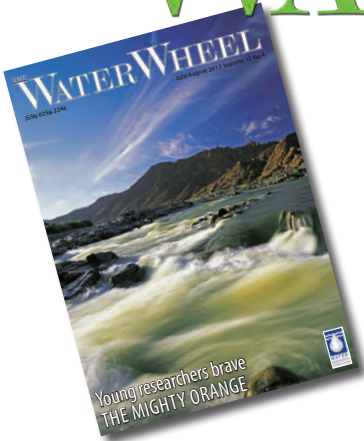
Dr Van der Merwe-Botha concludes with a message to local government and wastewater practitioners: “It is important to note that 0.2% of effort and cost go into planning, 19% into construction of the infrastructure and 44% into the maintenance and operation of the chosen technology. Make the 0.2% count in order to give best benefit to the 44%.” □

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To order the report, *Drivers for wastewater technology selection – Assessment of the selection of wastewater treatment technology by municipalities in relation to the management capability and legislative requirements (Report No. TT 543/12)* contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.

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