

## Wastewater treatment

### Drivers for wastewater technology selection

A WRC-funded study assessed the selection of wastewater treatment technology by municipalities in relation to their management capability and legislative requirements.

#### Background

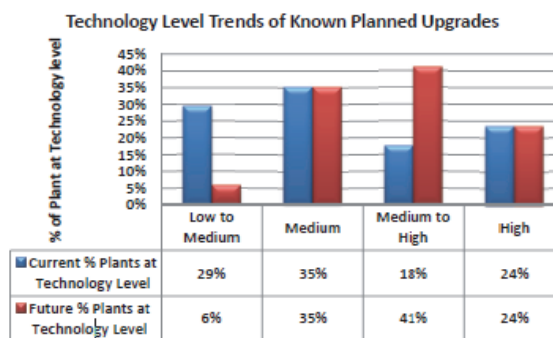
Poor wastewater treatment not only threatens the health of surrounding communities, but also the ability of South Africa's receiving water systems to continue supporting people and ecosystems. It is not only the management, operation and maintenance aspects of wastewater treatment that are of importance 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. This 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.

#### Main results

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



**Figure 1**

*Technology level trends of known planned upgrades.*

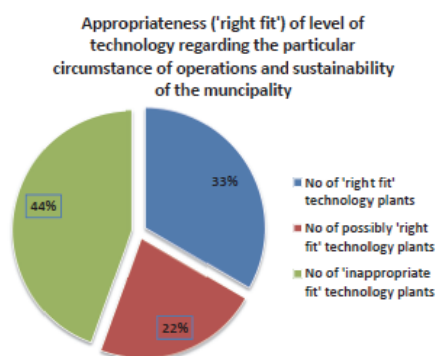
pushed as 'preferred solutions' in especially small towns and villages without full analysis of the long-term sustainability of the technology choice. Key issues being ignored include aspects of affordability, operations and maintenance, energy requirements and the human capacity and competencies required to manage these systems.

These decisions are made against an already beleaguered environment delaying the very symptoms that are causing wastewater treatment plant failure. 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.

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.



**Figure 2**  
*Appropriateness ('right fit') level of technology regarding the particular circumstance of operations and sustainability of the municipality.*

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.

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 options which are not financially or operationally sustainable.

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.

## Conclusion

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.

### Further reading:

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, Email: [orders@wrc.org.za](mailto:orders@wrc.org.za), or Visit: [www.wrc.org.za](http://www.wrc.org.za) to download a free copy.