TRADE & INDUSTRIAL POLICY STRATEGIES

POLICY BRIEF: 14/2020

A case for water and sanitation in South Africa's post-lockdown economic recovery stimulus package

OVERVIEW

As South Africa responds to COVID-19 and aims to stimulate the economy and job creation post lockdown through an infrastructure-led package, an opportunity should not be missed to address many of the water and sanitation challenges in the country. This is much needed and would provide multiple benefits, not only for the economy but also for the poor communities that need the infrastructure and services as well as municipalities that require strengthening of their water and wastewater infrastructure. This policy brief looks at the benefits of including water and sanitation in the country's stimulus package and considers possible avenues to do so.

INTRODUCTION

South Africa is generally a water-scarce country. Without intervention, a 17% water deficit is forecasted by 2030 (WRG 2009). Therefore, having a robust and resilient water and sanitation system would enhance the capacity of the country to respond to various challenges, including those presented by future pandemics, similar to COVID-19.

In the face of COVID-19, the South African government organised the emergency supply of water storage tanks, water trucks and sanitisers to water-stressed communities. Though impressive, the intervention has been insufficient given the need, and is relatively expensive. Moreover, it only provides temporary relief to these disenfranchised communities.

An opportunity presents itself as part of a COVID-19 infrastructure and job creation response to provide a more sustained and structural intervention by improving the country's water and sanitation infrastructure as well as redressing historical inequalities. Such an intervention would also contribute to sustainably managing water and sanitation and, importantly pay special attention to the needs of women, girls, and those in vulnerable situations.

MULTIPLE BENEFITS OF FOCUSING ON WATER AND SANITATION

A focus on water and sanitation infrastructure as part of South Africa's economic recovery would bring multiple benefits. First, investing in water and sanitation is urgently required to ensure water security. This would contribute to further economic growth and job creation, as well as protecting employment and livelihoods. In 2016, about three million jobs were estimated to be highly water-dependent in South Africa, with the greatest proportion in the agricultural sector (Ward and Mudombi 2018).

Second, improving access to water and sanitation would contribute to reducing multidimensional poverty[1] and inequality. South Africa is one of the most unequal societies in the world, and the COVID-19 crisis has shed further light on the lack of access to water and sanitation services. Poor access to water and sanitation is associated with waterborne diseases and neglected tropical diseases. Moreover, it also contributes to anxiety, increased risk of sexual assault, lost educational opportunities, malnutrition and stunting (WHO 2020). The effects also have a gender dimension, with women carrying the biggest burden (Mudombi 2020).

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Third, the rollout of water and sanitation has the potential to stimulate industrial development and employment creation.

South Africa has well-established local capacity in the water sector, with many firms involved in the research, development and production of water technologies in the country (Montmasson-Clair, et al. 2017). At the same time, South Africa is also heavily dependent on imports. This could open opportunities for import substitution, particularly for pipes, pumps and valves as well as automation and control equipment. This presents many opportunities for small businesses to participate (Montmasson-Clair 2018). In addition, the sustainable management of water resources has the potential to preserve as well as create many jobs (Ward and Mudombi 2018).

Fourth, water and sanitation are central to South Africa's transition to sustainable development. Investing in water and sanitation allows governments to tap into opportunities arising from the shift to a circular economy. A circular approach can generate economic benefits that can be used to establish and sustain sanitation facilities, with immense social and environmental co-benefits (TBC 2016). New products, ranging from animal feed to plastics, cosmetics, nutrients and pharmaceuticals, as well as energy and water can be harnessed through a circular approach in water and sanitation.

Last, investing in improved water and sanitation solutions makes economic and financial sense at the household and municipal as well as macroeconomic levels. New water and sanitation technologies, and fixing water reticulation infrastructure can generate financial benefits, either through cost savings or the creation of new revenue streams, facilitating the rollout of services. The multiplier effect of water and sanitation investment should be acknowledged in South Africa's journey toward economic recovery.

AVENUES TO INCLUDE WATER AND SANITATION IN THE STIMULUS PACKAGE

Several complementary avenues are available for emphasising water and sanitation as part of an economic recovery strategy. They encompass addressing non-revenue water (NRW), fostering water demand management, investing in water and wastewater treatment, building ecological infrastructure and rolling out smart water and sanitation systems.

[1] Multidimensional poverty is comprised of several factors that amount to poor people's experience of deprivations (Stats SA 2014)

[2] This is somewhat compensated by the fact that agricultural users generally use raw water (surface or groundwater) rather than water that has been treated and distributed by municipalities, which is cheaper.

Addressing non-revenue water

The first avenue to improve water and sanitation through a stimulus package is to revamp South Africa's water reticulation network. The poor condition of the country's water pipes leads to high percentages of water losses, in turn resulting in lower revenue for municipalities and higher cost for water service provision. Water losses can result from physical leakage (i.e. the water never reaches customers) or commercial losses (through incorrect or lack of billing for instance). This is captured as NRW, i.e. the volume of water supplied by a water utility for which it receives no income. The No Drop report (DWS 2015a) shows that the average NRW per metro reaches 35%. The National Water and Sanitation Master Plan (DWS 2018a) notes that municipalities loose about 1 660 million m^3 a year through NRW, which amounts to about R9.9 billion each year (at a unit cost of R6/m^3) (DWS 2018a).

Aged and leaking infrastructure, due to a lack of proper maintenance, is the leading root cause of NRW (DWS 2015a). NRW is also associated with poor billing and a lack of proper metering (DWS 2015b). Moreover, a significant number of water consumers, including many who can afford it, do not pay for the services they receive (Bekker 2016; Mudombi 2020).

NRW can be tackled in a number of ways, all of which generate multiple benefits that include saving water, improving municipal revenues, and generating employment. Drawing lessons from the government's War on Leaks programme that was initiated in 2015 is an important starting point. The programme was anchored on recruiting out-of-school youths to take up training as water agents, artisans and plumbers to deal with the leaks and other challenges (DWS 2018b). Though a number of people were trained, the programme failed to address NRW as an issue and recent reports by the Department of Water and Sanitation (DWS) have shown that it was riddled with mismanagement. Training was essentially focused on outreach as opposed to plumbing and artisans, and there was a shortage of qualified and experienced mentors in some municipalities.

NRW can be actively tackled through increased integration of information and communication technologies to help improve service delivery, reduce losses and enhance water efficiency. Various software and devices have the capability to link consumption, payment, efficiency, awareness and training. The latter can stimulate the much needed behaviour change towards water conservation.

Investing in water demand management

A second avenue is to incentivise material improvements in water demand management. The challenge of physical losses is indeed compounded by the wasteful and inefficient use of water at the consumption level.

Figure 1: Water use in South Africa

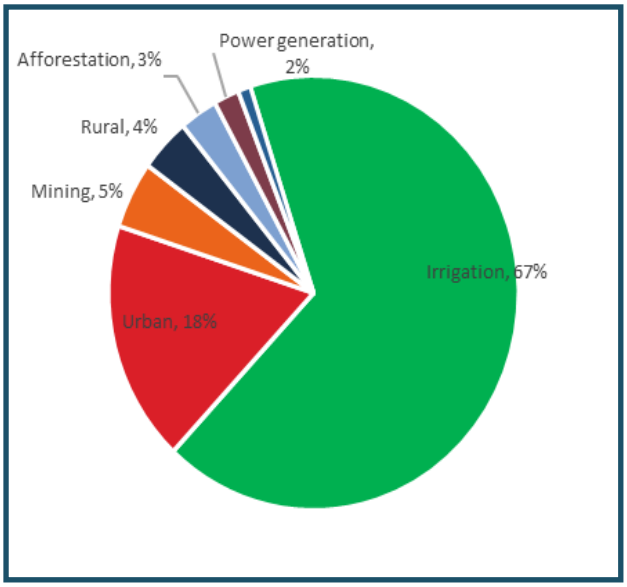
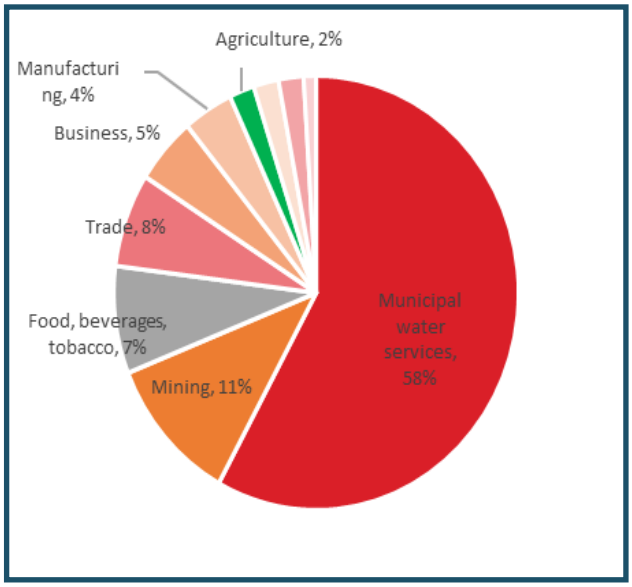


Figure 2: Financial value of water sales



Source: Montmasson-Clair and Mudombi (2020) based on data from DWS

The agricultural sector, which accounts for two-thirds of South Africa's water consumption (Figure 1), is generally heralded as the first port of call for reducing water demand (Montmasson-Clair and Mudombi 2020). Water use in the agricultural sector is notoriously inefficient as a result of the lack of metered consumption, cases of unauthorised abstraction, and relatively low tariffs compared to other users (DWS 2017)[2].

The potential to improve water consumption at the level of municipal consumers, i.e. mostly households and commercial buildings, is also significant. Municipal water use, while only accounting for 18% of total usage in the country, corresponds to 58% of total revenue (Figure 2). Strikingly, about 40% of water consumed by households in the country is used just to flush toilets (Burger 2015; Mudombi 2018a).

Last, water demand can be improved at the level of industrial processes, such as mining operations, power generation, textile manufacturing and agro-processing. Many industrial operations are particularly water-intensive, generating large amounts of water pollution and providing vast scope for improvement.

Overall, various technological solutions could be harnessed to improve water usage. First are low-cost solutions which have positive and short-term returns on investment, while potentially generating material demand savings (the so-called "low-hanging fruits"). These range from smart metering, dual flush toilets, water efficient showerheads and faucets at the household level to no-till agriculture and irrigation scheduling and pressure management at the agricultural and industrial levels. Second, there are more complex and disruptive solutions around process equipment opportunities (upgrading or replacement of less-efficient equipment). Third, more advanced solutions aimed at implementing a circular "closed-loop" approach, notably through reuse and recovery opportunities, exist.

Unlocking the potential of these solutions requires a multi-pronged approach. Significant effort needs to be directed at raising awareness about water demand management. Municipalities and companies have to be supported in the identification and trial of water efficient technologies, and the need to share the lessons learnt among each other. Policy also plays an important role in unlocking opportunities. For instance, the national building regulations and local by-laws need to be amended to require new developments to incorporate water efficiency and water reuse, particularly for non-potable uses such as toilet flushing. In addition, consideration could be given to raise prices for large consumers, from high-income households to industrial and agricultural users to drive these changes.[3] It would be beneficial to complement such measures with support for demand management and the use of new technologies.

Investing in water and wastewater treatment

A third avenue for improving water and sanitation in South Africa as part of a stimulus package is to invest in the country's failing water and wastewater treatment infrastructure. The Green Drop Report (DWS 2014) acknowledged that most of the country's wastewater treatment works (WWTWs) were not operating at optimal levels. In 2014, about 474 out of the 824 WWTWs (58%) displayed high or critical risk, while only 135 (16%) faced a low risk.

[3] The acceptability of such price increases remains, however, a point of contention. While customers would arguably be willing to pay more for better service, water revenues are not ring-fenced for the provision of water services. As such, increasing tariffs would provide important incentives for the modernisation of the sector but may not directly result in better service provision.

The potential of many of the technologies that embrace a circular approach has been successfully demonstrated – what remains is the need to translate research into products through commercialisation.

The South African water sector has not yet transitioned to a circular system and the current water and wastewater business cycle is predominantly based on the linear economy approach (Zvimba and Musvoto 2018). Opportunities exist to harness the value of wastewater, in the form of water reuse, energy and materials. WWTWs can be retrofitted with systems that enable circular treatment processes. The potential of many of the technologies that embrace a circular approach has been successfully demonstrated in the country; however, what remains is the need to translate research into products through commercialisation by developing the appropriate business tools for municipalities to use such technological solutions (Pillay, n.d.).

Another opportunity at the level of WWTWs is for municipalities to invest in energy efficiency measures in WWTWs through improving existing or upgrading to more energy efficient pumps, blowers and mixers. In metropolitan municipalities, the total estimated energy saving is around 358 460 MWh/year, which represents about R216 million/year in cost saving (GreenCape 2020).

Opportunities also exist to enhance wastewater treatment to enable the reuse of water used in industrial and mining operations. For instance, desalination technologies could be adequately harnessed for those operations and niche usages (Patel 2018). This would notably be relevant in the coal, phosphate, steel, and other mining industries that discharge acidic water as effluent, including water contaminated by acid mine drainage.

Against this backdrop, partnerships with the private sector offer multiple avenues. Institutional arrangements range from management and performance contracts, which aim to address a lack of technical capacity and skills, to concessions and leases, which provide for private capital, generally to construct or rehabilitate plants. Some of the main public-private partnership (PPP) opportunities in the water value chain include resource development (dams, desalination plants for mine and industrial wastewater, wastewater reuse, groundwater extraction and aquifer recharger), bulk infrastructure (WWTWs, pipelines), and distribution and reticulation (NRW reduction) (NBI 2019b).

Historically, private sector participation in the South African water and sanitation sector has been extremely limited (GWI 2017). Only a few PPPs have been implemented in the sector and results are been mixed. Indeed, PPPs are not a one-size-fits-all solution. They are, for instance, not suitable when a municipality has limited capacity to undertake the procurement process required. According to NBI (2019b), only four of the 144 water service authorities in the country, namely City of Johannesburg, eThekwini Municipality, City of Cape Town and Ekurhuleni Municipality, have an excellent PPP potential. In many cases, PPPs are not recommended to deliver public goods. Even if PPPs make technical and economic sense from the perspective of improving water security, they are not always a desirable option for households and society at large (NBI 2019a).

Building ecological infrastructure

A fourth avenue is to further emphasise protecting and building South Africa's ecological infrastructure. The ecological infrastructure is important in ensuring sustainability in the water sector.

For instance, Strategic Water Source Areas (SWSAs) are areas that either supply a disproportionate amount of mean annual surface water runoff in relation to their size and are considered nationally important; or have high groundwater recharge or where the groundwater forms a nationally important resource, or both (Le Maitre et al. 2018). Surface water SWSAs produce just over 50% of the mean annual runoff from just 10% of the land area (Le Maitre et al. 2018). Unfortunately, some of the country's ecological infrastructure is degraded (SANBI 2014; Mudombi 2018c).

While ecological infrastructure is an under-realised asset, it plays a significant role in enhancing returns on investment in built infrastructure and in ensuring a water secure future (DWS 2018a). In this context, water stewardship has been touted as one of the solutions towards developing and maintaining the ecological infrastructure. Water stewardship is defined as the use of water (by the private sector generally) that is socially equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site- and catchment-based actions (AWS, 2014). Businesses look beyond their "factory fences" and collaborate with other stakeholders, to reduce the risk that water may have on their profitability and long-term viability (GreenCape 2017; Ward and Mudombi 2018). For a meaningful and wider adoption of water stewardship, companies need to embrace water stewardship as a key strategy towards securing their water future.

Another key component of securing ecological infrastructure focuses on eradicating invasive alien plants (IAPs) that threaten biological diversity, water

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security, the ecological functioning of natural systems and the productive use of land (DEA 2017; Jenkin and Mudombi 2018). The Working for Water programme, led by the Department of Human Settlements, Water and Sanitation and the Department of Environment, Forestry and Fisheries, has been at the forefront of eradicating IAPs since its inception in 1995. It has been highlighted as a "success story" (Bek, Nel, and Binns 2017). The clearing of IAPs contributes to improved water security as well as employment creation through the clearing of the IAPs and value addition (Jenkin and Mudombi 2018).

Overall, the preservation and enhancement of ecological infrastructure is premised on the adequate valuation of natural capital. A new water paradigm that embeds water sustainability and resilience in day-to-day practices is necessary (Taing et al. 2019). Gauging the extent and forms of water usage through water assessments can enable the formulation of viable and sustainable strategies to improve water usage and efficiency (NCPC-SA 2017). This would also motivate consumers to embrace strategies, such as water stewardship, which can help to guarantee their water security.

Rolling out appropriate sanitation systems

Another avenue to include in a COVID-19 economic stimulus package is to support the roll-out of appropriate sanitation technologies. While South Africa has made remarkable progress in sanitation provision, there are notable challenges associated with this access. About 60% of households in South Africa have access to a flush toilet connected to a centralised sewerage system (see Mudombi 2018a: 15 for more details). But having the flush toilet as the most common type of toilet is not desirable as most parts of the country are water scarce. Given persisting challenges, the need to think beyond sewers as a solution to providing universal access to sanitation is indeed evident (BCG 2014).

In this context, next generation sanitation (NGS) or non-sewered sanitation systems are relevant. There are three key types of technology toolboxes that this new industry will introduce, namely: water efficient front-end technology (pedestals), modular and innovative back-end technologies that are SANS 30500 compliant, and various centralised, decentralised and on-site sludge treatment technologies that remove the threat of pathogens and pollutants from people (SASTEP 2020). Some specific available technologies include: low flush systems; full reclamation toilet units; community ablution blocks; decentralised wastewater systems; and greywater treatment systems (WRC and TBC 2018).

These systems eliminate some components of the conventional sanitation value chain. There are many benefits associated with these technologies, such as massive water savings, development of small businesses that support supply and the services part of the sanitation value chain, and sludge transformation into inert or valuable products (WRC and TBC 2018; Mudombi 2018b).

NGS systems can be applied in two ways. First, they can be used to leapfrog those who currently do not have proper access to water and sanitation services. Second, they can be harnessed to disrupt market segments that have inappropriate or unsustainable services and technologies.

As with sanitation technologies, there are a variety of smart water innovations for capturing, storing, dispensing and treating water that can be rolled out as robust point-of-use devices for communities. The systems are possible short- to medium-term options for improving water quality for rural communities and geographically isolated areas where centralised water networks are not feasible (Momba et al. 2013). Such systems can be easily rolled out without significant civil works. Linking these technology options with appropriate and innovative business and community models, such as multiple use water services (Van Koppen et al. 2020) and social franchising models (Wall and Ive 2010), has the potential to enable better access to water services as well as ensuring community and business resilience.

One key issue to spur the rollout of NGS technologies is to ensure building standards accommodate these systems. Most of the smart technological solutions are new, and would require dedicated support in showcasing and piloting their capabilities. Interaction between government departments, as well as government and the private sector, is needed to create opportunities for unlocking the domestic production of such technologies related to the sanitation economy, and resolving the procurement impediments.

There are efforts to build on. For instance, the Industrial Policy Action Plan (the dti 2018) aimed to position South Africa as a leading manufacturer of NGS technologies. From an industrial perspective, this is an opportunity for expanding the manufacturing, services, and supply of sanitation technologies.

The stimulus package is an opportunity to bridge the water and sanitation gaps, through rolling out locally-manufactured solutions that would also strengthen South Africa's global competitiveness and export potential.

CONCLUSION

The inclusion of measures to tackle water and sanitation challenges in South Africa's COVID-19 stimulus package is necessary and timely. Multiple benefits can be leveraged. These include: reduction of poverty and inequality; improvement in health, including in the fight against COVID-19; enhancing water security, and protecting the economy and livelihoods; job preservation as well as job creation; promoting sustainability through the circular economy; and financial savings. Some of the areas that can be targeted in the short to medium term are: addressing NRW; investing in water demand management; investing in water and wastewater treatment; building ecological infrastructure; and rolling out appropriate sanitation systems.

To implement these strategies, a number of options can be explored, however, their suitability depends on the context. Some would need a change in legislation and institutional arrangement to overcome current technical and skills limitations in various municipalities. A key challenge in the municipalities is the lack of financial and human resources.

Having targeted subsidies for the poor coupled with cost-reflective tariffs for other users, supported by more accurate billing, can contribute to the much-needed revenues. Different forms of PPP arrangements can be tailored to specific needs to create synergy, as well as share risks and rewards between the public and private sector.

It is necessary to build capacity in municipalities to manage projects. For instance, long-term planning, implementation, and the monitoring and evaluation of projects and programmes needs to be enhanced and budgeted for. One of the key enablers is project preparation support for municipalities for water and wastewater infrastructure projects. Having such capacity would increase the pipeline of projects that can potentially be funded by foreign investments, development finance institutions, or private sector finance.

Demand for water and sanitation technological solutions need to be stimulated through aligning local procurement, building regulations, and norms and standards. Looking ahead, the stimulus package is an opportunity to bridge the water and sanitation gaps, through rolling out locally-manufactured solutions that would also strengthen South Africa's global competitiveness and export potential. Co-benefits would be immense, strengthening local innovation capability, generating much-needed employment, and supporting small business and inclusive community development.

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