



Urban Agenda Platform

The global platform for sharing progress, action and knowledge on the implementation of the New Urban Agenda to achieve sustainable urban development.

Partnerships with the Private Sector to Achieve Sustainable Sanitation Service Provision

Region	Sub-Saharan Africa
Award Scheme	Guangzhou Award
Themes	Water & Sanitation
Sustainable Development Goals	Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture Goal 6 - Ensure availability and sustainable management of water and sanitation for all Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable Goal 17 - Strengthen the means of implementation and revitalize the global partnership for sustainable development

Summary

In order to provide a basic but safe level of sanitation to its citizens, eThekweni Municipality, through the Water and Sanitation Unit (EWS) installed over 80,000 Urine Diversion Toilets (UDTs) at a household level in rural areas. The Municipality made a commitment to empty the UDTs following concerns over health risks to residents during the emptying process.

Background and Objective

When UDTs were installed within rural households, residents were required to empty and bury the decomposed waste. However, research identified health risks to the residents due to the presence of pathogens in the faecal waste. These health and safety concerns, together with political pressure to provide a free toilet emptying service to the poor, motivated EWS to investigate opportunities to implement a circular economy approach – i.e. to convert waste into valuable products that could be sold to various markets. By deriving value from the waste the cost of sanitation services could be reduced for the municipality. The objective of the project was to establish sustainable business partnerships to remove and process UDT faecal waste to produce safe, reliable products that could be sold reducing municipal operating costs. There are four key partnerships which are critical to this innovative project. Public/Research funder: The BMGF wish to support “new normal” approaches to sanitation to provide safe, dignified sanitation to the millions of unserved people Public/Research Organisation: UKZN provide dedicated research support Public/Private Contractor: The UDT emptying contractor was appointed following a tender process. Local businesses are used to empty, bury/transit waste while adhering to health, safety and environmental requirements Public/Private: BSFL Plant Operator: The BSFL operator was appointed through a negotiated Service Level Agreement (SLA) which established the responsibilities, risks and objectives of the operation. The financial arrangement (Annexure C) within the SLA was innovative due to: Derisking through CAPEX provided by BMGF The payment of a variable gate fee to the operator Income from the sale of products and the gate fee Profit sharing between the Municipality and operator The BMGF provided the funds for the design and establishment of the BSFL plant The Municipality provided the funds for the emptying of the UDTs by the contractor The BSFL operator provided the technical resources for the establishment of the plant A business consultant assisted the Municipality with the establishment of the contracts and agreements.

Actions and Implementation

The following key lessons can guide other cities when embarking on a partnership approach to new circular economy projects: A regulatory framework needs to be established to allow for the use of tender processes and public private contracts When setting up agreements and contracts with the private sector, incentives and penalties should be included Public and private sector funding needs to be blended to de-risk the initiative and give ownership to the partners Ensure city management are aware of the project and its achievements so that new circular economy initiatives are more readily accepted in the future In the initial technical testing phase the operator should first achieve a saleable production line before investing in other technology product streams The stakeholders will need to allow time for testing, research and new iterations of the process and products before sustainability is achieved. Innovation is key to meeting the challenges of ensuring safe sanitation for all.

Outcomes and Impacts



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The main achievements are listed as follows: The BMGF partnership provided financial and technical support throughout the project. The UKZN partnership has provided feedback loops on process analysis and mass balance, factors affecting BSFL growth rate, impact of different feed ratios, and policy for implementation. The UDT emptying contractor partnership has resulted in over 40 000 UDTs being emptied by six small businesses in compliance with health, safety and environmental requirements. Small businesses have also received training on business management. An SLA was drawn up with the BSFL operator using an innovative financial model to share risk, costs and profit. Income has been derived from the municipal gate fee. As of August 2018, the plant is processing 1.5 tons of UDT waste per day. Different removal, disposal and processing options have been modelled. Some assumptions have been made on bioconversion rates, mass of faecal waste, product output, sale prices and municipal gate fees. The results show the following: removal transport and disposal at hazardous waste site: \$97/toilet removal and burial on site: \$75/toilet removal transport and BSFL processing: \$51/toilet (assuming a profit share of \$11 per toilet waste processed and 100% capital subsidy). The business model shows that processing waste will save up to \$46 per UDT compared to disposal at a waste site. Mass balance analysis has identified the volatile solids content of the UDT waste and primary sludge, and is being carried out on the adult BSFL (Annexure C). On-going testing by UKZN and the operator is aimed at improving feed rates, quality of nutrient additives, environmental conditions and inoculation rates. The specific tools used during the implementation include the use of near infrared spectroscopy (NIRS) to rapidly identify nutrient content of UDT faecal waste. New climate controlled insulated nursery to improve hatching rates and growth of neonatal larvae. Optimisation of BSFL inoculation rates to maximise bioconversion. The initiative demonstrates that the Municipality is committed to a circular economy approach rather than the linear “use and dispose” approach. Once the plant is operating sustainably, the project will demonstrate that sanitation operating costs can be reduced through partnerships with the private sector by deriving value from waste.

Initiative Contribution

The National Sanitation policy position requires every Municipality to reduce, reuse, recycle, and recover of resources in sanitation sector taking cognisance of associated health risks. Following research identifying health risks associated with emptying of UDTs, eThekweni Water and Sanitation (EWS) developed a policy to allow for emptying of the 80,000 UDTs every two years at no cost.

Innovative Initiative

Although the use of BSFL as a processing technology processing food waste has been in existence for several years, this project is “revolutionary” in that the technology has not been used as a sanitation solution. The risks were thus relatively high and de-risking required combined effort of both private sector and municipality. The BSFL technology has been used mainly to process food waste by the specialist operator. The outcomes from an investigation into the use of BSFL to process fresh faecal waste, inspired this pilot project. The use of public private partnership was inspired by an existing partnership with municipality and a private operator where wastewater is treated to a standard where it can be used in industry. This existing partnership also falls within the sanitation circular economy. Partnerships with UKZN and BMGF are being used in strategic planning and policy development. The research feedback loops provided by UKZN allow for changes to existing policy or the development of new and more appropriate policy. The public private partnerships allow for innovation through the development and mentoring of local businesses under the management of the emptying contractor, using BSFL technology to process UDT faecal waste to generate valuable products, and testing of new business models which allow for sharing of costs and profits by the municipality and the operator. There was a need to build relationships with city management to encourage them to move away from the normal linear approach to sanitation and embrace a new business model. A higher than expected sand content, climatic conditions and untested processing equipment affected the production of saleable products. Strategies to reach business viability included the production of a soil fertiliser to achieve early market penetration while validation of high value products take place, investigating new sand and solid waste separation technologies, installation of new insulation and heating systems for improved bioconversion, and new processing technologies for products such as feed, oil and chitin.

Resources devoted to delivery

Population size: 3,900,000

Population growth rate (%): 1.40

Surface area (sq.km): 2556.00

Population density (people/sq.km): 1523.00

GDP per capita (USD): 4819.00

Main source of prosperity: Finance sector (26% of GDP), closely followed by manufacturing (25%), trade (21% and transport (18%)