NEXT GENERATION SANITATION SOLUTIONS

KHANYISA PROJECTS CASE STUDY

Removal And Recycling Of Faecal Waste From 80 000 UD Toilets and Development of a Black Soldier Fly Processing Plant

AT A GLANCE

FUNDERS

The Bill and Melinda Gates Foundation And eThekwini Water & Sanitation.

TIMELINE

2015 to 2019

AREAS

Rural areas of eThekwini Municipality (Durban)

OBJECTIVES

What: EThekwini municipality has installed over 80 000 urine diversion (UD) toilets at households in rural areas.

Why: Due to concerns over waste disposal risks, Khanyisa Projects was asked to develop and implement a project to remove faecal waste from UD toilets and generate valuable products from the waste where possible.

How: The project involved a contract with a managing contractor and local small businesses to remove the waste and either bury onsite with tree planting or transport of waste to a recycling plant. The recycling plant which was constructed at the Isipingo waste water treatment works utilised black soldier fly technology to process the waste and generate valuable products.

TWO OPTIONS

- Where there is space on site and poor access, burial of waste on-site (with planting of a tree.)
- Where there is limited space, socio political pressures and good access, removal of waste to a decentralised processing plant and production of valuable end products.

KEY STEPS

- Development and approval of tender document
- Management of tender process
- Contracting of managing contractor with requirements for employment of local labor or local businesses
- Establishment of business incubator
- Management of removal and transport contract
- Selection of potential businesses for cycle 2 rollout
- Evaluation

VISION

The municipality's vision is that the profit that it derives from the first BSF plant will be used to establish additional BSF plants to ultimately address all UD and other faecal waste at minimal cost to the city.
The second element of the vision is that local businesses are empowered to form sustainable sanitation businesses that can provide ongoing waste removal services for the city.

FULL OVERVIEW

Since 2002, eThekwini municipality has installed over 80 000 urine diversion (UD) double vault toilets at the household level in rural areas. This technology was selected to replace ventilated improved pit latrines (VIPs) as the municipality's basic onsite sanitation option as it was expected that the UD systems would produce a degraded sludge which could be safely removed and buried on site by the resident. This approach eliminated the challenges and costs encountered when servicing VIP systems, which included access to pits, removal of sludge containing solid waste, and transport and disposal of sludge.

However, a number of concerns have since arisen over the removal of faecal material from UD toilets. These include health risks to residents who handle the potentially pathogenic sludge and dissatisfaction amongst household owners over the expectation that they will remove the faecal matter from their systems themselves while other recipients of basic sanitation receive a free service from the municipality. The municipality therefore needed to identify other safe and economically feasible faecal matter removal options which can be provided to the 80 000 (and increasing) homes.

Through funding from the Bill & Melinda Gates Foundation (BMGF), the eThekwini municipality's water and sanitation unit (EWS), together with a professional consulting team (Khanyisa Projects, partners in development and the university of KwaZulu-Natal's pollution research group) began exploring the use of business partnerships using incentivized contracts for the safe and efficient removal and disposal or processing of the UD contents.

The project will involve the disposal or recycling of waste by means of two options:

1. Where there is space on site and poor access, burial of waste on-site (with planting of a tree)
2. Where there is limited space, socio political pressures and good access, removal of waste to a decentralized processing plant and production of valuable end products

In order to implement these two disposal / recycling options the project has been divided into two components as follows:

The first component is a management contract which includes the appointment of local labour to undertake the removal of faecal waste from the UD toilet vaults and either bury onsite or transport the contents to a central BSF processing plant. The Tender Document stipulated that the managing contractor must adhere to all health, safety and environmental requirements. A mentoring program was initiated for local labour showing business potential through the establishment of a business incubation unit. The final step will be the selection of contractors for the second rollout (cycle 2) without the need for a managing contractor.

In summary, the key steps that are taking place are:

- Development and approval of tender document
- Management of tender process
- Contracting of managing contractor with requirements for employment of local labor or local businesses
- Establishment of business incubator
- Management of removal and transport contract
- Selection of potential businesses for cycle 2 rollout
- Evaluation

It is envisaged that the second UD waste removal cycle will be initiated during the last six months of this program. The second component is the establishment and operation of a faecal waste processing plant utilizing the black soldier fly (BSF) technology. During phase 1, the project team engaged with the private organization Biocycle which has been piloting the BSF technology to process faecal waste for several years. The larvae of the black soldier fly consume organic waste in order to grow to adult size. The adult larvae are then processed into products such as chicken feed, pet food and oils. The residue can be used as a soil conditioner or converted into biochar.

FULL OVERVIEW CONTINUED

Business modelling was undertaken and a draft Service Level Agreement was drawn up with a view to establishing a public private partnership between the municipality and Biocycle.

The Isipingo waste water treatment works was identified as a suitable site for the establishment of the processing plant. The following steps have taken place:

- Finalization of service level agreement including financial aspects
- Signing of service level agreement
- Reports to national treasury and council procurement committees
- Approval of procurement process by council and national treasury
- Approval of land use by council
- Establishment of BSF processing plant
- Monitoring of operation

At present the operator is making modifications to the plant to optimize the operation process.
Should the business partnership be successful, then the disposal costs that the municipality would normally pay for disposal at a hazardous waste site would be substantially reduced. There are still some risks associated with the model as the operator cannot say with certainty how the market will accept the products if faecal sludge forms part of the feedstock. The business partnership that has been agreed between the municipality and the selected operator involves the sharing of the risks and potential profit on a 50/50 basis. The project has also been significantly de-risked through the provision of funds by the Bill and Melinda Gates Foundation for the capital expenditure of the BSF plant.

The municipality's vision is that the profit that it derives from the first BSF plant will be used to establish additional BSF plants to ultimately address all UD and other faecal waste at minimal cost to the city.

The second element of the vision is that local businesses are empowered to form sustainable sanitation businesses that can provide ongoing waste removal services for the city.