Urine Diversion Toilet Waste Removal in eThekwini Municipality

Business Partnership Modeling

FSM3
Hanoi – Vietnam
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Technical and Financial Support

Bill and Melinda Gates Foundation (BMGF) and UK Department for International Development (DFID)

• City Partnerships for Urban Sanitation Services Delivery
• Phase 1 Planning complete
• Phase 2 rollout starting
EThekwni Municipality

- Second largest industrial hub
- Fastest growing urban area
- Major tourist destination
- South Africa’s major port
Ethekwini Municipality cont.

- Population 3.7 million
- Urban population 2 million
- Rural population 1.7 million
- 27 Treatment works combined flow of 400 ML per day
Background

- Over 80 000 UD double vault toilets installed in rural areas
- EThekwnini Decision
  - Provide safe economically feasible sludge removal option
Problem Statement

• Faecal degradation and pathogens die off not as effective as envisaged
• High risks to households and environment
• Service level inconsistencies
Key Challenges

- Health and Environmental compliance
- Transport costs
- Identify beneficial use of faecal waste
- Meeting expectations of communities
- Identify opportunities for participation of private sector and residents
- Sustainability of local business entities
The BSF Faecal Waste Recycling Process

**TECHNOLOGY FLOWCHART**

- **Scenario 1**
  - UD Toilet
  - Remove waste from chambers
  - Fill 100 litre sealed containers
  - Burying and tree planting

- **Scenario 2**
  - Transfer to pick-up point
  - Truck transports faecal waste
  - Fly breeding for eggs

**PROBLEM STATEMENT**
- Health Risks to residents when removing waste
- Dissatisfaction with self-removal of waste
- High cost of disposal at hazardous waste sites
METHODOLOGY
- Institutional analysis
- Environmental and health compliance
- Ground truthing
- Business Modelling of two scenarios:
  - Burial on site with tree planting
  - Processing using Black Soldier Fly (BSF) technology
- Development of UD waste removal contract
- Development of SLA for operation of BSF plant
- Emerging business support framework

BSF PLANT

BENEFITS
UD Waste Removal Contract
- Limits risks to Municipality
- Development of Emerging Businesses
- Efficiencies and Cost Savings
- Job Creation

BSF Processing Plant
- Recycling of waste
- Reduction of disposal costs to Municipality
Fly Breeding

Photograph - Newco

Photograph - Newco
Bioconversion
BMGF Phase 1 Activities

• Institutional Analysis
• Environmental and Health Compliance Study
• Concept Testing
• Business Modelling
  – UD waste removal
  – Processing of waste
• Procurement / Contract Options
• Policy Development
• Contractor Support Framework
Business Modelling: UD Sludge Emptying and Disposal

• Modelling exercise to estimate costs for Scenario 1 and 2
• Assumptions
  – Number of UDs
  – Sludge volumes (0,6 and 0,8m$^3$ per UD)
  – Labour requirements and costs
  – Travel and transport requirements
  – Supervision and overheads
  – Costs associated with disposal (burial and tree planting or processing)
Business Modelling: Black Soldier Fly (BSF) Processing Plant

- BSF identification as suitable processing technology
- Engagement with Specialist
- Identification of site for pilot plant
- Infrastructure options
- Business modelling based on 10 tons and 20 tons of faecal waste
- Business feasibility study – viability over 3 years and 5 years – different CAPEX arrangements
Selected Procurement Options

• **Waste removal element:**
  – Standard tender using an incentivised contract
  – Detailed specification ensuring adherence to health, safety and environmental requirements
  – Pricing on a per task basis
  – Use of local teams
  – Tender process will exclude contractors with limited experience
Selected Procurement Options

- **BSF Processing Plant**
  - Service Level Agreement for O & M
  - Approval to deviate from normal tender procedure
  - Uncertainty on costs and income
  - Proposed financial mechanism

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Municipal Gate Fee  R350/ton ($30)  Income Sales
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Feed Market
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BSF Plant Ring Fenced
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Profit after Operating Costs
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Municipality  BSF Plant Operator
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BMS
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Khayisa Projects
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Contractor Support Framework

• SA has identified vibrant small, medium and micro enterprise development (SMMEs) as key to economic growth
• UD waste removal program ideal for development of SMMEs
• Use of a business incubator
Thank You