



# Integrated Agro-industrial Wastewater Treatment and Value Addition Innovations

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## Background

In the eastern Africa region agriculture and industrial processing are viewed as the main drivers for economic growth. However, these sectors are associated with environmental degradation due to the unsustainable utilization of land and water resources, discharge of untreated or partially treated wastewater to the environment, and greenhouse gas (GHG) emissions, and consequently climate change.

There is also a growing demand for alternative energy sources to fossilized fuel that are cheaper and environmentally friendly. The current conventional agro-process wastewater treatment processes in the region tend to separately focus on reducing pollution load or biogas production. These treatment processes do not integrate pollution reduction, energy and nutrient recovery from agro-process wastewater to contribute to the ever-increasing energy demands but at the same time reduce GHG emissions.

Furthermore, these wastewater treatment technologies often do not meet national discharge standards to protect the human population and the environment. Innovative treatment technologies and processes that not only treat wastewater from industrial activities from slaughterhouses, tanneries and breweries for example, but that also add value along the waste treatment chain are necessary strategies to contribute to global climate change mitigation efforts and environmental sustainability.



## The Project goal

This project focuses on developing and testing technologies for integrating biogas production and water and nutrient recycling from slaughterhouses, wine production and tanning processes in Uganda, Tanzania and Ethiopia respectively in partnership with the industrial partners in the respective countries.

## The Innovation

Integrated wastewater treatment technologies that combine pollution reduction, energy and nutrient recovery from agro-industrial waste.

## Milestones achieved and expected outputs

- 1 In Uganda, initial testing of the pilot digester system receiving slaughterhouse wastewater at the Kampala City abattoir is complete and quantity and quality of biogas



currently stands at 8-13 m<sup>3</sup>/day and 61% methane, respectively. Process performance optimization is ongoing.

- 2 In Tanzania, construction of the integrated wastewater treatment facility for treating wastewater from banana brewery as well as producing biogas, bio-fertilizer and clean water for reuse complete and process performance optimization is ongoing.
- 3 In Ethiopia, preliminary data from the pilot-scale two stage anaerobic-aerobic digester and constructed wetlands system for treating tannery wastewater and producing biogas and clean water for reuse has been completed and process performance optimization is on-going.
- 4 Intellectual property audit and full techno-economic feasibility analysis as well as a business plan developed for the three technologies to guide the scaling up and roll-out of these innovative technologies.

### Future prospects

Once the pilot-demonstrations are completed, the next step will be to scale up and disseminate and/or commercialize the innovations to industrial stakeholders in the region generating similar type wastewater. Scaling up of technologies in partnership with



*“Banana Investment Limited (BIL) was initially interested in this project as it promised to deliver innovations that would help the company manage its waste while complying with the National Environment Management Council (NEMC) regulations. In addition this innovation would generate biogas that could be used in meeting the factory’s energy needs, help it adhere to set emission rules, and save energy costs by using generated biogas. BIL is expected to save about 300 litres of furnace oil per day, which costs 8 million Tanzanian shillings (equivalent to \$5,000) every month.”*

**Adolf R. Olomi** *Banana Investments Limited, Tanzania*

interested industrial partners to fully manage their waste and convert it into value added products that not only impact their profitability but also solve environmental problems will follow. Search for innovative funding mechanisms has been initiated for scaling up and delivering these innovative wastewater treatment solutions to prevent a pollution catastrophe in eastern Africa.

### Participating countries, institutions and organizations

#### Research Institutions

University of Dar es Salaam, Tanzania  
Makerere University, Uganda  
Addis Ababa University, Ethiopia  
National University of Rwanda

#### Private sector partners

Banana Investments Ltd, Tanzania  
Modjo Tannery Share Company Ltd, Ethiopia  
Kampala Abattoir, Uganda  
Switch Responsible Ventures AB, Stockholm, Sweden



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