

This item was submitted to [Loughborough's Research Repository](#) by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

Recovering value from faecal sludge in Northern Ghana

PLEASE CITE THE PUBLISHED VERSION

PUBLISHER

WEDC, Loughborough University

VERSION

VoR (Version of Record)

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

How, Darryl, and Ebenezer Atsugah. 2021. "Recovering Value from Faecal Sludge in Northern Ghana".
Loughborough University. <https://hdl.handle.net/2134/16867093.v1>.

42nd WEDC International Conference

ONLINE: 13 – 15 September, 2021

**EQUITABLE AND SUSTAINABLE WASH SERVICES:
FUTURE CHALLENGES IN A RAPIDLY CHANGING WORLD**

Recovering value from faecal sludge in Northern Ghana

D. How & E. Atsugah

United Kingdom

REFERENCE NO. 3364

Overview

Over 80% of rural Ghanaians do not have access to adequate basic household sanitation, often relying on poorly maintained public toilets or open defecation.^[1] The lack of adequate sanitation increases the risk of life-threatening illness, malnourishment and stunting in children.

Since its inception in 2016, Sama Sama, iDE Ghana's WaSH social enterprise, has sold over 8,000 toilets and increased access to sanitation to over 63,000 Ghanaians. At the launch of the business, the first two stages of the value chain were prioritised: point of use and containment^[2]

With many gaining access to affordable non-sewered sanitation systems, it is increasingly critical to address the gaps in faecal sludge management (FSM). While there are wastewater treatment plants operating within the region, these were found to be either inaccessible to ordinary households or poorly maintained^[3]. Consequently, the toilets are not currently served by affordable waste management services, potentially resulting in overfilling of sludge pits and the communities are at risk of losing these facilities from lack of maintenance.

Aims

Financing of sanitation services traditionally comes from charging tariffs from customers which can exclude poorer households. The project aims to identify revenue streams from waste sludge which can be invested in new installations allowing access to the wider community. The end goal is to design and develop a pilot-scale system which creates marketable products and is leveraged to finance other areas of the service chain.

Methodology

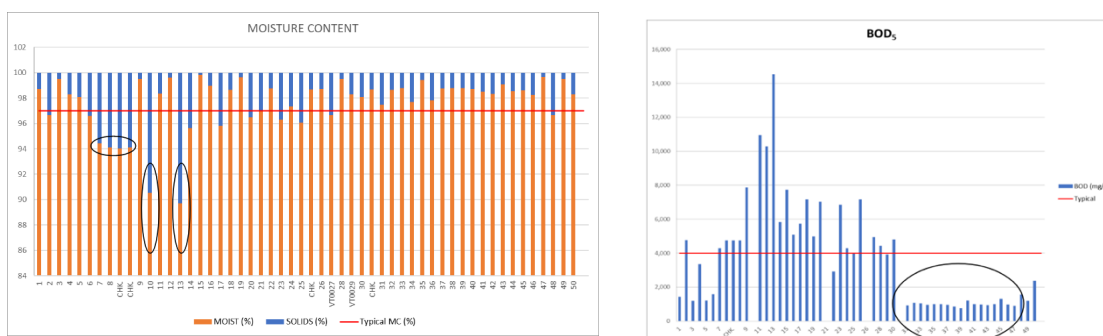
The collaboration between Arup and iDE focuses on identifying sustainable treatment systems and re-use of treated sludge. This is achieved using a twofold approach: assessment of sludge recovery technologies and analysing the local market through stakeholder engagement.

The team explored the suitability of various technologies including anaerobic digestion, energy briquettes, black soldier fly larvae (BSFL), vermicomposting, and solar drying. Whilst pathogen removal is priority, each technology was also assessed against several key design criteria to maximise the chance of uptake in Northern Ghana. This included affordability, deployability, stakeholder attraction, operator skill requirement and space requirement.

Preliminary findings

Preliminary sample data from extended sludge collection activities identified potential obstacles such as varying organic material between sources (1,000 – 14,000 mg/l BOD) and generally high moisture content (98%).^[4] Using this data, the team will carefully design a suitable system to adapt to the local context. Equally important is changing public perception to sludge-based products. This will be gauged through ongoing

stakeholder engagement which will reveal how views from local community and collaborators change with continued knowledge sharing.



During market research and stakeholder engagement activities, it was discovered that BSFL and vermicomposting showed the most potential, mainly due to low capital and maintenance costs whilst returning relatively high-value, marketable products – though it is clear that challenges exist for either systems. [5] The team will seek to find ways to overcome these and learn from external collaborators – as well as literature review. Nevertheless, it is clear that there is a market for faecal-based products which can incentivise collection and transport services.

The team learned that early engagement with various stakeholders is key to identifying opportunities for product recovery. It is also important that cultural attitudes must be taken into account to ensure community buy-in, such as apprehension towards faecal-based fuels for cooking from people of Islamic faith.

Next steps

The team is currently developing and assessing designs for both systems to understand constructability and scalability. Outputs from the pilot plant will then be used to inform effective business models and serve as foundation for the overall FSM strategy. Lessons learned and additional qualitative and quantitative data will be presented to shed light on how to build a business that can provide services along the entire sanitation value chain, from containment to reuse. Technical and socio-economic learnings from this project will be used to support and assist in creating a framework for developing sustainable treatment systems in Ghana and beyond.

References

1. Appiah-Effah, E.; Duku, G.A.; Azangbego, N.Y.; Aggrey, R.K.A.; Gyapong-Korsah, B.; Nyarko, K.B. Ghana's post-MDGs sanitation situation: An overview. *J. Water Sanit. Hyg. Dev.* 2019, 9, 397–415.
2. "Sama Sama | Providing High Quality Toilets in Northern Ghana" Last accessed May 14, 2021. <https://www.samasamaghana.com/>.
3. KNUST Civil Engineering Department. UNICEF - Assessment of Waste Water Treatment Plants in Ghana. 2016.
4. How, D; Robinson, C. Sustainable FSM in Northern Ghana - iDE Arup Workshop. Arup. Unpublished presentation. 2020.
5. How, D; Robinson, C. Sustainable FSM in Northern Ghana - iDE Arup Workshop. Arup. Unpublished presentation. 2020.

Contact details

Darryl How:

Arup, Rose Wharf, 78 East Street, Leeds LS6 4PR, United Kingdom.
Telephone: +44 113 242 8498. Email: darryl.how@arup.com
Website: <http://www.arup.com>

Ebenezer Atsugah:

iDE Ghana, House No. 204, Jisonaayili Street, P.O. Box TL 2793, Tamale, Northern Region, Ghana. Telephone: +233 243800523.
Email: eatsugah@ideglobal.org Website: <http://www.ideglobal.org>