



GCIC Market Analytics Industry Report Brief

Domestic Waste Management



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Executive Summary

Global access to improved sanitation rose from 54% in 2000 to 68% in 2015, although it still fell short of the 77% access rate set for the Millennium Development Goals (WHO, 2015). The 700 million population deficit still without access were mostly identified to be from developing countries with India, Pakistan, Indonesia, Nigeria and Ethiopia accounting for 75% of the underserved populations when it comes to sanitation.

The increasing trend of urbanization has been attributed to as a contributor to limited access to improved domestic sanitation. Of the 2.5 billion people with no access to improved sanitation, 735 million live in cities in low-income countries, with an increasing proportion of them resorting to open defecation. The World Bank estimates that poor sanitation costs countries \$260 million dollars, whereas an estimated return of \$9 is gained on every \$1 investment into improved sanitation.

In Ghana, an estimated 72% of the urban population rely heavily on shared sanitation, which is particularly poor compared to other countries (Dorothy Peprah, 2015). Coverage rates for urban areas remain relatively low, with only 20% having access to improved sanitation and close to 20% practising open defecation.

Many businesses and start-ups globally have been innovating and investing in the sector to tackle the unique challenges that the urban poor face with respect to accessing good sanitation. From Dry/waterless toilets currently being implemented in parts of Peru ([X-Runner](#)), Ghana ([Clean Team](#)) and Haiti ([SOIL](#)) to Container-based sanitation where waste is collected in sealed replaceable containers. New innovation trends seek to convert waste to energy achieving the emerging concept and goal of “zero waste” with innovations like [Norsk Biogas AS](#) in Norway championing the cause.

A huge opportunity exists for Ghanaian start-ups as the current value chain has gaps in access and reuse of waste. A number of international organizations and governments are taking initiatives ([The Accelerator Programme](#) and [The eThekwini Declaration](#)) to address these issues hence provide opportunities for partnership not just to solve a pandemic problem but also receive huge revenues as sanitation is improved.

This report analyses data derived primarily from desk research, experts in the domestic waste management industry and programme coordinators of the GAMA-SWP programme to understand the domestic waste management industry globally and in Ghana specifically.

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Global Outlook of Industry

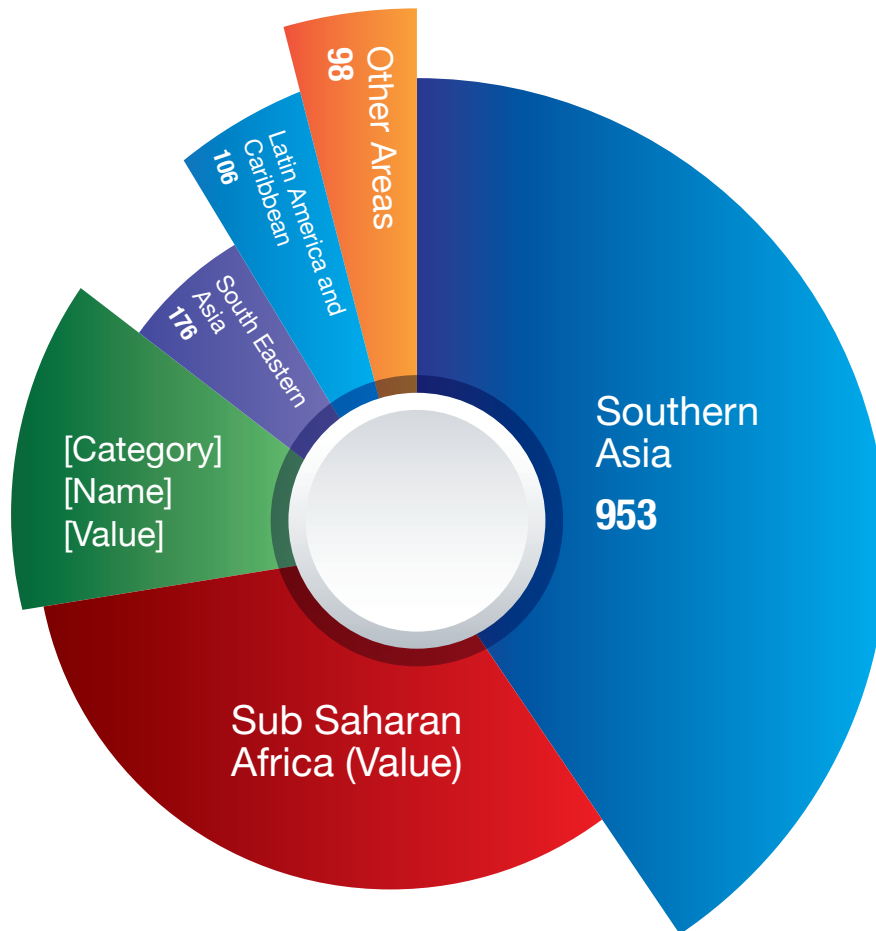
While global access to improved sanitation rose from 54% in 2000 to 68% in 2015, this fell short of the Millennium Development Goal (MDG) target of 77%, reflecting a deficit of about 700 million people and accounting for the largest gap in any of the MDG targets (WHO, Water Sanitation Hygiene, 2015). The figure below shows definitions and access rates for different levels of sanitation facilities (WHO/UNICEF, 2017 Joint Monitoring Programme (JMP)).

Fig 1: Levels of domestic sanitation and global access rates



The distribution of this improved access to sanitation is not uniform globally. Open defecation is a major problem in developing countries, with only 5 countries (India, Pakistan, Indonesia, Nigeria and Ethiopia) accounting for 75% of these underserved populations. With recent rapid population growth and slow economic progress, the number of people in Sub-Saharan Africa and South Asia without access to sanitation has increased since 1990 (UNICEF, 2017). The chart below shows the distribution of people without adequate access to sanitation.

Fig 2: Populations without adequate access to sanitation (in millions)



Social and Cultural Trends Affecting the Industry

Steady progress has been made in achieving these sanitation goals, but the global population is now more urban than it was in 1990 (43% urban in 1990, 54% urban in 2015), thus exacerbating the effects of poor sanitation. Of the 2.5 billion people with no access to improved sanitation, 735 million live in cities in low-income countries, with an increasing proportion of them resorting to open defecation. 33% of people in these poor urban areas rely on communal toilets, and the popularity of these shared toilets is increasing. As such, shared sanitation facilities could be a workable solution to inadequate sanitation access for lower-income urban communities in developing countries (WHO/UNICEF, 2014).

It is important to understand the different contexts of these underserved communities in order to help them improve their sanitation access. As such, sanitation solutions for rural communities may be significantly different from those for urban ones, but most efforts to improve sanitation for low-income communities have lacked this consideration. Thus, progress in sanitation coverage has failed to keep up with population growth in urban areas compared to rural areas, with more people lacking adequate sanitation in urban areas in 2008 than in 1990.

Sanitation Solutions for Low-Income Urban Areas Globally

Urban households traditionally have one of two main types of domestic sanitation: on-site sanitation (such as pit latrines, domestic manholes, soakaways, etc.) and sewerage systems. Most lower income households cannot afford these sanitation solutions, and thus alternative solutions – such as using small bore sewers and condominium-type layouts – are necessary for these poorer communities. Community blocks are also a popular sanitation solution in high-density, low-income, urban communities, even though the Joint Monitoring Program (JMP) does not include them in its definition of improved sanitation (see definitions above). These shared toilet facilities are run cooperatively by community members and serve only community members, unlike public toilets, which are run commercially by local enterprises, and thus can price poorer people out of access to sanitation.

In recent years, many businesses and start-ups globally have been innovating and investing in the sector. To tackle the unique challenges that the urban poor face with respect to accessing good sanitation, these start-ups and enterprises are employing innovative approaches, some of which are discussed below:

- **Dry/waterless toilet:** This is a type of toilet system that incorporates dry compost toilets into a subscription-based service, where the human waste from the toilets is commercially made into compost. This system is especially useful to low-income urban communities without reliable access to water. [X-runner](#) (in

Peru), [Clean Team](#) (in Ghana) and [SOIL](#) (in Haiti), are some of the businesses that have led this kind of sanitation innovation. Even though the households they serve can pay up to US\$10 a month for 5 users, these businesses charge significantly less for their services, thus making them popular among low-income urban areas.

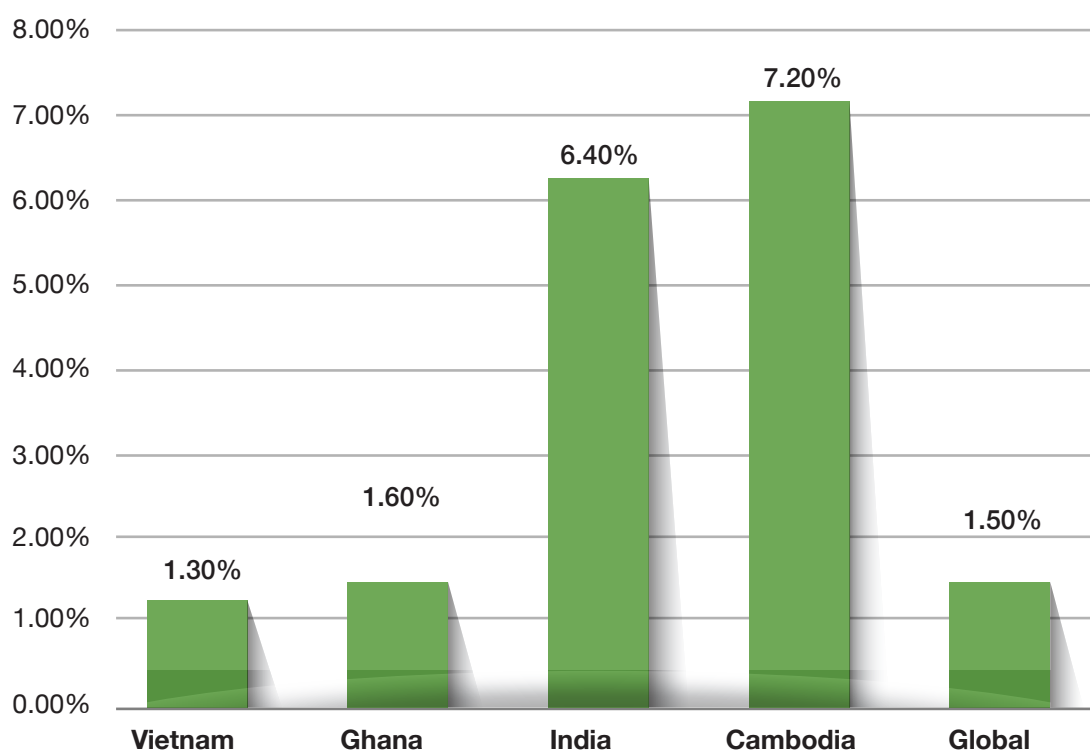
- **Container-based-sanitation (CBS):** This is a modern system where toilets collect waste in sealed, removable containers, that are periodically removed and replaced with empty ones, and then transported to a treatment facility. This low-cost subscription based system was designed in 2013 by a team of innovators and funders from the design firm, IDEO, the UK non-profit, Water and Sanitation for the Urban Poor (WSUP) and Unilever.

While these solutions can be instrumental in increasing access to adequate sanitation, many poor households hesitate to get them because they fear such enhancements to their housing may result in increased rent or loss of their tenancy. This dynamic between poorer renters and landlords is an important consideration when designing sanitation solutions for urban low-income households. Additional factors that should be considered in the design of these sanitation solutions include habits and preferences of the users (i.e. wiping vs. washing, sitting vs. squatting, etc.), local availability of materials, availability of water for flushing and technical compatibility.

Economic Impact and Outlook of Industry

The World Bank estimates that poor sanitation costs countries US\$260 billion annually, with developing countries the worst affected.

Fig 3: Percentage of GDP lost due to poor sanitation



As such, it is a good investment for national governments, donors and development partners to improve sanitation in developing countries. In addition to the consequent public health improvements, this improvement can yield economic benefit of up to US\$9 for every US\$1 invested (World Bank Report, 2013). Many governments and international development agencies have thus, increased their efforts to tackle the growing sanitation problem globally. Some of these large-scale initiatives include:

- The “Clean India mission” (‘Swachh Bharat’) by Indian Prime Minister Modi in 2014, which aims to provide 560 million people with a toilet by 2019

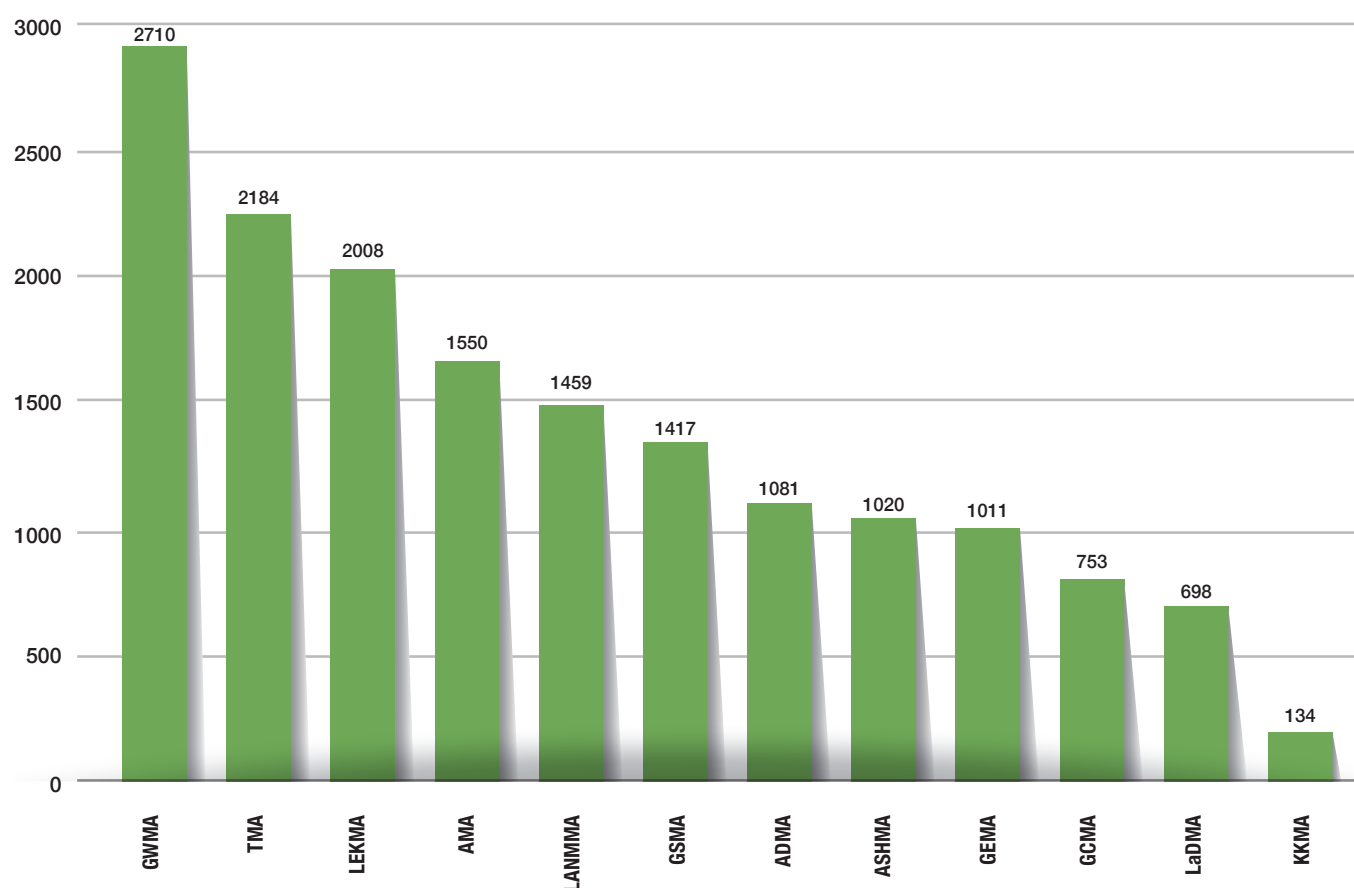
- The “Reinvent the Toilet Challenge” of the Bill and Melinda Gates Foundation, started in 2011, to accelerate technological innovations in the sanitation industry.
- The Accelerator program, launched by the Toilet Board Coalition (TBC) in Ghana in 2016, that aims to help promising sanitation business models to scale with by connecting them with support and resources from multinational corporations. The program helps provide businesses with the resources to scale and improve their operations accordingly, and also reduces investment risks, raising investors’ confidence in the sector.
- The eThekwini Declaration, signed by over 30 African governments in February 2018, that recognizes the importance of sanitation and commits signatory governments to spending 0.5% of GDP on sanitation (WSP-Africa, 2008).
- The Sustainable Development Goal (SDG) 6, that seeks to end open defecation by 2030, with special attention to women and girls and in vulnerable areas.
- The Community Approaches to Total Sanitation (CATS) program by UNICEF in 50 countries in sub-Saharan Africa and South Asia, that has already helped end open defecation in 39,000 communities, with a total population of over 24 million people.

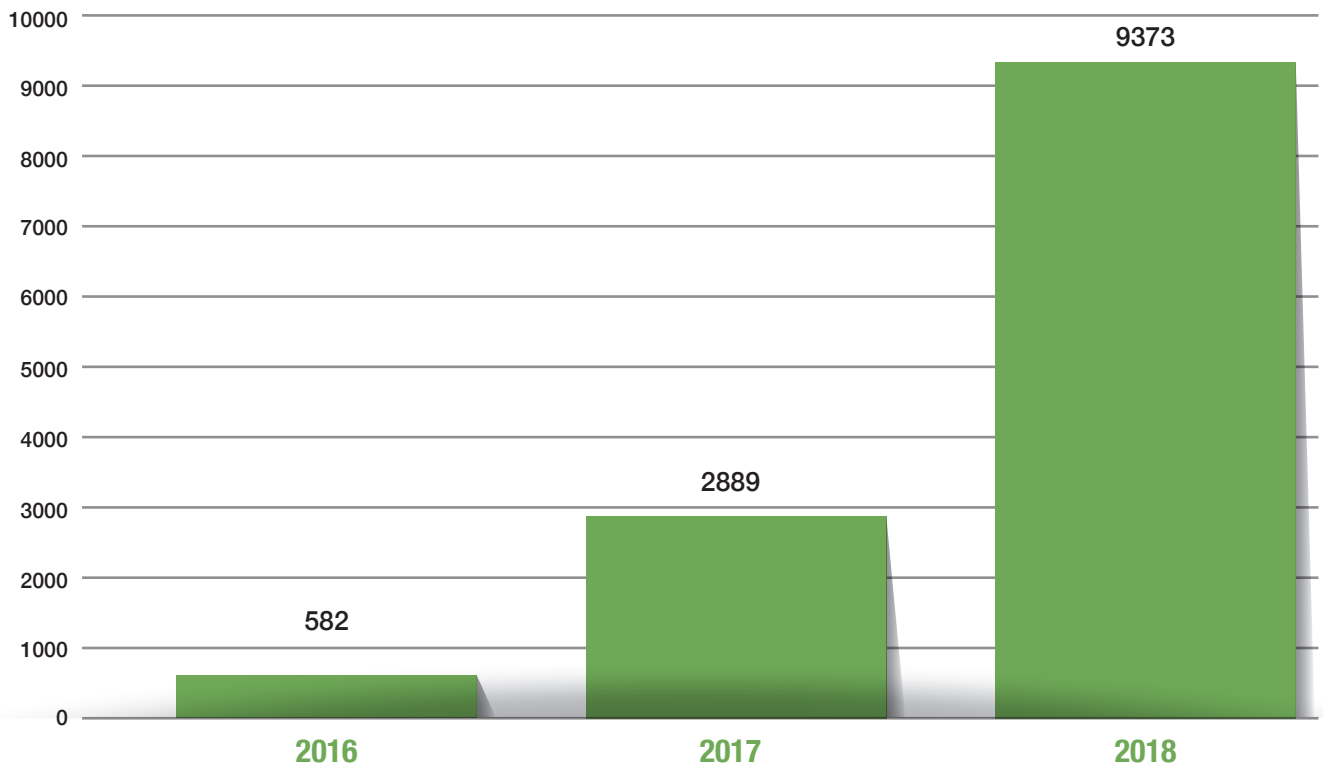
Industry and Regulatory Trends in Ghana

By 2015, only 95 countries worldwide were able to achieve sanitation targets of the MDGs. Ghana was classified among the nations who had made either limited or no progress at all (WHO/UNICEF Progress report 2015). Ghana relies heavily on shared sanitation in urban areas than any other country, with an estimated 72% of its urban population using shared facilities (Dorothy Peprah, 2015). Coverage rates for urban areas remain relatively low, with only 20% having access to improved sanitation and close to 20% practising open defecation.

In 2016, Greater Accra Metropolitan Assembly (GAMA) embarked on its Water and Sanitation Project (WSP), with US\$150 million funding from the World Bank. This project seeks to increase access to improved sanitation by providing technologically suitable toilet facilities to urban households and schools at subsidized costs.

Fig 4: Number of toilets constructed by GAMA municipalities by December 2018.





In addition to the GAMA project, Ghana is one of 5 countries where the United States Agency for International Development (USAID) has partnered with the Toilet Board Coalition (TBC) in 2014, to run projects that aim to improve access to sanitation. For example, the Water, Health and Hygiene (WASH) programme under the USAID-TBC collaboration introduced Digni-Loo, an affordable, safe sanitation solution for rural and peri-urban areas run by the NGO, Global Communities. The WASH programme has improved the domestic sanitation for 50,000 Ghanaians so far (GNA, 2017).

Also, the government of Ghana created the Ministry of Sanitation and Water Resources in 2017 to have more oversight on sanitation-related issues. This is a step towards fulfilling a campaign promise by the current government to ensure every Ghanaian household has a toilet. In addition, the Special Development Initiative Ministry is also embarking on a project to construct community toilets across the 10 regions of the country.

Value Chain of Industry

Fig 3: Sanitation industry value chain



Each node of the sanitation industry value chain – from waste capture to disposal – requires different skills and assets. As such, it is challenging to create seamless collaboration between social innovators, large companies, multilateral organizations and governments to carry out sanitation initiatives better. The emergence of platforms that encourage collaboration, such as the Toilet Board Coalition therefore fill an important role of liaising the efforts these different stakeholders to help improve sanitation access in developing countries across the value chain.

Industry Innovations Applicable in Ghana

Dry/Waterless Toilet – X-runner

X-runner is a Swiss-registered Peruvian social enterprise that has been operating since early 2012, piloting a dry-toilet and waste collection system, integrated into a composting process. Its model is based on a monthly subscription service, where waste is collected weekly from households, and then safely processed into compost by the company. The enterprise has served hundreds of households in Lima, Peru, and its technology would fit well into the Ghanaian market, given the popularity of subscription based public toilet services coupled with the scarcity of water in some areas of Ghana.

Energy from Waste – Norsk Biogass AS

Norsk Biogass AS, founded in 2006, is a Norwegian company that makes and supplies pre-treatment technology to prepare food waste and organic residue from existing waste streams for use in renewable energy production. Their patented technology, BioSep, enables users to automate the removal of packaging from food products and transport packaging from food waste. Although mostly used in Europe and the United States, this technology could be a good fit for the Ghanaian market, even though it will require significant investment. It does, however provide a solution for industrial-scale separation and disposal of mixed organic and inorganic waste for biogas production.

‘Pee-cycling’ (Fertilizer from urine) – Waternet

Waternet is a Dutch company founded in 2006, that is dedicated to protecting the canals and waterways in Amsterdam and its surrounding areas. In 2016, the company experimented with a project to manufacture fertilizer from urine collected during a popular festival in the city. The company was able to extract phosphates for fertilizer production out the 23,000 litres of urine collected, and recycled enough water to irrigate farmland the equivalent of 10 soccer fields. Though this experiment has not been replicated by Waternet since, Rich Earth Institute in the USA has been doing so, saving over 887,000 gallons of water. This project can be replicated in Ghana, though it will require a lot of public education and finding the right company capable of implementing the technology using the right business model.

Summary and Conclusion

- 72% of Ghanaians use shared facilities with 20% practising open defecation with poor sanitation costing Ghana about 1.6% of its annual GDP.
- TBC's work is relevant at ensuring each stakeholder in the value chain interacts well to ensure an overall improvement of the sanitation for all.
- GAMA-SWP project is spearheading the provision of toilet facilities to poor urban communities with over 9,373 toilets installed in 2018.
- With limited access to water across urban and peri-urban areas in Ghana, dry/waterless toilets like X-runner, presents good prospects to meet sanitation needs of beneficiary without much worry about water.

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Annex 1- List of Innovations- National & Global Industry Innovations - National (Ghana)

Innovation Description	Sub-sector	Type of waste/ Type of technology	Name of business	Country	
Portable toilet (with no physical connection)			Thetford	Ghana	https://www.ghanayello.com/company/49391/Thetford
Gizeo Biogas Systems	Energy	Kitchen waste	Cibus Technologies Ghana	Ghana	http://www.ghanacic.org/all-clients/cibus-technologies-ltd/ This technology solves waste and energy issues in residential homes by recycling mostly kitchen waste into cooking fuel and garden fertilizer
Cooking gas and fertilizer	Energy	Kitchen waste	Das technologies	Ghana	http://www.infodev.org/articles/start-ghana-turns-waste-cooking-gas
House hold Toilet			Northern Sama Sama Project	Ghana	https://web.facebook.com/SamaSamaGH/ https://www.modernghana.com/news/817915/samasama-flush-toilets-for-8-mmdas-in-the-northern-region.html

Industry Innovations – Global

Innovation Description	Sub-sector	Type of waste/ Type of technology	Name of business	Country	Links (business, sample product)
Luxury Portable toilet /shower	Sanitation		Dr Loo Bidvest Prestige Toppla portable toilet Co. Ltd	United Kingdom South Africa United States of America	https://drloo.co.uk/ https://bidvestprestige.co.za/our-services/toilet-hire/ https://www.manta.com/c/mhzhm9r/toppla-portable-toilet-co-ltd
Waga Box	Energy/ Power	Solid domestic waste	Waga Energy	France	http://waga-energy.com/?lang=en Technology capable of converting biogas from household waste into renewable energy (bio methane) for the supply of electricity up to 3000 households. This has a communal capacity
Waste information server (The WIS can be setup to power any number of waste collection sectors)	Information technology	All solid domestic waste	Sunrise Technologies	Ireland	https://sunriseinnovations.ie/page/waste-information-server-wis
Separett waterless toilet	Sanitation		X-runner	Peru	https://xrunner-venture.org/
Fertilizer	Crop production	Urine	University of Michigan, University of Buffalo and Rich Earth Institute. Waternet	USA Netherland	https://www.independent.ie/world-news/north-america/this-university-is-recycling-urine-to-use-as-fertiliser-35396389.html https://www.betterworldinternational.org/innovation/pee-cycling-smart-model-sustainability/

Home Biogas: turns home waste into energy	Energy generation	Solid domestic waste (food/ animal waste)	Biogas World	Israel	https://www.biogasworld.com/product/anaerobic-digestion/small-scale-digester-en/homebiogas/ This is a personal self-installable home-based biogas machine.
Automated removal of packaging waste and conversion of food waste and organic residue to produce renewable energy	Energy production	Food waste and organic residue	Norsk Biogass Bioelectricity Uganda	Norway Uganda	http://en.greenbusiness.no/focus/norsk-biogass-as https://www.facebook.com/BioElectricityUganda/
Households toilet	Sanitation		Turning Earth	USA	http://turningearthllc.com/
Portable mini-flush toilets	Sanitation		Chembros Portable Sanitation Solutions	South Africa	https://jjchembros.com/portable-toilets/polyjohn/
Eco Digester	Energy	Food waste with eco digester	Eco-Wiz Recycling Ltd	Singapore	www.eco-wiz.com



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