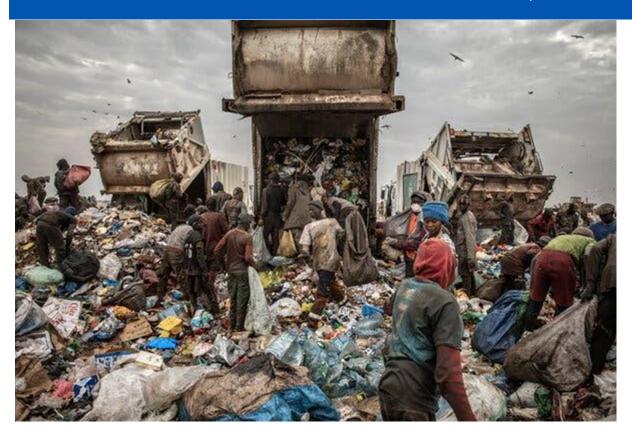
## **TRAINING REPORT**

SWM Training for private sector & governments representatives in Zambia Matthew Haden

September 2024













Disclaimer:
This Knowledge product was funded by the European Union. ts contents are the sole responsibility of the authors and do not necessarily reflect the views of the European Union.

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## ABBREVIATIONS AND ACRONYMS

CO2	Carbon Dioxide
EA&P	East Asia and Pacific
EPR	Extended Producer Responsibility
HDPE	High-Density Polyethylene
LDPE	Low-Density Polyethylene
MRF	Materials Recovery Facility
MENA	Middle East and North Africa
OECD	Organisation for Economic Co-operation and Development
PPE	Personal Protective Equipment
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
R-HDPE	Recycled High-Density Polyethylene
R-LDPE	Recycled Low-Density Polyethylene
R-PET	Recycled Polyethylene Terephthalate
SWM	Solid Waste Management
SSA	Sub-Saharan Africa
WtE	Waste-to-Energy

#### 1. Introduction

Following the webinar session on plastics management and recycling, the EU delegation in Zambia requested a solid waste management training for private sector & governments representatives in Zambia. During the training preparation, the UDTF worked with INTPA F4, the EUD delegation in Zambia and the Green Tech for Circular Economy program. As part of the training preparation, the parties agreed to include one on one ask the expert sessions following the main training session.

The following document presents a summary of the training session and one on one ask the expert sessions. It presents the contents of the main training session, including questions and responses discussed after each section of the main event. As well as the one-on-one ask the expert sessions, and the results and recommendations for a way forward.

## 2. SWM Training Overview

The main training event took place on 10 September 2024 and was attended by 76 people, 43 participants in person and 33 participants who joined the session online. The gender breakdown was nearly 50:50. The main training event covered the following topics:

- 1. Overview of Solid Waste Management in S-S Africa
- 2. Recovery Context
- 3. Deep Dive: Focus on Organic Waste
  - Large-Scale Windrow Composting
  - Black Soldier Fly Larvae Commercial
  - Black Soldier Fly Larvae Small Scale
  - Biogas Large Scale/Small Scale
  - Biochar, Alternative Uses Jet fuel
  - Questions and Answers
- 4. Deep Dive: Focus on Recycling
  - Recyclable Waste Typologies and Economic Values
  - Metals, Paper, Glass
  - Plastic
  - Business Models and Market Situations
  - Material Recovery Facilities
  - Co-Processing / RDF Cement Plants
  - Waste to Energy
- 5. Waste Policies and Future Developments
- 6. Practical Application Examples
- 7. Questions and Answers
- 8. Overview of Green Tech for Circular Economy Program

Please see a detailed summary of each section in the annex.

## 2.1 Results of SWM Training

Both the online and in-person participants were highly engaged throughout the training, demonstrating their interest by asking a wide range of insightful questions. From the depth and variety of questions and comments, it was evident that this was not only one of the most practical trainings but also one where the participants were especially eager to learn and apply the knowledge presented. The expert leading the session noted that rarely has there been such an attentive and motivated group, making this training stand out as a unique learning experience.

The information shared was particularly relevant to Zambia's context, focusing on solid waste management (SWM) and the future potential of the sector. The combination of theoretical knowledge and practical advice provided attendees with tangible strategies that can immediately benefit Zambia's SWM efforts. Moreover, the connections and networks established during the training are expected to contribute to the long-term success of projects, helping to elevate the country's SWM sector to a new level of professionalism and efficiency.

One of the key highlights was how the training integrated the upcoming Green Tech for Circular Economy program. By linking the concepts discussed with real-world applications, participants could clearly see the opportunities for innovation in Zambia. They left with not only a vision of what is possible but also a clear understanding of the steps needed to achieve it. Many attendees left feeling empowered and ready to take action, knowing that they could leverage this knowledge to implement projects and potentially secure additional funding for their initiatives.

The training was further enhanced by individual one-on-one Ask the Expert meetings, which allowed participants to explore their ideas in greater depth. These personalized sessions were invaluable, enabling attendees to refine their project concepts and strengthen their business models with expert feedback. As a result, many participants are now better positioned to transform their ideas into actionable projects that can drive sustainable change in Zambia's SWM landscape.

#### 2.2 Quizzes

Throughout the presentation, three quizzes were strategically used to gauge participants' knowledge at different stages of the webinar and to encourage active engagement.

The first quiz focused on the composition of waste in low-income versus high-income countries. Its purpose was to underscore the significant differences between these two contexts, as understanding these variations is essential for designing effective waste management projects. In low-income countries, for instance, organic waste makes up a much larger proportion of the waste stream than in high-income countries. Projects that work in high-income contexts might not translate well to low-income countries due to these compositional differences.

The participants showed a solid grasp of the disparities in waste composition, correctly identifying organic waste as a major issue in Zambia. However, many incorrectly assumed that plastic was the second-largest component in both low- and high-income countries. In reality, plastic ranks third in low-income countries and fourth in high-income countries. Despite this misconception, the quiz sparked lively discussion and demonstrated the participants' high level of engagement and awareness of local waste issues.

The second quiz explored the varying economic values of recyclable materials, aiming to help participants understand these differences to better design material recovery systems for their projects. This quiz particularly resonated with the waste management practitioners in attendance, many of whom performed well. However, some participants were surprised to learn that globally, PET

plastics often have higher market values than HDPE plastics. In Zambia, this dynamic is reversed because all PET is exported, while HDPE is repurposed locally to create new products. This led to an interesting discussion about how recycling markets differ globally and nationally, helping participants grasp the complexities of recycling economies and the factors that influence the value of different materials.

The third and final quiz was designed to highlight the importance of waste reduction and recycling by focusing on the decomposition rates of various materials in landfills. Participants were asked to estimate how long different items—such as glass, cans, tins, and plastics—take to break down when disposed of in a landfill. The results were eye-opening for many, as they were surprised by the extensive timeframes required for these materials to decompose. This quiz helped reinforce the message that waste accumulation in landfills occupies valuable space and imposes financial burdens on local governments, further emphasizing the need for robust recycling and waste reduction strategies.

Overall, the quizzes served not only as a way to test the participants' knowledge but also as a tool to deepen their understanding of waste management in the local Zambian context. Many attendees were already actively involved in waste management and demonstrated a solid knowledge base. However, the quizzes helped clarify misconceptions and offered valuable insights into the challenges and opportunities unique to Zambia's solid waste management (SWM) landscape. The interactive nature of these quizzes kept participants engaged and provided a platform for further discussion and learning.

## 2.3 Questions and Answers during Training

The presentation sparked a lively and engaging discussion throughout the training, with participants interested in the expert's practical knowledge drawn from running his own companies in a country just next door to Zambia. His hands-on experience demonstrated the potential for similar ventures within Zambia, leaving the attendees eager to learn more about the practical applications of the insights shared.

One of the key topics that generated the most interest was the expert's experience with carbon and plastic credits. Participants were keen to understand how these credits could be accessed and leveraged, and given the expert's firsthand experience in managing companies that successfully work with both carbon and plastic credits, he was able to provide clear, actionable examples of how these mechanisms can be utilized. This real-world knowledge helped the attendees envision how similar projects could be developed within Zambia, offering a pathway to unlock new revenue streams through environmental sustainability initiatives.

Another major focus of the discussion centered around developing large-scale waste management projects, such as composting facilities. Participants asked practical questions on how to start such initiatives, and the expert provided step-by-step guidance. He explained how to accurately assess the waste available, especially the easy-to-collect types, sign memorandums of understanding (MOUs) with agro-processors and potential markets, secure land or space for operations, and explore financing opportunities, particularly through carbon credit programs. This detailed advice gave participants a clear blueprint for initiating their own projects.

The training also delved into the challenges of recycling certain materials, with specific questions raised about difficult-to-recycle items like glass and different types of plastics. The expert offered

insights into why some materials present greater difficulties in the recycling process and what strategies might be used to manage or repurpose them effectively.

One of the training's highlights was the strong parallels drawn between the expert's experiences in neighboring Tanzania and the opportunities available in Zambia. For instance, the expert shared how his companies co-process waste with the same cement companies that operate in both countries. The fact that local Zambian cement companies were at the training and were similarly willing to participate in waste co-processing opened the participants' eyes to the possibilities of replicating and expanding these practices in Zambia. This demonstrated that the innovations and successes achieved in Tanzania could be directly applicable to Zambia, further inspiring attendees to take action.

Overall, the expert's deep knowledge and firsthand experience, combined with the active participation of local companies, created a highly informative and energizing training that showed participants not just what was possible, but how to practically achieve it in Zambia.

## 3. Ask the Expert Sessions

As part of the overall SWM Training, participants were offered to set up one on one meetings with the expert to delve deeper into their projects and ask more specific questions. After the training there was great demand for the one-on-one Ask the Expert sessions and the timeslots got booked up quickly. Even people who had not had the opportunity to participate in the training signed up once word got around. Due to the demand, it was required to make extra online sessions available in the coming week and amend the original contract. The total number of Ask the expert sessions done was 19.

## 3.1 Summary of One-on-One Sessions

While each one-on-one Ask the Expert session was different there were several themes that participants were interested in.

<u>Carbon Credits</u> – Many participants wanted to know more about Carbon Credits. The expert was able to go into specific details based on the project. This included going further into detail on the different versions of verifications – Gold Standard and Verra, the different methodologies and the large number of NGOs and companies that assist in the registration and project development phase. The expert described the prior research and development needed to approach these carbon credit project developers and the necessary process. This was very helpful information, and future work could be focused to help guide serious projects in this process.

<u>Plastic Credits</u> – Similar to carbon credits, all companies working with plastic material were interested in how to receive additional funding for plastic collection and recycling. The expert was able to go into specific details based on the type of plastic. This included going further into detail on large number of NGOs and companies that assist in the registration and project development phase for plastic credits – many of which overlap with the carbon credits. The expert described the prior research and development needed to approach these plastic credit project developers and the necessary process to realize this. Like carbon credits, this was very helpful information, and future work could be focused to help guide serious companies in this process.

Exporting Plastic and other low-value Waste - There were a few waste collection companies that were looking for better markets for their products. The expert and the companies were able to discuss what companies in South Africa could potentially purchase waste materials – Extrupet for PET for

example and what the price per ton would be. The expert suggested contacting several transporters to see if the prices would make more economic sense. The other imperative info is with regards to pressing force for the balers used. The expert provided information on which balers suppliers are good and affordable and why horizontal balers can further assist companies to reach different markets. Future projects around enhancing these trade connections or sponsoring trial delivery of material to find better markets could be useful.

Attracting more Waste for co-processing and windrow composting — The expert also met with both cement companies looking to access additional waste material and municipalities and companies operating waste facilities and landfills asking how they can reduce waste going to landfill. The expert described both accessing the right material for co-processing and windrow composting and how to combine these projects. The expert has a lot of experience with this and described the process of selecting certain areas with concentrated amounts of organic waste for windrow composting and areas with material good for making refuse derived fuel and suggested link ups between the cement companies and the waste providers. Setting up trials on different landfill areas to dry material and then provide it for fuel were suggested. Future projects could be around full trials of windrow composting combined with refused derived fuel.

<u>Community Black Soldier Fly Bins</u> — Other meetings were with NGOs and smaller waste recycling companies that were looking for different models to handle organic waste. The expert suggested building community compost bins and even told the participants where they could find examples of these in Zambia — as BioBuu has built out community compost bins for a local Zambian Fish farm — Lake Harvest. Future projects could be working with BioBuu and local NGOs to develop community insect bins in different areas for the collection and reduction of organic waste and turn them into small business models.

## 4. Recommendations

The expert was impressed with the format for the training and one on one Ask the Expert sessions that was developed by the EUD combined with future EUD programming. As mentioned above, this was one of the most impactful consultancies the expert has done in terms of imparting practical knowledge to engaged participants. It was also nice that instead of visiting projects where they showcase solutions already working or doing waste composition studies or landfill visits all which are repetitive and generally not very insightful, the expert had more time to speak directly to participants and have input into the development and improvement of businesses and projects in SWM. In terms of recommendations, the expert only has recommendation on potential future engagements.

## 4.1 Future Engagements

As mentioned in the section above, there could be some practical engagements that would go beyond knowledge sharing and into specific project development assistance. This could include assisting serious companies with the proved capacity to develop carbon credit, plastic credit, refuse derived fuel, exporting of recyclables with horizontal balers or community organic waste treatment projects. This could work on a project basis or mentoring and could include co-designing and making connections to the right organizations.

## ANNEX I – SWM Training Summary

The presentation is available at the related documents section of the SWM & Circular Economy thematic area of the URBAN HUB, in capacity for development, <u>click here</u>. And the video recording of the webinar can be accessed clicking in the following: <u>Plastic management and Recycling</u> and <u>Organics</u>.

Below we have detailed a summary of each section:

#### 1. Overview of Solid Waste Management in S-S Africa with focus on Zambia

In this section, the presenter discussed the current situation of solid waste management in SSA. SSA countries generate less waste compared to other regions globally, but this is set to change. SSA, South Asia, and to a lesser degree MENA, will experience the fastest growth in waste generation in the coming decades. As population growth and urbanization continue, SSA's waste generation will rise, and currently unmanaged waste is creating severe problems.

Waste is often openly burnt, causing air pollution, or dumped in waterways, leading to flooding, diseases, and ecosystem destruction. Proper landfills are scarce; most collected waste ends up in poorly constructed dumpsites that fail to manage leachate and have uncontrolled fires, leading to heavy air pollution and a considerable CO2 footprint. This mismanagement affects the entire SWM system, as trucks frequently get stuck, take hours to dump waste, and dump locations keep moving further away.

Zambia is no different - Zambia has experienced rapid urbanization, leading to increased waste generation. Lusaka, the capital city, produces the highest amount of waste, approximately 1,000 tons per day, according to the Lusaka City Council. An estimated 45% of waste generated in Zambia is formally collected – the rest is dumped in the environment or burned. Waste collection services are often inadequate in many parts of Zambia, particularly in low-income and peri-urban areas. The national waste collection rate is less than 40%, with much of the waste ending up in illegal dumpsites or being burned. The Chunga landfill in Lusaka is one of the few operational landfills, though it faces issues like poor waste management practices and insufficient capacity, but the landfill gate / tipping fees is low

#### 2. Recovery Context

This section gave an overview of waste recycling in SSA with a focus on urban areas where most of the waste is generated. Material recovery in cities can benefit from economies of scale, enhancing the profitability of recycling and composting, though this depends on local conditions and market demand. Compost, recycled materials, and energy can result from treatment and recovery processes, which should minimize waste throughout the value chain before transferring residual waste to final disposal facilities. The public sector often struggles with waste collection, leading to significant involvement from the informal sector. Sustainable financing is also a challenge, as user fees often do not cover costs, and revenue leakage is common.

#### 3. Deep Dive: Focus on Organic Waste

This section started with a quiz on the waste composition of high-income countries vs low income countries. That quiz pointed out that unlike in high-income countries, most of the waste in low-income countries is organic waste at over 60 %. In S-S Africa, organic waste management is waste management.

#### Large-Scale Windrow Composting

Easiest intervention is windrow composting. Windrow Composting is a method of composting organic waste in long rows or piles, known as "windrows," that are regularly turned to promote decomposition. This method is commonly used for large-scale composting operations such as municipal waste

management, agriculture, and industrial composting. It is important to start with locations that already have high concentrations of organic waste. Fruit and Veg markets, Argo processors, Large Factories. Places where implementing systems of separation are easy. Material is brought into the compost facility into a receiving area. This material is then mixed every day to make a homogenous mixture and to take out as many non-organic materials as possible. After there is enough material to make a full windrow – the use a front loader to build the windrow. This windrow is turned around once a week and watered every other day depending on the season. The material will sit in the rotting stage in windrows for around 6 – 12 weeks depending on the material. At around 6 weeks, you can normally combine to windrows together. After the rotting stage you can bring the material to a mature stage area and put in a large pyramid. This stage is normally around 6-12 weeks as well. Then after that you bring to the drum-screen and separate the composted material from the larger pieces and residual. You pack the compost material and the residual either goes back into the windrow system or if it has lots of inorganic material like plastic – it is taken to the dumpsite or to waste to fuel.

#### Black Soldier Fly Larvae Commercial

BSFL composting is an innovative, efficient method of composting organic waste using the larvae of the Black Soldier Fly (Hermetia illucens). These larvae are highly effective at converting organic matter into valuable by-products, including protein-rich feed and compost. This technique is widely used in waste management, agriculture, and the production of sustainable animal feed. BSFL also assists with livestock feed issues, not just with methane reduction. Can be up to 41x better than windrow composting at reducing carbon. BSFL facilities need large indoor space and equipment for breeding, feeding, processing. These upfront Capex costs can make the process challenging. The main byproducts are dried insect protein and compost. The compost is better than compost from a windrow compost due to certain elements of the BSFL that is left behind – like their exoskeleton shell can be used as a natural pesticide. It is still important to due additional processing of the insect protein in order properly incorporate it into finished livestock feed – including removing the oil and mixing with other ingredients.

#### Black Soldier Fly Larvae Small Scale

BSFL has also been used a community or smaller level in countries like Zambia or other areas on the tropic cause you don't need to breed the larvae they are native. These models are interesting cause they are community composting that provide BSFL larvae. The community can put their waste in these bins, and the insect naturally comes in, lays eggs and eats the waste. The larvae then self-harvest – as they are looking for dry locations to become flies. They can then be fed directly to chickens. Key message is that this is a cheap way to manage organic waste in a community.

#### Biogas – Large and Small Scale

Biogas Production is a process of generating renewable energy by breaking down organic waste (such as agricultural waste, manure, food scraps, and sewage) in an oxygen-free environment (anaerobic digestion). This process produces biogas, a mixture of methane ( $CH_4$ ) and carbon dioxide ( $CO_2$ ), which can be used for electricity, heat, or as vehicle fuel. The remaining material, known as digestate, can be used as a nutrient-rich fertilizer. Very high capex and challenging to make economic sense with new renewable mix. Really depends on gate fees, source of waste and power purchasing agreement. With Small scale biogas there are a lot of different variables of small to medium scale biogas, works better with agricultural and livestock waste – still need to use the gas nearby in most cases. Projects need to be reviewed on a case-by-case basis. Very big in India where the government assists with subsidization.

#### Biochar, Alternative uses – Jet fuel.

Biochar is a relatively new process for woody biomass organic waste that can be funded through carbon credits. The waste material is gasified and turned into Biochar which is then dug into the ground to bury the carbon. Other new ideas are using biomass to produce Sustainable Jet Fuel through Gasification and the Fischer-Tropsch method

#### 4. Deep Dive: Focus on Recycling

Once organic waste is removed from the waste stream, collection and processing of recyclable and nonrecyclable material is easier.

#### Recyclable Waste Typologies and Economic Values

This section went through the different prices of different recycling products and also looked at their environmental cost as not all recycling is created equal. This section included two quizzes, the first quiz explored the varying economic values of recyclable materials, aiming to help participants understand these differences to better design material recovery systems for their projects. The second quiz asked the decomposition of materials

#### Metals, Paper, Glass

Metal Recycling continues to be the most lucrative and easiest recycling. This industry will continue to grow with electronic waste and batteries and renewable energy. Paper, though often not as glamorous as plastic recycling and not as lucrative as metal recycling remains one of the lowest cost recycling initiatives and one that makes economic sense almost everywhere either through export or through local paper mills or even egg cartons Two the lowest entry level recycling process for paper and cardboard is large-scale baling which will allow for export and egg carton recycling processes. The next level is having a full-scale pulping facility. Glass Recycling is an expensive capex and very low value product – as it competes with sand. Glass reuse is the best way – no extra energy to produce, no plastic bottles

#### Plastic

This section discussed the dire impacts of plastic waste in SSA currently. SSA has the largest portion of mismanaged and uncollected plastic waste. Globally, only 14% of plastic is recycled, with much incinerated. In SSA, the recycling rate is around 6%, and plastic waste is expected to triple by 2060. This waste impacts tourism, fisheries, agriculture, infrastructure, and health, but recycling creates jobs and generates foreign exchange through exports. European regulations are driving demand for recycled PET (R-PET), making it more valuable than virgin plastic.

#### Business Models and Market Situations

This section highlighted the different business models and market conditions that make recycling of material economically feasible. Effective waste management relies on high volumes and low transport costs. Proximity to ports is crucial for exporting, but local manufacturing using recycled materials is also viable. Ideal conditions include access to at least 200 tons of material per month within 200 km of a port or processor. Alternative recycling methods face challenges, but co-processing in cement kilns is a promising option for non-recyclable plastic. Successful recycling businesses need significant quantities of materials and should start with a horizontal baler system, expanding as needed into shredding, washing and extruding.

#### Material Recovery Facilities

This section went over the difference between a Dirty Material Recovery Facility and a Regular Material Recovery Facility where separation already takes place. You can receive dirty mixed material, but the recyclables will be very dirty and hard to recycle. Without segregation at source large scale material recovery facility will struggle to operate efficiently. When a facility receives sorted waste is when it works. However, household segregation is incredibly challenging and expensive to implement. If you do, you need very good communication. It also costs extra to collect.

#### Co-Processing / RDF – Cement Plants

Many cities across Africa have cement plants. To make refuse derived fuel – or just plastic to fuel, you need an investment usually of just a plastic crusher. This depends on the feeding mechanism of the cement kiln, but most cement kilns cannot take material bigger than 10cm. This is where most of the waste in Europe goes for "recycling", Cement companies are focusing on this more and more – to reduce cost and have 'sustainable fuel'. Co-processing – waste to fuel in a cement kiln is a very attractive way to dispose of all the non-recyclable plastic material.

#### Waste to Energy

Waste to Energy Plants can cost upwards to 100 million dollars. There are a lot of European companies selling this technology to Africa as a panacea for their waste problems. The reality is that it is very expensive to buy, operate and the energy received does not cover the costs. In Europe these work a lot better when you separate out the organic waste, so you have dry waste. Also when there is a lot higher plastic content – which has a higher calorific value. Co-processing is better.

#### 5. Waste Policies and Future Developments

This section looked at the policy landscape for managing all waste material. Recycling alone is insufficient; policies must also limit plastic production. Effective policies, such as those in the EU, prioritize recycled PET over virgin plastic and ban common ocean-polluting items. African countries have implemented bans with varying success, emphasizing the need for clear enforcement and industry cooperation. Extended Producer Responsibility (EPR) schemes and plastic credits can support recycling infrastructure and incentivize plastic collection.

#### 6. Practical Application Examples

In this section the presenter detailed practical examples for recycling plastic, looking at the following scenarios:

- Waste to Fuel with Plastic Credits in Tanzania: The Recycler, in partnership with CleanHub, collects non-recyclable plastic waste, shreds it, and delivers it to a cement company for use as fuel. They receive payment per ton of plastic collected and processed, funded by brands seeking plastic credit payments.
- BioBuu has managed Mabwepande Compost Facility built on carbon credits to offset the
  city of Hamburg. BioBuu expanded to build second facility registering their own carbon credits
  and building out animal feed facility. BioBuu's facility in Kenya failed due to issues around preconsumer waste availability which was needed for export of BSF. Important to have many
  different revenue lines.

#### ANNEX II - Literature

- C&EN 2018. Andy Burning for Chemical & Engineering News. https://cen.acs.org/environment/sustainability/Periodic-graphics-plastic-recycled/96/i17
- ECL 2023. Airborne hydrophilic microplastics in cloud water at high altitudes and their role in cloud formation. August 2023 Environmental Chemistry Letters 21(6):3

  <a href="https://www.researchgate.net/publication/373114445\_Airborne\_hydrophilic\_microplastics\_in\_cloud\_water\_at\_high\_altitudes\_and\_their\_role\_in\_cloud\_formation">https://www.researchgate.net/publication/373114445\_Airborne\_hydrophilic\_microplastics\_in\_cloud\_water\_at\_high\_altitudes\_and\_their\_role\_in\_cloud\_formation</a>
- OECD Global Plastics Outlook Database. Share of plastics treated by waste management category after disposal or recycling residues and collected letter, 2019.
- https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm
- Plastic Is Everywhere. Now Big Oil Companies Are Producing Even More of It. By Avi Salzman <a href="https://www.barrons.com/articles/shell-chevron-oil-chemicals-plastics-d75f8fee?reflink=desktopwebshare\_permalink">https://www.barrons.com/articles/shell-chevron-oil-chemicals-plastics-d75f8fee?reflink=desktopwebshare\_permalink</a>
- UNEP, 2015 "World's Cities Produce up to 10 Billion Tonnes of Waste <a href="https://mpra.ub.uni-muenchen.de/71518/1/MPRA">https://mpra.ub.uni-muenchen.de/71518/1/MPRA</a> paper 71518.pdf
- Recycling Plastic Is a Dangerous Waste of Time by Frank Celia. <a href="https://quillette.com/2024/06/17/recycling-plastic-is-a-dangerous-waste-of-time-microplastics-health/">https://quillette.com/2024/06/17/recycling-plastic-is-a-dangerous-waste-of-time-microplastics-health/</a>
- Swiss National Science Foundation Data prepared in Pollak (2019) on the basis of data from Kaza et al (2018). <a href="https://nfp-energie.ch/en/dossiers/190/cards/264">https://nfp-energie.ch/en/dossiers/190/cards/264</a>
- United Nations Comtrade database (2023). <a href="https://ourworldindata.org/grapher/share-plastic-waste-exports">https://ourworldindata.org/grapher/share-plastic-waste-exports</a>

World Bank What a Waste Database, 2018 or latest available.

Yale Environmental Performance Index. (2022) https://epi.yale.edu/

## ANNEX III - List of Participants in Person

See excel tables in the file: "20241004 SWM Training in Zambia\_List of participants.

The tabs "In-Person participants" and "On-Line participants" marked in green show all the people that participated in the trainings main event on 11 of September.

The participants of the on-to-one Ask the Expert sessions were in Lusaka, Katete, Livingstone, Kapiri Mposhi, Kusumbakesa, and Kitwe, and are shown in the blue tabs. The "Ask the expert September 11" shows the in-person, and few on-line meetings that took part in Lusaka. And "AddAtE On-Line Sept25-30", shows the additional Ask the Expert sessions that took place on-line between 25 and 30 of September 2024.

All tabs without colour and marked as pre-registered contain information captured form people interested in participating. However not all the pre-registered actually participated in the training.

# ANNEX IV – Training Survey Results

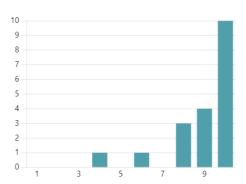
See survey results in the file "Survey results.pdf", or in the following pages.

# SWM Webinar in Zambia: Organics recovery, and key materials management and recycling.

19 Responses 06:14 Average time to complete Active Status

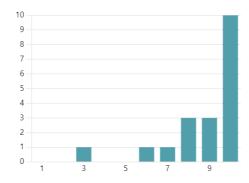
1. How would you rate this webinar overall?

8.95 Average Rating



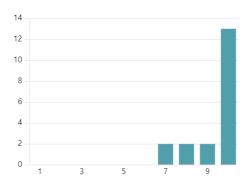
2. How would you rate the morning session: SWM Context and focus in Organics Recovery

8.79 Average Rating



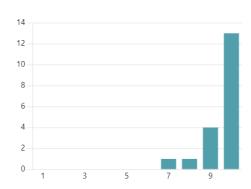
3. How would you rate the afternoon session: Focus on Key Material Management and Recycling. Waste Policies and practical examples.

9.37
Average Rating



4. How would you rate the expert leading the webinar?

9.53 Average Rating



5. Please review this training and write your suggestions for improvement.

19

Responses

Latest Responses

"It was too compressed. Next time it should be split into two days"

"More hands on and practical training with tangible results"

"It was useful and inspiring. Great opportunity to learn and network."

practical training training was on point plastic credit training program training was great training was very insightful

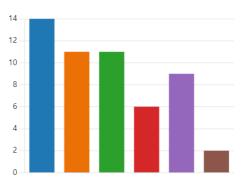
waste is recyclable session training companies
companies
circular economy training is okay

waste management training materials

training materials

6. What would further support your learning process applicable to your work in SWM?





7. Would you be interested in other training sessions on other subject?





8. Which topics?

Latest Responses

"Waste management equipment "

17 Responses "Grant writing Understanding carbon and plastic credits Monitoring and eval...

"Plastic credits Organic waste Recyclable collection"

7 respondents (41%) answered Waste for this question.

innovations in the circular social enterprises organic SMS

plastic and carbon plastic creditsMonitoring

circular economy waste credits

Green products financing

Waste waste management sector project

funds projects E-waste

Mining waste Plastic credits set ups

management equipment access to fina

access to finance Management in zambia

9. If you like, you can also tell us your email, so we can have more direct communication for future events.

Latest Responses

"maro on white cleaners @gmail.com"

"Emmanuel.kapesa@zm.ab-InBev.com"

"sepozm@gmail.com"

15 Responses 10. If you like, you can also tell us your name, so we can have more direct communication for future events.

Latest Responses
"DEREK MWAPE"
"Emmanuel Kapesa"
"Giulia Praolini"

14 Responses

1 respondents (7%) answered **Kyembe Mushinkula** for this question.

Imuwana Mwanamwalye nthandose Katete

Alfrd yotamu Kyembe Mushinkula Godfrey Kabwe
Salifya Mungaila Misolo Sakala Kema
Giulia Praolini Danny Lemba Chinyemba Chikahya