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NATIONAL TRAINING AND USER MANUAL FOR SORTING MUNICIPAL SOLID WASTE

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National Training and User Manual for Sorting Municipal Solid Waste



LIST OF CONTRIBUTING AUTHORS

Sarah Naigaga,	Ag. Legal and Corporate Affairs Manager, NEMA
Kiguli Dan Kibuuka,	Environment Inspector, NEMA
Richard Mukasa	Environment Inspector, NEMA
Mugambwa,	
Kinobe Joel,	Lecturer, Makerere University
Michael Ahimbisibwe,	Ag. Principal Energy Officer, Ministry of Energy and Mineral Development
Oketch Mark Lazarus,	Energy Officer, Ministry of Energy and Mineral Development
Akumu Justine,	Energy Officer, Ministry of Energy and Mineral Development
Kizito Simon,	Principal Inspector, Ministry of Local Government
Mbabazi Catherine,	Finance and Administration, Ministry of Energy and Mineral Development
Edidah Busingye,	Principal Urban Officer, Ministry of Local Government
Dr. Miria F. Agunyo,	Project Manager, Ministry of Energy and Mineral Development
Jude Byansi Zziwa,	Manager Waste and Sanitation, Kampala Capital City Authority
Kirabira Joseph,	Solid Waste Management Officer, Kampala Capital City Authority
Masengere George,	Senior Environment Officer, Mukono Municipal Council
Nyaribi Rhodah,	City Environment Officer, Mbale City
Tumwebaze Herbert,	City Environment Officer, Mbarara City
Pauline Nabanda,	City Environment Officer, Masaka City
Nabihamba Ernest,	Principal Production and Environment Officer, Jinja City

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ACRONYMS

MSW:	Municipal Solid Waste
ASTM:	American Society for Testing and Materials
E-Waste:	Electronic waste

DEFINITIONS

"disposal" means any operation related to waste management which is not a recovery operation even where the operation has as a secondary consequence the extraction of substances or energy;

"electrical or electronic waste" means waste from electrical or electronic equipment or any part of the equipment, including equipment that is old, obsolete, has reached end-of-life or has ceased to be of any value to its owner;

"recovery" means any operation the principal result of which is—
(a) waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function; or (b) waste being prepared to fulfil that function, in the plant or in the wider economy;

"recycling" means any recovery operation by which waste materials are re-processed into products, materials or substances whether for the original or other purposes, and includes the reprocessing of organic material;

"re-use" means any operation by which products or components that are not waste are used again for the same purpose for which they were intended;

"waste" means any substance or object which is dumped, abandoned, discarded or disposed of or intended or required by law to be disposed of;

"waste handler" means a person licensed by the National Environment Management Authority to collect, transport, store, treat or dispose of waste;

"waste management" means activities relating to the collection, transportation, storage, treatment and disposal of waste, including the management of waste at source and during decommissioning of waste management facilities;

"waste management facility" means a plant, site, structure and associated facilities or infrastructure used in the management of waste.

Waste promoter: waste generator, individuals engaged in any part of the life cycle of waste.

"Healthcare waste" means hazardous or non-hazardous waste from medical or veterinary treatment and associated tutoring, research and laboratory facilities, and similar waste originating from other sources;

"Municipal waste" means waste, excluding industrial waste, collected within a local government;

TRAINING AND USER MANUAL FOR SORTING MUNICIPAL SOLID WASTE



1.0 Background

Waste sorting is the process by which waste is separated into different components. Waste sorting can occur manually at the household and 'at other source points', the sorted waste is collected through solid waste collection schemes, manually or automatically separated in materials recovery facilities or mechanically in biological treatment systems. Waste is temporally collected at source, segregated and sorted into different components, and may be temporally stored while planning its sustainable waste management. Collection of waste is generally carried out using door to door mechanism, from roadside bins and gazette collection bins. Waste collection responsibility mainly lies with the Local Government such as City/Municipal/Local body and the waste generator. Proper waste sorting and segregation is most important from a reuse, recycling point of view and for decreasing the waste load for treatment and further disposal. Responsibility of waste sorting and segregation lies on waste generator as well as on dedicated officers for waste collection and further management. Sorting of plastic, metals, woods, paper, and biodegradable waste not only provides economic advantage due to recycling but also saves money and efforts for their further treatment or disposal. Urban areas and cities are relatively well covered for waste sorting, collection, transportation, treatment and disposal while rural areas are mostly neglected, resulting in open disposal of wastes. Emerging waste streams including e-waste, medical waste, chemical waste, oil and gas waste among others and this is usually mixed with municipal solid waste.

Enabling Legal framework

Uganda has a sound policy and legal framework supporting waste management. The Constitution of the Republic of Uganda 1995 (as amended), the National Environment Act, No. 5 of 2019, the Local Government Act, Cap. 243, Employment Act, 2006, the Occupational Safety and Health Act, 2006, the Workers' Compensation Act,

2000, the Public Health Act, 2000, the Physical Planning Act, 2020, , the National Environment (Waste Management) Regulations S.I. 49/2020, entail mechanisms for sustainable waste management.

National Urban Waste Management Policy and Strategy (Ministry of Lands), Renewable Energy Policy, 2007. Electronic Waste Policy, 2012. National Environment Management Policy 1994 (as amended).

Justification of the Training and User Manual

Public awareness is very important for proper waste sorting and segregation. The socio-economic background is also crucial for public behavior in proper waste sorting. The urban authorities/cities should raise public awareness for solid waste sorting through different kinds of engagements emphasizing its economic and environmental benefit. These authorities can partner with private sector, civil society, media amongst others to raise awareness on solid waste sorting.

Social, Economic and Environmental benefits of waste sorting and Segregation include;

1. Enhanced awareness of the general public on the impact of waste on their health, well-being and the environment.
2. Enhanced contribution of the waste sector to the green economy.
3. Improved livelihoods of all stakeholders involved in waste management.
4. Enhanced waste reduction, reuse, recycling and resource recovery.
5. Enhanced adoption of green technologies and cleaner production mechanisms for example;
 - (a) Resource recovery technologies
 - (b) Industrial symbiosis
 - (c) Environmental Auditing
 - (d) Life cycle assessment

2.0. Introduction to the training and user Manual

2.1. Purpose of the manual

The training and user manual focuses on training of municipal solid waste generators and handlers on sorting, considering the entire life cycle of the waste. The phases of the value chain will be addressed in form of modules aiming at providing waste generators and handlers with knowledge and skills to enable them act as change agents/ champions, ambassadors, game changers and advocates for sustainable municipal solid waste management in their daily lives and work.

2.2. Objectives of the training and user Manual

1. To demonstrate municipal solid waste sorting and the infrastructural requirements.
2. To define the standards to be used in municipal solid waste composition analysis/profiling.
3. To ensure effective and efficient municipal solid waste sorting to enable re-use, recycling and resource recovery.

2.3. Target Audience

The primary audience of this manual is the general public, trainer of trainers, waste promoters and handlers involved in waste sorting. Additionally, it targets civil society, practitioners and managers in the waste management value chain.

3.0. Module 1: Preparing of solid waste for sorting

3.1. Waste Composition Analysis

Fresh solid waste composition analysis is carried out according to standard methods ASTM D5231-92 (2016) for unprocessed Municipal Solid Waste (MSW). The waste is sorted into constituents of (i) wood; (ii) food; (iii) Textile; (iv) garden and yard; (v) paper and pulp; (vi) glass, plastics and metals. Each category of waste is weighed using calibrated weighing scales. Electronic waste is now forming part of the waste stream and it is hazardous in nature. It should be segregated out from the general MSW waste stream for specialized management. Table 1 shows the composition of MSW

Table 1 showing waste stream constituents

S/N	Constituents
i.	wood;
ii.	food;
iii.	textile;
iv.	garden and yard;
v.	paper and pulp;
vi.	glass, plastics and metals.
vii.	electronic waste.

3.2. Waste Sorting

The MSW used for resource recovery (material and energy) must be either inherently clean, source-separated by the generators, or effectively mechanically and/or manually separated to a degree that allows the production of good input for the optimal treatment for an acceptable end product. An adequate composition analysis of the solid waste must be carried out to provide up to date information on the composition and variability of potential feedstock. In undertaking fresh MSW composition analysis, MSW

is sorted into constituents of (i) wood; (ii) food; (iii) Textile; (iv) garden and yard; (v) paper and pulp; (vi) glass, plastics and metals (ASTM D5231-92, 2016) for unprocessed MSW.

Textile, glass, plastics, metals and other inert non-biodegradable material are sorted out for reuse, recycling and disposal as appropriate..

The organic and biodegradable fraction of solid waste (wood, food, garden, yard, paper and pulp) shall be put together for reuse and treatment. MSW feed stocks upon arrival at a MSW management facility should be visually inspected to ensure that the quality standards are adhered to and any contamination is within acceptable limits. Municipal solid Waste sorting can be mechanical or manual depending on the capacity.



Preparation of waste for characterization

Module 2: Gender and waste sorting

Waste sorting can also provide support to both men and women and ease their overall work burden through improved family health. Waste sorting initiatives can also contribute to gender equality through offering opportunities for women's increased employment. Given that women are more involved in activities including; but not limited to cleaning, food preparation, family health, laundry, and domestic maintenance. Women and men may view MSW management differently; they may also manage waste differently and put different priorities on its disposal. Therefore, there is need to explore the involvement of women and men, elderly, youth and persons abled differently in the sorting initiative.

Gender related waste streams generated includes diapers, menstrual pads amongst others while the different genders may face a number of challenges while sorting MSW: People abled differently are more prone to be affected by leachates and other hazardous material as compared to others.



Sorting waste at Kitezi landfill, Kampala

Module 3: Environment, Social, Health and Safety

All stakeholders should be trained in Environment, Social, Health and Safety to ensure that workers know of and understand the potential risks associated with health-care waste sorting, the value of periodic immunization against viral hepatitis, tetanus amongst others and the importance of consistent use of fit for purpose personal protection equipment. Workers at risk include women and men, elderly and youth and persons abled differently operators of waste treatment equipment, and all operators involved in waste handling, sorting and disposal. Essential occupational health and safety measures include the following:

- a. proper training of workers'/ tool box training;
- b. provision of equipment and clothing for personal protection;
- c. establishment of an effective occupational health programme that includes immunization, post-exposure prophylactic treatment, and medical surveillance.

Protective clothing: The type of protective clothing used will depend to an extent upon the risk associated with the waste, but the following should be made available to all personnel who collect or handle waste:

- Helmets, with or without visors - depending on the operation.
- Nosal masks - depending on operation.
- Eye protectors (safety goggles) - depending on operation.
- Overalls (coveralls) - obligatory.
- Industrial aprons - obligatory.
- Leg protectors and/or industrial boots - obligatory.
- Disposable gloves or heavy-duty gloves - obligatory.



Demonstrating the use of PPE in waste management

Personal hygiene

Basic personal hygiene is important for reducing the risks from handling/sorting waste, and convenient washing facilities (with clean water and soap) should be available for personnel involved in the task. Body sanitizers should equally be used where water and soap are not readily available.

Management Practices

Some of the management practices contributing to a reduction in risk for personnel who sort or handle waste include:

- a. Waste segregation: careful separation of different types of waste into different and distinct containers or bags defines the risk linked to each waste package.

- b. Appropriate packaging: prevents spillage of waste and protects workers from contact with waste.
- c. Waste identification (through appropriate and distinct packaging and labelling): allows for easy recognition of the waste stream and of its source as biodegradable and non- biodegradable.
- d. Appropriate waste storage: limits the access to authorized individuals only, protects against infestation by insects and rodents, and prevents contamination of surrounding areas.
- e. Appropriate transportation: reduces risks of generators and workers being exposed to waste.

Special precautions for clearing up spillages of potentially hazardous substances

For clearing up spillages of leachate, fluids or other potentially hazardous substances, particularly if there is any risk of splashing, eye protectors and masks should be worn, in addition to gloves, overalls and gumboots.

Response to injury and exposure

Measures of response should be established that prescribe the actions to be taken in the event of injury or exposure to a hazardous substance. All staff who handle /sort waste should be trained to deal with injuries and exposures.

The programme should include the following elements:

- a. Immediate first-aid measures, such as cleansing of wounds and skin, and irrigation (splashing) of eyes with clean water;
- b. An immediate report of the incident to a designated

- responsible person;
- c. Retention, if possible, of the item involved in the incident; details of its source for identification of possible infection;
- d. Additional medical attention in an accident and emergency or occupational health department, as soon as possible;
- e. Medical surveillance;
- f. Blood or other tests if indicated; recording of the incident;



Weighing of waste after sorting

CONCLUSION

Waste collection receptacles (sacks, buckets and bins) affordance by the MSW generators are in use in households, restaurants and food courts. However, it has been noted and reported that color coding of waste receptacles has not yet been complied with. Promotion of color coding of waste receptacles could enhance sorting of waste in the future.

