

---

Opinion Article

## **Sustainable Solid Waste Disposal in Enugu.**

Emenike, Augusta Ifeoma (PhD)<sup>1</sup>, Arc Nwagbara Augustine Okey (PhD)<sup>2</sup>, Emenike, Chinonyelum Nneoma<sup>3</sup>

*Department of Architecture, Faculty of Environmental Sciences, Enugu State University of Science and Technology, Nigeria<sup>1,2</sup>*

*Fame Konsult, Enugu, Nigeria<sup>3</sup>*

**ABSTRACT:** Solid Waste management is a serious challenge to urban centres and Enugu is not an exemption. Enugu city has been operating an open landfill site for disposing of its solid waste for a long time now. This is called a landfill where wastes are sorted and burnt intermittently. This creates a lot of environmental problems especially pollution (the air is mostly smoky, the land is degraded and the soil is not left out). The aim of this study is to highlight the evils of this type of disposal method and proffer alternative ways of disposing Solid Wastes. The study employed descriptive research method by observing the existing dumpsite and appraising existing literature on solid waste disposal and environmental challenges posed, also show cased a developed country' model of disposing wastes. The study showed that open air dumpsite is very dangerous to other land uses, the ecosystem in general and the people within the vicinity in particular. It was then recommended that the city of Enugu should try to move away from the current way of disposing solid wastes and move towards more sustainable and greener methods.

**KEYWORDS:** Approach, challenge, disposal, pollution, recycle, solid wastes, urban.

### **I. INTRODUCTION**

One major problem of urban centres in Nigeria is the issue of solid waste management and disposal. This has to do with how the generated solid wastes are collected, transported and disposed off finally. This has assumed a bigger proportion with the rate of urbanisation, increases in population and advances in technology; [1] [2][3] the solid waste produced become mountains within days of non-collection. The interest of this study is at the final disposal point, to evaluate the environmental consequences of the current disposal method to the surroundings generally and the inhabitants in particular. Urban wastes are divided into solid waste and liquid waste. The solid waste also known as municipal waste consisting of all household waste, hospital waste, industrial waste, etc, [4][5]. The liquid waste

aspect is from sewerage (storm flood water, used water from residences and sewage). Solid wastes are categorized into four as shown on the chart below

#### CHART 1: CATEGORIES OF SOLID WASTES

##### Garbage: the four broad categories

**Organic waste:** kitchen waste, vegetables, flowers, leaves, fruits.

**Toxic waste:** old medicines, paints, chemicals, bulbs, spray cans, fertilizer and pesticide containers, batteries, shoe polish.

**Recyclable:** paper, glass, metals, plastics.

**Soiled:** hospital waste such as cloth soiled with blood and other body fluids.

*Source: Municipal Solid Wastes*

All these types of wastes have different decaying time (see table 2 below) and have varying effect on the environment ranging from mild to hazardous, [6]. These effects are heightened with the various methods of disposal available to the urban centre. In Nigeria most of the urban centres make use of landfill, open dump site and incineration systems. There are various issues and challenges arising from them especially that of environmental pollution (air) and land degradation.

## CHART 2: DEGENERATION TIME FOR VARIOUS SOLID WASTES

The type of litter we generate and the approximate time it takes to degenerate	
Type of litter	Approximate time it takes to degenerate the litter
Organic waste such as vegetable and fruit peels, leftover foodstuff, etc.	a week or two.
Paper	10–30 days
Cotton cloth	2–5 months
Wood	10–15 years
Woolen items	1 year
Tin, aluminum, and other metal items such as cans	100–500 years
Plastic bags	one million years?
Glass bottles	undetermined

*Source: Municipal Solid Wastes*

Enugu metropolis operates an open landfill which is burnt intermittently. Here there is an informal organisation that sort through the wastes collecting materials (metals, glass, etc.) and sell them to industries. When these are done the rest of the wastes is then burnt. This burning creates a lot of environmental problems ranging from pollution of the air and soil leaving the land degraded, [7]. This also affects the aesthetics of the layout within the vicinity of the dump site. Thus, the landlords of adjoining plots are not willing to develop their plots and even when developed tenants are not willing to move in and occupy because of the current scenario. The study aims to highlight evils of open dump site especially to the immediate surroundings and to proffer alternative ways of solid waste disposal, a more sustainable way. To be able to achieve this, the following strategies will be pursued such as; the various sources of solid waste should be noted, it is good to sort solid wastes at the sources, and the stakeholders (adults and children) should be educated and re-educated in the proper way of bagging and disposing wastes. Best practices from a country that have achieved a lot in solid waste disposal will be examined. The scope of this study is Enugu Metropolis especially the dump site at Independence Layout phase II

### 1.1 Solid Waste Management in Enugu Metropolis

One of the objectives of the present and previous governments of Enugu State is to ensure cleanliness of the major cities of the state including Enugu Metropolis. With this in mind there has been several agencies entrusted with solid waste management and the present one is Enugu State Waste Management Agency (ESWAMA), [8]. This agency has the responsibility to ensure effective and efficient collection, removal, treatment and disposal of all kinds of waste in the state, [9]. The agency is mandated by the state sanitation law to do all these and even more such as arresting, detaining and persecuting of defaulters when need be. The same law also compels residents to cooperate with ESWAMA in their efforts to keep the environment clean. The residents are required to clean their environment, bag their wastes and deposit them at designated collection points. At these points the ESWAMA trucks collect the bagged wastes at interval of days (varies from a day up to seven days) depending on the importance of the street/location. These are then taken to the dump site for burning, see plate 1 and 2. There is an informal (private) collector organisation at work at this site picking from the heap of waste items like metals, glass, etc for reuse and sale to factories.



*Plate 1: Dump site at Independence  
Layout phase 11  
Source: Researchers' field work*



*Plate 2: Collection point on the road  
Source: Researchers' field work*

## 1.2 Solid Waste Disposal Strategies

There are basically about four to five ways of disposing solid wastes such as open dump, landfill, sanitary landfill, incineration and composting. These are discussed below:

**Open Dump.** It is an uncovered area used for dumping solid wastes of all kinds. The waste is untreated, not segregated, uncovered and burnt at intervals. This becomes a breeding ground for flies, rats and insects that spread diseases, [10]. Rain falling on this also create run-off that contaminates land and water. Open dump is gradually been phased out.

**Landfill.** It is a pit dug on the ground (could be old abandoned quarries, mines, etc) located in an urban area where large amount of waste is generated. Into this pit wastes are dumped, at the end of the day, a layer of soil is used to cover it and compressed by earth moving equipment. This is repeated until the pit is full then it is covered with mud and could be developed into a park, playground, etc. Landfill has the problem of leaching whereby water seeps from the waste into the ground contaminating water and soil.



*Plate 3: Earthmoving truck at work on a landfill.*

*Source: Wikipedia, Solid Waste Management*

**Sanitary Landfill.** It is an alternative to landfill and solved the problem of leaching. It is an engineering facility lined with impermeable materials over impermeable soil, [11]. It is very costly to build and maintain. This produces a lot of methane gas which could be bottled for use as fuel.

**Incineration Plant.** This is burning of wastes in large furnace known as incineration plant. Incineration is used as a last resort especially for treating infectious waste. To do this waste is segregated first, removing those for recycling and the remaining is burnt. Burning of wastes in incineration plants produces tones of toxic ash, pollutes the air, water and leaches the area where ash is eventually disposed.



Plate 4: Incineration plant, Vienna.

*Source: Wikipedia, Solid Waste Management*

**Composting.** It is the oldest waste disposal method known to man and has been widely used. This is putting all the vegetable materials into a pit for it to decay and then used for manure. This means that the waste must be segregated into biodegradable and non-biodegradable before composting.

**Modern ways of dealing with solid wastes.** There are newer methods introduced into waste disposal such as recycling, reuse, biological reprocessing, energy recovery, etc that utilize technology to channel waste to other usefulness, to achieve sustainability and greening of the environment, see the waste pyramid below.

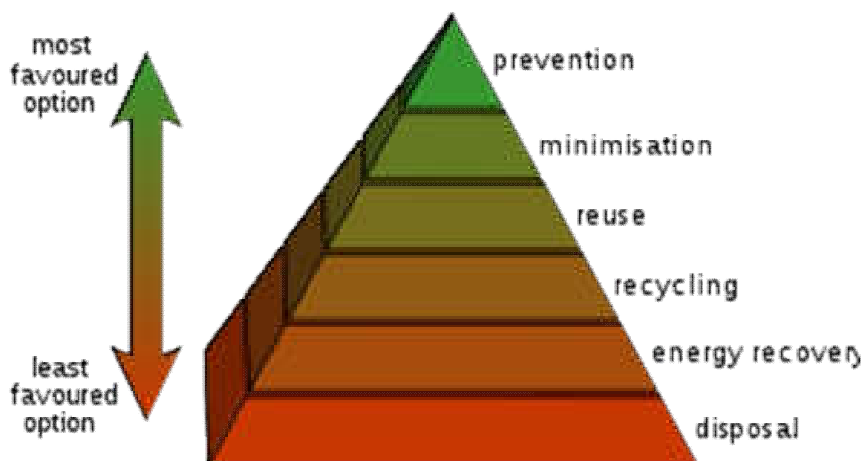


Plate 5: Waste pyramid.

Source: Wikipedia, Solid Waste Management

Taking a closer look at the waste pyramid and the management style in Enugu presently, we are still at the bottom of the pyramid (disposal). We need to move up the pyramid and move the city forward to harness energy from these wastes. In doing this, the management should incorporate sorting at the source to help in recycling and reuse of waste materials thereby reducing (minimising) the wastes. With this solid waste disposal model the city becomes more sustainable, becoming green with cleaner air and ripples of other actions and reactions will follow.

### 1.3 Environmental Issues of the Current Solid Waste Disposal in Enugu

The operation of open landfill in Enugu metropolis creates a lot of environmental challenges both to the agency that collect the waste, the populace and the environment at large. These include but not limited to air pollution, surface and underground water pollution, soil pollution and land degradation. There are also health hazard associated with these such as skin disease, diarrhoea, etc especially to those that come in contact with the wastes on daily basis.

#### Japan Example

In Japan there are definite laws regulating wastes production, treatment and disposal as shown below

##### **Fundamental Law for Establishing a Sound Material-Cycle Society**

Law for the Promotion of Effective Utilization of Resources

- Provides the promotion by businesses of resource conservation and recycling



Container and Packaging Recycling Law

- Calls for sorted collection by municipal governments and recycling by companies

Home Appliance Recycling Law

- Provides collection by sales outlets and recycling by Manufacturers

Construction Waste Recycling Law

- Provides Separate Demolition, and recycling of construction waste by contractors

Food Recycling Law

- Calls for recycling of food waste by food businesses

ELV Recycling Law

- Recycling of shredder dust, etc. by manufacturers, [12].

The definition of general waste in Japan is similar to what is generally referred to as municipal waste in the United Kingdom (UK) but do not include used paper and scrap metal. These two (used paper and scrap metal) are recycled by their producers while government at ward level take care of general waste. General wastes are classed into four groups as shown below. Plastic materials are classed as not suitable for recycling but are used for energy recovery at incineration plants. The town (Tokyo) is divided into wards (23 in number) and these wastes are treated at this level of government, [13]

**Separation of Wastes in Tokyo 23 Wards**

**Recyclable waste:** Used paper, glass bottles, cans, PET bottles, etc. (Collected once a week)

**Combustible waste:** Kitchen refuse, wood and grass, waste paper, etc. (Twice a week)

**Non-combustible waste:** Ceramics, plastics, etc. (Once a week)

**Bulky waste:** Furniture, futons, electronic waste\*(Needs a reservation and there is a charge)

\* Excluding the items specified in the Home Appliances Recycling Law

Construction and demolition wastes are treated as industrial wastes; their generators are responsible for their disposal.

Large businesses are required to make plans for recycling (used paper recycling and minimization), their wastes.

Finally there is energy recovery from wastes and used as fuel as shown over leaf.



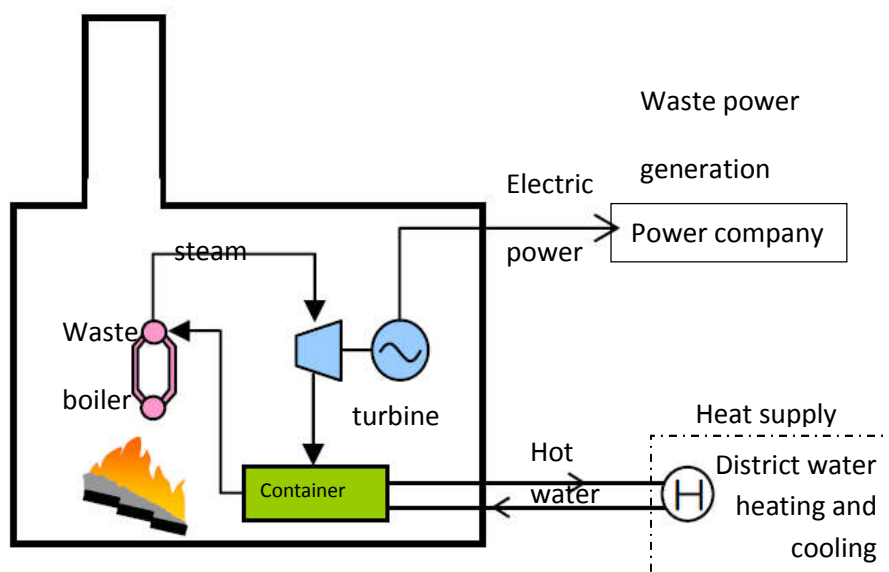


Fig. 1: Highly Efficient Energy Recovery Facility

Source: Waste Management in Tokyo.

## II. STUDY AREA

The study is on Enugu metropolis in south eastern Nigeria. Enugu is the capital of Enugu State. It lies in the south-eastern foot of Udi hills, about 93 km (58 miles) north east of Onitsha. It is on latitude  $7^{\circ} 29^{\prime}$  north of the equator and  $6^{\circ} 27^{\prime}$  east of the Greenwich. The present city was founded in 1909 after coal deposits were discovered at the nearby village of Enugwu Ngwo by a team of British geologists and acquired township status in 1917 as a second class town, [14]. The study is on the existing Enugu open landfill site at Independence layout phase 11. The study employed descriptive research method whereby literatures on solid waste disposal methods were reviewed and the dump site was visited.

## III. DISCUSSION

From the literature reviewed open dump is on the way out because of inherent problems of pollution and degrading of environment. In fact open dump has since become extinct in many developed countries.

On observation the roads leading to the dump site are in very bad condition due to the presence of very heavy trucks, earth moving trucks. Another major issue is that of pollution, which is very serious here, the air is constantly heavy

with smoke (smog) especially on the day of burning the waste. The soil is completely drenched with water seeping from the waste. These pollute the land by defacing it aesthetically and lowering the quality of the environment and the productivity of the land especially for farming. From the Japan example x rayed above, the country did not leave anything to chance there are definite laws for all categories of wastes and who should deal with what. It is worth borrowing a leaf from.

#### IV. CONCLUSION

In concluding therefore, there is an urgent need for Enugu to move a step further than this present open dump site. We could borrow a leaf from the developed countries like Japan that have achieved zero waste status by converting all their waste to wealth. The slogan is 'waste not that waste'.



*Plate 6: The Slogan*

*Source: Wikipedia, Solid Waste Management*

#### V. RECOMMENDATIONS

The study has shown the evils associated with open dump site and how it is becoming phased out for more modern, efficient and effective methods of wastes disposal. There must be a shift in the way and type of disposing solid waste in Enugu.

- The government should put in more effort in strengthening the institutions charged with solid waste disposal, by making out definite regulations and enforceable laws to guide these institutions.
- These institutions should be brought closer to the people may be at the ward or local government level not at the state level.
- This study recommends that wastes should be sorted at the source into different groups (glass, metal, paper, plastics, etc) for easier treatment. This will also aid recycling, re-use and so on.
- The stakeholders should be educated on the issues at stake and shown how current paradigms are working, [15][16].

- The government should also invest on the resource (human and capital) for the desired change to take place.
- There must be documentation on day to day basis on these changes, outcomes and effects to aid future planning.

## REFERENCES

- [1] Iriruaga, E. T. (nd) Solid Waste Management in Nigeria, D-Waste; Waste Managementfor Everyone. Accessed 27/5/16.
- [2] What is Solid Waste. [www.epa.gov/epaoswer/osw/](http://www.epa.gov/epaoswer/osw/)
- [3] Did You Know. [www.epa.gov/epaoswer/osw/](http://www.epa.gov/epaoswer/osw/)
- [4] Solid Waste Management, [www.wmo.ch](http://www.wmo.ch)
- [5] Municipal Solid Waste: [www.epa.gov/epaoswer/non-hw/muncpl/index.htm](http://www.epa.gov/epaoswer/non-hw/muncpl/index.htm)
- [6] What is Solid Waste. [www.epa.gov/epaoswer/osw/](http://www.epa.gov/epaoswer/osw/)
- [7] UNEP publication, Solid Waste Management, vol. 1 CalRecovery incorporated.
- [8] Emenike, A. I. and Okonkwo, A.U. Participatory Waste Management System an option for Effective Urban Solid Waste Management in Enugu. IJSER, 6(7). 2015, pp1227-1234
- [9] Solid Waste Management, [www.wmo.ch](http://www.wmo.ch)
- [10] [www.dep.state.pa.us](http://www.dep.state.pa.us)
- [11] Braxton J. (2010) Waste Disposal Management. [http://EzineArticles.com/expert/Jeni\\_Braxton/606435](http://EzineArticles.com/expert/Jeni_Braxton/606435)
- [12] Waste Management in Tokyo 1
- [13] Waste Management in Tokyo 11 [www.wastemgt/Tokyosuper-EconTownProject/EnvtofTokyo.htm](http://www.wastemgt/Tokyosuper-EconTownProject/EnvtofTokyo.htm)
- [14] Emenike, A. I. Evaluation of Environmental and Landscape Qualities of Public Open Spaces in Enugu Metropolis. Unpublished Doctoral thesis, ESUT, Enugu. 2014
- [15] What you can do to reduce solid waste. [www.epa.gov/epaoswer/osw/](http://www.epa.gov/epaoswer/osw/)
- [16] Surat; a success story. [www.epa.gov/epaoswer/osw/](http://www.epa.gov/epaoswer/osw/)
- [17] Wikipedia Publication. [En.wikipedia.org/.../Solid Waste Management](http://En.wikipedia.org/.../Solid%20Waste%20Management).