Solid Waste Management Aiming Biogas Production In Albania

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Abstract

One of the main environmental problems in Albania is the continuously increasing generation of municipal solid waste.

In many countries, sustainable waste management as well as waste prevention and reduction, have become major priority. Uncontrolled waste dumping (on the roads, river sides, etc.) in our country is no longer acceptable. Controlled landfill disposal and incineration of wastes are not considered optimal practices, as energy recovery and recycling of nutrients and organic matter is aimed.

Continuously efforts have been done for the improvement of this critical situation such as approval of laws, decisions, regulations etc., according to the National Strategy on Integrated Waste Management (2018-2030) and EU Directives 2008/98/EC on waste and repealing certain Directives.

In this paper are presented the characteristics of a wide range of urban solid waste, industrial solid waste and composition of the waste i.e. waste stream. As organic waste component represents the highest percentage (41% - 66%) at the waste composition should be used for biological treatment and for biogas production.

Keywords: urban solid waste, biogas, environment, waste management, generation.

Introduction

There is still a long way to go to close all resource cycles in the global economy. On the one hand, there are still considerable knowledge gaps concerning possible resource recovery and reuse practices. On the other hand, there are frequently significant political, social and economic obstacles to the implementation of the solution identified. [2].

Environmental sustainability is the core issue that will need to be addressed for development to focus on human well-being and yet stay within the limitations of planet's capacity. Environmentally sound waste management is one of the key elements for sustainable development. [1]. Waste is a global issue. If not properly dealt with, waste poses a threat to public health and the environment. It is a growing issue linked directly to the way society produces and consumes. It concerns everyone. Waste management is one of the essential utility services underpinning society in the 21st century, particularly in urban areas. Waste management is a basic human need and can also be regarded as a 'basic human right'. Ensuring proper sanitation and solid waste management sits alongside the provision of potable water, shelter, food, energy, transport and communications as

essential to society and to the economy as a whole. Despite this, the public and political profile of waste management is often lower than other utility services. [1].

On a larger scale, when significant quantities of municipal or industrial solid waste are dumped or burned in the open, the adverse impacts on air, surface and groundwater, soil and the coastal and marine environment, and thus indirectly on public health, can be severe. [3]. Even worst taking into consideration Albania is a small mountainous country and the total land area covers 28 748 km2. Meanwhile it has a reach hydrographic net (groundwater, streams rivers, springs, lakes, wetlands).

The main problems, expressed in general terms, related mainly to: partial range of service coverage; insufficient collection and removal of waste; limited amount deposited and treated at landfill; a large number of deposit sites (authorized and unauthorized), which are outside the sanitary and engineering standards; limited number and poor quality of waste collection equipment and waste transport; lack of infrastructure for integrated waste management; unexpected change in the policies leading the development of infrastructure for final waste processing; poor implementation of the law and, in general, sub-legal acts; poor interaction and coordination of central government structures with local government and other interested parts.

Methodology

The most important part of this study is the identification and the collection of the data and then selection of them, from the Central Government Institutions, National Agencies, INSTAT, etc, related with the topic.

Processing and calculation of above mentioned data, preparing tables and graphs to obtain indicators, needed for results discussion and conclusions.

Results and Discussion

Monitoring on solid waste generation and waste management is a very important process toward sustainability. Taking into account the monitoring data on different types of solid waste, can prepared the strategy for their management, recycling and reuse according to EU Directives and Albanian Laws. [6][7][8][9][11][12][13][14].

The data on the amount of the **generation of urban solid waste** is only approximately known, because different institutions used different methodologies and practices. Nevertheless the data indicate, within the period of 15 years, a significant increase in urban waste generation. Based on this study during the period 2013 – 2018 (Table 1, 2 and Figure 1, 2), urban solid waste amounted to 0.940 thousand – 1.2 million tones and comparing with the generation of waste in 1998 (520 thousands tones), the amount recently is doubled [4] [5]; in 2018 the generation of urban waste is increased about of 10%. It is expected that the quantities of domestic waste will increase in the future as consumption rises and more household are incorporated in the regular waste collection network.

Table. 1: Generation of managed urban solid waste in years (tonnes)

Solid waste	Urban solid waste (tonn)					
	2013	2014	2015	2016	2017	2018
Total waste managed	940,160	1,228,884	1,413,233	1,300,373	1,253,913	1,172,907
Household waste	827,828	970,818	1,142,964	1,072,236	1,109,399	1,097,705
Industrial waste	112,332	258,066	270,269	228,137	144,514	227,366

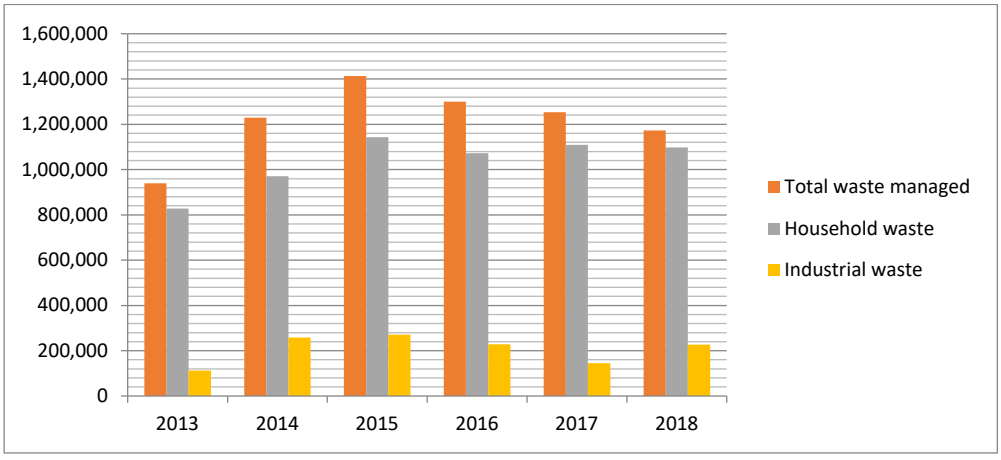

Figure1. Generation of managed urban solid waste

Table.2: Generation of managed urban solid waste in years (%)

Solid waste	Urban solid waste (%)					
	2013	2014	2015	2016	2017	2018
Total waste managed	100	100	100	100	100	100
Household waste	88	79	81	83	89	83
Industrial waste	12	21	19	17	12	17

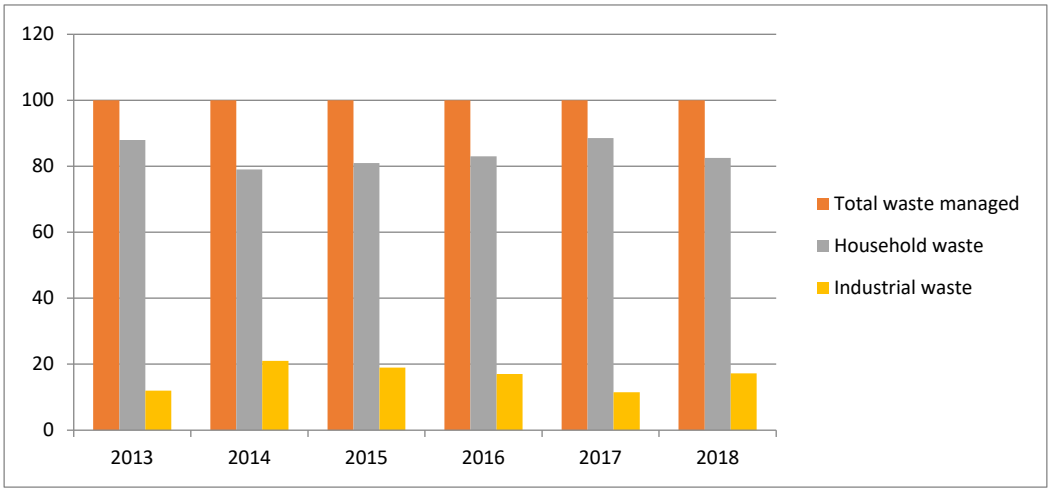

Figure 2. Generation of managed urban solid waste

The sludge from the growing number of Waste Water Treatment Plants, the growing number of discarded car wrecks, the solid waste from rural area and the spoiled up and down on the river sides, lakes are not included in the urban solid waste. These waste impact the underground and surface water quality.

According to the estimated situation during the study, (see Table. 2, Figure. 2) waste from industrial sector represent 12 – 20% of total urban waste (see Table 1, 2 and Figure 1, 2). Comparing with the amount generated in 1998 (415 thousand tones) it's noticed that the quantity is reduced twice in time. Even in 2018 the amount of industrial solid waste (227 thousands tones) is much more less than that of 1998. [4] [5]. This declined trend refers to the closing of many manufacturing, mining industries, leather processing and electricity supply, etc. According to the estimated situation in 2018 industrial waste represent 17% of total waste quantity.

A very important indicator related with sustainable development is **generation of waste stream.** It means the composition of total urban waste. This indicator in Albania is started to monitor from 2013 and indicate the improvement of the waste management and a better implementation of the Laws, Decisions and Regulations. [6][7][8][9][11][12][13][14].

According to data acquisition from the study, the highest share in the entire structure of urban waste is that of organic waste (61.2%); see Table 3 and Figure 3, followed by plastic waste (9.7%) and cupboard/paper waste (7.7%).

Table 3. Generation of waste stream in percentage

Waste stream	Generation of waste stream in %					
	2013	2014	2015	2016	2017	2018
Organic waste	41	50.2	51.4	49.52	45.9	61.2
Wood waste	4	6.1	4.6	5.84	3.9	5.1
Biodegradable animal waste						
Cardboard paper waste	12	8.7	9.9	7.87	9.5	7.7
Plastic waste	14	9.1	9.6	10.01	16.8	9.7
Glass waste	7	4	4.5	4.24	4.8	3.8
Textile waste	3	2.6	2.9	2.81	3.2	2.2
Ferrous and non-ferrous metal waste	3	5.8	4.8	3.38	2.7	1.5
Hospital waste	1.9	1.2	0.51	0.26	0.21	2.65
Inert waste	3	3.7	8.2	11.9	7.4	5.5
Electric and electronic waste	9	8.1	1.1	0.84	1.2	1
Other waste	2.1	0.5	2.5	3.34	3.4	0.1

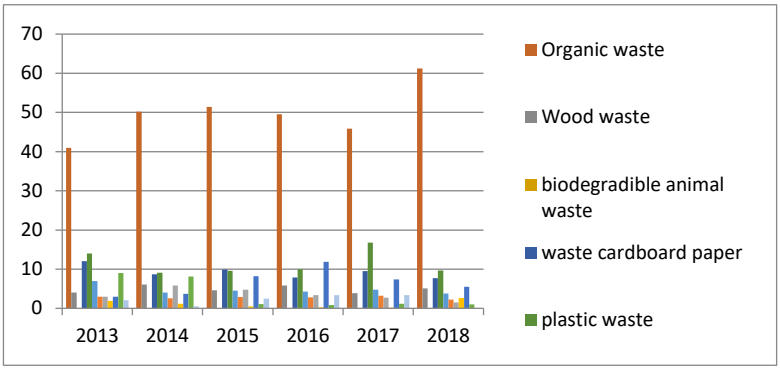

Figure 3: Generation of waste stream in percentage

Organic waste component represent a percentage from 41% to 61% of the material composition of urban solid waste. A large part of these waste are bio digestible and can used for production or utilized as potential substrate in anaerobic digestion to produce biogas, renewable source of energy and environment friendly too.[15]. This share is nearly constant in 2013 – 2017 while there is an increase about 10% in 2018 while the proportion of other materials varies in years. The main decrease is in the share of electric and electronic waste followed by plastic waste and less in glass waste. [5].

According to the data of the study, the high quantity of the organic component, according to the National Strategy of Integrated waste management may be used biologically for many purposes which will find out during the next step of the study. [10]. Also some of the other components of the solid waste are suitable for recycling and reuse.

Conclusions

The generation of total solid waste is increased every year, the major part is household waste is up to 83% and industrial waste is less than 20%.

In the total percentage of solid urban waste, organic waste component represents the highest percentage (41% - 66%) at the waste composition and should be used for biological treatment and for biogas production, which will find out during the next step of the study. [15]

As landfilling and incineration are not considering optimal practices, biogas production from the organic waste will be one of the best solutions as renewable energy sources, reduce greenhouse gas emission, contribute

to EU energy, environmental policies and sustainable waste management strategies.

Reference

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