

Utilising Pay as you Throw Systems and Autonomous Composting Units in Balkan Med countries

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Abstract

In this paper a European Union and National funded project activities are described. The project "BIOWASTE" promotes the transfer and application test of innovative technologies (PAYT and ACUs), aiming to enhance managing efficiency in solid wastes related issues, such as source separation schemes and treating systems emphasizing in organic wastes. The proposed systems will be introduced in three different types of touristic municipalities, Municipality of Yermasoyia (intensified touristic area with prolonged touristic summer), Municipality of Katerini (less intensive touristic area, with short summer period directly related with the sea cost) and Municipality of Probistip (less intensive touristic area with a very large number of small and decentralized communities with significant number of tourists). In the framework of the BIOWASTE, each municipality will: a) develop a detailed Pay as You throw (PAYT) system, b) provide the appropriate equipment for the implementation of the PAYT system (weighing units for waste collection trucks, bins with identification systems), and c) install an Autonomous Composting Unit (ACU) at the sites of a hotel or hospitality units or decentralized communities to receive the bio-waste produced directly without the need to collect them. ACUs are small closed integrated composting units, with zeroing of effluent and expanding liquids.

Keywords: PAYT, Autonomous Composting, Units, Identification system, Local Authorities

1. Introduction

Pay-as-you-throw (PAYT) generally is a mechanism to charge waste generators proportionate to the waste amount produced and the services they receive for it so as to cover the overall waste management expenses and finance the waste management system in communities. Generally can be said that pay-as-you-throw systems have mostly evolved over the past thirty years. The first steps to relate payment for waste services directly to the

collected unit or actual waste generator were made with the use of prepaid sacks or labelled bins.

However, in the context of municipal solid waste management, the PAYT approach (also known as unit pricing (Dijkgraaf and Gradus, 2004) and differential and variable rate or variable fee charge systems (Van Beukering et al., 2009) is an economic instrument that applies the "polluter pays" principle at the municipal level by charging inhabitants according to the amount of waste they send for third party management (Bilitewski et al., 2004).

All aforementioned data rise interest and the introduction of PAYT systems been offered as a complete commercial product or service. In the frame of this concept, a project was proposed and funded by a European Union and National founding agency in Greece, Cyprus and Republic of North Macedonia. All elements of this project as well as the up to date developments and expected outputs will be analysed in the present paper; among them are the aspects of the weighing and charging of waste, the IT system integration, as well as the feedback information on the users to help them adapt their waste generating habits, etc.

2. Methods

Partners with various backgrounds from Greece, Cyprus and Republic of North Macedonia contributed in the organisation and implementation of the well-balanced and structured activities of the project, including 3 municipalities and 3 universities.

Hellenic Mediterranean University (HMU) had made a detail design for Municipality of Katerini (MK), Municipality of Yermasoyia (MY) and Univeristy of "Goce Delcev" (UGD) for Municipality of Probistip in order to select pilot areas and calculate the required ACU's volume for each area. Consequently, based on the data and the expression of interest, HMU and UGD

proposes the optimal choice for the placement of the ACUs in order to meet the requirements and objectives of the BIOWASTE project in any case. So the different needs of each municipality and after the study the table below shows the capacity of each ACU, the installation area and the Average number of equivalent persons that will use the ACUS. Regarding the equivalent persons for Prosilio area ecclesiastical nursing home, social care and households will participate 35 persons (3 meals / day) & 200 meals & 60 students (2 meals /day) and 175 person 50 households and for General Hospital of Katerini are 350 persons (3 meals/ day). The study for MK shows that for General Hospital, the total organic material produced per day is about 430kg or 150tn / year and for Prosilio 260kg or 95 t / year. The assumptions that were taken into account was for households 3,5 persons with 450 gr / person produced organic waste (Purcell and Magette, 2009) and for hospitals 350 gr/meal (Fieschi and Pretato, 2018). Respectively for MY the study's results shows that for Chalomandres – Columbia, the total organic material produced per day is about 215kg or 78tn / year and for Miramare hotel 412kg or 150 tn / year. The assumptions that were taken into account was for households 3 persons with 450 gr / person and for hotels 375 gr/meal (Fieschi and Pretato, 2018).

Table 1. ACUs' capacity and installation areas.

Municipality	Capacity (m ³)	Installation areas	Average number of equivalent persons
Municipality of Katerini	8-15	Prosilio Community	660
	8-15	General Hospital of Katerini	950
Municipality of Probistip	4-15	Hotels "San Niko" & "Creshovo Topche"	500

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Municipality of Yermasoyia	4-15	Kalnishte Area	500
	8-15	Miramare Hotel	1.100
	2-6	Chalomandres – Columbia	50 households
	2-6		60 households
	2-6		50 households

3. Conclusions

The BIOWASTE project (<http://www.biowaste-balkanmed.eu/>) addresses two fields: new innovative technologies and recycling operations. The main result of the BIOWASTE project will be to create a solid wastes source separation scheme, aiming mostly in the hospitality industry, as well as, small and decentralized communities, to which organic wastes are in its core, with their onsite treatment to play an important and key role.

BIOWASTE is a project that is expected to: a) help municipalities to be aligned with the EU policy on waste management and specifically in the need for source separation schemes and separate collection & management of the organic wastes, b) help the municipalities become more resources' efficient though the limitation of fossil fuels that consume for the collection and transfer of wastes, c) reduce the overall carbon foot print of the wastes management though the improvement of the purity of the collected wastes and the reduction of wastes lead to landfills, and d) utilize state of the art technologies (PAYT and ACUs) as main tools in order to achieve all deliverables and aims.

The project ends in May 2020 and so far the partners have achieved to deliver and implement all necessary activities to set the basis for a successful pilot application, expected to start in June 2019.

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