



Usage of Pay as you Throw System and Autonomous Composting Units in Municipality of Probishtip

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Seminar on

THE CONCEPT OF SUSTAINABLE DEVELOPMENT IN LAW AND POLICIES:

OCCURRENCE, CHALLENGES AND PERSPECTIVES

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Introduction

- Municipal Solid Waste (MSW) management is still one of the major environmental challenges at national level, and although with national and regional waste plans in place, Republic of North Macedonia with its eight regions has only one regional landfill active, and at least 54 non-standard municipal landfills and hundreds of dump sites and old landfills.



Introduction

Annually, about 3300 tons of MSW is generated in Municipality of Probishtip, with estimated 45.3 % organic waste, all together disposed at a non - standard landfill just out of the city borders, and as soon as regional waste management system kick-in this should be changed, affecting current practices and costs.

PUC	Waste Collectors	Waste transport	Annual waste production	Average waste production
<ul style="list-style-type: none">• 2 units / 5 departments	<ul style="list-style-type: none">• 120L plastic bin (household use)• 1.1 m³ container (buildings)	<ul style="list-style-type: none">• 8, 10 and 16 m³ vehicles + tractor	<ul style="list-style-type: none">• 3.300 t/year	<ul style="list-style-type: none">• 0.296 t/capita (0.81 kg/day)

Introduction

“Utilizing Pay as You Throw Systems and Autonomous Composting Units for Biowastes Management in Touristic Areas”.

- Goce Delcev University
- Hellenic Mediterranean University
- Municipality of Katerini
- Municipality of Yermasoyia
- Municipality of Probishtip

Project organization & coordination

The Project includes transfer and application of innovative technologies

- Pay As You Throw - PAYT system
- Autonomous Composting Units - ACUs

for biowaste management in

- Municipality of Katerini
- Municipality of Yermasoyia
- Municipality of Probistip

PAYT system and ACUs as innovative technologies for biowaste management involves source separation schemes of organic waste in different bins (biowaste in 10L bins and residual mixed waste in 80L coded bins).

Pay As You Throw - PAYT

In the context of municipal-level solid waste management, the PAYT approach is an economic instrument that is applicable at the municipal level by charging residents according to the amount of waste they produce.

The technical implementation of the PAYT is based on the following three approaches:

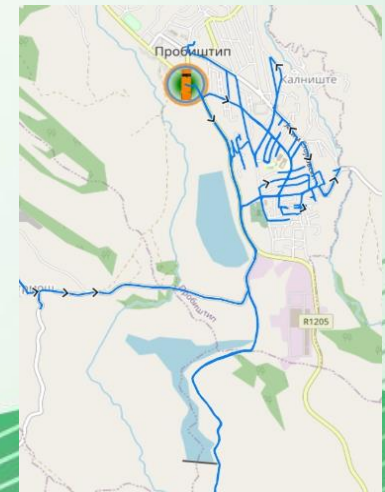
- identification of waste producer
- waste quantity measurement
- disposal cost (e.g. per kilogram and/or discharge).

Experience so far shows that the waste tax should not only depend on the amount of waste generated, but should consist of a basic and variable fee.

On the one hand, this reflects the structure of waste disposal costs, which consists of fixed and variable costs, and on the other hand, the inclusion of a fixed (basic) tax helps to avoid illegal dumping practices that may increase if fees are paid only on the collected quantities of waste.

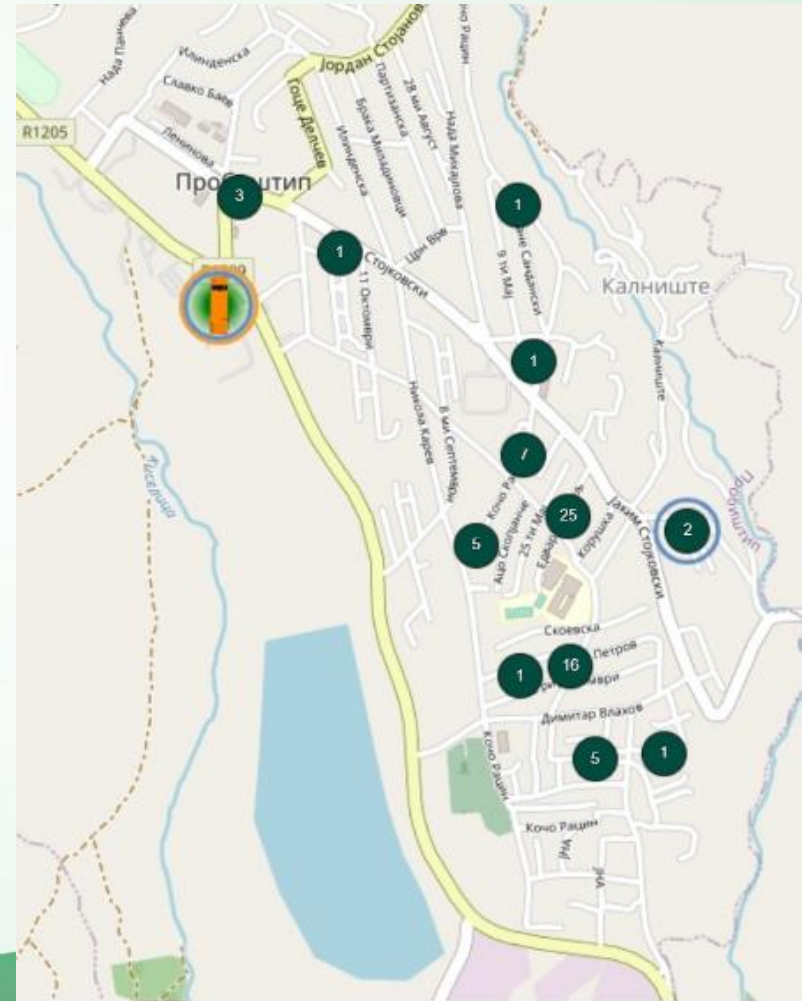
Pay As You Throw - PAYT

- For introducing "Pay As You Throw" system specially designed weighing equipment built into the one waste collection truck owned by PUC Nikola Karev and coded waste bins for hospitality enterprises and households have been supplied.
- Waste collection vehicle was upgraded with:
 - ✓ Weighing scale and RFID reader for waste generator identification with data logging/transfer capabilities.
 - ✓ GPS receiver and wireless data connection (GPRS, SMS and CSD) with real-time data collection, transfer and programming capabilities.



Pay As You Throw - PAYT

Each bin/waste generator was uniquely identified with appropriate RFID chip and logged in database.



Pay As You Throw - PAYT

- Waste collection bins equipped with RFID chips were distributed as follow:



80 L bins for non biodegradable waste (household use) - 80 units,



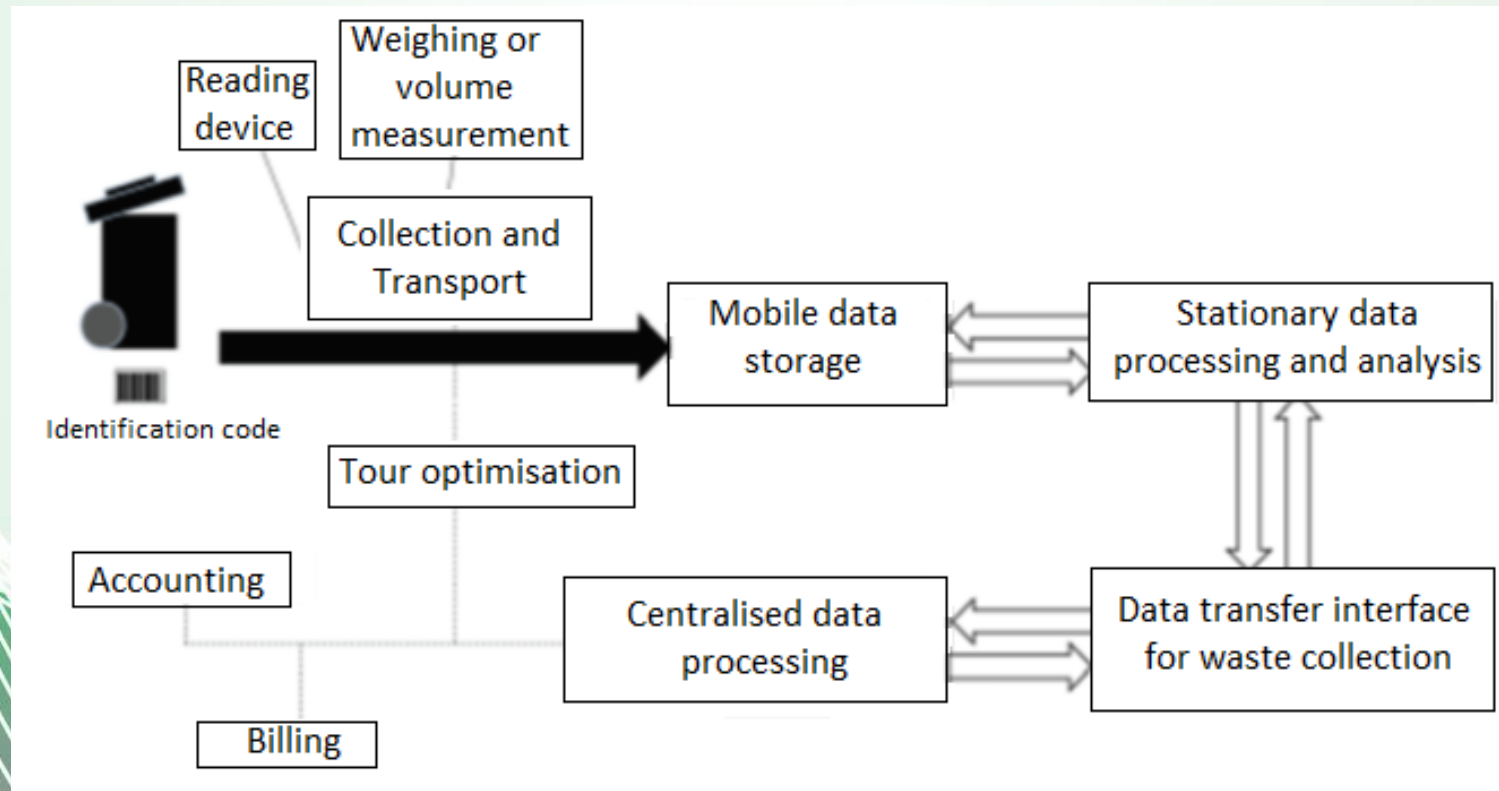
1100 L bins for non biodegradable waste (collective buildings and commercial use) – 2 units,



10 L small bins for bio degradable waste - 80 units.

Pay As You Throw - PAYT

The "Pay As You Throw" system allows for a direct correlation of each waste producer with the quantities it generates you get accurate data on the amount of mixed waste that each hotel, restaurant or household produces. The scheme for collecting and processing the data used is shown in Figure.



Pay As You Throw - PAYT

All data are collected in central database and processed with specialized software with extended analytical, reporting and exporting capabilities (csv, xls...).

Report on logged wastebins (1): 2020-06-08 00:00:00 - 2020-06-09 23:59:59

Symbol	Realization date	Weight (kg)	Client group	Name of WCP	Address of WCP	WCP description	Container id	Waste type	Container type	RFID	WCP ID	Approval type	Location
PS0749AB	2020-06-08 11:12:17	3	CO Probishtip	MATO DOOEL	2210 Probishtip, Jakim Stojkovski 97A		4000000ED2B0CB	Biowaste	1100L	4000000ED2B0CB	30	RFID Reader	Probishtip, Jakim Stojkovski
PS0749AB	2020-06-08 11:23:33	11	CO Probishtip	Cvetan Ilevski	2210 Probishtip, 25ti maj 7		4000000ED2B0FC	Biowaste	1100L	4000000ED2B0FC	26	RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:23:52	18										RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:26:52		CO Probishtip	Goche Arsovski	2210 Probishtip, Tori Davitkov 8		4000000ED2B0FE	Biowaste	1100L	4000000ED2B0FE	18	RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:26:53	5	CO Probishtip	Goche Arsovski	2210 Probishtip, Tori Davitkov 8		4000000ED2B0FE	Biowaste	1100L	4000000ED2B0FE	18	RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:27:06	15										RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:27:23	18	CO Probishtip	Milka Petrova	2210 Probishtip, Tori Davitkov 12		4000000ED2B114	Biowaste	1100L	4000000ED2B114	37	RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:27:35	25										RFID Reader	Probishtip, 25 ti Maj
PS0749AB	2020-06-08 11:45:26		CO Probishtip	Aleksandar Zarevski	2210 Probishtip, Aco Skopjanche 37		4000000ED2B0C9	Biowaste	1100L	4000000ED2B0C9	29	RFID Reader	Probishtip, Aco Skopjanche
PS0749AB	2020-06-08 11:46:09	16	CO Probishtip	Aleksandar Zarevski	2210 Probishtip, Aco Skopjanche 37		4000000ED2B0C9	Biowaste	1100L	4000000ED2B0C9	29	RFID Reader	Probishtip, Aco Skopjanche
PS0749AB	2020-06-08 11:46:09	8										RFID Reader	Probishtip, Aco Skopjanche
PS0749AB	2020-06-08 11:46:16		CO Probishtip	Aleksandar Zarevski	2210 Probishtip, Aco Skopjanche 37		4000000ED2B0C9	Biowaste	1100L	4000000ED2B0C9	29	RFID Reader	Probishtip, Aco Skopjanche
PS0749AB	2020-06-08 12:33:14	48	CO Probishtip	Emilija Vasilevska	2210 Probishtip, Lesnovska		4000000ED2B120	Biowaste	1100L	4000000ED2B120	20	RFID Reader	Probishtip, 22 pr Dekabr
PS0749AB	2020-06-08 12:33:27	31										RFID Reader	Probishtip, 22 pr Dekabr

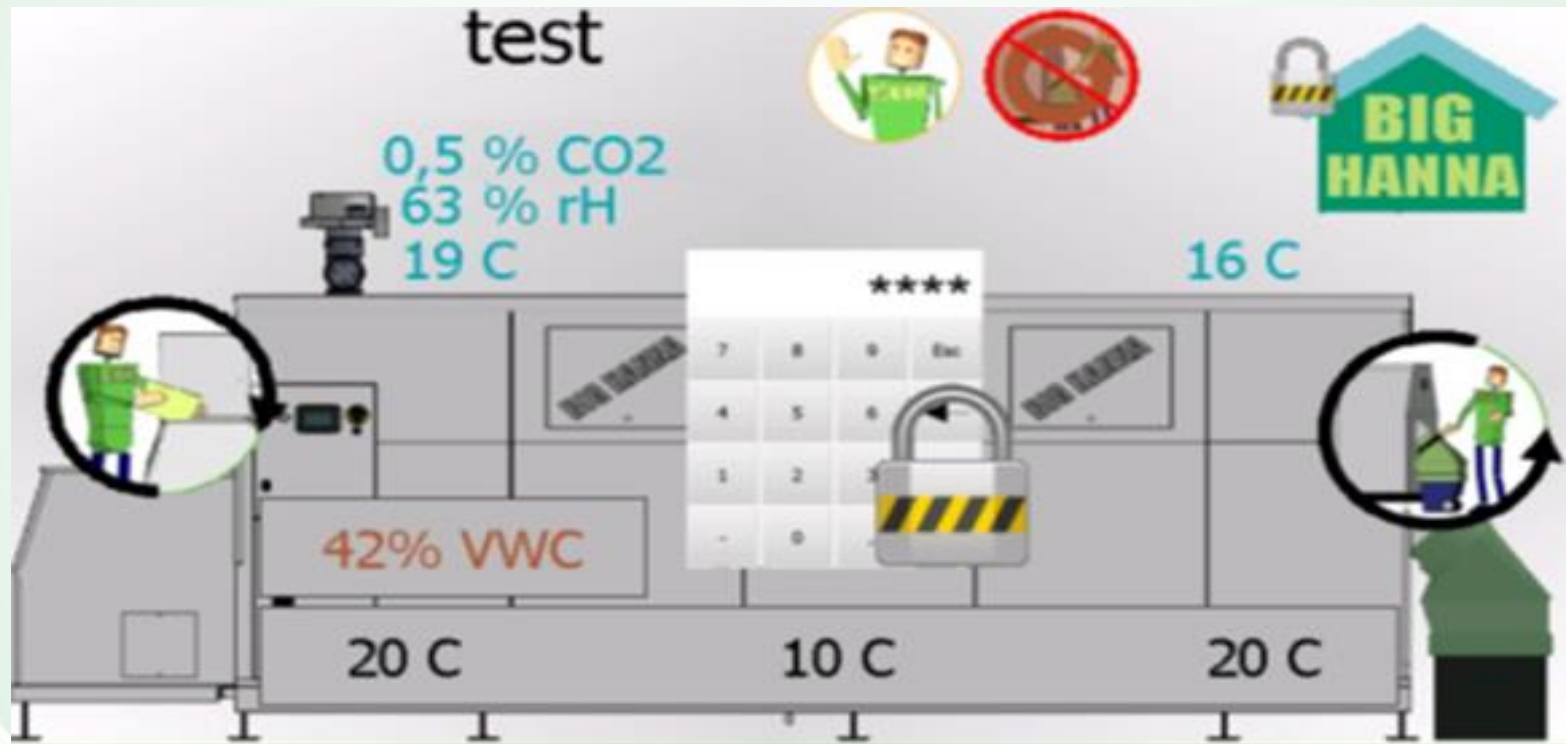
Autonomous Composting Units - ACUs

Two Autonomous Composting Units (Big Hanna T-240) with producing capacity of 60 tons/per year were supplied and installed.

One of the ACUs was installed for the hospitality enterprises, the other for the households in Kalnishte settlement.



Autonomous Composting Units - ACUs



Autonomous Composting Units - ACUs

Both units before started, appropriate information/learning material prepared and distributed, and all participants were trained in several session and hands on trainings.



Environmental benefits

Removal of biodegradable waste from the landfilling stream is a mandatory according the current National and EU regulations and will provide numerous environmental benefits starting from:

- Reduced nuisance and improved waste collection points hygiene (odour, ...);
- Reduced GHG emission throughout the waste management process;
- Landfill leachate reduction;
- Reduce landfill volume;
- Reduced waste collection, transport and disposal costs.

Composting will allow for nutrients usage, especially phosphorus, thus reducing the need for artificial fertilizers production/usage, improved soil quality and carbon dioxide sequestration.

Conclusion

Properly implemented PAYT system can significantly improve waste management operations through an accurate waste generation data, collection frequency and routes optimization, thus having direct impact on cost and environmental footprint.

Although generally seen as innovative, PAYT systems are based on robust, well proven and available technologies, allowing local companies to enter this market, thus reducing service costs and providing opportunities for local growth and employment.

Upscaling the system to municipal level is natural next step and in light of regional waste management scheme all benefits offered from more efficient waste management will be significantly multiplied. In addition, officially introduced PAYT system will allow implementation of incentive schemes for waste selection and composting, thus improving success rates for new waste management schemes.

Conclusion

Selected ACUs can operate efficiently in colder climate conditions if proper waste selection and regular feed is assured.

Odours, equipment noise and site hygiene are important aspects for wider acceptance of the waste selection and composting activities.

If properly used, bio-filters can virtually eliminate any nuisance odours from the process (noise is not an issue).

Compost produced was confirmed as reach with organics and nutrients and can be safely used as organic fertilizer and soil additive. Test performed confirmed full alignment with requirements of Low on fertilizers, bio-stimulators and soil additives (Official Gazette of RM, No.27 from 014).

Thanks for your attention!