Faculty of Technology and Technical Sciences Veles

"St. Kliment Ohridski" University - Bitola

Interreg Balkan-Mediterranean
European Regional Development Fund
Benefit As you Save - BAS

INTERREG Balkan-Mediterranean project:
STIMULATING CITIZENS PARTICIPATION TO RECYCLE PROCESSES THROUGH THE IMPLEMENTATION OF BENEFITS SYSTEMS **Project Acronym: Benefit As you Save - BAS**

ACTION PLAN FOR THE IMPLEMENTATION OF THE PILOT ACTIVITIES WITHIN

THE PROJECT

„STIMULATING CITIZENS PARTICIPATION TO RECYCLE PROCESSES THROUGH THE IMPLEMENTATION OF BENEFITS SYSTEMS“

Project Acronym : Benefit As you Save - BAS

2018

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Contents

Chapter 1:

INTRODUCTION

The Project **„STIMULATING CITIZENS PARTICIPATION TO RECYCLE PROCESSES THROUGH THE IMPLEMENTATION OF BENEFITS SYSTEMS - Benefit as you Safe (BAS)“** is a project within the **INTERREG Balkan-Mediterranean** programme co-financed by the European Regional Development Fund and the national funds of the countries participating: Greece – as a leading partner, Albania, Bulgaria, Cyprus and the Republic of North Macedonia. The Faculty of Technology and Technical Sciences (FTTS) in Veles, part of the University “St. Kliment Ohridski” in Bitola, is responsible for project implementation.

The goal of the project is to create local strategies, action plans and tools in partner regions in order to increase the percentage of specially selected sources of recyclable materials; strengthening the active participation of citizens in the recycling process; contribution to the material life cycle and the efficiency of resources in partner regions and improvement of living conditions of citizens through their participation in local recycling activities. The ultimate goal is to have a sustainable system even after the completion of the BAS project.

Stimulating citizens' participation in recycling processes through the implementation of a benefits system is a project that can help increase the culture for selecting municipal waste and it’s recycling. The benefits can be multiple: less rubbish – zero waste; environmental and economic benefits; creation of Eco-gardens and Eco-schools, etc.

In order to review the current state of waste management in the regions covered by the BAS project, the municipalities of Veles and Bitola, a survey was conducted covering municipal utilities, kindergartens, primary and secondary schools in these municipalities. In the survey emphasis is given on the sorting of plastic and paper.

The methodology used in the survey is to conduct an interview using a survey questionnaire of 10 questions (Annex 1) to which the directors and employees answered in what way they are connected to the management of municipal waste and how familiar they are with the sorting of municipal waste in their institution. The issues were topically divided into five groups.

The processing of the obtained results from the survey delivered important information on the state of the municipal waste management in the municipalities of Veles and Bitola. In particular, we can point out the received information on the manner of sorting and recycling of municipal waste, the available equipment, as well as the application of the motivation system for selecting and collecting waste in the indicated institutions in both municipalities.

The information obtained indicates a number of weaknesses in the management of municipal waste:

(1) There is a shortage of waste baskets and sorting bins;

(2) There are no systematic solutions for the sorting of municipal waste;

(3) The benefits system is not used much

(4) The citizens are not very educated on the sorting and recycling of municipal waste.

The preliminary survey results indicated the need to encourage citizens' awareness of the significance and benefits of sorting and recycling of municipal waste, even from a younger age through education, to set up systemic solutions and to financially support the institutions in providing the necessary infrastructure for that purpose.

Chapter 2:

CURRENT STATE OF AFAIRS WITH THE SOLID WASTE MANAGEMENT IN THE MUNICIPALITIES OF VELES AND BITOLA

2.1. Solid waste management in the municipality of Veles

The municipality of Veles is part of the Vardar planning region and is a municipality with a population of 55108. The public utility company “Derven” (PUC “Derven”) is responsible for collecting and transporting waste on a municipal level. The collected waste is transported and disposed of at the Municipal Landfill "Bunarbere".

In cooperation with representatives from the Municipality in Veles, data are provided on the quantity and structure of solid waste that has been collected in the municipality in the last two years (2016 and 2017). The data are presented in tables (Table 1-3).

Table 1 – Data on collected and transported municipal and other types of non-hazardous waste

Number	Code	Type of waste	Quantity			
			2016 (t)	%	2017 (t)	%
1	2	3	4			
1/1	200301	Mixed municipal waste	18793	72,4%	18793	69,0%
2/1	200302	Waste from open markets	897	3,5%	893,2	3,3%
3/1	150102	Plastic Packaging	227	0,9%	314,6	1,2%
4/1	150101	Paper and cardboard	371	1,4%	542	2,0%
5/1	200201	Biodegradable	572	2,2%	418	1,5%
6/1	040109	Processed finalized (leather)	413,6	1,6%	632,4	2,3%
7/1	020102	Animal tissue	1166	4,5%	1112,2	4,1%
8/1	040222	Other waste (textiles)	644,3	2,5%	634,1	2,3%
9/1	200108	Kitchens and canteens	388	1,5%	398	1,5%
10/1	101208	Production of ceramic tiles	137,2	0,5%	184,8	0,7%
11/1	100101	Dust and slag from boilers	296,7	1,1%	250,7	0,9%
12/1	020304	Materials unsuitable for consumption	520,7	2,0%	475,6	1,7%
13/1	120101	Scraping and milling of metals	484,5	1,9%	505,5	1,9%
14/1	020399	Other waste (tobacco)	11,4	0,0%	4,75	0,0%
15/1	030105	Scrapes, offcuts, chippings, wood, wood boards, veneer	22,5	0,1%	22,5	0,1%
16/1	191212	Textiles, plastics, paper	227,5	0,9%	231,25	0,8%
17/1	170504	Soil	795	3,1%	1838	6,7%
	Total:		**25967,4**	**100%**	**27250,6**	**100%**

Most of the municipal waste that was collected and transported by PUC "Derven" described in Table 1 was deposited at the municipal landfill - "Bunarbere". The various types of industrial non-hazardous waste are deposited in special places in the landfill, marked for that purpose, and are not mixed.

In 2016, selection of packaging waste (paper and cardboard) started, which is stored in a separate area – *Collection center for packaging waste*, after a permit for processing, treatment and/or storage of this type of waste was obtained. The procedure for obtaining a permit is ongoing. The quantities of selected packaging waste are listed under No. 4/1 in Table 1.

In the manipulation of the waste shown in Tab. 1 during the disposal in the municipal landfill - "Bunarbere", item No. 17/1 (soil) is used for covering the other type of waste in layers.

The data for removed inert waste at the Municipal landfill for inert waste (MLIW) is shown in Table 2.

Table 2 – Data for removed inert waste at the municipal landfill for inert waste

Number	Code	Type of waste	Quantity			
			2016 (t)	%	2017 (t)	%
1	2	3	4			
1/2	17 0 9 0 4	Mixed construction materials	289,4	22,2%	250,7	10,3%
2/2	17 0 5 0 6	Soil	794,6	61,0%	/	/
3/2	17 0 1 0 3	Roof tiles, ceramics, bricks	21,24	1,6%	22,4	0,9%
4/2	17 0 1 0 1	Concrete	81,8	6,3%	189	7,8%
5/2	17 0 5 0 4	Stones and soil	17	1,3%	1969,5	80,8%
6/2	17 0 8 0 2	Gypsum	29,3	2,2%	/	/
7/2	17 0 3 0 2	Asphalt	69,3	5,3%	6	0,2%
		Total	**1302,6**	**100 %**	**2437,6**	**100 %**

Based on the concluded *Contract on Business and Technical Cooperation for establishing services for selected collection and transport of waste of electrical and electronic equipment (WEEE)* between NULA OTPAD DOO Skopje and PUC Derven, the transfer and taking over of WEEE is done in accordance with the legislation. The taking over is followed with adequate documentation.

The collected waste of electrical and electronic equipment is shown in Table 3.

Table 3 – Data on the received dangerous waste of electrical and electronic equipment

Number	Code						Type of waste	Quantity			
								2016 (t)	%	2017 (t)	%
1	2						3	4			
1/3	2	0	0	1	3	6	Waste of electrical and electronic equipment	9,001		8,438	
							Total	**9,001**		**8,438**	

The route of waste movement in the municipality of Veles and the procedure of exploitation procedure are presented in a tabular manner (Table 4 – Table 6).

Table 4 – Procedures on exploitation of the landfill

Total exploitation area (m^2)	Number and mark of cells	Exploited area annually (m^2)	Number of layers	Quantity of covering soil (m^3)	Degree of compaction (t/m^3)
1	2	3	4	5	6
300 000		70 000	40	30 000	30%

Table 5 - Procedure for collection, transportation and destination of waste in "Bunarbere"

Number	Code						Type of waste	Collected by	Transported by	Destination
1/1	2	0	0	3	0	1	Mixed municipal waste	PUC "Derven"	PUC "Derven"	MLB*
2/1	2	0	0	3	0	2	Waste from open markets	PUC "Derven"	PUC "Derven"	MLB
3/1	1	5	0	1	0	2	Plastic Packaging	PUC "Derven"	PUC "Derven"	MLB
4/1	1	5	0	1	0	1	Paper and cardboard	PUC "Derven"	PUC "Derven"	MLB
5/1	2	0	0	2	0	1	Biodegradable	PUC "Derven"	PUC "Derven"	MLB
6/1	0	4	0	1	0	9	Processed finalized (leather)	PUC "Derven"	PUC "Derven"	MLB
7/1	0	2	0	1	0	2	Animal tissue	PUC "Derven"	PUC "Derven"	MLB
8/1	0	4	0	2	9	9	Other waste (textiles)	PUC "Derven"	PUC "Derven"	MLB
9/1	2	0	0	1	0	8	Kitchens and canteens	PUC "Derven"	PUC "Derven"	MLB
10/1	1	0	1	2	0	8	Production of ceramic tiles	PUC "Derven"	PUC "Derven"	MLB
11/1	1	0	0	1	0	1	Dust and slag from boilers	PUC "Derven"	PUC "Derven"	MLB

12/1	0	2	0	3	0	4	Materials unsuitable for consumption	PUC "Derven"	PUC "Derven"	MLB
13/1	1	2	0	1	0	1	Scraping and milling of metals	PUC "Derven"	PUC "Derven"	MLB
14/1	0	2	0	3	9	9	Other waste (tobacco)	PUC "Derven"	PUC "Derven"	MLB
15/1	0	3	0	1	0	5	Scrapes, offcuts, chippings, wood, wood boards, veneer	PUC "Derven"	PUC "Derven"	MLB
16/1	1	9	1	2	1	2	Textiles, plastics, paper	PUC "Derven"	PUC "Derven"	MLB
17/1	1	7	0	5	0	4	Soil	PUC "Derven"	PUC "Derven"	MLB

** MLB – Municipal landfill "Bunabere"*

Table 6 - Procedure for collection, transportation and arrival (at the destination) of waste at the Municipal Landfill for Inert Waste

Number	Code						Type of waste	Collection	Transport	Destination
1/2	1	7	0	9	0	4	Mixed construction materials	PUC "Derven"	PUC "Derven"	MLIW*
2/2	1	7	0	5	0	6	Soil	PUC "Derven"	PUC "Derven"	MLIW
3/2	1	7	0	1	0	3	Roof tiles, ceramics, bricks	PUC "Derven"	PUC "Derven"	MLIW
4/2	1	7	0	1	0	1	Concrete	PUC "Derven"	PUC "Derven"	MLIW
5/2	1	7	0	5	0	4	Stone and soil	PUC "Derven"	PUC "Derven"	MLIW
6/2	1	7	0	8	0	2	Gypsum	PUC "Derven"	PUC "Derven"	MLIW
7/2	1	7	0	3	0	2	Asphalt	PUC "Derven"	PUC "Derven"	MLIW
1/3	2	0	0	1	3	6	Waste of electrical and electronic equipment	NULA OTPAD DOO Skopje	NULA OTPAD DOO Skopje	NULA OTPAD DOO Skopje

** MLIW – Municipal Landfill for Inert Waste*

On the basis of the conducted survey for the waste disposal procedure in the municipality of Veles, and on the basis of the *Interview report* from the interview conducted with the Director of the municipal utility company "Derven" and his associates, as well as the *Interview report* on the utilities inspector from the municipality of Veles, as well as the analysis of the data in the *Annual waste disposal report* for 2016 and 2017 for the Municipality of Veles, the following situation was noted:

1. The municipal utility company "Derven" has insufficient conditions and infrastructure (special sorting bins, sorting containers and special vehicles) for selecting and sorting municipal waste from citizens in the city.

2. The municipal utility company "Derven" faces problems with lack of sufficient means of transportation and other equipment for sorted municipal waste due to financial reasons.

3. Partial manual selection of municipal waste is done in the Municipal landfill "Bunabere". Due to financial reasons, the utility company "Derven" cannot start the process of sorting municipal waste at the level of the entire city (lack of sufficient number of special baskets and containers for selection of different fractions of waste, vehicles, etc.). In some institutions and places in town the sorting of waste is partially functional, but there is no systemic solution.

4. The municipal utility company "Derven" does not dispose of mobile scales for the weighing of sorted municipal waste. There is only one scale at disposal at the municipal landfill where municipal waste is weighed. The data obtained from this weighing are used for the drafting of the annual report for waste management on a municipal level.

5. All parties included in the survey believe that the awareness and the mindset of the population for sorting and recycling of municipal waste are not at a satisfactory level. It is necessary to work on raising the awareness and accountability of the population, and in that aspect, programs and projects, such as the BAS project, are necessary and provide a basis for improving the current situation.

2.1. Solid waste management in the municipality of Bitola

The Municipality of Bitola is located in the Pelagonija planning region and is a municipality with 86408 inhabitants. The Public Utility "Komunalec" is responsible for collecting and transporting municipal waste. In cooperation with representatives from the Municipality of Bitola data are provided on the quantity and structure of solid waste collected in the municipality in the last two years (2016 and 2017). The data is displayed in a table (Table 1a-3a):

Table 1a – Data on collected and transported municipal and other types of non-hazardous waste

Number	Code	Type of waste	Quantity			
			2016 (t)	%	2017 (t)	%
1	2	3	4			

Number	Code						Type of waste	Quantity			
								2016 (t)	%	2017 (t)	%
1/1	0	1	0	5	9	9	Other waste	/	/	2520	7,4%
2/1	0	2	0	5	0	1	Materials unsuitable for consumption or processing	30,4	0,1%	9,8	0,0%
3/1	0	4	0	2	2	2	Waste from processed fibers	164,4	0,5%	124,3	0,4%
4/1	1	5	0	1	0	1	Paper and cardboard	166,77	0,5%	226,97	0,7%
5/1	1	5	0	1	0	2	Plastics	4,63	0,0%	3,87	0,0%
6/1	1	5	0	1	0	7	Glass	2,72	0,0%	3,37	0,0%
7/1	2	0	0	1	3	6	Discarded electric and electronic equipment	1,933	0,0%	62,59	0,2%
8/1	2	0	0	3	0	1	Mixed municipal waste	26486,5 1960 (м3)	84,5%	26633	78,7%
9/1	2	0	0	3	0	7	Bulky waste	60 (м3)	0,0%	45(м3)	/
10/1	2	0	0	3	9	9	Other waste	4500	0,0%	4270	12,6%
11/1	0	2	0	1	0	3	Biomass waste	4,6	14,3%	/	/
							Total:	**31361,95**	**100%**	**33853,9**	**100%**

Part of the municipal waste that has been collected and transported by Public Utility "Komunalec" – Bitola is described in Table 1a. Organic waste is deposited at the Municipal Landfill in v. Meglenci and the sorted waste (plastics and paper) is distributed to the companies that have permits for handling such type of waste. Different types of industrial non-hazardous waste is disposed of in special places marked for that purpose and it is not mixed together. Municipal waste and paper and plastic waste is collected in special days. The plastics and paper waste is specially balled, pressed (subjected to mechanical treatment) and distributed to companies licensed to handle such waste. The company has a stationary scale that measures the amount of waste.

In 2016, a Contract on Business and Technical Cooperation was established for the establishment of the services for selective collection and transportation of waste electrical and electronic equipment (WEEE) with "F Grupacija" – Skopje, while in 2017, a contract was signed with NULA OTPAD DOO Skopje. The collecting is accompanied with appropriate documentation, that follows the procedure of handover and takeover of WEEE in accordance with the law.

Table 2a – Data for removed inert waste at municipal landfill for inert waste

Number	Code	Type of waste	Quantity			
			2016 (м3)	%	2017 (м3)	%
1	2	3	4			
1/2	1 7 0 9 0 4	Mixed materials from construction and demolition	1155		20	
		Total	**1155**		**20**	

Table 3a – Information on received hazardous waste

Number	Code	Type of waste	Quantity	
			2016	2017
		/	/	/

The route of waste movement in the municipality of Bitola and the exploitation procedure are presented in a tabular manner (Table 4a – Table 6a).

Table 4a –Landfill Deposit Exploitation Procedures

Total exploitation area (m^2)	Number and mark of cells	Exploited area annually (m^2)	Number of layers	Quantity of covering soil (m^3)	Degree of compaction (t/m^3)
1	2	3	4	5	6
6000	2	1000	2	10 m^3/day	0

Table 5.1a - Procedure for collection, transportation and arrival (at the destination) of waste in the Municipal Landfill in the village of Meglenci for 2016.

Number	Code	Type of waste	Collection	Transport	Destination

1/1	0	1	0	5	9	9	Other waste	PU “Komunalec”	PU “Komunalec”	MLM*
2/1	0	2	0	5	0	1	Materials unsuitable for consumption or processing	PU “Komunalec”	PU “Komunalec”	MLM
3/1	0	4	0	2	2	2	Waste from processed fibers	PU “Komunalec”	PU “Komunalec”	MLM
4/1	1	5	0	1	0	1	Paper and cardboard	PU “Komunalec”	AD “Karton” Bitola	AD “Karton” Bitola
5/1	1	5	0	1	0	2	Plastics	PU “Komunalec”	““Nutrivet” DOO - Skopje	““Nutrivet” DOO - Skopje
6/1	1	5	0	1	0	7	Glass	PU “Komunalec”	““Nutrivet” DOO - Skopje	““Nutrivet” DOO - Skopje
7/1	2	0	0	1	3	6	Discarded electric and electronic equipment	PU “Komunalec”	„F Grupacija” Skopje	„F Grupacija” Skopje
8/1	2	0	0	3	0	1	Mixed municipal waste	PU “Komunalec”	PU “Komunalec”	MLM
9/1	2	0	0	3	0	7	Bulky waste	PU “Komunalec”	PU “Komunalec”	MLM
10/1	2	0	0	3	9	9	Other waste	PU “Komunalec”	PU “Komunalec”	MLM
11/1	0	2	0	1	0	3	Biomass waste	PU “Komunalec”	PU “Komunalec”	MLM

** MLM - Municipal Landfill in v. Meglenci*

Table 5.2a - Procedure for collection, transportation and arrival (at the destination) of waste in the Municipal Landfill in the village of Meglenci for 2017

Number	Code						Type of waste	Collected by	Transported	Destination
1/1	0	1	0	5	9	9	Other waste	PU “Komunalec”	PU “Komunalec”	MLM
2/1	0	2	0	5	0	1	Materials unsuitable for consumption or processing	PU “Komunalec”	PU “Komunalec”	MLM
3/1	0	4	0	2	2	2	Waste from processed fibers	PU “Komunalec”	PU “Komunalec”	MLM
4/1	1	5	0	1	0	1	Paper and cardboard	PU “Komunalec”	“Pakomak” Skopje	“Pakomak” Skopje
5/1	1	5	0	1	0	2	Plastics	PU “Komunalec”	“Nutrivet” DOO - Skopje	“Nutrivet” DOO - Skopje
6/1	1	5	0	1	0	7	Glass	PU “Komunalec”	“Nutrivet” DOO - Skopje	“Nutrivet” DOO - Skopje
7/1	2	0	0	1	3	6	Discarded electric and electronic equipment	PU “Komunalec”	”Nula otpad” - Skopje	”Nula otpad” - Skopje
8/1	2	0	0	3	0	1	Mixed municipal waste	PU “Komunalec”	PU “Komunalec”	MLM
9/1	2	0	0	3	0	7	Bulky waste	PU “Komunalec”	PU “Komunalec”	MLM

10/1	2	0	0	3	9	9	Other waste	PU “Komunalec”	PU “Komunalec”	MLM
11/1	0	2	0	1	0	3	Biomass waste	PU “Komunalec”	PU “Komunalec”	MLM

Table 6a - Procedure for collection, transportation and arrival (at the destination) of waste in the Municipal Landfill in the village of Meglenci

Number	Code						Type of waste	Collected by	Transported	Destination
1/2	1	7	0	9	0	4	Mixed materials from construction and demolition	PU “Komunalec”	PU “Komunalec”	MLM*

** MLM - Municipal Landfill in v. Meglenci*

On the basis of the conducted survey for the waste disposal procedure in the municipality of Bitola, and on the basis of the *Interview report* from the interview conducted with the director of the municipal utility company “Komunalec” and his associates, as well as the *Interview report* on the utilities inspector from the municipality of Bitola, as well as the analysis of the data in the *Annual waste disposal report* for 2016 and 2017 for the Municipality of Bitola, the following situation was noted:

Public Utility “Komunalec“- Bitola has a solid potential to work on the disposal of municipal waste. It partially disposes of special waste baskets for sorting of waste, collection containers for the selected waste and special vehicles intended for this activity.

The Public Utility "Komunalec" has a scale for measuring municipal waste. The obtained data from the measurements are used for the preparation of an annual report on waste treatment at the municipal level.

Based on past experiences, the management and the employees of PU "Komunalec" - Bitola believe that the level of awareness for sorting and recycling of municipal waste of the population in the city is unsatisfactory, but there is great interest and motivation for cooperation

Chapter 3:

IMPLEMENTATION OF A PILOT PROJECT WITHIN THE BAS

The target group in the pilot project are kindergartens, primary and secondary schools and the Faculty of Technology and Technical Sciences (FTTS) in Veles and Bitola.

Regarding the type of waste, two fractions of interest have been selected: paper and plastics. Table 7 shows an overview of the primary schools and kindergartens included in the pilot project for the municipality of Veles, and Table 8 presents the overview for the municipality of Bitola.

Table 7 - Kindergartens and primary schools included in the pilot project in the municipality of Veles

Kindergartens	
Name of institution	**Address**
Kindergarten - „Tunelot“	*Blagoj Gjorev, 215*
Kindergarten - „Dvorovi“	*Trajko Panov, 19*
Kindergarten - „Star most“	*Kole Cvetkov, 6*
Kindergarten - „Zeleznicka zgrada“	*Todor Janev, 7*
Kindergarten – „Zaba zgrada“	*Naroden Front, 1*
Kindergarten - „Cyril and Methodius“	*Arhiepiskop Mihail, 158*
Schools	
MPS „Vasil Glavinov“	*Hristo Tatarchev, 1*
MPS „Blaze Koneski“	*Ljubljanska, 1*
MPS „Blagoj Kirkov“ and MPS „Ordan Dzinot“ (both schools share a building, work in two shifts)	*Kresnensko Vostanie, 2*
MPS „St. Cyril and Methodius“	*Arhiepiskop Mihail, 156*
MMS „Kiro Dimov“	*Blagoj Nechev, 8*
MSS „Gymnasium“ and MVSS „Dimitrija Chupovski“ (both schools share a building, work in two shifts	*Blagoj Gjorev, 40*
MSS „Kole Nedelkovski“	*Andon Shurkov, 4A*
MSS „Jovche Teslichkov“	*Kukushka, 37*

MPS – Municipal Primary School
MMS – Municipal Music School
MSS – Municipal Secondary School
VMSS –Municipal Vocational Secondary School

Table 8 - Kindergartens and primary schools covered in the pilot project in the municipality of Bitola

Kindergartens	
Name of institution	**Address**
PMIKG „ Estreja Ovadija – Mara“- Prolet Bitola	*Naum Naumovski Borce no No.*
PMIKG „MAJSKI CVET“- BITOLA	*Smilevski kongres no No..*
3Majski cvet -Kacunka	*Niko Fundali no No.*
4Majski cvet- Kokiche	*Sever i Jug 19*

5Majski cvet - Peperutka	*Pitu Guli no No.*
6Majski cvet - Slavejche	*Ohridska no No..*
Schools	
Name of institution	**Address**
PS,, Alexander Turundzev" s. Kukurechani	*v. Kukurechani*
PS ,, Dame Gruev "- Bitola	*Gjorche Petrov 7 / Boris Bastero no No.*
PS ,, Elpida Karamandi"	*Vasko Karangelevski no No.*
PS ,,Gjorgi Sugarev“ - Bitola	*Dimitar Vlahov 32*
PS „St. Cyril and Methodius“ - Bitola	*Bul. 1-vi Maj 274*
PS ,,Kole Kaninski,“- Bitola	*Branko Radichevikj 57*
PS „Stiv Naumov“ - Bitola	*Stiv Naumov 93*
PS „Todor Angelevski“ - Bitola	*Ilindenska 82*
PS „ D-r. Trifun Panovski“	*Ohridska 50*
PS „Goce Delchev“	*29-ti Noemvri 13*
PS „Kliment Ohridski“	*Dimche Lahchanski no No.*
SMS Gymnasium „Josip Broz Tito“ - Bitola	*Bul. 1-vi Maj 51*
SMTS „Gjorgji Naumov“-Bitola	*Partizanska no No..*
SMES „Jane Sandanski“ – Economic School	*Bul. 1-vi Maj 59*
SMAS „Kuzman Shapkarev“ – Bitola	*Zaharija Shumljanska no No.. (Prilepska)*
State School of Music*,	*Bul. 1-vi Maj 110*
SMS „Taki Daskalo“ -Bitola	*Boris Kidrich 37*

PS – Primary school
SMS – Secondary Municipal School
SMTS - Secondary Municipal Technical School
SMES - Secondary Municipal Economic School
SMAS - Secondary Municipal Agricultural School
* Secondary school

Appendix 2 of this ***Action Plan*** the location of the covered kindergartens, primary and secondary schools is displayed using Google maps.

Chapter 3.1:

Preliminary research within the pilot project

In order to review the current state and real needs from the aspect of waste management for the target groups, a preliminary survey project is planned and conducted within the BAS pilot project. Directors and employees in charge of municipal waste in the kindergartens, primary and secondary schools in the municipalities of Veles and Bitola participated in the research.

The methodology used in the research is to conduct an interview using a survey questionnaire with 10 questions (Appendix 1) which was answered by the directors and employees who are in any way connected with the management of municipal waste and are familiar with the sorting of municipal waste in their institution. The issues were topically divided into five groups::

(Topic 1) - Current situation of municipal waste management (questions 1 to 4);

(Topic 2) - the current benefits system for the sorting of municipal waste (questions 5 and 6);

(Topic 3) - the level of education of children and students about the importance and benefits of sorting and recycling and the need for education (questions 7 and 8);

(Topic 4) - about the prospects of the BAS project and other similar projects (question 9);

(Topic 5) - recommendations and opinions for better management of municipal waste (question 10).

After processing the obtained data from the research, thematically summarized reports on the situation in the kindergartens and schools in the municipalities of Veles and Bitola were prepared separately.

3.1.1. Report from the interviews with the directors and employees in charge of municipal waste in kindergartens, primary and secondary schools in the municipality Veles

Kindergartens in the municipality of Veles

All six kindergartens in the municipality of Veles are organized as one institution with one manager.

Topic 1: The disposal of organic waste through the municipal utility company is satisfactory. In 90% of kindergartens, they do not have a separate container for organic waste but use the same container with the nearby citizens.

In general, they are partially satisfied with the sorting of municipal waste. Namely, kindergartens select municipal waste such as: plastics, paper and electronic waste, and they distribute it themselves. The problem is the insufficient number of municipal waste sorting baskets and the lack of containers for storing the sorted waste from the baskets. The sorted wasted is collected in big nylon bags or are otherwise stored in certain areas and then distribute to private companies licensed for recycling.

It can be concluded that the sorting of municipal waste is not done systematically.

Topic 2: For the management of organic waste, they are satisfied, saying that it can be even better. There is no classic benefits system, part of the sorted waste is distributed, and part is sold to cover the costs of its distribution.

Topic 3: The level of education about the importance and benefits of sorting and recycling in children from kindergartens is partial, which means that they need further education. Because of their age, they suggest that education is done continuously with pedagogical methods that are recommended for their age. One of the interesting ideas they gave is to do a QUIZ, where the questions will be posed through pictures, and if the child gets the answer right it will get a smiley face, and if it gets it wrong, it will get a crying face.

Topic 4: Directors and employees, with which interviews were conducted, accepted this project very well, with great interest, hope and motivation, and said that these types of projects a great perspective.

Topic 5: No special recommendations were given, the respondents just confirmed that these types of projects, that should also involve society, can increase the awareness for sorting of trash from a very young age, and children can be made aware of the significance and benefits from recycling municipal waste.

Schools in the municipality of Veles

All the primary and secondary schools in the city of Veles were visited, with the mention that the secondary schools: MSS “Gymnasium” and “Dimitrija Cupovski” are in one building, and the schools work in two shifts, and the primary schools MPS “Blagoj Kirkov” and MPS "Ordan Dzinot" are in one facility, and the schools are working in two shifts. The primary school "Vasil Glavinov" has branches in several villages: Buzalkovo, Prevalec and Slivnik

Topic 1: The needs for removal and sorting of municipal waste are partially met. The disposal of organic waste is on a satisfactory level, but 90% of schools do not have separate containers for organic waste but use the same container with the nearby citizens.

In 70% of schools waste is partially sorted, into plastic, paper and electronic waste, but this is not a systematic procedure, and in 30% municipal waste is not sorted. In schools where there is partial sorting, in 90% there are no bins for the sorting of municipal waste (only in 10%), in 29% there is no containers for storing sorted waste, and in the remaining 71% schools, have plastic and paper containers, but the majority of containers are either damaged or are not sufficient, and this is characteristic of big schools.

There is a noticeable need of bins and containers for the sorting of municipal waste in all schools, and a typical example of this is the primary school “Vasil Glavinov” that houses 1200 pupils.

Topic 2: In 21% of the schools where municipal waste is sorted (plastic and paper) there is a classic benefit system by concluding a contract with a private company for the sale of sorted waste of plastics and paper, and the main organizer is the company „Pakomak“ – Packaging and packaging waste management company. There more such companies, but the contracts were terminated due to the wrongful practice for students to gather plastics and paper from other places outside the schools, whereby they would first gather all of this waste in the school halls, and after it was sorted and stored in the set plastics and paper containers. This is no longer done.

Private companies with contracts (21% of schools) have licenses for municipal waste recycling and they provide containers in the respective schools. They own scales and weigh the sorted municipal waste in their premises, but the containers themselves don’t have scales built in, like there are in some EU member states.

Topic 3: The level of education about the importance and benefits of sorting and recycling in pupils is partial. Their curriculum includes classes that cover the benefits and significance of sorting and recycling of waste, but this is still not sufficient. Part of the schools have so called “Eco Boards” that perform occasional activities and educate students in this area. In our opinion, which is supported by the directors and teachers included in interviews, the pupils need to be further educated with a focus on sorting and recycling, as well as in the ways in which this can be implemented.

Topic 4: 90% of the directors and employees, with which interviews were conducted, accepted this project very well, with great interest and hope, and said that these types of projects a great perspective. Here are some of the stated opinions for these types of projects:

- are necessary and should continue,
- are a great initiative and a project,
- are welcome and a good project,
- confirmed that through such projects increase from a younger age the level of awareness for sorting and the importance and benefits of the recycling of municipal waste, as well as that this strengthens society in general.

We can conclude in accordance with the presented perspectives that this project is very positive, it was received with a high degree of awareness and is accepted exceptionally. The directors and teachers are very motivated, and as an example we would like to point out the schools: MSS „Gymnasium“, MPS „St. Cyril and Methodius“, MPS „Vasil Glavinov“ and MPS „Blaze Koneski“.

Topic 5: Some schools gave interesting recommendations to increase the participation in the sorting of municipal waste, increase the efforts of employees and students, with benefits from the municipality for sorting of waste. With this benefits system and system solution, motivation

will increase dramatically, and thus the sorted municipal waste will increase drastically, and indirectly, after a certain period, the level of students' awareness will be raised and generally the citizens' awareness about the sorting of municipal waste and the importance of recycling.

Other schools pointed out the need of bins and containers for sorting municipal waste and the need of systemic sorting. They confirmed that such projects, which should include society as well, can increase the awareness for sorting of trash from a very young age, and children can be made aware of the significance and benefits from recycling municipal waste.

3.1.2. Report from the interviews with the directors and employees in charge of municipal waste in kindergartens, primary and secondary schools in the municipality Bitola

Kindergartens in the municipality of Bitola

Two of the kindergartens involved in the project have greater capacity: PMIKG "Estreya Ovadia - Mara" - Spring and PMIKG "Majski cvet". Under the PMIKG "Majski cvet" there are four other kindergartens that have one joint manager

Topic 1: The Public Utility "Komunalec" is in charge of municipal waste and disposal of organic waste is on a satisfactory level. In 90% of the kindergartens, they do not have a separate organic waste container, but use the same container with the nearby citizens.

They are partially satisfied with the sorting of municipal waste. Namely, kindergartens sort municipal waste for the following categories: plastics, paper and electronic waste. Almost all kindergartens have "Pakomak" **paper bins**. The problem is the insufficient number of bins for selecting municipal waste (somewhere damaged) and insufficient containers for storing the sorted waste from bins. Some kindergartens complained about the untimely collection of this waste.

It can be concluded that the sorting of municipal waste is not done systematically.

Topic 2: There is no benefit system for sorting of municipal waste.

Topic 3: The level of education about the importance and benefits of sorting and recycling in children from kindergartens is partial and expected having in mind their age. Additional education is suggested, which will be continuous with the use of pedagogical methods that are recommended for their age.

Topic 4: Directors and employees, with which interviews were conducted, accepted this project very well, with great interest, hope and motivation, and said that these types of projects a great perspective.

Topic 5: The recommendations we were given confirmed that such significant projects should include the municipality and the society. They are particularly supportive of this project

because it includes preschool age children, which will make sure that they acquire sorting habits from a very young age and will gain elementary knowledge of the benefits of recycling municipal waste.

Schools in the municipality of Bitola

The project included all primary and secondary schools in the city of Bitola, and all were informed of the goals of the project itself.

Topic 1: The disposal of organic waste is on a satisfactory level, but 90% of schools do not have separate containers for organic waste but use the same container with the nearby citizens. The needs for removal and sorting of municipal waste are partially met. In 60% of schools waste is partially sorted, into plastic, paper and electronic waste, but this is not a systematic procedure. 30% of schools do not have bins for sorting of municipal waste, and the majority of plastics containers have been damaged, and the municipal waste is thus not sorted, and none of the schools had paper containers. The remaining 10% of schools sort municipal waste and have containers, but part of these containers have been damaged.

Topic 2: In 60 % of the schools where municipal waste is sorted (plastic and paper), the same is collected by the PU "Komunalec" Bitola. They own scales and weigh the sorted municipal waste in their premises, but the containers themselves don't have scales built in, like there are in some EU member states. Out of the surveyed institutions, 25% have a benefit system, while 75 % don't have any benefit system for the sorting of municipal waste.

Topic 3: The level of education about the importance and benefits of sorting and recycling in pupils is partial. Part of the schools have so called "Eco Boards" that perform occasional activities and educate students in this area. Their curriculum includes classes that cover the procedures of sorting and the benefits of recycling. The employed teachers and the director recommended for there to be constant education. But when all of this is supposed to be implemented into practice, they are met with obstacles. It is a joint opinion that by setting bins and containers in different colors, as per standard, they will achieve visual perception for waste sorting and developing environmental awareness. In the end it was mentioned that it would be nice if students could learn more about sorting municipal waste and recycling, i.e. for them to learn something new.

Topic 4: 90% of the directors and employees, with which interviews were conducted, accepted this project very well, with great interest and hope. They employees are very motivated, and they pointed out that these types of projects offer a great opportunity to save natural resources, strengthen society and protect the environment.

Here are some of the stated opinions on this project:

- a great initiative and project,

- joint cooperation in the future as well.

Topic 5: The majority of schools recommended increased participation of different subjects, including employees and pupils, for there to be a more successful managing of municipal waste. Other recommendations referred to the need of bins and containers adequate for the selected waste. The need was also mentioned to conduct educational workshops for raising the level of environmental awareness for a cleaner environment and learning about sorting and recycling benefits, etc.

This project was accepted in a positive manner because it includes the youngest population, because this is the age at which habits begin to be developed and to raise awareness for waste sorting.

3.1.3. Conclusions and recommendations after the conducted preliminary survey within the target groups covered by the pilot project

After processing the data obtained from the survey in cooperation with the municipal utility companies, kindergartens, primary and secondary schools in the municipalities of Veles and Bitola, significant information on municipal waste management was obtained. In the research emphasis is given on the sorting of plastics and paper.

1. The information points to the weaknesses in the municipal waste management in the municipal utilities because of the lack of sufficient bins and containers for sorting waste in both cities, and for Veles a lack of special vehicles for collecting the sorted waste. However, it can be noted that in the city of Bitola there is a partial sorting of plastics and paper, and in the city Veles the sorting is only partially realized.

2. In kindergartens and schools there is a partial selection of waste, but there is a lack of bins and containers for sorted waste, and there are no systematic solutions for its sorting and distribution.

3. Only a very small part of the institutions visited have a functional benefit system for sorting plastic and paper.

4. Children and pupils do not have a very high level of knowledge in sorting and recycling municipal waste, even though it is included in their curriculum.

5. The included institutions show a great interest in these types of projects and are motivated to improve the current situation.

On the basis of these results, it is recommended to raise the awareness of citizens on the significance and benefits of municipal waste sorting and recycling, from a very young age, by educating and implementing educational programmers and workshops. It was established that systemic sorting solutions are needed for plastic and paper and there needs to be an organized

distribution through a *benefit system*. It is recommended to find various ways for greater financial support to the utility companies and the indicated institutions in the infrastructure for the sorting and distribution of municipal waste to companies that have recycling licenses.

3.2. Procurement of waste handling equipment and implementation of an educational and promotional campaign for encouraging participation in the pilot project

Based on the research conducted on the actual needs of the covered institutions in the pilot project, the conclusion is that the procurement of bins and/or containers for paper and plastics selection is a necessary prerequisite for starting the pilot project. In accordance with selected fractions of waste (paper and plastics), covered in the pilot project, it is planned to procure bins and containers in appropriate color and dimensions for both fractions of waste. The required number of blue and yellow bins and containers (blue - for paper and yellow - for plastics) per institution is defined based on the capacity of the respective Kindergarten or school. For each institution, the location of the bins / containers, as well as the method of collecting and selecting the waste, it is necessary to arrange in cooperation with responsible persons from the competent institution, but also with the persons from the company in charge of the takeover and transport of the selected waste to the final destination. For the more successful implementation of the pilot project in kindergartens, it is recommended to purchase smaller-sized bins so that it will be easier for children from the youngest age to receive the message about the method of waste selection and the benefits from it.

FTTS, as coordinator, needs to maintain close and regular communication with all stakeholders in the pilot project. It is recommended therefore, that a simple and clear language is used for communication, as well as transferring certain messages through appropriate images (posters, flyers, etc.). It is essential that the correct separation and removal of materials is clearly explained and understood by all participants. For example, if they are used to washing and folding plastic packaging, this would reduce the need for very frequent emptying of the recyclable material collected in yellow containers.

It is recommended to prepare striking, concise and clear information materials in hard copy, but that will also be easily accessible online. For example, in addition to leaflets, stickers or other easily recognizable and understandable symbols with illustrative images, educational videos and leaflets for proper approach to selection and collection of waste can be prepared. For the target groups in this pilot project, it is recommended to produce educational promotional materials adapted to the age of children from kindergartens and schools, as well as promotional materials intended for the employees in these institutions (presentations for children of different ages, leaflets, posters, short video materials, etc.). Promotional material should help raise the environmental awareness of waste selection, especially emphasizing the benefits of recycling municipal waste.

It would be good to provide the first information materials to the participants before the start of the pilot project, as well as with the distribution of the bins and containers for selection and collection of waste. The materials should contain at least the following information: what is a pilot project, when it starts, why it is needed, what are the benefits to the pilot community; what will participants will sort and how will they do this; contact details (telephone number and email, website with information about the participants); practical advice and clear instructions for proper waste selection.

The information materials, stickers, leaflets together with waste bins/containers (as a set) can be distributed 2 weeks before the start of other activities in the implementation of the pilot project.

In the first weeks of the pilot initiative, it is desirable to collect more regular feedback, questions and suggestions from the participants. This can be done, for example, by placing a book or a box of suggestions and feedback in each of the institutions. It would be good to hold a meeting at the end of the first week with representatives of the participants and to collect initial feedback and possible suggestions for improving the system. Signing a contract or formal written consent to participate in the pilot program with the facilities involved will help the participants to meet the requirements of the project.

Providing sufficient resources to implement the pilot program is particularly important in terms of communicating with the participants. It is extremely important, especially at the start of the project, to ensure that there is a responsible person who will be available to assist in the implementation and not allow the formation of a negative public opinion on the pilot project. The best effects for the community will be achieved if the project has met the approval of the participants in the pilot program. After the end of the pilot period, it would be good for the FTTS to prepare certificates for the participants and to inform them about the results of the pilot project and the future plans.

3.3. Method of measurement and recording of selected recyclables

Collection, transport and frequency of removal

Measurement of selected waste at the level of the facility (kindergarten or school) is feasible and can be carried out by the persons responsible for collecting waste at the appropriate facility when emptying the bins/containers. The cheapest and easiest way is to note how full the bins/containers (visually) are by the waste collection teams. In order to monitor the quantity of collected waste, it is necessary to measure its weight or volume and to take into consideration how frequently the bins/containers awarded to the appropriate institution are emptied.

Furthermore, the quantity of selected recyclable materials (paper and plastics) can be checked when authorized companies collect the waste. If there is no mass measuring device in the waste collection unit, the quantity of waste can be reported using a simple conversion table (by size and percentage of container load) from volume to mass, according to the different specific density of the respective materials.

Monitoring the quantity changes and the proportion between the individual fractions within the pilot initiative will provide valuable information on the achieved level of recycling in kindergartens and schools in the municipalities of Veles and Bitola.

An additional method for determining the characteristics of the waste selected in the institutions covered by the pilot survey is for the participants to keep logs. This can be done as and exercise/task for the children and other pilot volunteers that would last at least a week.

The availability of bins (proximity), the size of bins/containers and how frequently they are emptied, are all factors that are most directly related to the students' motivation. For example, in the case of an overflowing waste container, children will probably cease to separate their waste and simply dispose of it in general waste containers. The appropriate frequency of waste collection should also be determined considering the type and volume of used bins/containers.

For the proper functioning of the collection and transport system, it is important to clearly define in advance the roles of all persons responsible for discharging the containers (packaging waste collection organizations, private concessionaires, public utility companies), and their staff to be thoroughly informed about requirements of the pilot project. This is especially important not only for the proper handling of recyclables, but also for monitoring the progress and measurement of the results of the action plan.

3.4. Rewards and benefits for the participants in the pilot project

The results of the conducted study on waste sorting in several European capitals showed that the highest percentages of the target fractions for selected waste were determined in cities that have introduced some form of payment according to the quantity of selected waste (Berlin, Budapest, Dublin, Helsinki, Ljubljana, Tallinn)[*]. While this practice has not been transferred to Macedonia, the pilot initiative will have to rely on other benefits as a reward for the participants' efforts. It is possible to test different types of benefits during the pilot project (every month or three months). It is advisable to conduct preliminary interviews and surveys with the target group to more accurately define attitudes and expectations, as well as benefits that have an effect.

The list of possible benefits for sorting and collection of waste for the participants in the pilot project is given in Table 9.

[*]Municipal Waste Europe, 2016

Table 9 – A list of possible benefits and rewards for the target group

Financial benefits if the school has a Contract with private companies licensed for waste collection (and compensate the school monetarily for a kilogram of sorted waste) The thus collected funds are invested in improving the conditions in the school.
The utilities and local authorities reward and stimulate target groups in the pilot project by offering: - **School yard landscaping,** - **Establishing or modernization of an Eco-Classroom,** - **Free transport for students and field trips** - **Free tickets for theater plays** - **Handing out environmentally friendly stationary**
* **By offering attractive opportunities for children, their parents are also motivated to help collect and sort the waste.**

3.5. Implementation stages

In accordance with the pilot project goals the following implementation stages were defined:

IS.1 Preliminary research for the perception of the current situation and the real needs of the target groups from the aspect of waste management

IS.2 Procurement of waste bins/containers

IS.3 Promotional and educational activities in the schools in the municipalities of Veles and Bitola. Training for the involved parties in the pilot project.

IS.4 Monitoring, evaluating and optimizing the activities for the implementation of pilot activities.

IS.5 Consultations on the implementation of the BAS project - Participation in joint workshops organized by the members participating in the BAS project

Table 10 shows the timetable for implementation stages in the period from July 2018 to September 2019.

Table 10 - Implementation Stages Timetable

IS	7/18	8/18	9/18	10/18	11/18	12/18	1/19	2/19	3/19	4/19	5/19	6/19	7/19	8/19	9/19
IS.1															
IS.2															
IS.3															
IS.4															
IS.5															

Chapter 4:

MONITORING THE PROCESS OF IMPLEMENTATION OF THE PILOT ACTIVITIES

Within the pilot project, it is recommended to collect specific data on the quantities, percentage of participation of both fractions (paper and plastics) and the quality of waste separation.

The monitoring should cover the following questions:

- **Quantitative data**: quantity, percentage of participation of individual waste fractions, quality of collected waste (degree of contamination – unwanted dirt)

- **Economic information and satisfaction of the participants** are used to determine how easy it is to use and how effective the pilot scheme is.

These data can be used to determine the total potential for diverting materials from landfilling and combustion to the three upper levels of the waste management hierarchy.

The success of the pilot project will be evaluated by the users through regular feedback. For this purpose, it is also desirable to conduct short studies at the beginning of the pilot period, after distributing the materials and containers for selective waste collection, in order to determine the starting position. After the participants will have had time to test the pilot programme, it would be good to conduct a second study to determine the level of participation, understanding, behavior, attitudes and satisfaction. To avoid lowering the motivation for participation it is necessary to conduct a continuous information and communication campaign. At the end of the pilot programme, it is also desirable to perform and publish an evaluation of the results in order to maintain motivation.

Working with focus groups or other forms of public consultation would help to compare and deepen the understanding and attitudes of the pilot participants compared to the general public with regard to the selection of recycled materials covered by the pilot project (paper and plastics).

Chapter 5:

SUSTAINABILITY OF THE PILOT PROJECT AFTER COMPLETION OF THE PROJECT "BAS"

The sustainability of each project depends on the costs-stakes balance and its benefits. The financial results of the pilot project depend on the commitment of the participants, which in turn depends on the benefits and incentives provided to them.

It is good to offer benefits that can be provided on a permanent basis, not once. The benefits in the waste collection and collection system have proven to be highly effective in European capitals with the highest achievements in the selective collection and recycling of municipal waste.*

The conducting of a plan for monitoring and assessment of results is an essential part of the sustainability of any benefit. The results of the pilot project will also help to define more precisely the new possibilities for determining the waste compensation, in accordance with the positive European legislation, and for implementing it in the legislation of our country.

* Municipal Waste Europe 2016