

IMPLEMENTATION OF ZERO WASTE CONCEPT IN EASTERN EUROPE SMALL COMMUNITIES. CASE STUDY: SĂLACEA VILLAGE, BIHOR COUNTY

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Abstract

This paper presents the implementation of Zero Waste concept in a village in Romania, in the eastern part of Europe. The City Hall of Bihor village Sălăcea and sanitation operator AVE implemented this year separate collection door-to-door system, five types of waste: paper, cardboard, plastic, metal, glass, biodegradable waste and residual waste. In just three months after implementation, the amount of waste generated by the 3,000 people (about 1,000 households) fell to less than half, from 27 tons to 12 tons only. Of these, 60% were collected separately, and the 40% end up being effectively recycled. Separate collection door-to-door system is one of the most important measures and the most difficult to implement of certification measures Zero Waste communities. Zero Waste strategy proposed by the community, 20 comprises a set of measures to prevent, recycling, disposal and energy recovery from reduction of not less than 90% of waste, which once implemented, guaranteed results. Thus, Sălăcea becomes common only in Romania to fulfill the targets of reducing the amount of waste to landfills.

Keywords: concept, zero-waste, door-to-door, prevention, reduce, waste landfill

INTRODUCTION

Zero Waste is a philosophy that encourages rethinking the life cycle of resources, so that all products can be reused, not to get into landfills, incinerators or ocean. ZW Romania 2030 is a project aimed at the transition from the linear (resource extraction, production, transportation, consumption and disposal/destruction) the circular economy, where resources are returned to the system. (Spiegelman, 2006). One objective is to reduce the amount of resources destroyed by burning or burial, more than 90% by 2030.

Zero Waste system is promoted as a way of harmonizing the human existence on the planet with finite resources. Zero Waste Concept has been successfully implemented in Europe, Africa, America, Asia and Australia. Zero Waste Romania promotes waste prevention - through changes in design, production and consumption - and recovery of all waste in a safe and sustainable without toxic incinerators or other technologies. (Snow, Dickinson, 2001). The recommended process is similar in nature reuses resources. One of the concepts that promote this is Cradle-to-cradle.

Cradle-to-cradle is a term used in life-cycle analysis to describe a material or product that is recycled into a new product at the end of its life, so that ultimately there is no waste. Cradle-to-cradle focuses on designing industrial systems so that materials flow in closed loop cycles which mean that waste is minimized, and waste products can be recycled and reused. „Cradle-to-cradle simply goes beyond dealing with issues of waste after it has been created, by addressing problems at the source and by re-defining problems by focusing on design”. (McDonough, Braungart, 2003). The cradle-to-cradle model is sustainable and considerate of life and future generations.

MATERIAL AND METHOD

Zero Waste is an ethic, economic, efficient and visionary objective, intended to guide people in changing lifestyles, so to emulate sustainable natural cycles, where all materials considered useless are designed to restore resources.

Zero Waste seeks both to design and manage products to prevent and eliminate toxicity of waste, their volume, preservation and recovery of all resources so that nothing is burned or buried. By implementing this concept Incinerators are a threat to human health, plants and animals.

There is a growing global population that is faced with limited resources from the environment. To relieve the pressures placed on the finite resources available it has become more important to prevent waste. (Woodyard, 2008).

To achieve zero waste, waste management has to move from a linear system to being more cyclical so that materials, products and substances are used as efficiently as possible. Materials must be chosen so that it may either return safely to a cycle within the environment or remain viable in the industrial cycle.

This study explains how to implement the concept of Zero Waste in Sălacea, Bihor County, by signing a partnership with ZERO WASTE ROMANIA so joining zero waste cities and villages and construction of waste management plant - compost station, sorting hall, with E.U. landfill according needed.

This community includes 3000 (2400 inhabitants of which live right in this municipality and the remaining 600 live in the village under, named Ottoman). It has around 1,000 households and is located 65 km away from Oradea.

It is first community in Bihor County, which reduced the amount of waste in just three months applying a set of 11 mandatory measures. Of course, this model can be replicated anywhere in rural but also in urban

neighborhoods of houses. Moreover, it intends to implement such a system of blocks and neighborhoods.

RESULTS AND DISCUSSION

In February 2018, Salacea Village, Mayor Horvath Bella, sign the official document assumes implementation of the strategy of Zero Waste community who was responsible. After a visit to the Rogno City in Italy, the mayor decided to implement this strategy and separate collection of door-to-door, convinced that the only solution for efficient waste management in the municipality that govern it.

So, the mayor together with sanitation operator AVE collector and company operator equipped with facilities suitable for treating the separately the collected fractions represented by coordinators of The Ecological Landfill ECO BIHOR decided that community citizens to be raised separately on different days, five fractions: plastic and metal, paper and cardboard, glass, biodegradable waste and mixed waste (waste).

To facilitate implementation of this system, those responsible for collection have made an awareness campaign in every school and kindergarten classroom, in every pub, church and culture house explaining clearly how to do sorting and especially how will collect these containers when they be filled and they explain the motive for these changes.

In the same time, they provided households with 120-liter green bins for glass waste collection, 10 liters of light brown ventilated greenhouse for biodegradable house collection, 23-liter waste bins for biodegradable waste deposited outside brown color, 40 liter bins for mixed waste (residual) and yellow colored bags for plastic and metal and blue for paper and cardboard waste.



Fig. 1 Types of containers used

Thus, citizens were encouraged not only to sort out, but also to reduce the waste produced, as they had to fit in the container or bag volume

received. Common citizens were explained and how waste will be collected separately on different days, the five waste fractions as they were sorted.



Fig 2. Five full containers waiting to be lifted

By distributing bins 40 L, the volume of the residual waste container was reduced from 120 liters to 40 liters.



Fig. 3 Crate for composting vegetable waste

This determinate the generators to fit in this low volume bin. Products Such as: grass, branches, ashes, dust, stones no longer fit in the container. It was distributed separately to containers for composting. (Favoino, 2006) The success of the reduction of the household waste through home composting achieved was quantities and separate collection of the bulky, waste electrical and others.

Because the village consists of a mixed population both explanations and print texts paper bags and the nylon was made in three languages: Romanian, Hungarian and Gypsy to make sure everyone understands what to do.

The formal - dual collection system was made as follows: the black bins of 120 L were collected household waste (wet fraction) which has been raised by 2 times month, in the yellow bags of 100 L were collected recyclable waste (dry fraction) were raised once a month.

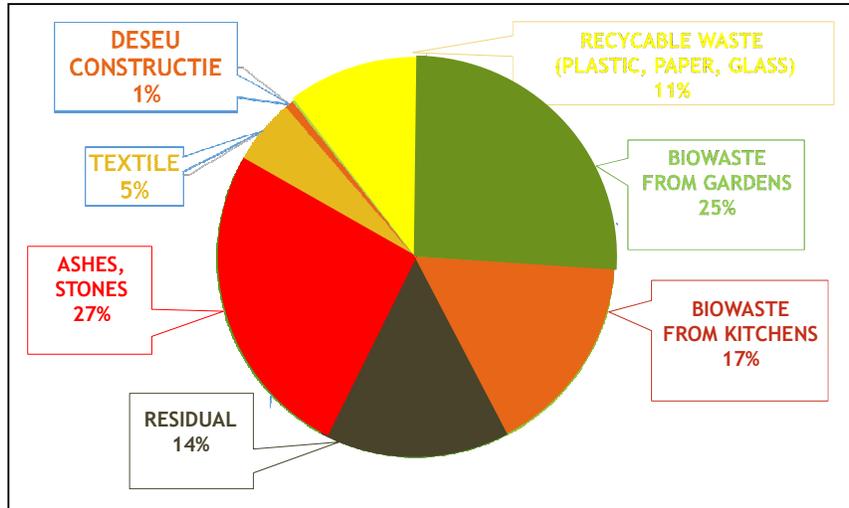


Fig. 4 Composition of the household waste dual system (dry/wet) in the monitoring period dec.2017- mart.2018

Thus, the dual system in the collected quantities was 330 t/year of waste from which: 320 t/year residual household waste (wet fraction), 10 t/year of the collected waste separately (dry fraction) and separated (weight) collection rate (3%).

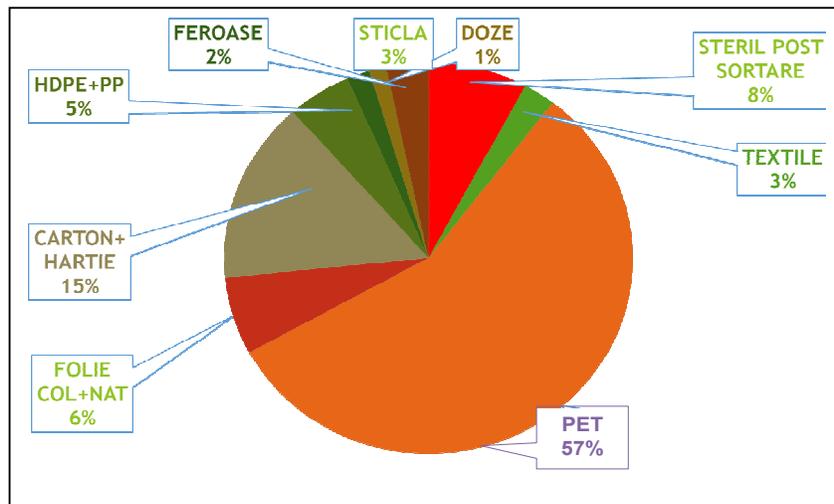


Fig. 5 Composition of the recyclable dual system (dry/wet) in the monitoring period dec.2017 - apr.2018

In just three months of its introduction, the amount of waste generated decreased to less than half, from 27 tons to 12 tons only. Of these, 60%

were collected separately, and the 40% end up being effectively recycled. Thus, Sălacea becomes the only community in Romania to fulfill the targets of reducing the amount of waste in landfills.

Table 1

The amount of waste collected before and after the system DEPLOYMENT door to door collection

WASTE quantity (tonne/month)	Before	%	After	%
Total WASTE quantity	27,50	100%	12,36	100%
Quantity eliminated by landfilling	26,68	97%	5,50	39%
Quantity collected separately	0,82	3%	6,86	61%
Quantity eliminated by landfilling	26,77	97%	7,47	60%
Recyclables waste from the total collected quantity	0,73	3%	4,88	40%

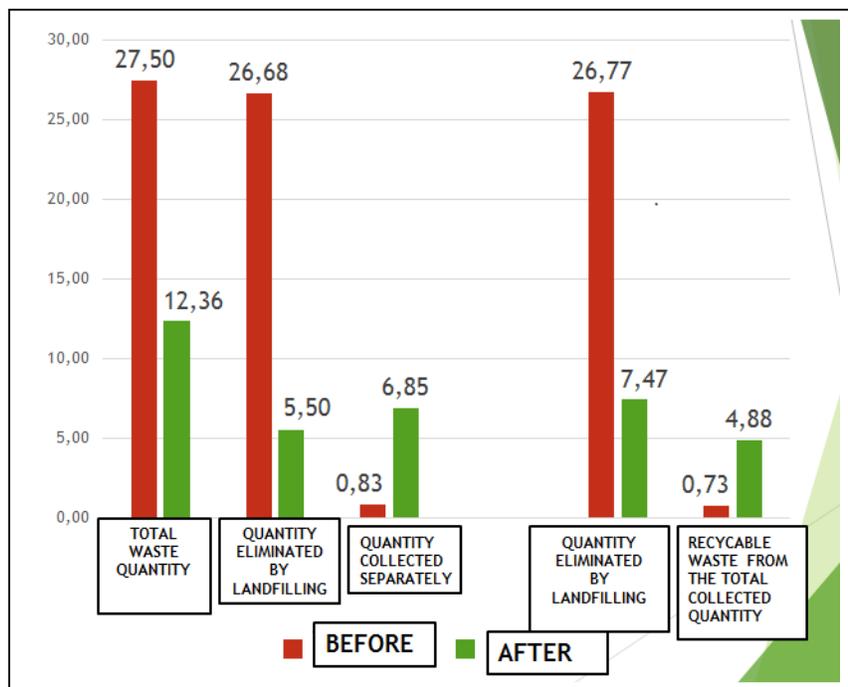


Fig. 6 Results comparison (t/month)

To get the results shown in the figure above, in the village there was also a pre-monitoring for a period of three months, which were measured quantities generated, the waste existing content. Saddle it noted that, should

invest approx. 12,000 euros to change bins: bins 3,000 to 3,000 people in 1,000 households at a cost of 4-5 euros per person plus supplies. But this is only kit home. Afterwards, there will be expenditure on paper or biodegradable bio-plastics waste. The package of economic calculations would have in the future and few benefits, if they meet targets: costs which they will have to pay tax on sanitation because they pay according to the pay-as-you-throat only people who exceed the quantities imposed.

At this time, residents Sălacea pay half of what they paid before for waste collection that is 5 lei per person per month. This system can become so efficient as to cover higher costs of operation by exploiting recyclable waste which would avoid taxes. In this municipality, waste is correctly selected, only half the amount going to storage and other (7 tons) goes for recycling. Hall does not pay rent for their storage is charged state but just as collected (5 tons), instead of 27 tons as was the original amount of waste. But on the other hand, must drive five routes, instead of two, in which case the two issues should be compensated at the end.

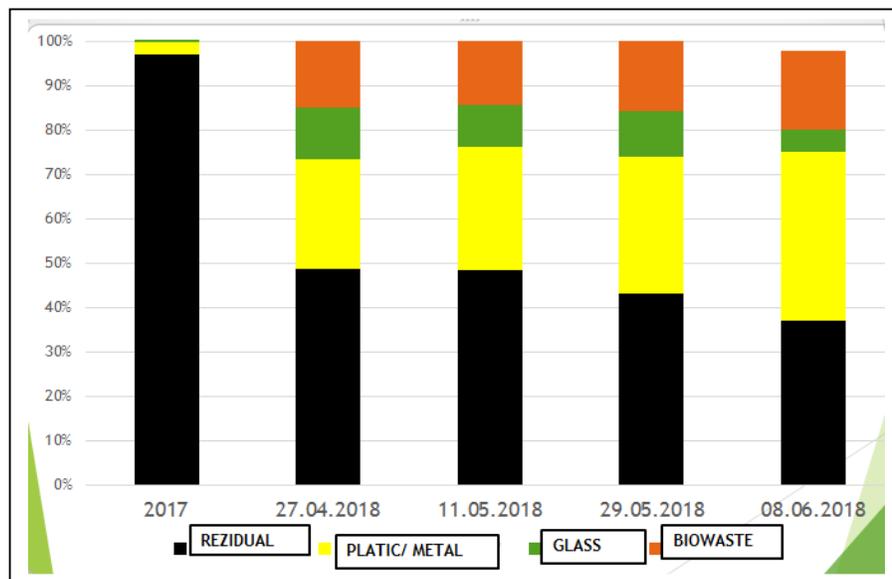


Fig. 7 Modification of the waste composition after changing the collection system

Thus, in the quantities of household waste was Approximately 27500 kg (27.5 tones) monthly from 8-10% recyclable which of bad quality. Quantity of the collected waste separately in yellow bags was under 5%.

After implementing of the new five fraction collection system, the total amount of waste per month was 12,400 Kg from which: 5500 Kg of the residual waste (5,5 tones) meaning 45%, the amount of recyclable waste

meaning 3785 Kg 31% (paper, cardboard, plastic, metal, etc.), the amount of waste glass was 1110 kg meaning 9% and the amount of bio-waste was 1960 kg meaning 16%. The amount of the separately collected waste is 40% quantities to be considered for reaching the E.U. targets against 3% in 2017.

CONCLUSIONS

Benefits proposed include:

- Saving money: since waste is a sign of inefficiency, the reduction of waste can reduce costs.
- Faster Progress: a zero waste strategy improves upon production processes and improving environmental prevention strategies which can lead to take larger, more innovative steps.
- Supports sustainability: a zero waste strategy supports all three of the generally accepted goals of sustainability - economic well-being, environmental protection, and social well-being.
- Improved material flows: a zero waste strategy would use far fewer new raw materials and send no waste materials to landfills. Any material waste would either return as reusable or recycled materials or would be suitable for use as compost.

Zero waste promotes not only reuse and recycling, but, more importantly, it promotes prevention and product designs that consider the entire product life cycle. Zero waste designs strive for reduced materials use, use of recycled materials, and use of more benign materials, longer product lives, reparability, and ease of disassembly at end of life. Zero waste strongly supports sustainability by protecting the environment, reducing costs and producing additional jobs in the management and handling of wastes back into the industrial cycle. A Zero Waste strategy may be applied to businesses, communities, industrial sectors, schools and homes.

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