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REVIEW ARTICLE

Zero waste strategies and Turkey's zero waste project

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ABSTRACT

The amount of waste in the world continues to increase in the framework of the population, increase in purchasing power and technological developments since the past years and this increase necessitates the need for sustainable and integrated management of waste. The disposal of waste without being used in the recycling and recovery process causes serious resource losses, both materially and energy.

The "zero waste" movement has recently gained importance as an alternative to the dominant "take-use-waste" production model and as a viable approach to climate change. Zero waste is a change of perspective. It requires think again about what we traditionally regarded as garbage and instead addressing all materials as valuable resources. Zero waste takes into account the entire material management system, from extraction of natural resources to product design, production and distribution, product use and reuse, recycling, composting, energy recovery and disposal. This paper discusses a variety of zero waste strategy implementations and Turkey's Zero Waste Project.

Keywords: Industrial waste, Turkey's zero waste project, zero waste strategy

1. INTRODUCTION

The result of human activities since the Industrial Revolution is a Earth warming effect resulting from carbon dioxide emissions and increased by emissions of other greenhouse gases. In this context, the challenge today is how to survive on Earth in an unprecedented scenario of economic development with increasing energy demand and global warming processes. Scientists warn that if they do not make significant changes to keep global temperature increases below 1.5 °C, the results will be disastrous. Decarbonisation of the energy sector while meeting the rapidly increasing demand for power, especially in the developing world, is probably the most important challenge facing the global energy system in the next 20 years [1].

Non-renewable resources are running out as a result of excessive consumption. The constant depletion of natural finite resources by the urban population leads to an uncertain future [2].

2. PRINCIPLES OF ZERO WASTE

The Zero Waste International Alliance (ZWIA) has published some principles and practical steps that cover the whole world from the city to the countryside and are applied in these places. The main principles of these publications are presented under the following headings.

2.1. Adopt the zero waste definition

In line with the sustainable development goal, a zero waste definition has been developed. In present, according to Zero Waste International Alliance, "Zero Waste is the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health".

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2.2. Establish benchmarks

Having a detailed timetable is essential for setting criteria, monitoring the process and evaluating the successes achieved.

2.3. Engage the whole community

In communities where Zero Waste is targeted, everyone has an individual role. Naturally, every person produces waste. What if everybody takes responsibility for the zero waste target? In such a case, the process to Zero Waste will become more quickly. All organizations (government organizations, non-governmental organizations, business and grassroots movements) and individuals everywhere should adopt the Zero Waste application first and then make it a target. With sustainable policies and implemented programs, society and businesses should be supported and deposit-return service could be provided.

2.4. Demand decision makers manage resources not waste

Waste disposal is mostly carried out through the use of landfills and incinerators. But these methods are not sustainable options. Landfilling is still low cost and can be applied to all types of waste, while it is the source of greenhouse gases. From climate change angle, incineration is the better choice for converting waste into energy [3].

2.5. Perform zero waste assessments

It is important to make evaluations in order to control the current waste management system implemented by the local government.

2.6. Enact extended producer responsibilities rules

This rule leads manufacturers to redesign the product so that the product is less toxic and can be easily reused or recycled after use. In the redesign phase, it forces them to use financial incentives. As a result, the used product is evaluated in an environmentally friendly way. Therefore, it can reduce the amount of waste disposed in landfills [4].

2.7. Expand Zero Waste infrastructures

In order for the Zero Waste program to be implemented and sustainable, a wide infrastructure should be possessed in subjects such as reuse, recycling and composting. Businesses and producers should be encouraged to ensure that the Zero Waste program is sustainable and to collect and process waste materials, take back and recycle worn products. With this incentive, popularizing social re-use can be achieved by supporting non-governmental organizations.

2.8. Challenge businesses to lead the way to Zero Waste

Zero Waste focused businesses have been established all over the world and have brought positive effects on the environment in managing resources and materials. Businesses that have adopted the Zero Waste target reduce the costs of managing resources and waste of their businesses. Therefore, it has also increased operating efficiency. Zero Waste businesses should be supported locally, and businesses should be encouraged to implement this program. In this context, economic incentive funds can be used. Resource managers need to be trained to use the Zero Waste approach and develop the program. Zero Waste is a strategy. To achieve Zero Waste, cultural exchange and organization are required. To create green jobs, it must create programs to educate businesses and visitors about the new rules and programs [3].

3. EXAMPLES OF ZERO WASTE CONCEPT IN SELECTED COUNTRIES

3.1. Singapore application

Singapore is a country that has limited land and natural resources for urban planning and development, and its population is constantly on the rise. For this reason, an integrated and long-term approach has been adopted in waste management. In Singapore, the amount of waste disposed has increased 7 times in the last 50 years, from 1,200 tons/day in 1970 to 8,284 tons/day in 2015. Per capita household waste amount was approximately 0.86 kg / person.day in 2015 [5]. If it continues in this way, the life of the Semakau Landfill is predicted to be about 35 years, and it becomes necessary to build an additional incineration plant every 7 to 10 years. With the Zero Waste Master Plan launched in Singapore, it aims to reduce the amount of incinerated waste sent to Semakau by 30%. It is aimed to increase the recycling rate of Singapore from 60% since 2012 to 70% by 2030. The government determines the domestic recycling rate of 22% in 2018 to 30% by 2030, while the non-domestic recycling rate is; It is aimed to increase from 74% to 81% [6]. Waste management in Singapore has traditionally been undertaken by the Singapore Ministry of the Environment (ENV). The law on solid waste management in Singapore is the Environmental Pollution Control Act (EPCA), which came into force in April 1999, and is a consolidation of existing legislation on air, water and waste control, including Environmental Public Health (EPHA).

3.2. Germany application

The most important legislation affecting waste management in Germany is the "Waste Prevention and Disposal Law", which was adopted in 1972 and significantly revised in 1986 to bring Germany into compliance with the current European Economic Community (EEC) legislation. The law imposes important obligations to reduce the amount of waste generated and to recover and recycle waste. In

addition, the law contains specific provisions on the management of waste containing toxic substances. In accordance with the "Waste Prevention and Disposal Law":

•Setting targets for the reduction, recovery and reuse of non-toxic wastes based on technical feasibility, cost and availability of markets;

•To publish guidelines for the environmentally friendly disposal of waste;

•Regulating the volume and conditions for the application of wastes to agricultural lands;

•Regulating the labeling and recycling of products that can produce toxic waste is among the duties of the government.

The law also gives the government the power to ban the sale of products containing toxic substances. The law defines the concept of "waste" as "... the materials that the producer wants to dispose of or, in particular, what is necessary for the protection of the environment and proper management for the public interest". In the Avoidance and Disposal Law, "waste management" defines "the recovery or production of waste as material or energy (reuse and recovery of waste), waste storage and the necessary collection, transportation, treatment and storage process" [7].

3.3. Indonesia application

When you talk about Zero Waste communities in Indonesia, three cities come to mind: Bandung, Cimahi and Soreang. These cities, which are struggling to manage their waste, have become leaders in Zero Waste program implementation in recent years. Zero Waste Project in Indonesia is carried out by Yayasan Pengembangan Biosains dan Bioteknologi (YPBB). YPBB found that Bandung, the third largest city in Indonesia, 2.5 million people living in the city generate approximately 1.500-1.600 tons of waste each day. Bandung's local government has already allocated 137 billion IDR for annual waste transportation. More than half of resident waste or 63% is organic waste. Recyclable materials come in second at 23% while the rest of 14% are remnant waste. This means that Bandung City can reduce the amount of resident waste brought to landfills by up to 86% and reduce waste collection, transportation and storage filling costs by $ 17.1 million (19 billion IDR) per year. Subsequently, potential savings can be employed in recruiting more waste workers and in developing more collections, decentralized recycling and the development of composting facilities. The recycling of 950 kg of wastes have provided in the project carried out by YBBB per day. Within the scope of this project has provided savings 63 million IDR (4,300 USD). YPBB is supposed to which can save up more by working with the government on zero waste [8].

4. TURKEY'S ZERO WASTE MANAGEMENT

There is a "Zero Waste" project initiated by the Ministry of Environment and Urbanization in 2017. The project basically aims to prevent waste and to use resources more efficiently. public institutions/ organizations in the project, educational institutions, shopping malls, hospitals, rest facilities and the implementation of fun-in large businesses and aims to move all applications in Turkey in 2023.

4.1. Types of waste

Wastes are handled in four main groups in practice.

Household waste: The definition of household waste in the Environmental Law; It is defined as "solid wastes from places such as residences, industry, workplaces, picnic areas that are not included in the scope of hazardous and hazardous waste" (Government gazette 09.08.1983, no 2872).

Medical waste: The concept of medical waste is expressed as "cutting-piercing wastes, pathological wastes and infectious wastes" in the Environmental Law. Since medical wastes are more dangerous than other wastes, their inspections are more stringent.

Industrial waste: Industrial wastes are wastes that are harmful to the environment and human health resulting from industrial activities. Industrial wastes can be classified as hazardous and non-hazardous wastes. It is the Waste Management Regulation (Government gazette 02.04.2015, no 29314), which is the most up-to-date and under the main legislation regarding industrial wastes.

Special waste: Waste oils, batteries, used tires and batteries that do not disappear from nature for a long time are listed within the scope of special waste. At the same time, agricultural solid wastes, corporate and industrial solid wastes and excavation wastes are also examined under this title. Each of the process management related to special wastes is planned with separate legislation such as Waste Oil Management Regulation (Government gazette 30.07.2008, no 26952), Waste Batteries and Accumulators Control Regulation (Government gazette 31.08.2004, no 25569).

The increasing amount of waste creates enormous pressure on the implementation of a sustainable waste management, creating opportunities for the implementation of new approaches and strategies. The term "Zero Waste" was first used in the chemical industry in 1973 in connection with the recovery of usable components from chemical compounds. [9].

Zero waste is a whole system approach that aims to eliminate waste instead of "managing" it. In addition to encouraging waste diversion from landfill and incineration, it is a guiding design philosophy to eliminate waste at its source and at all points in the supply chain [10].

Zero Waste International Alliance's Zero Waste concept, which was made in 2004, is "a source of recyclable materials and other products by encouraging human beings to have a sustainable natural life cycle and change their way of life in this direction with a purpose that is suitable for ethical rules, economic structure, and has a vision. It guides to be designed so that it can be used. With Zero Waste Management, it is aimed to systematically design and

manage products and processes in order to reduce and prevent the toxicity of wastes and products in their structure, to protect and preserve all resources, to prevent waste incineration and burial. With the zero waste application, the threats to the earth, human, animal or plant life can be eliminated by discharges to the soil, water or air " [11].

Therefore, zero waste management systems include product design, consumption and resource recovery stages. Zero waste products based on cradle-to-cradle design principles are essential. These types of products will ultimately not generate any waste during the production stages. The service life of the product designed in this way should be easily extended with repair and thus it should be ready for use again [12].

Reducing wastes to zero and ensuring their sustainability at the same time is expressed as "zero waste management". The main purpose of this management system is to reduce the pollution caused by environmental problems during production at the source with the most appropriate method, and to minimize these wastes with the directions to be made in the next stage [7].

When it is aimed to have zero waste, a holistic approach is required, such as zero energy, human and material resources, zero emissions in air, soil and water, zero waste in management and production activities, zero waste in product life and zero use of toxic substances [13].

In Turkey, companies, institutions or organizations, there are 7 steps that need to apply to be included in the Zero Waste System.

Zero Waste System Application Stages;

4.2. Determination of focal points

To ensure zero waste management, the people who will lead the team should be determined. These are the persons who will be responsible for the establishment, effective and efficient implementation, monitoring, information flow and reporting of the zero waste management system in the organization.

4.3. Determination of the current situation

While implementing the Zero Waste Management System in your organization, first of all, it will help you to determine how you are in terms of wastes and analyze your current situation.

4.4. Planning

At this stage, a deadline plan specific to the institution is prepared based on the current situation.

4.5. Determination of Needs and Supply

While applying the Zero Waste System in the institution, all the equipment that will be needed is determined, listed and supplied before the implementation, by considering each unit in the institution (such as offices, dining hall, infirmary).

4.6. Education

After the supply of the equipment is completed, practical training and information activities are carried out for the target audiences before starting the application.

4.7. Application

The accumulation equipment provided is placed at points easily accessible by personnel, at appropriate intervals. Information posters designed according to the equipment are hung on the equipment in an easily visible way. Attention should be paid to the color scale in spooling equipment and promotional materials.

4.8. Reporting

At this stage, monitoring is carried out by the working team in order to evaluate the effectiveness of the application, and if any, the deficiencies, deficiencies or the parties to be developed are determined and measures are taken.

5. CONCLUDED REMARKS FOR TURKEY

With the "Zero Waste Summit" held on November 1, 2018; With the Zero Waste project, the goal of increasing a livable environment and a stronger economy has been determined by separating wastes at their source and ensuring recycling. According to the summit realized, the Zero Waste Project is a savings and efficiency project [14]. It is seen as a resource to be converted into waste raw materials and new products with the recent studies on the environment. During the approximately one year period the project is in operation; 58,000 tons of waste electrical and electronic equipment, 2.2 million tons of packaging waste, 38,000 tons of vegetable and 184,000 tons of end of life tires were collected separately in 80,000 tons of mineral waste oil sources and recycled (Zero Waste Summit, 2018). The main goal is to spread this practice to the whole country with the published Zero Waste Regulation.

REFERENCES

[1]. BP Statistical Review of World Energy, 68th edition, June 2019. Available: *https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-full-report.pdf.,* (accessed 15 December 2020).

[2]. A. U. Zaman, S. Lehmann, "The zero waste index: a performance measurement tool for waste management systems in a 'zero waste city," *Journal of Cleaner Production,* Vol. 50, pp. 123-132, 2013.

[3]. Zero Waste International Alliance, *http://zwia.org/, [Online],* Available: (2020).

[4]. Zero Waste Sonoma. Extended Producer Responsibility (EPR) or Product Stew-ardship and Take-back. Available: *https://zerowastesonoma.gov/re-duce/residents/extended-producer-responsibility,* (accessed 15 December 2020).

[5]. Solid Waste Management, "Total Domestic Waste Disposed Per Capita", available: *https://data.gov.sg/dataset/solid-waste-management-total-domestic-waste-disposed-per-capita?view_id=e7298947-e719-49a4-96a5-81d6c4a64154&resource_id=21727d9f-dc4f-4992-a354-4375a3a766c4* (accessed 15 December 2020).

[6]. Singapore Zero Waste Plan, "Singapore‟s zero-waste plan aims to raise domestic recycling rate from 22 to 30 per cent by 2030", available: *https://www.ecobusiness.com/news/singapores-zero-waste-plan-aims-to-raise-domestic recyclingrate-from-22-to-30-per-cent-by-2030/*, (accessed 15 December 2020).

[7]. F.F. Kavak, "Sıfır Atık Yönetimi: Marmara Üniversitesi Anadoluhisarı Kampüsü Örneği," *MSc thesis*, İstanbul, 2020.

[8]. http://www.no-burn.org/meetourmembers-ypbb [Online]. Available: (2020).

[9]. P. Palmer,"Getting to Zero Waste," *Sebastopol: Purple Sky Press,* 2004.

[10]. T. Curran, I.D. Williams, "A zero waste vision for industrial networks in Europe," *Journal of Hazardous Materials,* pp. 207–208, 3-7, 2012.

[11]. http://zwia.org/zero-waste-community-principles/ (accessed 15 December 2020).

[12]. A. U. Zaman, "Roadmap towards Zero Waste Cities", *International Journal of Waste Resources,*" Vol. 4 (2), 2014.

[13]. B. Kopacek, Literature Review, "Approaches to zero waste," *Deliverable 1.1, Towards Zero Waste in Industrial Network, Tech.* Rep., Available: www.zerowin.eu. , 2010.

[14]. https://sifiratik.gov.tr/ [Online], Available: (2020).