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European Neighbourhood Instrument Cross-Border Cooperation



Project BSB1021 CIRCLECON

Project title: Knowing Circular Economy in Black Sea Basin

1.2 ACTIVITY TITLE: Regional Specific Study

Regional Study in the Region of Samsun, Republic of Turkey:

Programme priority	2. Promote coordination of environmental protection and joint reduction of marine litter in the Black Sea Basin
Programme priority specific objective	2.2 Promote common awareness-raising and joint actions to reduce river and marine litter
Project title:	Knowing Circular Economy in Black Sea Basin
eMS Code:	BSB-1021
Grant contract no	31113/11.03.2021
Project Deliverable:	T.1.2.1 Regional Specific Study
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Date	December 2021

Checked: LB, Varna Free University

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EXECUTIVE SUMMARY

Within the scope of the “KNOWING CIRCULAR ECONOMY IN BLACK SEA BASIN” Project, a total of 17 organizations, 12 of which were in the manufacturing sector, were interviewed. It was taken into account to interview at least two companies from the same industry to compare results. Flour, recycling, plastic industry are the sectors that multiple companies were interviewed. The iron-steel, cement, energy and feed sectors that have no alternatives. Other interviews are law enforcement, supervisory and organizations working with the principle of volunteerism in Samsun.

When the production process of the manufacturing companies in Samsun is examined the following conclusions were drawn:

- Firms comply with the legislation in Turkey.
- A company's waste is used as the raw material of another sector (eg, the waste from the flour factory is the raw material of the feed industry, the treatment sludge is used as the fuel of the cement factory, etc.)
- Companies try to keep the material from raw material to final product, from final product to waste in the system till the end of processes.
- Companies aim to create minimum waste,
- Companies try to use clean energy,
- It has been observed that it tries to reuse solid, liquid and gas wastes (eg, the iron-steel industry produces zinc from flue gas, etc.).

The identified shortcomings:

- The companies are evaluated regardless their contribution to the circular economy,
- The participation to the circular economy is only derived from economical concerns,
- Large corporate companies dominate the subject, whereas the small enterprises have insufficient knowledge of the circular economy,

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- The Chamber of Commerce and Industry and the Organized Industrial Zone Directorate are not prioritizing the subject and not providing any information nor guidance on Circular Economy.
- It has been determined that the inspections of law enforcement are insufficient, and that this lack of inspection increases the number of unlicensed companies.

As a conclusion, the Corporate Companies are well aware of the benefit and importance of circular economy in Samsun. However; creating awareness, establishing platforms where information, studies and good practices are explained and shared will influence a wider range of organizations which will be the pathway to a permanent presence of the subject in Samsun.

1.INTRODUCTION

A significant increase of waste has been observed with the transition from agricultural society to industrial society. Due to globalization, competition has increased and the supply processes and production activities have become more important and more complex. Therefore, It is inevitable that all the limited natural resources will be consumed in a very near future by the high rise population and consequently the high consumption.

The Global Economic model is based on a “Linear Economy” which means that raw materials are used to make a product, and after its use any waste (e.g. packaging) is thrown away (Buy-Use-Throw). As long as this approach continues, it is obvious that there will be uncontrollably sudden and big problems in the coming years. In fact, this is the starting point of the concept of circular economy, which has gained momentum and been adopted by all circles in recent years. The circular economy (CE) stands for the efficient use and reuse of resources, materials and products, and this new economic model enables the transition from a linear model based on consumption and disposal to a sustainable system that extends the life of products and materials and minimizes waste. The circular economy is accepted and supported by many countries, regions and cities, especially in the European Union, due to reasons such as strengthening the place of countries in global competition, accelerating sustainable economic growth and expected to create new jobs.

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In recent years, Turkey has been following the circular economy closely and has been working on this issue. In particular, the Zero Waste Project, which is owned by Emine ERDOĞAN, the wife of our Honorable President, and carried out by our Ministry of Environment and Urbanization, has become a hot topic in Turkey. For this reason, efforts are being made to spread the "zero waste" approach, which has been adopted by the corporate, private sector, municipality and individual in our country.

Between the dates 19.10.2021 and 22.11.2021, 11 private enterprises, Ondokuz Mayıs University (Faculty of Engineering, Department of Environmental Engineering), Organized Industry Regional Directorate, Provincial Directorate of Environment and Urbanization, Chamber of Commerce and Industry, Turmepa (Turkish Marine Environment Protection association) were interviewed. A total of 17 interviews were conducted.

The project was based on the production summary, and the issue was discussed in a broader framework by taking the opinions of the stakeholders, giving priority to the circular economy model in the production sector and the efficient use of resources. Considering all the dimensions and dynamics of institutions within the scope of legal regulations, it is decided that the subject of "Circular Economy" can be evaluated objectively by the relevant institutions and stakeholders in a comprehensive manner, as well as in the production sector.

This report, which is prepared as the output of the study, is not only a bibliography on the circular economy, but also offers a roadmap for the city's transition to a circular economy. The first part of the report, which consists of three main sections, covers the regulations and legal processes in Turkey, Samsun's circular economy (Zero waste) approach and studies. The second part, the field study, covers the tendency of the sectors operating in Samsun and looking, their requirements for the transition to the circular economy, the environmental, social and economic gains to be obtained if the circular economy is implemented, the circular ecosystem roadmap and the management model. In the last section, conclusions and recommendations are presented.

2.METHOD

The economy model in today's world is linear economy based on the logic of "Take-Use-Throw it" and it is obvious that as long as this approach continues, there will be uncontrollably sudden and big problems in the coming years. Since the consequences of the climate crisis are

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becoming more and more devastating, finite natural resources are decreasing, and accordingly, access to raw materials becomes more difficult, different alternatives should be considered instead of the linear economy, which is completely incompatible with nature and is unsustainable. In fact, this is the starting point of the concept of circular economy, which has gained momentum and been adopted by all circles in recent years.

The study is prepared by Samsun Metropolitan Municipality. It is aimed to evaluate the current knowledge and operations on circular economy to find solutions to increase resource efficiency in Samsun province, to investigate the environmental, social and economic gains of this system and to determine the road map in the transition process. In this context, it is aimed to reveal the big picture for the transition to the circular ecosystem by evaluating the information on the circular economy, current practices and the needs, resources and opportunities in the city with a circular economy perspective, by interviewing the businesses.

With in the scope of the project called “Knowing Circular Economy in Black Sea Basin” Samsun Metropolitan Municipality has made face-to-face interviews between the dates 19.10.2021 and 22.11.2021 with private enterprises, university, non-governmental organizations, chambers and directorates. A total of 17 interviews were made during the preparation of the analysis report. The information of the institutions and persons interviewed is as follows;

STAKEHOLDERS	INTERVIEW #
PRIVATE ENTERPRISES	11
LAW ENFORCEMENT	1
UNION-CHAMBER-UNIVERSITY	4
NON-GOVERNMENTAL ORGANISATION	1

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#	DATE	ORGANIZATION	PRODUCTION	INTERVIEWED	TITLE
1	19.10.2021	YEŞİLYURT IRON AND STEEL SMELLING PLANT	Iron & Steel	ÇETİN LİVAOĞLU	General Manager
2	21.10.2021	ULUSOY UN	Flour	GÜNHAN ULUSOY	CEO
3	25.10.2021	OSMANLI UN	Flour	MEHMET KAZANCI	Import&Export Manager
4	25.10.2021	PROYEM	Provender	CEYHUN KARAASLAN	Operations Manager
5	26.10.2021	BABACAN PLASTİK	Plastic Pipe, Plastic Construction Materials	HALİT TEMEL	Company Partner
6	26.10.2021	POLİSAN KİMYA	Construction Chemicals	EMRE BAYRAM	Operations Manager
7	28.10.2021	AYAN PLASTİK	Plastic Pipe, Plastic Construction Materials	EMRE AYAN	Company Partner
8	03.11.2021	GÜVEN ATIK	Waste Recycling	ERCAN KARA	Company Partner
9	03.11.2021	GÖZE HURDACILIK	Waste Recycling	DİLEK KAYA	Company Partner
10	06.11.2021	PROVINCIAL DIRECTORATE OF MINISTRY OF ENVIRONMENT, URBANISATION AND CLIMATE CHANGE	Ministry	TEVFIK AKÇAY	Deputy Manager
11	06.11.2021	SAMSUN CHAMBER OF COMMERCE AND INDUSTRY	Chamber	SÜLEYMAN KARABÜK	Secretary General
12	06.11.2021	ETİ BAKIR	Copper Production Facility	FATİH SARI	Environmental Engineer
13	08.11.2021	AVDAN ENERJİ	Energy Generation Company	SİNAN BEKTAŞ	Deputy General Manager
14	09.11.2021	KAVÇİM	Cement Production Facility	ALİ AYGÜNEŞ	Operations Manager
15	10.11.2021	ORGANIZED INDUSTRIAL REGIONAL DIRECTORATE	Controller	HAKAN TÜTÜNCÜOĞLU	Manager
16	10.11.2021	ONDOKUZMAYIS UNIVERSITY ENVIRONMENTAL ENGINEERING DEPARTMENT	University	GÜLFEM BAKAN	Head Of Department
17	16.11.2021	TURMEPA	Non-Governmental Organisation	DAMLA BALÇIK	Samsun Education Coordinator

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After making an appointment with the institutions and companies, face-to-face interviews were made with the above-mentioned people on the dates specified above, and they were recorded by voice. In the interviews, the following questions were asked, except for the questions containing the specific characteristics of the institution and the questions formed within the framework of the interviews.

- Can you introduce your institution and yourself?
- What are your company's studies on Circular Economy? (Past, present and future plans)
- What kind of difficulties do you experience in your work on the circular economy? (Past and present)
- How many products are returned to the circular economy in your company?
- How important is the circular economy to your company and why?
- What are the difficulties you experience while establishing a circular economy system?
- What are your suggestions?

While determining the business, especially the companies that produce were preferred. In addition, attention was paid to the fact that there were two companies doing the same job on a sectoral basis. Our aim here; The aim was to try to understand whether the examples of good practice or the problems experienced were on a business or sectoral basis. In the interviews;

- Clean (sustainable) production, which emphasizes pollution prevention, and the circular economy approach, which aims to control pollution after it occurs, are largely unknown, with the exception of corporate firms.
- Firms are trying to comply with the regulations. However, it was seen that the controls were not sufficient. It has been determined that the lack of supervision prolongs the process of fulfilling the responsibilities of the companies.
- Except for corporate companies, it has been determined that there are no waste management plans.

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- Considering both universities and public institutions, various studies are carried out in the field of production, but it is seen that these are not sufficient and are not carried out within the framework of a common systematic and national plan.
- Businesses; He drew attention to the inadequacy of companies that have a waste receiving license, especially those that have a hazardous waste license in Samsun. It is seen that most of the companies selected for disposal are outside the city, and especially the removal of the waste part, which we call the end product, affects the companies economically. For this reason, it has been determined that companies create circular economy models (products that they can recycle or their hazardous wastes) due to economic concerns.
- 10 of the 12 enterprises interviewed bring back the waste part, which we call the end product, to the economy at a rate of 98%. It has been determined that 2 businesses have end products that can be brought to the circular economy. One of the enterprises stated that the end product has usage areas, but due to the inadequacy of R&D studies in our country, the usage areas of this product are not specified on the basis of the regulation. The other enterprise stated that they chose the storage method, while they could add their final products to the circular economy because they could not receive government incentives.
- It has been observed that 85% of the companies realize the circular economy at a rate of 98% in their businesses. When viewed at this scale, it has been determined that the concept of circular economy is well executed on the basis of corporate firms, but these efforts are on an individual basis.
- It has been determined that the Organized Industry Directorate, to which they are affiliated, is not very familiar with the circular economy studies on the basis of companies.

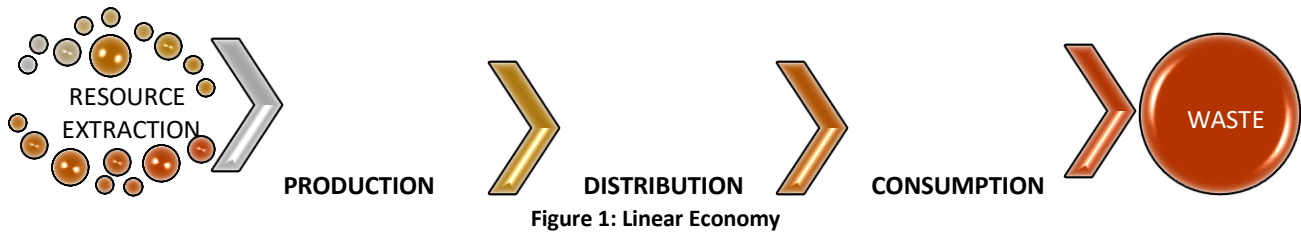
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3. CIRCULAR ECONOMY LEGISLATION IN TURKEY

Although the concept of circular economy has been widely used in recent years, it is a conceptual structure with a rich historical background. The concept was first discussed in Boulding's 1966 article titled "The Economics of the Coming Spaceship Earth", as it relates to the cyclical rather than linear flow of resources in the economy. (Veral, 2018: 151). Inspired by Boulding's work, two British environmental economists named D. W. Pearce and R. K. Turner first directly included the concept of circular economy in their 1990 study called 'Natural Resources and Environmental Economy. (Chuang, 2010: 46). There are also think tanks such as the Ellen MacArthur Foundation, which contributes significantly to the development of the concept by preparing researches and reports. Despite these, it is not possible to attribute the concept of circular economy to a person or institution in history. Many people and think tanks have had an impact on the development of the concept. The concept has its roots in industrial ecology, ecological economics, industrial ecosystems, clean production, product service systems, eco-efficiency, cradle-to-cradle design, biomimicry, performance economics, natural capitalism and zero emissions. (Korhonen vd., 2018: 545)

The circular economy (CE) stands for the efficient use and reuse of resources, materials and products, and this new economic model enables the transition from a linear model based on consumption and disposal to a sustainable system that extends the life of products and materials and minimizes waste. As a result of the increasing global population and current consumption habits, the stocks of resources are rapidly decreasing; non-renewable natural resources are depleted. However, 1.3 billion tons of waste produced annually by cities is expected to increase to 2.2 billion tons by 2025. As a matter of fact, landfills are overused due to the intense waste generation of the cities. Existing business models that lead to resource depletion and excessive waste generation are unsustainable as they threaten natural ecosystems and do not provide basic living conditions for all living species, they are against nature.

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A linear economy can be defined as an industrial mindset in which production and resources are considered unlimited and economic benefits are placed above all other criteria. Some of the problems that the linear economy will cause both in the short and long term can be summarized as follows:

- It produces large amounts of waste that harms the environment. It causes the unsustainable use of resources, that is, the depletion and overuse of natural resources.
- Since not all of the products put on the market are sold, it causes more products to be produced than the total demand, that is, excess inventory that causes loss of money for companies.
- Reduced product life cycles thus result in useless, out-of-function and, moreover, obsolete products.
- It causes price fluctuations due to the volatility of supply chains and dependence on raw materials.

Recently, landfills nearing capacity, the rapid depletion of natural resources, and the environmental impact of waste have prompted companies and governments to consider the amount of waste generated and ways to reduce it. Thus, the need for a new economic model has come to the fore and the circular economy is seen as the strongest alternative to meet this need. The circular economy goes beyond resource efficiency and recycling. It provides the framework for developing new business models that aim to increase the value, use and longevity of materials, products and assets, as well as redesign waste from production and consumption.

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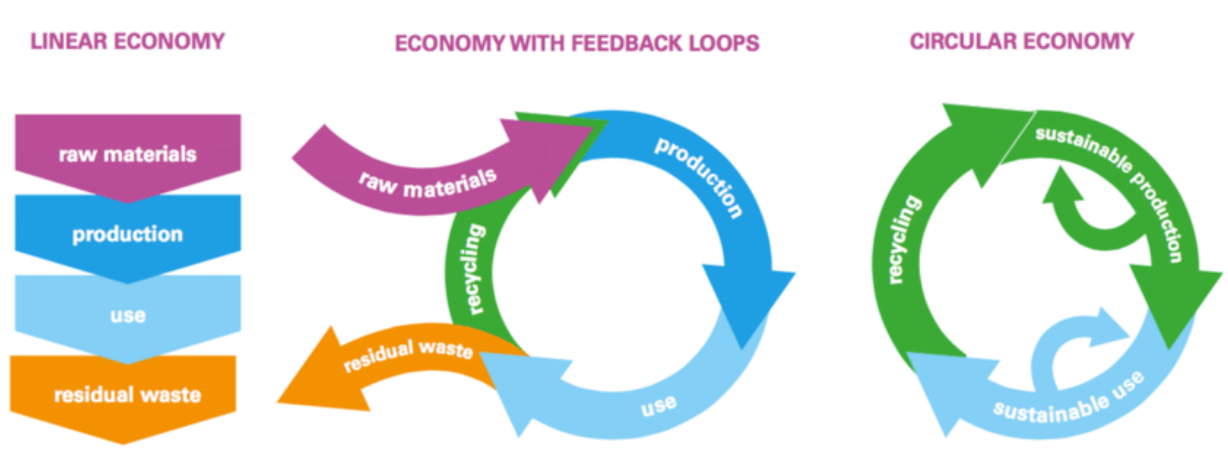


Figure 2: Transition from Linear Economy to Circular Economy

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From a linear to a circular economy

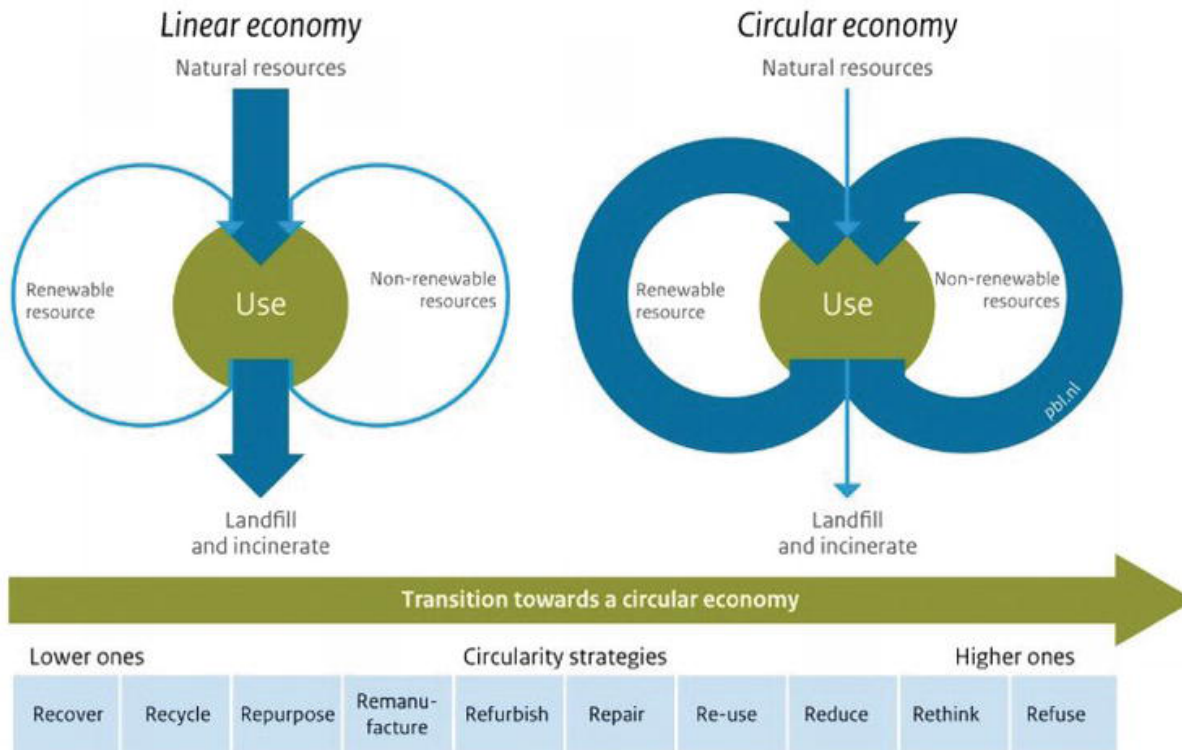


Figure 3: Comparison of Linear Economy, Economy with Feedback Loops and Circular Economy

The circular economy approach and its application is a concept developed against the linear economy to reflect the characteristics of the concepts related to closing the loops, namely reprocessing, reuse, repair, maintenance and recycling.

In addition to optimizing the resources used in the circular economy, these resources are tried to be kept in the cycles as long as possible, wastes are reduced as much as possible and unavoidable wastes are recovered or recycled.

The circular economy enables companies to rethink energy consumption and waste generation. This model, which enables the use of renewable energy and regulates waste management, also improves social, economic and natural capital. This approach is essentially based on the following three basic principles:

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- Avoid pollution and waste
- Keeping materials and products in use
- To enable natural systems to be recreated

The concept can work effectively for large and small businesses, organizations and individuals at any scale, globally and locally. The transition to the circular economy is not just about the practices aimed at reducing the negative effects of the linear economy. Rather, it represents a systematic change that builds long-term resilience, generates jobs and economic opportunities, and delivers environmental and societal benefits. Population growth and rapid urbanization, which emerged with industrialization and technological development, increase production, marketing and consumption activities throughout the world, causing pressure on the environment. The increase in these activities threatens the environment and human health by increasing the amount of waste generated. For this reason, with the rapidly increasing environmental awareness in Turkey, priority has been given to environmental protection policies including waste management around the world. The concept of Circular Economy entered our lives with the name of Zero Waste Project owned by Mrs. Emine ERDOĞAN and currently run by The Turkish Ministry of Environment, Urbanization and Climate Change in 2017.

3.1 ZERO WASTE

Zero Waste"; It is a target defined as "waste management philosophy, which includes preventing waste, using resources more efficiently, preventing or minimizing waste generation by reviewing the causes of waste generation, and collecting and recycling waste separately at the source in case of occurrence" and;

- ❖ Increase in productivity,
- ❖ Increasing performance due to clean environment,
- ❖ Reducing cost by voiding waste,
- ❖ Ensuring the reduction of environmental risks,
- ❖ Ensuring that employees have a sense of "sensitive consumer" as it contributes to the development of environmental protection awareness within the organization,
- ❖ It has taken its place in the definitions as ensuring that the institution has the title of "Environmentalism" in national and international markets, thereby increasing its prestige.

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In 2017, our Ministry of Environment, Urbanization and Climate Change announced the transition to the Zero Waste System to the first local administrations and official institutions and asked them to establish a system. This system consists of 7 stages.

In 7-stage system setup for Zero Waste;

1. Determining the Focal Point

Determining 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 institution.

2. Revealing the Current Situation

When applying the Zero Waste Management System in your institution, first of all, determining the state of the waste, analyzing the current situation.

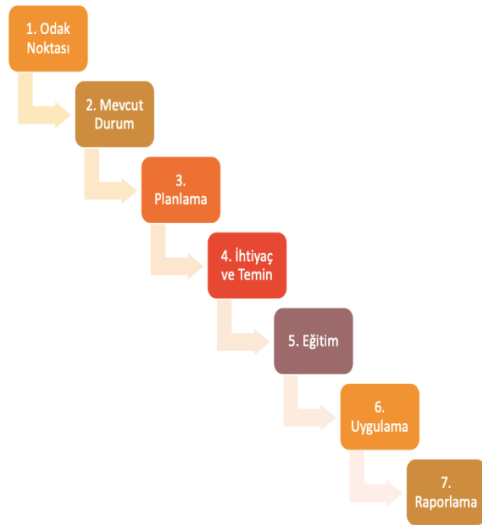


Figure 4: Zero Waste System Steps

3. Planning

At this stage, based on the current situation, the preparation of an institution-specific deadline plan.

4. Need and Supply

While the Zero Waste System is being implemented in the institution, considering each unit in the institution (offices, cafeteria, infirmary etc.), all the equipment that will be needed is determined, listed and provided before the implementation.

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5. Education

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

6. Implementation

The collection equipment provided should be placed at the points that personnel can easily reach, at appropriate intervals, informative posters designed according to the equipment, hanging on the equipment in a way that can be seen easily, paying attention to the color scale in the collection equipment and promotional materials,

7. Reporting processes were requested to be followed.

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

3.2 REGULATION

Waste management has been the subject of many legal regulations in our country since the 1930s. Since these years, the number of institutions that undertake functions in the field of environment has increased continuously. However, the fact that the authority and responsibility areas of the existing institutions were not changed while creating new institutions led to overlapping authority among the relevant institutions, while the lack of effective cooperation and coordination between the relevant institutions and organizations weakened the operability of the system. Due to factors such as weak financial support and insufficient technical knowledge and equipment, a healthy waste management system has not been established until today.

Our first waste regulation was published on 14.03.1991 with the name of the Solid Waste Control Regulation. With this regulation, for the first time, Turkey met with the words deposit, recycling and recovery.

The Regulation on Control of Hazardous Wastes was published on 14.03.2005.

On 02.04.2015, a new regulation was published with the name of Waste Management Regulation and the previous regulation was abolished. This regulation also included the management process of hazardous waste. In 2016, the Hazardous Waste Control regulation was also abolished.

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Control of Packaging Waste was published on 27.12.2017, and the place of packaging waste in the circular economy was emphasized for the first time.

The Zero Waste Regulation was published on 12.07.2019. With this regulation; It is aimed to collect recyclable and recyclable wastes separately, not only in terms of environmental pollution, but also to give these wastes an economic identity.

With this regulation, the Ministry has separately published 11 guides on 11.08.2020 in order to create a circular economy model in Turkey and to include local administrations, sectors and living spaces in the process. The transition processes of these institutions to the zero waste system are explained with the following guides. These manuals are:

- Shopping Mall, Business Center, Commercial Enterprise and Plaza Guide
- Educational Institution and Dormitories Guide
- Residence and Sites Guide
- Airport, Train and Bus Terminal Guide
- Institution and Organization Guide
- Rural Areas Guide
- Local Administrations Guide
- Zero Waste Blue Guide
- Organized Industrial Zones and Industrial Facilities Guide
- Healthcare Organizations Guide
- Tourism Facilities HOREKA (Hotel, Restaurant, Cafeteria) Guide

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3.3 ZERO WASTE DUTY HIERARCHY IN TURKEY

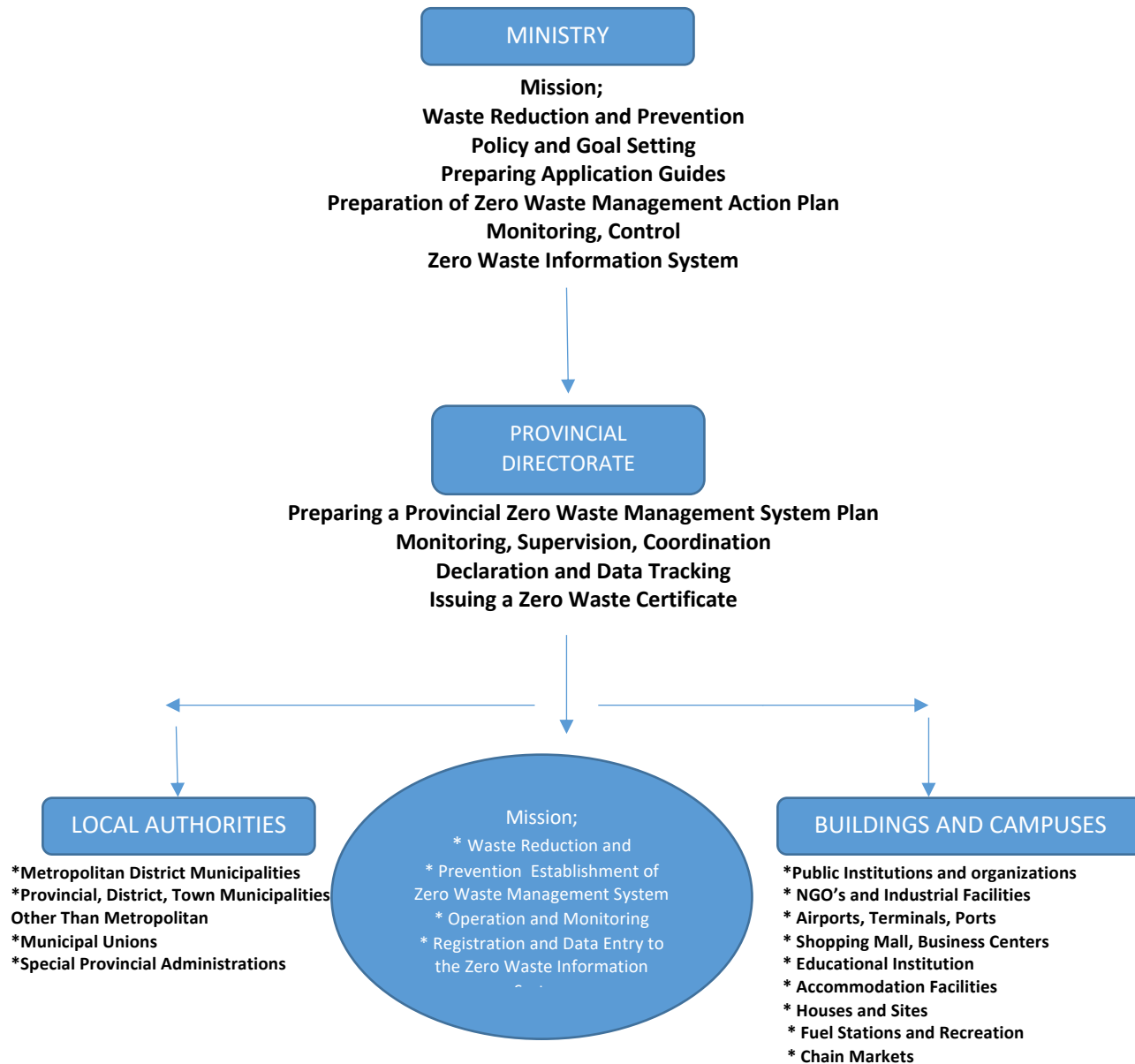


Figure 5: Zero Waste Mission Hierarchy

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3.4 WASTE MANAGEMENT REGULATION

It is the regulation that covers the formation, collection, transportation and disposal processes of hazardous wastes, packaging wastes, municipal wastes in our country in 02.04.2015.

3.5 NATIONAL WASTE MANAGEMENT PLAN (2016- 2023)

Turkish Ministry of Environment, Urbanization, and Climate Change has prepared a National Waste Management and Action Plan covering the years 2016-2023 to protect and develop our natural resources and ecosystems and to create a healthy and livable environment for current and future generations.

The National Waste Management and Action Plan which includes information on the capacity, location and time for the required facility investments, regionally determined methods of recycling, pre-treatment, intermediate storage and disposal for all waste types. Waste management activities planned to be carried out until 2023 serves as a guide for overall investment and operating costs. The need for public investment is expected to be between €2 to €3 billion, depending on the choice of technology.

With the policies and practices to be put forward within the framework of the National Waste Management and Action Plan, it will be possible for Turkey to have a better organized, integrated and strong corporate structure waste management system, as well as to provide our citizens with the opportunity to live in a healthier and cleaner environment.

The Medium and Long-term goals have been determined in the National Waste Management and Action Plan 2023 Report published by the Ministry of Environment, Urbanization and Climate Change. Some of the targets are;

- Ensuring that 35% of the waste that will be generated in 2023 is recycled and 65% is disposed of with regular landfills,
- Ensuring the rehabilitation of wild dump sites,
- Ensuring the dissemination of construction waste and excavation soil management,
- Ensuring that the collection and recycled of special wastes are increased by the management,
- There are facility investments for the recovery and disposal of hazardous wastes.

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3.6 PARIS CLIMATE AGREEMENT and GREEN RECONCILIATION ACTION PLAN

Within the scope of harmonization with the European Green Deal, the “Green Deal Action Plan” prepared by the Ministry of Commerce was published in the Official Gazette on 16 July 2021.

Green Deal action plan; It envisions increasing the efficient use of resources, restoring biodiversity and reducing pollution by moving to a clean, circular economy. The framework of this plan consists of the following policy areas:

- Clean Energy
- Sustainable industry (Sustainable, environmentally friendly production cycles)
- Construction and renovation (A cleaner and greener construction industry)
- From farm to fork (More sustainable food systems)
- Elimination of pollution
- Sustainable mobility (More sustainable means of transport)
- Biodiversity (Measures to protect fragile ecosystem)

The action plan and policy areas aimed to zero carbon emissions, decarbonize the energy sector, invest in environmentally friendly technologies, encourage innovation in production, and end the dependence on resource use.

3.7 CIRCULAR ECONOMY LEGISLATION IN SAMSUN

In line with the request of the Ministry of Environment, Urbanization and Climate Change, it is obligatory for each province to have its own zero waste management plan. It is the responsibility of Samsun Provincial Directorate of Environment, Urbanization and Climate Change to prepare this management plan for Samsun. This report, completed and published in 2020;

Purpose of the Provincial Zero Waste Management System Plan is to ensure the sustainability and efficiency of the zero waste management system to be implemented by local administrations, buildings and campuses at the provincial borders, both on a local and national scale, in a strategic integrity. It is ensured that the zero waste management system to be implemented throughout the province and carried out in coordination with the individuals producing the waste, the management of the buildings and campuses where the wastes are generated, the local administrations responsible for the waste management infrastructure and the administrations responsible for the formation of waste management targets and policies. With this plan, targets and policies are set for the zero waste management system to be implemented throughout the province, taking into account the local characteristics and current conditions of the province; short-term and long-term strategies are

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determined. Provincial Zero Waste Management System Plan to be prepared to meet the expectations and targets from the zero waste management system;

1. To ensure the establishment, implementation and cooperation of a zero waste management system by local administrations,

2. To ensure the integration of the zero waste management system to be implemented in the buildings and campuses with the zero waste management system applications established/to be established by the local administrations,

3. To ensure the creation of "Local Waste Management Systems" to be implemented in the province,

4. To ensure the sustainability and traceability of the zero waste management system and to update and develop it when necessary,

5. It is prepared by the commission to be determined by the Local Environment Committee to ensure that local administrative decisions are taken in compliance with the national legislation. It will be included in the agenda of the Local Environment Board and will be decided upon and implemented by all parties.

The Provincial Zero Waste Management System Plan Contains The Following Headings:

1. Information on the Working Team Determined at the Provincial Level
2. Current Situation in Waste Management
3. Vision, Short and Long Term Goals
4. Provincial Zero Waste Management System Planning
5. Education, Awareness Activities
6. Monitoring, development and reporting activities.

In particular, the study team played an important role in the preparation of the plan. While preparing the provincial zero waste action plan, it was aimed to create an applicable and sustainable plan by including not only the personnel of the Provincial Directorate of Environment and Urbanization, but also the personnel of different institutions.

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WORK TEAM

- Under the Presidency of the Provincial Directorate of Environment and Urbanization,
- Samsun Metropolitan Municipality and, if necessary, District Municipalities
- Provincial Directorate of National Education
- Provincial Health Directorate
- 19 Mayıs University
- Samsun University

As Samsun province, we comply with this action plan and are subject to all waste legislation valid in Turkey.

4. WASTE MANAGEMENT IN TURKEY

Considering that wastes harm the environment and human health due to physical, chemical and biological reasons; The necessity of systematic implementation of waste management comes to the fore. Integrated waste management is a system in which its goals and objectives are defined after accepting it as a concept that it evaluates waste management as a whole and examines its elements one by one in terms of efficiency and effectiveness. Its main purpose is; To minimize the impact of the elimination of wastes generated in this system on the environment and economy. (Bozkurt, 2012). Integrated waste management covers the following topics:

- It covers all solid waste,
- Covers all solid waste sources,
- Besides the separate collection of collection and recyclable waste,
- Recycling,
- Biological treatment of organic waste,
- Incineration,
- Regular Storage.

When we look at integrated waste management in Turkey; In 1991, with the “Regulation on Control of Solid Wastes”, the concept of solid waste began to be examined more. The issue of waste management, which gained momentum with the regulations that started to be published for the first time in 2003; Today, it has turned into a management strategy with an integrated waste

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management approach. For the best or a suitable waste management system; 'Solid Waste Management' should include the following objectives (Schübeler, 1996):

- To protect environmental health,
- To increase the quality of the urban environment,
- To support the efficiency and adequacy of the economy,
- It is necessary to establish sustainable solid waste management systems in order to generate employment and income, and to achieve these goals.

The collection, transportation and recycling of domestic solid wastes and their final disposal without adversely affecting the environment and human health have been given to Municipalities.

The population of Turkey is 83 million 614 thousand 362.2 (TUIK 16.11.2021). The average daily amount of waste per person collected in municipalities in 2018 was calculated as 1.16 kg according to TUIK.

Number of Provinces:	81	Number of Metropolitan Municipality:	30
Number of Districts:	922	Number of Provincial Municipality:	51
Number of Neighborhoods:	32164	Number of Metropolitan District Municipality:	519
Number of Villages:	18291	Number of District Municipalities:	403
Number of Affiliates:	23918	Number of Town Municipalities:	387
Total Number of Municipalities			1390

Figure 6: Civil Administration Departments of Turkey

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4.1 MUNICIPAL WASTE

The commercial, industrial and institutional wastes, which the municipality is responsible for, originate from households or are similar in content or structure, are called municipal waste or household waste. Municipal waste mainly includes the following components:

- Mixed domestic solid waste
 - Recyclable waste (glass, metal cardboard packaging waste)
 - Hazardous waste from homes (batteries, light bulbs, paint cans, etc.)
 - Commercial and institutional waste (waste from workplaces, schools and other public buildings)
 - Domestic industrial solid waste
 - Garden, market and market waste (green waste)
 - Street, sidewalk and square scraps
 - Bulky waste (furniture etc.)
- ❖ The following data are TUIK 2018 data.

Municipal Wastes are disposed of in regular waste disposal facilities in Turkey. Incineration facility is preferred for hazardous wastes. 67.2% of municipal waste was sent to landfills. 98.8% of the waste was collected.

While 67.2% of the 32 million 209 thousand tons of waste collected in municipalities where waste service is provided is sent to landfills, 20.2% to municipal dumps and 12.3% to recycling facilities, 0.2% is burned in the open. was disposed of by burial, spilling into stream or land.

Municipal Waste Indicators, 2016, 2018

	2016	2018
Total Number of Municipalities	1.397	1.399
Number of Municipalities Providing Waste Service	1.390	1.395
Ratio of the total municipal population of the municipality where waste services are provided (%)	98,6	98,8
Amount of collected waste (Thousand tons)	31.584	32.209
Average amount of waste per person (Kg/Person-day)	1,17	1,16
Ratio of collected waste according to disposal and recovery methods (%)		
Sent to Landfill	61,2	67,2
Sent to Municipal Dump	28,8	20,2

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Sent to Recycle Facilities	9,8	12,3
Other Disposal Methods	0,2	0,2

Figures in the table may not reflect the actual numbers due to rounding.

(1) It covers the disposal made by burning in the open, burying, pouring into the stream and land.

Figure 7: (2016-2018) Municipal Waste Indicators
Source:TUIK (2019)

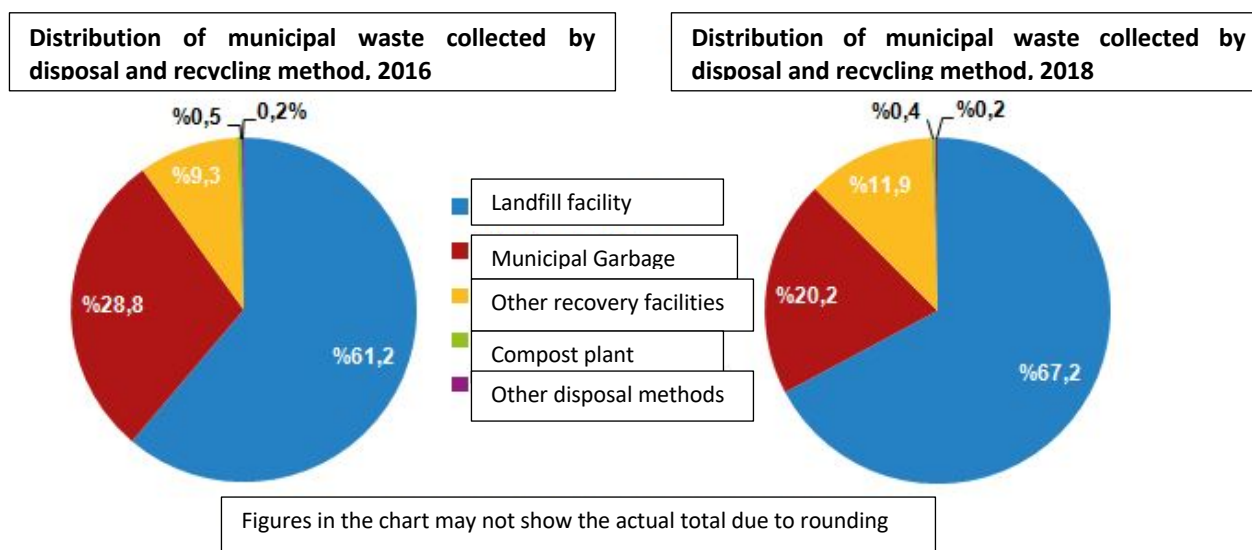


Figure 8: Distribution of Collected Municipal Waste by Disposal and Recovery Rate

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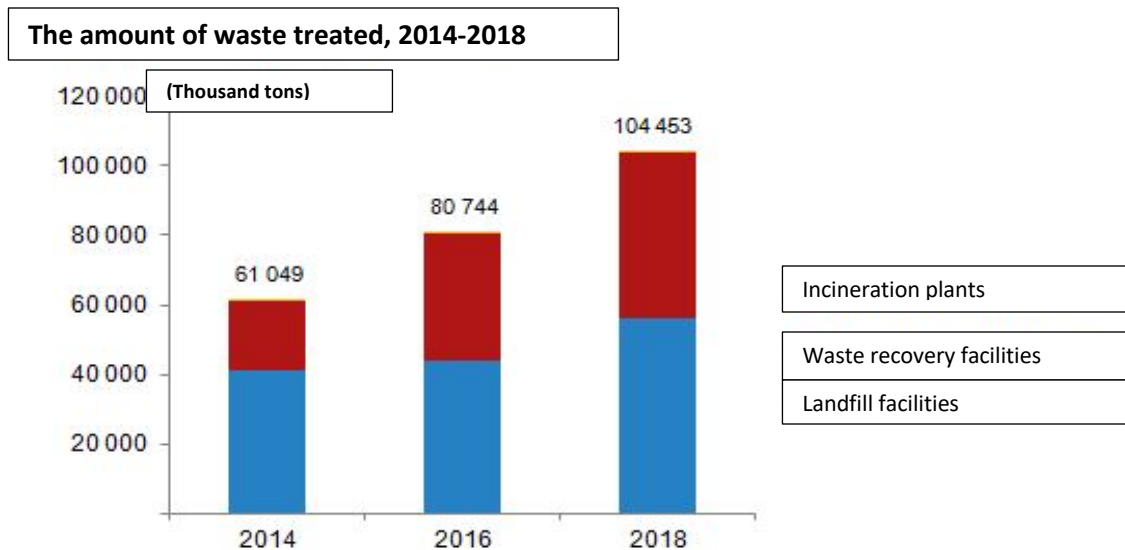


Figure 9: (2014-2108) Amount of Waste Treated

As a result of the studies carried out for the establishment of solid waste disposal facilities in Turkey; The number of landfills, which was 15 until 2003, increased to 38 in 2008, 46 in 2010, 79 in 2014, 81 in 2015, 84 in 2016 and 87 in 2017. reached 88. As of 2019, a population of 64.8 million is served in 1179 municipalities with 89 facilities.

According to the data of the Ministry of Environment, Urbanization and Climate Change for 2019, the ratio of the population served by landfill facilities to the total municipal population is 82%. By the end of 2023, it is aimed to improve all of the existing infrastructure facilities and to increase the rate of the population provided with waste disposal services to 100%.

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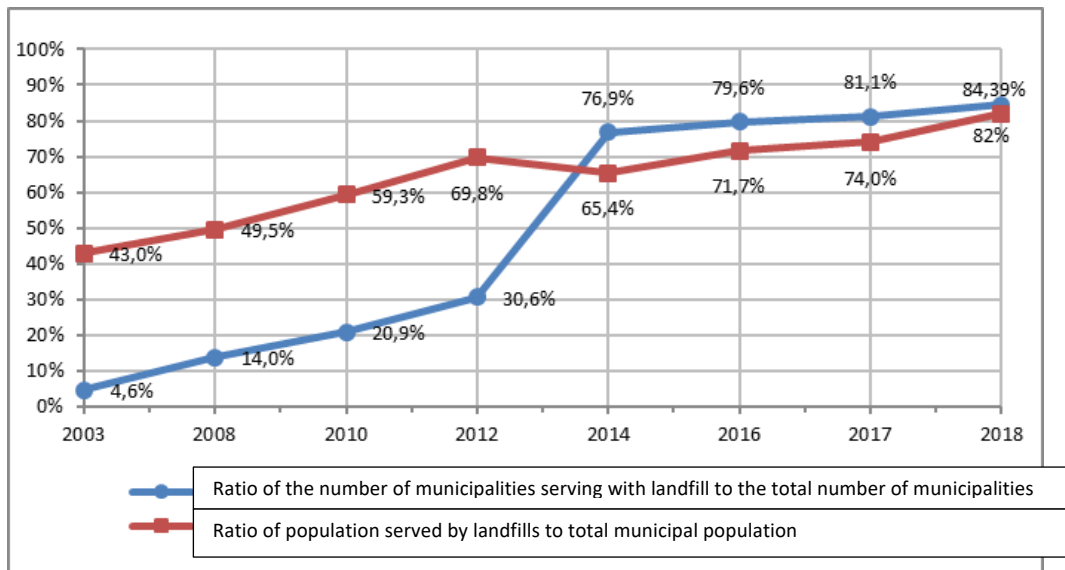


Figure 10: Number of Municipalities Served by Landfills and Population Ratio by Years (%)

Source: Ministry of Environment, Urbanization and Climate Change, General Directorate of Environmental Management

4.2 INDUSTRIAL WASTES

We define industrial waste, which is subject to the Waste Management Regulation, as industrial solid waste, which is undesirable solid matter and treatment sludge released in all kinds of industrial facilities. These types of wastes can be grouped under two groups according to their sources.

- Wastes not originating from industrial units, processes and processes
- Wastes resulting from industrial processes. In general, various packaging wastes such as glass, paper, wood and metal, as well as construction and rubble wastes are included in the first group. Solid wastes, which are formed as a result of industrial processes or processes and are in the form of sludge, are defined as "harmful wastes". All kinds of biological, chemical, toxic, flammable, explosive and radioactive solid wastes with hazardous properties and some ashes containing pollutants are in this class. Sludge with different characteristics comes out from various treatment units in water and wastewater treatment plants. The recovered and reused amount of solid wastes

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originating from the manufacturing industry is 1.4 million tons, the amount sold and reused is 5.2 million tons, and the disposed amount is 7.4 million tons.

4.3 HAZARDOUS WASTES

Hazardous wastes subject to Waste Management Regulation;

It can be defined as wastes that can harm human health and the environment, flammable, explosive, oxidizing, infectious, irritating, harmful, toxic, carcinogenic, corrosive and exhibit one or more of the characteristics considered dangerous. Businesses in Turkey are obliged to prepare a hazardous waste management plan,

YEAR	2008		2010		2012		2014		2016	
	Total waste amount	Hazardous waste amount in total waste amount	Total waste amount	Hazardous waste amount in total waste amount	Total waste amount	Hazardous waste amount in total waste amount	Total waste amount	Hazardous waste amount in total waste amount	Total waste amount	Hazardous waste amount in total waste amount
Municipalities	28.454	-	29.733	-	30.786	-	31.230	-	33.763	-
Manufacturing Industry	12.482	1.136	13.366	964	14.420	806	15.733	1.006	16.267	1.194
Workplaces										
Thermal Power Plants	25.622	24	18.748	(**)	19.262	5	24.191	9	19.477	12
Organized Industrial Zones	255	34	313	(**)	421	62	533	32	474	...
Mining Managements	729.75	2.314	951.782	3.181	755.218	2.355	811.056	(**)
Health Organizations	50	50	60	60	69	69	74	74	81	81
Total			791.97		1.016.741		826.981		861.118	

Figure 11: (2008-2016) Hazardous Waste Amounts Collected Between Years

General Principles

- It is essential to take necessary measures to minimize waste at its source,
- Measures that will not harm the environment and human health should be taken at every stage of waste management,
- It is forbidden to collect, sell and dispose of wastes for commercial purposes other than at disposal facilities licensed by the Ministry, and to burn them by mixing with other fuels,
- Wastes cannot be directly mixed with any other substance or waste or diluted, except for physical, biological and chemical pre-treatments.

Temporary Storage of Wastes

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Temporary Storage is defined as the safe storage of wastes within the facility. In case there is no suitable place within the facility, in an appropriate area belonging to the manufacturer, before they are transported to the intermediate storage, recovery and final disposal facilities or before they are reused in the facility.

A total of 2223 waste disposal and recycling facilities were operational.

985 facilities which is including 117 waste disposal facilities and 868 recycling facilities operated by or on behalf of municipalities, were operated in 2014. In 2018, a total of 2 223 facilities operated, of which 166 were waste disposal facilities and 2,057 recycling facilities. While 41 million tons of waste was disposed of in landfills and 43 thousand tons in incineration facilities in 2014, 20 million tons of waste was recovered in recycling facilities. In 2018, it was determined that 56 million tons of waste was disposed of in landfills, 494 thousand tons of waste was disposed of in incineration facilities, and 48 million tons of waste was recovered in recycling facilities.

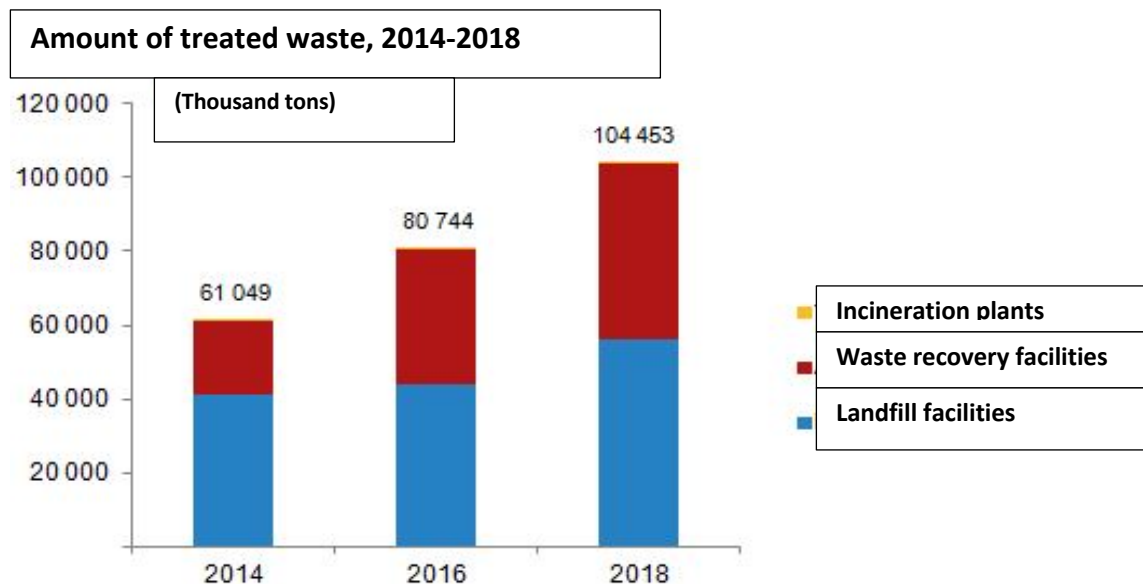


Figure 12: (2014-2018) Waste Amounts Treated Between Years

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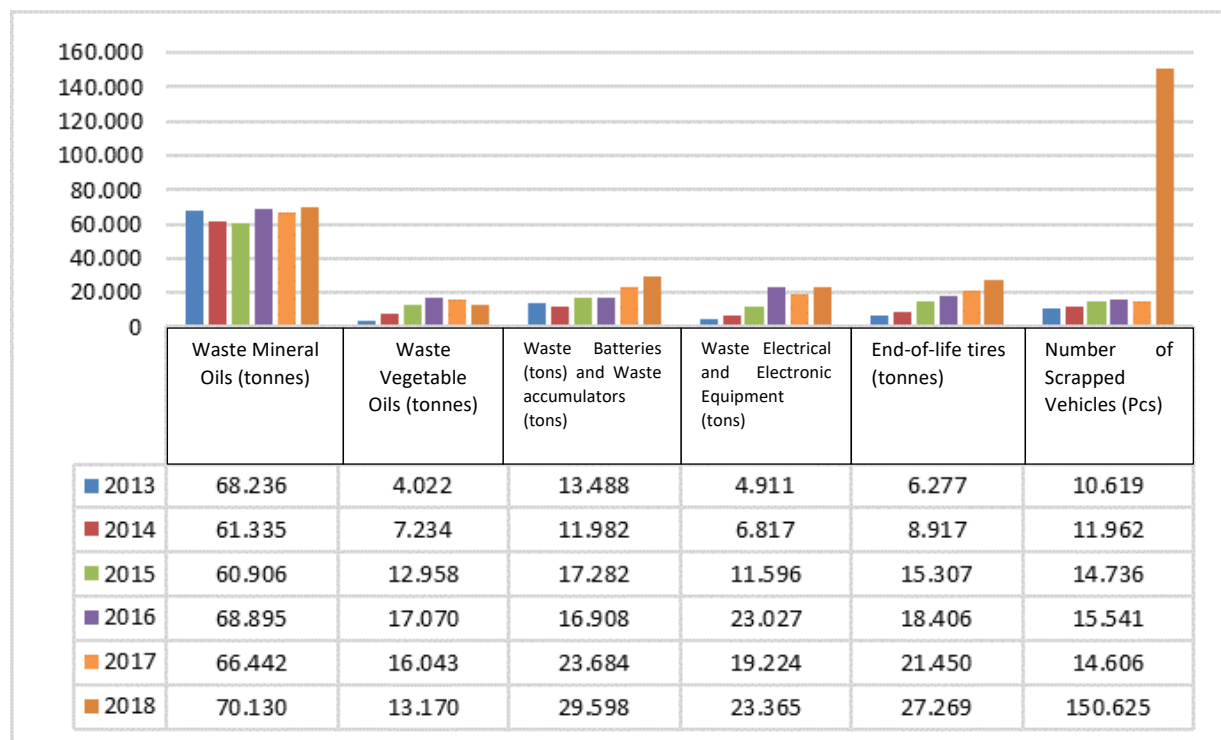


Figure 13: (2013-2018) Hazardous Wastes Collected Between Years

Environmental protection expenditures amounted to 38.2 billion TL

Sources: 1. For the number of scrapped vehicles; General Directorate of Environmental Management

2. For other data: Ministry of Environment, Urbanization and Climate Change, Ministry of Environment, Urbanization and Climate Change, General Directorate of EIA, Permission and Inspection, Hazardous Waste Declaration System (TABS) data

4.4. WASTE MANAGEMENT AND CIRCULAR ECONOMY IN SAMSUN

Samsun population is 1 million 356 thousand 079 people according to 2020 TUIK data. Samsun consists of 17 districts.

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Samsun Population by Districts

	District	District Population	Population Percentage
2020	Ilkadam	336.501	% 24,81
2020	Atakum	221.082	% 16,30
2020	Bafra	143.443	% 10,58
2020	Çarsamba	140.245	% 10,34
2020	Canik	101.253	% 7,47
2020	Vezirköprü	94.360	% 6,96
2020	Terme	71.938	% 5,30
2020	Tekkeköy	54.363	% 4,01
2020	Havza	39.221	% 2,89
2020	19 Mayıs	26.044	% 1,92
2020	Alaçam	25.123	% 1,85
2020	Kavak	21.154	% 1,56
2020	Ayvacık	19.843	% 1,46
2020	Salıpazarı	19.709	% 1,45
2020	Asarcık	16.706	% 1,23
2020	Ladik	16.391	% 1,21
2020	Yakakent	8.703	% 0,64

Figure 14: Samsun Population by Districts
Source : TÜİK(2021)

Domestic wastes in Samsun are collected by district municipalities and disposed of by Samsun Metropolitan Municipality. There are two regular storage facilities in Samsun. The Central Solid Waste Regular Landfill (MKADDS), became operational in 2008. On the other hand, Çarşamba Sanitary Landfill Site was incorporated into Samsun Metropolitan Municipality in 2014 with the Entire City Law No. 6360. Since 2015. All the wasted from districts are disposed in these two landfills. 4 transfer stations were established as Samsun Metropolitan Municipality, as transportation brought an additional cost for our long-distance districts. District municipalities that bring their wastes to these transfer points, which are created by calculating the short distances that the districts can reach,

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are transported to the Samsun Central Solid Waste Landfill Facility for disposal by being transferred to large trucks here. Samsun is divided into 4 regions.

- ❖ Western Region: Yakakent, Alaçam, Bafra, Ondokuz Mayıs
- ❖ Southern Region: Vezirköprü, Ladik, Havza, Kavak, Asarcık
- ❖ Eastern Region: Terme, Carsamba, Salıpazari, Ayvac
- ❖ Central Region: İlkadım, Atakum, Canik. Tekkekoy

TRANSFER STATIONS

- ❖ Bafra Transfer Station (Serves the western region.)
- ❖ Kavak Transfer Station (Serves Kavak, Asarcık districts.)
- ❖ Havza Transfer Station (Serving the districts of Havza, Ladik)
- ❖ Vezirköprü Transfer Station (serving Vezirköprü district)

At the Central Solid Waste Landfill, which became operational in 2008

- Medical Waste Sterilization Facility
- Methane Gas Cycle Plant
- Biogas Plant
- Pre-sorting Facility
- Waste Museum
- Sludge Drying Plant
- Greenhouse
- Electrical energy is produced from domestic waste stored in the medical field.

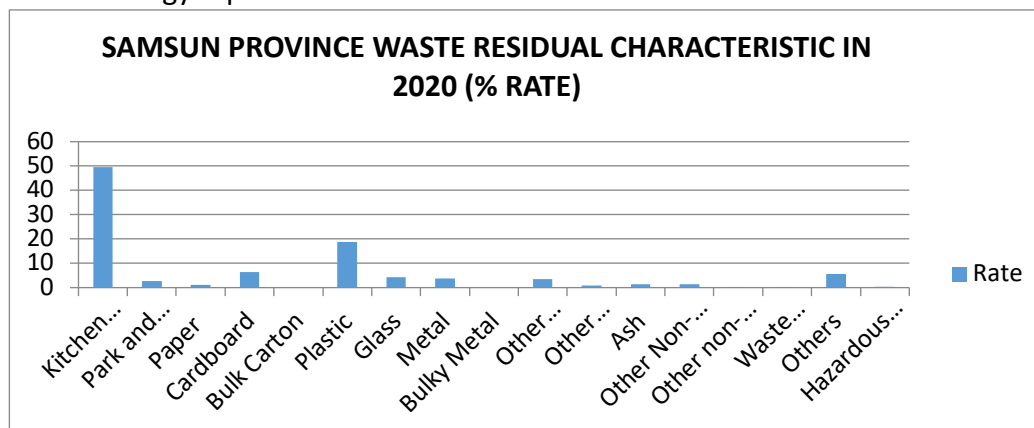


Figure 15: Samsun Province Waste Characterization in 2020

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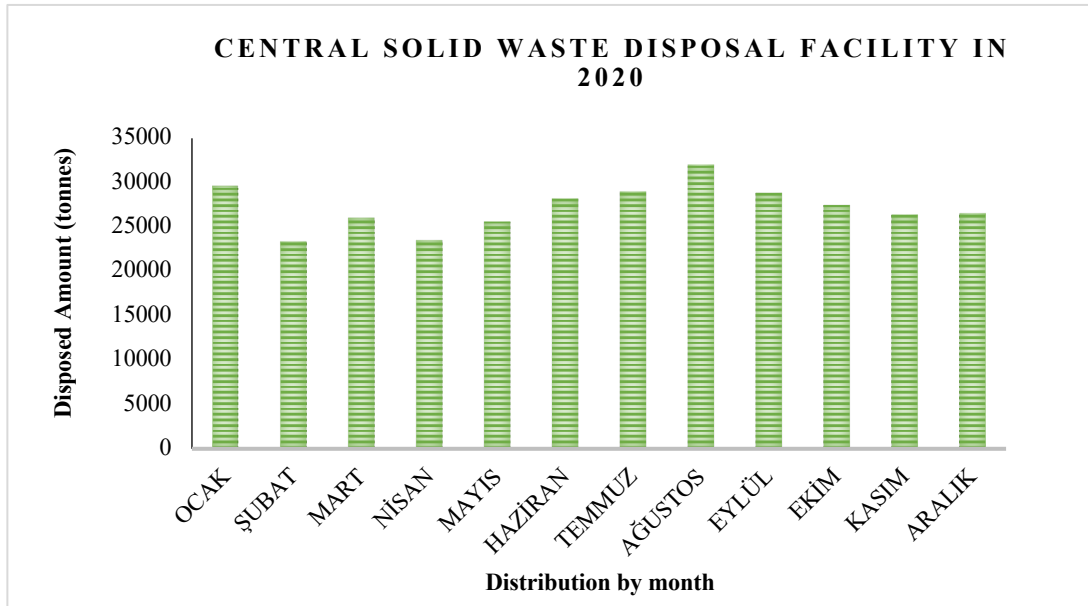


Figure 16: Amount of Waste Disposal in the Central Solid Waste Landfill Facility in 2020

Source: Samsun Provincial Directorate of Environment and Urbanization 2020 Environment Provincial Status Report

Çarşamba Landfill

Only the eastern districts bring domestic waste to the Çarşamba sanitary landfill. Electricity is produced only from landfill gas in the field.

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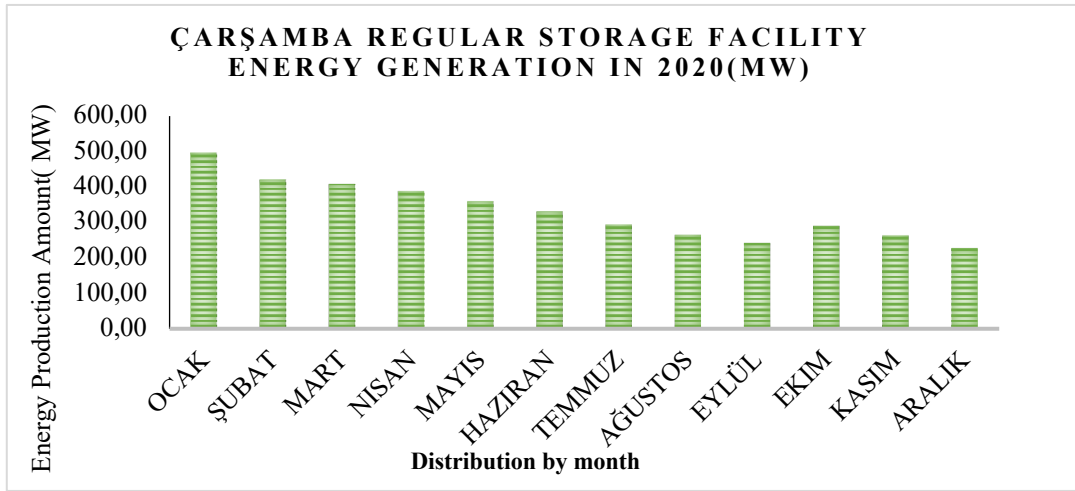


Figure 17: 2020 Energy Production of Çarşamba Landfill Facility

Source: Samsun Provincial Directorate of Environment and Urbanization 2020 Environment Provincial Status Report

4.5 ZERO WASTE MANAGEMENT IN SAMSUN

Information on the works carried out in our province in 2020 within the scope of the Zero Waste Regulation is given below.

Trainings

Trainings given within the scope of zero waste management in 2020

(Provincial Directorate of Environment, Urbanization and Climate Change, 2020, Data were obtained from Graphical Reports in Zero Waste Information System/Trained Person Report.)

Target Group	Number of Trainings Organized	Number of Persons Provided Training
Institution / Organization Representatives	84	3.344
Students	295	55.481
Citizen	54	9.431
Employee	1121	41.848

Figure 18: Zero Waste Trainings in 2020

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2018-2020 Number of people who participated in the trainings given within the scope of zero waste management on a yearly basis. (Provincial Directorate of Environment, Urbanization and Climate Change 2020)

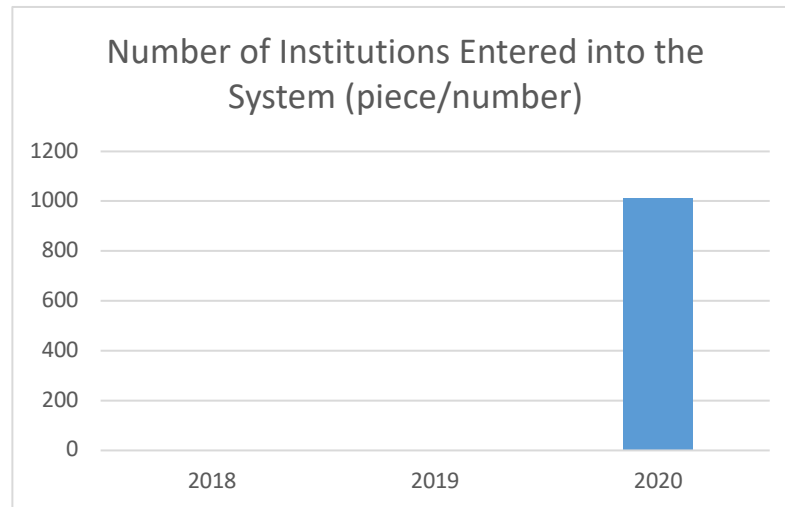
Number of people who participated in the trainings given within the scope of zero waste management on a yearly basis

(Provincial Directorate of Environment, Urbanization and Climate Change, 2020, Data were obtained from Graphical Reports in Zero Waste Information System/Trained Person Report.)

Year	Number of Persons Provided Training
2017	10.270
2018	28.300
2019	71.332
2020	90.920

Şekil 19: Number of Zero Waste Trainings by Years

A Waste Retrieval Center was established by İlkadım Municipality in order to ensure that the recyclable wastes are collected separately at the source without mixing them with other wastes, and to leave them for recycling and/or disposal.



Packaging waste statistics in Samsun for 2019

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- Since the statistics for the year 2020 in the Packaging Information System include the raw data whose evaluation and examination process is still ongoing, the charts and graphs include 2019 as the final data. When the said process is over, the verified statistical data can be accessed from the Packaging Bulletin on the website of the General Directorate of Environmental Management.

The number of registered economic enterprises in our province has increased to 417 in 2020.

-Number of registered economic enterprises in Samsun in 2019

(Samsun Provincial Directorate of Environment, Urbanization and Climate Change,2019)

Number of Businesses Putting to Market	358
Number of Packaging Manufacturers	33
Number of Suppliers	26

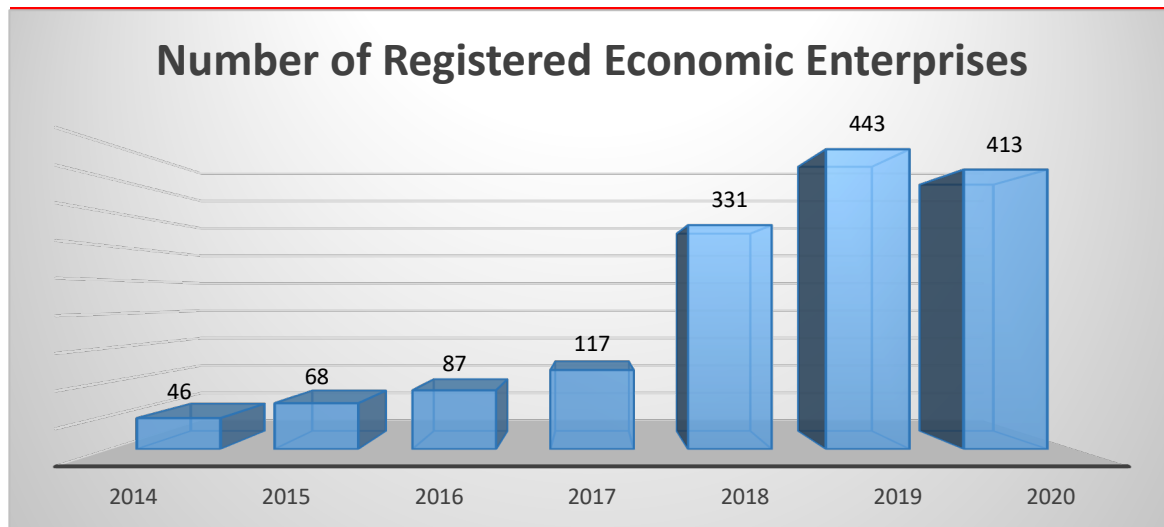


Figure 20: Number of registered economic enterprises in Samsun on a yearly basis

(Samsun Provincial Directorate of Environment, Urbanization and Climate Change,2020)

There are 11 packaging waste collection and separation facilities with GFB/Environmental Licenses and 13 recycling facilities in Samsun.

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Number of packaging waste collection and separation facilities registered in Samsun in 2019

(Samsun Provincial Directorate of Environment, Urbanization and Climate Change, 2020)

Number of Packaging Waste Collection Separation Facility (CSF) Total	1. Type CSF #	2. Type CSF #	3. Type CSF #
6	3	3	

Number of packaging waste recycling facilities in Samsun in 2019

(Samsun Provincial Directorate of Environment, Urbanization and Climate Change, 2020)

Number of Packaging Waste Recovery Facilities (WRF)	Plastic Packaging Waste WRF Number	Paper-Cardboard Packaging Waste WRF Number	Glass Packaging Waste WRF Number	Metal Packaging Waste WRF Number	Wood Packaging Waste WRF Number	Composite Packaging Waste WRF Number	Textile Packaging Waste WRF Number
13	8	4	5	5	5	4	4

* Since a recovery facility can process more than one packaging waste, the total Number of Recovery Facilities may be different.

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Packaging Waste Management Plan (PWMP) status of municipalities in Samsun in 2020

Municipality Name	Population	PWMP Status (Exist-Nonexistent)	PWMP Approval Date
ALAÇAM	25.854	Exist	23.09.2016
ASARCIK	17.628	Exist	21.03.2019
ATAKUM	202.618	Exist	26.09.2016
AYVACIK	21.847	Exist	21.03.2019
BAFRA	142.210	Exist	26.09.2016
CANİK	97.564	Exist	29.11.2017
ÇARŞAMBA	138.840	Exist	07.01.2019
HAVZA	40.194	Exist	11.12.2018
İLKADIM	332.230	Exist	21.03.2019
KAVAK	21.692	Exist	11.12.2018
LADİK	16.734	Exist	13.11.2017
ONDOKUZMAYIS	26.337	Exist	21.09.2019
SALIPAZARI	22.923	Exist	14.01.2019
TEKKEKÖY	52.258	Exist	29.08.2016
TERME	72.354	Exist	18.01.2019
VEZİRKÖPRÜ	95.569	Exist	21.03.2019
YAKAKENT	8.864	Exist	01.03.2017

4.6 GOOD PRACTICE EXAMPLES IN SAMSUN PROVINCE

Within the scope of the project called “KNOWING CIRCULAR ECONOMY OIN BLACK SEA BASIN” an interview was conducted by the Samsun Metropolitan Municipality on 18.11.2021 with Avdan Energy. Avdan Energy is one of the 13 private enterprises that is forming the circular economic dynamic of Samsun.

Avdan Energy, Samsun Avdan Enerji Üretim ve Ticaret A.Ş., was established in 2010 with the aim of generating energy from the wastes stored at the Samsun Metropolitan Municipality Solid Waste Storage Area. It takes its name from its neighboring villages of Aşağı Avdan and Yukarı Avdan.

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At the beginning of 2012, Samsun Avdan Energy commissioned the electricity generation plant that collects the landfill gas formed in the Solid Waste Site and converts it into electrical energy. The power plant continues its activities with an installed power of 8.4 MW. It also continues to work with Samsun Metropolitan Municipality Environmental Protection Department on waste leachate control and disposal, waste characterization, reduction of biodegradable wastes to be disposed of in landfills as per the regulation of the Ministry of Environment on Regular Landfilling of Wastes. As a result of these studies, the pre-separation facility and the biomethanization-biogas facility, where the waste leachate is mixed with organic wastes and fermented, has been commissioned. The sludge from SASKİ's treatment facilities is dried by using the waste heat of the power generation plant at the facility. Dried sewage sludge is given to cement plants as fuel.

For the first time in Turkey, a facility that dries domestic sewage sludge was established in a garbage plant. The efficiency of the integrated facility has increased to 63% and annual drying energy is equivalent to 3 million m³ of natural gas. In this process, which is a first in Turkey, the waste heat released from the engines producing electrical energy is used. With this heat, the treatment sludge is dried at a rate of 90%.

5. REGIONAL CHALLENGES IN A CIRCULAR ECONOMY

The project named "Knowing Circular Economy in Black Sea Basin"; A total of 17 interviews were conducted by Samsun Metropolitan Municipality between 19.10.2021 and 22.11.2021, including meetings with 11 private enterprises, university, non-governmental organizations, chambers and directorates that make up Samsun's cyclical economic dynamic. When choosing businesses,

- It was taken into consideration to choose at least two companies from the same sector to understand whether the good practice studies and/or the problems experienced were sectoral or operational.
- The raw material of one sector is the waste of another sector. The aim was to measure whether the circular economy model was starting to take shape.
- Institutional enterprises with high raw material input and product output were selected in Samsun. The aim was to be able to comment on the waste processes of large enterprises.

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Difficulties Encountered by Firms:

- Clean (sustainable) production, which emphasizes pollution prevention, and the circular economy approach, which aims to control pollution after it occurs, are largely unknown, with the exception of corporate firms.
 - It has been determined that the methods used by the companies producing hazardous waste to re-evaluate their final product wastes and bring them into the circular economy are not available in Turkey, so they are obtained from abroad. This causes the solution to be economically expensive and prolongs the service procurement process. Firms conveyed that the technical equipment of the recycling or disposal process, which they could not reach in Turkey, was insufficient due to the inadequacy of R&D studies in Turkey.
 - It has been determined that corporate firms follow the regulations and methods, but non-corporate enterprises have lack of compliance on the basis of the regulation, and that the law enforcement's lack of sufficient control causes unfair competition.
 - Firms think that audits are not sufficient.
 - Organized Industry Directorate and Samsun Chamber of Commerce and Industry do not have a plan in the field of circular economy and do not want to take responsibility in this regard,
 - There is no national or regional association regarding circular economy approaches and/or practices,
 - The circular economy solutions of the companies are due to the expensive disposal fees,
 - When looking at both universities and public institutions, various studies are carried out in the field of production, but these are not sufficient and they are not carried out within the framework of a common systematic and national plan.
- Lack of licensed companies in our province for the recycling and disposal of some types of waste, difficulties in the delivery of wastes.
- Waste Management Plan does not match the actual process,
 - Expensive R&D studies and long approval periods bring additional costs to companies,
 - A healthy waste management system could not be established due to factors such as the state's weak financial support for the circular economy and insufficient technical knowledge and equipment.
 - It has been determined that the infrastructure of the responsibilities required to fulfill by the European Union compliant Regulations and the companies is not fully established in Turkey.

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In line with the evaluations and studies, the framework conditions in the field of circular economy in our country have been determined as follows:

- Clean (sustainable) production, which emphasizes pollution prevention, and the circular economy approach, which aims to control pollution after it occurs, are largely unknown, with the exception of corporate firms.
- When looking at both universities and public institutions, various studies are carried out in the field of production, but it is seen that these are not sufficient and are not carried out within the framework of a common systematic and national plan.
- When the legislation still in force in our country is evaluated, it is seen that the concept of circular economy is tried to be made with Zero Waste legislation, and the development of cleaner production technologies is determined as a need. However, laws and action plans aiming directly at the realization of the circular economy are not sufficient in our country.
- Within the scope of the European Union harmonization process, it is seen that many regulations that intersect with the circular economy are harmonized or are in the plan. In this context, the process of regulations regarding Eco-label, Eco-design and Integrated Pollution Prevention and Control (IPPC), zero waste issues, which are within the scope of the harmonization plan, will be important in terms of disseminating their applications.
- This study provides an important input for prioritizing the industrial sectors of our country on the basis of cleaner (sustainable) production practices, provides an important input to the policies to be formed regarding the future issue, and forms a basis for similar studies to be carried out in the future with more comprehensive data sets and the contributions of stakeholder institutions/organizations.

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6. OVERVIEW, CONCLUSIONS AND RECOMMENDATIONS

Overview

Excessively increasing population and product demand have brought along some problems on human health and ecosystem. Excessive consumption is the basis of modern society. This situation causes air, soil and water pollution, as well as excessive amounts of waste, climate change and environmental hazards. In the linear economy, which is the current economic system, raw materials are produced, processed into a final product and become waste after consumption. In a linear economy, the goal is to create value by producing and selling as many products as possible. For this reason, it is a system in which economic benefits take precedence over all other criteria. Although the linear economy provided growth and prosperity for a period, it also brought sustainability problems. Because the linear model causes unsustainable use of resources and creates large amounts of waste that destroys the environment. The transition to the circular economy is both important and includes opportunities at the community level. Innovative business models and policy frameworks help move towards sustainable systems. But a new form of consumption is equally necessary to change the way we use and consume products and materials. It can encourage the community to use shareable products or learn how to repair defective products. Accordingly, it can help increase the demand for recyclable products and materials. Sharing ideas or repairing products on the basis of the circular economy provides economic, social and environmental advantages, changing the consumption habits of the society and creating a sustainable life awareness. The circular economy is increasingly important in building a better future as well as encouraging future generations to think and design in a sustainable way.

Conclusions

Considering the data of the study, we see that postgraduate studies on circular economy and green economy in Turkey were prepared after 2010. However, it is seen that the application and field technical analysis studies are not qualified enough and on a significant scale in our country.

In Turkey, the issue of circular economy has not yet been addressed in the context of the city. The first step of the Circular Economy strategy is to adopt a waste management approach with useful models to the public, and zero waste is a very appropriate application in this context. In this way, besides recycling the waste materials, it will be possible to use the resources "better and more effectively" instead of "less" by supplying them as needed and presenting them for consumption.

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With the increase in Circular Economy practices in our country, it is possible to close the foreign trade deficit and turn the situation into a foreign trade surplus with the right management of the potential we have. This process is close enough to be realized within the scope of 2023 targets.

Recommendations

- As a result of the situation analysis, it has been seen that there is no study that deals with the circular economy in the context of the city.
- It is clear that the transition to a circular economy requires holistic policy measures and necessary investments, as well as the use of advanced technology and radical behavioral changes. In this context, important responsibilities fall on all stakeholders, and governments have an important role in supporting the process by creating new regulatory frameworks and ensuring this transformation.
- For the transition from a linear economy to a circular economy; Strategies of closing, slowing and narrowing resource cycles should be implemented. In addition, adopting the circular economy requires innovative business models based on resource efficiency and closed material flow cycles.
- Although the structure of the policies supporting the transition to the circular economy will vary according to the country and its conditions, it is considered that following the policies and studies to be followed by the EU and member countries to implement the main areas and priority sectors in our country and to prepare a road map for the transition to the circular economy, which is considered to have a significant potential.
- The Circular Economy is an expected result for our world where pollution events are seen at a global level. This trend should take place as a guide in our country. In this context; A long-term strategy should be adopted, involving government, companies, universities and academics.
- New infrastructure investments that will enable the development of the Circular Economy; It is necessary to harmonize industrial processes, redesign the supply chain and put the waste management process on a recovery basis. It has been determined that this issue has deficiencies within the framework of the province.
- The phenomenon of circular economy has started to attract attention from a wide range of people. In the researches, it is seen that this phenomenon is mostly approached within the framework of basic concepts such as waste management and recycling. In this case, there is

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no guidance on how businesses can adapt or change their existing business models to transition to a circular economy. By adopting the mentality "Everything is an input of an output", examples of business models that will enable the "reuse" of resources have started to increase with the sharing ecosystem.

- In order for the European Green Deal to be successful and to achieve its goals, a very serious determination must be put forward.

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APPENDIX

APPENDIX A:

WASTE MANAGMENT IN TURKEY:

Waste management is an issue that should be handled with a system approach. System approach; In addition to the basic elements of waste management such as waste generation, collection, processing and disposal, it requires that it be dealt with in integrity with issues such as energy, environmental protection, protection of resources, productivity increase and employment. The system approach in waste management does not only involve the removal of solid wastes from the human environment; It will also make positive contributions to the economic development as well as the protection and development of the environment and human health (Agrawal, 1990).

Waste statistics and waste management are collected under the following headings:

1. Municipal wastes,
2. Packaging wastes,
3. Medical wastes,
4. Waste oils,
5. Waste vegetable oils,
6. End-of-life tires,
7. End-of-life vehicles,
8. Waste electrical and electronic equipment,
9. Waste batteries and accumulators,
10. Wastes containing PCB and PCT are hazardous wastes,
11. Mine wastes,
12. Iron and steel and slag wastes,
13. Ash wastes from thermal power plants,
14. Sewage sludge originating from the municipality and
15. Sewage sludge originating from industry.

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The management of solid waste, which covers a large part of the waste, is also very important. Solid waste management can be defined as the discipline that covers the stages of waste control, collection, accumulation, transportation-transfer, processing and final removal of solid wastes, taking into account the production and consumption habits of the society in relation to human and environmental health, economy, engineering, conservation of resources, aesthetics and other environmental issues. (Tchobanoglous, et al. 1977). Its main purpose is; it is the destruction of unwanted material (Dhindaw, 2004).

INDUSTRIAL WASTES IN TURKEY

A significant amount of primary and secondary treatment sludge is produced in domestic wastewater treatment plants using biological treatment methods. These sludges can be disposed of together with municipal waste. However, some sludges, especially those generated in industrial wastewater treatment, should be considered as hazardous waste. According to the manufacturing industry waste inventory made by the State Institute of Statistics in 1996, the amount of industrial solid waste in 3073 workplaces with 10 or more employees is 14 million tons.

Pursuant to the Hazardous Waste Control Regulation, which regulates the principles regarding the separate collection, temporary storage, transportation and disposal of hazardous wastes originating from institutions, establishments and businesses engaged in production, consumption and service activities, and the Communiqué on the Recovery of Certain Non-Hazardous Wastes, which regulates the principles for the management of certain non-hazardous wastes. ; Hazardous waste producers are obliged to prepare a “3-Year Hazardous Waste Management Plan”, and some non-hazardous waste producers are obliged to prepare a “Non-Hazardous Waste Management Plan” With the Ministry of Environment and Urbanization letter dated 04.06.2012 and numbered 9223; It was stated that since hazardous and non-hazardous wastes may occur at the same time as a result of industrial activities, it was stated that the plans for waste management should be made by considering all types of waste, and the instruction that the new plans to be prepared should be prepared in the form of an "Industrial Waste Management Plan" in the updates to be made regarding the waste management plans including all hazardous and non-hazardous wastes. given. The "Industrial Waste Management Plan", the format of which has been prepared by the Ministry of Environment and Urbanization, should be prepared by businesses that produce

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hazardous and non-hazardous waste as a result of their activities and submitted to the Provincial Directorate of Environment and Urbanization. Waste management plans prepared by the waste producers and submitted to the Directorate and approved by the Directorate are valid for 1 year from the date of approval, and the validity period will also be specified in the waste management plans to be approved thereafter. A new (revised) waste management plan must be submitted to the Directorate by each waste manager before the validity period expires, and waste management plans that have not expired must be submitted to the Ministry/Directorate during the inspections made by the Ministry/Directorate. In case of violation of the above-mentioned issues regarding the Industrial Waste Management Plan Format, an Administrative Fine will be applied within the scope of the Environmental Law No. 2872. The amount of waste generated by sectors is given below.

Principles of Preparation and Evaluation of Industrial Waste Management Plan

1- In order to ensure waste management in harmony with the environment, a waste management plan is prepared by the waste producer or waste owner in accordance with the format determined by the Ministry.

2- Waste management plans are prepared to cover three years from the date of submission. For the data of the previous year, the necessary evaluation is made by the provincial directorate through the declaration system.

3- Prepared waste management plans are submitted to the provincial directorate of the province where the facility is located for approval.

If the provincial directorate deems it necessary during the evaluation of the waste management plan, it conducts an on-site inspection/audit at the facility.

4- Deficiencies identified in the management plan are completed within the period to be determined by the provincial directorate and submitted for approval again. In case the deficiencies are not found/remedied, the waste management plan is approved by the provincial directorate. The approval letter states the date the plan was submitted, the date it was approved, the years it covers, and the date the plan should be resubmitted.

5- The validity period of the approved waste management plans is three years from the date of approval by the provincial directorate. Waste management plans are renewed three months before the expiry date and submitted to the provincial directorate for approval.

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6- In case of a situation requiring changes in the waste management plan within the validity period, the renewed waste management plan is submitted to the provincial directorate for approval within one month.

7- A waste management plan is prepared for facilities that do not have process-related waste and generate waste such as fluorescent lamps, cartridges and toner only as a result of the administrative building and administrative activities; However, it is not obligatory to obtain the approval of the provincial directorate for the prepared management plan.

8- Information on temporary storage areas of hazardous and non-hazardous wastes is given in the waste management plan.