2024

MODERN TRENDS AND A CIRCULAR APPROACH TO WASTE MANAGEMENT

ANALYTICAL REPORT

This project was funded by the European Union's Horizon 2020 research and innovation program under grant agreement No.101000717.

Introduction

Circular production is not just a way to recycle resources, but a new economic paradigm where waste becomes the beginning of a new life cycle, creating sustainability, efficiency, and a balance between nature and progress.

One of the biggest challenges of the millennium is global environmental pollution and the growing amount of waste. According to the UN and other international organizations, this problem is recognized as one of the key threats to the Earth's ecosystems. Ukraine also faces serious challenges in the field of waste management. In response, many countries, especially in the EU, have been introducing the concept of a circular economy over the past decades, which aims to reuse materials, reduce waste, and recycle.

Although many countries have already moved to new waste management models, such as extended producer responsibility (EPR) and recycling of household materials, the problem still remains. For example, the issue of microplastics and garbage islands in the oceans has become more acute in the last decade. This indicates the need not only for individual changes in production and consumption, but also for a systematic approach to the development of new materials and technologies in the field of waste collection, sorting and recycling.

This analytical report has been prepared in cooperation with Kharkiv Zero Waste , an organization that is actively working to implement the principles of sustainable development and the concept of "zero waste" in Kharkiv and the region. Thanks to the support and expert assistance of Kharkiv Zero Waste, relevant data was collected and analyzed to better understand the potential of the circular economy and modern environmental approaches to waste management.

Models

There are two models: linear and circular. Each of these models helps to understand the logic of production, but the circular model is the best today.

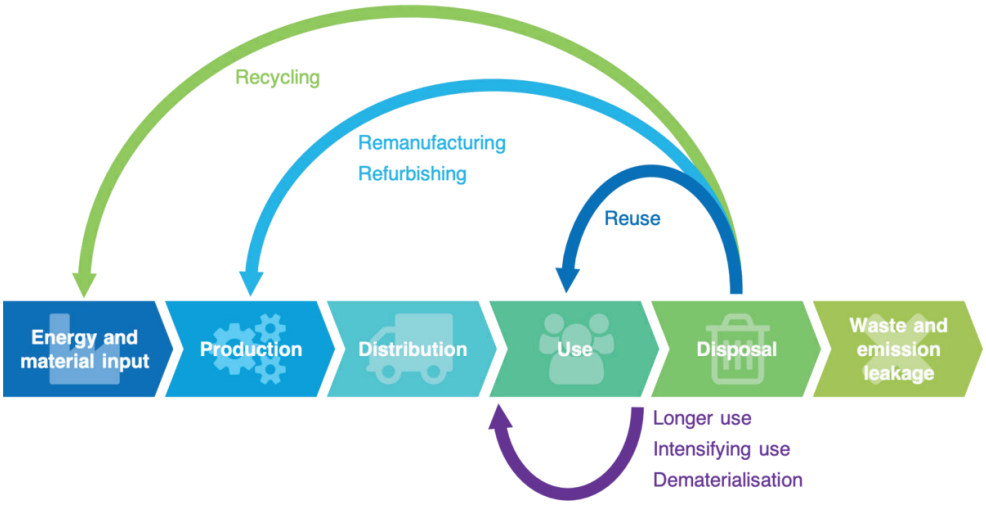
THE TRADITIONAL LINEAR MODEL AND ITS IMPLICATIONS

The linear economy that dominated in the past operates on the principle of: “extract-produce-use-throw away”. In Ukraine, this approach remains the main one. The example of Kharkiv, where there are several large landfills, shows the typical consequences: methane generated by the decomposition of organic waste causes fires that need to be extinguished regularly, and landfills require expensive reclamation measures. This model leads to overuse of resources and environmental degradation.

CIRCULAR MODEL: APPROACHES AND PROSPECTS

The circular economy aims to solve the problem by reducing resource consumption, reusing materials, and minimizing waste. The main aspects of this model include:

- Reducing theconsumption of valuable raw materials - reducing the need to extract oil, gas and other non-renewable resources.
- Development of new products and business models - production of recyclable products and growth of the market for reusable goods (e.g., reusable containers and packaging, upcycled clothing).
- Engaging communities and cities - community involvement at the local level and participatory practices play an important role.



Credits: Kharkiv Zero Waste

Zero Waste as an approach

The modern approach to waste management focuses on the principles of “zero waste”, which involve minimizing waste generation, conserving resources, and avoiding waste incineration and disposal. This concept is gaining popularity around the world, and the EU is actively promoting standards that limit the use of single-use plastic, encouraging the use of alternatives. Currently, three Ukrainian cities (Lviv, Liubotyn, and Lutsk) are already on the way to becoming certified as Zero Waste cities.

01

Refuse

Avoiding excessive consumption and disposable products.

02

Reduce

Reducing the amount of materials and resources used.

03

Reuse

Reuse of different things.

04

Recycle

Ensuring the collection and recycling of materials.

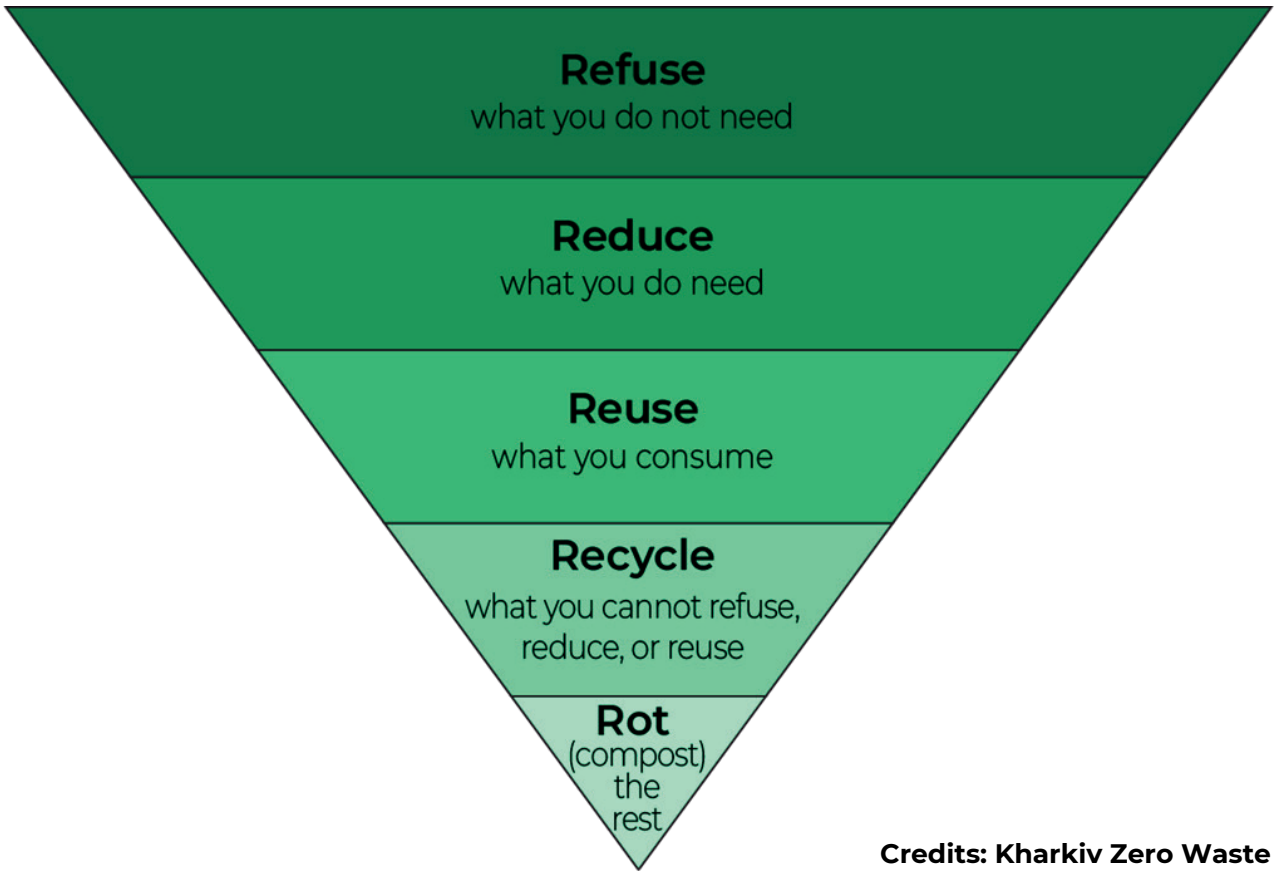
05

Rot

Disposal of organic waste through natural processes.

The 5R pyramid

This approach is supported at the EU level and in Ukraine, where a waste management hierarchy has been implemented at the national and local levels. This pyramid, which starts with the most desirable actions and ends with lower priority ones, is the basis of the Zero Waste approach and helps reduce the negative impact on the environment through conscious consumption and effective waste management.



Credits: Kharkiv Zero Waste

In cities, eco-friendly projects such as reusable packaging stores and rental services are increasingly common, but they have not yet become widespread. Such initiatives are popular among conscious citizens, but they need to be more widely disseminated and supported at the state level.

In general, the main challenges for Ukraine are to expand the infrastructure for waste recycling, encourage the reuse of goods, conduct mass information campaigns to raise environmental awareness, and create a legislative framework that would facilitate the wider implementation of the 5R concept at the national level.

Refuse

Waste prevention is the first and most important step in the waste management hierarchy. This principle involves keeping a product in its original state before it becomes waste. Prevention is particularly important in the area of organic and single-use waste. For example, food establishments can donate leftover food to the needy or animals, avoiding their disposal. A similar approach has been successfully implemented in the EU countries through food banks, and although this experience is only developing in Ukraine, a food bank is already operating in Lviv. For Kharkiv, given the saturation of the market, it may be advisable to explore the possibilities for organizing a food bank.

Single-use plastic and the search for alternatives

The problem of non-recyclable waste is primarily caused by single-use plastic: cups, takeaway packaging, personal care products, ear buds, etc. Reusable alternatives have been developed, but are still little known to the general public. In Ukraine, as in the rest of the world, an important step is to organize educational campaigns aimed at popularizing reusable goods and gradually abandoning disposable items. For example, a reusable thermal mug replaces hundreds of disposable cups, and a textile bag reduces the demand for plastic bags.

The role of government and business

Local authorities can support waste prevention initiatives by encouraging eco-friendly businesses, community initiatives, and creating information resources, such as a map of repair services. In the context of war-related restrictions, the use of reusable tableware may seem challenging, but for closed events it is possible to implement approaches without disposable tableware. Business responsibilities also include developing repairable products, redesigning packaging for reuse, and providing consumers with information about recyclability.

Reuse

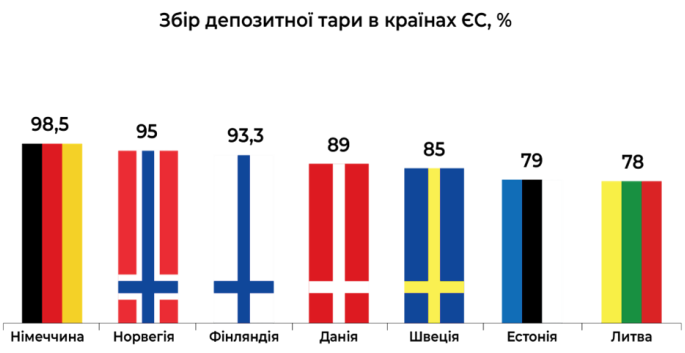
Reusing things is important for reducing waste. In Kharkiv, the eco-hub actively accepts and donates furniture, household items, clothing, and even building materials for reuse, which helps reduce the burden on landfills and support those in need of materials to rebuild their homes. Although most citizens consider sorting to be the main stage of waste management, it is by no means the only or the most important step in the circular model.

Waste management strategy of Ukraine

Ukraine has made commitments under the EU-Ukraine Association Agreement, including to reduce waste going to landfill to 10% by 2035. The National Waste Management Strategy envisages a reduction in landfilling from 95% to 30% by 2030 through the implementation of infrastructure for sorting and recycling, including bio-waste. Kharkiv already has an EU-compliant landfill in the Dergachiv community, but the strategy requires expanded infrastructure, information systems, and ongoing monitoring to be implemented effectively.

The problem of single-use plastics and polymers

Most plastic waste, including single-use products, cannot be fully recycled and often takes decades, if not centuries, to decompose in nature, leaving microplastics behind. In addition, polymers can be recycled a limited number of times, after which they become unusable and must either be incinerated or buried, which contradicts the principle of “zero waste” (no burn, no bury).



*Відсоток збору в Литві в 2016 році (через 6 місяців з моменту запровадження заставної системи)

Credits: Kharkiv Zero Waste

Recycle

Waste recycling is one element of the management strategy, but not the main one. In Kharkiv, there are facilities for recycling certain types of waste, for example, an enterprise in the Zmiivska community recycles tetrapack packaging and uses the resulting pulp to produce printed products.

01

Recycling tetrapak

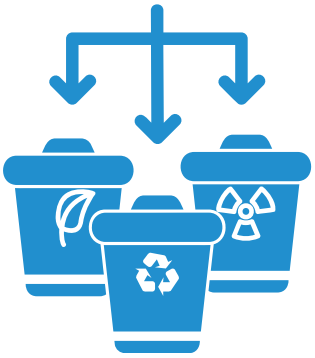
The only tetrapack recycling facility in Kharkiv Oblast is located in the Zmiivska community, where the paper part of the packaging is used for printed products and the polyaluminum mixture is used to produce asphalt and manhole covers.

02

Working with polymeric waste

Despite the large number of companies processing various types of polymers before the full-scale war, today some types of plastic in Kharkiv remain commercially unprofitable for recycling. Problematic materials include PET from dairy products, PS and PP. Active work with producers is needed to change the packaging to recyclable materials and expand the waste collection system.

03

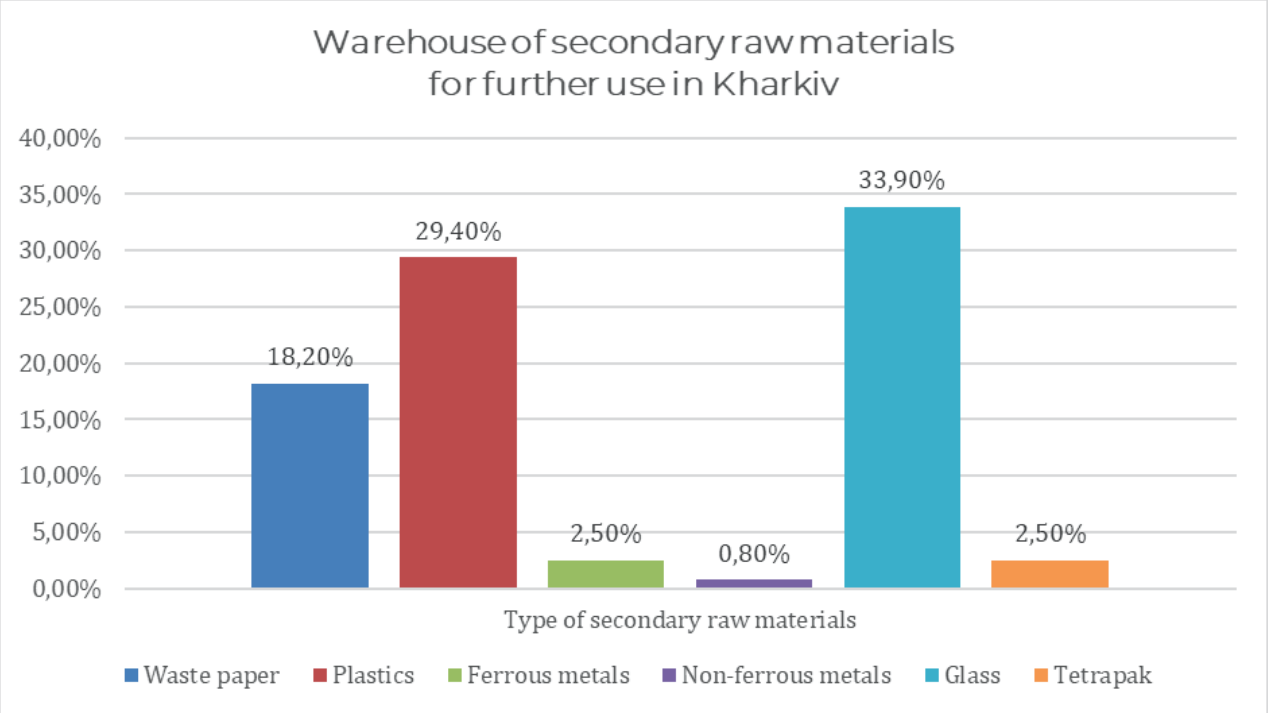


Waste sorting at home

Prior to the war, Kharkiv had a well-developed system for recycling various types of waste, including paper, glass, metals, and plastic. However, the issue of sorting remains important, especially with regard to combined packaging, which should be removed from production due to recycling difficulties.

Secondary raw materials

Most people we interviewed associate waste management primarily with sorting. However, sorting is not the first step in the waste management hierarchy. It is not a panacea and cannot solve the problem of pollution without additional steps. Meanwhile, the number of single-use plastic items in the world continues to grow.



Data provided by Kharkiv Zero Waste

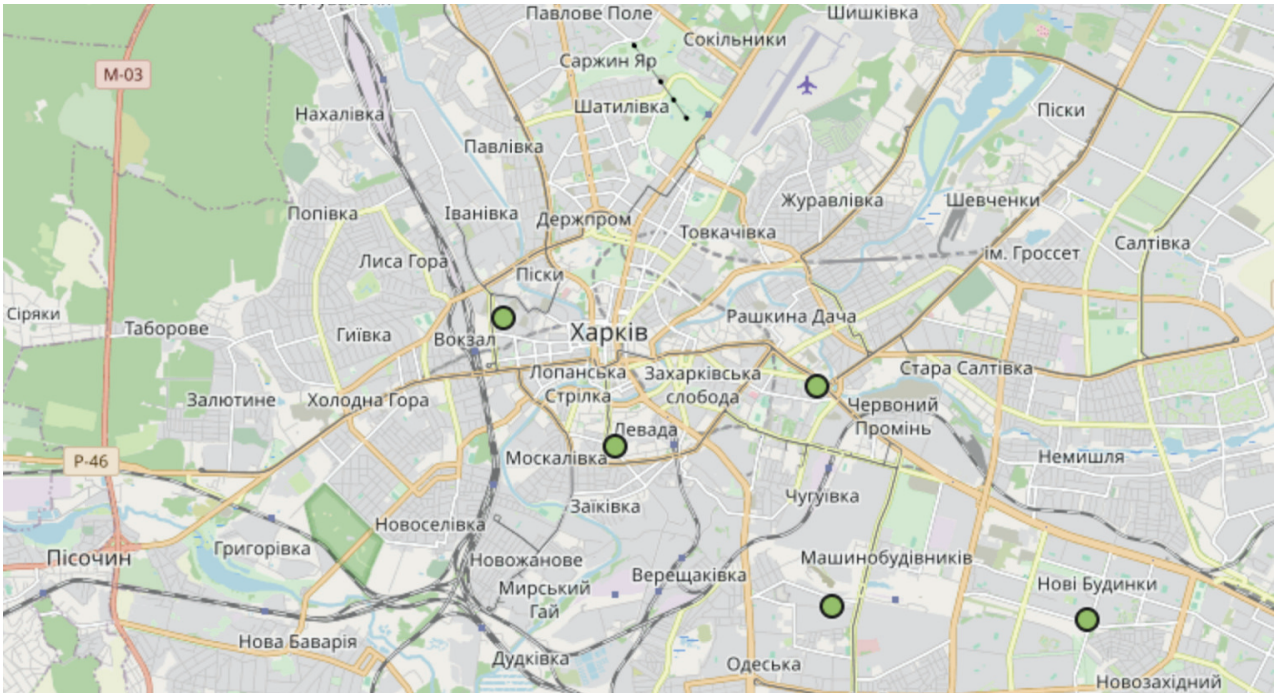
The only enterprise in Kharkiv Oblast that recycles tetrapak packaging (Pure Pak, Tetra Pak) is located in the Zmiivska community. The resulting paper raw materials are used to produce printed products by Ranok Publishing House, such as notebooks, books, diaries, textbooks, and packaging materials.

The composition of tetrapak is interesting for recyclers because it contains: 75% paper, 20% polyethylene and 5% aluminum. This combination of components makes it possible to obtain useful materials for further use.

Polymer processing

Polymer recycling is an economically viable process. Before the outbreak of the full-scale war, there were 49 enterprises in Ukraine that processed various types of polymers. However, the situation has changed due to the relocation of facilities. It is important to note that each technology is usually focused on a specific type of recyclable material. The food and chemical industry uses 7 types of polymers, each of which has its own recycling code marked in a triangle on the packaging.

National map of recycling collection points



Credits: https://recyclingpoints.org/

In Kharkiv, the problem with recycling certain types of plastic, such as PET from dairy products, PS and PP, remains relevant, as the collection and processing of these materials is commercially unprofitable. The experience of the local eco-hub shows that consumers follow the rules, ensuring that their packaging is clean and suitable for recycling. It is proposed to identify key producers and processors to discuss the possibility of collecting plastic from the public for further recycling or to consider redesigning packaging. Producers should take responsibility for their packaging by organizing its collection and recycling, which will become more effective once extended producer responsibility systems are in place.

Granulation of flake

Flake granulation is the most popular method of PET bottle recycling. The plastic flakes produced in this process are used to make flexi pellets, which are used to create new products such as synthetic winterizer, roofing felt and new PET forms. The use of recycled materials significantly reduces the cost of producing polyethylene pellets, as the quality of the pellets is almost as good as that of virgin materials.

Photos courtesy of Zero Waste Kharkiv
Credits: Kharkiv Zero Waste

Recycling polymers has a significant environmental impact, as it contributes to a significant reduction in landfills. However, the recycling cycle of polymers is limited, and unlike aluminum or glass, polymers become unusable over time, so they eventually end up in landfills. Therefore, it is advisable to consider switching to bioplastic packaging, abandoning disposable packaging, and switching to reusable packaging.

This is the strategy Kharkiv Zero Waste proposes to use as a basis for waste management in Kharkiv and Ukraine. In times of war, an additional incentive for consumers and local businesses is to support the collection, procurement and processing of recyclable materials, which simultaneously helps to support the budget and develop the local economy.

Rot

Organic waste makes up a significant portion of municipal waste, but it is still not collected separately in Ukraine. Composting organic waste will significantly reduce the amount of waste and provide valuable fertilizer. In Kharkiv, it is planned to introduce residential composters for organics, which will reduce the burden on landfills. In the existing waste management infrastructure in Ukraine, resource fractions (such as plastic, glass, paper) are often mixed with organic waste, which makes it difficult to sort and recycle them further. Organic waste, which makes up a significant portion of household waste (up to 100-120 kg per person annually), ends up in landfills along with other waste. This not only reduces the efficiency of sorting lines, but also leads to excessive disposal of resources.

Reducing the burden on landfills

According to the morphological analysis of solid waste in Kharkiv, organic waste accounts for more than 50% of the total weight of waste entering landfills. Composting can reduce the volume of this waste by 2-3 times, which reduces the need for landfilling.

Increasing the efficiency of sorting lines

Wet organic waste often contaminates resource-rich materials, making them unsuitable for recycling without prior treatment. Separate composting ensures that the resources are kept pure for further use.

Production of biogas and biofertilizers

Composting avoids the production of landfill gas, which is often the cause of fires. Instead, the collected biogas can be used for heating or electricity generation. Kharkiv already has landfill gas treatment facilities at the Dergachi landfill.

Home composting as an additional option

01

The problem of landfill gas

The disposal of organic waste in landfills leads to the formation of landfill gas, which is explosive and toxic. The collected biogas can be used to heat boiler rooms, which reduces the need for coal and cuts energy costs. Currently, biogas is used at nine landfills in Ukraine, including one in Kharkiv.

02

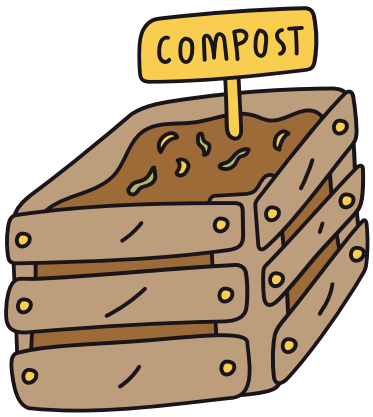
Decentralized composting as a solution

For effective organic waste management, it is advisable to implement a system of separate collection and decentralized composting. There are already successful examples of such initiatives in Ukrainian cities, such as Lviv and Liubotyn, where house composters have been installed. This allows residents to compost their kitchen and garden waste, which not only reduces the amount of garbage, but also creates fertilizers, including vermicompost, which is suitable for use in flower beds and gardens.

Home composting, particularly with the use of EM bins and the California worm, is an effective way to recycle organic waste at home. A family of three to four people can produce up to 500 kg of fertilizer per year using such systems. This fertilizer is several times more effective than humus, has no unpleasant odor and is safe for plant health.

The main advantages and stages of home composting

1. **Reducing household waste** — organic waste makes up a significant portion of municipal solid waste (MSW). Composting at home reduces the burden on local landfills and infrastructure, and also reduces the cost of garbage collection.
2. **Production of environmentally friendly fertilizers** — compost obtained from food and garden residues enriches the soil with nutrients. It's an ideal fertilizer for house plants, gardens, and vegetable gardens, and it also helps to maintain soil health without additional chemicals.
3. **Composters as a solution for urban and private households** — Installing compact composters in apartments, on balconies or in yards is a simple and affordable solution. They can work using different methods, such as fermentation with effective microorganisms (EM), or aerobic composting with oxygen.
4. **Involve the community in environmental practices** — home composting is an easy way for residents to get involved in environmental initiatives. Educational campaigns and trainings can help residents better understand composting techniques and their benefits.
5. **Reducing the generation of harmful landfill gases** — composting prevents organic waste from going to landfills, where anaerobic digestion produces harmful gases (methane and others) that contribute to the greenhouse effect and pose a risk of fire.

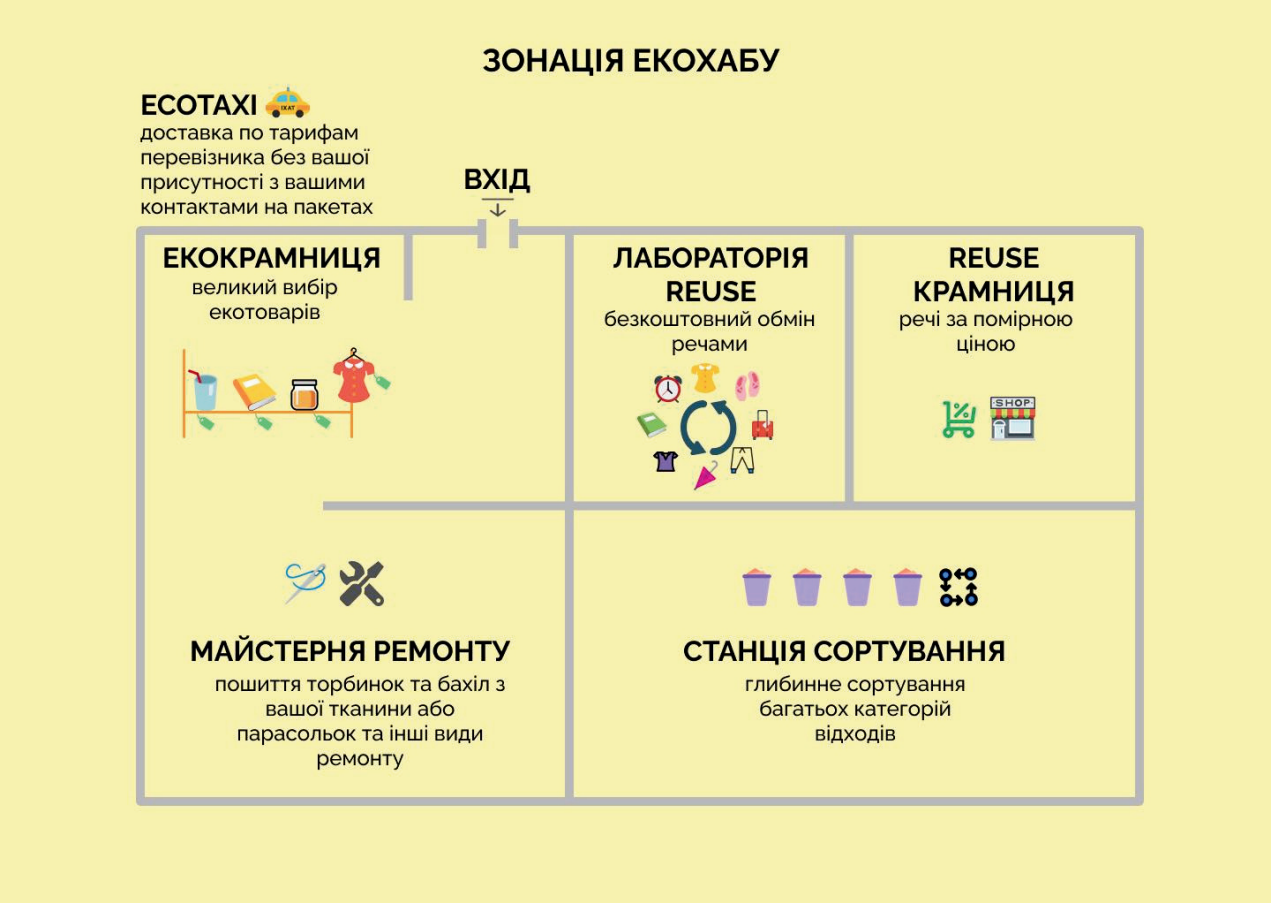


Home composting is an important part of the zero waste strategy and can be actively implemented in Kharkiv as an additional option that does not require large investments but brings significant environmental and economic benefits.

Ecohub as a platform

An eco-hub is a space where local residents can practice zero waste principles through waste sorting and recycling, purchasing reusable goods, repairing things, and upcycling. It also serves as a platform for training the community in waste management skills and promotes the circular economy. Ecohubs act as centers for recycling, information and civic engagement, promoting the transition to an environmentally responsible lifestyle.

Map of the ecohub operating in Kharkiv



Credits: Kharkiv Zero Waste

The eco-hub in Kharkiv is already a center of the circular economy, where residents can recycle waste, buy reusable alternatives to disposable items, and access repair services. During the war, a new area for the collection and reuse of building materials emerged in Kharkiv, helping to rebuild damaged buildings.

CC YARD: RECOVERY AND REUSE OF BUILDING MATERIALS

A special trend that emerged during the war is the CC Yard, an initiative aimed at reusing construction materials. As part of the Zero Waste Yard project, recycled materials from the dismantling of damaged buildings are donated to local residents to repair their homes, and the remains are used as a backfill for sinkholes. CC Yard serves as a resource for communities in Kharkiv region that actively helps with the restoration of destroyed housing.

EXPANDING THE NETWORK OF ECO-HUBS

To increase convenience, eco-hubs should be accessible in every district. In 2019, thanks to the active participation of local residents, six such hubs were operating simultaneously in Kharkiv, although some of them had to be closed due to resistance. Two main centers remained - in Saltovka and in the center. According to the managers, to fulfill all the tasks of the eco-hub, they need a space of at least 400 m^2.

ENHANCEMENTS AND COLLABORATIONS TO EMPOWER

Similar to the reuse centers in the EU that specialize in certain types of goods, eco-hubs can combine different topics. For example, by working with window and furniture manufacturers, the hub's services can be expanded, which is especially important for people who need affordable materials to rebuild their homes.

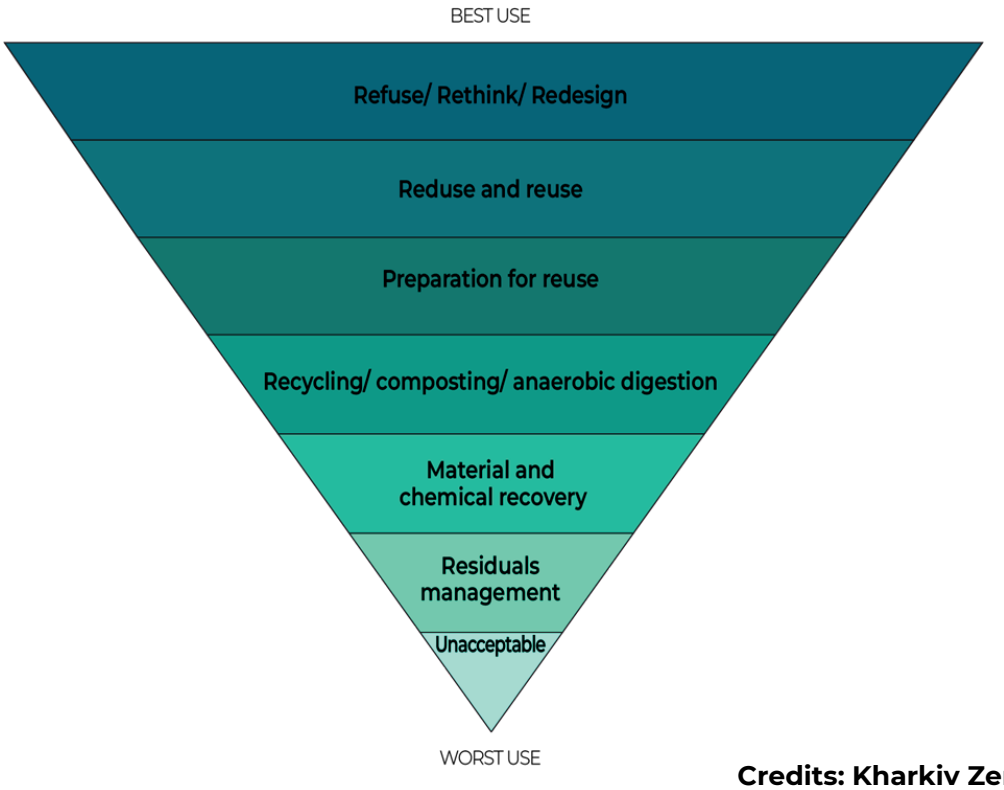
Image of the ecohub operating in Kharkiv

Credits: Kharkiv Zero Waste

Zero Waste City – a prospect for Kharkiv

For the city, the zero waste principle means no landfilling or incineration, which requires the active use of the 5R concept. The implementation of this strategy will allow Kharkiv to significantly reduce the amount of waste at landfills, support the circular economy and meet European environmental standards. The city has the potential to develop in the direction of sustainable waste management, which requires coordinated efforts from the authorities, business, and the community.

The Zero Waste City Model is a realistic and promising strategy for Kharkiv, which aims to minimize waste generation, reuse and recycle waste responsibly with maximum resource conservation. As part of this concept, the city aims to reduce the amount of waste going to landfills and to abandon incineration, which pollutes the air and affects the health of residents.



Credits: Kharkiv Zero Waste

Recommendations for Kharkiv

Development of a recycling model

We need to actively implement a concept based on reducing the use of disposable plastic products, supporting reusable containers and packaging, and switching to compostable materials.

Coordination with local authorities

The implementation of the zero waste policy requires regulatory support from the state and local authorities, including the adoption of relevant laws, regulations, and orders.

Attracting business

Manufacturers and retailers should switch to environmentally sustainable services and products, and support reusable and recyclable solutions.

Active role of the community

Information campaigns, the involvement of civil society organizations and public education will help to shape environmental awareness.

Information campaigns and environmental education

Educational events, workshops and trainings for the public, businesses and educational institutions will help raise awareness of environmental behavior and the importance of sorting.

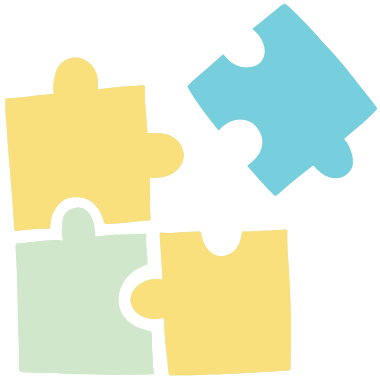
Infrastructure for waste sorting and recycling

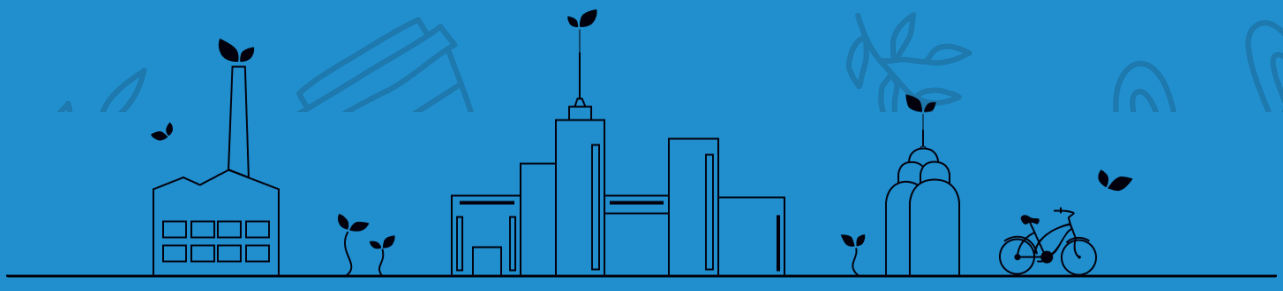
The installation of accessible and convenient recycling collection points, separate containers for plastic, glass, paper, and organic waste will allow Kharkiv residents to effectively engage in separate waste collection.

10 steps to a strategy

1. Developing a culture of waste prevention through information campaigns and events for the public aimed at responsible consumption and the use of reusable items instead of disposable ones.
2. Create mechanisms that encourage manufacturers to take responsibility for the disposal of their product packaging and switch to environmentally friendly materials.
3. Installing composters for organic waste in residential areas and private households to reduce the burden on landfills.
4. Use of organic waste for biogas production at landfills and in municipal boilers, which reduces energy costs and contributes to environmentally friendly heat supply.
5. Installing containers for separate waste collection in residential areas, offices and educational institutions to maximize the recovery of recyclable materials.
6. Eco-hubs as open spaces for sorting, upcycling, sharing things, and conducting educational events on the circular economy that unite residents into a community of conscious consumers.
7. Adoption of local regulations that limit the use of single-use plastic products and encourage the transition to reusable packaging.
8. Tax incentives or support for zero waste stores that offer products in reusable packaging.
9. Use of resources from dismantled buildings (brick, metal, wood) for the construction and restoration of the city's infrastructure.
10. Implementation of comprehensive plans at the local government level that cover short- and long-term measures to gradually achieve the zero waste goal.

The concept of “zero waste” involves minimizing waste at all stages of its generation and processing. This strategy is vital for Kharkiv, as it allows to significantly reduce the amount of waste at landfills and extend their operational life, reducing the environmental impact on the city and rationalizing its operations.





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