

DIPLOMA PREPARATORY:

Transforming city centers into a “Zero Waste City”



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Table of contents

- I. Theme3**
 - What is the topic that interests you? 3*
 - Why do you find it relevant? Why is it worth to be dealt with?..... 3*
 - What is your aim?..... 4*
 - What is your world-changing idea? How do you want to change the world for the better?..... 5*

- II. Site 7**
 - Where is your project?..... 7*
 - What characteristics a location should have?..... 9*
 - Detailed description of the site 10*

- III. Function 14**
 - What kind of building could host such activities? 14*
 - What kind of activities could serve your aim? 18*
 - Detailed Room Program 21*

- References 22**

I. Theme

Transforming city centers into a “Zero Waste City”

What is the topic that interests you?

The **Waste Management Crisis** facing the world today is a multifaceted challenge with far-reaching environmental, social, and economic implications. The crisis has been exacerbated by rapid urbanization, population growth, changing consumption patterns, inadequate waste management infrastructure, and limited awareness of sustainable waste management practices. It demands urgent and comprehensive solutions to mitigate its adverse impacts on our planet and communities. The global population is rapidly increasing especially in my home region, Metro Manila, according to World population review, there is now estimated at 14,667,089 people living there. Manila is now the world's most densely populated city with 42,857 people per square kilometer, or 111,002 people per square mile. This is all contained within an area of 42.88 square kilometers (16.56 square miles). Urbanization and higher standards of living contribute to increased consumption and subsequently, more waste in cities like Manila. Improper waste disposal, including illegal dumping and littering, is a significant issue. Inadequate waste collection systems and a lack of proper disposal facilities lead to environmental pollution and health hazards.

Why do you find it relevant? Why is it worth to be dealt with?

Zero waste initiatives and waste management are critically relevant for several reasons that encompass environmental, social, economic, and public health aspects. Zero waste initiatives aim to reduce, reuse, and recycle materials to the maximum extent possible, ultimately minimizing the amount of waste sent to landfills or incinerators. This approach conserves natural resources, reduces pollution, and helps protect ecosystems, biodiversity, and the overall environment.

Proper waste management, including waste-to-energy technologies and methane capture from landfills, can significantly reduce greenhouse gas emissions. By diverting organic waste from landfills and converting it into energy or compost, we can contribute to mitigating climate change. Waste management promotes the concept of a circular economy, where materials are reused, recycled, or repurposed. This reduces the need for virgin raw materials, conserving energy and resources required for manufacturing new products. Well-managed waste initiatives contribute to community well-being by creating jobs in waste collection, recycling, and associated industries.

Even in Hungary, citizens are more concerned about the waste generation and the problems that it would produce in the future according to OECD Environmental Performance Review 2018 (Organization for Economic Cooperation and Development) proving that this issue is something that Hungarians themselves are aware of.

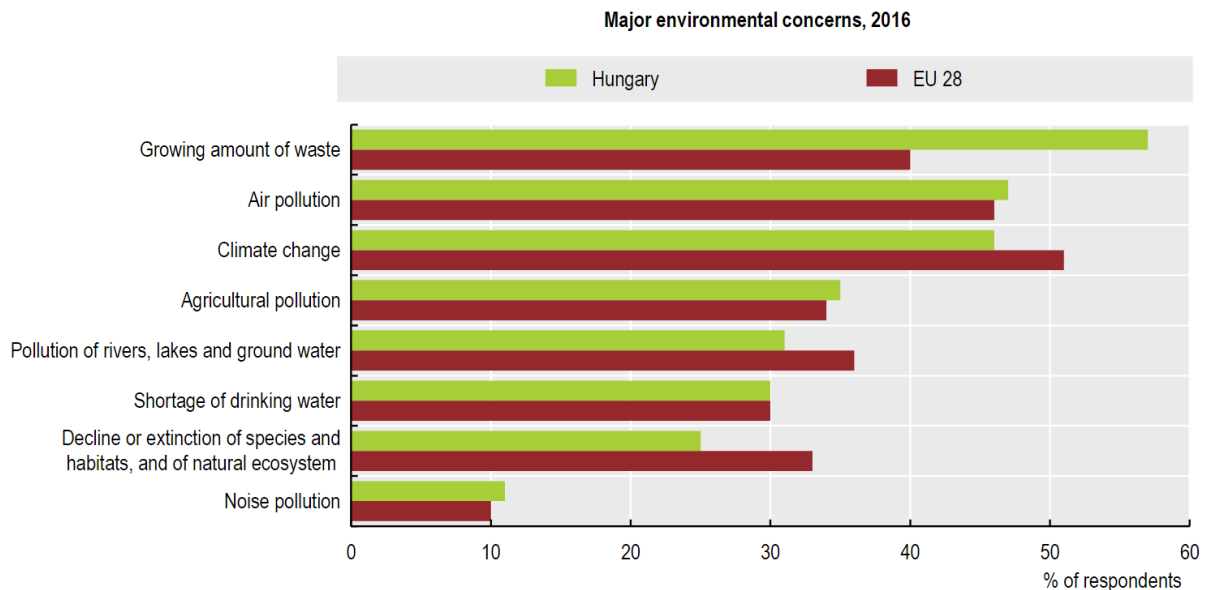


Figure 1: Hungarians are most concerned about waste generation

What is your aim?

Transforming city centers into "Zero Waste Cities" is a critical endeavor to address the burgeoning global waste crisis. This movement is fueled by a growing recognition of the unsustainable nature of our current waste management practices and the pressing need to transition towards a circular economy that minimizes waste, encourages recycling, and promotes sustainable consumption. Achieving the goal of a "Zero Waste City" entails multifaceted approaches, including waste reduction strategies, recycling initiatives, circular economy principles, public engagement, and policy reforms.

Community engagement and education are vital components of transforming city centers into "Zero Waste Cities." Empowering communities with knowledge about waste reduction, recycling processes, and the benefits of a circular economy can instill a sense of ownership and pride in achieving sustainability goals. Citizen involvement in waste management decisions and initiatives can also provide valuable insights and grassroots support. Therefore, this study would focus on that aspect; to connect and inform the community about what they can contribute to the city's welfare.

What is your world-changing idea? How do you want to change the world for the better?

The transformation of city centers into "Zero Waste Cities" is an intricate and dynamic process that requires a holistic approach. Only through collective efforts and a strong commitment to sustainable practices can we build cities that prioritize environmental stewardship and embrace a zero waste future. Creating and investing in infrastructures that would help these causes can significantly boost a city's initiative to be a zero waste city.

The idea is to create a **Zero-waste facility in each district** where people can go, learn to separate their own trashes therefore it can be processed in its proper classifications. As an architect, designing a zero-waste facility with the consideration of the trash and the community holds a great impact on how we can change the urban communities as often these initiatives are only a success in small cities. It's a challenge to how architecture could create a prototype of zero waste centers that could be replicated in capital or urban cities considering the increasing migration to cities that intensifies the cause of this problem.

These innovative spaces are not just waste management centers; they are the embodiment of a mindset shift towards sustainable living. One such facility, nestled in the heart of our community, is leading the charge in redefining how we perceive and handle waste. One of the facility's key initiatives is to change people's perspective on waste by emphasizing the importance of separating trash into specific classifications. This seemingly simple act holds the power to transform the communities.

Rethinking Waste as a Resource

At the zero-waste facility, trash is not a burden but an opportunity. By sorting waste into distinct categories like paper, plastics, glass, metals, and organic matter, people begin to see the inherent value in what was once considered refuse. This shift in mindset fosters a culture of recycling and reusing, reducing the need for virgin resources, and curbing the environmental impact of waste production.

Environmental Impact Awareness

The facility serves as an educational hub, offering workshops, tours, and interactive exhibits that highlight the environmental consequences of improper waste disposal. Visitors are invited to witness firsthand the effects of pollution, landfill overflows, and plastic pollution in our oceans. This visceral experience encourages them to take individual responsibility and actively participate in recycling programs.

Collaborative Efforts with Local Businesses

The zero-waste facility collaborates with local businesses to implement sustainable practices. By engaging restaurants, supermarkets, and manufacturers, they promote eco-

friendly packaging, waste reduction, and responsible disposal methods. These partnerships not only reduce the facility's environmental footprint but also demonstrate the economic benefits of recycling and waste diversion.

Demonstrating the Circular Economy

In a world that often operates on a linear model of "take, make, dispose," the zero-waste facility champions the circular economy. By showcasing products crafted from recycled materials and encouraging consumers to buy recycled goods, they demonstrate that waste can indeed be a valuable resource. This circular approach minimizes waste, conserves resources, and creates a sustainable loop of production and consumption.

Community Engagement and Empowerment

Perhaps the most significant impact of the facility lies in its ability to empower communities. Residents become active participants in waste management, realizing that their individual actions can collectively lead to transformative change. The facility provides resources, tools, and guidance, enabling residents to adopt zero-waste practices in their homes and neighborhoods.

As the zero-waste facility continues to inspire a mindset shift, its influence extends far beyond its physical borders. It serves as a model for sustainable waste management, illustrating that every action, no matter how small, matters in the pursuit of a greener, healthier planet. With this proposal, waste is not merely separated into classifications; it is sorted into opportunities for positive change. The facility's initiatives are a testament to the power of collective action, education, and community engagement. Through its efforts, it seeks to shape a future where waste is no longer a problem to be disposed of, but a resource to be cherished and utilized wisely.

II. Site

Where is your project?

Budapest, Hungary

Given that I'm studying in Budapest at the moment, I wanted to show the needs of this facility in Hungary, specifically in its center, Budapest. Since the 2018 Environmental Performance Review, Hungary has proven to have a comprehensive policy and legal structure for waste management, primarily influenced by EU regulations and reinforced through specific targets and economic tools. While efforts have been made to enhance material management, there has been limited emphasis on promoting the shift towards a circular economy.

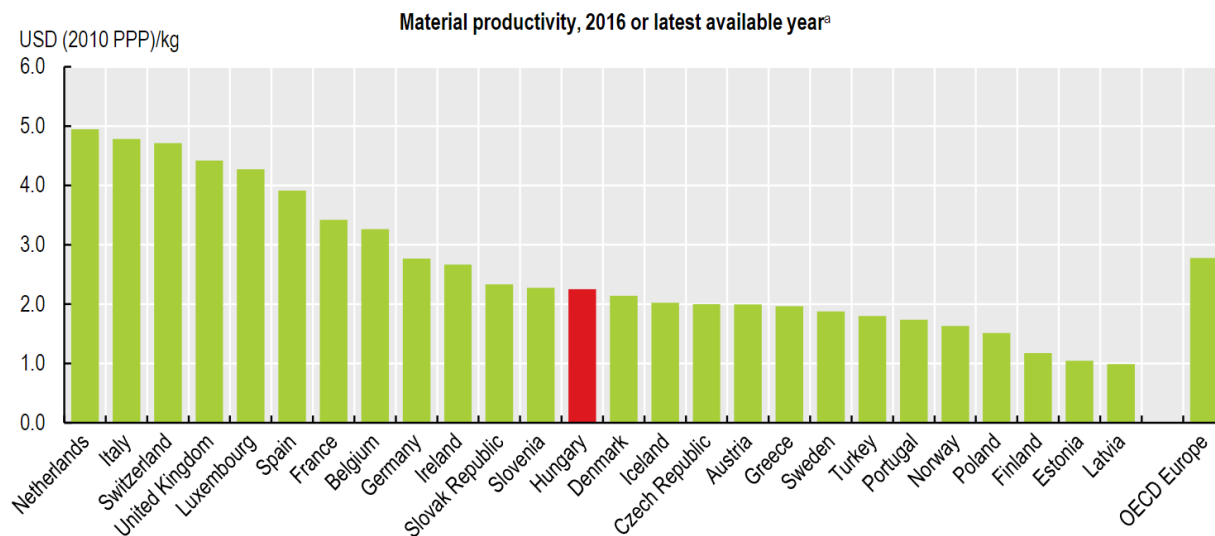
Positive trends in waste management include the disconnection of waste generation from economic growth, increased rates of recycling and recovery, and reduced reliance on landfilling. Despite these advancements, Hungary is considered an average performer and faces challenges, particularly in areas like glass recycling, where it lags behind its European counterparts.

Successfully transitioning to a circular economy necessitates the implementation of new policies, innovative business models, and collaborative approaches with businesses and society. Hungary's recent institutional instability, the centralization of waste-related governance, and the absence of collaborative mechanisms for a circular economy could impede progress in this area.

Hungary's material consumption

Hungary faces challenges in achieving sustainable material management due to its limited availability of raw materials, necessitating a dependence on energy and material imports as reported by the EEA in 2016. In comparison to other European countries in the OECD, Hungary's economy is less resource intensive. The per capita domestic material consumption (DMC) in Hungary was 10.9 tonnes (equivalent to 30 kg per person per day) in 2016, which is below the OECD Europe average of 35 kg per person per day.

When considering material productivity, which is defined as the economic value generated per unit of material used or gross domestic product (GDP) per unit of DMC, Hungary falls below the OECD Europe average (as shown in Figure 4.1). This suggests that the country has the potential to utilize material resources more efficiently for wealth creation. However, Hungary's performance in this regard is comparable to neighboring Central European countries like Slovenia, the Czech Republic, or the Slovak Republic.

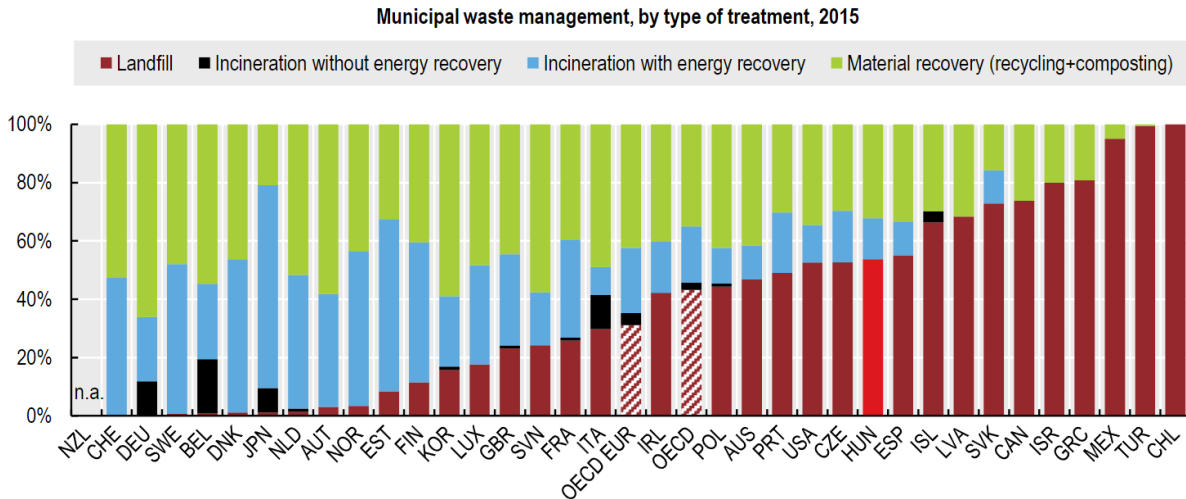


a) Material productivity designates the economic output (in terms of GDP) generated per unit of domestic material consumption (DMC), calculated as the sum of domestic extraction of raw materials used by an economy and the physical trade balance (imports minus exports of raw materials and manufactured products). Source: Eurostat (2017), *Material Flows Accounts*, (database); OECD (2017) *National Accounts Statistics* (database).

StatLink <http://dx.doi.org/10.1787/888933712738>

Figure 2: Material productivity remains below the OECD average

Landfilling remains the most frequent treatment option for municipal waste (54% in 2015). However, material recovery rates (including recycling and composting) steadily increased from 10% to 32% over 2006-15 (Figure 4.4). This rate of Hungary is still below the OECD average (Figure 2). Energy recovery slightly increased from 9% to 14% between 2008 and 2015.



Notes: Data refer to the indicated year or to the latest available year. They may include provisional figures and estimates. Household and similar waste collected by or for municipalities, originating mainly from households and small businesses. Includes bulky waste and separate collection. For the specific country notes see the source database.

Source: OECD (2017), "Municipal waste", *OECD Environment Statistics* (database).

StatLink <http://dx.doi.org/10.1787/888933712814>

Figure 3: Hungary is lagging behind in waste recovery

All the data shown above reflects the necessity of an intervention that would help Hungary better managed waste, its recovery, and its efficient processing.

Budapest as a city have seen see promising improvements in terms of managing its waste but the data above also showed the needs for it to be improved. Also, in the latest state of European zero waste cities report (gathered by <https://zerowastecities.eu/>) shows that Budapest is nowhere to be found which means it is imperative that we do something about it. The establishment of a zero-waste facility can help the city move closer to achieving its waste reduction and sustainability goals.

What characteristics a location should have?

Since my goal for this facility is to be adaptable to any capital cities, I created a set of criteria that would help me find the best site in the Hungarian capital, Budapest:

- The site should be near or easily accessible to the housing complexes to serve as its focus community.
- The site should have ample backyard spaces for the needed outdoor functions.
- The site should be easily seen by people given the aim of the facility to spread awareness.

With all these criteria set, the most preferable one chosen, that could also amplify the aim of the project by reusing it is the abandoned building near the Bikás Park in District 11.

Detailed description of the site

The site is located near the residential area in the XI District of Budapest. Most buildings on the surrounding area have around 11-storey high buildings and some commercial ones with 3 storey heights. The plot is a private lot that can be acquired by the public use given that the former function was stopped. It is initially built as a commercial space until its main structural framing was formed. It is located within 500 meters from the Bikás Park m4 station. It is bounded by 3 streets: Vahot, Bártfai, and Wartha Vince. It is directly beside a residential housing with 11 storeys high. The plot has an area of 555 square meters with an abandoned building occupying an area of 353.66 square meters. The plot is relatively flat and rectangular in shape.

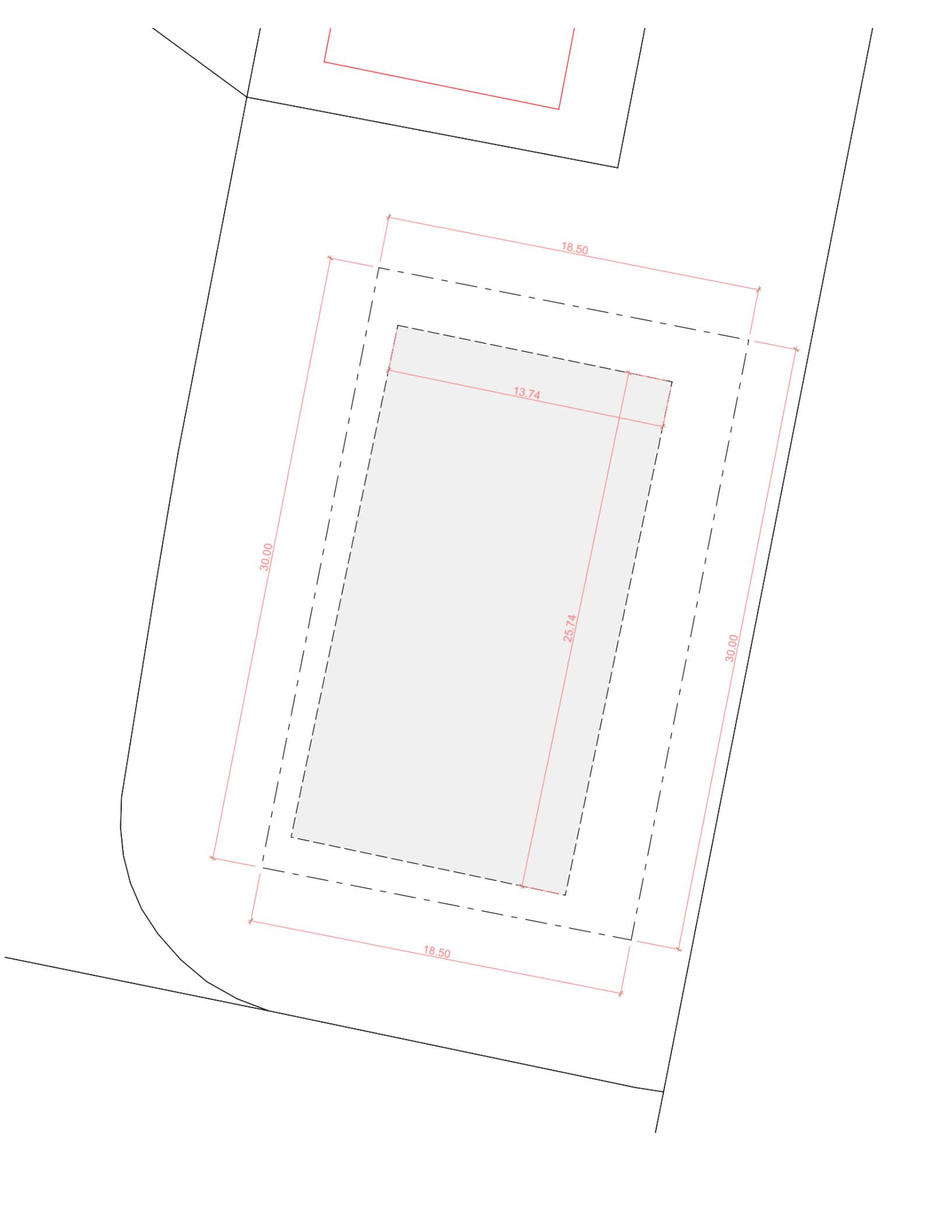
Here are the base map, site plot with dimensions, site photos as follows:



Google Earth

90 m







III. Function

What kind of building could host such activities?

A zero-waste facility is designed to minimize waste generation and maximize recycling, reuse, and composting to divert as much waste as possible from landfills and incinerators. Kamikatsu, located in Japan, is known for its innovative approach to achieving zero waste, and similar models could offer numerous benefits to a city like Budapest.

One great sample of this as mentioned is the one in Kamikatsu. A quaint town in Japan — Kamikatsu — proved to the world that it could be done by emphasizing the concepts of reduction and reuse and making recycling creative and fun. This town's emphasis on reducing what to throw is manifested in their city-wide waste management strategy and demonstrates how a single step like this could make a significant contribution to solving the global waste crisis. Located on Shikoku island in Southeastern Japan, the small, picturesque town of Kamikatsu, home to a tightly knit community of fewer than 2,000 residents, is the first municipality in Japan to implement Zero Waste. In 2003, Kamikatsu declared their Zero Waste goal of eliminating waste by 2020, without resorting to incinerators or landfills. Kamikatsu has an extensive waste sorting system, where people separate wastes into 45 specific categories such as aluminum cans, steel cans, newspapers, paper cartons, and paper flyers. They also wash and transport their waste to the waste collection center — a practice that the residents initially found tedious, but which eventually became second nature to them. They also manage all their organic waste within each household.



Since the amount of waste had been increasing exponentially, the option of investing in waste-to-energy incinerators was brought to the table but was not acknowledged as appropriate solution due to its financial costs. This left the municipal government officials to find a new approach to dealing with their residential waste. At first, the most feasible solution was for the town to transport their waste to other municipalities, but it was not cost-efficient and was an unsustainable move for a small economy. So, the municipal officials came up with a better plan — to reduce as much waste going to incinerators or landfill as possible. This was the threshold of Kamikatsu's Zero Waste scheme and a step towards the Zero Waste ambition.



Looking back, it's been almost 16 years since the town embarked on its Zero Waste scheme. At this point, the waste reduction process that was once a burden, has become a way of life for the town of Kamikatsu. Last 2003, after Kamikatsu promulgated its Zero Waste scheme, the town aimed to: 1. Raise the ecological consciousness of individuals; 2. Ensure that no waste goes to an incinerator or landfill by 2020, and consequently amplify the reuse-recycle scheme; 3. Develop networks with like-minded individuals.

As for the next steps, the town aims to prevent waste production altogether. Back in 2015, the town developed a further roadmap of achieving Zero Waste by 2020. This ambition of becoming the first Zero Waste town in Japan by 2020, without resorting to incinerators or landfills, is within the bounds of possibility. According to Sakano, the only thing that prevents the town from becoming 100% Zero Waste is the reality that some manufacturers refuse to change the nature of their production process— they still use nonrecyclable packaging and materials in their products.¹⁵ Aside from involving the residents and local businesses, the community's next step is to pressure outsiders to get involved in incorporating the idea of a circular economy in the production and supply of single-use products. The quaint town of Kamikatsu developed innovative ways to prevent the disposal of a staggering amount of waste. Not only is this strategy open to its local community, but anyone involved in the production and consumption of products. Without a doubt, Japan's greatest asset lies in its people — innovative, purposeful, and well-

disciplined. Like them, we too can do something to alleviate waste pollution that has grown immensely in proportion throughout the world. May the town folk's ingenious way of implementing Zero Waste serve as an example for world leaders and a source of inspiration for people.

Comprehensive Approach Leads to 81% Recycling Rate

Kamikatsu has adopted a “Bring Your Own Resources” approach, asking residents to personally deliver their sorted waste. The town's Waste Station is open from 7:30 am to 2:00 pm every day, except for three days around the New Year. Onsite staff assist with any difficulties in sorting of waste.

“I think some people come here because they look forward to talking with the staff,” Sakano says. “The whole town converges here, which makes it also a place for sparking community interaction.”

Some of the notable spaces the Zero Waste Facility in Kamikatsu have are:

- **Waste Drop Off with 45 classifications of waste** - There is likewise an impressive number of subcategories for each type of waste. There are separate bins for different types of paper products such as newspapers, magazines, cartons. There are even more trash bins for plastic bottles, caps, and cans, and even metals are further classified into aluminum and steel.



- **KURU-KURU: reuse and recreate** - From becoming a hub for social interaction among residents, the waste collection center later expanded to include a circular shop or kuru-kuru shop (kuru-kuru meaning circular in Japanese), where locals can drop off items they no longer need and take away any of the items that were also dropped off there for free. Additionally, in an effort to eliminate the use of disposable plastic cups and plates for special occasions, residents can also borrow 8,000 tableware items from the Zero Waste Academy for free. Next to the waste collection center is a kuru-kuru craft center where local women, particularly grannies, make products out of discarded materials such as teddy bears from old kimonos, a traditional Japanese garment.



- **Zero Waste accreditation for business owners** - The Zero Waste Academy trains local shops on how to recycle waste products and partners with them in conducting waste audit reports to identify the different categories of waste. On top of that, the organization manages a Zero Waste accreditation scheme, where local businesses are given certification according to their efforts to reduce waste and control its use of single-use products.



What kind of activities could serve your aim?

With most of the principles of the Zero Waste Facility adapted in my program. I will propose 5 main areas for my building as indicated in the image below. This is also in-line with the thinking of revamping the FKF (Hungarian Public Works) Collection Facilities which currently have 17 waste classification system which are stipulated from the EU zero waste laws. The addition of the 3 more waste types is introduced to better intensify some of the goals of the facility. These are the Food wastes, Fabrics, and Steel scraps/wires now having 20 waste classification to start with.

20 Waste Classification

Plastic packaging waste

PET bottles, plastic bottles, nylon films

Metal packaging waste

canned, beer and soft drink metal cans

Paper (mixed)

is clean paper found in every household

Beverage cardboard (tetrapak)

Cardboard boxes for packaging milk and fruit juice drinks

Colored packaging glass (bottles)

wine, champagne, and other beverage bottles

White packaging glass (bottles)

jars for drinks, preserves and pickles

Hungarocell (only completely clean, white packaging Styrofoam)

protective packaging for technical items

Batteries, portable small batteries

dry batteries and all kinds of small battery cells

Car starter battery

acid starter batteries

Electronic waste

computers, televisions, monitors, mobile phones, etc.

Electrical waste

refrigerator, washing machine, vacuum cleaner, DIY machine, garden machine, etc.

Fluorescent lamp, light fixture, light bulb

all lighting fixtures

Tired oil and its roll

Used car oil and its used bottle

Edible oil and its roll

used kitchen oil and its bottle

Solar panels:

only in residential quantities (2-3 panels)

Toner waste:

printer cartridge

Antifreeze liquid:

delivered well sealed and packaged

+

Food Waste

Spoiled/waste food put in a proper container

Fabrics

Recyclable Fabrics for reuse

Steel wires

Reusable steel wire, tube, etc.

Recycling Drop-off:

Waste Classification: The Recycling Drop-off is a community initiative that encourages responsible waste management by providing designated collection points where residents can dispose of their waste based on proper classification, promoting the separation of recyclable materials from general waste to enhance the efficiency of recycling processes.

Recyclable Wastes: These drop-off points facilitate the convenient disposal of recyclable wastes such as paper, plastic, glass, and metal, contributing to environmental sustainability and reducing the overall burden on landfills by diverting materials that can be repurposed through recycling.

Environmental Impact Awareness:

This area is dedicated to spreading the campaigns through digital screens, posters and such so the neighborhoods are within reach of the program and people are aware of the facility and its initiatives.

Zero Waste Academy:

Zero Waste Accreditation: The Zero Waste Academy is a comprehensive program aimed at empowering local businesses with the knowledge and tools to achieve zero-waste goals, offering accreditation to those establishments that actively minimize their environmental impact by adopting sustainable practices and reducing waste generation.

Local Shops Training: This initiative involves specialized training sessions for local shops, equipping them with strategies to minimize packaging, implement effective waste reduction measures, and engage with their community to foster a culture of responsible consumption, creating a network of environmentally conscious businesses.

Circular Shop:

Reuse, Recreate, Upcycle: The Circular Shop is a retail concept centered around the principles of the circular economy, emphasizing the reuse, recreation, and upcycling of products. By encouraging consumers to buy pre-owned items, supporting creative initiatives to transform discarded materials into new products, and promoting the upcycling of goods, the Circular Shop aims to minimize waste and promote sustainable consumer habits.

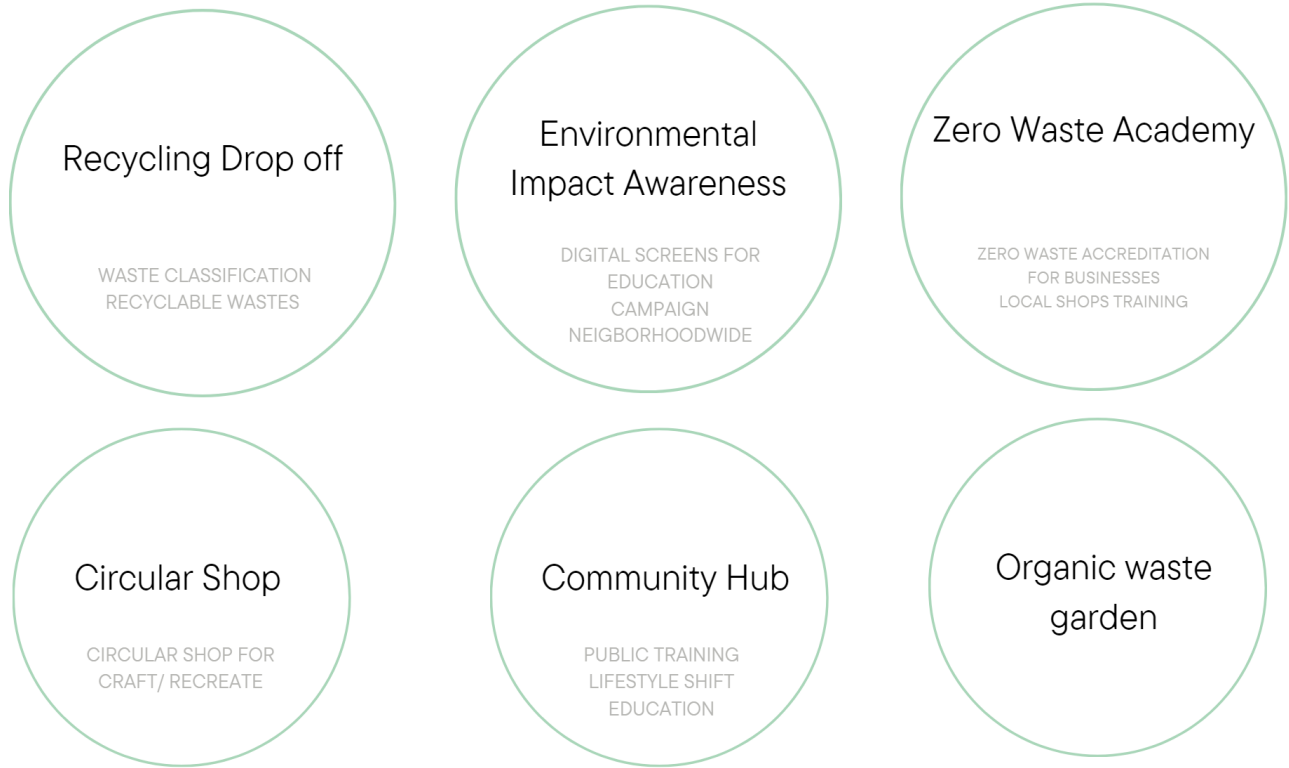
Community Hub:

Public Information Lifestyle Shift: The Community Hub serves as a central information hub for the community, offering resources and educational programs to foster a lifestyle shift towards sustainability. By disseminating public information on eco-friendly practices, waste reduction, and community engagement, the hub becomes a catalyst for positive

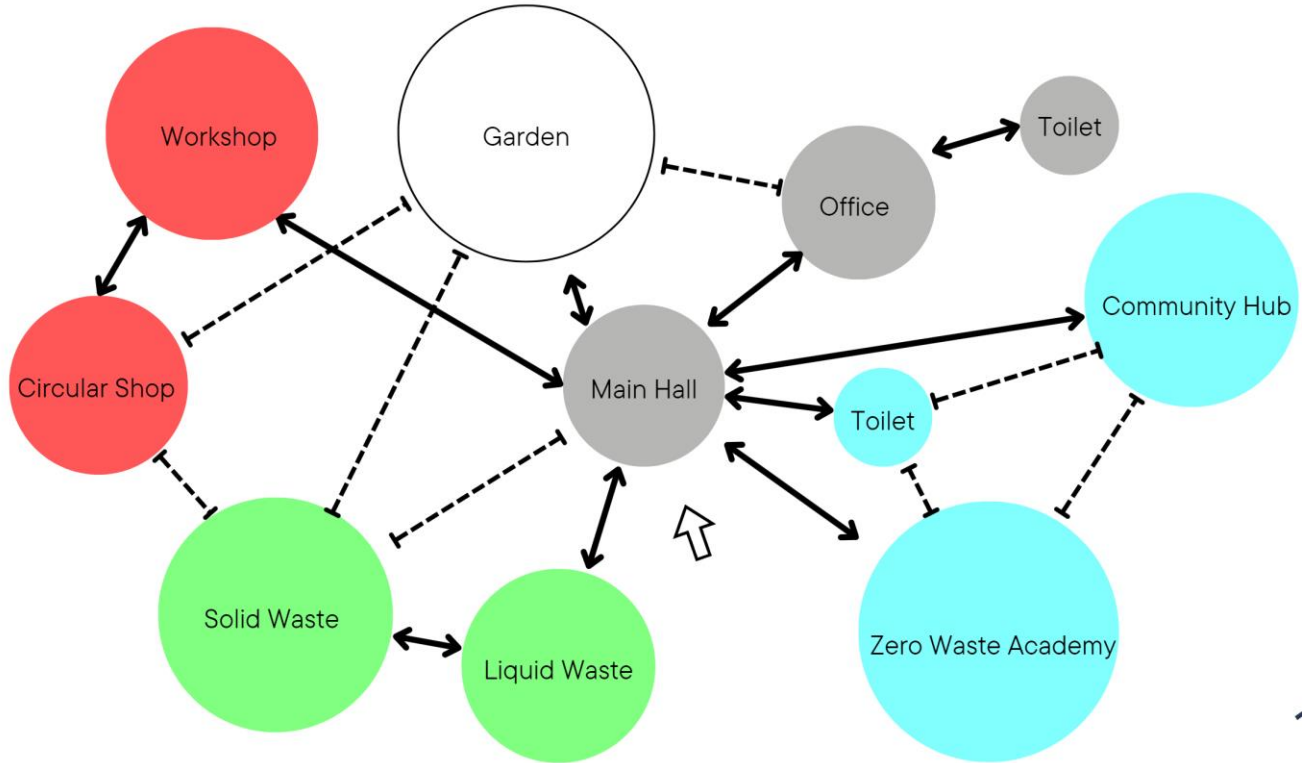
environmental change and a gathering point for like-minded individuals committed to building a more sustainable future.

Organic waste garden:

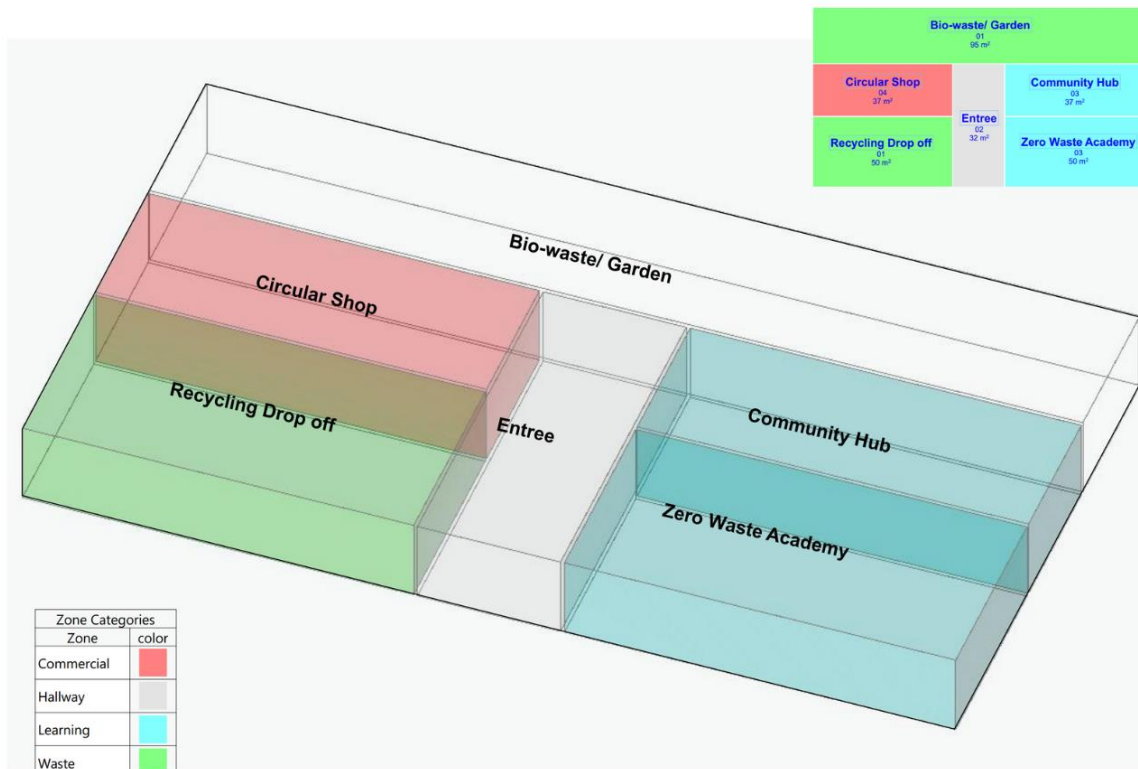
The Organic Waste Garden is a sustainable green space that transforms kitchen and garden organic waste into nutrient-rich compost through an on-site composting system. By integrating organic waste recycling into the community, the composts made from organic wastes can be distributed or sold to the community to enrich the soil, creating a thriving ecosystem that promotes sustainable gardening and reduces the environmental impact of organic waste disposal.



Detailed Room Program



Study of initial distribution of areas:



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