

# CURE+ Baseline study: City of Riga, Latvia

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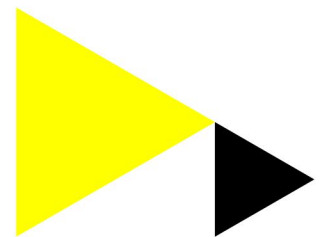
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# CURE+

CENTRES FOR URBAN RESOURCES,  
REUSE AND REMANUFACTURE

## Baseline study

City of Riga, Latvia

Sara Rueda Raya, Frazen Tolentino-Zondervan, Willem van Winden, Patricia van Hemert

May 2024

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## Lists of Abbreviations

CDW	Construction and Demolition Waste
CE	Circular Economy
CEAP	Circular Economy Action Plan
CURE+	Centres for Urban Resources, Reuse, and Remanufacture
EC	European Commission
EPR	Extended Producer Responsibility
ERC	Environment Resource Centre
EUKI	European Climate Initiative
EU WFD	European Union Waste Framework Directive
IAP	Integrated Action Plan
URC	Urban Resource Centre
URGE	circUlaR buildinG citiEs
ULG	Urbact Local Group
VAT	Value Added Tax
WPP	Waste Prevention Plan
WMP	Waste Management Plan

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## 1. Introduction

### 1.1. City of Riga

Riga was established in 1201. It is the capital and largest city of Latvia and is home to one-third of the entire population of the country. The territorial division of the city consists of 6 districts and suburbs, three executive boards, and 58 localities (City Development Department of Riga Municipality, 2014). Riga accounts for approximately half of all national economic activity including exports. The top three sectors of the economy of Riga in 2020 by share of total value added are (1) trade and service, which accounts for 15.7%; (2) the real estate sector, which accounts for 11.6%; and (3) transport and logistics which contributes 14.3%. The total added value of the construction sector in the city is 7.6% (Riga City Council, 2021). The biggest exporters are in wood products, IT, food and beverage manufacturing, pharmaceuticals and metallurgy (Feleki 2023).

Construction is Riga's 6th largest industry with 98% of Construction and Demolition Waste (CDW) recovered (Riga Integrated Action Plan for the transition to circular economy in construction in Riga Municipality, 2022). The volume of the CDW collected from the households is being recorded since 2020. On average around 20,000 m<sup>3</sup> of the CDW are being collected in Riga per year. According to the reports of the waste management companies, around 10% of the collected household CDW is being sent to the landfill, the rest is being prepared for regeneration (Riga City Council, 2024).

### 1.2 EUKI Funding

CDW is the most significant waste stream in the European Union (EU) in terms of mass. Around 340 million tons of CDW were generated between 2010 and 2018 in the EU (EEA, 2020). Therefore, the EU Circular Economy (CE) Action Plan (EC, 2015) has identified CDW as a priority waste stream. The EU Waste Framework Directive (EU WFD) sets a 70% recovery target for CDW by 2020. Most member states achieved this target on time. However, the recovery rate was mainly based on backfilling or downcycling, which hampers the implementation of CE objectives (Galvez-Martos et al., 2018). Currently, most material streams from demolition and renovation works are unavailable for reuse or upcycling activities (EEA, 2020). Thus, the recovery potential of CDW in the EU is still under-exploited, with current CDW streams unsuitable for reuse or closed-loop recycling (EEA, 2020).

The CURE+ project (Centres for Urban Resources, Reuse and Remanufacture) aims to support the EU CE Action Plan by promoting and designing urban CE practices to track, trace, reduce, reuse, repair, remanufacture, and upcycle household-related CDW. This is done by learning from the best practices elsewhere and mapping the current waste management practices in four participating European cities, namely Riga (Latvia), Tartu (Estonia), Kavala (Greece), and Barcelona (Spain), to develop locally tailored solutions for each city. Developing tailored-made solutions requires working with local stakeholders from

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cities/municipalities, private businesses, and universities while putting citizens at the forefront of this initiative.

The CURE+ project is funded by the European Climate Initiative (EUKI). EUKI is an initiative launched in 2017 by the German Federal Ministry for Economic Affairs and Climate Action to improve collaboration among the member states on climate action. EUKI supports organizations within the EU to implement plans related to contributing to the expansion of renewable energy, improving energy efficiency, and reducing CO<sub>2</sub> emissions. Furthermore, EUKI-funded projects aim "to strengthen technological advances and political dialogue, social justice in climate action as well as climate education and sustainable economy" (EUKI, 2017).

### **1.3 Problem Statement and justification for selecting this city**

The EU's transition to a CE aims to reduce the pressure on natural resources while creating sustainable growth and jobs (EMF, 2015). Achieving the EU's 2050 climate neutrality targets is also a prerequisite. To contribute to this goal, the CURE+ will specifically address the following issues:

- Lack of knowledge of current CDW flows, their composition, and their characteristics to identify them as recoverable. In each partner city, including the city of Riga, there is a lack of reliable and available data and classification systems.
- Different understanding and varied accounting systems of EU-member states for waste recovery operations; as a result, there is a lack of comparable (baseline) data on how much of CDW is currently recovered, and it is difficult to measure improvements over time.
- A habit of giving preference to raw materials over secondary materials (originated from waste) for two reasons: 1.) They are cheaper; and 2.) Warranties and standards assure their quality, giving consumers and companies a limited incentive to use recovered materials.
- Lack of knowledge and resources to rethink value chains and business models, product design, and the overall economic systems to achieve the lowest environmental impact; and
- Communicating and promoting long-term benefits from implementing circular actions in the building sector.

In sum, a common understanding, exchange, transfer of knowledge, and capacity building are crucial for the CURE+ partner municipalities to achieve the EU climate goals.

There are two main reasons why Riga is an interesting focus city for the CURE+ project. Firstly, Riga is active and ambitious regarding CE. It participates in several European projects related to CE and CDWs (or construction in general). The city runs and designs a number of (pilot) projects which can inform the other partners in the project. Second, Riga will benefit from the lessons and experiences collected in the CURE+ project, to further develop its

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circular activities, the most relevant one being the development of an Urban Resource Centre (URC).

## **1.4 Aim of the Report**

The aim of this report is twofold. First, it highlights the unique aspects of Riga, including its CDW management approaches, legal and policy frameworks, city visions and strategies, innovative practices, and enablers and barriers for CDW management. Second, recommendations on how to organize URC as an innovative approach for CDW management are formulated using the baseline insights obtained from the local stakeholders and findings during this study.

## **1.5 Article Roadmap**

The sections of this report are structured as follows. Chapter 1 introduces the city of Riga, the funding body behind this project, the problem statement and justifications for selecting this city, followed by the aim of this article. Chapter 2 presents the sources of information in this article, which include interviews and reports. Chapter 3 provides an overview of the CDW management practices based on national and local level policies and regulations and CDW stream analysis. Chapter 4 discusses the current city vision and strategies, innovative practices and experiments, and the barriers and enablers to more circular CDW management. Chapter 5 recommends how a URC, as an innovative experiment, can be organized to manage CDWs in Riga better.

## 2. Methodology

This report is based on research using qualitative methods. The data in this report were collected from reports, in-depth interviews, and a workshop. The reports include policy documents on the national and city level. Some of these reports were written in Latvian and were translated into English. The interviews, which were conducted in June 2023, consisted of different stakeholders ranging from Non-Government Organizations (NGOs), academia, industry/business, and government officials. The profiles of the participants are presented in Table 1. All interviews were conducted in person and were recorded via MS Teams. The transcripts of interviews were generated using the same platform and were analyzed by coding relevant answers to the themes of this report. The information obtained from the reports and interviews was validated and supplemented through a workshop held among city stakeholders in Barcelona in October 2023. The representatives of Riga city were also included in Table 1 as part of the sources of information in this report.

**Table 1** Profile of the interviewees in Riga City.

Interviewees	Type of stakeholders	Profile
1	NGO & Academia	Chairman of the board (NGO Green Liberty) and researcher and assistant professor at the University of Latvia
2	Private	Building and territory maintenance Leading management specialist
3	NGO	Development and sustainability manager (Free Riga)
4	Private	Sales manager at a waste management and recycling company
5	Public	Advisor to the director of the Riga City Development Department
6	Private	Representative of the Association of Building Materials Manufacturers and Commercial Director at a Building Materials Manufacturer
7	Private	Head of the Environmental Services department at waste management company
8	Public	Elected Councilor



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9	NGO	CEO of a waste management association
10	Public	Lecturer/Researcher
11	Public	Lecturer/Researcher
12	Private	Head of the Environmental Management Department at a landfill operator
13	Public	Riga municipality Project manager, circular economy expert
14	Public	Senior waste management specialist, Riga municipality

### 3. Construction and Demolition Waste Management practices

This section identifies the different policies or regulation frameworks in Latvia and Riga and the CDW stream analysis.

#### 3.1 Waste Management Plans (WMP) and Legal Framework

##### *State WMP of Latvia*

The State WMP of Latvia was initially adopted in 2006. It went through different revisions leading up to its current version for 2021-2028. The Ministry of Environmental Protection and Regional Development oversees the preparation and setting forth of WMP. The State WMP has four objectives:

1. Expand the current system for separate collection of waste;
2. Develop the institutional framework for waste management;
3. Create stronger waste management regions; and
4. Implement CE principles that will lead to increased waste recycling (at least 65% of total municipal waste) and reduced disposable waste (no more than 10% of the total municipal waste will be disposed in landfills in 2035).

Guided by these four objectives, the State WMP seeks to offer support to:

- Reuse of building materials in construction processes (inclusion in Green Public Procurement and Standards);
- Construction practices that result in little waste and use as much waste as possible in the construction process (training, inclusion of criteria in tenders for the best construction, award for the most environmentally friendly construction);
- Support the reuse of the soil surface and asphalt (through inclusion in Green public procurement, standards); and
- Promoting the use of compost from biodegradable waste in economy.

Reusing means that a product or components can be used again for the same purpose without reprocessing the item, while recycling waste focuses on transforming the recovered wastes into products, materials, or substances that will be used for original or other purposes. The State WMP also includes a commitment to develop legal acts for application of the end-of-waste status for CDW. The specific waste prevention program, measured by mainstream of Ministry of Environmental Protection and Regional Development, can be found in Appendix Table 1.

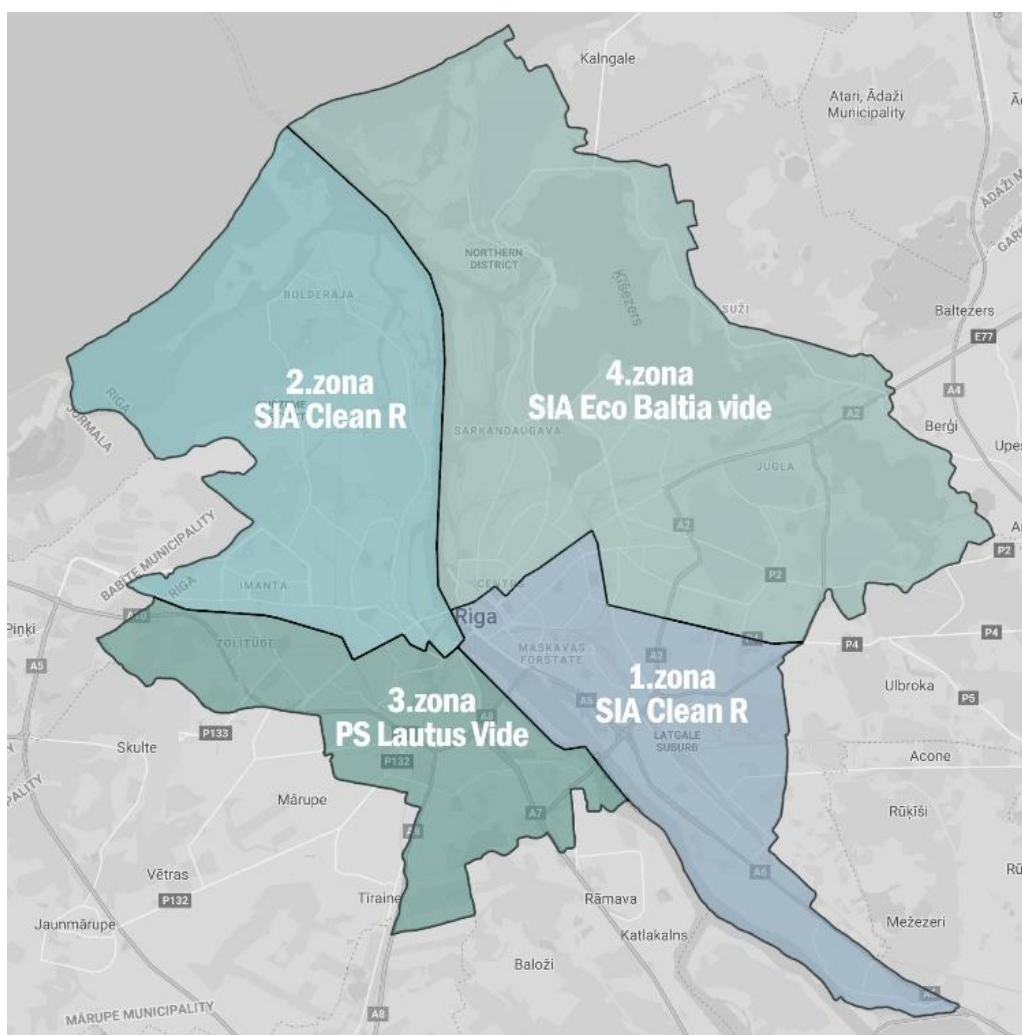
##### *Regional Waste Management Plans*

All Regional WMPs are valid from 2005-2025 with revisions every 3 years (except for the Riga region). The Ministry of Environmental Protection and Regional Development and municipalities of each waste management region are in charge of the Regional WMPs and

their enforcement. At the time of this report, the new Regional WMP for the period 2024-2028 has been finalised and is going through the adoption process by the municipalities included in the region.

### *Local Regulations in Riga*

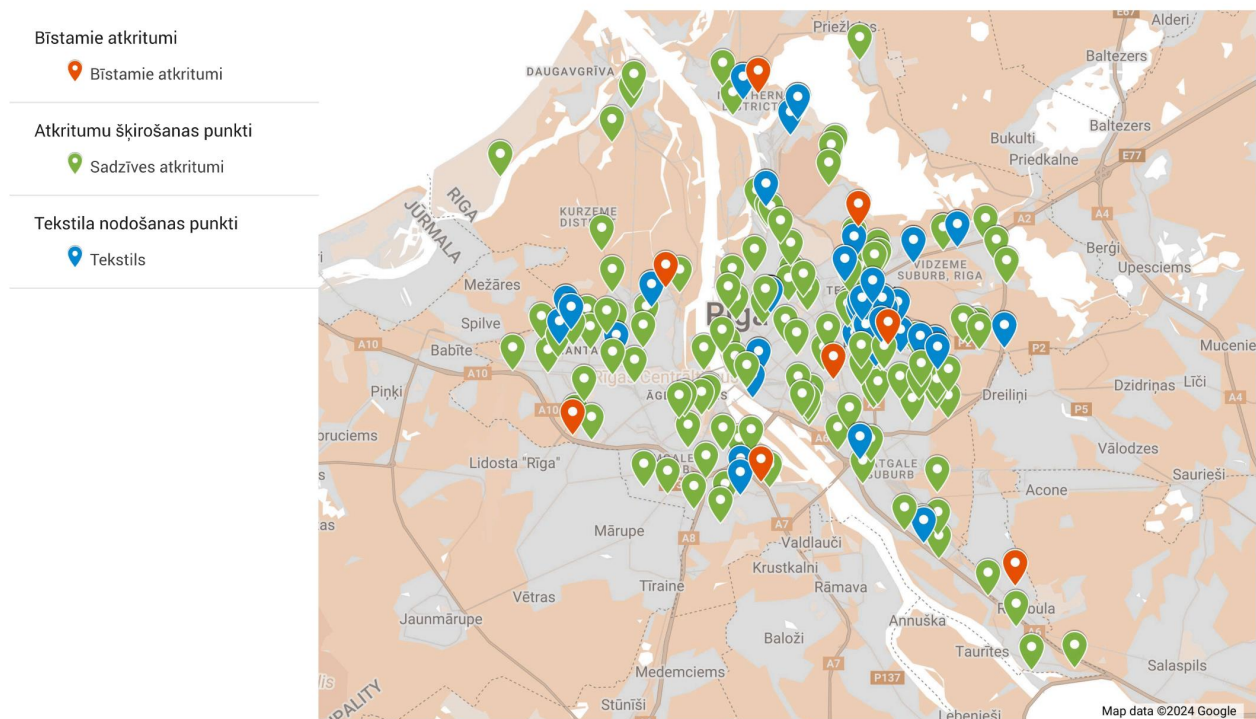
Riga does not have WMP but instead has local regulations for managing municipal wastes and CDWs collected from the households. The municipality has four waste management areas or zones, which are currently being serviced by three waste management companies that won in the procurement process of the municipality (see Figure 1). These companies are SIA Clean R, which services Zones 1 and 2; PS Lautus Vide, which services zone 3; and SIA Eco Baltia vide, which services Zone 4. The municipality has signed agreements with these three waste management companies, which are then in charge of implementing rules for the segregation and collection of wastes among citizens.



**Figure 1** The map of four waste management zones of Riga including the waste management companies that service them.

Sorted wastes, such as plastics, papers, metals, and glasses can be disposed for free; Plastic, paper and metal sorting is mandatory for blocks with more than five apartments, glass and biowaste sorting - for blocks with more than 10 apartments. If the pollution in sorted waste (meaning incorrectly sorted) is 20% or more, the residents have to pay for this contaminated container in the same way as for unsorted waste. There are also free sorting points for textile, paper, plastic, glass, and hazardous waste in many places across the city (refer to Figure 2 for the waste sorting points in Riga city).

## Atkritumu šķirošanas punkti Rīgā



**Figure 2.** Map of the different waste sorting points in Riga (Legend: Red - hazardous waste; Blue - textile; Green - glass, paper and plastics).

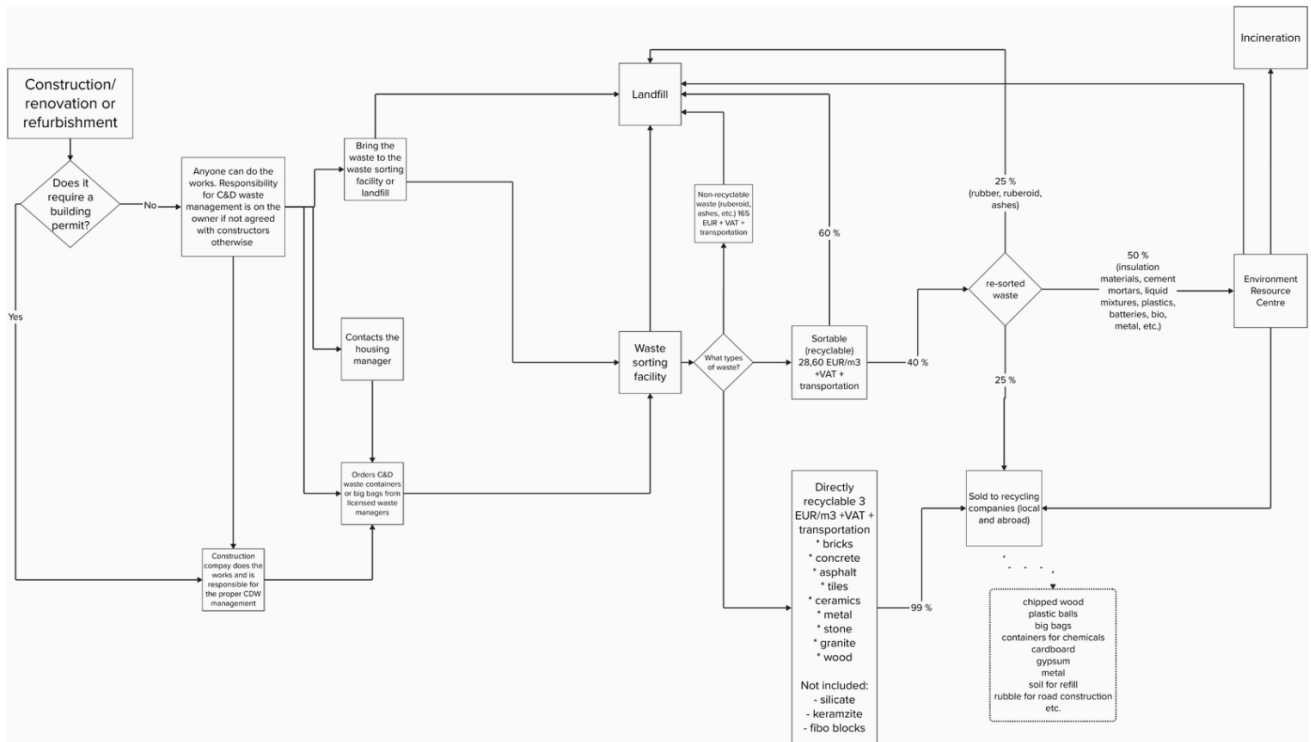
The way the waste management company charges citizens depends on the situation of citizens. For those living in multi-apartment building, the waste management company issues an invoice to the manager of the multi-apartment building, who in turn distributes the amount to the residents of the building and invoices them. The owners of private houses sign a contract with the waste managers themselves and pay directly.

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Raising citizen's awareness in waste management is done directly by waste management companies and other parties. Some waste managers organize campaigns and promotions to inform and educate citizens to improve their waste sorting practices and reduce waste generation. The building managers also work on their part to educate and inform the residents. For example, the total amount of waste management is divided in the bill in such a way that it is visible how much the residents overpay for irresponsible waste sorting practices.

### **3.2 CDW stream analysis**

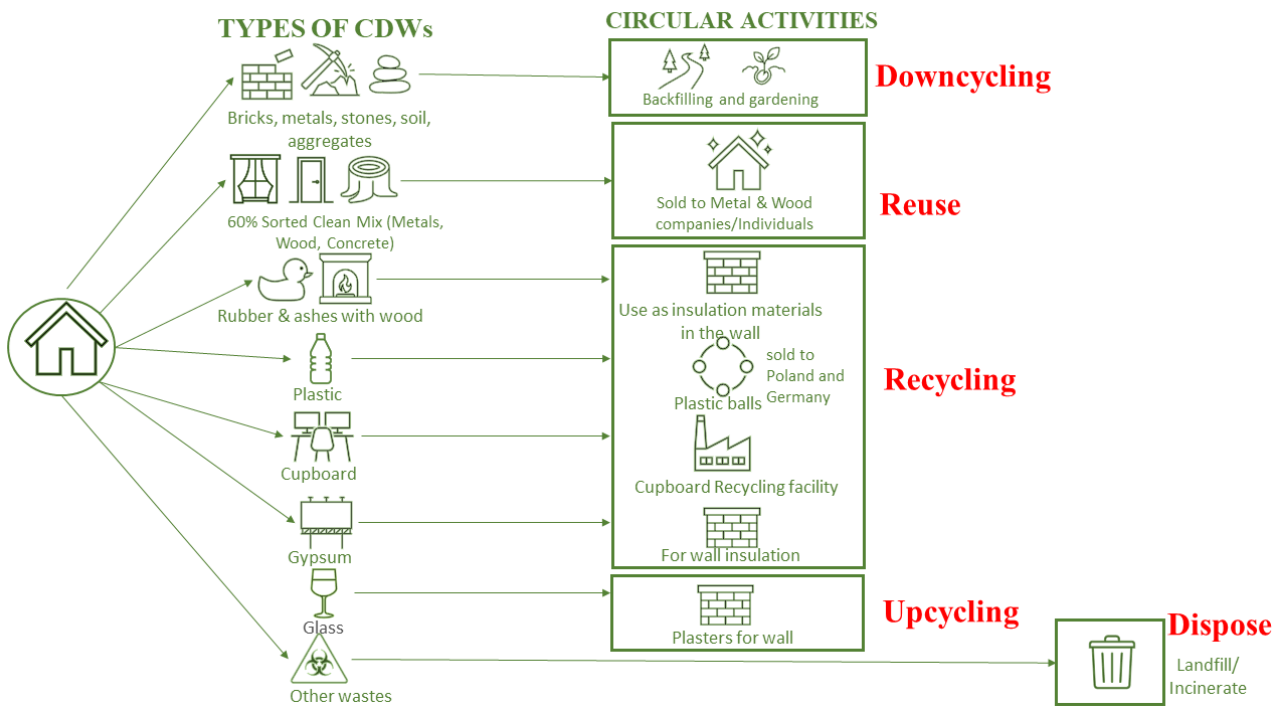
The processes and the stakeholders that are involved in the management of the CDW stream are illustrated in Figure 2. Before a construction, renovation, or refurbishment happens, an individual must consider whether a building permit is required or not. If a building permit is required, the construction company does the work and is solidary responsible for the management of CDW together with the customer. The construction company orders the CDW containers or big bags from licensed waste managers. Then, the collected CDW will go to a waste sorting facility, which will determine the type of waste, if not already sorted directly on the construction site. There are, in general, three types of waste. First is the non-recyclable waste, which costs €165 per cubic meter (m<sup>3</sup>), excluding Value Added Tax (VAT) and transportation. This waste goes to the landfill. Second is the sortable recyclable waste, which costs €28,60 per m<sup>3</sup>, excluding Value Added Tax (VAT) and transportation. Sixty percent (60%) of this waste goes directly to landfill. In contrast, the remaining 40% are resorted and are further broken down into three compositions: (1) 25% can be sold to recycling companies, (2) 25% such as rubber, rubberoid, and ashes go straight to landfill, and (3) the remaining 50% consists of insulation materials, cement, mortars, liquid mixtures, plastics, batteries, biometal goes to Environment Resource Centre (ERC). The ERC then determines whether the waste can be sold to recycling companies, go to a landfill, or be incinerated. The directly recyclable materials, which cost €3 per m<sup>3</sup> are sold to recycling companies. The landfill charges are €181.50 per tonne for the CDW if accepted from a private person (it was raised substantially; it used to be €85); and €2.5 to €7 per tonne if accepted from a legal person.



**Figure 2** The processes and stakeholders involved in the management of CDWs in Riga city.

If a building permit is not required, an individual can do the renovation or refurbishing activity and is responsible for the management of CDW unless agreed upon with a contractor. There are three options for individuals to handle the generated CDWs: (1) bringing themselves the waste to the waste sorting facility or landfill, (2) contacting the housing manager to order the CDW containers or bags, or (3) ordering personally the CDW containers and bags that they will bring to the waste sorting facility. The collected CDW in the waste sorting facility will undergo the same process as discussed above.

Figure 3 summarizes the different types of waste and the circular activities that are currently done by these CDWs based on conducted interviews (June 2023). Four main circular activities can be identified – recovery (downcycling), recycling, upcycling, and reuse. Sorted clean mix wastes such as metals, wood, and concrete are sold to metal and wood companies or individuals. Bricks, stones, soils, and aggregates are used for backfilling and gardening. Waste such as rubber and ashes with wood, plastic, cupboard, and gypsum are recycled. Glasses are used for producing plasters for walls, which are good for heat transmission and acoustical qualities (Interviewee 6, June 2023). Finally, the other wastes are being disposed to landfill or are incinerated.



**Figure 3** The different types of CDWs, including the circular activities for each waste stream (Sources: Interviews, June 2023 and Reports).

## 4. Towards more circular CDW management

This section focuses on three topics: the current vision and strategies of Riga in relation to CE and CDW management, the current innovative practices and experiments, and the barriers and enablers in managing CDW in Riga.

### 4.1 Current city vision and strategies

In terms of the vision and strategies, there are several initiatives and programs that the city of Riga participates in to align with its CE strategies. These initiatives and programs are from European, national, and city levels (see Figure 3).



**Figure 4** The different initiatives and programs that fit with Riga city's CE strategies on CDW. From left to right (European, National, and City strategies).

#### *European Level Strategies*

The relevant European level strategies in relation to CE management of CDWs are the EU Waste Framework Directive for CDW, European Green course, “Right to Repair”, and Extended Producer Responsibility. The EU WFD has two goals: (1) To manage the CDW in an environmentally sound way, and (2) To reap the full potential of CDW by transitioning to CE. For the 2020 target, seventy percent (70%) of CDW by weight must be recovered through reuse, recycling, and preparation of other material recovery of non-hazardous CDW (European Commission, 2008). The European Green Course is a new EU growth strategy for a fair and prosperous society, focusing on a modern, resource efficient, and competitive economy with zero GHG emissions by 2050. The consumers’ “Right to Repair” is a newly adopted EU proposal to promote sustainable consumption through easy repair of defective goods, to reduce waste and to support repair sector. The coverage of the new proposal is



both within and beyond the legal guarantee period. The relevant sets of “Right to Repair” tools for consumers, which could be applicable to CDW, include (1) an online matchmaking repair platform to connect consumers with repairers and sellers of refurbished goods in their area; and (2) development of a European quality standard for repair services to help consumers identify repairers who commit to a higher quality (EC, 2023). The fourth EU level strategy is the Extended Producer Responsibility (EPR) scheme, which provides incentives to producers for designing environmentally friendly products and makes these producers responsible, either both financially and/or physically for managing waste at the end of a product’s life cycle (European Union Law, 2024). Example application of EPR in CDW is the product take-back by producing companies.

### *National Level Strategies*

#### **1. Latvia's Circular Economy Action Plan 2020-2027**

The Action Plan for the Transition to a Circular Economy 2020-2027 aims to provide policy framework and action points that will facilitate the transition of Latvia to a CE, while contributing to the implementation of the European Green Deal and the UN’s Sustainable Development Goals (EEA, 2022; Ministry of Environmental Protection and Regional Development, 2020). Below are the set targets in the Action Plan for the Transition to a Circular Economy 2020–2027:

- *Resource productivity* (which is measured based on gross domestic product divided by domestic material consumption): increase from EUR 0.90 per kilogram in 2020 to EUR 1.55 by 2027;
- *Circular Material Use rate*: an increase from 6.6% in 2020 to 11.0% by 2027; and
- *Public awareness and participation*: percentage of total population as a measure of CE implementation, based on Eurobarometer and other surveys.

### *Local level strategies*

The relevant city development programs include Riga Development Program 2022-2027 and the Integrated Action Plan (IAP). The on-going EU funded projects that are related to Construction and CDWs and in which Riga is currently involved with are the CURE+ project, Let’s Go Circular, Non-Haz City 3, and Creative Circular Cities. Each will be briefly discussed below including its alignment with the CURE+ project.

#### **1. Riga Development Program 2022-2027**

The Riga Development program 2022-2027 (DP2027) is medium-term plan that aligns and further elaborates the implementation of Riga Development Strategy, which is the city’s long-term vision up to 2030-time horizon (City Development Department of Riga Municipality, 2014). The Riga Development Strategy is based on three pillars namely Society, Urban

Environment, and Economy. The DP2027 defines the priority issues that the city needs to address in the next six years based on nine critical priorities, each with goals, targets, and indicators (City Development Department of Riga Municipality, 2022). Two relevant priorities related to CDW are:

- (1) *An Urban Environment that promotes quality of life* where residents are encouraged to be involved and to participate in social innovations and forming neighbourhood identities; and
- (2) *Good Environmental and Resilient Urban Ecosystem to mitigate climate change* in which the municipality will support the implementation of new, innovative, climate change mitigating solutions such as those related to waste management.

## **2. Integrated Action Plan (IAP) for the transition to the circular economy in the construction sector in Riga**

The IAP is a local planning document that addresses the transition to a CE in the construction sector in Riga city municipality. The vision of IAP is for the Riga city municipality to establish itself as a guiding example for its citizens while implementing economically viable circular practices in the construction and renovation sectors. Additionally, it assists society and industry in gaining access to information and fostering a supportive regulatory environment and infrastructure. This initiative is crucial in facilitating the shift towards a CE within the construction sector (Kalnina, 2021).

The IAP is an outcome of co-creation sessions that combined various stakeholders' views, experiences, and interests in frame of the project URGE (URBACT III action planning network). URGE stands for 'circUlaR buildinG citiEs'. It brought together 9 European city partners. The URGE project served as a learning environment and a medium for inspiring and developing integrated urban policies that promote sustainable development among the participating cities and stakeholders (Kalnina, 2021). This project was specifically focused on the construction sector since it is a major consumer of raw materials, and there are significant gaps in implementing CE principles in this sector.

An Urbact Local Group (ULG) was set up as part of the URGE project, and it involved more than 20 key players in the construction industry. To address the issue that surplus construction materials often end up in landfills, the ULG decided to conduct a Construction materials and repair items exchange point test in 2021 to assess the feasibility of introducing such a permanent activity and prepare guidelines for implementing such points.

Together with the stakeholders represented in the ULG, the IAP was developed. The IAP consists of a vision, and 4 strategic goals, which are expected to be achieved through the implementation of 11 actions (Riga Energy Agency, 2021).

### **3. Let's Go Circular!**

The Let's Go Circular! project (funded through URBACT IV) is an on-going project and involves 10 different European cities including Riga (Feleki, 2023). Using the 10R (Refuse to Recover) principles of CE, this project focuses on developing a CE action plan for each partner city (URBACT, 2023). Let's Go Circular has direct link to the construction sector and CDWs since this project supports the currently being developed CE action plan 2026-2030, which will be an official city planning document of Riga. The existing IAP in the construction sector, which is an outcome of the previous round of URBACT from URGE project, will be revised and the updated actions will be included in the CE Action Plan 2026-2030. According to the conducted baseline study (URBACT, 2023), the strong points of Riga that could serve as its contribution for Let's Go Circular! Project, as well as the basis for developing action plans for enhancing CE in the construction sector are having: (1) Guidelines on circular construction (from URBACT III/URGE), (2) (Upcoming) launching of the first design procurement for the circular reconstruction, (3) (Upcoming) launching of circular dismantling of the building (selective dismantling) to test the circular procurement of deconstruction and sharing of secondary materials, (4) citizen engagement in circular spatial planning, and (5) first-hand experience on circular design development.

### **4. NonHazCity 3**

Riga takes part in the NonHazCity 3 project (funded under the Interreg Baltic Sea Region programme). It specifically focuses on helping municipalities, entrepreneurs, and individuals to construct and renovate buildings using non-toxic materials to promote human health and environmental protection (Interreg Baltic Sea Region, n.d.). In relation to CURE+ project, NonHazCity 3 can help informed decision making when it comes to chemicals and building materials information, not only during design and construction phase, but also during the renovation and demolition activities. This can help identify how to properly disassemble and manage the materials recovered from these activities.

### **5. Creative Circular Cities**

This project emphasizes the role of cultural and creative sectors for enhancing circularity in the production and consumption of products among citizens (Interreg Baltic, n.d.). There are six demo cities, which include Riga city, in this project. Being agent of change, cultural and creative sectors can influence the current mindsets of people and can promote "circular lifestyles". At the same time, the project can support these sectors to develop innovations that support circular business models. Even though the project is not directly related to construction sector, there are plans in Riga, among other activities, to create a circular cultural space in the library's garden. The activity will involve citizens from the neighborhood and will require some minor construction, and thus align with the CURE+.

## 4.2 Innovative Practices and Experiments

Based on interviews with stakeholders, we identify several innovative practices in the management of CDW. These practices can be classified into six categories. The first category is related to material usage based on the 10R principles of CE, the next three are related to social movements, while the remaining two are on technology adoption.

### *1. Reuse of materials*

Some manufacturers of construction materials have started to use recycled materials. For instance, a Riga-based producer of dry mixes tried to use recycled glass as alternative material for virgin sand when producing plasters/concrete. This is however not a regular mass production since it is an expensive process. The recycled glass are good, high-quality construction materials for heat transmission and acoustics (Interviewee 6, June 2023). Insulation in buildings could cut energy spending by 50%, though the average savings should be 60-70%.

In addition, ash added in the mixes is circular, it comes from the incineration of natural stones. But using recycled materials is not straightforward: any new mix containing used materials must be rigorously tested to comply with high industry standards. And in many cases, used materials are more expensive than virgin ones; i.e. recycled glass is relatively expensive (it takes much energy in the process) and is not subsidized (Interviewee 6, June 2023). Windows are also for reuse, with some of them having artistic values (Interviewee 4, June 2023).

### *2. Exchange points and Community-based Resource Center*

Exchange points are organized either as an event or as part of a community space. For example, a trial exchange point where people can bring their materials, take, share, and sell them for a cheaper price, was organized by an innovative NGO Free Riga in one summer (Interviewees 3 & 13, June 2023). In addition to this, Free Riga also has few permanent free shops, where people can exchange materials, such as clothes, shoes, books, etc. Although construction materials are not the focus of these free shops, the CURE+ project can learn from its operation, which can serve as input for the business model of Riga's planned URC. These include: (1) the need to have a business model and make the operation professional (e.g. providing salary and education to workers) since it is impossible to rely on volunteers all the time; and (2) there is a need to work locally, it must be rooted in a community (Interviewee 3, June 2023).

### *3. Sustainable building usage*

Free Riga is an NGO with circular principles at the heart of what they do; they give empty buildings a new life, for communities, artists, refugees or others in need of cheap space. This organization is based on central values such as sustainability, social inclusiveness, and

responsibility both towards the physical and community spaces. For instance, old vacant buildings are transformed into new creative social platforms that could focus on doing social initiatives, creative work, co-working, co-living or a hub for incubators. They also provide space for designers that work with reusable materials. They also do the renovations as much as possible with used building materials. (Interviewee 3, June 2023).

#### *4. Grassroot system*

During the interview (Interviewee 3, June 2023), a new model was being piloted in one area of Riga. The contacts of residents including their skills were being collected. These skills include maintenance work, plumbing, repairing, etc. By sharing these information and citizens having knowledge on whom to contact if they need someone, e.g. such as on renovation, there will be a person to do the tasks. At the same time, there is a space or basement from Free Riga with availability of materials and where people can work, e.g. carpenter using machines to cut woods, or people working with metals and melting these metals. Overall, a system that is facilitated by the grassroot community engages citizens to more circular practices.

#### *5. Waste sorting centres/points and Waste separation technologies*

Waste sorting centres or points and their waste sorting technologies also play a role in managing CDWs in the city. Around two waste sorting centres are currently being run by waste management companies. The target is to establish eight (8) sorting centres, which will be owned by the municipality, in the coming years. Some companies focus on sorting and separating wastes for further recycling/reuse (Interviewee 4, June 2023).

#### *6. CleanR App*

The CleanR App is an application where households can register to request waste collection at a specific point within the waste management zone serviced by the waste management company Clean R. The payment is based on individual household's wastes (Interviewee 8, June 2023).

### **4.3 Barriers and Enablers**

Several barriers and enablers were identified from the interviews and reports. Table 2 summarizes the lists of barriers including the specific examples obtained from interviews and the sources of information. In summary, the barriers for a more circular management of CDW in Riga city come in three main categories: market/ business, rules & regulation, and citizens behaviour. Market and business-related barriers include a lack of waste material to produce recycled or upcycled products, complex product requirements, resource constraints, high costs of upcycling materials, high logistics costs, and workers (sorting waste) at the construction site not speaking the Latvian language. Citizens related factors include illegal dumping and lack of awareness and education on CDWs that include improper disposal of

waste. Barriers related to regulation include lack of regulation on material passports as well as lack of financial support from national government for municipalities to implement agreed EU goals and strategies.

**Table 2** Lists of barriers for a more circular management of CDW in Riga city.

Barriers	Examples according to interviews
<p><b>1. New incineration capacity reduces the incentive for reuse or recycling.</b></p>	<p>- The development of the capacity for non-recyclable waste incineration with energy recovery is a source of disagreements at the national level [Interviewee 4]. The Ashes generated from incineration are not safe for the environment. They pose environmental as well as health risks [Interviewee 1]. At the same time, having new incineration facility reduces motivation to reuse or recycle wastes.</p>
<p><b>2. Waste generated in Latvia is insufficient to sustain large-scale circular practices in big plants.</b></p>	<p>- Latvia cannot produce the amount of waste that Schwenk (cement factory) needs for creating energy by burning waste; thus, the latter has to buy waste in Italy [Interviewee 4].</p> <p>- There is less interest for a company to cooperate with household or private individuals since the amount of materials [or waste] they can bring is critically small [Interviewees 6, 12].</p> <p>- There is not enough 'gypsum' waste to supply to a company (Knauf), while some materials are already in the buildings built around 2000. Therefore, this waste stream must be sourced in other countries [Interviewee 6].</p> <p>- Company Kronospan is buying old furniture and wooden frames to produce furniture boards. However, Latvian sources are not enough; they also buy from another country/s [Interviewee 6].</p> <p>- A landfill operator who has crushing and sorting plants with capacity of 90,000 tons per year. However, this capacity is underutilized (only 50% is used) in the last year, due to economic recession that causes less sources of waste, as well as to competition and price (Interviewee 12).</p>
<p><b>3. Continuing the current practices of waste management (e.g., lack of waste separation) could lead to limited landfill capacity.</b></p>	<p>- Space is becoming a problem. If current practices in the landfill continue, the landfill will become full within a maximum of 6 years [Interviewee 4, 12]. Incineration is seen as a solution. In relation to the first discussed barrier, incineration reduces incentives for CE practices [Interviewee 4].</p>

Barriers	Examples according to interviews
<p><b>4. Production problem due to specific requirements of manufacturers (Unviable business model)</b></p>	<p>- Some manufacturers deal with complex window frames that require specific design and composition (e.g., in terms of glass, plastics, and metals). Treating the plastics could be time consuming for companies thus they refuse to do it themselves [Interviewee 4]. Thus, the frames are wasted.</p>
<p><b>5. Workers in the construction sector sometimes do not speak the Latvian language, making it challenging to follow instructions.</b></p>	<p>- Some workers come from Kazakhstan, and most do not speak the region's major languages such as, Latvian, English, or Russian. As a consequence, they lack idea on waste separation or do not follow instructions on proper waste management [Interviewee 8].</p>
<p><b>6. Illegal dumping</b></p>	<p>- Some CDWs, including hazardous ones such as asbestos (expensive to dispose), are being dumped by individuals or companies into the forest [Interviewees 1, 4, 12].</p>
<p><b>7. Lack of awareness and/or education on (CD) waste management.</b></p>	<p>- Many people are dealing with the construction waste improperly. Like throwing them in a household waste container if they are doing a smaller renovation, not ordering the specific container for construction-based waste [Interviewee 1].</p> <p>- People use asbestos for improving roads, which are driven by car all the time [Interviewee 1]. This has negative environmental and health impact.</p> <p>- Many people are dealing with CDWs improperly; it was not part of the social norm to separate or do something with the waste. [Interviewee 8]; Especially elderly people have low awareness of waste separation [Interviewee 2].</p> <p>- Improper disposal of bulky waste is a regular practice [Interviewee 2].</p>
<p><b>8. A single place available for wastes disposal on multi-apartment buildings in one block, makes dumping of waste difficult to control.</b></p>	<p>- There are some people who live in single houses that bring their bulky waste or construction waste to apartment buildings in one block. This increases the waste bill of people living in the apartment house block [Interviewee 8].</p> <p>- Problem arises in areas with many apartments in one block. They have one space for waste disposal where everyone must go and throw their bulky waste. As a result, it is hard to control the waste flow [Interviewee 2].</p>

Barriers	Examples according to interviews
<b>9. Costs of upcycling materials is expensive.</b>	<p>- The recycled glasses are used for producing plasters. These recycled glasses are very good construction materials because they improve heat transmission and have acoustical qualities. Yet these are very expensive to reproduce as it goes through several processes (draining, melting, blowing) [Interviewee 6]. Only a company who has the capability can engage in this process.</p> <p>- When using recycled materials, there is a need to improve and check for quality and strength. However, this will be an expensive process [Interviewee 6].</p>
<b>10. Costs of logistics or transport are high.</b>	<p>- Materials such as concrete are cheap and heavy; therefore, the logistics costs are high [Interviewee 6].</p>
<b>11. Resource constraints</b>	<p>Most of the businesses are small and medium in size and they lack capacity and time to get engaged (e.g. for circular activities). If they cannot find a specific niche market, they will do the minimum from what the government is demanding [Interviewee 1].</p>
<b>12. Lack of regulation on material passport</b>	<p>The regulation is not very enforcing when it comes to the [material] passports. Unlike in other countries, when demolition happens, an audit is conducted to understand which second-hand materials could still be reused, e.g. window frames [Interviewee 1].</p>
<b>13. Low investment on research and innovation</b>	<p>- The regulation can help push support for research and innovation. At the moment, Latvia has very low investment in research and innovation, one of the lowest in Europe [Interviewee 1].</p>
<b>14. Asbestos dumping requires high fee</b>	<p>- Similar to Estonia where it has been cleared out after the interviews, the disposal of asbestos requires a fee. In the case of Latvia, it requires [a lot] of payment [Interviewee 8].</p>
<b>15. Lack of (financial) motivation from national government to support municipalities to implement EU (circular) goals and strategies.</b>	<p>- There is always an ongoing discussion between the (national) government and the municipalities, in various subjects such as waste sorting and environment. From municipalities' point of view, the (Latvian) government agreed to EU goals and strategies, while pushing the responsibility to implement and to achieve these goals to them. Yet, there is a need for financial resources and support to implement these. Therefore, municipalities have less motivation to take many responsibilities</p>



<b>Barriers</b>	<b>Examples according to interviews</b>
	even though they work closer to the people and have contract with waste management companies [Interviewee 1].

Source: Interviews, June 2023.

Table 3 presents the lists of enablers for a more circular management of CDW in Riga. In summary, the enablers for management of CDW in Riga city are related to factors such as government/regulation, market and citizens. The government part, such as subsidies for second-hand material or recycling, green procurement, and increase in landfill gate fee play enabling role for the management of the CDWs. Identified market related enablers are possibility for niche market, having separation technology, and sustainable financing of the banks. Citizens related enablers are participation of individuals on social media or platform for management of CDW and the community's willingness to pay for a URC.

**Table 3** The lists of enablers for circular management of CDW in Riga city.

<b>Enablers</b>	<b>Examples according to interviews</b>
<b>1. Government subsidies for second-hand material or recycling</b>	- There are two types of wood – packaging wood and construction wood that a waste management and recycling company is selling. The woods are sold for 30 euros/ton by this company. But the government pays more for second use/recycled wood. The firm received 16 euros per ton subsidy for packaging wood. [Interviewee 4].
<b>2. Presence of separation technology companies</b>	- Companies such as Clean R, EcoBaltia vide, and PS Lautus Vide operate in Riga. They have CDW sorting facilities and a plastic factory that help in facilitating the management of CDW [Interviewees 4, 6, 12].
<b>3. Possible niche markets (or economy)</b>	- Some wealthy clients buy materials from demolition companies for the renovation of houses [Interviewee 1].  - Many cafeterias, creative spaces, and touristic establishments are proud to use old, used windows [Interviewee 5].
<b>4. Sustainable financing of the banks</b>	- Banks in Latvia initiated a taxonomy for "brown" and "green" businesses. Non-green businesses get half percent (0.5%) more expensive loans [Interviewee 1].

Enablers	Examples according to interviews
<b>5. Green procurement</b>	<ul style="list-style-type: none"> <li>- Green procurement guidelines focus on resource efficiency, yet there has been less focus on elements of circularity [Interviewee 1].</li> </ul>
<b>6. Strong social media/ marketplace community</b>	<ul style="list-style-type: none"> <li>- People use Facebook, AndeleMandele platform, or www.ss.com if they want to sell, give away for free, or exchange CDW with reuse potential [Interviewee 5].</li> <li>- There is a Whatsapp group among 160 Viskali residents for those who want to exchange building materials [Interviewee 3].</li> </ul>
<b>7. Educational centres and raising public awareness campaigns</b>	<ul style="list-style-type: none"> <li>- The landfill has an educational centre to teach people how to recycle and repurpose household materials to raise awareness [Interviewees 2, 12].</li> <li>- The environmental education centre of a landfill operator had been visited by around 8,000 visitors in the last year (2022). During the visits, there were excursions offered related to waste sorting [Interviewee 12].</li> <li>- There are online tools/online managers related to waste sorting instructions that citizens can access when logging in on waste management company websites [Interviewee 2].</li> <li>- There were some public awareness campaigns done by a landfill operator related to waste sorting, incineration, biowaste, and so forth. Other campaigns are related to the reduction of waste as well as sorting of wastes that include households (e.g. kitchen-, biowastes) as well as general wastes [Interviewee 12].</li> </ul>
<b>8. Community's willingness to pay for an idea of URC</b>	<ul style="list-style-type: none"> <li>- According to a survey conducted by Free Riga, customers are willing to pay for a community that facilitates material exchange, design consultations, and education on how to repair things. The organization checked the willingness to pay with a survey and the options are: 1) Monthly payments for members; 2) similar to what is done in Brussels, if you participate in the community or bring something, you earn value points, which is some sort of alternative currency; and 3) you pay an entrance fee like 3 euros for coming in [Interviewee 3].</li> </ul>
<b>9. Mandatory waste sorting with penalty for incorrect sorting</b>	<ul style="list-style-type: none"> <li>- Containers for sorting waste, which was voluntary before, became mandatory [Interviewee 8].</li> <li>- There is an existing agreement between waste management companies and citizens when it comes to sorting of waste. Sorted waste such as plastics, metals, and glasses are free. If the pollution in sorted waste (incorrectly sorted) is more than 20%, residents must pay for contaminated container in the same</li> </ul>

Enablers	Examples according to interviews
	way as for unsorted waste [Interviewee 2]. This encourages citizens to observe proper waste sorting.
<b>10. Increase in landfilling gate fee</b>	- The landfilling gate fee increased from 80 euros to 165 euros, and companies are under more pressure to reuse or to sell their materials, especially the construction and bulky waste, instead of bringing them directly to landfills [Interviewee 8].
<b>11. Local nationalism</b>	There is a strong local nationalism among citizens. This means that using local products have higher meaning as compared to buying products from other countries, such as in China. For example, according to public survey, green, local products are popular among people [Interviewee 1].
<b>12. Knowledge from technical university</b>	There are people from the Riga Technical University who work on different construction materials, both new and second hand. Work on CDWs include how they are incorporated in new materials [Interviewee 13].

Source: Interviews, June 2023.

## 4.4 Urban Resource Centre (URC) Initiative(s)

### *Design of the URC*

The idea of URC is not new in Riga city since a prototype of a resource centre has been done in the past URGE project. This project aimed to focus on a free shop principle where people exchanged construction materials, tools and items for refurbishment, both – leftovers and secondary materials. This pilot activity aimed to raise awareness and test the activity of citizens, potential hurdles and different important aspects of such an activity. All findings and conclusions were gathered in a document that is available online (Riga Energy Agency, n.d.).

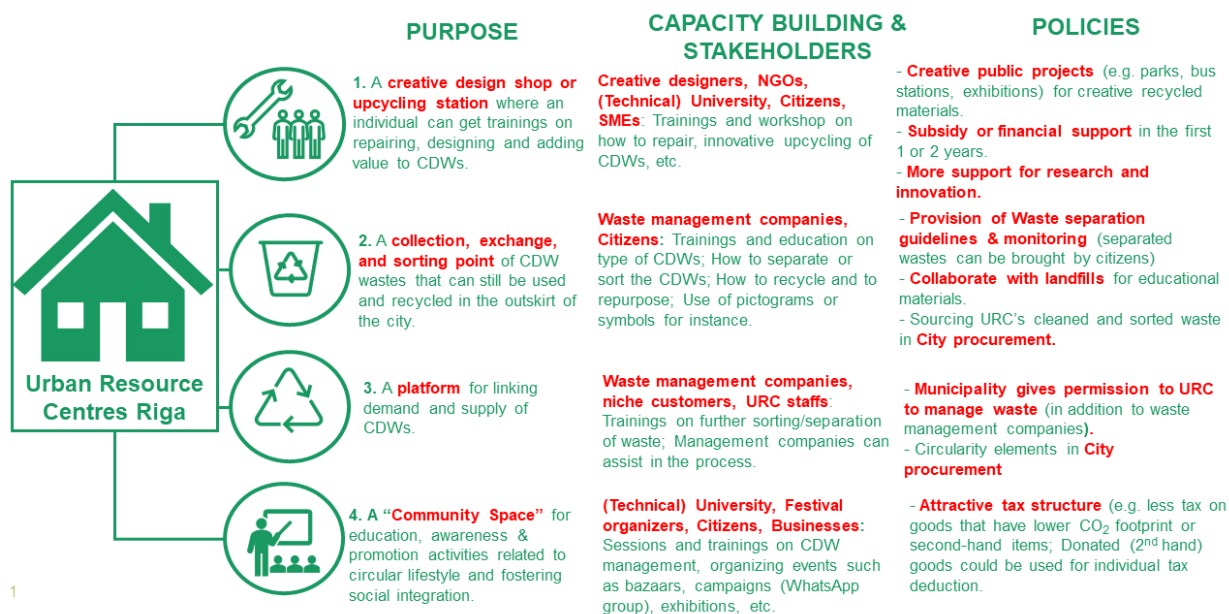
There are several book exchange cabinets, community fridges, bike repair shops and free shops in the city where people exchange clothes, shoes, books, and other things while being run voluntarily with some small donations from participants.

The innovative practices discussed in Section 4.2 as well as the barriers and enablers for CDW management in Section 4.3 provide input on establishing URC(s) in the city. This idea was further developed in the workshop that was conducted in Barcelona (Interviewees 13 and 14, October 2023).

According to Figure 4, the design of URC in Riga could serve different purposes. Firstly, the URC will serve as a workshop area for creative design, upcycling wastes, and repair stations

for CDWs and non-CDWs. The URC will provide a free table or space for citizens to work on, and the participants can bring their own tools or use the ones that are available on site. A mentor will guide visitors and members of a workshop or activity, such as repairing items or new ones.

## How can an Urban Resource Centre look like?



**Figure 5** Possible Design(s) of URC in Riga City.

Secondly, even though it will not be the main activity of the URC, it could extend its operation on the outskirts of the city by having a small branch that serves as a collection, sorting, and/or exchange point of waste that can still be used and recycled. People can bring and take waste, both CDW and other types, such as electronics, furniture, etc., for free. This service can be provided in cooperation with the waste management companies. For example, one of the waste management companies operates a CDW exchange, sorting and recycling point on the outskirts of the city, with limited availability of public transportation. So, the URC that is closer and more available to the citizens could develop synergies with such a sorting, exchange and recycling point.

In the future, the desired situation as a possible overspill of the learning from the URC of Riga city, is to have small collection/exchange points in several neighbourhoods such as in multi-apartment buildings, with no designated implementor. This will make the collection/exchange points accessible to many residents and will enhance their participation and engagement on managing CDW, as well as other wastes.

Thirdly, the URC could serve as a platform where the demand and supply for CDW for companies could be matched. As identified in the lists of barriers and enablers, there is a

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limited amount of waste generated in Latvia, while there are demands for construction materials from few companies as well as opportunities for supplying CDWs for niche markets. For instance, some wealthy clients buy materials from demolition companies for the renovation of houses, and many cafeterias, creative spaces, and touristic establishments use windows that could be made of reused or recycled materials. Therefore, the URC could facilitate in linking the suppliers and buyers for CDWs, for instance via the online platform that is developed by the municipality of Riga.

Fourthly, the URC would serve as a “community space”, where educational, awareness, and promotion activities can take place, as well as serve as a meeting point for citizens, NGOs, and circular happenings that bring together businesses, academia, and citizens. For example, through collaboration with various stakeholders, the URC can tie up with some events such as bazaars, campaigns, workshops or trainings, university events, and exhibitions in the city. Raising awareness and education could lead to high citizen’s involvement in CDW management, which could also help achieve the desired level of (upcycled and recycled) waste that could be supplied to niche markets.

#### *Managing operations of the URC*

The future URC will be organized using public-private partnerships. The municipality of Riga will own the physical URC and tender the rights to manage it. The citizens, NGOs, companies and public institutions will be involved in the activities, workshops, and education related to waste management, recycling and upcycling of wastes, etc.

For the URC to sustain its operation in the long-term, business model(s) that will show how each stakeholder can benefit from the operation of URC should be developed. The initial ideas for possible business model, which could be adapted or modified on the actual implementation, are as follows:

1. The URC will charge small fees (or on a donation basis) to its members or citizens who want to attend the organized workshops, creative sessions, or training. Non-members are also welcome and need to pay the entrance fee for the workshop for a small amount.
2. The items that members make could be sold for a price, for instance, in a store focusing on circularity or selling unique items. Strong localism (local nationalism) is popular among the citizens of Latvia and therefore is an opportunity to offer circular, locally made products.
3. Offering facilities tailored to both businesses and individuals can be an income generating activity and at the same time a form of raising awareness for URC. For entrepreneurs and small businesses, renting a “green” office could be a source of fixed income of URC. For individuals, having a CE supermarket (like the ones in Sweden) facility in URC could be another source of income. For example, family with children can go to entertainment area and restaurant, while providing parents a sustainable

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shopping experience using CE products that are crafted or upcycled by URC members.

4. The larger-scale collection points outside the city centre can include other "income generating activities" besides its main purpose, such as holding monthly (or quarterly bazaars). According to surveys, citizens are interested in paying for fixed entrance, donations, exchange points, and this social movement.
5. A URC can be set up through collaboration among several stakeholders who share the costs of running it. Such cooperation can help achieve various objectives, such as education, raising awareness, promoting a circular lifestyle, and fostering social integration.
6. Waste management companies could be part of URC because citizens work with them when it comes to waste sorting, collection, etc. Having waste management companies pay into a fund (through the tenders) could finance URCs operation.
7. The municipality or the partnership of stakeholders (see above) can cover some basic costs of the URC and the organization that gets the rights to manage the URC in the tender is responsible for the generation of the rest of the budget (organization of workshops, providing consultancy and repair services, sales etc.)

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## 5. Recommendations

To make the idea of URC feasible, the following set of recommendations are formulated:

For capacity building of stakeholders as well as for policy makers:

1. When there are plans to set up financially self-sufficient URC, a feasibility study is recommended to analyze the possible business model(s) of the URC. In addition, a survey could be conducted in terms of finding practicalities related to URCs, such as the URCs must be accessible, its central locations, and rental facilities. The municipality could collaborate with universities to conduct this feasibility study and/or survey.
2. In addition to feasibility study, the URC should collaborate with schools and (technical) universities to promote capacity building through education and to explore further innovative ideas on upscaling CDWs via school projects and research.
3. Selected stakeholders involved in the URC must either go through or provide training, depending on their role in the operation of URCs. For instance, the waste management company will provide training and develop materials that will educate citizens and URC's workers on the separation and recycling of waste. For example, it could be by providing pictograms or symbols on the type of CDWs, how to separate or sort them CDWs, and how to recycle and repurpose them.
4. In addition, the waste management company will assist in the sorting or separation process done by the staff of URCs via training (and its sorting technology in the future).
5. Creative designers or NGOs will provide workshops on repairing, doing innovative arts using CDWs, etc. Coordinators or staff of URCs will be assigned to manage the operation as well as the financial health of the URC.
6. Encouragement campaign should be organized in apartment buildings where people have WhatsApp groups. The campaign will include organizing small events where people can bring and take usable items, for example. This will inspire and create more awareness among citizens.

For policymakers, the set of recommendations are as follows:

1. Being the owner of the physical URC, the municipality must provide the building and land area necessary to operate the URC.
2. The government needs to provide subsidies or financial support to stakeholders such as creative designers and repair cafes in the first or second year to kick-start their operation in the URC. Once proven to be financially healthy, this subsidy can be eliminated.

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3. The municipality should focus more on monitoring waste sorting and management.
  4. Circularity element must be added in public procurement. At the moment, only the energy efficiency is included.
  5. The municipality could source URC's cleaned and sorted waste in its city procurement, which involves using recycled materials for creative public projects such as parks, bus stations, and exhibitions.
  6. An attractive tax structure could be implemented, such as less tax on goods with lower footprints or second-hand items. In terms of individual taxation, a scheme that could be adopted is in relation to donation system. Citizens can get monetary value for goods that they donate, and they can use it for tax deduction.
  7. The municipality could permit URC to manage waste (in addition to waste management companies).
  8. To further boost the CE practices among businesses, the government could create market conditions for businesses to be open for new markets. At the moment, the Lavian market is too small therefore market development, either via niche or outside the country can be stimulated. For instance, the government should further provide financial subsidy or support for companies to research the quality of the materials produced via second-hand products, to increase the trust of consumers in using these products. Another thing is to support the strong localism among citizens, by strict implementation of "anti-dumping" measures for imported products that are sold at reduced price due to subsidy or overproduction from other countries (see European Commission, n.d.), in addition to introducing more tax on products made of primary raw materials. This could encourage local consumerism as well as could strengthen local business opportunities.



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## Appendix

**Table 1** Waste prevention programme Part 1: measures by main material streams

No.	Action directions and measures	Plan objectives <sup>163</sup>	Results of the action	Performance indicator	Responsible authority	Responsible authority	Indicative source of funding	Maturity (year)
<b>3. Construction waste<sup>1</sup></b>								
3.1.	Support the re-use of building materials in construction processes (inclusion in Green public procurement, standards)	M1, M2, M3, M4, 1.6., 2.1.	Development of regulatory acts	Increased amount of recycled materials	Ministry of Environmental Protection and Regional Development	Ministry of Economics, industry associations	Within the existing budget	Throughout the plan, according to program
3.2.	Promote construction practices that result in little waste and use as much waste as possible in the construction process (training, inclusion of criteria in tenders for the best construction, award for the most environmentally friendly construction)	M1, M2, M3, M4, 1.6.,2.1.	Taken informative E-measures	Reduction in construction waste	Ministry of Environmental Protection and Regional Development	Ministry of Economics, industry associations	Within the existing budget	Throughout the plan, according to program

<sup>1</sup> Regarding the re-use of construction products, it is to be encouraged that their re-use is stimulated, but it is essential to ensure that the quality of these materials does not affect the safety requirements imposed on the structures, so that it is necessary to assess where such materials could be used and, if necessary, to carry out an assessment of the performance of these materials. The EU is examining this issue in the context of the revision of the Construction products Regulation.

3.3.	Support the reuse of the soil surface and asphalt (through inclusion in Green public procurement, standards)	M1, M2, M3, M4, 1.6., 2.1.	Development of regulatory acts	Increased use of recycled material	Ministry of Environmental Protection and Regional Development	Ministry of Economics, industry associations	Within the existing budget	Throughout the plan, according to program
3.4.	Promoting the use of compost from biodegradable waste in economy	M2, 1.2., 1.3., 1.5., 1.6., 2.1.	Study research and development of regulatory acts	Reduced amount of buried biodegradable waste	Ministry of Environmental Protection and Regional Development	Waste management merchants	Within the existing budget	2022.

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