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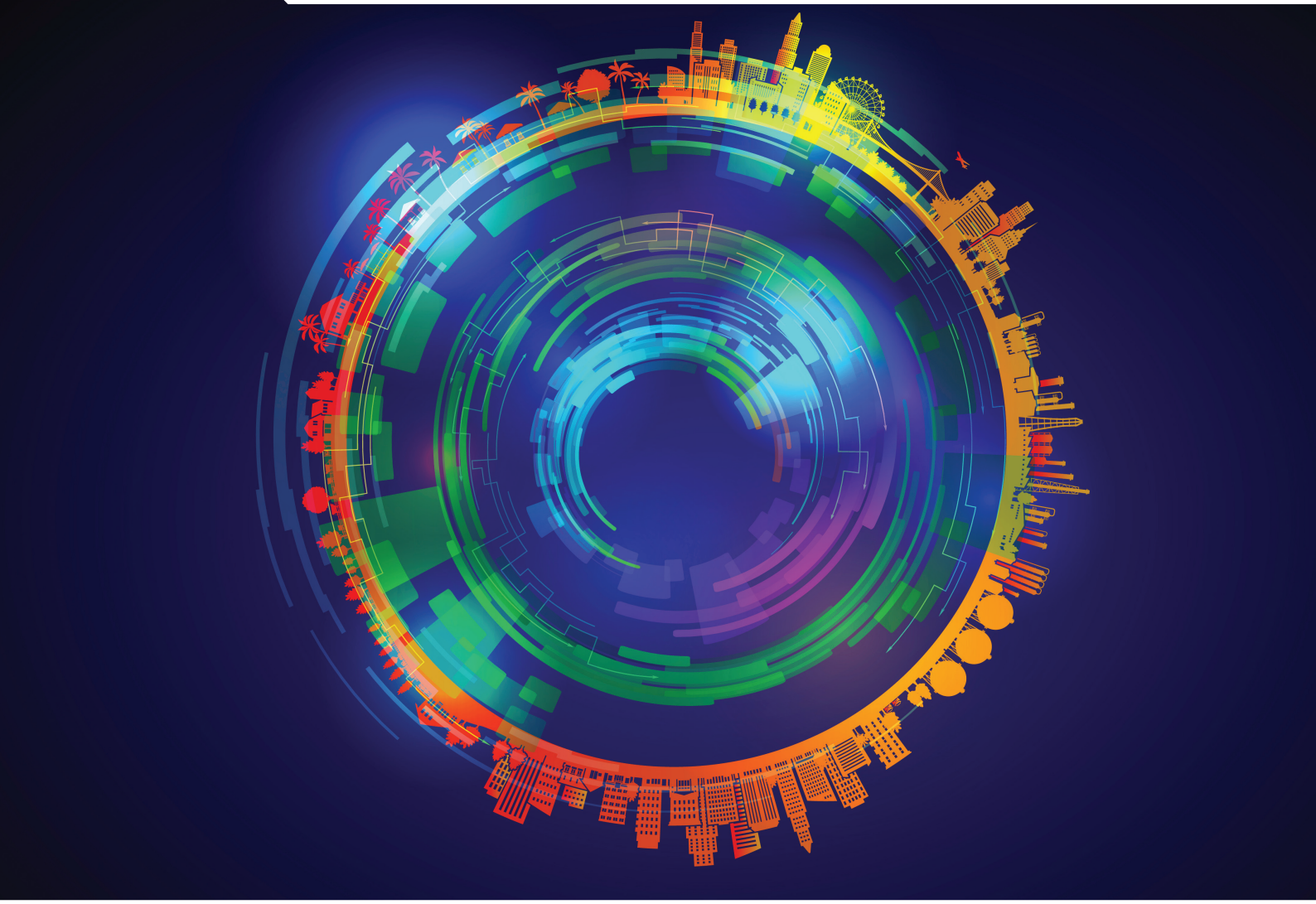
The Circular Economy in Tallinn, Estonia



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The Circular Economy in Tallinn, Estonia

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Preface

Meeting the Paris Agreement target to reduce global warming to 1.5°C and achieving global net-zero emissions in 2050 requires unprecedented transformations. At the same time, the COVID-19 pandemic and Russia's war of aggression against Ukraine have increased attention on the need for resilience to face shocks such as the cost of living, food and energy crises. They raised the need for policies to support more sustainable production and consumption patterns, whilst also driving inclusion.

Across the globe, cities, where most people live and work, have taken significant actions to enhance people's well-being and economic growth, in a way that is compatible with environmental protection goals. Along with the energy transition, efficient material and resources management in cities is increasingly becoming a priority, since material mis-management is responsible for two thirds of global greenhouse gas emissions (GHG).

The circular economy provides a means to build a more sustainable, carbon-neutral and resilient society. Adopting circular economy approaches to steel, plastics, aluminium, cement and food production could help cut global GHG by 9.3 billion tonnes by 2050. Cities have an important role to play in this transition, as they account for over 70% of annual GHG emissions.

As European Green Capital for 2023, Tallinn has a unique opportunity to reinforce the foundations of its transition from a linear to a circular economy, investing in efforts to slow, narrow and close material loops in key economic sectors, including the built environment, food and tourism. Such a transition will not only enable environmentally positive impacts, but also boost innovation, create jobs and retain talents. The newly created Circular Economy Department in the city administration is a signal of this transformation.

Building on the findings of a 20-month policy dialogue between the OECD and the city of Tallinn and 60 stakeholders from public, private and non-profit sectors, this report identifies key challenges and provides policy recommendations to help the city further develop its circular economy strategy, including through setting targets for the future. In particular, it calls for: a systems approach to overcome silos across policy areas; a meaningful stakeholder engagement to create a circular economy ecosystem where businesses, universities and residents can interact; and a modern approach to data collection and service provision by leveraging on Estonian championship on the digital economy.

The OECD Centre for Entrepreneurship, SMEs, Regions and Cities and the city of Tallinn stand ready to work further together to support the implementation of the policy recommendations of this report.



Lamia Kamal-Chaoui

Director, OECD Centre for Entrepreneurship, SMEs, Regions and Cities, OECD



Mihhail Kõlvart

Mayor, City of Tallinn

Foreword

The world is facing unprecedented challenges. In addition to the green and digital transitions, the COVID-19 pandemic and Russia's war of aggression against Ukraine have created new challenges, including cost of living, food and energy crises.

Estonia weathered the pandemic shock better than most other OECD countries. Its GDP contracted by only 2.7% in 2020, one of the smallest decreases in Europe, and rebounded strongly in 2021 (by 8.2%), surpassing pre-pandemic levels. However, the war in Ukraine and high inflation have seen growth slow significantly in recent years, with 0.5% growth anticipated this year. Whilst growth is expected to pick up in 2024, and Estonia is well-advanced on the digital transition, the country faces major structural transformations from the green transition. Although substantial progress has been made in recent decades, with GHG emissions declining by 71% between 1990 and 2020, Estonia's GHG emissions (15.1 tCO2e per capita in 2018) remain high relative to the OECD average (11.5 tCO2e). The OECD report *Net Zero+: Climate and Economic Resilience in a Changing World* (2023) argues that to accelerate climate action, policies should address materials shortages, supply-chain vulnerabilities, skills gaps, rising costs of capital, and obstacles to scaling up clean energy supply.

Tallinn is Estonia's main economic hub and the largest contributor to the national economy, accounting for more than 50% of national GDP but also 30% of national CO_2 emissions. The city has set ambitious plans to reduce GHG emissions in key sectors such as buildings, transport and energy generation and consumption, and to achieve climate neutrality by 2050. The Tallinn 2035 city strategy and the Climate-neutral Tallinn plan recognise the critical role that the circular economy can play in achieving those goals. But the circular economy can also help drive the economic recovery by boosting competitiveness through production savings and material reuse and increase resilience through reducing energy dependencies.

This report - *The Circular Economy in Tallinn, Estonia* – is designed to help Tallinn meet its goals. It adds to, and draws on, the wealth of country- and city-specific reports produced as part of the OECD Programme on the Circular Economy in Cities and Regions, namely Glasgow (United Kingdom), Granada (Spain), Groningen (Netherlands), Montreal (Canada), Umeå (Sweden), Valladolid (Spain) and Ireland. The programme supports national, regional and local governments in their transition to a circular economy through evidence-based analysis, multi-stakeholder policy dialogues, policy recommendations and customised action plans and knowledge-sharing activities.

Acknowledgements

This report was prepared by the OECD Centre for Entrepreneurship, SMEs, Regions and Cities (CFE) led by Lamia Kamal-Chaoui, Director, as part of the Programme of Work and Budget of the Regional Development Policy Committee (RDPC). It is the result of a two-year policy dialogue with the Tallinn Strategic Management Office and 60 stakeholders from the public, private and not-for-profit sectors in Tallinn and Estonia.

The report and underlying policy dialogue were led by Oriana Romano, Head of the Water Governance and Circular Economy Unit, CFE, under the supervision of Aziza Akhmouch, Head of the Cities, Urban Policies and Sustainable Development Division and Soo-Jin Kim, Deputy Head of Division, in the CFE. The report was drafted and co-ordinated by Oriana Romano and Ander Eizaguirre, Policy Analyst, CFE. Georges Laimé, María Ferrer, and Mariam Fofana, Policy Analysts, contributed written inputs to the report. Juliette Lassman, Policy Analyst, provided support with the organisation of the virtual policy seminar.

The OECD Secretariat is grateful for the high level of commitment from Mayor Mihhail Kõlvart and Deputy Mayor Joosep Vimm. Warm thanks are also extended to the local team in Tallinn's Strategic Management Office formed by Krista Kampus, Head of European Affairs and International Cooperation Department, Strategic Planning Division; Liina Kanarbik, Chief Specialist, Circular Economy Department; and Aleksandr Taraskin, former Leading Specialist, Circular Economy Department. Furthermore, the policy dialogue benefited from the peer-review of Anthony Naralingom, Head of Unit 'Economic Transition and Entrepreneurship Awareness', Brussels Agency for Business Support – hub.brussels, Belgium.

This report builds on interviews conducted during the OECD fact-finding mission (15-19 November 2021) and a virtual policy seminar (7 September 2022), as well as insights from the OECD Survey on the Circular Economy in Cities and Regions and desk research. Interim findings and progress results were presented at the 4th OECD Roundtable on the Circular Economy in Cities and Regions (12 April 2022). Thanks are also due to stakeholders who shared written comments on earlier drafts.

The report was submitted to delegates of the Working Party on Urban Policy for approval by written procedure by 17 May 2023 under cote CFE/RDPC/URB(2023)12. The final version was edited and formatted by Eleonore Morena, and François Iglesias and Pilar Philip prepared the manuscript for publication.

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Abbreviations and acronyms

AECM	Association of Estonian Cities and Municipalities
BRPCE	Brussels Regional Programme for a Circular Economy
CAD	Canadian dollar
CBS	Statistics Netherlands
CE	Circular economy
CEP	European Commission Clean Energy Package
CERIEC	Centre for Intersectoral Studies and Research on the Circular Economy
CIRB	Brussels Regional Informatics Centre
CHP	Combined heat and power
C&D	Construction and demolition
ECEIA	Estonian Circular Economy Industries Association
EEA	European Environment Agency
EIB	European Investment Bank
EIC	Environmental Investment Centre
EPR	Extended producer responsibility
ERDF	European Regional Development Fund
ERR	Estonian Public Broadcasting
ETS	School of Technology of Montreal
EU	European Union
EUR	Euro
FAO	United Nations Food and Agriculture Organization
FEMP	Spanish Federation of Municipalities and Provinces
FDI	Foreign direct investment
GDP	Gross domestic product
GDSI	Global Destination Sustainability Index
GHG	Greenhouse gas
GPP	Green public procurement
GDS	Global Destination Sustainability Index
ICCA	International Congress and Convention Association
ICT	Information and communication technology
IHOBE	Public Society of Environmental Management of the Basque Country
IEA	International Energy Agency
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
IT	Information technology
LCA	Life cycle analysis
LULUCF	Land Use, Land Use Change and Forestry
MoU	Memorandum of understanding
NWMP	National Waste Management Plan
ODA	Official development assistance
OVAM	Public Waste Agency of Flanders
PLB	Netherlands Environmental Assessment Agency
PMMD	City of Toronto Purchasing and Materials Management Division
PREC	Regional Programme for the Circular Economy
PRO	Producer responsibility organisation

REACH	EU Registration, Evaluation, Authorisation and Restriction of Chemicals
RECE-XG	OECD Expert Group on a New Generation of Information for Resource-efficient and Circular Economy
R&D	Research and development
SDG	UN Sustainable Development Goal
SEI	Stockholm Environment Institute
SME	Small and medium-sized enterprise
SRIK	Information Centre for Sustainable Renovation
SWMS	Solid Waste Management Services
TalTech	Tallinn University of Technology
TNO	Netherlands Organisation for Applied Scientific Research
TU Delft	Delft University of Technology
UK	United Kingdom
UN	United Nations
UNECE-TF	United Nations Economic Commission for Europe Task Force on Measuring the Circular Economy
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
VAT	Value added tax
WEEE	Waste from Electrical and Electronic Equipment
WMP	Waste management plan

Executive summary

Key findings

In a circular economy, waste and pollution are designed out, products and materials are kept in use as long as possible, and natural systems are regenerated. The city of Tallinn conceives the circular economy as a means to advance environmental goals while generating opportunities for job creation and stimulating innovation through a systems approach. As a recipient of the European Green Capital award in 2023, the city aims to reach carbon neutrality by 2050, as set out in the Tallinn 2035 city strategy and reported in the "Tallinn Sustainable Energy and Climate Action Plan 2030". Efficient resources management is particularly relevant in a city like Tallinn where the population is: *growing*, increasing the demand for services, housing and infrastructure, not least because it houses, relative to its population, one of the highest shares of Ukrainian refugees within OECD countries; *ageing,* potentially bringing changes in energy consumption due to the greater use of energy such as electricity, heat and gas; and *changing* its structure towards increased single-person households, implying a drop in material efficiency and higher per capita levels of waste generation.

Over the last 10 years, Tallinn has demonstrated considerable progress towards sustainable waste management: from 2012 to 2019, biowaste collection almost tripled (+243%) and the city achieved higher levels of separate collection, while landfill decreased by 80% over the same period. In 2019, the city banned the use of single-use plastic plates, cups and utensils at public events. In 2020, the waste management department was transformed into a circular economy one, and, in parallel, the Tallinn Strategic Management Office and other stakeholders have taken a number of initiatives, such as: the organisation of Waste Reduction Weeks; guidance on sustainable minimum requirements for event organisers, including reducing and sorting waste; the introduction of the Tallinn Creative Incubator to support the design of circular business models (e.g. product as a service), as well as the e-construction platform by the Ministry of Economic Affairs and Communications to facilitate information and data on the whole life cycle of buildings (from design to end of life). Going forward, the Tallinn Waste Management Plan 2022-2026 foresees reuse and repair centres. Building on these milestones, Tallinn is ready to move from a sustainable waste management approach to a fully-fledged circular economy. The city is planning to set up a long-term vision on the circular economy, based on the findings and recommendations of this report.

Transitioning to a circular economy in Tallinn will require overcoming a number of governance gaps.

First, there is no structured scheme to align regulatory frameworks across national and local governments to support the transition towards a circular economy. Similarly, there is no mechanism to co-ordinate sectoral strategies and programming documents across municipal departments that take into account a circular approach.

Second, some enabling conditions are not fully in place, e.g. skills on life cycle analysis and circular business models (sharing economy initiatives, renting and lending), adequate financial resources for the implementation of projects, and consideration of circular economy requirements such as the integration of Life Cycle Analysis (LCA) in procurement decisions.

Third, the city's engagement with stakeholders from the business community and civil society tends to remain constrained to *ad hoc* projects and communication campaigns. In addition, data on waste management is currently not regularly updated, and there is a need to generate information about urban metabolism flows and how material loops are closed.

Key recommendations

Building on this analysis of governance gaps, the OECD Checklist on the Circular Economy in Cities and Regions and international best practices, this report provides policy recommendations for the city of Tallinn to play an important role as a promoter, facilitator and enabler of the circular economy through a collective and co-ordinated approach across stakeholders and levels of government:

To **promote** the circular economy, the city could:

- Clearly define roles and responsibilities of the newly created Circular Economy Department and lead by example, by embedding circular economy principles in daily activities and practices of the municipality, from service delivery to public procurement.
- Develop a circular economy strategy with clear objectives, targets and actions that would allow identifying the "what", the "how" and the "whom" of the circular economy transition in the city.
- Raise awareness on the circular economy through "circular economy ambassadors" in businesses to promote circular economy communication and messaging as well as events across their networks.

To **facilitate** collaboration among a wide range of actors, the city could:

- Foster horizontal and vertical co-ordination as well as co-ordination across Estonian cities and towns to share practices and scale up projects: national and local governments should align strategies and regulations, through a co-ordination committee and joint funding projects. The city could set up regular inter-department meetings to inject circular economy principles in municipal practices and tools and lead a platform of Estonian local governments for collective action towards a circular economy.
- Enhance stakeholder engagement through: co-producing the future circular economy strategy; facilitating dialogues across the city, businesses and residents with the aim of creating a circular ecosystem in the city; leveraging on the events organised within the European Green Capital 2023 and using digital tools to engage citizens, such as the "Open the City Application".
- Pilot projects and assess their results against pre-defined indicators. Projects can include circular neighbourhoods, sharing platforms, material development and experimentation for new constructions.

To **enable** the necessary governance and economic conditions, the city could:

- Establish clear requirements in tenders to: foster efficient material use and reuse, quality and maintenance; apply the life cycle analysis and consider the longer-term impacts of each purchase; and stimulate a dialogue between procurement officials and potential contractors.
- Mobilise financial resources, such as grants, and foster efficient allocation of resources to support companies adopting circular economy principles.
- Develop resource management, social and technical skills to meet the challenges of the circular transition and support capacity building for circular businesses in co-operation with universities.
- Support business innovation by: organising hackathons and idea competitions on the circular economy; stimulating demand by being a launching customer; and establishing a one-stop shop on the circular economy for SMEs.

- Develop a monitoring framework for the future circular economy strategy to assess progress made on the achievement of targets, including through the OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions. Tallinn can also make the most of information obtained through digital tools such as digital maps, blockchain and artificial intelligence.

1 Drivers for the circular transition in Tallinn, Estonia

This chapter provides an overview of the rationale for the circular economy transition in the city of Tallinn, Estonia, by looking at the main socio-economic and environmental data and trends that have an impact on resource management, including population growth. The circular economy can play a key role in the building and maintenance of infrastructure and housing, as well as in shifting towards sustainable production and consumption patterns while lowering greenhouse gas (GHG) emissions in key sectors such as buildings, transport and energy. The city of Tallinn conceives the circular economy as a means to contribute to environmental goals while creating opportunities for jobs and stimulating innovation through a systems approach. The city aims to reach carbon neutrality by 2050, as set by the Tallinn 2035 Development Strategy and reported in the Tallinn Sustainable Energy and Climate Action Plan 2030.

The circular economy in cities and regions: An overview

As the places where people live and work, consume and dispose, cities and regions play a fundamental role in the transition to the circular economy. By 2050, the global population will reach 9 billion people, 55% of which will be living in cities, high-density places of at least 50 000 inhabitants (OECD/EC, 2020[1]). By 2060, total emissions are projected to reach 75 gigatonnes of carbon dioxide equivalent (Gt CO_2-eq), of which materials management would constitute approximately 50 Gt CO_2-eq. Global material use is projected to more than double in 2060 (from 89 Gt in 2017 to 167 Gt) (OECD, 2019[2]). The pressure on natural resources will increase, while new infrastructure, services and housing will be needed. Already, cities represent almost two-thirds of global energy demand (IEA, 2016[3]), release up to 70% of GHG emissions (World Bank, 2009[4]), consume 70% of food (FAO, 2023[5]) and produce 50% of global waste (UNEP, 2013[6]). As such, for cities and regions, the circular economy represents an opportunity to rethink production and consumption models, services and infrastructure (OECD, 2020[7]).

While there are many definitions of the circular economy (Box 1.1), three main principles characterise it: i) design out waste and pollution; ii) keep products and materials in use; and iii) regenerate natural systems (Ellen MacArthur Foundation, 2019[8]). According to the OECD (2020[7]), in cities and regions, the circular economy implies a systemic shift, whereby: *services* (e.g. from water to waste and energy) are provided making efficient use of natural resources as primary materials and optimising their reuse; *economic activities* are planned and carried out in a way to close, slow and narrow loops across value chains; and *infrastructures* are designed and built to avoid linear lock-in (e.g. district heating, smart grid, etc.).

The circular economy can increase competitiveness through production savings and material reuse. According to the European Environmental Agency (EEA), the increase in competitiveness through production savings is estimated at EUR 600 billion in the EU-27 by 2030 (EEA, 2016[9]). Some activities, such as those related to the construction and food sectors, are projected to bring relevant economic benefits in terms of added value. The transition towards a circular economy is also expected to produce a positive net effect on job creation provided that workers acquire the skills required by the green transition (EC, 2020[10]). Yet, the transition should be “just” by taking into account people’s social well-being, quality of life and equity.

However, the circular economy is not an end per se but a means to an end. It provides an opportunity to do more with less, better use available natural resources, reduce waste generation and transform waste into new resources. It can play an important role in achieving carbon neutrality (OECD, 2019[11]). For instance, the city of London, United Kingdom (UK), is pursuing circularity in order to make a substantial contribution to the city’s aspiration to become a zero-carbon city by 2050. The city of Oulu, Finland, developed in 2019, an environmental programme (Environment Program 2026 - Towards Carbon Neutral Oulu) that sets the goal to become carbon-neutral by 2040 (City of Oulu, 2019[12]). The city of Joensuu, Finland, included circular economy actions within its climate programme (Carbon Neutral Joensuu 2025) that aims to transform Joensuu into a carbon-neutral city by 2025 (City of Joensuu, 2020[13]). In Scotland, UK, it is estimated that a more circular economy could reduce carbon emissions by 11 million tonnes per year by 2050 (OECD, 2020[7]).

In Tallinn, the transition towards a circular economy is conceived as a means to contribute to environmental goals, while creating opportunities for jobs and stimulating innovation through a systemic approach. Awarded European Green Capital 2023, the city aims to reach carbon neutrality by 2050, as set by the Tallinn 2035 Development Strategy and reported in the Tallinn Sustainable Energy and Climate Action Plan 2030 (City of Tallinn, 2022[14]). The circular economy holds great potential to contribute to this goal: globally, material mis-management is responsible for two-thirds of annual GHG emissions (OECD, 2019[2]). The adoption of a circular economy framework in five key areas for cities (steel, plastic, aluminium, cement and food) could achieve a reduction of 9.3 billion tonnes of GHG in 2050 (Ellen MacArthur Foundation, 2021[15]).

Box 1.1. Definitions of a circular economy

There are more than 100 definitions of a circular economy. Examples of definitions of the circular economy include:

- An economic system that replaces the end-of-life concept, with reducing, alternatively using, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim of accomplishing sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers (Kirchherr, Reike and Hekkert, 2017[16]).
- The circular economy is one that has low environmental impacts and makes good use of natural resources through high resource efficiency and waste prevention, especially in the manufacturing sector, and minimal end-of-life disposal of materials (Ekins et al., 2019[17]).
- The circular economy is restorative and regenerative by design. Relying on system-wide innovation, it aims to redefine products and services to design waste out while minimising negative impacts. A circular economy is then an alternative to a traditional linear economy (make, use, dispose) (Ellen MacArthur Foundation, 2018[18]).
- The circular economy is where the value of products, materials and resources is maintained in the economy for as long as possible by returning them into the product cycle at the end of their use, thus minimising the generation of waste (EC, 2015[19]).
- There are three different layers of circularity, with increasingly broad coverage: i) closing resource loops, which is defined relative to a traditional economic system; ii) slowing resource loops and materials flows; and iii) narrowing resource loops, which implies a more efficient use of materials, natural resources and products within the linear system (OECD, 2019[2]).

Source: Kirchherr, J., D. Reike and M. Hekkert (2017[20]), "Conceptualizing the circular economy: An analysis of 114 definitions", https://doi.org/10.1016/j.resconrec.2017.09.005; Ekins, P. et al. (2019[17]), "The circular economy: What, why, how and where", https://www.oecd.org/cfe/regionaldevelopment/Ekins-2019-Circular-Economy-What-Why-How-Where.pdf; Ellen MacArthur Foundation (2018[21]), *What Is a Circular Economy?*, www.ellenmacarthurfoundation.org/circular-economy/concept; EC (2015[19]), *Circular Economy – Overview*, https://ec.europa.eu/eurostat/web/circular-economy; OECD (2019[2]), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, https://doi.org/10.1787/9789264307452-en; OECD (2020[7])The Circular Economy in Cities and Regions: Synthesis Report, https://doi.org/10.1787/10ac6ae4-en.

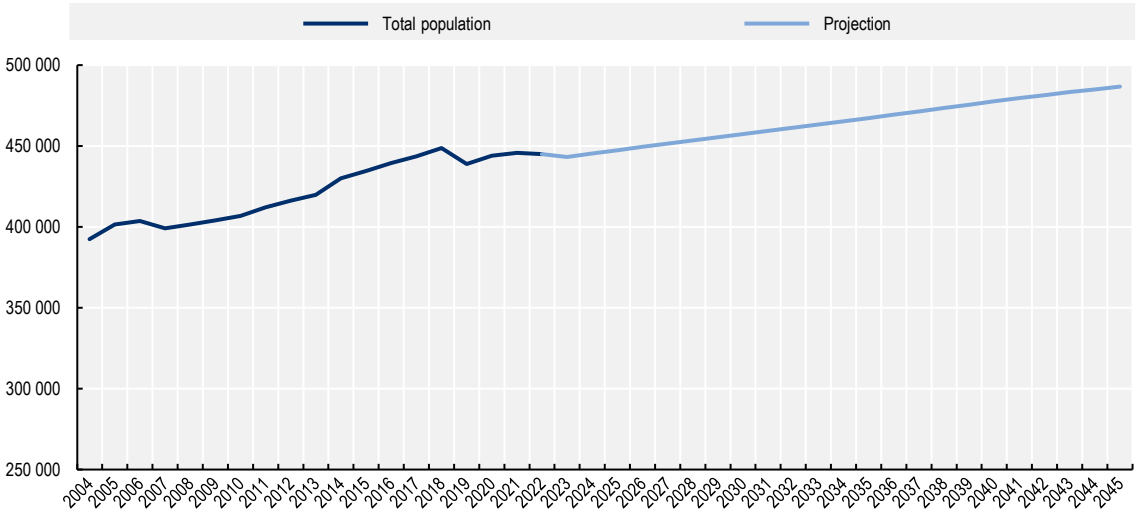
Socio-economic factors

Demography

Contrary to the national trend, Tallinn's population is expected to grow by 2045, potentially implying the need for investment in infrastructure and housing. Located on the northern coast of the country, Tallinn is the capital of Estonia, hosting one-third of the country's total population (445 002 out of 1 328 400 inhabitants in 2022, reaching 600 000 inhabitants comprising the metropolitan area). Between 2004 and 2022, Tallinn's population has grown by 13.4% and, by 2045, it is expected to increase by 9.3% compared to 2022 (Figure 1.1). On the other hand, by 2045, the Estonian population is projected to decrease by 3% from 2019 levels (City of Tallinn, 2022[22]). In 2022, the population was composed prevalently of the Estonian community (52.9%) and the Russian community (35%) (City of Tallinn, 2022[22]). Moreover, as a consequence of Russia's large-scale aggression against Ukraine, Estonia had welcomed

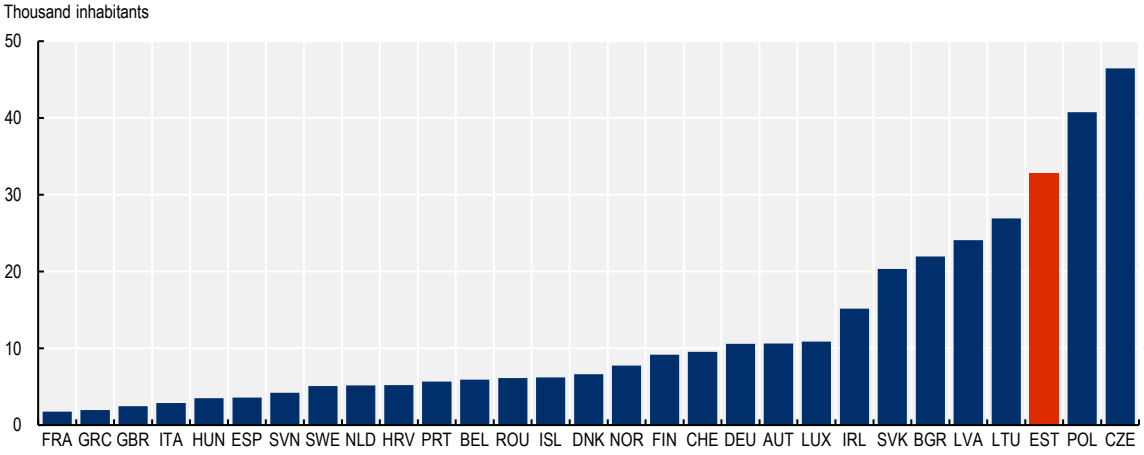
about 70 000 Ukrainians[1] by March 2023 (UNHCR, 2023[23]). Estonia is one of the leading OECD countries receiving refugees as a percentage of its total population (32.7 per 1 000 inhabitants) (Figure 1.2) (UNHCR, 2023[24]). The permanent settlement of Ukrainian refugees in Estonia could help maintain the growing demographic curve between 9 and 40 years, which would vary depending on the number of refugees staying in the country for a long-term period (estimations suggest between 10 000 and 60 000) (ERR, 2022[25]). Demographic changes will potentially impact the need for infrastructure and housing. How infrastructure is designed, built and operated can help reduce the use of fossil fuel and make heating and cooling more efficient (OECD, 2022[26]).

Figure 1.1. Population trends and projections in Tallinn, 2004-45



Source: City of Tallinn (2022[22]), *Statistics and Yearbooks*, https://www.tallinn.ee/et/node/19981; Statistics Estonia (n.d.[27]), *RV088: Population Projection 2020-2080: Demographic Indicators by County and Sex*, https://andmed.stat.ee/en/stat/rahvastik__rahvastikunaitajad-ja-koosseis__rahvaarv-ja-rahvastiku-koosseis/RV088/table/tableViewLayout2.

Figure 1.2. Number of refugees from Ukraine registered for temporary protection or similar national protection schemes



Note: Last updated March 2023. OECD calculations based on UNCHR, Operational data portal (2023[28]).
Source: OECD (2023[29]), *OECD Economic Surveys: Czech Republic 2023*, https://doi.org/10.1787/e392e937-en.

Both in Estonia and Tallinn, the population is ageing, potentially bringing changes in energy consumption. By 2045, the share of the population aged 65 years old and more will reach 21.5% of total residents in the capital (18.7% in 2022) and will represent more than one-quarter of the total population (26.7% in 2045; 22% in 2022). Meanwhile, the share of the population aged 0-14 years and 15-64 years will slightly decrease by 2045 compared to 2019, by 1.1% and 2% in the capital and 1.8% and 5.1% in the country respectively (City of Tallinn, 2022[22]; Statistics Estonia, 2022[30]). In addition, the population aged 60 or more has increased by 23% in the period 2008-22. While elderly people tend to make greater use of energy goods such as electricity, heat and gas (EC, 2008[31]; 2019[32]), they are also increasingly facing energy poverty: in 2019, 7.6% of EU-27 households were unable to keep their home adequately warm, due to low levels of household income, energy inefficient homes and high energy costs. Among households composed of a single adult aged 65 or more in the EU-27, this share represents more than 10.7% (Eurostat, 2020[33]).

The transformation of the household structure from two-three-person to single-person dwellings will have consequences for material efficiency. Between 2008 and 2021, the number of single-person households in Tallinn increased by 50% (from 61 290 to 92 503). Over the same period, the number of households with 3 and 4 members decreased by 14% and 3% respectively. In 2020, the highest proportion of dwellings that received a building permit were single-person houses (58%) followed by 3 to 5 dwellings (20%) (City of Tallinn, 2022[34]). Moreover, the ageing of the population leads to smaller households. The decline in household size implies a reduction in terms of material efficiency as common household services, including appliances and installations, are shared by a smaller number of individuals (EEA, 2016[35]). Some studies also suggest that single-person households consume more per capita electricity (between 23% and 77%) and gas (between 38% and 54%) and use close to 50% more land per capita in comparison with households composed of 2 or 4 people (Williams, 2005[36]). Per capita levels of waste generation also tend to grow as household sizes decrease (OECD, 2011[37]).

Economy

Estonia has endured the pandemic shock better than other OECD countries. Due to a large, timely and effective policy response to mitigate the COVID-19 shock, the gross domestic product (GDP) contracted by only 2.7% in 2020, one of the smoothest decreases in Europe. The second wave at the beginning of 2021 did not put the recovery on hold and GDP surpassed the pre-pandemic levels. OECD projections suggest that the war in Ukraine will slow this trend. After an annual GDP growth of 8.2% in 2021, high inflation is projected to hinder growth to 1.3% in 2022 and 1.8% in 2023 (OECD, 2022[38]).

Tallinn is Estonia's main economic node and the largest contributor to the Estonian economy. With a strong weight of the services sector in Tallinn, mainly linked to the information and communication technology (ICT) sector, the capital accounts for more than half of the annual GDP (51.4% in 2021) and its GDP per capita is 57% higher than the national average (EUR 37 034 and EUR 23 642 in 2021 respectively) (Statistics Estonia, 2023[39]). Services accounted for 84.1% of the local economy in 2019, followed by industry and construction (15.8%). Approximately one-third (29%) of the nearly 60 000 companies based in Tallinn were engaged in the ICT sector and technical and scientific activities in 2020 (City of Tallinn, 2022[22]).

Tourism is another relevant sector of the city, which holds considerable potential as a driver for the circular transition due to the links to many services (e.g. energy, water, waste management, food and transport) (OECD, 2021[40]). The Old Town has been registered on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List and the city welcomes more than 2.5 million foreign visitors every year (City of Tallinn, 2022[22]). In July 2022 only, the city accommodated a total of 147 287 non-resident tourists, 3 times more than in 2021 and 2 times more than in 2020 for the same month, yet 30% less than pre-pandemic levels (Statistics Estonia, 2023[39]). In 2022, the city scored 57 out of 100 on

the Global Destination Sustainability Index[2] in its assessment (49.5 in 2021), ranking first in Eastern Europe (GDS Movement, 2022[41]).

Estonia is the European Union (EU) leader in terms of digital public services and is among the top EU countries for digital skills (ranked fifth in the EU, with almost two-thirds of citizens having at least basic digital skills) (e-Estonia, 2021[42]). In Estonia, elections have been held on-line since 2007 and 99% of administrative services are digitalised. Consequently, digital signatures save up to 2% of the national GDP. There are two main initiatives that determined Estonia's leadership in the digital field. First, the Tiger Leap programme, launched by the national government in 1996, boosted digitalisation in schools by equipping them with technology, building ICT capacities for teachers and improving access to the Internet (Education Estonia, 2022[43]). Moreover, in 2014 the government launched the e-Residence initiative, which aims to enable non-Estonians to access general Estonian services through a transnational digital identity. Services available include among others: setting up a business, managing accounts and payments through Estonian banking institutions and contributing to the payment of taxes (Republic of Estonia, 2022[44]). Nevertheless, Estonia's digital solutions also generate significant environmental costs, for example, through the energy consumption of ICT equipment. In 2022, the total impact of the ICT equipment life cycle of all Estonian state agencies was estimated at 26 000 tonnes of CO_2 equivalent (tCO_2e), accounting for more than 1% of Estonia's total GHG emissions (EY, 2022[45]).

Tallinn is exploring how digitalisation can contribute to the achievement of environmental targets as well as to the circular transition while minimising environmental costs and externalities (e.g. increasing CO_2 emissions). Tallinn can build on existing digital tools. For example, in 2020, the Tallinn Dashboard[3] made available municipal data on COVID-19 updates, traffic live streams, population, data on the use of streets and roads, noise level, electricity usage and detailed planning information of building lots and three-dimensional (3D) models of the city (City of Tallinn, 2020[46]). Another initiative that aims to help companies implement smart and digital solutions in the city is Tallinnovation. Since 2020, the city of Tallinn in collaboration with Tehnopol Science and Business Park launch an annual innovation competition to implement smart city solutions to make the city greener and more sustainable. The programme is open to Tallinn-based companies, which can submit their ideas to receive financial support, pilot their project, obtain contacts and advice from the city of Tallinn and benefit from the support of the Tehnopol Science and Business Park mentorship programme. Selected companies also receive financial support of EUR 100 000 and testbed solutions for their projects (City of Tallinn, 2021[47]).

Living standards and employment

Income segregation is increasing in the city, with large differences between Tallinn's districts, while the COVID-19 pandemic raised the level of unemployment. A total of 16.7% of the population is at risk of poverty and some districts are home to almost a third of the total subsistence beneficiaries, 32% of them residing in Lasnamäe and 26% in Northern Tallinn. Due to COVID-19, the unemployment rate increased to almost double between 2019 and 2020 (from 3.5% to 6.5%). Despite the effect of the pandemic, Tallinn's unemployment level in 2020 stood at 6.5%, slightly below the national level (6.8% in 2020) and the OECD average (6.9% in December 2020). Since then, the city has not recovered pre-crisis employment levels, registering 6.6% by 2021 and 2022, above the national (6.2% in 2022) and OECD (4.9% in December 2022) levels. Moreover, the impact on unemployment was milder than the last economic shock, the 2008 financial crisis, when unemployment in Tallinn reached 16.8% in 2010 (City of Tallinn, 2022[22]; OECD, 2022[48]; 2022[49]).

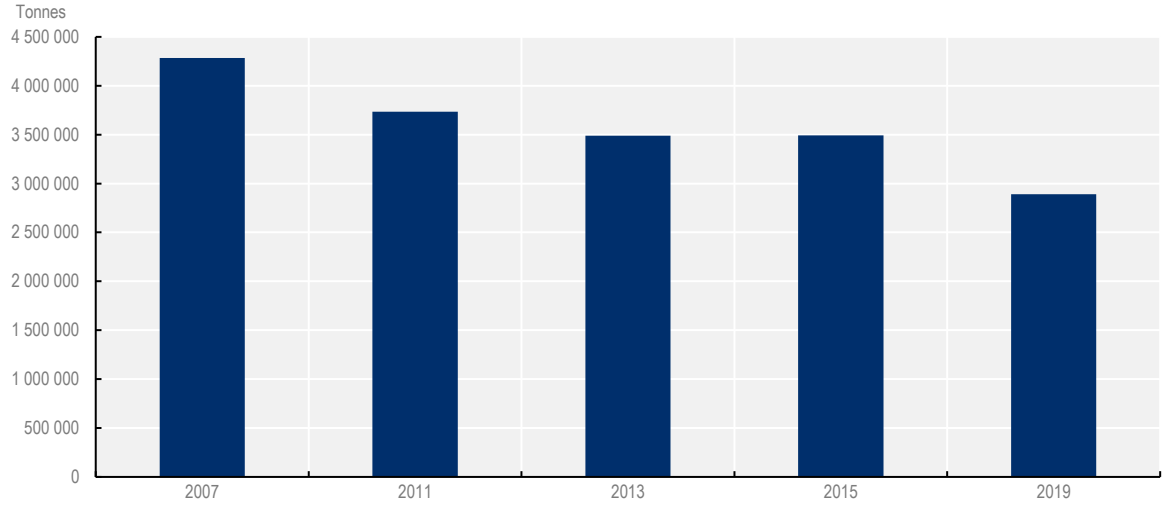
Environmental data and trends

Emissions and energy

Estonia is characterised by a carbon-intensive economy among OECD countries. Estonia's high GHG emissions have declined substantially since 1990 (-71% in 1990-2020) but further progress is needed to reach the OECD average (OECD, 2022[50]). The GHG emissions generated in Estonia in 2018 (15.1 tCO2e per capita) are above the OECD average of 11.5 tCO_2e per capita. In 2019, activities related to sewerage and waste management accounted for 8.4% of total GHG emissions in the country (no data are available at the city level). In 2020, GHG emissions, excluding land use, land use change and forestry (LULUCF), were already 72% lower than in 1990. Estonia is aiming for net zero emissions by 2050 (OECD, 2022[38]). Along the same line, *Tallinn* 2035 strategy and the Climate-neutral Tallinn plan set the goal of reducing GHG emissions by 40% by 2030 and achieving climate neutrality by 2050 (City of Tallinn, 2021[51]). The city aims to lower GHG emissions in key sectors such as buildings, transport and energy generation and consumption.

In Tallinn, CO_2 emissions related to the combined combustion of fuels and energy generation accounted for 2 890 688 t CO_2 in 2019 (-33% from 2007 levels, Figure 1.3), of which 24% originated from the transport sector, 31% from households, 19% from energy production, 16% from the service sector and 10% from industry and construction (City of Tallinn, 2020[52]). Yet, the latest CO_2 emissions inventory from 2019 showed a downward trend in the city mainly due to lower emissions from households, energy production and the industrial sectors.

Figure 1.3. CO_2 emissions in Tallinn, Estonia, 2007-19



Source: City of Tallinn (2020[52]), *Analyses and Emissions Inventory*, https://www.tallinn.ee/et/energiaagentuur/analuusid-ja-heitkoguste-inventuur.

Estonia is heavily dependent on oil shale for the generation of electricity. In 2019, the share of oil-shale-fired electricity represented 70% of the total, considerably above the OECD average (23%) (OECD, 2021[53]). Oil is the largest energy source in Estonia's energy consumption, accounting for 36% of total final consumption in 2017. Most oil is consumed in the transport sector. The rising price of key commodities, including oil, as a result of the war, could pose a challenge for Estonia and the EU, which is taking steps towards green energy (Box 1.2). Electricity is the second-largest energy source at 21% of total final consumption, followed by district heat (16%), and bioenergy and waste (15%) (IEA, 2019[54]). Estonia also

has large domestic biomass resources, with bioenergy and waste accounting for 27% of domestic energy production and 19% of the total primary energy supply in 2018.

Box 1.2. The EU transition towards green energy

The production and use of energy account for more than 75% of the EU's GHG emissions. In response, the EU has adopted a series of measures to move away from fossil fuels to a clean energy system based on the increased use of renewable energy sources.

In 2019, the EU unveiled the Green Deal, which aims to make Europe climate neutral by 2050 by focusing on three key principles: i) ensuring secure and affordable EU energy supplies; ii) developing a fully integrated, interconnected and digitalised EU energy market; iii) prioritising energy efficiency, improving the energy performance of our buildings and developing an electricity sector based largely on renewable energy sources. In line with these objectives, the Clean Energy Package (CEP) adopted in 2019 comprises eight legislative acts on the energy performance of buildings, renewable energy, energy efficiency, governance and electricity market design. More specifically, the CEP updates the EU's 2030 targets (40% reduction in GHG emissions compared to 1990 levels, 32% share of renewables in the EU's energy mix and 32.5% energy efficiency target compared to a 2007 baseline).

In 2020, the European Commission (EC) presented a comprehensive EU strategy for energy system integration. The strategy encourages member states to rely on renewable energy sources to decarbonise their energy systems and to promote sector integration, i.e. the interconnection of different energy carriers (electricity, heat, cooling, gas, solid and liquid fuels). The aim is to improve the flow of energy between users and producers while reducing waste.

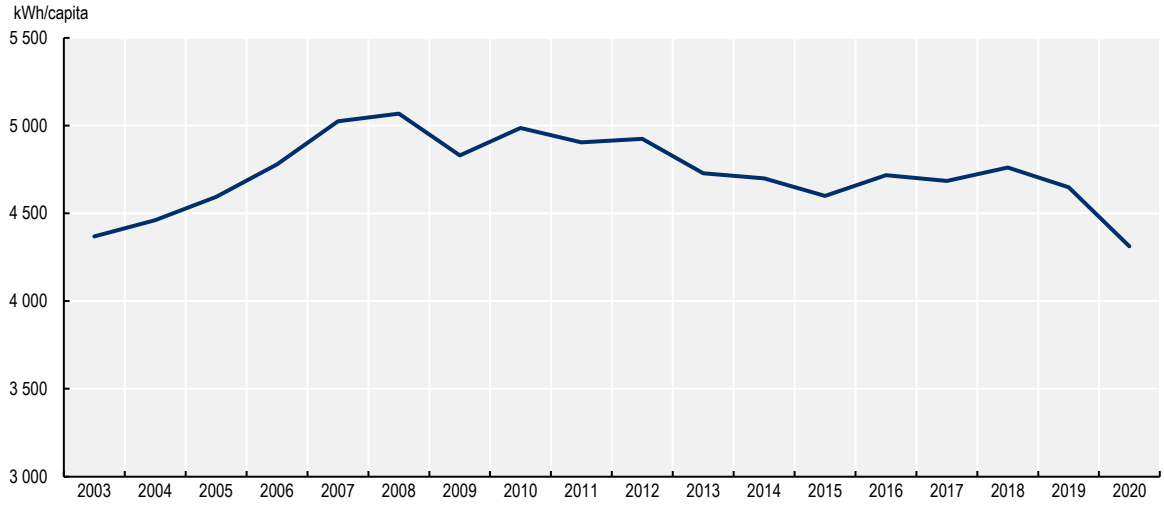
Between 2021 and 2027, the LIFE Clean Energy Transition programme supports the implementation of the EU's sustainable energy policies and aims to facilitate the transition to an energy-efficient, renewable energy-based and climate-neutral economy.

Last, in 2022, the EU launched the RePowerEU plan following the war in Ukraine to rapidly reduce dependence on Russian fossil fuels by 2027 with a target of 45% renewable energy share across the EU. The EC estimates that, by 2030, the share of renewables in electricity should increase to 69%, in transport to 32% and in heating/cooling to at least 2.3 percentage points per year. However, even taking into account the projections for an increase in renewables in all three sectors by 2027, the capacity to expand renewables at the European level still falls short of the ambitions set out in the REPowerEU plan.

Source: EC (2019[55]), *Clean Energy for All Europeans Package*, https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en; EC (2020[56]), *EU Strategy on Energy System Integration*, https://energy.ec.europa.eu/topics/energy-systems-integration/eu-strategy-energy-system-integration_en; IEA (2022[57]), *Is the European Union on track to meet its REPowerEU goals?*, www.iea.org/reports/is-the-european-union-on-track-to-meet-its-repowereu-goals.

In Tallinn, per capita electricity consumption has remained stable in recent years, peaking before the outbreak of the economic crisis in 2008 and declining since then (Figure 1.4). In terms of fuel consumption, energy from wood waste increased 15-fold between 2003 and 2019 (the latest year for which data are available), while other sources such as coal (-93%) and natural gas (-49%) decreased significantly over the same period (City of Tallinn, 2022[22]).

Figure 1.4. Consumption of electricity per capita in Tallinn, Estonia, 2003-20



Source: City of Tallinn (2022[22]), *Statistics and Yearbooks*, https://www.tallinn.ee/et/node/19981.

Material consumption and waste management

In 2020, Estonia's domestic material consumption (DMC) per capita amounts to 29 tonnes and remains above the OECD average (OECD, 2023[58]). The material consumption consists mostly of non-metallic materials representing 57%, followed by fossil energy materials and biomass with 23% and 20% respectively (Eurostat, 2023[59]). In terms of resource productivity, Estonia remained the fourth lowest at the OECD level in 2019.

Municipal waste generation per capita in Estonia has remained below OECD levels since 2000. Between 2000 and 2020, Estonia generated an average of 376 kilograms (kg) of municipal waste per capita. Since 2012, the amount of municipal waste generation is on constant growth in the country (from 280.5 kg/capita in 2012 to 383.2 kg/capita in 2020) with a decreasing curve between 2018 and 2019 (from 405.1 kg/capita to 369.1 kg/capita). The municipal waste per capita generated by OECD countries has remained stable over time (around 550 and 500 kg/capita in 2000-20) and it follows a similar trend over the period 2012-20: from 511.6 kg/capita to 533.7 kg/capita (OECD, 2023[60]) (Figure 1.5).

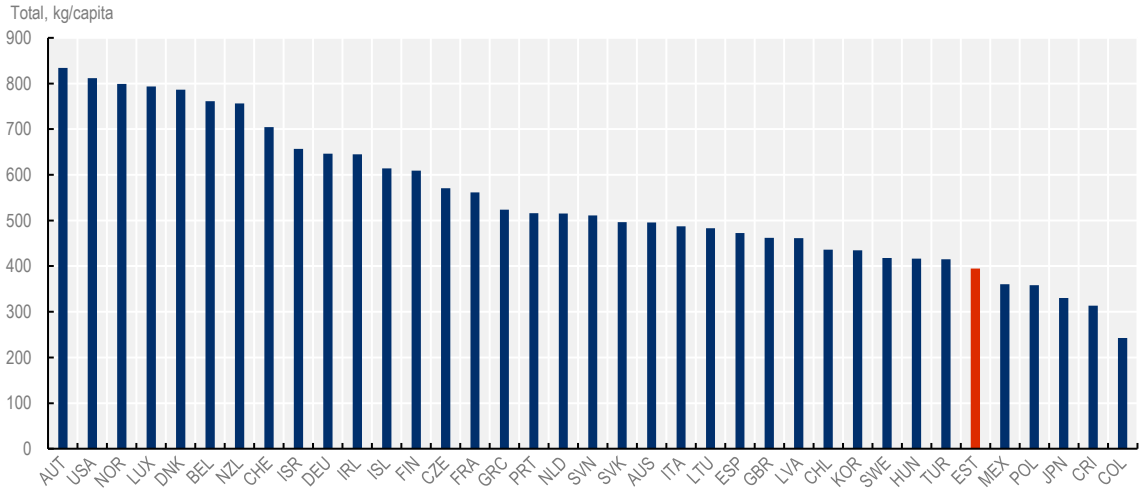
Over the period 2016-20, Tallinn generated an average of 4.2 tonnes of waste per capita (Estonian Ministry of the Environment, 2023[61]). Regarding the origin of the waste, construction and demolition accounted for more than half of the waste generated in the city (58.2%), followed by waste from waste and wastewater treatment plants (14.1%), municipal waste (9.5%), unspecified waste (5.5%), packaging waste (4.5%), waste from exploration, extraction and physical and chemical treatment of minerals and earth materials (4.2%) and other (4%) (City of Tallinn, 2022[34]).

An estimated 44 500 tonnes (t) of food waste are generated in Tallinn every year. More than half of it is generated by households, while the rest is produced predominantly by the commercial and catering sectors (City of Tallinn, 2022[34]). At the national level, approximately 167 000 t of food waste is generated annually in Estonia. Almost half of it is generated by households, 19% by the food industry, 14% in primary production, 12% in trade and 6% in the catering sector. The total value of food wasted in the entire food supply chain is estimated at EUR 164 million per year.

Over the last 10 years, Tallinn has achieved higher levels of separate collection (biowaste collection has almost tripled [+243%] in the period 2012-19, partly due to awareness initiatives and regulation, while landfilling has decreased by 80% [from 229 700 to 46 200 t] over the same period). This is particularly

important as landfill methane is the largest contributor to GHG emissions from waste management activities (IPCC, 2007[62]). In this context, CO_2 emissions have been reduced by 67% to 37% over the period 2016-20, depending on the air monitoring station. However, the incineration of municipal waste has increased significantly over the last decade (+17% for the period 2012-20 but +30% for the period 2012-19) (City of Tallinn, 2022[22]). It should be noted that the waste management and treatment indicators for 2020, the latest year for which data are available, reflect lower results than in the years before the pandemic. Therefore, the upward trend is likely to increase with a return to a business-as-usual scenario.

Figure 1.5. Municipal waste generation in OECD countries in 2012-21



Note: Municipal waste is defined as waste collected and treated by or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, as well as yard and garden waste, street sweepings, the contents of litter containers and market cleansing waste if managed as household waste. The definition excludes waste from municipal sewage networks and treatment, as well as waste from construction and demolition activities. Data refer to the most recent available year, which ranges from 2012 to 2021: 2012 for Mexico; 2018 for Chile, Colombia, New Zealand and the United States; 2019 for Australia and Greece; 2020 for Austria, Iceland, Ireland, Italy, Japan, Korea, Türkiye, and the UK; 2021 for Belgium, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Norway, Hungary, Israel, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, and Switzerland.
Source: OECD (2023[60]), "Municipal waste (indicator)", https://doi.org/10.1787/89d5679a-en (accessed on 25 March 2023).

References

City of Joensuu (2020), *Carbon-neutral Joensuu 2025*, https://www.joensuu.fi/web/climate-joensuu-english/carbon-neutral-joensuu-2025. [13]

City of Oulu (2019), *Environment Program 2026 - Towards Carbon Neutral Oulu*, https://www.ouka.fi/oulu/ymparisto-ja-luonto/ajankohtaista/-/asset_publisher/2fVr/content/ymparistoohjelma-2026-kohti-hiilineutraalia-oulua-on-hyvaksytty/50266. [12]

City of Tallinn (2022), *Circular Economy in Tallinn*, https://www.tallinn.ee/et/keskkond/ringmajandus-tallinnas. [14]

City of Tallinn (2022), *Statistics and Yearbooks*, https://www.tallinn.ee/et/node/19981. [22]

City of Tallinn (2022), *Tallinn Waste Management Plan 2022-2026*, https://www.tallinn.ee/et/keskkond/jaatmehooldusest-uldiselt. [34]

City of Tallinn (2021), *Tallinn Sustainable Energy and Climate Action Plan 2030*, https://www.tallinn.ee/en/strateegia/climate-neutral-tallinn-tallinn-sustainable-energy-and-climate-action-plan-2030. [51]

City of Tallinn (2021), *Tallinnovation Smart City Innovation Competition - The 1st Year Follow-up*, https://www.tallinn.ee/en/tallinnovatsioon/tallinnovation-smart-city-innovation-competition-1st-year-follow. [47]

City of Tallinn (2020), *Analyses and Emissions Inventory*, https://www.tallinn.ee/et/energiaagentuur/analuusid-ja-heitkoguste-inventuur. [52]

City of Tallinn (2020), *Tallinn Dashboard*, https://gis.tallinn.ee/portal/apps/dashboards/355a2c1bd19d4f47b554ec4bfd82a666. [46]

EC (2020), *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe*, European Commission, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN. [10]

EC (2020), *EU Strategy on Energy System Integration*, European Commission, https://energy.ec.europa.eu/topics/energy-systems-integration/eu-strategy-energy-system-integration_en. [56]

EC (2019), *Clean Energy for All Europeans Package*, European Commission, https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en. [55]

EC (2019), *The Future of Cities*, European Commission, https://publications.jrc.ec.europa.eu/repository/handle/JRC116711. [32]

EC (2015), *Circular Economy - Overview*, European Commission, https://ec.europa.eu/eurostat/web/circular-economy. [19]

EC (2008), *Environment and Ageing*, European Commission, https://ec.europa.eu/environment/enveco/others/pdf/ageing.pdf. [31]

Education Estonia (2022), *How It All Began? From Tiger Leap to Digital Society*, https://www.educationestonia.org/tiger-leap/. [43]

EEA (2016), *More From Less - Material Resource Efficiency in Europe*, European Environment Agency, https://www.eea.europa.eu/publications/more-from-less. [9]

EEA (2016), *Urban Sustainability Issues - What Is a Resource-efficient City?*, European Environment Agency, https://op.europa.eu/en/publication-detail/-/publication/15ad5a5b-b50e-11e5-8d3c-01aa75ed71a1/language-en. [35]

e-Estonia (2021), “Estonia – A European and global leader in the digitalisation of public services”, https://e-estonia.com/estonia-a-european-and-global-leader-in-the-digitalisation-of-public-services/. [42]

Ekins, P. et al. (2019), "The circular economy: What, why, how and where", Background paper for an OECD/EC Workshop on 5 July 2019, https://www.oecd.org/cfe/regionaldevelopment/Ekins-2019-Circular-Economy-What-Why-How-Where.pdf. [17]

Ellen MacArthur Foundation (2021), *Completing the Picture: How the Circular Economy Tackles Climate Change*, https://ellenmacarthurfoundation.org/completing-the-picture. [15]

Ellen MacArthur Foundation (2019), *Introduction to the Circular Economy*. [8]

Ellen MacArthur Foundation (2018), *What is a Circular Economy?*, https://www.ellenmacarthurfoundation.org/circular-economy/concept (accessed on 10 December 2020). [18]

Ellen MacArthur Foundation (2018), *What Is a Circular Economy?*, https://www.ellenmacarthurfoundation.org/circular-economy/concept. [21]

ERR (2022), "The long-term impact on Estonia of the war between Russia and Ukraine", Estonian Public Broadcasting, https://www.err.ee/1608605128/arenguseire-ukraina-pogenikud-lukkaks-eesti-rahvastikuprobleeme-edasi. [25]

Estonian Ministry of the Environment (2023), *National Waste Plan 2022-2028*, https://www.envir.ee/j%C3%A4%C3%A4tmekavaksh. [61]

Eurostat (2023), *Material Flow Accounts and Resource Productivity*. [59]

Eurostat (2020), *Ageing Europe: Looking at the Lives of Older People in the EU*, https://ec.europa.eu/eurostat/documents/3217494/11478057/KS-02-20-655-EN-N.pdf/9b09606c-d4e8-4c33-63d2-3b20d5c19c91?t=1604055531000. [33]

EY (2022), *Analysis of the Current Status of and Possibilities Regarding Green Digital Government*, Ernst & Young. [45]

FAO (2023), *Urban Food Agenda*, Food and Agriculture Organization of the United Nations, http://www.fao.org/urban-food-agenda/en/. [5]

GDS Movement (2022), *2021 Performance Overview*, Global Destination Sustainability Movement. [41]

IEA (2022), *Is the European Union on Track to Meet its REPowerEU Goals?*, International Energy Agency, https://www.iea.org/reports/is-the-european-union-on-track-to-meet-its-repowereu-goals. [57]

IEA (2019), *Energy Policies of IEA Countries: Estonia 2019 Review*, International Energy Agency, https://www.iea.org/reports/energy-policies-of-iea-countries-estonia-2019-review. [54]

IEA (2016), "Cities are in the frontline for cutting carbon emissions, new IEA report finds", International Energy Agency, http://www.iea.org/news/cities-are-in-the-frontline-for-cutting-carbon-emissions-new-iea-report-finds. [3]

IPCC (2007), *Climate Change 2007: Working Group III: Mitigation of Climate Change*, Intergovernmental Panel on Climate Change, https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/ch10.html. [62]

Kirchherr, J., D. Reike and M. Hekkert (2017), "Conceptualizing the circular economy: An analysis of 114 definitions", *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232, https://doi.org/10.1016/j.resconrec.2017.09.005. [16]

Kirchherr, J., D. Reike and M. Hekkert (2017), "Conceptualizing the circular economy: An analysis of 114 definitions", *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232, https://doi.org/10.1016/j.resconrec.2017.09.005. [20]

OECD (2023), "Material consumption (indicator)", https://doi.org/10.1787/84971620-en (accessed on 6 April 2023). [58]

OECD (2023), "Municipal waste (indicator)", https://doi.org/10.1787/89d5679a-en (accessed on 25 March 2023). [60]

OECD (2023), *OECD Economic Surveys: Czech Republic 2023*, OECD Publishing, Paris, https://doi.org/10.1787/e392e937-en. [29]

OECD (2022), *Greenhouse Gas Emissions*, OECD, Paris, https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG. [50]

OECD (2022), *International Migration Outlook 2022*, OECD Publishing, Paris, https://doi.org/10.1787/30fe16d2-en. [26]

OECD (2022), *OECD Economic Outlook, Volume 2022 Issue 2*, OECD Publishing, Paris, https://doi.org/10.1787/f6da2159-en. [49]

OECD (2022), *OECD Economic Surveys: Estonia 2022*, OECD Publishing, Paris, https://doi.org/10.1787/21ef46e4-en. [38]

OECD (2022), *Unemployment rate (indicator)*, https://doi.org/10.1787/52570002-en (accessed on 23 July 2022). [48]

OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://doi.org/10.1787/17017efe-en. [53]

OECD (2021), *The Circular Economy in Glasgow, United Kingdom*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/7717a310-en. [40]

OECD (2020), *The Circular Economy in Cities and Regions: Synthesis Report*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/10ac6ae4-en. [7]

OECD (2019), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, OECD Publishing, Paris, https://doi.org/10.1787/9789264307452-en. [11]

OECD (2019), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, OECD Publishing, Paris, https://doi.org/10.1787/9789264307452-en. [2]

OECD (2011), *Greening Household Behaviour: The Role of Public Policy*, OECD Studies on Environmental Policy and Household Behaviour, OECD Publishing, Paris, https://doi.org/10.1787/9789264096875-en. [37]

OECD/EC (2020), *Cities in the World: A New Perspective on Urbanisation*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/d0efcbda-en. [1]

Republic of Estonia (2022), *e-Residency*, https://www.e-resident.gov.ee/. [44]

Statistics Estonia (2023), *National Accounts*, http://www.stat.ee/en/find-statistics/statistics-theme/finance/national-accounts. [39]

Statistics Estonia (2022), *How is Our Country Doing?*, https://tamm.stat.ee/kategooriad/eesti-areng/tulemusvaldkonnad/keskkond/indikaatorid/208. [30]

Statistics Estonia (n.d.), *RV088: Population Projection 2020-2080: Demographic Indicators by County and Sex*, https://andmed.stat.ee/en/stat/rahvastik__rahvastikunaitajad-ja-koosseis__rahvaarv-ja-rahvastiku-koosseis/RV088/table/tableViewLayout2. [27]

UNCHR (2023), *Operational Data Portal*, https://data2.unhcr.org/en/situations. [28]

UNEP (2013), *UNEP-DTIE Sustainable Consumption and Production Branch*, United Nations Environment Programme. [6]

UNHCR (2023), *Operational Data Portal: Ukraine Refugee Situation*, United Nations High Commissioner for Refugees, https://data.unhcr.org/es/situations/ukraine. [23]

UNHCR (2023), *Ukraine Situation: Regional Refugee Response Plan*, United Nations High Commissioner for Refugees. [24]

Wijkman, A. and K. Skånberg (2017), *The Circular Economy and Benefits for Society: Jobs and Climate Clear Winners in an Economy Based on Renewable Energy and Resource Efficiency*, https://circulareconomy.europa.eu/platform/sites/default/files/the-circular-economy-czech-republic-and-poland.pdf. [63]

Williams, J. (2005), "One-person households – A resource time bomb?", *WIT Transactions on Ecology and the Environment*, Vol. 81, https://doi.org/10.2495/ECO050411. [36]

World Bank (2009), *World Development Report 2010*, World Bank, Washington, DC, https://doi.org/10.1596/978-0-8213-7987-5. [4]

Notes

[1] As of 6 April 2023, 44 588 refugees from Ukraine registered for Temporary Protection or similar national protection schemes (https://data.unhcr.org/en/situations/ukraine).

[2] The GDS Index is a destination-level programme that measures, benchmarks and improves the sustainability strategy and performance of tourism and events destinations. The index is the result of a collaborative partnership between the International Congress and Convention Association (ICCA), IMEX Exhibitions, City Destinations Alliance (CityDNA), MCI Group and GUBI consulting.

[3] Specifically, the dashboard includes a statistics portal that provides information on general data (demographic trends, administration, entrepreneurship and finance), education (ratio of pupils to population), public health (family doctors), social services, housing statistics (housing completions by type of building), culture and sports (sports centres and facilities), tourism (number and cost of beds in accommodation facilities in Tallinn), transport (cycle routes, public transport routes) and the economy (GDP per capita, average gross monthly wage, unemployment rate, municipal budget for operating expenditure, entrepreneurial activity in the city). It also provides an overview of the total number of coronavirus cases in the world per country (total number of cases, total number of deaths, total number of doses administered).

2 Towards the circular economy in Tallinn, Estonia

This chapter details and analyses the main components of existing circular economy initiatives promoted in Estonia and the city of Tallinn. At the national level, the first step towards a circular economy in Estonia is reflected in the *Circular Economy White Paper* published in 2022. At the local level, the city of Tallinn transformed its Waste Management Department into a Circular Economy Department, with the intention of co-ordinating action towards the implementation of a future circular economy strategy for the city.

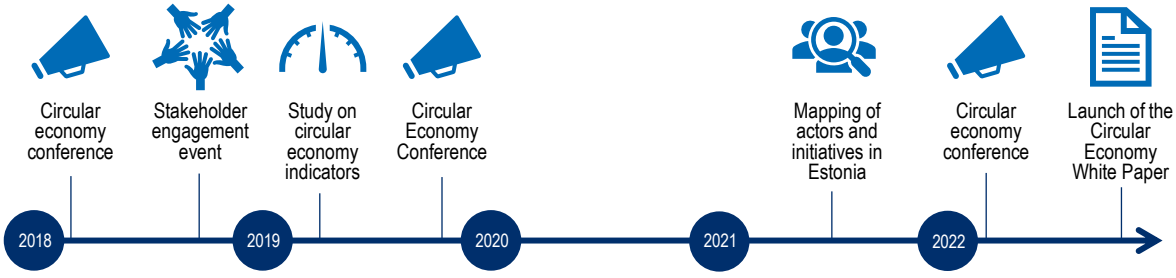
Progress towards a circular economy in Estonia

As acknowledged by the national strategy Estonia 2035, the transition to a circular economy can contribute to environmental objectives (Government of the Republic of Estonia, 2021[1]). They include: i) reducing the total net greenhouse gas (GHG) emissions to 8 million tonnes of CO_2 equivalent (tCO_2e) by 2035; ii) reaching a circular material reuse rate of 30% by 2035 (17.3% in 2020); iii) reducing the energy consumption of residential and non-residential buildings from 16.7 terawatt-hours (TWh) to 14.5 TWh by 2035; and iv) reducing GHG emissions from the transport sector from 2 395 000 tCO_2e in 2019 to 1 700 000 tCO_2e in 2035 (Statistics Estonia, 2022[2]). National strategy Estonia 2035 recognises: the key role of the private sector in reducing waste generation and increasing material recycling; the importance of raising awareness across society to adopt sustainable practices; and digital solutions to enable reliable data to measure progress.

The first step towards a circular economy in Estonia is reflected in the Circular Economy White Paper (*Ringmajanduse valge raamat*), launched in 2022 and co-ordinated since 2018 by the Ministry of the Environment. The white paper highlights the importance of business, sustainable production and consumption, digitalisation, skills, economic and regulatory frameworks, and awareness in the circular economy. The paper also acknowledges the existence of barriers in the country to move towards a circular economy such as: unclear roles and responsibilities; limited environmental and circular economy awareness in society; lack of circular economy experts and innovative solutions; and the siloed approach to a circular economy. Nevertheless, this document does not contain specific objectives for the circular economy policy. While it identifies stakeholder groups that could be engaged in the priority areas (national government, municipalities, entrepreneurs, citizens), it does not provide a clear definition of what the role and contribution of local authorities should be.

The development of the white paper was led by a steering group consisting of representatives of all Estonian ministries and the Government Office. It was informed by multi-stakeholder events carried out between 2018 and 2022 (Figure 2.1) to identify how the circular economy could stimulate innovation and become a driver of competitiveness (Estonian Ministry of the Environment, 2022[3]). The ministry also commissioned studies on international experiences in measuring the circular impacts and the implementation level of the circular economy in Estonia in the construction, plastics, textile and wood industries, and services sectors (i.e. accommodation and shopping centres) (Estonian Ministry of the Environment, 2019[4]).

Figure 2.1. Timeline of circular economy initiatives in Estonia, 2018-22



Source: Own elaboration based on Estonian Ministry of the Environment (2022[5]), *Creating a Strategy and Action Plan for Circular Economy in Estonia*, https://ringmajandus.envir.ee/en/creating-strategy-and-action-plan-circular-economy-estonia.

The steering group continued to play a role after the launch of the white paper, identifying the actions to be taken in strategic areas, such as the ban on single-use plastics. Municipalities, on the other hand, are called to contribute to the following four strategic actions (Table 2.1): favouring the use of sustainable products and services, promoting the sharing economy, raising awareness and implementing environmental management measures.

Table 2.1. Priorities, actions and key stakeholders of the Circular Economy White Paper in Estonia

Priority areas for development	Strategic actions	Key stakeholders
Resources are used responsibly and based on demand, resource use is well-considered and waste production is minimised.	Showing a preference for sustainable products and services	National government Municipalities Entrepreneurs Citizens
	Promoting the sharing economy	National government Municipalities Entrepreneurs Citizens
	Ensuring safe material circulation	Entrepreneurs
	Using the best possible approach, implementation of green public procurement	Entrepreneurs
The business models of Estonian companies are forward-looking and circular.	Increasing the interoperability of supply chains	Entrepreneurs
	Involving science in creating circular economic solutions	National government
	Encouraging businesses and partnerships between businesses and research institutions	National government Entrepreneurs
	Encouraging co-operation between businesses and the state	National government Entrepreneurs
The necessary know-how and expertise for implementing a circular economy is ensured and the co-operation between stakeholders and sectors is well-functioning.	Ensuring expertise, know-how and succession	National government
	Ensuring access to skilled labour, including foreign labour	National government Entrepreneurs
	Promoting cross-sectoral co-operation, including participation in international co-operation networks	National government
Functional digital solutions have been created to support the circular economy and high-quality data for monitoring the situation have been ensured.	Creating sharing and collaboration platforms	Entrepreneurs
	Ensuring interoperability between databases and collaboration platforms	National government Entrepreneurs
	Implementing innovative digital solutions, including those using artificial intelligence	National government Entrepreneurs
The circular economy is well co-ordinated and there is a supportive legal and economic environment.	Updating legislation and regulations	National government
	Defining roles, functions and responsibilities of stakeholders	National government
	Developing and applying principles and standards for gathering information	National government
	Creating digital platforms for collecting, analysing and exchanging information	National government Entrepreneurs
Environmentally conscious thinking and environmentally friendly behaviour are mainstreamed in society.	Awareness raising	National government Municipalities Entrepreneurs Citizens
	Guiding consumer behaviour	National government Entrepreneurs Citizens
	Implementing environmental management measures	National government Municipalities Entrepreneurs

Source: Estonian Ministry of the Environment (2022[6]), *Circular Economy White Paper for Estonia*, https://ringmajandus.envir.ee/sites/default/files/2022-06/Ringmajandus_valge_raamat.pdf.

In parallel to the White Paper, at the national level, the government enables the transition to a circular economy through regulatory, financial and awareness-raising tools. First, in 2022, the Ministry of the Environment established mandatory requirements for green public procurement for furniture, cleaning products and services, office information technology (IT) equipment and copying and graphic paper, which should be implemented by all Estonian municipalities. In 2023, the ministry also established requirements for green public procurement for road vehicles (Estonian Ministry of the Environment, 2023[7]). Second, its Environmental Investment Centre has supported 42 circular economy projects (mainly resource efficiency measures) in Harju County (where Tallinn is located) for a total of EUR 3.2 million for the period 2011-21 (EIC, 2022[8]). Third, the ministry has created a one-stop-shop website that compiles the information available on the circular economy in the country, including circular economy solutions, success stories and a contact list of ministry representatives from the Department of Environmental Management.

A number of sectoral plans are making room for actions linked to the circular economy transition:

- The National Waste Management Plan (NWMP) 2022-28 by the Ministry of the Environment, to be launched by the end of 2023, will be consistent with the white paper. It will be the 4th National Waste Plan (Box 2.1). The strategic goal of the National Waste Plan is to implement the waste hierarchy principles and encourage the transition to a circular economy. The plan is expected to be based on four strategic objectives: i) sustainable and conscious production and consumption; ii) promotion of waste prevention and reuse; iii) increasing safe material circulation; and iv) consideration of the effects of waste management on both the human and natural environment as a whole (Estonian Ministry of the Environment, 2022[9]; 2023[10]).
- The forthcoming Food Waste Prevention plan sets out six areas for action to prevent, reduce and increase social responsibility for food waste throughout the food supply chain, from primary production to final consumption: i) data recovery and food waste generation mapping; ii) legislative framework and regulatory objectives; iii) implementation of effective co-operation; iv) innovation and research and development (R&D); v) promotion of food redistribution; and vi) awareness and communication. It was informed by five multi-stakeholder roundtables held in 2020 (Estonian Ministry of the Environment, 2022[11]).
- Finally, the Estonian Environmental Strategy 2030 includes some specific targets linked to the circular economy, such as the reduction of the amount of waste disposed of in landfills and the objective of increasing the share of recovered waste (Estonian Ministry of the Environment, 2015[12]).

At the international level, the Ministry of the Environment partners with Norway-based research organisation SINTEF to implement the project “Increasing the capacity of the circular economy”. Actions foreseen by this initiative include mapping the circular economy capacity of local governments, designing training programmes aimed at officials, creating circular economy training courses for teachers and information days as well as inter-school competitions, and developing digital and educational materials to raise awareness (Estonia Ministry of the Environment, 2021[13]). Finally, the Ministry of the Environment collaborates with the Ministry of Environmental Protection and Regional Development of the Republic of Latvia for the cross-border implementation of the deposit packaging system (Estonian Ministry of the Environment, 2023[14]).

Box 2.1. Waste management in Estonia

Waste management in Estonia is decentralised and falls under the responsibility of local governments. The Waste Act (2004) determines that local authorities should organise mixed municipal waste collection, transport and processing, while Producer Responsibility Organisations (PROs) collect packaging waste and other products of concern. According to the Local Government Organisation Act (State Gazette, 1993[15]), municipalities must: i) ensure the adoption and updating of a waste management plan; ii) establish the rules for waste management in their territories; and iii) set the rules for the types of waste subject to

organised waste transport and establish the procedure for determining the size of the waste transport service fee. In 2015, a ruling by the Administrative Chamber of the Supreme Court of Estonia established that municipalities have the right to determine where municipal waste is to be delivered after collection. Nevertheless, despite available financial support, mainly through European Union (EU) funds, there is little interest in municipalities to apply for the financing of waste treatment investment projects. Private waste management operators are also eligible to apply for up to 50% grant financing of investments in waste treatment and recycling facilities. However, the five-year contracting period is not appealing for the private sector to generate a return on investments.

The overall policy direction in waste management is determined by the waste management plan developed by the Ministry of the Environment:

- The first National Waste Management Plan (NWMP) (2003-07) sought primarily to organise "environmentally safe, flexible, institutionally granted and economically justified waste management on all levels". The plan started a major transformation of Estonia's waste sector, particularly in light of the country's accession to the EU. The transposition and implementation of EU waste legislation was a major focus of this plan, which set waste prevention and waste recycling as major goals. It also dealt with practical issues such as the establishment of new landfills and the closing of old ones, around 150 sites in 2001.
- The aim of the second NWMP (2008-13) was to reduce the amount of waste disposed in landfills, increase waste recovery and reduce negative impacts on the environment. In pursuing these objectives, the second plan aimed to implement the EU "waste hierarchy" – promoting waste prevention, recycling and recovery, and then reducing the amount of waste deposited in landfills. The plan foresaw waste-to-energy solutions.
- The third NWMP (2014-20) was extended by the government of Estonia until the end of 2022, including three strategic objectives. First, it established the goal of increasing waste recycling and reuse. Second, it pursued the reduction of environmental risks from waste, including via improvements in monitoring and enforcement. Priority areas of the second objective include completing closure work for 17 remaining landfills and reducing illegal waste disposal. And third, it promoted waste prevention and reduction, as well as the reduction of hazards of waste and GHG emissions from waste disposal.

Source: World Bank (2021[16]), *Baseline Review of Estonian Municipal Solid Waste Management System*, https://envir.ee/ringmajandus/jaatmed/jaatmevaldkonna-tervikanaluus; State Gazette (1993[15]), *Local Government Organisation Act*, https://www.riigiteataja.ee/en/eli/ee/509012014003/consolide/current.

Towards a circular economy in Tallinn, Estonia

Tallinn is in the process of defining its vision for the circular economy. The city acknowledges the key role of the circular economy within the "green transformation" pillar of city strategy Tallinn 2035,[1] which lays the foundation for the future vision of the city to become "green and global". Moreover, the *Tallinn Sustainable Energy and Climate Action Plan 2030* recognises the key role of the circular economy in achieving climate goals, by: fostering reusable materials (especially in the built environment); producing energy from biowaste and wastewater; and transforming waste into heat and electricity (City of Tallinn, 2021[17]).

The first step demonstrating the city's commitment towards a circular economy was the transformation of the Waste Management Department into a Circular Economy Department (*Ringmajanduse osakond*) in 2021. The department is in charge of the waste management and circular economy policy of the municipality, as part of the Tallinn Strategic Management Office. Its main responsibilities include: i) leading the design of the city's future circular economy strategy, as well as awareness-raising initiatives; ii) setting up public procurement

processes for waste management and transport (covering paper and cardboard, biowaste, bulky waste and mixed municipal waste); iii) verifying the performance of contracts and the quality of work carried out; iv) formulating the budget for the operational costs of waste management; and v) designing and updating the waste management plan in alignment with the NWMP. While the department's main focus is still on waste management, it is increasingly promoting reuse and repair as part of the circular economy vision (City of Tallinn, 2022[18]).

The Tallinn Waste Management Plan 2022-2026, led by the Circular Economy Department, promotes the shift from traditional waste collection to reuse and repair, supports sustainable reuse solutions and promotes waste reduction campaigns. As part of the plan, Tallinn will create by the end of 2026 a network of Reuse and Repair Centres (*ringmajanduskeskus*). In 2020, the municipality opened dedicated spaces for reuse and repair within waste collection centres in Pääsküla and Paljassaare (Box 2.2).

Box 2.2. Waste management in Tallinn, Estonia

The Tallinn Waste Management Plan 2022-2026 is based on the NWMP and supported by local regulations. The main orientations for the development of the plan are: i) promoting waste prevention; ii) promoting and increasing separate collection and recycling of waste; iii) improving waste management and monitoring; iv) supporting the implementation of circular economy principles; v) raising awareness. In addition, the plan sets out a number of initiatives to achieve these objectives, together with detailed implementation procedures, including costs per activity, possible sources of funding and the monitoring process. The main change foreseen in the plan is to make separate collection of biowaste mandatory on all properties in 2023.

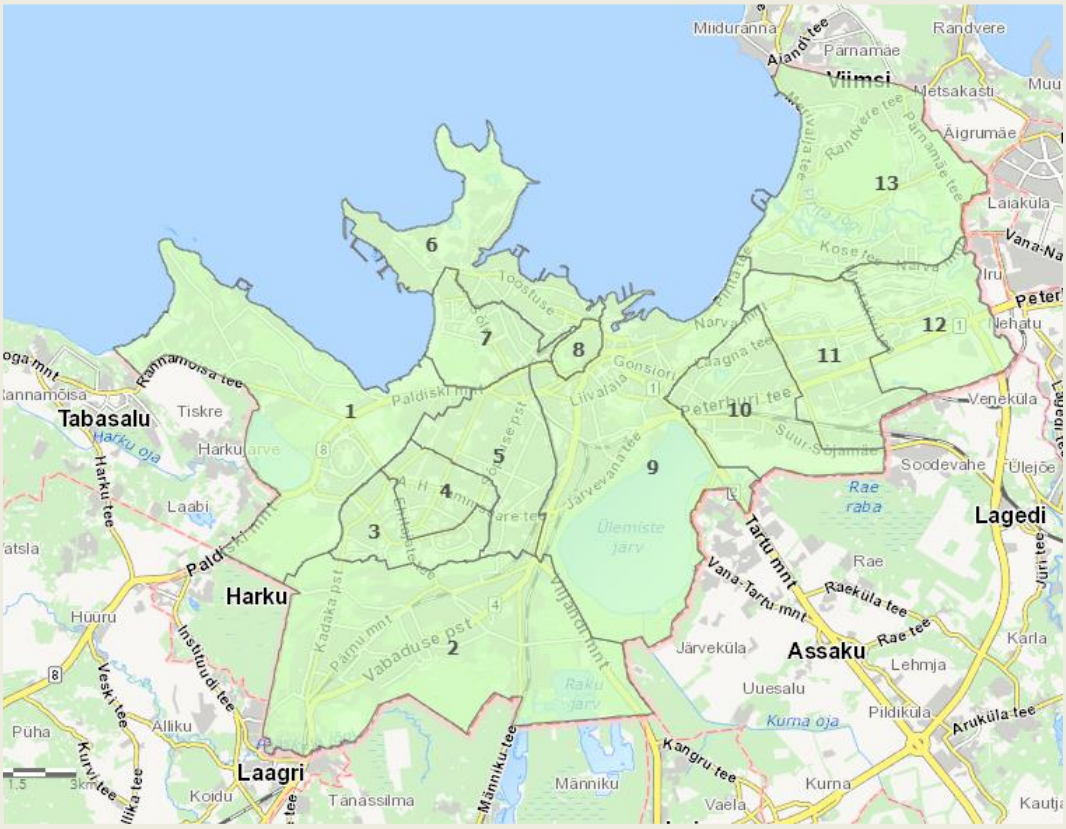
The city of Tallinn is divided into 13 administrative waste management areas (Figure 2.2) whereby 2 areas are served by a municipal-centred model and 11 by a decentralised one. In accordance with the amendment of the Waste Act, municipal-centred models will last until the end of their contracts (2023 in the case of Tallinn) and will be replaced by decentralised ones, selected through a concession procedure for 5 years.

The Circular Economy Department of the Tallinn Strategic Management Office is responsible for setting up public procurement processes for waste management and transport, which covers paper and cardboard, biowaste, bulky waste and mixed municipal waste. The frequency of collection can vary considerably depending on the administrative area: the minimum collection frequency for single-family houses is once a month but, for businesses, it can range up to six times a week for multi-storey buildings (World Bank, 2021[16]).

The Circular Economy Department handles the solid waste stations, hazardous municipal waste collection sites, package waste collection sites (in co-operation with three Producer Responsibility Organisations or PROs) and the future Reuse and Repair Centres that will be operational in 2026. There are also several collection points for clean textiles and clothing. In addition, separate collections of packaging waste, electrical and electronic waste, tires, batteries and accumulators are implemented through producer responsibility schemes and organised by the respective PROs. The collection of packaging waste is regulated by the Packaging Act (State Gazette, 2004[19]) and is the responsibility of packaging PROs, which agree on the location of collection points with municipalities. In 2022, there were about 400 collection points in Tallinn and the actual number needs to be increased to 500, according to the Packaging Act. However, despite regulations requiring a packaging waste collection point within 500 metres of every household, the amount of waste collected is low. This could be due to a number of factors, including: a lack of economic incentives for citizens, the fact that collection points sometimes remain full for long periods, the high collection costs for packaging PROs or the limited capacity of households to sort packaging waste. Glass,

plastic and metal packaging of soft drinks and light and strong alcoholic beverages are covered by a deposit system organised by a PRO (*Eesti Pandipakend OÜ*).

Figure 2.2. Waste management areas in Tallinn



Source: Municipality of Tallinn (2022[20]), Organized waste transport, https://www.tallinn.ee/est/keskkond/Korraldatud-jaatmevedu

The main source of financing for the door-to-door collection of household waste is provided by the citizens, who pay directly to the waste management company. Exceptionally, the Tallinn Waste Centre (*Tallinna Jäätmekeskus*) collects the fees directly from the customers and pays the contracted waste management company. Fees are established during the tender process through market competition and vary depending on the type of waste. In Tallinn, the fee per lift of an 800-litre container is approximately EUR 5.50 including VAT. However, to incentivise separation at source, the fee for separately collected waste fractions included in the municipal waste management system is significantly lower than the fee for mixed waste, while there is no additional fee for paper and cardboard collection. In Tallinn, the biowaste collection fee is 50-75% lower than the mixed waste fee. The fee for bulky waste for door-to-door collection is around 16 EUR/m^3 and 10 EUR/m^3 in waste stations. Citizens can bring construction and demolition (C&D) waste to waste stations. Reusable materials like plastic, wood, cardboard, metal, different packages and a certain amount of hazardous waste are free of charge.

Source: City of Tallinn (2022[20]), *Organized Waste Transport*, https://www.tallinn.ee/est/keskkond/Korraldatud-jaatmevedu;
State Gazette (2004[19]), *Packaging Act*, https://www.riigiteataja.ee/en/eli/ee/513052021001/consolide/current; World Bank (2021[16]), *Baseline Review of Estonian Municipal Solid Waste Management System*, https://envir.ee/ringmajandus/jaatmed/jaatmevaldkonna-tervikanaluus.

Regarding financial support, the city of Tallinn will provide funds (EUR 0.5 million) for the creation of future Creative and Circular Economy Centres (*loome- ja ringmajandus keskus*) by 2023, led by the Tallinn Creative Incubator (*Tallinna Loomeinkubaator*) (City of Tallinn, 2021[21]). This first centre, which should be operational by the end of 2024, will support new and existing companies in circular product design and advice on how to advance towards the circular economy. It is embedded in Tallinn's city action plan of the European Green Capital 2023 programme (City of Tallinn, 2021[22]; 2021[23]). The city intends to leverage the award as European Green Capital for 2023 to transition from a linear to a circular economy. Within the framework of the green capital, some of the scheduled events and projects aim to raise awareness and build capacities in areas related to the circular economy such as waste prevention and reuse. For example, the event Trash - Let's Change the Attitude, Trash vs. Raw Material, organised in March 2023, showcased options for reducing waste generation and extending the lifespan of products, as well as waste pursuing collection by type, and raising awareness on why it is necessary (Green Tallinn, 2023[24]). Before Tallinn, various European Green Capitals have taken action towards sustainable waste management (Box 2.3).

Box 2.3. Sustainable waste management practices in selected European Green Capital cities

The European Green Capital Award is an annual prize established and administered by the European Commission (EC) to recognise cities that best protect the environment and the quality of life of their citizens. Each year, the winning city is a model of green action and shares its practices with other cities. Some of the cities that have received the award since its launch in 2010 have made significant progress towards sustainable waste management. Some examples are as follows:

- **Nantes, France**: The city was designated European Green Capital in 2013 and adopted its circular economy roadmap in 2018. It has improved the performance of waste management with the Tri'sac system, which consists of two different coloured bags that are placed in the same container. At the treatment plant, a dedicated separation line equipped with optical sensors separates the yellow bags (recyclable) from the blue bags (residual waste). The sealed packaging is then sent to a sorting centre for recycling.
- **Ljubljana, Slovenia**: In 2014, Ljubljana became the first capital city in the EU to commit to a zero waste target and was awarded European Green Capital in 2016, largely due to its performance in waste management. The city has improved the separate collection of organic waste and reduced the amount of waste sent to landfill by 95%.
- **Oslo, Norway**: The city of Oslo was awarded the title of European Green Capital in 2019. This title is the result of Oslo's long-term efforts to achieve ambitious goals for sustainable urban development and the circular use of resources. Starting in 2010, the FutureBuilt programme piloted 54 building projects for climate-neutral buildings and urban areas based on the recycling and reuse of existing building stock. The initiative resulted from a collaboration between the municipal authorities of Oslo, the Ministry of Local Government and Modernisation, the Norwegian State Housing Bank and a wide range of stakeholders. As a follow-up, the strategy for Oslo European Green Capital 2019 called on businesses and private actors to implement circular practices in the building sector towards emission-free construction sites.
- **Lisbon, Portugal**: The city was granted the European Green Capital award in 2020, setting off the launch of the *Lisbon Commitment - Climate Action 2030* charter. The charter includes targets on waste and the circular economy for energy efficiency, endorsed by more than 200 organisations. The municipality brought together a broad network of stakeholders to develop an application/information and communication technology (ICT) that can identify food sources and food waste in the city and help improve waste prevention and source separation of biowaste. Lisbon also provides free compost bins to households and bans single-use plastics at public events.

- **Lahti, Finland**: European Green Capital in 2021, the city now uses one-third of household waste to produce recycled materials and the other two-thirds to produce energy. The city-owned company, Lahti Energy, uses solid recovered fuel, mainly from plastic, cardboard, wood and paper products unsuitable for recycling, to supply all the city's electricity and heat needs. Ninety-five percent of Lahti Energy's district heating is produced with renewable or recycled fuels, and 90% of its electricity is emission-free. Lahti aims to become a zero-waste city with a fully circular economy by 2050.

Source: Green Lahti (2021[25]), "Lahti is full of energy expertise", https://greenlahti.fi/en/lahti-is-full-of-energy-expertise; Circular City Funding Guide (2020[26]), *Lisbon: The First EU Green Capital in Southern Europe*, www.circularcityfundingguide.eu/case-studies/lisbon-the-first-eu-green-capital-in-southern-europe/; Nantes Metropole (2019[27]), *Nantes European Green Capital 5 Years Report*, https://circabc.europa.eu/ui/group/c6e126de-5b8c-4cd7-8d36-a1978a2a63de/library/1c87af1c-a25e-419e-a418-41c49e27d9ad/details?download=true; City of Ljubljana (2023[28]), *Circular Economy Examples in the City of Ljubljana*, www.ljubljana.si/en/ljubljana-for-you/environmental-protection/towards-circular-economy/examples-of-circular-economy/; FutureBuilt (2019[29]), *What is FutureBuilt*, www.futurebuilt.no/English.

Existing national and local circular economy-related initiatives in Tallinn and Estonia

The circular economy aims to: i) design out waste and pollution in a way that they can be repaired, reused and recycled, as well as generate the least amount of waste (including air pollution); ii) keep products and materials in use, through business models based on sharing, reselling or by doing maintenance, repair and refurbishment activities; and iii) transforming waste into resources, going from extraction to regeneration (OECD, 2020[30]; Ellen MacArthur Foundation, 2018[31]). The section below provides an overview of the main initiatives already in place in the city of Tallinn and Estonia, based on the information obtained on the OECD mission to Tallinn (16-19 November 2021), desk research and the responses to the OECD Survey on the Circular Economy in Cities and Regions (OECD, 2021[32]). Each of the actions has been classified into ten different categories[2] and three main phases of the circular economy: i) preventing waste generation and designing out pollution; ii) keeping resources in use in the economy; iii) transforming waste into resources (Table 2.2). Activities are related mostly to the built environment, food, tourism and events and textile.

Preventing waste generation and designing out pollution

Tallinn has put in place several initiatives to reduce waste generation. They consist of applying regulatory tools, developing capacity-building and awareness-raising initiatives, as well as implementing ad hoc projects to avoid food and textile waste. Details are provided below.

Through a **regulation** set out in 2019, the city banned the use of single-use plastic plates and utensils at public events (ERR, 2019[33]). From June 2023, only reusable dishes (plates, cups) and cutlery are allowed in public events in Tallinn with less than 30 000 visitors per day. At the national level, from January 2024 only reusable dishes and cutlery will be allowed at all public events, regardless of the number of visitors. Organisers of public events in Tallinn are obliged to ensure that at least mixed municipal waste, biodegradable waste and recyclable packaging are sorted and, if the event generates other types of waste (e.g. paper cardboard and returnable bottles), these should also be collected separately. With this restriction, Tallinn aims to reduce the amount of plastic waste produced, increase waste awareness and promote the use of reusable tableware. In terms of public procurement, Tallinn is participating in the Interreg 2021 project "StratKIT - Innovative Strategies for Public Procurement: A tool for sustainable procurement in the Baltic Sea Region", which aims to promote the use of sustainable catering services.

Table 2.2. Existing national and local circular economy-related initiatives in Estonia

Phase	Category	Action	Leading institution	Sector
Preventing waste generation and designing out pollution	Regulation	Ban of single-use plastic plates, cups and utensils at public events (2019).	City of Tallinn	Not sector specific
		Ban of single-use dishes (cups, plates) and utensils at public events. Only reusable dishes and cutlery are allowed at public events with less than 30 000 visitors/day in Tallinn (starting 1 June 2023).	City of Tallinn	Not sector specific
		Ban of single-use dishes (cups, plates) and utensils at public events. Only reusable dishes and cutlery are allowed at public events in Estonia (starting 1 January 2024).	Ministry of the Environment	Not sector specific
		StratKIT - Innovative Strategies for Public Catering: a tool for sustainable procurement in the Baltic Sea Region.	City of Tallinn	Not sector specific
	Capacity building	Capacity building for companies and start-ups to move towards the circular economy.	Tallinn Creative Incubator	Not sector specific
		Training course: “Circular economy training for companies - How to take the first step”.	Estonian Environmental Management Association	Not sector specific
	Awareness raising	Annual Waste Reduction Week, ongoing since 2016.	Ministry of the Environment City of Tallinn	Not sector specific
		Let's Cook Together! campaign.	Schools in Tallinn	Food
		Respect Food Completely! campaign, with a list of recommendations and tips to contribute to the prevention of food waste.	Ministry of the Environment	Food
		"Always respect food!" seminar on food waste and ways to save and share food.	Ministry of the Environment	Food
	Guidelines	Guide on prevention and reduction of food waste and food loss in schools.	Stockholm Environment Institute (SEI) Tallinn	Food
		Guidelines and recommendations to organise events in a sustainable way.	Visit Tallinn	Tourism
	Labels	Green Key eco-label.	Estonian Tourist Board Tallinn Centre of Stockholm Environment Institute	Tourism
	Ad hoc projects	Horizon 2020 project "Renewing the school food and catering paradigm to improve public health and food systems."	City of Tallinn	Food
		Fashion for Change project to provide support to fashion companies to integrate the principles of the circular economy.	Estonian Academy of Arts	Textile

Phase	Category	Action	Leading institution	Sector
Keeping resources in use in the economy	Reuse facilities and schemes	Reuse Centres for the promotion of reuse.	*MTÜ Uuskasutuskeskus*	Not sector specific
		Deposit reuse system (*Panditops*) for event organisers and catering companies.	*Eesti Pandipakend*	Not sector specific
		Deposit reuse system for event organisers and restaurant takeaway food (*Ringo).*	*Ringo Eco OÜ*	Not sector specific
	Capacity building	Capacity-building project "Old house in a sustainable way".	City of Tallinn	Built environment
		Training courses and communicating information on the construction sector.	SRIK - Information Centre for Sustainable Renovation	Built environment
	Financial support	Facade Makeover programme of grants for individuals and apartment associations aiming at improving apartment buildings' energy efficiency.	City of Tallinn	Built environment
		Co-operate with the Estonian food bank Toidupank, whose volunteers collect unsold food from shops and distribute it free of charge to families in need.	Toidupank City of Tallinn	Food
	Awareness-raising data and information	An interactive guide to food donation.	Ministry of the Environment	Food
		E-construction platform to increase the productivity of the built environment sector.	Ministry of Economic Affairs and Communications	Built environment
	Pilot testing and experimentation	Reusable food packaging containers for restaurants.	Bringpack recycling company	Food
		Wolfscape: transforms an underused area into a new liveable and climate-neutral district.	TalTech, Rohetiiger, Siemens, Hendrikson & Ko and *Arhitektuuribüroo PLUSS*	Built environment
Transforming waste into resources	Research activities	Study on recycling of building demolition waste.	Tallinn University of Technology Ministry of Economic Affairs and Communications Ministry of Finance Ministry of the Environment Estonian Association of Circular Economic Enterprises *AS Eesti Keskkonnateenused* (Waste management company)	Built environment

Source: Own elaboration based on the OECD mission to Tallinn (16-19 November 2021), desk research and the responses to the OECD Survey on the Circular Economy in Cities and Regions.

Capacity-building initiatives focus on waste prevention and circular business models. The Tallinn Creative Incubator offers on its website seven educational videos on how companies and start-ups can move towards a circular economy. Specifically, the videos provide guidance on designing circular business models (e.g. product as a service), managing product manufacturing (e.g. material selection, managing production waste), circular design (e.g. promoting reuse, increasing durability) and opportunities in specific sectors (e.g. food) (Tallinn Business Incubators, 2022[34]). In addition, the Estonian Environmental Management Association organised a circular economy training course for companies in Tallinn in 2019 ("Circular economy training for companies: How to take the first step"). The training was mainly aimed at manufacturing companies wanting to apply circular economy principles in the design and production of their products. After the course, ten selected companies participated in an assessment of their innovation and design capabilities in relation to the circular economy, resulting in a tailor-made action plan (Estonian Environmental Management Association, 2019[35]).

Awareness-raising campaigns aim to engage residents, young people and other stakeholders in reducing waste generation by providing information on practices such as reusing, sharing and recycling. For example, Waste Reduction Week, organised by the Tallinn Strategic Management Office with the support of the Ministry of the Environment since 2016, focused on circular communities in 2021, calling for the best use of clothing collection points and reusable packaging (City of Tallinn, 2021[36]). Many schools in Tallinn in 2018-19 adhered to the national campaign Let's Cook Together!. Students were invited to prepare meals with the help of school chefs, using leftover food from the previous meal. The Ministry of the Environment also promoted the Respect Food Completely! campaign, which shares a detailed list of recommendations to avoid food waste (e.g. from information on preserving and freezing food, ideas on how to make use of leftovers and guidance on how to choose the right amount of food) (Estonian Ministry of the Environment, 2021[37]). Moreover, on the occasion of the United Nations International Day of Awareness of Food Loss and Waste in September 2022, the Ministry of the Environment organised a seminar ("Always respect food!") on food waste and ways to save and share food. The seminar presented practical solutions for food recovery and redistribution and highlighted the barriers that hinder food sharing (Estonian Ministry of the Environment, 2022[11]).

Guidelines promote sustainable behaviour among producers and consumers. For example, the Stockholm Environment Institute Tallinn Center launched a guide to reducing food waste in school canteens in 2020 (SEI, 2018[38]). Visit Tallinn, Tallinn's official tourism portal, provides guidelines and recommendations on minimum sustainable requirements for event organisers, including reducing and sorting waste, using energy-saving light bulbs, reducing consumption (e.g. water, paper), producing new materials from secondary materials, reducing food waste, purchasing services from companies that apply sustainable principles and using tap water instead of bottled water (Visit Tallinn, 2021[39]; 2021[40]) (Annex Table 2.A.1). The Tallinn Strategic Management Office prepared similar guidance for sustainable events that was launched in 2023.

Labels are incentives to promote green, circular and sustainable practices. For example, Estonia joined in 2021 the Green Key, an eco-label awarded in 56 countries (Visit Estonia, 2022[41]). The Estonian Business and Innovation Agency co-ordinates the Green Key award process in co-operation with Stockholm Environment Institute Tallinn. In addition to hotels, these labels measure and evaluate the sustainable and environmental commitments of other tourist attractions such as museums, visitor centres, parks, zoos, etc. Some of the requirements of the label are related to the circular economy, including: selecting shower equipment and dishwashers based on water-saving principles, avoiding over-packaging, banning disposable cutlery and purchasing recycled office paper.

Another way to promote waste prevention is through **ad hoc projects**. In the fight against food waste, Tallinn is involved in a four-year Horizon 2020 project entitled "Renewing the school food and catering paradigm to improve public health and food systems", officially launched at the end of 2022. The main objective of this initiative is to create a sustainable food culture in schools that promote the prevention of

food waste. Additionally, the Fashion for Change project, led by the Estonian Academy of Arts, aims to prevent waste generation in the fashion industry and provide support (e.g. mentoring programmes, international networks) to textile companies to integrate circular economy principles into their business models.

Keeping resources in use in the economy

In Tallinn, measures to maximise resource efficiency and keep them in use in the economy consist, for example, of extending the life of buildings or facilitating reuse by offering second-hand products. They are implemented through, financial support, awareness raising and capacity-building activities and pilot testing and experimentation.

The promotion of the extension of the use of the products is fostered through **reuse facilities and dedicated schemes**. The Reuse Centres (*MTÜ Uuskasutuskeskus*) facilitate reuse by offering second-hand products that can compete with new products. The Reuse Centre, whose business model is based solely on the sale of donated products, has 16 shops throughout Estonia, 8 of which are located in Tallinn. Products accepted for reuse include clean and usable clothing in good condition, furniture, crockery, toys, books, shoes, accessories, hobby equipment, music/movies, houseplants and other equipment. One of the main obstacles the Reuse Centres face is the difficulty in managing the clothes they receive, as in many cases their poor condition (e.g. dirt, holes) prevents them from being reused (MTÜ Uuskasutuskeskus, 2022[42]). In 2019, *Eesti Pandipakend* launched a deposit reuse system (*Panditops*) for event organisers and catering companies, aiming to minimise the use of disposable cups, dishes (plates, bowls) and cutlery (forks, knives and spoons) at all types of events held in Estonia. The deposit cup works on the same principle as the deposit return system for beverage containers (Eesti Pandipakend, 2022[43]). In 2021, three municipal buildings and eight large office buildings located in the city centre joined the Ringo system. Owners of commercial buildings who have joined the scheme will place a large general collection box in their building and small return boxes in office kitchens. Ringo Eco provides the collection, washing and deposit handling for reusable packages suitable for events, takeaway food and commercial use (Ringo Eco, 2022[44]).

Training courses on life cycle management and building maintenance developed by academic institutions in Tallinn provide designers, professionals and businesses with information and tools to maximise resource efficiency. For example, courses cover the reuse of building materials, renovation solutions as well as durable assembly and adaptive construction (TalTech, 2021[45]; 2021[46]). In 2014, Tallinn launched a capacity-building project in the building sector Old House in a Sustainable Way, addressing the following topics: i) installation of homemade solar panels; ii) renovation of old windows; iii) renovation of old floors; iv) maintenance of roofs; and v) ventilation systems in old houses. The main objective of the initiative was to raise awareness and involve residents in the preservation of buildings through restoration (Tallinn City Council, 2013[47]). Other actions include the collection and dissemination of information and the organisation of training courses in the construction sector, such as the replacement of old windows, the renovation of facades and the restoration of furniture (SRIK, 2022[48]). The action was led by the Information Centre for Sustainable Renovation (SRIK), which operates under the umbrella of the Estonian Heritage Society and aims to contribute to the preservation of buildings valuable for their architecture, history and environment.

The city offers **financial support** to individuals and housing associations to improve the energy efficiency of apartments by renovating buildings and installing environmentally friendly equipment (e.g. installation of photovoltaic panels). The Facade Makeover programme, managed by Tallinn City Council Property Department, has provided grants to more than 200 apartments since 2010. The maximum subsidy rate is 10% of the construction costs, with a limit of EUR 20 000 per apartment building. The municipal budget for this initiative amounted to EUR 400 000 in 2022 (City of Tallinn, 2022[49]). In addition, the city supports and co-operates with the Estonian food bank Toidupank, whose volunteers collect unsold food from shops and

distribute it free of charge to families in need. The city signed a memorandum of understanding (MoU), committing to provide logistics (storage, distribution and sorting) and financial support (EUR 75 000 in 2019 and EUR 130 000 in 2020). In 2020, Toidupank provided weekly food aid to more than 3 000 residents.

Awareness-raising initiatives, data and information also aim to promote appropriate use of goods and extend their life cycle, through guides and online platforms to combat food waste and introduce circular principles in the built environment sector. For example, the Ministry of the Environment has published an interactive guide on food donation, which provides data on the amount of food waste generated annually in Estonia and its environmental impact, includes a question and answer section to clarify doubts about the food donation process and shares a map with all Estonian partners to collaborate on food donation (Estonian Ministry of the Environment, 2022[50]). The e-construction platform, launched in 2017 by the Ministry of Economic Affairs and Communications, facilitates the digital and secure exchange of information and data between the parties involved in the entire lifecycle of buildings (from design to demolition) (Estonian Ministry of Economic Affairs and Communication, 2020[51]). Information on the materials and technologies used in the building helps to plan future replacements or repairs. In addition, e-construction includes digital twins that allow a replica of the buildings to be visualised in three dimensions (3D). The ministry's next steps are to make progress in calculating the carbon footprint of buildings. However, the main problems of the platform are related to the lack of harmonisation of data and comparability with other EU countries.

Pilot testing and experimentation are important tools in Tallinn to keep resources in use. For example, food packaging deposit system Bringpack kicked off a pilot project in the Tallinn Baltic Station market, where customers were able to buy food at selected restaurants in a reusable container and then return it to a new collection point. However, the project did not go beyond the trial phase (Postimees, 2022[52]; Estonian World, 2021[53]). Launched in 2017, the Hundipea project aims to transform the former industrial and harbour area of Noblessner, in the northern district of Tallinn, into the country's first climate-neutral neighbourhood. For this purpose, it will transform 480 000 m^2 of land into an environmentally friendly area with sustainable housing accommodating nearly 16 000 residents. The district's building blocks include mobility networks to minimise car use, smart buildings, a circular waste management system and greening of landscapes and buildings. The project will act as a testbed for new methods and strategies that could be applied to other areas of Tallinn (Hundipea, 2022[54]).

Transforming waste into resources, putting them back in the system

In 2021, approximately 50-55% of waste was separately collected and designated for recycling in the city, while, in 2017, the recycling rate was 47%. However, due to the small local market, most of the collected recyclables are exported abroad for processing. For instance, scrap metals are nearly entirely exported because there are no metallurgy processing capabilities, with the exception of a recycling facility for lead-acid batteries in Sillamäe (Estonia). Paper and cardboard are mostly exported with limited capacities available for reprocessing paper to insulation materials, some cardboard products and packages. Finally, in terms of biowaste, used cooking oil is mostly collected for export to produce biofuel and the main treatment method for all other biowaste has been composting (World Bank, 2021[16]).

The final phase of closing the loop in Tallinn takes place through ***research activities*** on how to put the resources back into the system. For instance, in 2022, TalTech, the Tallinn University of Technology, led some research on the application of circular economy principles in construction and the Ministry of Economic Affairs and Communications, in co-operation with the Ministry of Finance, the Ministry of the Environment, the Estonian Circular Economy Industries Association (*ECEIA*), commissioned a study from TalTech on recycling building demolition waste. The research identified opportunities for selective dismantling as well as regulatory and economic barriers to the reuse of materials (Ehitus, 2022[55]). Various international examples are available on this issue. For example, the city of Mikkel, Finland, is applying circular material management methods to carry out the demolition of a healthcare centre and a hospital.

After a selective demolition procedure, the municipality will digitally track the recovered materials through material passports, which will be eventually put to new use in a building materials market (City Loops, 2021[56]).

Taking stock of existing initiatives: Connecting people, policies and places

As demonstrated above, while Tallinn is making a progess towards minimising wasted resources, keeping resources in use and transforming waste into resources, it lacks a systematic approach that integrates circular economy principles into all of the city's strategic priorities. Further barriers include limited funding and financial incentives to promote the circular economy and low awareness of the opportunities of the circular economy among key stakeholders (see Chapter 3).

Such a systems approach to transition to a circular economy requires connecting people, places and policies. This "3Ps" framework implies a shift towards sustainable production and consumption pathways as well as new business and governance models (people). It also requires a holistic and systems approach that cuts across sectoral policies and a functional approach going beyond the administrative boundaries of cities and linking them to their hinterland and rural areas to close, narrow and slow loops at the right scale (places) (OECD, 2020[30]). Figure 2.3 provides an overview of a tentative application of the three dimensions to the case of Tallinn in order to support a forward-looking and systems approach to the circular economy. The 3Ps framework was first developed in 2016, based on a multilevel governance analysis and survey across 48 cities on water governance in cities (OECD, 2016[57]).

- **People**: Many stakeholders in Tallinn showed limited awareness of their possible role within the circular economy transition, which is an aspect that the city could develop through the future circular economy strategy. The circular economy is a shared responsibility across levels of government, stakeholders and firms. As such, it is key to identify the actors that can play a role in the transition and allow the needed cultural shift towards different production and consumption pathways, and new business and governance models. In the case of Tallinn, Figure 2.4 provides a first mapping of stakeholder groups that could be engaged in circular economy-related activities.
- **Policies**: In the case of Tallinn, the built environment, food, tourism and events sectors hold potential but are not yet linked to the circular economy in their strategic documents. As such their potential in reaching the carbon neutrality goal of the city, while boosting innovation and jobs, has still to be exploited. The circular economy requires a holistic and systems approach that cuts across sectoral policies. As somebody's waste can be someone else's resource, the circular economy provides the opportunity to foster complementarities across policies. The variety of actors, sectors and goals makes the circular economy systemic by nature. It implies a wide policy focus through integration across often siloed policies, from environmental, regional development, agricultural to industrial.
- **Places**: Although Tallinn has experimented with circular initiatives at the neighbourhood level, there has been little interaction with the surrounding areas. Cities and regions are not isolated ecosystems but spaces for inflows and outflows of materials, resources and products, in connection with surrounding areas and beyond. Indeed, circular economy initiatives take place at various scales, ranging from the micro level (e.g. neighbourhood) to the metropolitan, regional and national levels, where, in some cases, linkages across urban and rural areas are particularly relevant (OECD, 2020[30]). Therefore, adopting a functional approach going beyond the administrative boundaries of cities is important for resource management and economic development.

Figure 2.3. The 3Ps framework applied to the case of Tallinn, Estonia

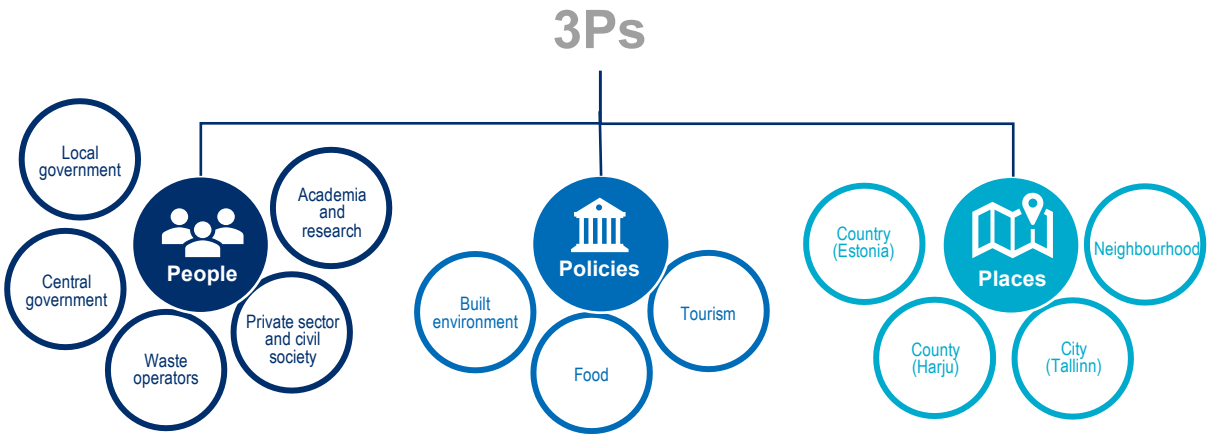
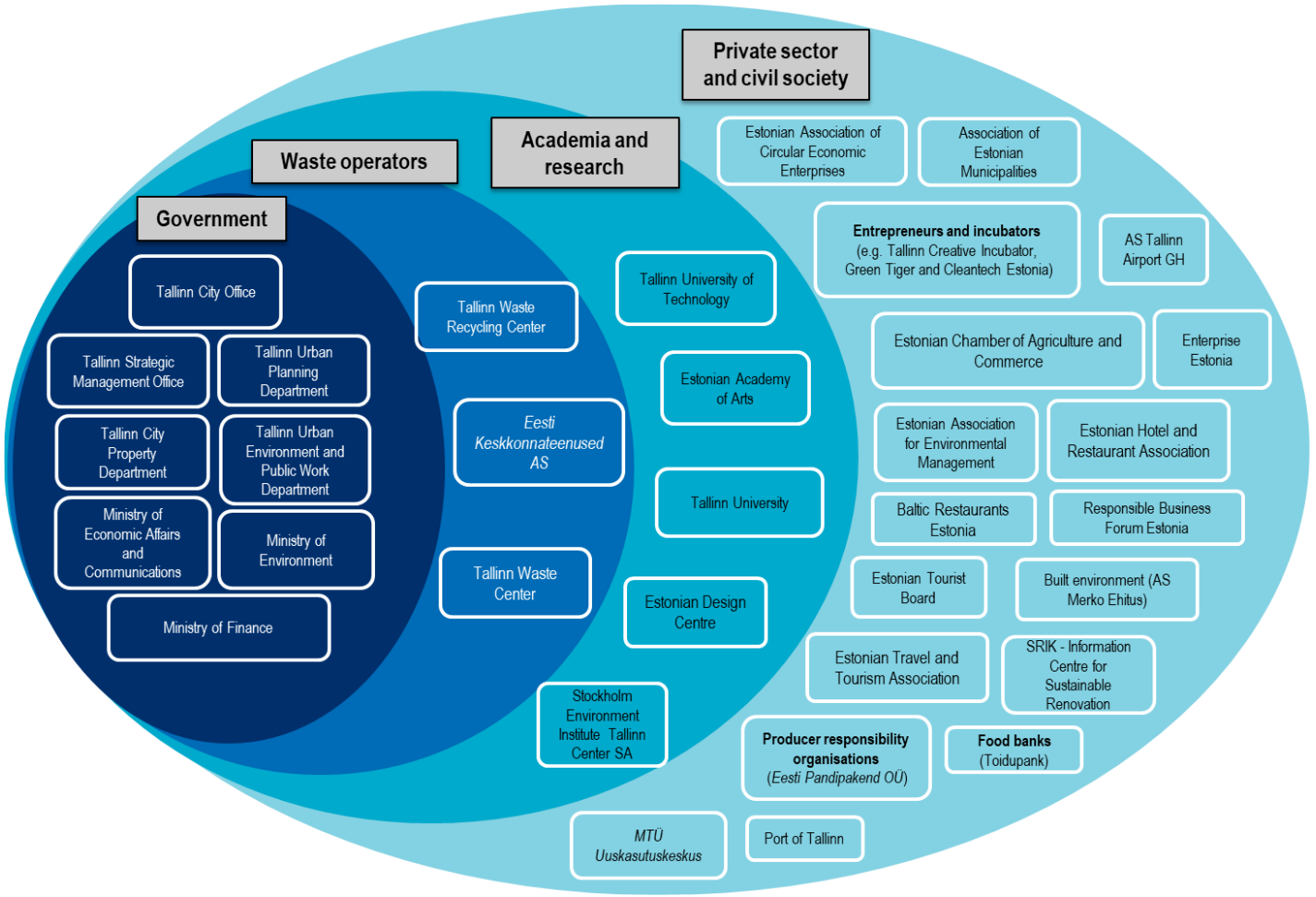


Figure 2.4. Stakeholders' map in Tallinn, Estonia



Note: This stakeholder's map is based on the OECD fact-finding mission to Tallinn held on 16-19 November 2021.

Annex 2.A. City guidelines for environmentally friendly events in Tallinn, Estonia

Annex Table 2.A.1. Guidelines for environmentally friendly events in Tallinn, Estonia

Category	Minimum requirements	Recommendations
Materials	• Visitor badge holders must be reusable and will be collected and reused at the next event. • Use recycled paper. • Decorations must be reusable. • Replace paper materials (invitations, publications, etc.) with electronic alternatives. • Avoid over-packaging goods, gifts and other items.	• Distribute as few souvenirs and gifts as possible, prioritising green services and donations. For physical gifts, for example, give preference to local food and tastes or reusable items. • The design and selection of labels, education, training and other materials should be reusable. Organisers should make the return and collection of these items convenient and clear to the visitor. • When ordering materials and equipment, choose moderate quantities to ensure that surpluses are kept to a minimum. It is advisable to co-operate with other organisers of similar or simultaneous events when purchasing larger quantities of materials, equipment, etc., to optimise packaging and reduce the need for transport. • When using flowers and other plants, renting or the use of pot plants is preferred.
Food and water consumption	• The use of single-use plastic, mixing sticks, cocktail garnishes and single-use utensils and cutlery is not allowed. • The remaining food is guaranteed to be donated or taken away by organisers and customers, preferably in reusable containers. • Edible food must not be thrown away. • When choosing food and caterers, make sure that plant-based staples are offered. For catering, order at least one whole food dish and include at least a couple of caterers offering whole food dishes in the catering.	• Invite participants to bring their own reusable bottles and their own food. Provide a dishwashing facility at the event. • Make clean tap water available free of charge at events and place water points near food areas. • Avoid serving bottled water (and other bottled beverages) wherever possible and offer refillable bottles. • Fill the glasses according to the visitor's needs, do not fill them without the visitor's request. • Give preference to fair trade coffee, tea, sugar and local herbal infusions and honey. • Avoid serving food in small containers. • Give preference to caterers offering local and/or organic food.
Waste management	• Waste must be collected separately, with a minimum of separate collection of biowaste, packaging and mixed municipal waste. • If waste containers are ordered from a waste management company, they must be of the correct colour and marked with the appropriate waste type pictogram: biowaste; glass packaging; paper and cardboard; mixed municipal waste; and hazardous waste. • Category collection is supported by clear and comprehensible labelling of waste containers/frames in Estonian and, if necessary, in foreign languages. • Waste collected in bulk must be handed over to a waste manager holding the relevant environmental permit issued by the Environment Agency. The organiser of the public event must provide proof of the handover and the quantities of waste at the request of the local authority. • Places used for permanent events must provide organisers with facilities for separate collection and disposal of waste.	• Waste containers will be accompanied by instructions explaining how to separate waste. • At the waste collection points, volunteers supervise the separate collection of waste.

Category	Minimum requirements	Recommendations
Transport	• Always inform participants how to get to the event by public transport and where the parking areas are to avoid congestion at the event. Include a recommendation to come to the event by public transport, bicycle or on foot in all promotional material. • When choosing a venue, make sure it is easily accessible by public transport, bicycle and on foot.	• Run private buses/trains where possible. • Provide bike parking (with the possibility of locking the bike or with a manned guard) at the venue (or in its immediate vicinity). • Encourage organisers to sell tickets for certain events on a per-car basis: one ticket per car, regardless of the number of passengers. • Provide information to foreign visitors on how to offset the climate impact of air travel.
Energy and resource efficiency	• In the case of multi-day events outside opening hours, electricity use at the venue must be kept to a minimum. • If the location of the event allows it, a permanent power supply solution should be chosen instead of temporary generators. • The organiser must ensure that there is no loss of resources during and after the event.	• Give preference to electricity from renewable energy sources. When ordering special transport, give preference to vehicles with low CO_2 emissions. • Ensure that the equipment used at the event is as energy efficient as possible. Use the least amount of electricity-consuming equipment necessary to run the event. • Use fixtures and fittings at the event that minimise the possibility of wasting resources: hand-washing stations with pumps or timers, motion-activated lighting, refillable instead of disposable containers, etc. • When organising conferences, give preference to Green Key labelled or renewable energy venues.
Respect for the surrounding area and community	• After the event, the event site must remain in the same good condition as before the event. • Arrangements for transport/parking should be made to ensure minimal disruption to local life. • Damage to the landscape must be restored. • Owners of surrounding properties will be informed of the event and any traffic and other changes at least one week in advance. • Sound and light pollution associated with the event is kept to a minimum (e.g. where possible, lighting installations are preferred to fireworks; the event venue is not left fully lit, music playing all night, etc.). • The place of the event and its surroundings must be cleaned up within eight hours of the end of the event or by the deadline specified in the public event permit.	• Involve, where possible, the local community and people in the area of the venue in the organisation of the event, offering them participation as volunteers or discounted admission, shopping, etc. • Where possible, showcase the cultural heritage associated with or near the venue.
Communication	• Environmental rules must be communicated to visitors and made publicly available at least one week before the event. • Partners/traders must be informed of the environmental rules in writing at the time of the conclusion of the co-operation agreement or sufficiently in advance of the event to enable the trader/partner to fully comply with the environmental rules. • Environmental rules will also be explained on the spot during the event to both visitors and partners. • Environmental communication should be supported by public communication of the event as well as onsite infographics (reusable signs, signage, etc.). Using simple language and visuals and avoiding jargon.	• To explain the rules on environmental care and waste management, create simple and clear guidelines that reach the target groups (e.g. traders, participants in exhibitions, etc.) in good time. Production and setup teams, as well as traders/showgrounds and partners, need to be reminded of the greening rules on the spot immediately before and during the event. • Prepare possible responses to critical questions from the community, participants and the media (e.g. accusations of littering and dismissive attitudes towards extra efforts by the visitor).

Source: Visit Tallinn (2021[39]), "Recommendations for the company", https://www.visittallinn.ee/est/professionaal/praktiline-info/j%C3%A4tkusuutlik-turism/soovitused-ettev%C3%B5ttele.

References

Circular City Funding Guide (2020), *Lisbon: The First EU Green Capital in Southern Europe*, http://www.circularcityfundingguide.eu/case-studies/lisbon-the-first-eu-green-capital-in-southern-europe/. [26]

City Loops (2021), "Selective demolition of two buildings in Mikkeli", https://cityloops.eu/news?c=search&uid=BYpFwjwd. [56]

City of Ljubljana (2023), *Circular Economy Examples in the City of Ljubljana*, https://www.ljubljana.si/en/ljubljana-for-you/environmental-protection/towards-circular-economy/examples-of-circular-economy/. [28]

City of Tallinn (2022), *Circular Economy in Tallinn*, https://www.tallinn.ee/et/keskkond/ringmajandus-tallinnas. [18]

City of Tallinn (2022), *Facade Renovation Grant*, https://www.tallinn.ee/en/facade-renovation-grant. [49]

City of Tallinn (2022), *Organized Waste Transport*, https://www.tallinn.ee/et/keskkond/korraldatud-jaatmevedu. [20]

City of Tallinn (2021), *Climate-neutral Tallinn. Tallinn Sustainable Energy and Climate Action Plan 2030*, https://www.tallinn.ee/en/strateegia/climate-neutral-tallinn-tallinn-sustainable-energy-and-climate-action-plan-2030. [17]

City of Tallinn (2021), "Tallinn budget 2022 to endorse smart city projects and green transition", https://www.tallinn.ee/en/tallinn-budget-2022-endorse-smart-city-projects-and-green-transition. [22]

City of Tallinn (2021), "Tallinn Creative Incubator creates a new creative and circular economy center", https://www.tallinn.ee/et/uudis/tallinna-loomeinkubaator-loob-uut-loome-ja-ringmajanduskeskust. [23]

City of Tallinn (2021), "The center of the creative and circular economy will be in the city center", http://www.tallinn.ee/et/kesklinna-tuleb-loome-ja-ringmajanduse-keskus. [21]

City of Tallinn (2021), *Waste Reduction Week*, https://www.tallinn.ee/et/keskkond/jaatmetekke-vahendamise-nadal-ewwr#Nadal21. [36]

Eesti Pandipakend (2022), *Panditops*, https://panditops.ee/et (accessed on 9 May 2023). [43]

Ehitus (2022), *Study on the Reuse and Recycling of Demolition Waste from Apartment Buildings*, https://eehitus.ee/timeline-post/lammutusuuring/. [55]

EIC (2022), *Homepage*, Environmental Investment Centre, https://kik.ee/en. [8]

Ellen MacArthur Foundation (2018), *What is a Circular Economy?*, https://www.ellenmacarthurfoundation.org/circular-economy/concept (accessed on 10 December 2020). [31]

ERR (2019), "Tallinn to ban single-use plastic dishes, utensils at public events", Estonian Public Broadcasting, https://news.err.ee/922752/tallinn-to-ban-single-use-plastic-dishes-utensils-at-public-events. [33]

Estonia Ministry of the Environment (2021), *Project - Increasing the Capacity of the Circular Economy*, https://ringmajandus.envir.ee/et/projekt-ringmajanduse-voimekuse-tostmine. [13]

Estonian Environmental Management Association (2019), *Circular Economy Training for Companies in Tallinn*, https://ekja.ee/et/ringmajanduse-koolitus-tallinnas/. [35]

Estonian Ministry of Economic Affairs and Communication (2020), "Introducing a BIM-based permit process in Estonia", https://kirahub.org/wp-content/uploads/2020/02/10.30-EE-introducing-a-BIM-based-permits-process-in-Estonia-Jaan-Rick.pdf. [51]

Estonian Ministry of the Environment (2023), *Environmentally Friendly Public Procurement*, https://www.envir.ee/ringmajandus/ringmajandus/keskkonnahoidlikud-riigihanked. [7]

Estonian Ministry of the Environment (2023), *National Waste Plan 2022-2028*, https://www.envir.ee/j%C3%A4%C3%A4tmekavaksh. [10]

Estonian Ministry of the Environment (2023), *PACKGDEPO*, https://ringmajandus.envir.ee/en/packgdepo. [14]

Estonian Ministry of the Environment (2022), *Circular Economy*, https://ringmajandus.envir.ee/en. [3]

Estonian Ministry of the Environment (2022), *Circular Economy White Paper for Estonia*, https://ringmajandus.envir.ee/sites/default/files/2022-06/Ringmajandus_valge_raamat.pdf. [6]

Estonian Ministry of the Environment (2022), *Creating a Strategy and Action Plan for Circular Economy in Estonia*, https://ringmajandus.envir.ee/en/creating-strategy-and-action-plan-circular-economy-estonia. [5]

Estonian Ministry of the Environment (2022), *Estonia's Eighth National Communication*, https://unfccc.int/sites/default/files/resource/Estonia%208th%20National%20Communication.pdf. [9]

Estonian Ministry of the Environment (2022), *Food Donation*, https://www.toiduannetamine.ee/ (accessed on 21 February 2022). [50]

Estonian Ministry of the Environment (2022), *Food Waste and Prevention of Food Waste*, https://envir.ee/ringmajandus/jaatmed/toidujaatmed. [11]

Estonian Ministry of the Environment (2021), *Respect Food Completely!*, https://envir.ee/toiduj%C3%A4%C3%A4tmed. [37]

Estonian Ministry of the Environment (2019), "Developing a methodology for a circular economy strategy", https://ringmajandus.envir.ee/sites/default/files/Strateegia%20-%20fotod/2.2%20Ringmajanduse%20indikaatorid%20I%C3%B5pparuande%20kokkuv%C3%B5te%20050719.pdf. [4]

Estonian Ministry of the Environment (2015), *Estonian Environmental Strategy 2030*, https://envir.ee/en/media/2042/download. [12]

Estonian World (2021), "Reusable food packaging introduced in Estonia", https://estonianworld.com/technology/reusable-food-packaging-introduced-in-estonia/. [53]

FutureBuilt (2019), *What is FutureBuilt*, http://www.futurebuilt.no/English (accessed on 23 March 2022). [29]

Government of the Republic of Estonia (2021), *Estonia 2035*, https://valitsus.ee/en/estonia-2035-development-strategy/strategy/strategic-goals. [1]

Green Lahti (2021), "Lahti is full of energy expertise", https://greenlahti.fi/en/lahti-is-full-of-energy-expertise. [25]

Green Tallinn (2023), "Trash - Let's change the attitude, trash vs. raw material", https://greentallinn.eu/events/prugi-muudame-suhtumist-prugi-vs-tooraine-teemapaev-palmimaja-konverentsisaalis-ja-oppeklassis/. [24]

Hundipea (2022), *A Bright District Emerging*, https://hundipea.ee/en/ (accessed on 5 November 2022). [54]

MTÜ Uuskasutuskeskus (2022), *Homepage*, https://uuskasutus.ee/ (accessed on 12 March 2022). [42]

Nantes Metropole (2019), *Nantes European Green Capital 5 Years Report*, https://circabc.europa.eu/ui/group/c6e126de-5b8c-4cd7-8d36-a1978a2a63de/library/1c87af1c-a25e-419e-a418-41c49e27d9ad/details?download=true. [27]

OECD (2021), *OECD Survey on the Circular Economy in Cities and Regions*. [32]

OECD (2020), *The Circular Economy in Cities and Regions: Synthesis Report*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/10ac6ae4-en. [30]

OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/9789264251090-en. [57]

Postimees (2022), "The packaging recycling company Bringpack shuts down its system", https://startup.postimees.ee/7530458/pakendiringluse-firma-bringpack-paneb-oma-susteemi-kinni. [52]

Ringo Eco (2022), *Keeping Our Nature Clean*, https://ringo.eco/en/ (accessed on 20 March 2022). [44]

SEI (2018), "Campaign in schools: Let's cook together!", Stockholm Environment Institute, https://www.sei.org/featured/kokkamekoos/. [38]

SRIK (2022), *About Us*, Information Centre for Sustainable Renovation, https://www.renoveeri.net/about-us. [48]

State Gazette (2004), *Packaging Act*, https://www.riigiteataja.ee/en/eli/ee/513052021001/consolide/current. [19]

State Gazette (1993), *Local Government Organisation Act*, https://www.riigiteataja.ee/en/eli/ee/509012014003/consolide/current. [15]

Statistics Estonia (2022), *How is Our Country Doing?*, https://tamm.stat.ee/kategooriad/eesti-areng/tulemusvaldkonnad/keskkond/indikaatorid/208. [2]

Tallinn Business Incubators (2022), *Circular Economy*, https://inkubaator.tallinn.ee/ringmajandus/. [34]

Tallinn City Council (2013), *Tallinn Development Plan 2014–2020*, https://www.tallinn.ee/et/media/312605. [47]

TalTech (2021), “A new test facility supports research towards a circular economy”, Tallinn University of Technology, https://taltech.ee/en/news/new-test-facility-supports-research-towards-circular-economy. [45]

TalTech (2021), *Future CityHack 2021*, Tallinn University of Technology, https://taltech.ee/en/events/future-cityhack-2021. [46]

Visit Estonia (2022), *Open the Door with the Green Key*, http://www.visitestonia.com/en/why-estonia/open-the-door-with-the-green-key. [41]

Visit Tallinn (2021), *Organizing a Sustainable Event*, https://www.visittallinn.ee/est/professionaal/konverentsiturism/lisaks/j%C3%A4tkusuutlikud-%C3%BCritused#kuidas-ara-tunda-kestliku-turismi-pohimotteid-viljelev-ettevote. [39]

Visit Tallinn (2021), “Recommendations for the company”, https://www.visittallinn.ee/est/professionaal/praktiline-info/j%C3%A4tkusuutlik-turism/soovitused-ettev%C3%B5ttele. [40]

World Bank (2021), *Baseline Review of Estonian Municipal Solid Waste Management System*, World Bank, Washington, DC, https://envir.ee/ringmajandus/jaatmed/jaatmevaldkonna-tervikanaluus. [16]

Notes

[1] The strategy consists of 6 strategic goals and 13 areas of action. The strategic goals are the following: i) friendly urban space; ii) creative global city; iii) healthy mobility; iv) green transformation; v) kind community; and vi) home that includes the street. The areas of action are the following: business environment; education and youth work; environmental protection; municipal order; culture; mobility; urban landscape; urban planning; preservation and development of city property; social welfare; sports and physical activity; utility networks; health and healthcare.

[2] These categories include: i) ad hoc projects; ii) awareness raising; iii) capacity building; iv) financial support; v) guidelines; vi) labels; vii) pilot testing and experimentation; viii) regulation; ix) research activities; and x) reuse facilities and schemes.

3 Unlocking the potential of the circular transition in Tallinn

This chapter identifies the main challenges that Tallinn faces in the transition from a linear to a circular economy and suggests policy recommendations to overcome them. These recommendations specify how Tallinn can act as promoter, facilitator and enabler of the circular economy, building on the OECD Checklist for Action on the Circular Economy in Cities and Regions.

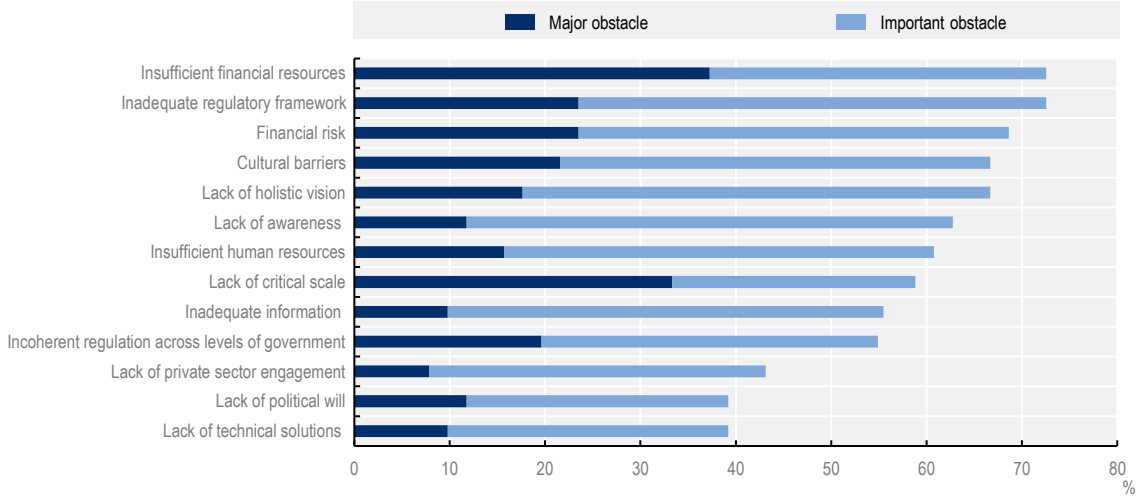
Main obstacles to the circular economy in cities and regions

Building on the OECD framework "Mind the Gaps, Bridge the Gaps" (Charbit and Michalun, 2009[1]) and its sector-specific application to the case of water governance (OECD, 2011[2]), the OECD synthesis report on the circular economy in cities and regions (2020[3]) highlighted five types of governance gaps that cities face when designing and implement a circular economy:

- **Funding gap**: The transition towards a circular economy implies investments and adequate incentives to make the economic and financial case for the circular economy. Funding gaps translate into insufficient financial resources, financial risks, a lack of critical scale for business and investments, along with lack of private sector engagement.
- **Regulatory gap**: Regulatory barriers can inhibit the development and implementation of circular economy strategies. Inadequate regulatory framework and incoherent regulation across levels of government hinder abilities to respond to emerging needs related to the circular economy.
- **Policy gap**: The variety of actors, sectors and goals makes the circular economy systemic by nature. It implies a wide policy focus through integration across often siloed policies. A lack of holistic vision, leadership or political will could lead to fragmented initiatives on the circular economy and weak accountability.
- **Awareness gap**: Poor awareness of circular economy practices amongst key players can hinder opportunities for scaling them up. Cultural barriers are also an important obstacle prevalent within the business community, among governments and residents, which prevent the necessary behavioural shifts required to transition to a circular economy.
- **Capacity gap**: Capacities should match the needs of the circular economy transition, in terms of skills and human resources. A lack of human resources and technical solutions represents an obstacle towards creating links and partnerships across value chains and preventing resource waste.

As a result of a survey of 51 cities and regions, OECD (2020[3])emphasised that insufficient financial resources, inadequate regulatory frameworks and cultural barriers are among the main obstacles for subnational governments to transition from a linear to a circular economy, while the lack of technical solutions were not a primary obstacle (Figure 3.1):

Figure 3.1. Main obstacles to the circular economy in 51 surveyed cities and regions

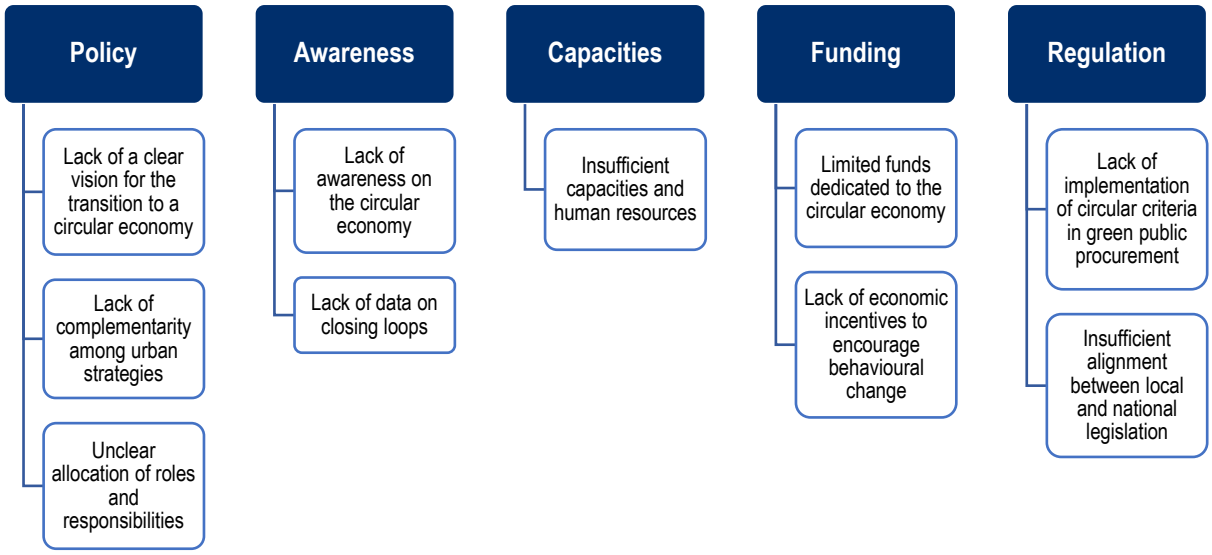


Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

Governance challenges to the circular transition in Tallinn, Estonia

This section presents the main governance obstacles in the transition to a circular economy in Tallinn, as a result of the fact-finding mission held in November 2021, an OECD (2021[4]) Survey on the Circular Economy filled out by the local team led by the Tallinn Strategic Management Office, key messages from the policy seminar organised in September 2022 and desk-based research.

Figure 3.2. Governance gaps for a circular economy in Tallinn, Estonia



Source: Own elaboration based on OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

Policy gap

Tallinn lacks a clear vision for the transition to a circular economy. To date, there is no document that serves as a basis for understanding the city's rationale for moving towards a circular economy, the needed actions to reach clear goals and how to measure their achievement over time. Such a vision would create a common narrative across government entities and stakeholders contributing to the circular economy transition, including universities, social entrepreneurs and companies. It would maximise synergies while scaling up impacts. As indicated in Chapter 2, a number of initiatives exist to reduce waste and promote reuse but they are not part of a circular economy framework that would go beyond waste management and allow for an optimal configuration of resource management in the city.

There is also a lack of complementarity among local strategies. The city of Tallinn is pursuing various policies and programmes related to circular economy objectives that could benefit from a more holistic approach. The city strategy Tallinn 2035 and the Climate-neutral Tallinn plan recognise the role of a circular economy in achieving climate-related goals. However, it is unclear how these policies are linked in a coherent way. While the Tallinn 2035 strategy includes concepts closely related to the circular economy, such as life cycle analysis (LCA) and more sustainable production and consumption patterns, most of the actions focus on optimising waste management, such as reducing waste generation and increasing recycling. The Climate-neutral Tallinn plan also incorporates the transition to the circular economy from a waste management approach, which includes waste sorting measures and whose action plan states that only waste that cannot be recycled should be incinerated. Joint actions or details are not specified. Lastly, the Tallinn European Green Capital programme is not sufficiently connected to the circular economy and

the narrative on how they can complement each other is missing. For instance, the circular economy is not included within the four themes (sustainable city, learning city, inclusive city, smart city) of the Tallinn European Green Capital programme.

The city has transformed its Waste Department into a Circular Economy Department. Nevertheless, its tasks are yet to be clearly defined, especially in terms of how to co-ordinate amongst departments and allow a holistic approach across strategic plans of the city. In practice, the substance of the daily work for the Circular Economy Department has not yet changed, being predominately in charge of waste management.

Awareness gap

While the city has been investing in awareness-raising campaigns on waste reduction and reuse in particular, the circular economy and related costs and benefits are still widely an unknown concept for many businesses and citizens. Business representatives interviewed during the OECD mission reported low levels of engagement in the city's planned activities, largely untapped opportunities for business models applying circular economy principles and challenges to develop specific skillsets. Citizens have been involved in waste prevention campaigns but the city does not communicate specifically on the circular economy, even as part of the European Green Capital initiatives. More generally, while many stakeholders in Tallinn appreciate that the city is taking the lead in moving towards a circular economy (through the awareness-raising initiatives and ad hoc projects described in Table 2.2), there is limited understanding of the role of the municipality in this process.

There are also some data gaps. There is limited data and reporting on material flow and transparent management of waste (World Bank, 2021[5]) The Statistical Yearbook of Tallinn does not yet provide data and information on closing loops (going beyond waste management, economic structure, energy and water supply) to inform decision making, business and residents. Another area to be prioritised in this regard concerns the provision of more updated data. As of early 2023, some of the measured sections dated from the years 2019, while the most recent data were from 2020 (City of Tallinn, 2023[6]).

Capacity gap

The transition to a circular economy requires building capacities that are still partially lacking within the municipality of Tallinn. The city reckons that technical capacities in LCA and circular business models (e.g. sharing economy initiatives, renting and lending) should be strengthened. In addition, system skills (capacities to understand, evaluate and enhance) and technical skills (competencies to design, plan and accelerate the transition engaging a variety of stakeholders) are also to be built. In particular and related to green public procurement (GPP), there is a disconnect between public officials in charge of drafting the tenders and those managing the contracts, which creates challenges to follow how the contract is performing once it has been awarded. On that front, the city reports a shortage of staff to advance the GPP work.

Funding gap

The city does not allocate funds to support external circular economy projects, beyond the budget allocated to the Circular Economy Department for the implementation of the initiatives led by the municipality (Chapter 2). The main financial contribution of the municipality to the transition to a circular economy is the contribution of EUR 0.5 million to the establishment of the future Creative and Circular Economy Centre (*loome- ja ringmajandus keskus*), which will be operational by the end of 2024. At the national level, the Ministry of the Environment provides funding for environmental projects in the country through the Environmental Investment Centre. For example, the centre supported 42 projects related to the circular economy in Harju County (where Tallinn is located) with a total of EUR 3.2 million over the period 2011-21

(EIC, 2022[7]). However, the projects funded do not necessarily focus on the circular economy but on resource efficiency measures.

There is a lack of adequate financial incentives to promote the adoption of a circular approach in Tallinn. For instance, in Estonia, although waste management fees are established by local government regulation, there is no standardised methodology for setting these charges (World Bank, 2021[5]). In Tallinn, whereas the waste fee is based on waste production (as users pay according to the contracted frequency of waste collection), the price of the fee is low, providing limited incentives to reduce generation. Households are usually charged a single amount for waste management, rather than a separate rate for mixed and source-separated waste. Although the lower source separation fees are intended to encourage households to sort waste at source, this is not the case, as the bills only show the total amount of waste generated. Therefore, the lack of visibility of the different charges on the bill may lead to a lack of incentives to improve waste sorting. Furthermore, there are no fines for households that do not sort their waste properly.

Regulatory gap

At present, there are no structured schemes for permanent co-ordination between the national and local governments to develop an aligned regulatory framework that supports moving towards a circular economy. In terms of conducive regulation to a circular economy, national and local regulations are not always aligned. For example, after banning the use of plastic cutlery in Tallinn, from June 2023, only reusable dishes (plates, cups) and cutlery will be allowed in public events with less than 30 000 visitors per day. However, at the national level, the regulation on the use of reusable dishes and cutlery at all public events, regardless of the number of visitors, will not enter into force before January 2024. In terms of waste management, the National Waste Act that entered into force in 2004 placed the responsibility for all municipal waste activities with the local government, without officially specifying the reuse and recycling targets at the local level. The disconnect between national ambitions and local execution can be responsible for poorly executed waste separation or for opting for the least cost treatment options for incineration or landfilling (World Bank, 2021[5]). The city of Tallinn would also benefit from greater clarity on upcoming national regulations and priorities to advance the design of its local circular vision.

Regarding public procurement, official statistics show that, in Estonia, only 4.5% of the total number of procurements and 16% of the total procurement costs are green. In 2020, 8 323 public procurements were carried out in Estonia. The cost of public procurement reached EUR 3.7 billion, which is 14% of gross domestic product (GDP) and 32% of the state budget. While the Estonian government includes green criteria in public procurement processes, these have not always been trickled down and implemented by local governments, fearing increasing prices. For instance, in Tallinn, GPP, one of the most effective tools for cities to lead by example, is not prioritised and does not fully exploit the potential of the circular economy in the products and services of municipal services. For instance, in the catering public procurement processes in schools, standards such as the use of sustainable labels or the commitment to donate leftover food are not considered. To date, there are no incentives for innovation or for the adoption of circular business models (i.e. shifting from ownership to services such as renting), as the price is the main criterion, and it is not clear what the city defines as green and circular procurement. The current public procurement legislation does not allow flexible collaboration with different stakeholders, especially for bringing green innovation and solutions to the city). The Purchasing and Procurement Centre of Tallinn is in the process of designing a GPP plan to systematically apply the principles of green procurement (Box 3.1). However, as it is currently formulated, the future plan does not take into account the circular economy requirements such as the integration of LCA into procurement decisions.

Box 3.1. Implementation of the GPP in Tallinn, Estonia

Building on Tallinn 2035 and the Climate Neutral Tallinn initiatives, Tallinn is designing an action plan to implement GPP. In 2022, a public official in charge of GPP took office, establishing the premises for introducing sustainable criteria in the city's procurement. This plan, which has yet to be officially approved by Tallinn City Council, will prioritise five product categories (public space, construction, catering, information technology [IT] sector, transportation) and create specific working groups for each of them. These working groups will involve experts from different municipal departments and will define sustainable standards. The groups will be led by the Purchasing and Procurement Centre of the Tallinn Strategic Management Office. The plan foresees the implementation of several actions such as:

- Developing a strategy for the implementation of GPP in the city.
- Setting objectives of prioritised areas and defining measuring tools related to GPP.
- Creating training for procurement specialists.
- Developing an information catalogue on the GPP, as well as guidelines and support materials.
- Organising seminars/workshops for sharing the best practices on GPP.

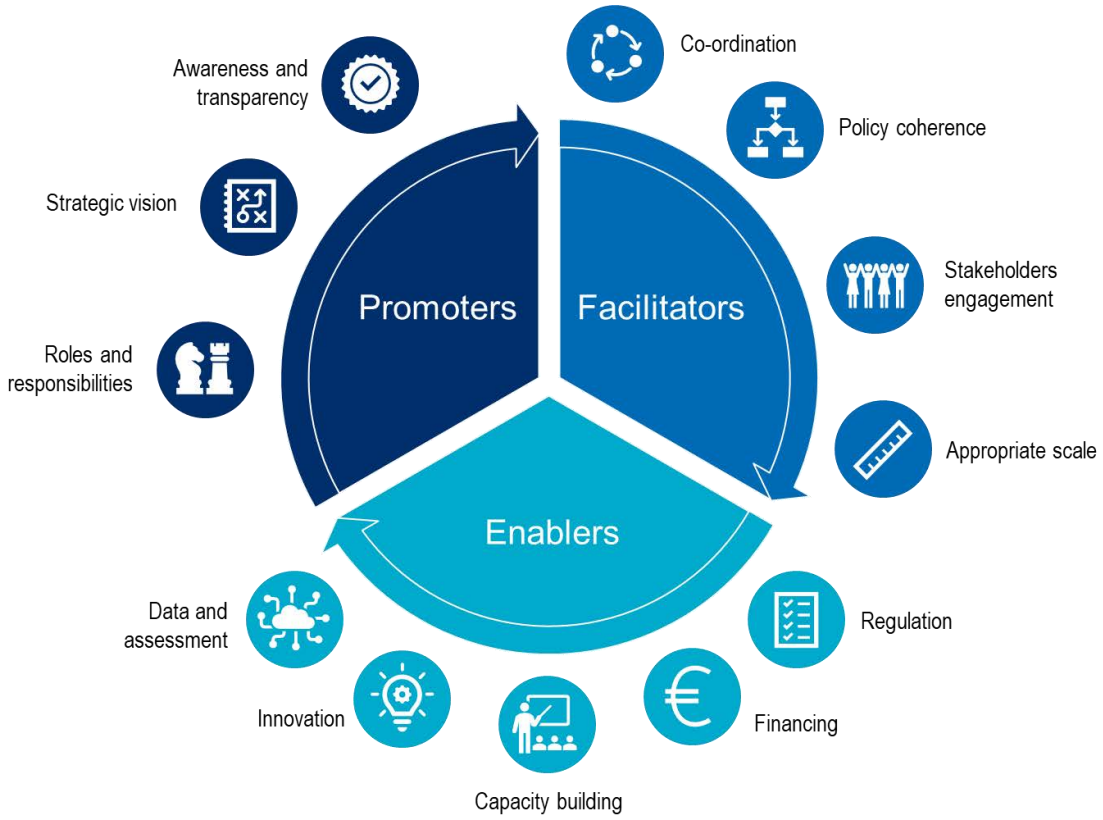
Source: OECD mission to Tallinn (16-19 November 2021).

Policy recommendations and actions for a circular economy in Tallinn, Estonia

Based on the main obstacles identified in Tallinn for its transition towards a circular economy and the 3Ps guiding framework, this section proposes a set of recommendations to move forward. According to the OECD, cities can act as promoters, facilitators and enablers of the circular economy (Figure 3.3) (2020[3]):

- **Promoters**: Cities can promote the circular economy by acting as role models, providing clear information and establishing goals and targets, in particular through: defining who does what and leading by example (roles and responsibilities); developing a circular economy strategy with clear goals and actions (strategic vision); promoting a circular economy culture and enhancing trust (awareness and transparency).
- **Facilitators**: Cities can facilitate connections and dialogue and provide soft and hard infrastructure for new circular businesses, in particular through: implementing effective multi-level governance (co-ordination); fostering system thinking (policy coherence); facilitating collaboration amongst public, not-for-profit actors and businesses (stakeholder engagement); and adopting a functional approach (appropriate scale).
- **Enablers**: Cities can create the enabling conditions for the transition to a circular economy to happen, for example by: identifying the regulatory instruments that need to be adapted to foster the transition to a circular economy (regulation); helping mobilise financial resources and allocating them efficiently (financing); adapting human and technical resources to the challenges to be met (capacity building); supporting business development (innovation); and generating an information system and assessing the results (data and assessment).

Figure 3.3. The governance of the circular economy in cities and regions: A Checklist for Action



Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

This chapter presents policy recommendations and related actions for the city of Tallinn, as a result of the interviews with 60 stakeholders, during the OECD mission (15-19 November 2021) and a policy seminar on 7 September 2022 (Table 3.1), as well as on the basis of international best practice. The 12 governance dimensions for each cluster (promoter, facilitator and enabler) build on the Checklist for Action for Cities and Regions Transitioning to the Circular Economy (OECD, 2020[3]). These governance dimensions were inspired by the OECD Principles on Water Governance (OECD, 2015[8]) and they are accompanied by the OECD Scoreboard on the Governance of the Circular Economy, developed thanks to the collective efforts of several cities, involved in the OECD programme on the Circular Economy in Cities and Regions as case studies (OECD, 2020[9]; 2020[10]; 2020[11]; 2021[12]; 2021[13]; 2022[14]).

It is important to note that:

- **Actions are neither compulsory nor binding**: Identified actions address a variety of ways to implement and achieve objectives. However, they are neither compulsory nor binding. They represent suggestions, for which adequacy and feasibility should be carefully evaluated by the city of Tallinn, involving stakeholders as appropriate. In turn, the combination of more than one action can be explored, if necessary.
- **Prioritisation of actions should be considered**: Taking into account the unfeasibility of addressing all recommendations at the same time, prioritisation is key. As such, steps taken towards a circular transition should be progressive. Table 3.1 provides an indicative timetable for actions (short, medium and long terms) based on the discussion and results of the Policy Seminar on the Circular Economy in Tallinn held on 7 September 2022.

- **Resources for implementation should be assessed**: The implementation of actions will require human, technical and financial resources. When prioritising and assessing the adequacy and feasibility of the suggested actions, the resources needed to put them into practice should be carefully evaluated, as well as the role of stakeholders that can contribute to the implementation phase.
- **The proposed actions should be updated in the future**: New potential steps and objectives may emerge as actions start to be implemented.
- **Several stakeholders should contribute to their implementation**: Policy recommendations and related actions should be implemented as a shared responsibility across a wide range of actors. Based on the results of the Policy Seminar on the Circular Economy in Tallinn held on line on 7 September 2022, Table 3.1 provides an indicative selection of actors that can contribute to each of the proposed actions.

Promoter

Roles and responsibilities

Having a clear vision of organisational goals and responsibilities is the first step in moving towards a circular economy in a coherent and strategic way. Defining *who does what* and *how* is essential to ensure accountability and should be a priority for Tallinn. Following the restructuring of the department in 2021, the Waste Management Department was renamed the Circular Economy Department, there is a need to further define its objectives and responsibilities to lead and co-ordinate a circular economy transition. The department should be characterised by its transversal nature within the municipal organisation. The definition of roles should primarily take into account the tasks of designing the new circular economy strategy and complementary activities, as well as the future duties that will be involved in the implementation phase (e.g. financing and budgeting, data and information, and stakeholder engagement). Tallinn could regularly evaluate the department's circular economy activities and adjust actions as necessary.

International practices show how local authorities are empowering and defining the roles and responsibilities of their municipal departments in charge of the circular economy transition. Since 2018, the city of Roubaix, France, set up a circular economy department dedicated to developing economic opportunities with low environmental impact, local job creation and high social value in the city. The department is responsible for setting a number of actions targeting the private sector, which are defined in the 2018 *Circular Economy Mission*. Examples of the responsibilities of the department include managing a network of entrepreneurs to work on circular businesses and supporting companies in identifying and accessing secondary materials in the city (EC, 2023[15]; City of Roubaix, 2022[16]). In 2018, the city of Wiltz, Luxembourg, adopted a *Commitment Charter for the Circular Economy* to guide activities led at the city level. In 2020, the city set up a circular economy department to integrate circular economy practices in other policy-making areas (urban planning, construction, local economic development, etc.) (Net Zero Cities, 2022[17]). In Rotterdam, Netherlands, circular economy initiatives come under the responsibility of the support programme Rotterdam Circular, led by the Municipal Executive of Rotterdam and the Port Authority of Rotterdam. Rotterdam Circular is in charge of implementing the Rotterdam Circularity Programme (2019-23). The tasks of Rotterdam Circular include removing identified barriers to the circular transition as well as, setting requirements in public procurement processes to encourage entrepreneurs to supply circular products or services (City of Rotterdam, 2019[18]).

Table 3.1. Synthesis of policy recommendations, actions and sequence for the circular economy in Tallinn, Estonia

Role	Governance dimension	Action	Short-term	Medium-term	Long-term	Selected leading actors
Promoter	Roles and responsibilities	Define roles and responsibilities of the Circular Economy Department to lead and co-ordinate the circular economy transition	X			Tallinn Strategic Management Office
		Embed circular economy principles in daily activities such as adopting circular business models		X		Tallinn Strategic Management Office
	Strategic vision	Develop a circular economy strategy with clear objectives, targets and actions that would allow identifying the "what", the "how" and the "whom" of the circular economy transition in the city: • Collaborate with universities and start-ups in the city on the analysis of stock and flow analysis to identify key sectors • Map existing initiatives related to the circular economy in Tallinn • Define clear and achievable objectives, actions and expected results linked to the global agendas and local priority areas • Identify key sectors and related actions: built environment, food, tourism and events • Ensure financial and human resources • Involve stakeholders in the development of a circular economy strategy • Monitor progress regularly	X			All stakeholders from Figure 2.4
	Awareness and transparency	Improve the circular economy webpage of the city of Tallinn to create a one-stop-shop including information on good practices being implemented in the city, access to circular economy policies and strategies at the national and supranational levels, financing opportunities and impacts		X		Tallinn Strategic Management Office
		Introduce the figures of "circular economy ambassadors" to promote circular economy communication and messaging as well as events across their networks			X	Green Tiger Tallinn Creative Incubator Tallinn Science Park
		Organise events on the business opportunities of the circular economy		X		Tallinn Strategic Management Office
Facilitator	Co-ordination	Strengthen co-ordination with the Estonian government through joint consultations, working groups or a co-ordination committee, and joint funding projects to align national and local strategies to optimise the use of financial and human resources	X			Tallinn Strategic Management Office Estonian Ministry of Finance Ministry of Economic Affairs and Communications of Estonia Ministry of Environment of Estonia
		Set up regular inter-department meetings to inject circular economy principles into municipal practices and tools	X			Tallinn Strategic Management Office Tallinn Urban Planning Department Tallinn Urban Environment and Public Work Department

Role	Governance dimension	Action	Short-term	Medium-term	Long-term	Selected leading actors
		Set up a platform for Estonian local governments for collective action towards a circular economy			X	Association of Estonian Cities and Municipalities (AECM) Ülemiste City
	Policy coherence	Integrate circular economy principles (e.g. reduce waste production, keep resources in use and transform waste into resources), activities and metrics into the strategic policies, such as Tallinn 2035, Climate-neutral Tallinn and EU 2023 Green Capital	X			Tallinn Strategic Management Office
	Stakeholder engagement	Co-produce the strategy with all of the relevant stakeholders in the city	X			All stakeholders from Figure 2.4
		Inform stakeholders about circular economy initiatives and related opportunities and facilitate dialogue across the city, businesses and residents within a circular urban ecosystem		X		All stakeholders from Figure 2.4
		Leverage on the events organised for the European Green Capital 2023 award to engage stakeholders in the transition towards a circular economy	X			Tallinn Strategic Management Office
		Use digital tools to engage citizens in the circular transition, minimising environmental costs and externalities		X		Tallinn Strategic Management Office
	Appropriate scale	Facilitate pilot projects to foster the circular economy transition and scale them upon the assessment of results against pre-defined indicators			X	Green Tiger Tallinn Creative Incubator Tallinn Science Park
Enabler	Regulation	Establish clear requirements in local tenders to foster efficient material use and reuse, quality and maintenance		X		Tallinn Strategic Management Office Tallinn City Property Department
		Apply the life cycle analysis to look beyond short-term needs and consider the longer-term impacts of each purchase		X		Tallinn Strategic Management Office Tallinn City Property Department
		Stimulate a dialogue between procurement officials and potential contractors, in order to incorporate circular requirements for suppliers and design tenders to promote circularity			X	Tallinn Strategic Management Office Tallinn City Property Department
		Create a monitoring and evaluation framework for GPP to analyse procurement policy results			X	Tallinn Strategic Management Office Tallinn City Property Department
	Financing	Mobilise financial resources and foster efficient allocation of resources to enable the transition from a linear to a circular economy	X			Tallinn Strategic Management Office
		Strengthen the effectiveness of municipal grants on the adoption of circular economy principles, ensuring that projects are scaled up after the experimentation phase		X		Tallinn Strategic Management Office
		Monitor and evaluate impacts achieved by funded circular economy projects, share information on funding opportunities after the end of the grant and consider the possibility of applying external audits to the projects			X	Tallinn Strategic Management Office

Role	Governance dimension	Action	Short-term	Medium-term	Long-term	Selected leading actors
	Capacity Building	Carry out internal training (for the public administration) and peer-to-peer learning to scale up circular economy practices	X			Tallinn Strategic Management Office
		Support external training to provide entrepreneurs and employees with deeper knowledge and tools to succeed in their circular projects and discover business opportunities in a circular economy	X			Green Tiger Tallinn Creative Incubator Tallinn Science Park Tallinn University Tallinn University of Technology
	Innovation	Organise hackathons and idea competitions on the circular economy		X		Green Tiger Tallinn Creative Incubator Tallinn Science Park Tallinn University Tallinn University of Technology
		Stimulate demand by being a launching customer		X		Green Tiger Tallinn Creative Incubator Tallinn Science Park
		Establish a one-stop-shop on the circular economy for small- and medium-sized enterprises (SMEs)			X	Tallinn Strategic Management Office
	Data and assessment	Develop a monitoring framework for the future circular economy strategy to assess progress made on the achievement of the targets, including through the OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions		X		Tallinn Strategic Management Office
		Make the most of information obtained through digital tools such as digital maps, blockchain and artificial intelligence to trace the origin of materials and promote sustainability through supply chains		X		Green Tiger Tallinn Creative Incubator Tallinn Science Park

In addition, it is important for Tallinn to "lead by example" and demonstrate its commitment and the feasibility of implementing circular practices. Beyond existing good practices (e.g. ban of single-use plastic plates and utensils at public events and joining deposit reuse systems in municipal buildings), the city should further embed circular economy principles in daily activities such as adopting circular business models moving from ownership to services, setting circular criteria in the design of public procurement tenders (encouraging the use of secondary materials such as the use of recycled plastics for office furniture, making public buildings apply circular economy principles). Box 3.2 provides an overview of international practices that can be inspirational for the city.

Box 3.2. Examples of cities leading by example for the adoption of circular economy practices

A shift from ownership to services

- The city of Amsterdam, Netherlands, implemented the Learning by Doing programme, which aims to show, with empirical examples, that the circular economy is profitable in all aspects, by convening the different city departments and diverse stakeholders to define policy actions.
- The municipality of Bollnäs, Sweden, has applied what the local government calls "functional public procurement" (*funktionsupphandlingen*) to rent light as a service in municipal pre-schools and schools.
- The city of Ljubljana, Slovenia, aims to foster "product as a service" schemes by renting printers, electric lamps or furniture instead of buying them.
- In Oulu, Finland, public libraries have extended their services from borrowing traditional items (e.g. books, e-books, audiobooks, music, films, etc.) to skis, skates and other sports equipment.

Waste management prevention and reduction

- The city of Paris, France, addresses waste generated by events organised in public areas and assesses their environmental impact through the implementation of the Charter for Eco-responsible Events. The city also provides technical equipment to weigh the waste produced during events and collect waste from the event organisers.
- The city of Gothenburg, Sweden, applies a waste management strategy to its Gothenburg Culture Festival, in which the use of single-use packaging is banned.

Use of secondary materials

- In the city of Ljubljana, Slovenia, the public tender for the selection of suppliers of sanitary paper products included the "zero waste" criterion, which required sanitary products to be made of cardboard packaging or hollow cardboard packaging collected in the city.
- Groningen ,Netherlands, opened a tender for a ten-year service of refurbished furniture for the municipality and, since 2018, all plastic bins within the municipality are made of recycled plastics.

Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

Strategic vision

Establishing a circular economy vision in Tallinn is necessary as a starting point for the transition. Developing a circular economy strategy with clear objectives, targets and actions would allow identifying the "*what*", the "*how*" and the "*whom*" of the circular economy transition in the city. The strategy should

build on: i) an analysis of stocks and flows; ii) a mapping of the existing circular economy-related initiatives; iii) clear and achievable goals, actions and expected outcomes; iv) budget and resources; v) a shared understanding and co-creation with stakeholders to build consensus and vision; vi) a monitoring and evaluation framework. The Circular Economy Department could lead the following steps for the design, development and implementation of the strategy:

- **Collaborating with universities and start-ups in the city on the analysis of stock and flow analysis to identify key sectors** potentially capable of applying circular economy principles and practices. The analysis should be repeated after a certain period of time (e.g. 2-3 years) to assess changes in production and consumption and change priorities.
- **Mapping existing initiatives related to the circular economy in Tallinn**. This exercise could be conducted through an online platform for uploading initiatives and projects in the field of circular economy, or through offline platforms, collecting input from stakeholders through regular meetings, surveys, interviews and public consultations. Initiatives have been also mapped by this report (Chapter 2).
- **Defining clear and achievable objectives, actions and expected results linked to the global agendas and local priority areas**. The strategy could contribute to and complement existing green initiatives (e.g. the emission reduction target set out in the Climate-neutral Tallinn plan, increasing the material reuse in Tallinn 2035). It should also define goals in terms of job creation, innovation, economic growth as well as ambitious waste management targets. The objectives of the strategy should be linked to the achievement of the United Nations (UN) Sustainable Development Goals (SDGs) and European Union (EU) frameworks. Furthermore, the long-term vision should identify priority areas for the city, such as carbon neutrality, energy efficiency, responsible consumption and job creation.
- **Identifying key sectors and related actions**. Three sectors show great potential in the city of Tallinn in relation to their transition to a circular economy: built environment; food; and tourism and events. Table 3.2 presents an overview of all the sectors included in circular economy initiatives that participated in the OECD survey (2020[3]). Below actions for each sector are described in relation to international examples:
  - **Built environment**: As demonstrated by international practices, circular economy principles applied to the built environment concern all of the phases, from design to planning, operation and end of life. For example, the city of Amsterdam, Netherlands, developed the roadmap "*Circular Amsterdam: A vision and roadmap for the city and region*" in 2016. To organise the building chain in a circular way and fulfil the growth ambition to build 70 000 new homes by 2040, the roadmap planned to improve the circularity of the construction sector through: i) smart design to make building more suitable for repurposing and reuse of materials; ii) efficient dismantling and separation of waste streams for high-value reuse; iii) high-value recovery and reuse of materials and components; and iv) exchange of commodities between market players (Circle Economy et al., 2016[19]). Box 3.3 provides further examples from the Brussels-Capital Region, Belgium.
  - **Food**: Circular food systems in cities are based on preventing and managing food waste, enhancing food security and promoting local food. In London, United Kingdom (UK), the strategic roadmap set in 2017 for a circular food economy consisted in: i) ensuring that no food waste is destined to landfill or incineration; ii) reducing food waste by 20% by 2025; iii) ensuring that food surplus and food waste are used to their greatest potential; iv) boosting community and commercial food growing in London. The strategy also set guidelines for responsible business and consumer behaviour, as well as good practices to prevent food waste and maximise the use of urban space for food growing (LWARB, 2017[20]). The city of Guelph, Canada, aims to become Canada's first technology-enabled circular food economy, reimagining an inclusive food-secure ecosystem that by 2025 increases access to affordable,

nutritious food by 50%, where 50 new circular businesses and collaborations are created and circular economic revenues are increased by 50%. The programme Our Future Food launched in 2020 aims to grow local food in a regenerative manner, reduce food waste, and design and market healthier food products (City of Guelph, 2020[21]). In the Brussels-Capital Region, Belgium, there are initiatives: to grow mushrooms in cellars using the city's organic waste resources and creating labels for restaurants and canteens (schools, hospitals, retirement homes, companies, nurseries); to promote the consumption of local and seasonal products, and food produced in an environmentally friendly way; and to minimise food waste (Good Food Brussels, 2022[22]; Bruxelles Environnement, 2022[23]).

- **Tourism and events**: Circular economy practices in tourism and events can relate to innovation and experimentation, guidance and awareness-raising, and the creation of networks for collaboration across the value chain. The city of Paris, France, launched its 2nd roadmap in November 2018, which addresses waste generated by events organised in public areas and assesses their environmental impact. To tackle this issue, the city aims to foster the implementation of the Charter for Eco-responsible Events, provide logistical and technical means for weighing the waste produced during events, and undertake waste collection from the organisers (City of Paris, 2018[24]). In the Brussels-Capital Region, Belgium, the agency in charge of tourism, Visit Brussels, is leading several initiatives: i) supporting collaboration and partnerships between hotel managers and start-ups and SMEs offering circular solutions (e.g. sustainable food catering, modular furniture services); ii) developing guidelines for tourists on restaurants, hotels and activities that consider circular economy principles; iii) launching pilot projects to assist hotel managers in the development of plans to encourage waste prevention and reuse; iv) producing a guide for tourism companies that want to move towards a circular economy (hub.brussels, 2020[25]). In Amsterdam, Netherlands, a total of 12 hotels have started co-operating with actors along their different value chains to incorporate circular principles in their business models. As such, they jointly purchase and bundle waste streams, contract rental services and share information to provide more sustainable products and services (CREM, 2018[26]).

- **Ensuring financial and human resources** for the design and implementation of the strategy. Tallinn should allocate a defined part of the municipal budget to the future strategy.
- **Involving stakeholders in the development of a circular economy strategy**. The circular economy is a shared responsibility among stakeholders, who should be engaged from the very beginning of the process. The city could involve stakeholders from civil society and the private sector. For the latter, in order to get the message across to a larger number of businesses, the city could collaborate with sectoral associations (e.g. Estonian Travel and Tourism Association, Estonian Hotel and Restaurant Association), the Estonian Chamber of Agriculture and Commerce and the incubators of the city (e.g. Tallinn Creative Incubator, Tallinn Science Park, Green Tiger, green-tech and deep-tech clusters). It is particularly relevant that Tallinn consults Estonian ministries working in the circular economy when defining its own strategy. In addition, since the current version of the national white paper does not set concrete targets, this consultation with the national government could shed light on future priorities at the national level.
- **Regularly monitoring progress** (e.g. number of circular economy-related projects, number of circular buildings to be constructed, etc.) to assess socio-economic and environmental impacts and communicate results to the public. Further information for the design of a monitoring framework for the strategy is detailed in the recommendation on data and assessment.

Table 3.2. International overview of sectors included in selected local and regional circular economy initiatives

Cities and regions	Initiative	Waste	Construction and demolition	Land use and spatial planning	Food and beverage	Manufacturing industry	Textile	Water and sanitation	Energy	Biomass	Agriculture	Mobility	Transportation	ICT sector	Forestry	Culture
Amsterdam (Netherlands)	Amsterdam Circular 2020-2025	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Barcelona Metropolitan Area (Spain)	Circular Economy Promotion Programme AMB Circular (2019)	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓			
Flanders (Belgium)	Circular Flanders (2016)	✓	✓	✓	✓	✓		✓						✓		
Greater Porto Area (Portugal)	LIPOR's Commitment to Circular Economy Principles (2018)	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓			
London (UK)	London's Circular Economy Route Map	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		
Maribor (Slovenia)	Strategy for the Transition to a Circular Economy in the Municipality of Maribor (2018)	✓	✓	✓				✓	✓			✓	✓			
Nantes (France)	Circular Economy Roadmap	✓	✓	✓	✓				✓	✓	✓	✓	✓			
North Karelia (Finland)	CIRCWASTE – Towards Circular Economy in North Karelia	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	
Paris (France)	Circular Economy Plan of Paris 2017-2020	✓	✓	✓	✓				✓	✓						✓
Rotterdam (Netherlands)	Rotterdam Circularity Programme 2019-2023	✓	✓	✓	✓	✓	✓	✓		✓	✓					
Scotland (UK)	Circular Glasgow	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		
Tilburg (Netherlands)	Tilburg Circular Agenda 2019	✓	✓	✓	✓	✓	✓			✓						
Valladolid (Spain)	Valladolid Circular Economy Roadmap (2017-2018)		✓	✓	✓	✓	✓	✓		✓		✓				

Note: ICT – Information and communication technology.
Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

Box 3.3. Circular economy principles applied to the built environment in the Brussels-Capital Region, Belgium

The Brussels-Capital Region, Belgium has been developing and implementing initiatives to foster circularity in the built environment across different areas:

- **Planning**. Brussels is increasingly taking a district rather than an individual building approach to the built environment. This holistic approach enables a complete vision of mobility, energy and water flows before the building phase and the creation of economies of scale. In this sense, the Tivoli Green City is a flagship project that seeks to connect an existing residential neighbourhood with the industrial zone of the Port of Brussels by redeveloping a brownfield site between the two.
- **Digital tools**. Brussels is part of the EU project Buildings as Materials Banks, which aims to create circular solutions in the building sector. The city's participation in this project, which explores the use of different tools (e.g. digital material passports) to unleash circularity in the built environment, is part of a broader aim to encourage companies in the sector to think about buildings as material banks for new and future builds.
- **Capacity building**. Brussels fosters circular practices in the building sector, such as waste prevention, waste reuse on site and renovation, by publishing guidelines and case studies for construction companies. With the Confederation of Building Companies, Brussels is also fostering networking between companies and setting up training programmes.
- **Secondary materials**. Through the Confederation of Building Companies, Brussels is seeking to develop a platform to boost the creation of a market for secondary materials in the construction sector. This platform connects companies producing potential waste to companies wishing to incorporate secondary material into their construction.

Source: Tivoly Green City (2023[27]), *Le Projet*, https://www.citydev.brussels/fr/projets/tivoli-greencity; BAMB (2020[28]) *Buildings As Material Banks (BAMB2020)*, https://www.bamb2020.eu/ (accessed on 30 April 2019); Guide Bâtiment Durable (2022[29]), *Economie circulaire*, https://www.guidebatimentdurable.brussels/economie-circulaire; port.brussels (2021[30]), *A propos – stratégie*, https://www.port.brussels/fr/a-propos/strategie.

Awareness and transparency

While communication efforts have been prioritised in areas such as sustainability or green policies, the promotion of the circular economy in Tallinn remains largely unexplored. There is room for Tallinn to clarify how and why citizens should contribute to the transition, and how it complements other environmental initiatives taking place in the city (i.e. the 2023 European Green Capital Award and the goal of becoming a carbon-neutral city by 2050), by looking for synergies and delivering the message in the most effective way. A series of actions could be adopted, such as:

- **Improving the circular economy webpage of the city of Tallinn**. Although Tallinn Municipality's website features a section on circular economy and waste management, most of the information is mainly dedicated to the latter. Beyond the definition of the circular economy, some of the examples of the information included are: information on the municipal waste transport; location and price list of the waste stations in Tallinn; location of collection points for clothes and other usable items; and location of the Reuse Centres (*MTÜ Uuskasutuskeskus*). Moreover, the website also contains guidelines related to waste management, such as labels for collection bins, guides on waste collection for public events organisers and biowaste collection instruction material for catering and accommodation companies. Building on the current website, Tallinn could create a

one-stop-shop including the following sections: i) good practices of circular economy initiatives being implemented in Tallinn both by the municipality and businesses; ii) information and access to circular economy policies and strategies at the national and supranational level (e.g. links to the Estonian White Paper, EU Circular Economy Package); iii) information on financing opportunities available from the municipality and other institutions (e.g. Estonian government, Environmental Investment Centre); iv) environmental, economic and social impacts of the circular economy; v) guidance on how to participate in public procurement processes, challenges, hackathons.

- **Introducing the figure of "circular economy ambassadors" to promote circular economy communication and messaging as well as events across their networks**. For instance, existing clusters and incubators (Green Tiger, Tallinn Creative Incubator, Tallinn Science Park), as well as universities (TalTech, Estonian Academy of Arts and Tallinn University) could promote circular economy practices based on their expertise. ReLondon, a partnership between the Mayor of London and London's boroughs to improve waste and resource management in London, UK, has started recruiting "circular economy ambassadors" in different companies and local authorities to share information on the benefits of the circular economy for each economic sector and to raise awareness in the workplace (LWARB, 2017[20]). In Glasgow, UK, the Glasgow Chamber of Commerce nominated 24 ambassadors from large companies and SMEs across Glasgow to share their experience and knowledge of the circular economy (OECD, 2021[13]).
- **Organising events on the business opportunities of the circular economy**. The events allow the business community to share experiences, make synergies, find partners and seek financial and human resources needed to scale up projects. For example, in the city of Valladolid, Spain, the Agency of Innovation and Economic Development organised annual Circular Weekends between 2017 and 2019, which consisted of a two-day event to foster peer learning, share existing business models and create a network of individuals interested in pushing forward the circular economy (OECD, 2021[12]). Between 2017 and 2019, the city and Opportunity Peterborough (a council-owned not-for-profit economic development company) held five circular economy workshops open to business organisations, entrepreneurs, as well as schools and community groups. The goal was to harness learning among businesses and raise awareness in the food and agriculture, manufacturing, service, and third sectors (Future Peterborough, 2018[31]).

Facilitator

Co-ordination

There are three types of co-ordination that can be pursued by the city of Tallinn in its role of facilitator: i) vertical co-ordination across levels of government; ii) horizontal co-ordination across municipal departments; iii) co-ordination with other Estonian cities and towns to scale up solutions. As such:

- **Vertical co-ordination**: In order to pursue common objectives (e.g. carbon neutrality, resource efficiency), national and local strategies should be aligned to optimise the use of financial and human resources and overcome regulatory constraints. It is recommended that the city take part in consultations on strategic documents on the circular economy at the national level and engage representatives of relevant national ministries (e.g. Ministry of Economic Affairs and Communications, Ministry of the Environment) in the development of the Tallinn strategy on the circular economy. International examples provide evidence that co-ordination and the setting of common goals across all levels of government is essential to move from a linear to a circular economy. In the Netherlands, the programme for a Circular Dutch Economy by 2050 (Government of the Netherlands, 2016[32]), the Amsterdam Circular Strategy 2020-2025 (City of Amsterdam, 2020[33]) and the Rotterdam Circularity Programme 2019-2023 (City of Rotterdam, 2019[18]) share the common goal of reducing raw material consumption by 50% between 2016 and 2030 and achieving 100% circularity by 2050. Signed in 2016 by eight cities, including Amsterdam and

Rotterdam, three ministries and three knowledge parties,[1] the City Deal Circular City (*Circulaire Stad*) (Hotspot Holland Circular, 2016[34]) is a co-ordination mechanism established by the national government through the circular economy programme to facilitate the exchange of best practices and knowledge sharing. Moreover, the design of the Amsterdam Circular Strategy was carried out in co-operation with the national government as well as with governments at the subnational level. As such, it prioritises three of the five sectors identified in the national programme and set up the Amsterdam Circular Monitor (City of Amsterdam, 2020[35]) supported by three national agencies, two provinces, one municipality, five local entities and departments and three research institutions.[2] In Quebec, Canada, the creation in 2017 of the Interdepartmental Group on the Circular Economy, led by the Ministry of Economy and Innovation and the regional waste management agency Recyc-Québec, brings together 13 Quebec ministries and public companies to facilitate the implementation of the circular economy policies and initiatives led by the government of Quebec (Circular Quebec, 2019[36]). The Circular Economy Fund (Fondaction, 2023[37]), launched in 2022 to support emerging companies in Quebec and test innovative circular solutions, is the result of a collaboration between the city of Montreal, Canada, and Recyc-Québec. In Belgium, the Brussels-Capital Region defined a co-ordination committee (Box 3.4).

- **Horizontal co-ordination**: The Circular Economy Department should set up regular inter-department meetings to inject circular economy principles into municipal practices and tools, as well as ensure that a circular economy can help achieve the strategic economic, social and environmental objectives of the city (see section below on policy coherence). Due to the systems nature of the circular economy, all departments should be endowed with the necessary capacities to adopt circular business models and to design public procurement processes that include circular economy criteria. Co-ordination should be strengthened with: Tallinn Education Department; Tallinn Urban Planning Department; Tallinn City Property Department; Tallinn Transport Department; as well as with other institutions managed by the Tallinn Strategic Management Office (e.g. Tallinn Waste Centre). In Toronto, Canada, the establishment of a cross-divisional working group in 2018 allowed to engage ten city divisions in the circular procurement pilot that is co-led by the city of Toronto's Solid Waste Management Services (SWMS) division and Purchasing and Materials Management Division (PMMD). Apart from citizens and businesses, the initiative Circular Gothenburg, Sweden, launched in 2016 and led by the city's Consumer and Citizen Service Administration in collaboration with other city departments, targets the city's own departments as important players in circular economy transformation providing them guidelines and clear goals. In Paris, France, 16 out of 20 city departments are taking action based on the city-wide circular economy strategy co-ordinated by the Environmental Department between 2017 and 2020 (C40 Cities/Climate-KIC, 2018[38]).
- **Co-ordination with other Estonian cities and towns**: A circular economy can produce economic, social and environmental impacts if business models are scaled up. As such, Tallinn, as the city in Estonia that is taking action on the circular economy, could set up a platform of Estonian local governments for collective action towards a circular economy. Key actors would include representatives of cities, the Association of Estonian Cities and Municipalities (AECM) and the Ministry of the Environment, although at the national level, an inspiring example in this respect is the Spanish National Coordination Commission for Waste. It involves national, regional and local authorities, represented by the Spanish Federation of Municipalities and Provinces (FEMP). This commission integrates 12 technical working groups (1 for each waste stream), including a specific group on the circular economy (OECD, 2020[10]).

Box 3.4. Co-ordination of the circular economy programme of the Brussels-Capital Region, Belgium

In March 2016, the government of the Brussels-Capital Region adopted the Brussels Regional Programme for a Circular Economy 2016-2020 (BRPCE). The programme comprises 111 measures across 4 strategic areas: transversal measures (e.g. regulation), sectoral measures, territorial measures and governance measures. The latter mainly consist of strengthening co-operation between different levels of government, notably through a steering committee and a co-ordination committee.

The BRPCE Steering Committee is responsible for monitoring the implementation of the strategy. It meets at least every six months but can be convened at any time to intervene and/or take important decisions. The steering committee is composed of the ministers responsible for the BRPCE, the prime minister and associated ministers. The responsible ministers are the Minister for the Environment and Energy, the Minister for the Economy, Employment and Vocational Training and the Secretary of State for Scientific Research and the Collection and Treatment of Household Waste. Associated ministers include the Minister of Education and the Minister of Social Promotion - Adult Education. In addition, several regional partners are involved in the steering committee: Brussels Environment, impulse.brussels, Brussels Economy and Employment, Actiris, Brussels Training, VDAB Brussel, Innoviris, Citydev, finance&invest.brussels, Bruxelles-Propreté, Brussels Planning Agency, the Port of Brussels, Atrium, Brussels Mobility, the Brussels Regional Informatics Centre (CIRB) and the Economic and Social Council.

The operational co-ordination committee is organised by the aforementioned responsible ministers and their administrative bodies: impulse.brussels (Brussels Enterprise Agency), Brussels Environment (the agency responsible for the environment and energy), Bruxelles-Propreté (the agency responsible for household waste management and urban cleanliness) and Innoviris (the agency for the promotion and support of innovation). These agencies are responsible for the co-ordination of the BRPCE and its day-to-day operations.

Source: Government of the Brussels-Capital Region (2016[39]), *Programme régional en economie circulaire 2016-2020*, https://document.environnement.brussels/opac_css/elecfile/PROG_160308_PREC_DEF_FR.

Policy coherence

The circular economy goes beyond waste and requires a holistic approach across the policies set up by different municipal departments. Enhancing a systems approach within the municipality can help strengthen synergies between departments, minimise duplication and ensure consistency, as well as clarify how the circular economy can contribute to the various municipal objectives.

Tallinn could **integrate circular economy principles (e.g. reducing waste production, keeping resources in use and transforming waste into resources)** activities **and metrics into the strategic policies** such as the Tallinn 2035 strategy, the *Climate-neutral Tallinn. Tallinn Sustainable Energy and Climate Action Plan 2030* and the Tallinn Waste Management Plan 2022-2026. Moreover, the New General Urban Plan (2019), which promotes a compact city model, could be linked to various actions in complementary sectors that foster circularity in the city, from mobility to infrastructure. The inter-municipal co-ordination set up towards the awarding of Tallinn as EU Green Capital in 2023 could be replicated to boost a circular economy in the city.

International practice shows that identifying synergies and strengthening horizontal co-ordination across policies and government departments can prevent the fragmentation of initiatives and promote policy coherence, especially in reaching carbon neutrality, one of Tallinn's goals. For instance, in Helsinki, Finland, as a result of the revision of the Helsinki Metropolitan Area Climate Strategy, the Sustainable Urban Living Programme (HSY, 2021[40]) recognises the circular economy as a means to achieve climate goals through a more efficient waste and water management. In Calgary, Canada, the Calgary Climate Strategy (City of Calgary, 2022[41]) includes a pilot of circular economy grants for reuse and repair initiatives to reduce the waste-related GHG emissions. As one-fifth of the carbon footprint caused by the consumption of goods and services, the Climate Change Strategy 2020-30 of Scotland (Skills Development Scotland, 2020[42]) recognises the circular economy as a key element to achieving the net zero target and commit to ensure the development of work-based capacity-building programmes on the circular economy. Similarly, the London Climate Action Strategy 2020-2027 (City of London, 2020[43]) commits to embedding circular economy principles in the city's core projects by using life cycle carbon and cost assessment techniques to support the achievement of the target of net zero emissions by 2050.

Stakeholder engagement

Stakeholders have a key role to play in the transition to a circular economy, as they will be the implementers of the transition. Therefore, their involvement in the design of the circular economy strategy and related policies is essential. Stakeholder engagement is key to ensuring that they will contribute in different capacities to the transition from a linear to a circular economy, by experimenting with new business models and or by adapting to different behaviour.

The municipality is aware of the importance of actively involving all relevant stakeholders. For example, Tallinn has developed its own green event guide and invited event organisers to follow the guidelines on a voluntary basis. The idea behind this initiative was to test the guidelines with event organisers before making them mandatory, in order to see how implementing the recommendations could work in practice. The aim is to explore all options and make the guidelines mandatory by the end of 2023. Tallinn could continue testing and piloting experiences to engage stakeholders in the transition towards a circular economy and set long-term strategic goals.

First, **Tallinn could co-produce the strategy with all relevant stakeholders in the city** (Figure 2.4). For instance, the Circular Economy Strategy of Greater Paris, France, was developed by 240 stakeholders from over 120 different organisations. They were divided into working groups and defined 65 proposals. The region of Flanders, Belgium, implemented the Green Deal Circular Procurement (GDCP) between 2017 and 2019. In total, 108 purchasing organisations, local authorities, companies, financial institutions and 54 facilitators were involved in the design of the initiative (OECD, 2020[3]).

Second, Tallinn could **inform stakeholders and facilitate dialogue across the city, businesses and residents** with the aim of creating a circular ecosystem in the city and fostering innovation. For instance, the current circular economy section of the municipal website could share good practices on circular economy activities and the stakeholders that are leading them (see section on awareness and transparency).

Third, the city **could leverage the European Green Capital 2023 award** and engage with private companies, universities and various non-governmental organisations (NGOs) through ad hoc circular events, meetings and workshops.

Fourth, the city could **use digital tools to engage citizens**, such as the Open the City (AvaLinn) application, while minimising environmental costs and externalities (City of Tallinn, 2023[44]). This app provides citizens with the opportunity to share ideas and make suggestions to build liveable urban space. The digital transition brings therefore opportunities for Estonia's economy (e.g. digital public services), however, environmental costs and externalities (e.g. increasing CO_2 emissions) also need to be carefully considered. Through the use of innovative technologies and digitalisation, international practices show

how local governments can facilitate collaboration between public, non-profit and business actors, fostering bottom-up policy making and engaging stakeholders in the circular economy. For instance, in the city of Liège, Belgium, the launch in 2017 of the *Réinventons Liège* participation process supported by the CitizenLab platform provided local policy makers with valuable insights from citizens to identify 77 priority actions in the city and shape the waste management policy (City of Liege, 2017[45]). In Nesodden, Norway, nearly 300 families responded in 2016 to a survey on product needs, which served as the basis for the creation of the *Tingenes Bibliotek* in 2018, the first Nordic Smart Library of Things to provide shared tools to the community (Circular Regions, 2020[46]).

Appropriate scale

The development of small-scale pilot projects and their replication on a larger scale can help to adopt a functional approach, identify opportunities and efficiently adjust the appropriate scale of implementation. The city of Tallinn could facilitate **pilot projects to foster the circular economy transition and scale them upon the assessment of results against pre-defined indicators**. One example could be applying circular practices in schools and kindergartens (composting, producing own energy and food, using recycled materials). In Helsinki, Finland, the Smart Kalasatama pilot project launched between 2015 and 2017, co-ordinated by the City of Helsinki Innovation Unit, acted as a district's urban laboratory, aiming to produce and test technologies to accelerate the circular economy in an urban environment. Other areas in Helsinki and other cities in Finland have replicated this pilot project model (Helsinki Region Environmental Services Authority, 2021[47]). In Stockholm, Sweden, the pilot plant of the Stockholm Biochar Project which operated between 2013 and 2020 and was awarded the Bloomberg Philanthropies prize in 2014, will be scaled up to 6 plants aiming to produce around 1 800 tonnes of biochar annually, sequestering 6 800 tonnes of CO_2. In addition, Stockholm received more than 100 requests from cities and organisations interested in replicating the programme (Nordregio, 2018[48]). In Vienna, Austria, the data obtained from two pilot projects in 2016 dismantling large industrial buildings allowed the identification of key challenges in building demolitions and the integration of the projects' results into a city GPP scheme (RREUSE, 2016[49]).

Enabler

Regulation

International practices suggest that cities and regions can promote the uptake of circular economy systems through changes in legislation and specific regulatory tools, including the potential of public procurement. Cities can use "regulatory sticks and incentive carrots" as tools for circular transformation to foster waste reduction, reuse and recycling over disposal. These tools can include policy measures such as circular procurement, product norms, industry targets, standards for secondary materials, awareness building or economic incentives such as tax reductions, extended producer responsibility (EPR) schemes, differentiated fee structures for waste management and investment support (EIB, 2021[50]). While public procurement holds great potential in boosting circular economy practices in sectors such as transport, waste, water, built environment and food in Estonia and more precisely in Tallinn, circular criteria are not yet embedded in GPP. Following international practices, Tallinn could:

- Establish clear requirements in local tenders to foster efficient material use and reuse, quality and maintenance (e.g. use of secondary materials in publicly purchased goods).
- Apply life cycle analysis (LCA) to look beyond short-term needs and consider the longer-term impacts of each purchase. The analysis shows the importance of other dimensions (installation, operation, maintenance and disposal costs) to be considered besides the price.
- Stimulate a dialogue between procurement officials and potential contractors, in order to incorporate circular requirements for suppliers and design tenders to promote circularity. This could

help better understand the criteria of the tender from potential suppliers and improve the efficiency of the tendering process. The dialogue could also help provide suppliers with a better understanding of the needs and public officers to get information to design feasible and effective tender specifications that match the capacity of the market (OECD, 2015[51]).

- Create a monitoring and evaluation framework for GPP to analyse procurement policy results, enabling the city to incorporate the lessons learned in the design of new procurement policies and regulations.

Local governments can accelerate the transition towards a circular economy through public procurement practices in several sectors (e.g. food, built environment). For instance, in 2014, the city of Grenoble, France, cancelled a contract for 326 outdoor advertisements and planted trees in replacement to reduce unnecessary consumption and promote a shift towards more sustainable lifestyles among its population (Knowledge Hub, 2022[52]). Since 2020, the city of Turku, Finland, has implemented circular procurement to reduce food waste and GHG emissions from food and related services, in accordance with the Finnish Procurement Act, by doubling the proportion of vegetarian meals and reducing heating and electricity consumption. This initiative aims to reduce GHG emissions of food services by 25% and reduce food loss from 12% to 6% by 2029 (City of Turku, 2021[53]). Another example is the city of Paris, France, with its Sustainable Food Plan, which, since 2009, encourages the procurement of seasonal and local food to boost the local economy and reduce environmental impact. The plan covers 1 200 municipal refectories, including in schools, retirement homes and staff lunchrooms, accounting for over 30 million meals a year. Procurement is also adapted to the built environment, where local governments can help to develop markets for circular products and services (City of Paris, 2015[54]). For example, the city of Amersfoort, Netherlands, has implemented circular public procurement for construction since 2016, with a tender volume of approximately EUR 100 million per year. Besides the renovation of the town hall and the construction of the new Amersfoort ring road projects, various initiatives have been launched such as an online knowledge platform where project leaders can share experiences with circular procurement (Municipality of Amersfoort, 2020[55]). Another example is the city of Copenhagen, Denmark, which developed a strategic document *Sustainability in Construction and Civil Works* in 2016, which sets out environmental requirements for construction and civil works, for instance, by stating that all materials suitable for recycling must be source-separated and cleaned, unless applicable exceptions apply (City of Copenhagen, 2016[56]). Box 3.5 also provides examples of how the Brussels-Capital Region promotes the inclusion of circular economy criteria into public procurement processes.

Box 3.5. Circular public procurement practices in the Brussels-Capital Region, Belgium

The Brussels-Capital Region actively promotes initiatives to include circular economy criteria in public procurement processes. Some examples are:

- "**Buyer meet suppliers**" events provide public authorities with the opportunity to meet suppliers. These events allow public authorities to have a more comprehensive overview of possible solutions while being able to meet a variety of suppliers. Moreover, the presence of different suppliers at the event can increase competitiveness, stimulate innovation and forge synergies.
- **Innovative public procurement** allows providing the supplier with space for innovation to co-create a solution. This solution is particularly relevant in cases where the buyer lacks a precise definition of the solution they are looking for but is instead looking for a set of key performance outcomes. The Brussels-Capital Region launched this process with the main transport company in Brussels (Steebe, in charge of metro, tram and bus management) to achieve a citywide mobility system that encourages multi-modality.

- The Brussels-Capital Region offers **training** for public authority buyers in the introduction of sustainable criteria. This capacity-building initiative aims to provide guidelines on the criteria that authorities can include, which is often one of the main challenges.

Due to the broad approach of the circular economy, the Brussels-Capital Region also divides the tenders into product design, product use and the phase of closing loops:

- In terms of product **design**, there are a number of criteria that products have to comply with before they are ready for use. For example, the Brussels-Capital Region has made it compulsory to purchase second-hand furniture.
- Focusing on the product **use phase**, the Brussels-Capital Region designs tenders aimed at guaranteeing the maximum usage time of a product through tenders based on performance rather than ownership.
- The Brussels-Capital Region also designs tenders targeting the **phase of closing the loop**. For example, some of the requirements include suppliers reusing assets at the end of the product use phase. For instance, this applies to IT equipment, requiring equipment to be reused or donated to an association for reuse at the end of its use phase.

Finally, the Brussels-Capital Region has created incentives for local administrations to include circular criteria. The introduction of circular criteria in these processes can often be challenging for local authorities due to concerns about the price escalation caused by these requirements. The region awards non-monetary prizes to those administrations that adopt circular criteria with the recognition of being “exemplary in a circular economy”, providing visibility and acknowledgement of their efforts.

Source: OECD mission to Tallinn (16-19 November 2021).

Financing

Tallinn could help mobilise financial resources and foster efficient allocation of resources to support companies adopting circular economy principles. This may take the form of grants or subsidies or guarantees to secure access to external financing. For instance, the city of Montreal, Canada, provides financial support through several instruments: municipal funding, venture capital funds, innovation grants and sectoral calls for projects (Box 3.6). The Hague in the Netherlands adopts a tailor-made funding strategy for each circular project by matching the right funding instruments (e.g. European funds such as Interreg and regional funds such as the European Regional Development Fund) to the planned activities. The Hague also proposes co-financing for the projects that require additional funding as a complement to grants and considers alternative types of funding (e.g. loans or guarantees) to ensure optimal funding decision making (City of The Hague, 2019[57]). Furthermore, public-private partnerships can be useful in de-risking circular economy projects (UNEP, 2020[58]). The UK-based private equity firm Circular Capital works actively with other frontrunners such as Circular Glasgow, an initiative launched and hosted by Glasgow Chamber of Commerce (2017[59]). In 2006, the government of Flanders, Belgium, set up the Circular Flanders initiative (2018[60]), a public-private partnership which finances circular economy projects in areas such as construction, energy, water, trade and plastics, among others. As of 2019, the initiative has supported 135 projects through its subsidy scheme. Beyond incentivising private investment through economic instruments (e.g. tax reliefs, exemptions, cross-border EPR systems), public funds could also be focused on funding initial phases of research and development (R&D), complemented with blended-finance models and supported by GPP targeting specifically innovative circular activities and relevant digital applications (Barteková and Börkey, 2022[61]).

The city should strengthen the effectiveness of municipal grants by ensuring that projects are scaled up after the experimentation phase. As such, it is key to identify and update a set of criteria that could help

select the projects, evaluating proposals received based on the "scalability" of each project. It is also important to make distinctions across applicants (e.g. private, non-profit organisations) with different means, resources and scope. In addition, the city should monitor and evaluate the impacts achieved by funded projects, share information on funding opportunities after the end of the grant and consider the possibility of applying external audits to the projects (OECD, 2020[3]). For example, between 2017 and 2018, the city of Valladolid, Spain, operated a grant programme for circular projects to support the development of local circular initiatives to create jobs and economic prosperity. Through this programme, the local government financed a total of 61 projects for a total budget of EUR 960 000 benefitting in particular private companies, business associations, non-profit entities and research centres based in the city. However, projects struggled to scale up after the experimentation phase (City of Valladolid, 2017[62]).

Box 3.6. Examples of funding actions in favour of the circular economy in Montreal, Canada

The city of Montreal provides financial support to the circular economy ecosystem through various financing and investment instruments:

- **Municipal funding.** The city adopted a dedicated budget in 2020 to develop the Circular Economy Roadmap of Montreal (*Feuille de route montréalaise en économie circulaire*) with dedicated budgets in the city's 2022-2030 Downtown Strategy to ensure smooth implementation. The roadmap complements the Montréal 2030 strategic plan, the Montreal Zéro Déchêts 2020-2025 action plan and the Montreal Climate Plan 2020-2030.
- **Venture capital funds.** In collaboration with Fondaction, a fund committed to sustainable development, and Recyc-Québec, a recovery and recycling company, in 2021, the city launched Canada's first private venture capital fund in the circular economy. With a target capitalisation of CAD 30 million and a contribution of CAD 3 million from Recyc-Québec, it aims to support SMEs in the agri-food, recycling, resource recovery and eco-construction sectors.
- **Innovation grants.** In 2022, the city adopted a grant programme to support start-up pilot projects with the aim of stimulating innovations that respond to an urban challenge, ecological transition or labour shortage. The Open Innovation Grant (*subvention à l'innovation ouverte*) encourages emerging companies to collaborate with established organisations in the city to test innovative solutions in a business context, especially related to the circular economy.
- **Sectoral subsidy programmes.** In 2022, the city launched the Sustainable Development and Mobility Programme (*Programme aménagement et mobilité durables*) which finances projects up to CAD 1 million to reduce energy consumption or protect the environment, including the development of circular economy practices. In 2021, the city earmarked CAD 59.7 million for the Sustainable Industrial Buildings Program, which offers subsidies to industrial buildings supporting construction or renovation work that respects sustainable development principles (in particular UN SDGs 9 and 11).
- **Sectoral call for projects.** Within the "Challenge in social economy - Acting for the ecological transition" (*Défi en économie sociale - Agir pour la transition écologique*) launched in 2021, the city funded two projects to reduce textile and construction waste to the tune of CAD 500 000 each. The *Architecture sans frontières* project aims to reduce the waste of construction, deconstruction and renovation materials and the *Renaissance* industrial pilot project aims to create new products from recycled clothing.

Source: OECD (2022[63]), *Vers une stratégie d'économie circulaire à Montréal*, https://www.oecd.org/cfe/cities/Montreal_economie_circulaire.pdf,

Capacity building

Tallinn can foresee two types of training programmes: internal (for public administrations) and external (e.g. for business).

- Internal training can be related to technical issues for specific sectors, from food to construction, or to the use of tools for enhancing the circular economy, from creating ad hoc strategies to improving GPP. First, Tallinn should review and analyse the required skills and capacities for carrying out all activities associated with the design, definition, implementing and monitoring of the future circular economy strategy of Tallinn. As emerged from the gap analysis above, Tallinn should prioritise building capacities for the newly created Circular Economy Department and the Purchasing and Procurement Centre of the Tallinn Strategic Management Office to ensure that public officials have the right skills to work on procurement innovations. The Amsterdam Metropolitan Area (AMA), Netherlands, identified six groups of skills relevant to future circular jobs: basic skills (capacities that facilitate acquiring new knowledge); complex problem solving (abilities to solve new, complex problems in real-world settings); resource management skills (capacities for efficient resource allocation); social skills (abilities to work with people towards achieving common goals); system skills (capacities to understand, evaluate and enhance "sociotechnical systems"); and technical skills (competencies to design, arrange, use and repair machines and technological systems) (Circle Economy/EHERO, 2018[64]). There are opportunities for Tallinn to **learn from its peers**. For example, Tallinn could seek to collaborate with other Estonian municipalities on circular economy issues through the framework of the R-Klubi (Green Club) network launched by the engage with the AECM. This initiative, initiated in April 2023, aims to address strategic environmental and climate issues to support and promote the green transition in local government's daily activities and investments. R-Klubi is foreseen to be a platform and network for public officials from local governments to share knowledge and experience on green initiatives. The city of Tallinn could use this platform to present the work on the circular economy, learn from other experiences and seek guidance from other cities. Regarding exchange with cities abroad, Tallinn could explore co-ordination opportunities with nearby cities that are well advanced in their circular transition such as Helsinki, Finland.
- External training can provide entrepreneurs and employees with deeper knowledge and tools to succeed in their circular projects and discover business opportunities in a circular economy. This training could target business actors and be supported by the city in collaboration with universities, such as Tallinn University of Technology, the Estonian Academy of Arts and Tallinn University. For example, as part of the Circular Flanders initiative (Belgium), the Public Waste Agency of Flanders (OVAM) offers a masterclass on the circular economy. In four half-day sessions, participants are trained to identify the opportunities for their business to adopt circular economy principles (Circular Flanders, 2023[65]). Glasgow Chamber of Commerce, UK, has organised workshops and events to build capacity and share good practices among businesses aiming at transitioning to the circular economy, especially on topics such as manufacturing, low carbon and renewables, retail, textiles and fashion (Glasgow Chamber of Commerce, 2017[59]). In 2022, the City Council of Dublin, Ireland, supported by the Eastern-Midlands Regional Waste Management Office, developed MODOS, a circular economy training programme for micro, small- and medium-sized enterprises in the construction and the built environment, food, retail, manufacturing, textiles and fashion, electronics, plastics and packaging sectors. Training can also provide city administrations with the skills and knowledge to successfully implement circular economy strategies, initiatives and projects (Local Enterprise Office Dublin City, 2022[66]). For example, in 2018 the city of Toronto, Canada, established the Unit for Research, Innovation and Circular Economy within the Solid Waste Management Services (SWMS) Division (Ellen McArthur Foundation, 2019[67]) to support the development of the circular procurement project, together with nine other city divisions (Recycling Council of Ontario, 2018[68]). This unit supports both internal and external circular economy training

and capacity building, for instance, by holding one-on-one discussions to explore how setting a cross-divisional working group could impact each division's procurements or by holding cross-divisional workshops to develop the circular economy framework for Toronto. The Paris Region Institute in France intervenes in areas such as energy efficiency and renovation, circular economy, planning and sustainable building, through its Energy and Climate Department. The institute aims to increase the skills of city actors in these areas, in particular elected officials and technicians of the local authorities, by proposing tailor-made educational tools and by organising training and workshops (FEDARENE, 2023[69]). In 2021, the Basque Government and Bilbao City Council, Spain, set up the Basque Circular Hub as a result of a public-private partnership. This circular economy services centre, managed by the Public Society of Environmental Management of the Basque Country (IHOBE), aims to support 500 companies and train 1 200 professionals by 2024. Since 2021, the hub supports the city of Bilbao in the development of a circular economy roadmap and in the search for innovative circular solutions (Basque Government, 2021[70]).

Innovation

Despite a large number of incubators present in the city, support services for start-ups in their transition to the circular economy are incipient. The entrepreneurial and innovative environment of Tallinn, especially in the IT sector, and the large number of initiatives aimed at supporting start-ups (e-residence, incubators) can be useful to stimulate action towards a circular economy from local businesses. There are some measures that the city can consider supporting business development, including:

- **Organising hackathons and idea competitions on the circular economy**. Building on the experience of organising hackathons on strategic areas of the city, such as waste management, green technologies and the design of the future of Tallinn, the city could pose a number of local challenges (e.g. projected increase in single-person households, waste generation) to be solved through solutions that include circular economy principles. Once the main ideas have been identified, they should be accompanied by incubation and business support. In order to scale up the project, the city could consider providing financial support (through direct grants or loans, or funding programmes) and physical space for project development (e.g. in facilities provided by the municipality to businesses). Tallinn could launch a competition following the Tallinnovation model that aims at implementing Smart City solutions. For the circular economy solutions, Tallinn could co-operate with universities to provide mentoring and recommendations for project implementation to those entrepreneurs participating in the competitions.
- **Stimulating demand by being a launching customer**. Tallinn can be the first customer to stimulate demand and encourage business in small companies and start-ups. More specifically, circular design products and technological solutions (e.g. in the recycling processes) need demand to be in the market. Tallinn can stimulate this demand by seeking solutions. If the solution provided by a project is successful, the municipality can invest in it, being the first customer of innovative products and goods.
- **Establishing a one-stop-shop on the circular economy for SMEs**. Tallinn could aim to offer all services, information and administrative support regarding circular economy projects for businesses, in order to reduce transaction costs for entrepreneurs and SMEs willing to be a part of the transition. This single window could be incorporated within the section on the circular economy of the municipal website.

International practices show evidence of how cities support innovation and encourage the development of new circular products and business models. In 2017, the city of Rotterdam, Netherlands, revitalised a former water park resort, turning it into the BlueCity business park, a circular incubator that provides over 30 start-ups and scale-ups access to resources, knowledge and expertise on circular economy areas such as the built environment, food, textile and plastics (EU, 2017[71]). The city of Espoo, Finland, co-ordinated

the Smart and Clean - Collaborative Kera 2022-2023 project, which aims to transform the Kera industrial area into a smart and circular district, consisting of repurposed buildings and new circular buildings for housing and a physical hub. This hub, supported by a digital platform, will facilitate the co-creation of new circular ideas through networking, experimentation and prototyping (City of Espoo, 2022[72]). Finally, Box 3.7 shows how the city of Montreal, Canada, is encouraging business innovation in the field of circular economy.

Box 3.7. Actions to support innovation and business development in the circular economy in Montreal, Canada

The city of Montreal encourages innovation in the field of the circular economy through:

- **Calls for projects and support for pilot projects.** As part of Reinventing Montreal (*Réinventer Montréal*), the city seeks to rethink the use of a former industrial site, 4 000 Saint-Patrick, which covers 28 000 square metres. Sid Lee Architecture won the international call for projects launched in 2020 with its Les Ateliers Cabot project, which aims to transform the former industrial site into an artistic, entrepreneurial and technological hub.
- **Programmes.** The city of Montreal has set several programmes to provide financial support to incubators and accelerators, to support the development of pilot projects. The 2022 Montréal in Common programme (*Montréal en commun*), led by the Montreal Urban Innovation Laboratory, aims to test 13 innovative projects on mobility, food and data through a CAD 50 million award from the government of Canada as part of the Smart Cities Challenge.
- **Innovation incubators and accelerators.** The city supports the Esplanade, an accelerator for social and environmental impact businesses, which seeks to support innovative solutions related to the circular economy, the environment and the climate. Since 2015, the Esplanade has accelerated 254 businesses, supported 22 cohorts and mobilised over 100 coaches.
- **Collaborations with knowledge institutions.** The city collaborates with certain universities and research centres such as the Policy Lab of McGill University and the Centre for Intersectoral Studies and Research on the Circular Economy (CERIEC) of the École de technologie supérieure (ÉTS) set up in 2020 to help shape and deploy the circular economy. CERIEC co-ordinates the Quebec Circular Economy Research Network, which aims at building capacity to deploy circular economy strategies at the scale of industrial sectors and territories.
- **Co-operation with networks.** The city collaborates with the PME MTL Est-de-l'Île network to support the Synergie Montréal initiative with a financial contribution of CAD 1 275 000 until the end of 2024. Synergie Montréal supports companies in integrating circularity strategies into their business model, having supported 1 900 companies and contributed to the achievement of more than 200 synergies between 2018 and 2021.

Source: Reinventing Cities (2020[73]), *Réinventer Montréal*, https://www.c40reinventingcities.org/en/events/reinventer-montreal-presentation-publique-public-presentation-1531.html; City of Montreal (2020[74]), "Montréal en commun : la ville comme laboratoire", https://montreal.ca/articles/montreal-en-commun-la-ville-comme-laboratoire-15119; Esplanade (2023[75]), *Homepage*, https://esplanade.quebec/; PME MTL (2023[76]), *Synergie Montréal*, https://pmemtl.com/outils-et-ressources/synergie-montreal.

Data and assessment

A circular strategy for the city of Tallinn should be accompanied by a set of indicators to measure progress and impacts. Developing a monitoring framework for the future circular economy strategy can help assess progress made on the achievement of the targets. For the design of the monitoring framework, Tallinn could be inspired by the structure defined by the OECD Expert Group on a New Generation of Information for a Resource-efficient and Circular Economy (RECE-XG), which identified a set of key indicators to measure the following dimensions: material life cycle and value chain; interactions with the environment; responses and actions and socio-economic opportunities for a just transition (Table 3.3). Tallinn could incorporate circular economy data into the city's dashboard and make it available to the public. The Tallinn Dashboard contains green statistics on air quality, noise, municipal waste (e.g. treatment and collection), water (access to drinking water, wastewater reuse), nature and biodiversity, green spaces and sustainable land use (City of Tallinn, 2023[77]). The city could complement these data by addressing other fields such as reuse and use (amount of waste deposited at Waste Centres or the amount of the items collected in Reuse Centres [*MTÜ Uuskasutuskeskus*]), the economic dimension (e.g. number of companies implementing circular business models) and the social dimension (e.g. number of jobs from circular economy-related activities). A number of cities have developed monitoring frameworks to assess progress towards their strategies (Box 3.8). The OECD collected more than 400 circular economy indicators in its *Inventory of Circular Economy Indicators*, gathering indicators from 29 circular economy strategies (OECD, 2020[78]).

Tallinn could also assess the progress towards the enabling conditions for the circular economy by using the OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions (Box 3.9). The OECD scoreboard is a self-assessment tool of governance which aims at supporting cities and regions, to evaluate the level of implementation of circular policies and identify gaps. The scoreboard results from a literature review that collected over 450 indicators from national, regional and local circular economy strategies, the *OECD Inventory of Circular Economy Indicators* and discussions at the OECD online workshop "Measuring circularity in cities and regions through the OECD Scoreboard" (OECD, 2020[3]).

Table 3.3. Frameworks, themes and indicators identified by the OECD expert group RECE-XG to monitor progress towards a circular economy

Framework	Themes	Indicator topics - Aspects to be considered
Material life cycle and value chain	The material basis of the economy	▪ Material inputs and consumption: share of renewable materials and recyclable materials. ▪ Material accumulation in the economy.
	The circularity of material flows and the management efficiency of materials and waste	▪ Waste generation. ▪ Contribution of secondary raw materials to material inputs or consumption. ▪ Contribution of renewable materials to production processes. ▪ Products diverted from the waste stream through repair, remanufacture and reuse. ▪ Materials diverted from final disposal through recycling and recovery. ▪ Materials leaving the economic cycle.
	Interactions with trade	▪ Material exports, imports, trade balance.
Interactions with the environment	Natural resource implications	▪ Material extraction (used). ▪ Natural resource residuals (unused extraction). ▪ Changes in natural resource stocks; extraction rates and depletion ratios. ▪ Water abstracted for material extraction and processing. • Intensity of use of forest resources.
	Environmental quality implications	▪ Impacts on climate and air quality: GHG emissions, carbon footprint of priority materials, air emissions. ▪ Impacts on water and soil quality: pollutant discharges to water from material extraction and processing; soil contamination due to material extraction and processing and end-of-life management. • Impacts on biodiversity: land and habitats.

Framework	Themes	Indicator topics - Aspects to be considered
Responses and actions	Support circular use of materials, promote recycling markets and optimise design	• Taxes, tax reliefs, transfers, regulations supporting circular business models and the use of repaired, refurbished and remanufactured goods. • Reform of subsidies encouraging unsustainable use or extraction of materials. • Circular public procurement; green public procurement; extended producer responsibility, deposit-refund, pay-as-you-throw schemes. • Design for extended lifespans, for recycling and dismantling. • Taxes on materials/products raising particular concerns. • Bans/guidelines on substances that restrict recycling.
	Improve the efficiency of waste management and close leakage pathways	• Investments in waste management. • Waste prevention and anti-littering instruments. • Bans, taxes on frequently littered items (e.g. plastics). • Bans, taxes on landfilling, on incineration without energy recovery.
	Boost innovation and orient technological change for more circular material lifecycles	• Circular economy R&D budgets of governments and businesses. • Development and international diffusion of circular economy technologies.
	Target setting and planning	• Targets on: resource productivity, recycling, recycled content, waste reduction and prevention and landfilling. • Circular economy plans and strategies.
	Strengthen financial flows for a circular economy and reduced leakage	• Domestic flows: government and business expenditure on circular economy activities; government budgets allocated to circular economy objectives (link to green budgeting). • International flows: circular economy-related official development assistance (ODA); foreign direct investment (FDI).
	Inform, educate, train	• Product and packaging instruments: eco-labelling, certification schemes, … • Integration of circular economy issues in school curricula and professional training. • Other information and communication instruments.
Socio-economic opportunities for a just transition	Market developments and new business models	• Circular economy entrepreneurship, goods and services; business models, start-ups, industrial ecology/symbiosis initiatives. • Employment markets and jobs; recycling markets.
	Trade developments	• Trade in circular economy-related goods and services. • Supply security/autonomy/resilience.
	Skills, awareness and behaviour	• Circular economy literacy and skills. • Public opinion on circular economy issues. • Behavioural changes (households, consumers, firms).
	Inclusiveness of the transition	• To be defined; to reflect how different territories and population groups are affected or benefit from circular economy policies and actions (young people, women, vulnerable communities, etc.).

Note: The OECD RECE-XG and the United Nations Economic Commission for Europe Task Force on Measuring the Circular Economy (UNECE-TF), along with country representatives, have identified a set of key indicators based on an in-depth review of existing monitoring frameworks and datasets.
Source: OECD (2022[79]), *Decarbonising Buildings in Cities and Regions*, https://doi.org/10.1787/a48ce566-en.

Box 3.8. Examples of circular economy monitoring frameworks at the local level

A number of circular economy monitoring frameworks have been developed at the subnational level in several countries. Indicators employed in regional and local monitoring frameworks tend to measure the results and impacts of circular economy strategies:

- The city of Paris, France, proposes performance indicators and impact indicators for each of the 15 actions included in the *Roadmaps towards a Circular Economy*. More than 100 indicators help measure progress towards a circular economy covering areas such as: the built environment, energy, food and textile.

- The city of Amsterdam, Netherlands, measures its level of circularity using three main indicators developed in 2015 by a programme of the Ministry of Infrastructure and the Environment of the Netherlands: value preservation (measured by raw material efficiency and by the use of renewable resources), economic (measured in added value per person and the percentage of circular services in the economy) and ecological (measured by environmental costs, water pollution, CO_2 emissions) impacts.
- In Toronto, Canada, the 11 indicators from the *Circular Economy Procurement Implementation Plan and Framework* focus on the impacts and results of procurement activities, in environmental (e.g. CO_2 savings as a result of procurement activities), social (e.g. number of green jobs created and secured, number of city staff trained on circular economy procurement principles) and economic (e.g. waste reduction savings) areas.
- In Peterborough, UK, the *Circular City Roadmap* published in 2018 is monitored through eight impact-focused indicators divided into four categories to measure impacts related to: i) economic (share of circular jobs; share of circular business); ii) social (number of shares on Share Peterborough, a resource sharing platform for business in the city; share of adults cycling and walking); iii) energy (CO_2 emissions per capita; the amount of renewable electricity available to each household); and iv) waste (share of non-household waste recycled; share of household waste recycled) dimensions.
- In North Karelia, Finland, the *Roadmap of the Circular Economy of North Karelia* includes: four indicators in the field of construction and waste: the recovery rate of construction waste as material; the recycling rate of construction waste; a separate collection rate of construction waste; and construction waste.
- In Brussels, Belgium, the Regional Programme for the Circular Economy 2016-20 (PREC) includes a set of 15 proposed indicators for measurement, mainly measuring the governance of the circular economy transition.
- In Galicia, Spain, the Galician Strategy of Circular Economy 2019-2030 foresees 101 circular economy indicators to measure the level of implementation of education and awareness-raising related actions, in addition to the following actions: eco-design, service models, industry, food production, urbanism, the built environment and public works, water cycle management, waste management.

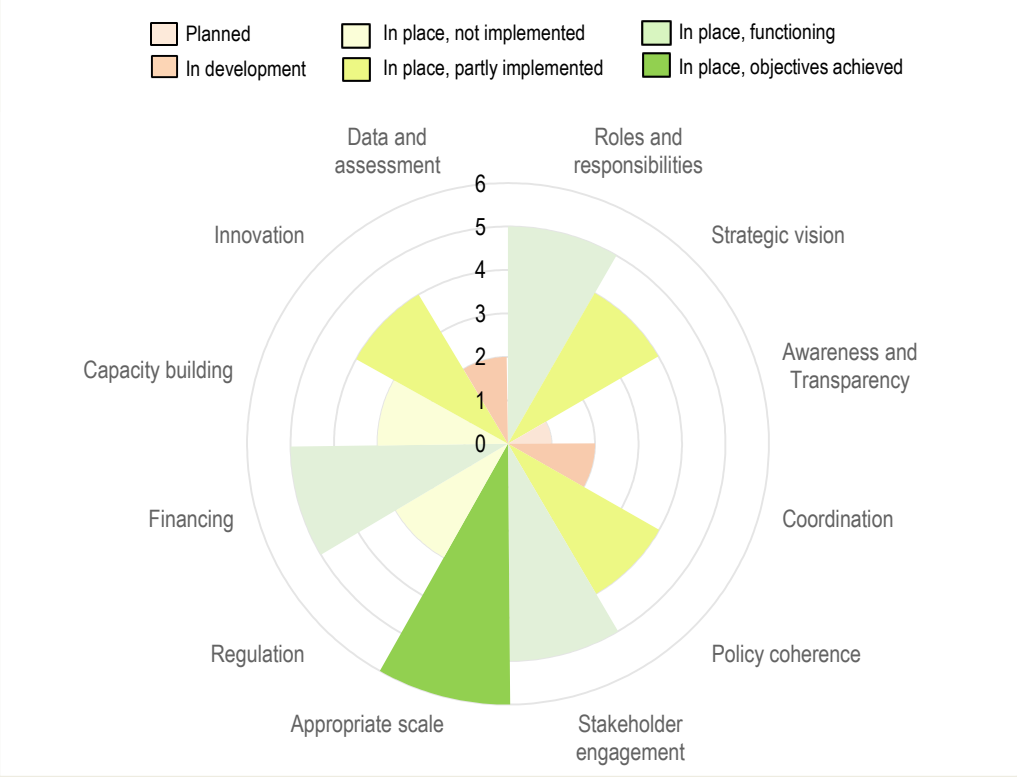
Source: OECD (forthcoming[80]), *An International Review of National and Sub-national Circular Economy Monitoring Frameworks: Lessons and Ways Forward for Italy*, OECD Publishing, Paris.

Box 3.9. OECD Scoreboard on the Governance of the Circular Economy

The OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions counts 12 key dimensions, whose implementation governments and stakeholders can evaluate based on a scoreboard system, indicating the level of implementation of each dimension: Newcomer (Planned; In development), In progress (In place, not implemented; In place, partly implemented) and Advanced (In place, functioning; In place, objectives achieved). Each dimension aims to serve as a guide for governments to promote, facilitate and enable the circular economy as follows: i) roles and responsibilities; ii) strategic vision; iii) awareness and transparency; iv) co-ordination; v) policy coherence; vi) stakeholder engagement; vii) appropriate scale; viii) regulation; ix) financing; x) capacity building; xi) innovation; xii) data and assessment. The visualisations of the results provide an overview of the level of circularity of a city or region for each of the 12 circular economy governance dimensions.

Self-assessment has been applied by a number of cities to carry out an assessment of their governance conditions. In 2020, the Scottish city of Dundee used the OECD Scoreboard on the Governance of the Circular Economy to identify the level of advancement towards a circular economy. The tool enabled the city to gather stakeholders, engage different departments, understand the state of the art of the circular transition in the city and receive valuable information to design the future vision. In 2021, the city of Montreal, Canada, applied the OECD scoreboard. enabling local stakeholders to self-assess enabling conditions towards the circular economy in the city. In total, 117 stakeholders were involved in the process and the tool served as a stepping-stone towards a circular economy strategy for the city (*Vers une feuille de route pour l'économie Montréalaise*).

Figure 3.4. Visualisation of the OECD scoreboard results



Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en; OECD (2022[63]), *Vers une stratégie d'économie circulaire à Montréal*, https://www.oecd.org/cfe/cities/Montreal_economie_circulaire.pdf.

Tallinn can also make the most of information obtained through digital tools such as digital maps, blockchain and artificial intelligence (AI) to trace the origin of materials and promote sustainability through supply chains. Digital technologies, such as AI, blockchain, the Internet of Things (IoT) and cloud computing, facilitate the transition to a more resource-efficient and circular economy, by helping overcome obstacles to the large-scale adoption of greener business models and more effective implementation of circular economy policies (Barteková and Börkey, 2022[61]). Blockchain can support the circular economy by improving transparency and traceability for producers, consumers and recyclers, as well as tracing the origin of raw materials, and provides essential data in order to promote sustainability within supply chains. AI includes the ability of machines and systems to acquire and apply knowledge and carry out intelligent behaviour. AI applications hold many promises for the circular economy, creating value in terms of productivity gains, improving and automating decision making, saving costs and enabling better resources.

For example, AI systems can help improve the monitoring of the quality of specific materials, thus reducing the demand for and dependence on virgin materials. Finally, through accurate and remote monitoring, IoT technology ensures that products are managed more efficiently, especially regarding end-of-life collection, remanufacturing and recycling. Many cities have started to use "smart bins", which are enabled with IoT sensors to track real-time the level of waste in the bin, providing key information for the collection process. In the built environment, cities have started to implement IoT monitoring for predictive maintenance or to optimise transport flows with adaptive signal control systems.

There are some international examples showing how digital tools can enable a circular economy. For instance, in 2021, the municipality of Mikkeli, Finland, used circular material management methods to undertake a circular demolition of the Pankalampi Health Centre and Tuukkala Hospital. Following a selective demolition procedure, salvaged materials were incorporated into a digital databank developed by the South-Eastern Finland University of Applied Sciences and a construction materials marketplace developed by the private company MIKSEI. The use of the marketplaces is being promoted to both private and public actors who are interested in obtaining secondary construction materials (City Loops, 2021[81]). Similarly, since 2021, the municipality of Oslo, Norway, maintains a database of the planned and ongoing demolitions to serve as "material banks" for the construction of public and private projects in the city. The database allows social enterprises such as city architects and project managers to reclaim materials when sites are demolished (ICLEI, 2020[82]). International practices show that indicators employed in local monitoring frameworks tend to measure the results and impacts of circular economy strategies. Between 2024 and 2017, the region of Chania in Greece and the city of Sevilla, Spain, implemented the LIFE EWAS "Sustainable waste management using ICT tools" project. This project aimed to optimise waste collection in terms of collection frequency and route planning by using sensors to measure the level of filing of containers (BlockWASTE, 2021[83]). More recently, the city of Prague, Czech Republic, introduced smart waste management as part of its zero-waste plan Smart Prague 2030, by providing real-time data through sensors or quick response (QR) codes (Smart Prague, 2017[84]). To date, the city has implemented three pilot projects: Smart Waste Collection (2022), Radio-Frequency Identification (RFID) Waste Bins (2022) and Smart Solar-Powered Compacting Bins (2017) (Smart Prague, 2022[85]).

References

BAMB (2020), *Buildings As Material Banks (BAMB2020)*, https://www.bamb2020.eu/ (accessed on 30 April 2019). [28]

Barteková, E. and P. Börkey (2022), "Digitalisation for the transition to a resource efficient and circular economy", *OECD Environment Working Papers*, No. 192, OECD Publishing, Paris, https://doi.org/10.1787/6f6d18e7-en. [61]

Basque Government (2021), "The Basque Government and Bilbao City Council set up the first advanced circular economy services centre in Southern Europe", https://www.euskadi.eus/news/2021/the-basque-government-and-bilbao-city-council-set-up-the-first-advanced-circular-economy-services-centre-in-southern-europe/web01-ejeduki/en/. [70]

BlockWASTE (2021), *State of Digitalization in European Municipal Waste Management*, https://blockwasteproject.eu/wp-content/uploads/2021/10/O1.A2.1-Comparative-State-of-Digitalization-in-Municipal-Waste-Management.pdf. [83]

Bruxelles Environnement (2022), *Label Resto Good Food*, https://environnement.brussels/thematiques/alimentation/restauration-et-cantines/label-good-food-resto. [23]

C40 Cities/Climate-KIC (2018), *Municipality-led Circular Economy Case Studies*, https://circulareconomy.europa.eu/platform/sites/default/files/circular-cities.pdf. [38]

Charbit, C. and M. Michalun (2009), "Mind the Gaps: Managing Mutual Dependence in Relations among Levels of Government", *OECD Working Papers on Public Governance*, No. 14, OECD Publishing, Paris, https://doi.org/10.1787/221253707200. [1]

Circle Economy/EHERO (2018), *Jobs & Skills in the Circular Economy: State of Play and Future Pathways*, https://www.circle-economy.com/resources/jobs-skills-in-the-circular-economy-state-of-play-and-future-pathways. [64]

Circle Economy et al. (2016), *Circular Amsterdam - A Vision and Action Agenda for the City and Metropolitan Area*, https://www.circle-economy.com/resources/developing-a-roadmap-for-the-first-circular-city-amsterdam (accessed on 30 April 2019). [19]

Circular Flanders (2023), *Everything about Circular Flanders*, https://vlaanderen-circulair.be/en/about-us. [65]

Circular Flanders (2018), *Together Towards a Circular Economy*, https://circulareconomy.europa.eu/platform/sites/default/files/kick-off_statement_circular_flanders.pdf. [60]

Circular Quebec (2019), *The Quebec Approach - Key Steps*, https://www.quebeccirculaire.org/static/la-demarche-quebecoise.html. [36]

Circular Regions (2020), *Tingenes Bibliotek*, https://circularregions.org/initiatives/tingenesbibliotek/. [46]

City Loops (2021), "Selective demolition of two buildings in Mikkeli", https://cityloops.eu/news?c=search&uid=BYpFwjwd. [81]

City of Amsterdam (2020), *Amsterdam Circular Strategy 2020-2025*, https://www.amsterdam.nl/en/policy/sustainability/circular-economy/. [33]

City of Amsterdam (2020), *The Circular Economy Monitor: An Outline*, https://onderzoek.amsterdam.nl/publicatie/the-circular-economy-monitor-an-outline. [35]

City of Calgary (2022), *Calgary Climate Strategy – Pathways to 2050*, https://www.calgary.ca/environment/climate.html?redirect=/climate-strategy#:~:text=Our%20strategy&text=Approved%20by%20Council%20July%205%2can%20accelerated%20pace%20and%20scale. [41]

City of Copenhagen (2016), *Sustainability in construction and civil works 2016*, https://kk.sites.itera.dk/apps/kk_pub2/index.asp?mode=detalje&id=%202071. [56]

City of Espoo (2022), *Smart and Clean - Collaborative Kera*, https://www.espoo.fi/en/kestava-kehitys/smart-and-clean-collaborative-kera. [72]

City of Guelph (2020), *Creating Canada's First Circular Food Economy*, https://guelph.ca/wp-content/uploads/SmartCities_Booklet.pdf. [21]

City of Liege (2017), *Reinventing Liege*, https://www.reinventonsliege.be/plus-dinfos/demarches-mobilisatrices. [45]

City of London (2020), *Climate Action Strategy 2020-2027*, https://www.cityoflondon.gov.uk/assets/Services-Environment/climate-action-strategy-2020-2027-20-10-20.pdf. [43]

City of Montreal (2020), "Montréal en commun : la ville comme laboratoire", https://montreal.ca/articles/montreal-en-commun-la-ville-comme-laboratoire-15119. [74]

City of Paris (2018), *Paris Circular Roadmap*, https://cdn.paris.fr/paris/2019/07/24/58d790111b39273c144ddc19744a1b5c.pdf. [24]

City of Paris (2015), *Paris Sustainable Food Plan 2015-2020*, https://cdn.paris.fr/paris/2019/07/24/725249f7bb31e255a00a85dfa98037e6.pdf. [54]

City of Rotterdam (2019), *From Trash to Treasure - Rotterdam Circularity Programme 2019-2023*, https://rotterdamcirculair.nl/wp-content/uploads/2019/05/Rotterdam_Circularity_Programme_2019-2023.pdf. [18]

City of Roubaix (2022), *Circular Economy Strategy 2022-2026*, https://www.roubaixzerodechet.fr/wp-content/uploads/2022/09/Strategie-politique-Economie-circulaire-version-CM.pdf. [16]

City of Tallinn (2023), *Green Stats*, https://www.tallinn.ee/et/statistika/rohe-statistika. [77]

City of Tallinn (2023), *Open the City Application*, http://www.tallinn.ee/en/tallinnovation/open-city-application. [44]

City of Tallinn (2023), *Tallinn Statistical Yearbook*, https://www.tallinn.ee/et/statistika/tallinna-statistika-aastaraamat-tallinn-arvudes. [6]

City of The Hague (2019), *Nature and Environment in the City of The Hague*, https://www.denhaag.nl/en/in-the-city/nature-and-environment.htm. [57]

City of Turku (2021), *Supporting Circular Food Systems through Public Procurement*, https://www.turku.fi/sites/default/files/atoms/files//circular_turku_-_case_study_5.pdf. [53]

City of Valladolid (2017), *Circular Economy in Valladolid*, http://www.valladolidadelante.es/sites/default/files/Circular%20Economy_Valladolid.pdf. [62]

CREM (2018), *Getting Started with the Circular Hotels Leaders Group*, https://crem.nl/en/965/. [26]

EC (2023), *Roubaix*, European Commission, https://circular-cities-and-regions.ec.europa.eu/pilots/roubaix. [15]

EIB (2021), *The 15 Circular Steps for Cities – Second Edition*, European Investment Bank, https://www.eib.org/attachments/thematic/circular_economy_15_steps_for_cities_second_edition_en.pdf. [50]

EIC (2022), *Homepage*, Environmental Investment Centre, https://kik.ee/en (accessed on 23 March 2022). [7]

Ellen McArthur Foundation (2019), *Circular Economy Procurement Implementation Plan and Framework: Toronto*, https://ellenmacarthurfoundation.org/circular-examples/circular-economy-procurement-implementation-plan-and-framework-toronto. [67]

Esplanade (2023), *Homepage*, https://esplanade.quebec/ (accessed on 22 March 2022). [75]

EU (2017), “BlueCity revitalises abandoned Rotterdam water park into circular laboratory”, European Union, https://circulareconomy.europa.eu/platform/en/good-practices/bluecity-revitalises-abandoned-rotterdam-water-park-circular-laboratory. [71]

FEDARENE (2023), *Paris Region Institute*, European Federation of Agencies and Regions for Energy and the Environment, https://fedarene.org/member/paris-region-institute/. [69]

Fondaction (2023), *Canada’s First Circular Economy Investment Fund*, https://www.fondaction.com/fonds-economie-circulaire/. [37]

Future Peterborough (2018), *Measuring the Circular Economy: Developing an Indicator Set for Opportunity*, http://www.futurepeterborough.com/wp-content/uploads/2018/08/Final-Report-Measuring-the-Circular-Economy-of-Peterborough-2-1.pdf. [31]

Glasgow Chamber of Commerce (2017), *Circular Glasgow*, https://www.glasgowchamberofcommerce.com/projects/circular-glasgow/. [59]

Good Food Brussels (2022), *Le champignon de Bruxelles: Producteur de Champignons*, https://goodfood.brussels/fr/commerces/le-champignon-de-bruxelles-producteur-de-champignons. [22]

Government of the Brussels-Capital Region (2016), *Programme régional en economie circulaire*, https://document.environnement.brussels/opac_css/elecfile/PROG_160308_PREC_DEF_FR. [39]

Government of the Netherlands (2016), *A Circular Economy in the Netherlands by 2050*, https://circulareconomy.europa.eu/platform/sites/default/files/17037circulaireeconomie_en.pdf . [32]

Guide Bâtiment Durable (2022), *Economie circulaire*, https://www.guidebatimentdurable.brussels/economie-circulaire. [29]

Helsinki Region Environmental Services Authority (2021), *Sustainable urban living programme*, https://julkaisu.hsy.fi/sustainable-urban-living-programme.pdf. [47]

Hotspot Holland Circular (2016), *City Deal Circular City*, https://hollandcircularhotspot.nl/case/city-deal-circular-city/. [34]

HSY (2021), *Sustainable Urban Living Programme*, Helsinki Region Environmental Services Authority, https://julkaisu.hsy.fi/sustainable-urban-living-programme.pdf. [40]

hub.brussels (2020), “Circular economy: A recovery tool for Brussels tourism?”, https://hub.brussels/en/blog/circular-economy-a-recovery-tool-for-brussels-tourism/. [25]

ICLEI (2020), *Public Procurement of Circular Construction Materials*, Local Governments for Sustainability, https://circulars.iclei.org/resource/procurementconstruction/. [82]

Knowledge Hub (2022), “Grenoble regulates outdoor advertising to reduce excessive consumption”, https://knowledge-hub.circle-lab.com/cities/article/9882?n=Grenoble-regulates-outdoor-advertising-to-reduce-excessive-consumption. [52]

Local Enterprise Office Dublin City (2022), *Modos - Circular Economy - Dublin Training Programme 2022*, https://www.localenterprise.ie/DublinCity/Training-Events/Management-Development/Modos-Circular-Economy-Dublin-Training-Programme-2022.html#:~:text=MODOS%20is%20a%20circular%20economy,Regional%20Waste%20Management%20Planning%20Office. [66]

LWARB (2017), *London's circular economy route map*, London Waste and Recycling Board, https://relondon.gov.uk/wp-content/uploads/2021/02/LWARB-ReLondons-circular-economy-route-map-for-London.pdf. [20]

Municipality of Amersfoort (2020), *Circular Procurement*, https://www.pianoo.nl/sites/default/files/documents/documents/rebusfactsheet24-gemeenteamersfoort-engels-juni2017.pdf. [55]

Net Zero Cities (2022), *City Needs, Drivers and Barriers towards Climate Neutrality*, https://www.climate-kic.org/wp-content/uploads/2022/05/DRAFT-D13.1-Report-on-city-needs-drivers-and-barriers-towards-climate-neutrality.pdf. [17]

Nordregio (2018), *Stockholm Biochar Project*, https://nordregio.org/sustainable_cities/stockholm-biochar-project/. [48]

OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, https://doi.org/10.1787/da477dda-en. [86]

OECD (2022), *Decarbonising Buildings in Cities and Regions*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/a48ce566-en. [79]

OECD (2022), *The Circular Economy in Ireland*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/7d25e0bb-en. [14]

OECD (2022), *Vers une stratégie d'économie circulaire à Montréal*, OECD, Paris, https://www.oecd.org/cfe/cities/Montreal_economie_circulaire.pdf. [63]

OECD (2021), *OECD Survey on the Circular Economy in Cities and Regions*. [4]

OECD (2021), *The Circular Economy in Glasgow, United Kingdom*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/7717a310-en. [13]

OECD (2021), *The Circular Economy in Granada, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/5f8bd827-en. [12]

OECD (2020), *The Circular Economy in Cities and Regions: Synthesis Report*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/10ac6ae4-en. [3]

OECD (2020), *The Circular Economy in Groningen, the Netherlands*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/e53348d4-en. [9]

OECD (2020), *The Circular Economy in Umeå, Sweden*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/4ec5dbcd-en. [11]

OECD (2020), *The Circular Economy in Valladolid, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/95b1d56e-en. [10]

OECD (2020), *The OECD Inventory of Circular Economy Indicators*, OECD, Paris, https://www.oecd.org/cfe/cities/InventoryCircularEconomyIndicators.pdf. [78]

OECD (2015), *OECD Recommendation of the Council on Public Procurement*, OECD, Paris, http://www.oecd.org/gov/public-procurement/OECD-Recommendation-on-Public-Procurement.pdf. [51]

OECD (2015), *The OECD Principles on Water Governance*, OECD, Paris, http://www.oecd.org/governance/oecd-principles-on-water-governance.htm. [8]

OECD (2011), *Water Governance in OECD Countries: A Multi-level Approach*, OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/9789264119284-en. [2]

OECD (forthcoming), *An International Review of National and Sub-national Circular Economy Monitoring Frameworks: Lessons and Ways Forward for Italy*, OECD Publishing, Paris. [80]

PME MTL (2023), *Synergie Montréal*, https://pmemtl.com/outils-et-ressources/synergie-montreal. [76]

port.brussels (2021), *A propos – stratégie*, https://www.port.brussels/fr/a-propos/strategie. [30]

Recycling Council of Ontario (2018), *Moving Toward a Circular Economy: Considerations for Developing a Circular Procurement*, https://circularprocurement.ca/wp-content/uploads/2021/07/Considerations-for-Developing-a-Circular-Procurement-Framework-for-Municipalities.pdf. [68]

Reinventing Cities (2020), *Réinventer Montréal*, https://www.c40reinventingcities.org/en/events/reinventer-montreal-presentation-publique-public-presentation-1531.html. [73]

RREUSE (2016), "Social enterprises in Austria launch project to help re-use construction materials", https://rreuse.org/social-enterprises-in-austria-launch-project-to-help-re-use-construction-materials/. [49]

Skills Development Scotland (2020), *Climate Change Strategy 2020-30*, https://www.skillsdevelopmentscotland.co.uk/media/47743/sds-climate-change-strategy-2020-2030-final.pdf. [42]

Smart Prague (2022), *RFID Waste Bins*, https://smartprague.eu/projects/rfid_waste_bins. [85]

Smart Prague (2017), *About Smart Prague*, https://smartprague.eu/about-smart-prague. [84]

Tivoli Green City (2023), *Le Projet*, https://www.citydev.brussels/fr/projets/tivoli-greencity. [27]

UNEP (2020), *Financing Circularity: Demystifying Finance for the Circular Economy*, United Nations Environment Programme, http://978-92-807-3803-2. [58]

World Bank (2021), *Baseline Review of Estonian Municipal Solid Waste Management System*, World Bank, Washington, DC, https://envir.ee/ringmajandus/jaatmed/jaatmevaldkonna-tervikanaluus. [5]

Notes

[1] The signatories of the City Deal were the Ministry of Infrastructure and Environment, Ministry of Economic Affairs, Ministry of Housing and Civil Services, the municipalities of Amsterdam, Almere, Apeldoorn,

Dordrecht, Haarlemmermeer, Rotterdam, Utrecht and Venlo and Circle Economy, Royal Haskoning DHV and TNO Research.

[2] Netherlands Environmental Assessment Agency (PBL), Statistics Netherlands (CBS), the National Climate Monitor, the provinces of Flevoland and Noord-Holland, the municipality of Haarlemmermeer, the Amsterdam Metropolitan Area, the Amsterdam Economic Board, the Port of Amsterdam, various departments of the city of Amsterdam, Metabolic, Doughnut Economics Action Lab, Delft University of Technology (TU Delft) and the Netherlands Organisation for Applied Scientific Research (TNO).

Annex A. List of stakeholders consulted during the policy dialogue

Table A A.1. List of stakeholders consulted during the policy dialogue

Institution	Name
AS LHV Pank	Mihkel Tamm
AS Merko Ehitus	Mait Adler
AS Tallink Grupp	Katri Link
AS Tallinn Airport GH	Eero Pärgmäe
	Carolina Sinisalu
Baltic Restaurants Estonia AS	Aaro Lode
Cleantech Estonia	Indrek Kelder
Eesti Keskkonnateenused AS	Bruno Tammaru
	Argo Luude
Eesti Pandipakend OÜ	Kerttu-Liina Urke
Enterprise Estonia	Anneli Haabu
Estonian Academy of Arts	Reet Aus
Estonian Chamber of Agriculture and Commerce	Kaie Laaneväli-Vinokurov
Estonian Design Centre	Kerli Kehman-Vaarik
Estonian Hotel and Restaurant Association	Killu Maidla
Estonian Travel and Tourism Association	Merike Hallik
Green Tiger	Erkki Vedder
Horeca Service OÜ	Raul Vaet
Ministry of Economic Affairs and Communications of Estonia	Merike Koppel
	Jekaterina Iljina
	Ede Teinbas
	Helen Roosimägi
	Jaan Saar
	Erkki Seinre
Ministry of the Environment of Estonia	Mihkel Krusberg
	Rauno Künnapuu
Ministry of Finance of Estonia	Hannes Nagel
	Kadri Jushkin
MTÜ Uuskasutuskeskus	Diana Paakspuu
Port of Tallinn	Hele-Mai Metsal
Responsible Business Forum in Estonia	Kristiina Esop
Selver AS	Heneli Lamp
Stockholm Environment Institute Tallinn Center SA	Harri Moora
Sustinere OÜ	Hanna Soe
Tallinn City Office	Aivar Riisalu
	Kristina Brandt-Kure
Tallinn City Property Department	Vello Kima
	Mailis Linde

Institution	Name
Tallinn Creative Incubator	Anu Lõhmus
	Kairi Kõrve
Tallinn Education Department	Rainer Rannala
Tallinn Strategic Management Office	Raido Roop
	Krista Kampus
	Lüüli Junti
	Liis Läte
	Kaja Kangur
	Liina Kanarbik
	Pille Arjakas
	Toomas Türk
	Krista Kiil
	Teele Joost
Tallinn University	Mihkel Kangur
Tallinn University of Technology	Jaanus Müür
	Simo Ilomets
Tallinn Urban Environment and Public Works Department	Tarmo Sulg
Tallinn Urban Planning Department	Ivari Rannama
Tallinn Waste Centre	Kristjan Mark
Tallinn Waste Recycling Centre	Kertu Tiitso
Ülemiste City	Mati Fjodorov
Wolfscape	Mirjam-Mari Marastu

OECD Urban Studies

The Circular Economy in Tallinn, Estonia

As a European Green Capital 2023, Tallinn has a unique momentum to set the foundations for its transition from a linear to a circular economy. The newly created Circular Economy Department in the city administration is a signal of this transformation. The city conceives the circular economy as a means to advance environmental goals while generating opportunities for job creation and stimulating innovation through a systems approach. This report summarises the findings from a 20-month policy dialogue between the OECD, the city of Tallinn and stakeholders from public, private and non-profit sectors. It provides the main components of existing circular economy initiatives promoted in Estonia and in the city of Tallinn, key challenges and policy recommendations to help the city develop its long-term vision on the circular economy, setting targets for the future.

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