LAND MANAGEMENT, ENVIRONMENT & SOLID-WASTE: INSIDE EDUCATION AND BUSINESS IN CENTRAL ASIA
ERASMUS-EDU-2023-CBHE Project Number: 101129032

MICRO-CREDENTIAL

CIRCULAR ECONOMY FOR LAND AND WASTE MANAGEMENT

2.- Principles and Models of Circular Economy

Reading 1

CE principles and system thinking (with short reflection questions)

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This reading introduces the circular economy as a systemic transition from linear resource use towards models that reduce waste generation, retain the value of materials, and regenerate natural systems. It is particularly relevant for land and waste management because it links circular economy principles with territorial governance, infrastructure planning, material flows, urban-rural linkages, and the need to move beyond sectoral waste-management approaches.

Students should focus especially on the Executive Summary and the sections explaining the three principles of circular economy and the systemic shift required in cities and regions.

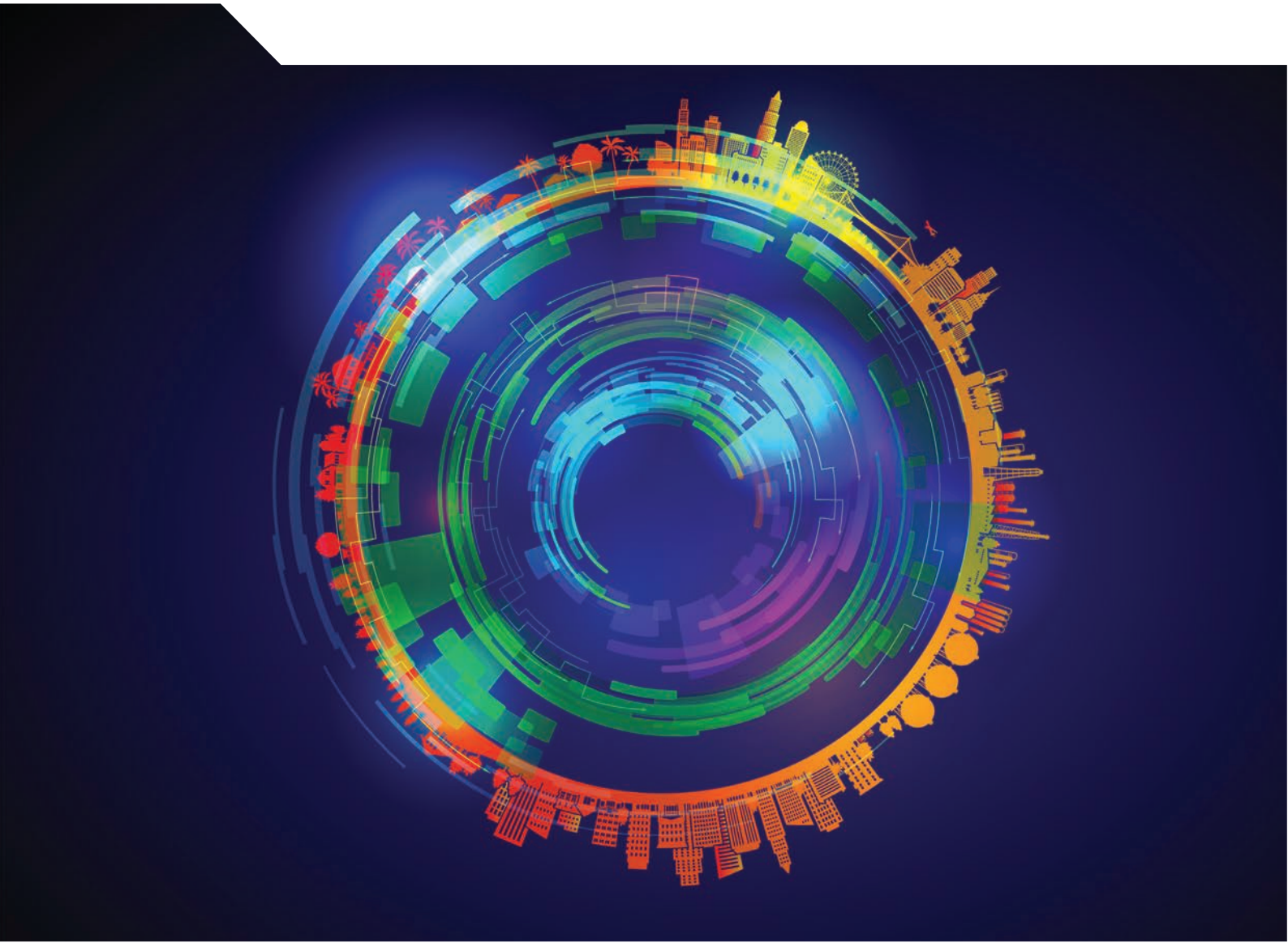
Short reflection questions

1. How does the circular economy differ from a conventional waste-management approach focused mainly on collection, treatment and disposal?
2. In land and waste management, which interventions would contribute most clearly to “designing out waste and pollution”?
3. Why does circular economy require systems thinking rather than isolated technical solutions?
4. What actors should be involved in a circular land and waste-management strategy: public authorities, companies, citizens, waste operators, land-use planners, or others?
5. Identify one example where solving a waste problem at the end of the chain could create new environmental or social problems elsewhere in the system.
6. How can land-use planning, infrastructure design and waste prevention be connected within a circular economy model?

OECD Urban Studies

The Circular Economy in Cities and Regions

SYNTHESIS REPORT



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The Circular Economy in Cities and Regions

SYNTHESIS REPORT

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BETTER POLICIES FOR BETTER LIVES

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Preface

We, Mayors and Deputy Mayors and City Leaders of Glasgow (United Kingdom), Granada (Spain), Groningen (Netherlands), Umeå (Sweden) and Valladolid (Spain), are delighted to introduce the results of this OECD report.

The COVID-19 unprecedented crisis highlighted the unsustainable nature of certain environmental and social trends. The pandemic has led to a drastic reduction in the use of fossil fuels and could lead to an 8% drop in carbon dioxide emissions globally in 2020, the lowest in decades, although temporary. Going back to "business as usual" is no longer an option but a *new normal* can be built, through bold political decisions. It is time to reconsider the way we work, move, produce and consume towards a green recovery, one that provides economic growth and social inclusion, while tackling climate change. This is especially true for urban areas, where most of the world population live and work, which account for up to 70% of greenhouse gas emissions, two-thirds of total energy demand and 50% of waste generation. If we want radical change, we should reflect on the limitations of our current linear economy, which takes and wastes resources and pursues economic growth at the expense of environmental quality. A circular economy creates value while reducing the environmental impact of the use of resources and waste disposal.

Cities and regions, sharing challenges and objectives towards greener, more inclusive and sustainable societies for all, have a key role to play in the transition to a carbon-neutral and circular economy. They hold core competencies for most policy areas underlying the circular economy such as solid waste, water, the built environment, land use or climate change. Being closer to citizens and businesses and more agile towards innovation and experimentation, local and regional governments can act as promoters, facilitators and enablers of the circular economy.

The report shows that progress has been made towards the circular economy. Cities and regions are increasingly setting long-term goals, fostering collaborations with the business sector and knowledge institutions, raising awareness on circular related practices, such as reusing, repurposing and sharing. However, much needs to be done in terms of upscaling practices and accelerating the implementation. This report provides a compendium and analysis of circular economy good practices, obstacles and opportunities. Its 3Ps analytical framework (*people, policies and places)* seeks to foster the transition towards the circular economy in cities and regions, building on policy recommendations and a scoreboard to self-assess the existence and level of implementation of enabling governance conditions.

While we are aware that this is only a first step on the road to the circular economy, we are particularly proud of the inclusive approach inherent to the development of this report and underlying recommendations and call for a massive and widespread use of them.

Susan Aitken Leader of the Council City of Glasgow (United Kingdom)	Luis Salvador Mayor City of Granada (Spain)	Glimina Chakor Deputy Mayor City of Groningen (Netherlands)	Hans Lindberg Mayor City of Umeå (Sweden)	Oscar Puente Mayor City of Valladolid (Spain)

Foreword

The circular economy is about preventing wasted resources, improving the durability of goods and products, and transforming waste into new inputs. The transition from a linear to a circular economy will be all the more relevant in the aftermath of the COVID-19 crisis when cities and regions will be urged to reconsider the link between environment and health, and reflect on the dematerialisation of the economy and society and on circular resources loops in response to the hyper-globalisation of the recent years.

In cities and regions, the circular economy should ensure that:

- *Services* (e.g. from water to waste and energy) are provided while preventing waste generation, making efficient use of natural resources as primary materials, optimising their reuse and allowing synergies across sectors.
- *Economic activities* are planned and executed in a way to close, slow and narrow loops across value chains.
- *Infrastructure* is designed and built to avoid linear lock-in, which uses resources intensively and inefficiently.

In the post-COVID-19 era, the circular economy can become the *new normal* and play a significant role to support local and national governments in their recovery packages to build back better. This unprecedented crisis highlighted the unsustainable nature of certain economic, environmental and social trends and the need to rethink from the ground up our production and consumption patterns towards a green recovery. The circular economy can help address such unsustainable trends leading to an inefficient water, energy and material use, as well as to air and soil pollution and find adequate solutions, particularly at the local level. Cities have a role to play in closing the loops, reducing waste, reusing resources and restoring ecosystems alongside long-term recovery measures for more resilient, sustainable and thriving societies.

This synthesis report provides an analytical framework, policy recommendations and a checklist for action for the transition towards the circular economy in cities, regions and countries. It builds on a 2-year policy dialogue with 300 stakeholders, a dedicated survey across 51 cities and regions from OECD countries, as well as in-depth case studies and knowledge sharing activities with Glasgow (United Kingdom), Granada (Spain), Groningen (Netherlands), Umeå (Sweden), Valladolid (Spain) and Ireland.

The report was produced as part of the OECD Programme on the Circular Economy in Cities and Regions, which aims to support national and subnational governments in their transition towards the circular economy through evidence-based analysis, multi-stakeholder dialogues, tailored recommendations and customised action plans. Going forward, the programme will strive to build further opportunities, evidence and recommendations to make the circular economy part of the solution towards healthier, less resource-wasteful and environmentally aware societies.

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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.

The report and underlying policy dialogues were co-ordinated by Oriana Romano, Head of the Water Governance and Circular Economy Unit, under the supervision of Aziza Akhmouch, Head of the Cities, Urban Policies and Sustainable Development Division in the CFE. The report was drafted by a core OECD team of experts comprised of Oriana Romano, Luis Cecchi, Policy Analyst, and Ander Eizaguirre, Junior Policy Analyst, with input from Elisa Elliott Alonso, Junior Policy Analyst. Authors are grateful for input and comments received on the survey and the draft report from Soo-Jin Kim, Deputy Head of Division, Stefano Marta, Programme Coordinator, A Territorial approach to the SDGs and Tadashi Matsumoto, Head of the Sustainable Development and Global Relations Unit from the Cities, Urban Policies and Sustainable Development Division in the CFE, and Peter Borkey, Principal Administrator of the Circular Economy and Resource Productivity Unit in the Environment Directorate (ENV).

Special thanks are conveyed to the 51 cities and regions surveyed (see the list in Annex A) for their responses to the questionnaire and feedback throughout the project. The authors thank the organisations and institutions that helped disseminate the survey to cities and regions, namely the Committee of Regions (CoR) Commission for the Environment, Climate Change and Energy (ENVE), ICLEI (Local Governments for Sustainability) and Zero Waste Europe, as well as to the Circular Economy Unit at the Climate Change Office (*Oficina de Cambio Climático*) of the Ministry of the Environment in Chile, the Environment, Sustainable Development and Circular Economy Institute (*Environnement, Développement Durable et Économie Circulaire*) of the Polytechnic University of Montréal (Quebec, Canada).

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Abbreviations and acronyms

AMB	Barcelona Metropolitan Area (*Àrea Metropolitana de Barcelona*)
ACEF	Amsterdam Climate & Energy Fund
AMA	Amsterdam Metropolitan Area
AWM	Waste Management Cooperation Munich (*Abfallwirtschaftsbetrieb München*)
BBL	Federation for a Better Environment (*Bond Beter Leefmilieu*)
CFE	Centre for Entrepreneurship, SMEs, Regions and Cities
CIP	Circular Innovation Program
CO2	Carbon dioxide
CoR	Committee of Regions
DAWE	Department of Agriculture, Water and the Environment
DCCAE	Department of Communications, Climate Action and Environment
DGAV	Directorate General of Food and Veterinary Medicine
DISER	Department of Industry, Science, Energy and Resources
DMC	Domestic Material Consumption
EC	European Commission
EEA	European Environmental Agency
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EPA	Environmental Protection Agency
EPOC	Environment Policy Committee
EPR	Extended Producer Responsibility
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organization
FEMP	Spanish Federation of Municipalities and Provinces (*Federación Española de Municipios y Provincias*)
FUA	Functional Urban Areas
GBP	British Pound
GDCP	Green Deal Circular Procurement
GDP	Gross Domestic Product
GHG	Greenhouse gas
GPP	Green Public Procurement

GVA	Gross Value Added
ICT	Information and Communications Technology
IEA	International Energy Agency
ITACYL	Technological Agricultural Institute of Castile and León (*Instituto Tecnológico Agrario de Castilla y León*)
LIPOR	Intermunicipal Waste Management Service of Greater Porto
LWARB	London Waste and Recovery Board
MAPAMA	Ministry of Agriculture and Fisheries, Food and the Environment (*Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente*)
MINECO	Ministry of Economic Affairs and Digital Transformation (*Ministerio de Asuntos Económicos y Transformación Digital*)
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OVAM	Public Waste Agency of Flanders (*Openbare Afvalstoffenmaatschappij voor het Vlaams Gewest*)
PPA	Portuguese Water Partnership
PPS	Portuguese Soil Partnership
PRAEC	Regional Action Plan for the Circular Economy (*Plan Régional d'Action en faveur de l'Economie Circulaire*)
PRPGD	Regional Plan for Waste Prevention and Management (*Plan Régional Occitanie de Prévention et de Gestion des Déchets*)
PUB	Public Utilities Board
R&D	Research and development
RAP	Reclaimed Asphalt Pavement
RDPC	Regional Development Policy Committee
RISN	Resource Innovation and Solutions Network
RMC	Raw material consumption
SBIR	Small Business Innovation Research
SDG	Sustainable Development Goal
SITRA	Finland the Finnish Innovation Fund
SMEs	Small- and medium-sized enterprises
SPQ	Portuguese Quality System
SPW	Walloon Public Service (*Service Public de Wallonie*)
TOTEM	Totem tool for construction sector
UN	United Nations
USD	American Dollar
UVa	University of Valladolid
VVSG	Association of Flemish Cities and Municipalities (*Vereniging van Vlaamse Steden en Gemeenten*)

Executive summary

The places where people live and work, consume and dispose hold a fundamental role in the transition to a circular economy. By 2050, the global population is estimated to reach 9 billion people, 55% of which will be living in cities. 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, produce up to 50% of solid waste and are responsible for 70% of greenhouse gas emissions. It is estimated that globally by 2050, the levels of municipal solid waste will double. The COVID-19 crisis highlighted the unsustainable nature of certain environmental and social trends and led to reconsiderations around current production and consumption patterns towards a green recovery. Through more efficient use of resources, eco-design, reuse, repurpose and remanufacturing, the circular economy is an opportunity for a new way of thinking and an example of resilience in the face of future crises.

The circular economy is based on three principles: i) design out waste and pollution; ii) keep products and materials in use; and iii) regenerate natural systems. In cities and regions, the circular economy implies a systemic shift, whereby: *services* 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 *infrastructure* is designed and built to avoid linear lock-in to avoid material waste.

The circular economy is expected to generate positive impacts on the environment through reducing atmospheric emissions, increasing the share of renewable energy and recyclable resources, as well as reducing the use of raw materials, water, land and energy. Projections show that shifting from a linear approach of “take, make and dispose” to a circular system is estimated to have as much as USD 4.5 trillion potential for economic growth by 2030. The circular economy could be worth as much as USD 700 billion in global consumer good material savings. Moreover, with activities such as repair, maintenance, upgrading, remanufacturing, reuse, recycling of materials and product-life extension, more labour intensive than the mining and manufacturing of a linear economy, the circular economy is likely to provide job creation opportunities.

The potential of the circular economy to support sustainable cities, regions and countries still needs to be unlocked. Achieving this requires going beyond solely technical aspects. It requires setting the right governance and enabling environment framework. The 3Ps framework (“people”, “policies” and “places”) used in this report, argues that the circular economy implies a shift towards sustainable production and consumption pathways as well as new business and governance models (*people*). It also requires a holistic and systemic 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*).

According to the results of the OECD Survey on the Circular Economy in Cities and Regions, respondents face five major categories in terms of gaps:

- *Financial gaps*: A vast majority of the 51 surveyed cities and regions reported challenges related to insufficient funding (73%), as well as financial risks (69%), lack of critical scale for business and investments (59%), and lack of private sector engagement (43%).
- *Regulatory gaps*: Regulatory barriers can inhibit the development and implementation of circular economy strategies. Inadequate regulatory frameworks and incoherent regulation across levels of government represent a challenge for respectively 73% and 55% of respondents.
- *Policy gaps*: A number of local policies and strategies share objectives with the circular economy at large. However, the lack of a holistic vision is a major obstacle for 67% of respondents, often due to poor leadership and co-ordination, and/or the lack of political will.
- *Awareness gaps*: Cultural barriers represent a challenge for 67% of surveyed cities and regions along with lack of awareness (63%) and inadequate information (55%) for policymakers to take decisions, businesses to innovate and residents to embrace sustainable consumption patterns.
- *Capacity gaps*: The lack of human resources is a challenge for 61% of surveyed cities and regions. Technical capacities should not just aim for optimising linear systems but strive towards changing relations across value chains and preventing resource waste.

The report suggests cities and regions act simultaneously as *promoters*, *facilitators* and *enablers* of the circular economy, in a shared responsibility with national governments and stakeholders. Cities and regions can:

- *Promote the circular economy*, acting as a role model for businesses and citizens, providing clear information and establishing goals and targets; promoting a circular economy culture and enhancing trust.
- *Facilitate connections and dialogue*, by: implementing effective multi-level governance to align priorities and incentives across sectors, levels of government and stakeholders; fostering system thinking to achieve policy coherence, integrating siloed policies; facilitating collaboration amongst public, not-for-profit actors and businesses; adopting a functional approach that goes beyond administrative boundaries and fosters rural-urban linkages and partnerships.
- *Enable appropriate governance conditions*, including: identifying the regulatory frameworks that need to be adapted to foster the transition to the circular economy; mobilising financial resources and allocating them efficiently; adapting human and technical resources to the challenges to be met; supporting business development through spaces for innovation, public procurement and partnerships; generating an information system based on robust data to evaluate results and policy outcomes.

To support the implementation of these recommendations, the report also provides a Checklist for Action with more specific guidance and milestones and a Scoreboard on the Governance of the Circular Economy for governments to self-assess existing enabling conditions for a circular economy, identify challenges and set priorities towards a more effective, efficient and just circular-economy transition.

1 Towards a circular economy: Key drivers

This chapter provides an overview of the main drivers of the circular economy in cities and regions, as result of the OECD Survey on the Circular Economy in Cities and Regions, desk research and interviews with several stakeholders within the OECD Policy Dialogues. It discusses why cities and regions are increasingly interested in transitioning from a linear to a circular economy.

Introduction

For cities and regions, the circular economy represents an opportunity to rethink production and consumption models, services and infrastructure. The circular economy is based on three principles: i) design out waste and pollution; ii) keep products and materials in use; and iii) regenerate natural systems (Ellen MacArthur Foundation, 2019[1]). Cities and regions have an important role to play in making this happen, as they are at the centre of key decisions determining economic growth, social well-being and environmental benefits. As such, 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.). Both the OECD Principles on Urban Policy (OECD, 2019[2]) and the OECD Principles on Rural Policy (OECD, 2019[3]) mention the circular economy respectively as a means to encourage more efficient use of resources, and more sustainable consumption and production patterns, in large, intermediary and small cities, including at the neighbourhood level, and to strengthen the social, economic, ecological and cultural resilience of rural communities.

Being 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[4]). 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[5]) and release up to 70% of greenhouse gas (GHG) emissions (World Bank, 2010[6]). By 2050, urban dwellers will still be the most exposed to high concentrations of air pollutants (OECD, 2012[7]). Cities produce 50% of global waste (UNEP, 2013[8]). It is estimated that globally by 2050, the levels of municipal solid waste will double (IEA, 2016[5]; UNEP/IWSA, 2015[9]). A total of 80% of food is consumed in cities (FAO, 2020[10]). At the same time, water stress and water consumption will increase by 55% by 2050 (OECD, 2012[7]). Moreover, in cities, income inequalities are higher than in other places and rich and poor dwellers live often spatially separated with consequences on equal access to goods and services. The circular economy in cities and regions is expected to reduce negative impacts on the environment through pollution decrease, increased share of renewable energy and reduction of raw materials, water, land and energy consumption (EEA, 2016[11]), while potentially increasing resilience and enhancing opportunities for economic growth and jobs.

Cities and regions hold core competencies for most policy areas underlying the circular economy. This includes water, solid waste, build environment, land use or climate change. In the building sectors, for example, cities can operate buildings and housing, and enforce regulation on commercial and residential buildings, in favour of heating, cooling and efficient energy performance. For solid waste, cities exercise powers in collection, treatment, cleaning, as well as in communication and information. Cities have powers over water management, operating infrastructures and incentivising water efficiency, amongst others. Cities and regions can approve land use planning and policies, including zoning, redevelopment and regeneration, encourage farmers' markets and commercial urban food production and develop climate adaptation plans (C40, 2011[12]).

The potential of the circular economy to support sustainable cities, regions and countries still needs to be unlocked. Projections at the city level show environmental, social and economic impacts of the circular economy: for example, applying a circular economy approach to the construction chain in the city of Amsterdam (Netherlands) would decrease GHG emissions by half a million tonnes of CO_2 per year (C40 Cities, 2018[13]). In London (United Kingdom), the benefits from circular approaches applied to the built environment, food, textiles, electrical appliances and plastics are estimated at GBP 7 billion every year by 2036 (London Waste & Recycling Board, 2015[14]). About 50 000 jobs linked to the circular economy are estimated to be created in the Île-de-France region (City of Paris, 2019[15]). However, today, less than 10% of the global economy is circular (Circle Economy, 2020[16]). Unlocking the potential of the circular economy

in cities and regions implies going beyond solely technical aspects. It requires putting the necessary governance in place to create incentives (legal, financial), stimulating innovation (technical, social, institutional) and generating information (data, knowledge, capacities).

In the post-COVID-19 scenario, the circular economy can become the *new normal*. This unprecedented crisis highlighted the unsustainable nature of certain environmental and social trends and led to a reconsideration of current production and consumption patterns, including for mobility, material use and food. The circular economy can help address unsustainable trends and find adequate solutions towards a green recovery. In particular, cities and regions have a role to play in closing the loops, reducing waste, reusing resources and restoring ecosystems alongside long-term recovery measures for more resilient, sustainable and thriving societies. By reconfiguring material loops, the circular economy offers an example of resilience in the face of future crises. Human-centred cities could reduce private car use and regenerate green spaces. Organic waste could be transformed into high-quality fertiliser for local food production in rural areas. Buildings, made of traceable and recyclable materials, could absorb carbon dioxide, treat wastewater and produce energy (Raworth, 2020[17]). This will require a combination of natural and technological loops, incentives to create projects and profitable investment, conducive regulations and strong links with rural areas, in order to promote a cultural shift towards a more resourceful and less wasteful society (Romano, 2020[18]).

Defining the circular economy

There are many definitions of the circular economy. However, the basic assumption consists of designing out waste and pollution of the economic system. More than 100 definitions of the circular economy have been counted (Kirchherr, Reike and Hekkert, 2017[19]) (Box 1.1). The circular economy avoids materials being used once and forever gone, through: *closing* the loops by recycling and remanufacturing; *slowing* loops by increasing the working life of goods and products; and *narrowing* loops by using natural resources and goods more efficiently within the linear system (e.g. buildings and cars) (McCarthy, Dellink and Bibas, 2018[20]). When it comes to cities and regions, then the circular economy can be defined as a guiding framework 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.).

Box 1.1. Examples of circular economy's definitions

- 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[19]).
- 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[21]).
- 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[22]).

- 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[23]).
- 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[24]).

Source: EC (2015[23]), *Circular Economy – Overview*, https://ec.europa.eu/eurostat/web/circular-economy; Ellen MacArthur Foundation, (2018[22]), *What is a circular economy?, www.ellenmacarthurfoundation.org/circular-economy/concept* ; Ekins, P. et al. (2019[21]), *The Circular Economy: What, Why, How and Where*; McCarthy, A., R. Dellink and R. Bibas (2018[20]), "The Macroeconomics of the Circular Economy Transition: A Critical Review of Modelling Approaches", http://dx.doi.org/10.1787/af983f9a-en; OECD (2019[24]), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, https://doi.org/10.1787/9789264307452-en; Kirchherr, J., D. Reike and M. Hekkert (2017[19]), *Conceptualizing the Circular Economy: An Analysis of 114 Definitions*.

The circular economy is not a new concept but is now facing a *validity challenge period*. Metaphorically, the circular economy is the shift from the "cowboy" to the "spaceman" economy where resources are finite: while the cowboy economy is characterised by unlimited resources in an unexploited open system, the spaceship economy is a closed system with limited reservoirs for extraction and pollution, where humans must find their place "in a cyclical ecological system capable of continuous reproduction of material form" (Boulding, 1966[25]). Key concepts that define the circular economy today were developed already in the 1970s, consisting of the service-life extension of goods, and selling goods as services, as a logical step in a utilisation-focused economy in loops in order to increase the competitiveness of economic actors (Stahel, 1982[26]; Stahel and Reday-Mulvey, 1981[27]; Reday-Mulvey and Stahel, 1977[28]; OECD, 1982[29]). Formally introduced in the economic literature by Pearce and Turner (1990[30]), the concept of the circular economy has been found in several schools of thoughts from environmental and ecological economics, to regenerative design, performance economy and industrial ecology, amongst others (Frosch and Gallopoulos, 1989[31]; Lyle, 1994[32]; Erkman, 1997[33]; Korhonen et al., 2018[34]; Stahel, 2019[35]). Collaborative consumption and the sharing economy have contributed to the circular economy framework. According to Blomsma and Brennan (2017[36]), the circular economy is now facing its "validity challenge period" on its way to becoming a robust and consolidated concept, implying a radical shift in consumption and production patterns.

The circular economy is not an end per se but a means to an end. The circular economy provides an opportunity to do more with less, to better use available natural resources, to reduce waste generation in the first place and to transform waste into new resources, while promoting new forms of employment and tackling inequalities (e.g. access to sharing services). As such, while the environmental narrative, whereby less use of material implies reduced GHG emissions has been so far predominant in promoting the the circular economy, cities and regions are increasingly paying attention to the social and economic components as drivers for this transition.

Nowadays, the circular economy represents a new socio-economic paradigm for policymakers and a wide range of stakeholders. The circular economy is about economics, innovation and competitiveness. As such, it goes beyond waste management and recycling and implies changes in production and consumption models, eco-design and integrated planning. Industry, universities and governments can spur innovation to deal with the consequences of the accumulated legacy waste of the Anthropocene (such as plastic in the oceans) (Stahel, 2010[37]). Still, most companies focus on waste management in their internal processes and devote less innovation efforts on product design, to improve reuse, repair or maintenance (EEA, 2019[38]). On the other hand, cities and regions often interpret the circular economy as a synonym

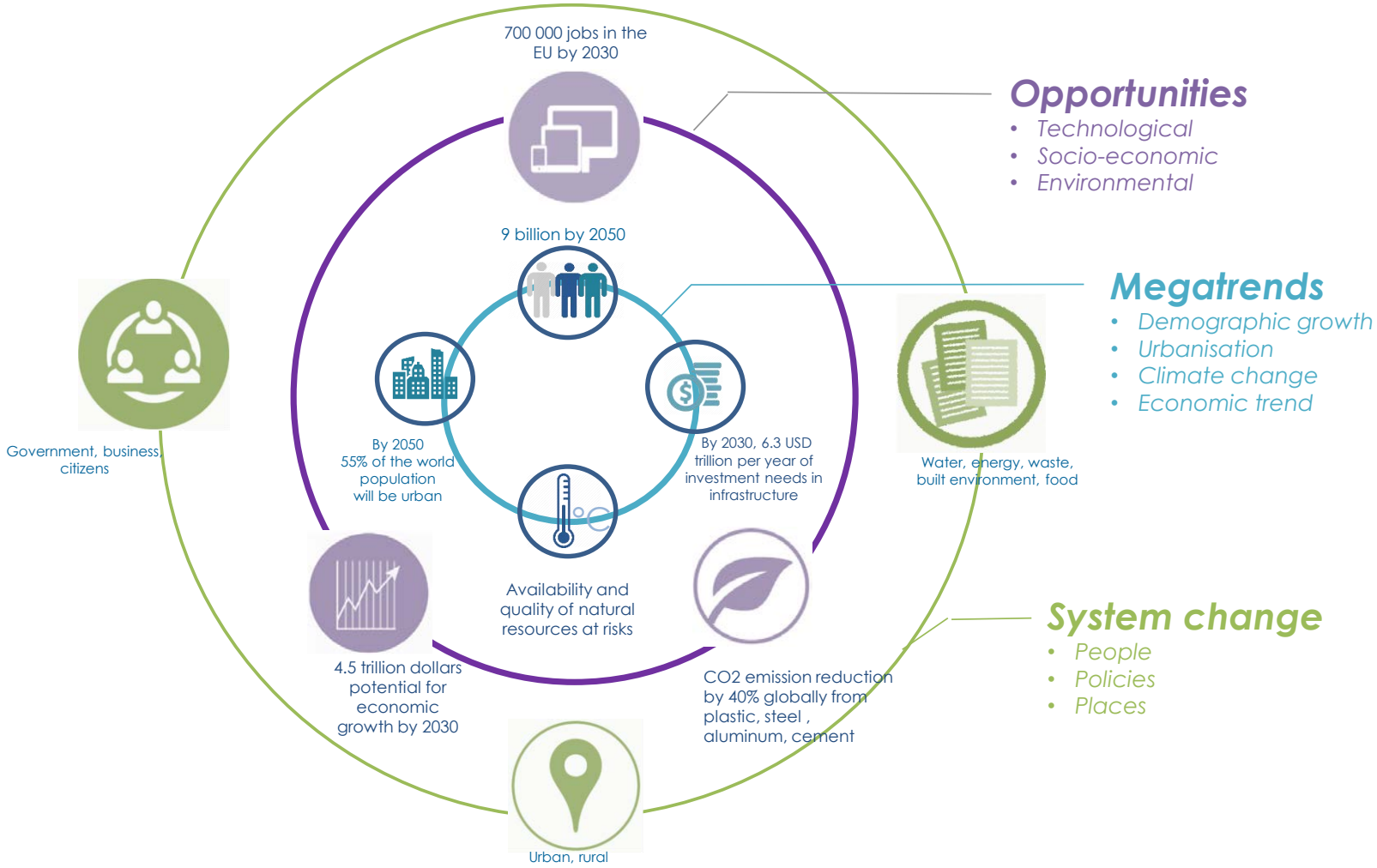
of recycling, missing the systemic perspective. The responses to the main challenges cities and regions are facing in terms of resource availability, GHG emissions and waste generation lie in the collective capacity to transition to a circular economy, an economic model that uses resources and materials rather than using them up (OECD, 2019[39]).

The circular economy can help drive sustainable development. By promoting a rethinking of business models consisting in designing more durable and recyclable products, reusing materials in the production cycle and fostering a more responsible consumption, the circular economy approach is an interesting implementation vehicle to Sustainable Development Goal (SDG) 12, pledging for more sustainable and responsible consumption and production patterns. Moreover, it is also equally relevant for the achievement of SDGs 6 (water), 7 (energy), 11 (sustainable cities and communities), 13 (climate action) and 15 (life on land).

The circular economy is transformative, systemic and functional. Projections show that shifting from a linear approach of "take, make and dispose" to a circular system is estimated to have USD 4.5 trillion potential for economic growth by 2030 (Accenture, 2015[40]). The circular economy could be worth as much as USD 700 billion in consumer material savings (Ellen MacArthur Foundation, 2013[41]). To make this happen, cities and regions would have to take into account the transformative, systemic and functional nature of the circular economy, which is expressed in this report by the 3Ps framework, *people, policies and places* (OECD, 2016[42]); Chapter 3; Figure 1.1). The circular economy is transformative as it implies a cultural shift towards different production and consumption pathways, and new business and governance models (*people*). It requires a holistic and systemic approach that cuts across sectorial *policies*, and a functional approach going beyond the administrative boundaries of cities to close, narrow and slow loops at the right scale (*places*). Starting from these considerations, the report is structured as follows:

- **Why**: Assessment of megatrends and opportunities as main drivers for cities and regions to transition from a linear to a circular economy (Chapter 1).
- **Who**: Analysis of who does what at various levels of government, as well as the role of key categories of stakeholders (Chapters 2 and 3).
- **What**: Mapping of the sectors that are mostly included in circular economy initiatives (Chapter 3).
- **Where**: Observations concerning the scale at which circular economy-related initiatives take place and interaction across urban and rural areas (Chapter 3).
- **How**: An appraisal of the main multi-level governance gaps to the circular economy in cities and regions (Chapter 4) and measurement frameworks (Chapter 5); zoom on policy responses and a self-assessment tool to factor in the existence and level of implementation of enabling conditions for transitioning to a circular economy (Chapter 6).

Figure 1.1. The analytical framework



Key drivers for the circular economy transition

According to the results of the OECD Survey on the Circular Economy in Cities and Regions, climate change, global agendas and economic changes are major drivers for surveyed cities and regions to transition to a circular economy (OECD Survey (2020[43]), Box 1.2). Major drivers for transitioning to a circular economy are environmental (climate change, 73%), institutional (global agendas, 52%) and socio-economic (changing economic conditions, 51%). Additionally, the circular transition is driven by job creation (47%), private sector initiatives (46%), new business models (43%), technical developments (43%) and research and development (R&D) (41%) (Figure 1.3). The word cloud in Figure 1.4 expresses the keywords respondents most associate with the circular economy in cities and regions, which are "climate change", "zero waste" and "innovation". The below section provides an in-depth description of these drivers.

Box 1.2. OECD Survey on the Circular Economy in Cities and Regions

The OECD Survey on the Circular Economy in Cities and Regions aimed at gathering data and information on:

- The current status of the circular economy in cities and regions, including common understanding, definitions and applications.
- The tools (including plans, legal and regulatory frameworks, economic instruments) to implement the circular economy in cities and regions.
- The main obstacles to the circular economy in cities and regions.
- The good practices available to date.

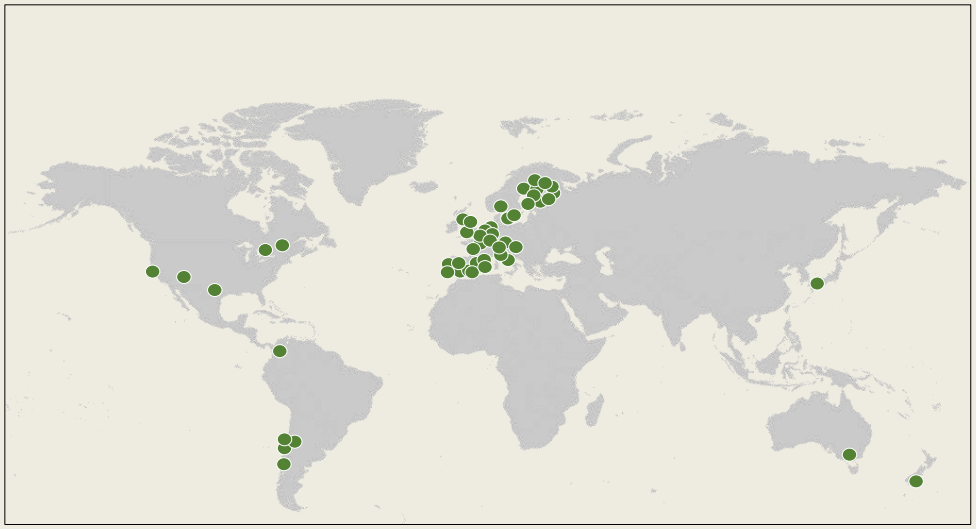
Launched in April 2019, the survey was submitted to more than 100 cities from OECD countries, through various network channels. Since October 2019, the survey has been extended to cities members of ICLEI – Local Governments for Sustainability. The survey has also been disseminated to the members of the Committee of Regions (CoR, ENVE) and Zero Waste Europe. By July 2020, a total of 51 responses were provided on a voluntary base by 47 cities, 1 regional county municipality and 3 regions, located in Europe (38), North and South America (10), Oceania (2) and Asia (1) (Figure 1.2; Annex 1.A). Almost two-thirds of the cities responding to the OECD survey are from the European Union (EU), representing 37% of the entire OECD Metropolitan Areas Database. The sample covers 6%[1] of the OECD Metropolitan Areas Database, which includes 668 metropolitan areas (11% for OECD member countries in Europe). As such, while the survey illustrate trends in a number of cities of OECD countries, the sample is not representative of the population of OECD or European cities.

Preliminary results were discussed during the 1st OECD Roundtable on the Circular Economy in Cities and Regions (4 July 2019, Paris, France), the OECD/European Commission (EC) seminar "Managing the transition to the circular economy" (5 July 2019, OECD, Paris), and the OECD webinars "Spotlight on the circular economy in cities and regions" and "What's new on the circular economy in cities and regions and how to measure circularity?" (31 March 2020).

Targeted respondents were primarily authorities in local administrations in charge of the circular economy in cities and regions such as: dedicated circular economy managers, officers of innovation agencies and other relevant actors with a mandate on the circular economy or likely to have one in the future; but also environmental, economic, waste or urban planning departments, CEOs of utilities, etc.

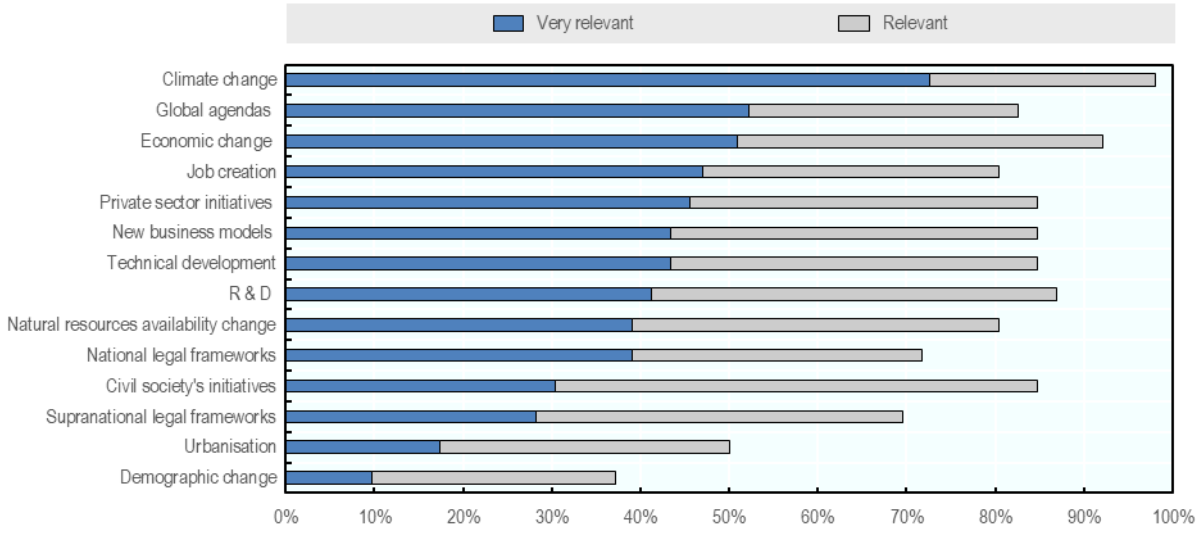
Cities and regions were invited to respond to the survey regardless of the level of maturity of circular economy strategies, initiatives, plans and programme.

Figure 1.2. Map of cities and regions surveyed



Note: Based on the 51 cities and regions that completed the OECD Survey on the Circular Economy in Cities and Regions.
Source (figure and box): OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Figure 1.3. Drivers of the circular economy in surveyed cities and regions



Note: Results based on a sample of 51 respondents that indicated the drivers being "Very relevant" and "Relevant".
Source: OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Figure 1.4. Keywords associated with the circular economy

Note: Results based on a sample of 51 respondents that were asked to choose the top 5 words most often associated with the circular economy. The answer is based on the following question: "Please indicate the top 5 words from the list suggested below you most often associate with circular economy in your context, ranking from 1 (most important) to 5 (less important)". Words could be selected out of 50 provided options.
Source: Own elaboration based on OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Environmental drivers

Climate change is a driver to the circular economy for 73% of surveyed cities and regions, as cities are both vulnerable to climate change impacts and contribute to climate risks. Cities contribute to 70% of GHG emissions (World Bank, 2010[44]). In order to achieve the objectives of the Paris Agreement under the United Nations Framework Convention on Climate Change to limit global warming to less than 2˚C and 1.5°C by 2030, emissions would have to be 25% and 55% lower than in 2018 respectively (UNEP, 2019[45]). The EU, within the framework of the EU Green Deal, aims to achieve an economy with net-zero GHG emissions (climate neutrality) by 2050. Additionally, within the 2030 Climate and Energy Framework, the EU includes energy targets and policy objectives for the period from 2021 to 2030, achieving at least a 32% share for renewable energy and 32.5% improvement in energy efficiency (EC, 2020[46]). The adoption of a circular economy framework in 5 key areas for cities (steel, plastic, aluminium, cement and food) could achieve a reduction of a total of 9.3 billion tonnes of GHG in 2050 (Ellen MacArthur Foundation, 2019[47]).

Materials management activities are directly or indirectly responsible for a significant share of GHG emissions in OECD countries. By 2060, total emissions are projected to reach 75 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). In addition, while recycling is projected to grow and become more competitive compared to the extraction of primary materials, its share remains ten times smaller than the share of mining. Consequently, there is a significant opportunity to potentially reduce emissions through effective materials management policies, prevention of material consumption, eco-design and reuse. These measures characterise the circular economy in cities and regions, for example in the built environment (OECD, 2019[24]).

Cities and regions are also part of the solution, as the majority of environmental and climate-related spending occurs at the subnational level. The transition from a linear to a circular economy gains growing relevance in relation to the future of investments and required infrastructure. Global investment in energy, transport, water and telecoms to support economic growth and development, are estimated at

USD 6.3 trillion per year by 2030 (OECD, 2017[48]). At the global level, the required infrastructure investment to meet the United Nations (UN) SDGs 6 (clean water and sanitation) and 7 (affordable and clean energy) for universal access to drinking water, sanitation and electricity is expected to reach USD 3.5 trillion (Oxford Economics, 2017[49]). As such, over half of the urban infrastructure that will exist in 2050 still has to be built. How this infrastructure is designed and developed will affect the way people will travel, buildings will be constructed and material repurposed, with the aim of reducing the use of fossil fuel and making heating and cooling more efficient. Between 2000 and 2016, subnational governments in 30 OECD countries were responsible on average for 55% of environmental and climate-related spending (OECD, 2019[50]). However, the climate-related investment represented 0.4% of gross domestic product (GDP) on average between 2000 and 2016.

The recovery phase following the COVID-19 crisis holds the potential for including circular economy principles in green policies and infrastructure. • The European Commission (EC) projects investment needs of additional EUR 260 billion per year to reach European Green Deal's goals (EC, 2019[51]). In order to transition towards a low-carbon economy, governments could encourage more efficient use of resources and more sustainable consumption and production patterns, notably by promoting circular economy to keep the value of goods and products at their highest, prevent waste generation, reuse and transform waste into resources (OECD, 2020[52]).

Institutional drivers

Global agendas are driving the transition to the circular economy for 52% of surveyed cities and regions. The circular economy approach can contribute to the achievement of the 2030 Agenda for Sustainable Development. While it is strictly linked to SDG 12 on sustainable and responsible consumption and production patterns (Box 1.3), other SDGs (e.g. 6, 7, 15) are also relevant for increasing sustainability in cities (SDG 11). The circular economy can also support the Paris Agreement under the UN Framework Convention on Climate Change since practices of reusing, recycling, sharing, amongst others, reduce GHG emissions and simultaneously address issues linked natural resources extraction and exploitation. Finally, the circular economy can support the implementation of the New Urban Agenda (2016), the European Green Deal and G20 initiatives on resource efficiency.

Box 1.3. The circular economy in cities and regions and Sustainable Development Goals

The 2030 Agenda for Sustainable Development, adopted in 2015 by UN member states, includes 17 SDGs. The aim of the 2030 Agenda is to set a 15-year-long plan to end poverty and other deprivations while implementing strategies that improve health and education, reduce inequality, promote economic growth and tackle climate change. The circular economy is an interesting implementation vehicle for various goals (Figure 1.5).

The OECD programme "A Territorial Approach to the SDGs" has developed a comprehensive indicator framework to measure where cities and regions stand on their SDG implementation path. Specifically, regarding SDG 12, the programme has identified three indicators to measure the progress of this goal (Table 1.2).

Figure 1.5. The circular economy in cities and regions and Sustainable Development Goals

The SDG 12 is composed of 11 targets and 13 indicators (Table 1.1).

Table 1.1. SDG 12 targets and indicators

	Targets		Indicators
12.1	Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1	Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies
12.2	By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1	Material footprint, material footprint per capita and material footprint per GDP
		12.2.2	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
12.3	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1	Global Food Loss Index
12.4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on human health and the environment	12.4.1	Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement
		12.4.2	Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment
12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1	National recycling rate, tons of material recycled

12.6	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1	Number of companies publishing sustainability reports
12.7	Promote public procurement practices that are sustainable, in accordance with national policies and priorities	12.7.1	Number of countries implementing sustainable public procurement policies and action plans
12.8	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1	Extent to which: i) global citizenship education and ii) education for sustainable development (including climate change education) are mainstreamed in: a) national education policies; b) curricula; c) teacher education; and d) student assessment
12.a	Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1	Amount of support to developing countries on research and development for SCP and environmentally sound technologies
12.b	Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	12.b.1	Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools
12.c	Rationalise inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimising the possible adverse impacts on their development in a manner that protects the poor and the affected communities.	12.c.1	Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels

Source: UN (2020[53]), *Goal 12: Sustainable Development Knowledge Platform*, https://sustainabledevelopment.un.org/sdg12 (accessed on 7 February 2020).

Table 1.2. OECD indicators for a territorial approach to SDG12

Goal	Indicator description	Subnational scale	Source	Desired direction
SDG 12. Responsible consumption	Municipal waste rate (kilos per capita)	TL2 and functional urban area (FUA)	OECD Regional Database (TL2) and Eurostat (FUA)	Negative
	Percentage of municipal waste that is recycled	TL2	OECD Regional Database	Positive
	Number of motor road vehicles per 100 people	TL2 and FUA	OECD Regional Database (TL2) and Eurostat (FUA)	Negative

Note: FUAs are economic units characterised by a city (or core) and a commuting zone that is functionally interconnected to the city. A city is a local administrative unit (i.e. LAU for European countries, such as the municipality, local authorities, etc.) where at least 50% of its population live in an urban centre. An urban centre is defined as a cluster of contiguous grid cells of 1 km^2 with a density of at least 1 500 inhabitants per km^2 and a population of at least 50 000 inhabitants overall.
The Territorial Level 2 (TL2) in the OECD classification refers to regional administrative regions officially established in each country.
Source: OECD (2020[54]), *A Territorial Approach to the Sustainable Development Goals: Synthesis report*, https://doi.org/10.1787/e86fa715-en; OECD (2020[55]), *Functional Urban Areas by Country*, https://www.oecd.org/cfe/regional-policy/functionalurbanareasbycountry.htm.

For almost 40% of surveyed cities and regions, national and supranational legal frameworks are proving important impetus towards a circular economy in cities and regions. This is, for example, the case of the European Circular Economy Package (EC, 2015[56]; 2018[57]), the New Circular Economy Action Plan (EC, 2020[58]) (Box 1.4). In Japan, the legislative framework for establishing a "sound material-cycle society" promotes the life-cycle and zero emissions economy (Japanese Ministry of the Environment, n.d.[59]).

Box 1.4. European Commission's measures for a circular economy

In December 2015, the EC adopted the *Closing the Loop - An EU Action Plan for the Circular Economy* package to support the EU's transition to a circular economy. The initiative was designed to contribute to "closing the loop" of product lifecycles, through recycling and reuse.

The package included the EU Action Plan for the Circular Economy, which focused on 54 actions targeting the whole life cycle of products (e.g. production, consumption, waste management and secondary raw materials); on five priority areas (plastics, food value chain, critical raw materials, construction and demolition, biomass and bio-based products and the review of fertilisers legislation), as well as on four legislative proposals amending the following legal acts:

- Waste Framework Directive
- Landfill Directive
- Packaging Waste Directive
- Directives on end-of-life vehicles, on batteries and accumulators and waste batteries and accumulators, and on waste electrical and electronic equipment.

In January 2018, the EC adopted new measures for the circular economy:

- EU Strategy for Plastics in the Circular Economy, to transform the way plastic products are designed, produced, used and recycled. By 2030, all plastic packaging should be recyclable.
- A communication (COM (2018) 32 final) on options to address the interface between chemical, product and waste legislation.
- A monitoring framework on progress towards a circular economy at the EU and national levels.
- A "Report on Critical Raw Materials and the Circular Economy" that highlights the potential to make the use of the 27 critical materials in our economy more circular.

On March 2019, the EC reported on the implementation of the action plan launched in 2015, assessing that all 54 actions had been delivered or implemented. According to the EC, the implementation of the Circular Economy Action Plan accelerated the transition to a circular economy in Europe with the following results:

- Increase of 6% of circular employment between 2012 and 2016.
- New business opportunities and development of new markets, as in 2017, circular activities (e.g. repair, reuse or recycling) generated around EUR 155 billion in value-added in the EU-28, 17% higher than in 2011.
- Increased recycling of municipal waste during the period 2008-16.

The *Reflection Paper Towards a sustainable Europe by 2030*, launched by the EC in 2019, argues that the circular economy should be made one of the backbones of the EU's industrial strategy. Furthermore, "A European Green Deal", one of the six priorities for the EC for 2019-24, includes the circular economy as one of the headline ambitions for 2019-20 and set the zero net GHG emissions target by 2050.

On March 2020, the EC also adopted a New Circular Economy Action Plan as one of the building blocks of the European Green Deal. The initiative aims at boosting the production of sustainable products, empowering consumers, focusing on sectors with a high circularity potential (e.g. information and communication technology [ICT], batteries, packaging, food, construction, textiles and plastics) and ensuring less waste. The initiative presents an outline with new measures to be taken between 2020 and 2022 and includes a section on cities and regions. Applying circular economy measures in Europe is expected to increase the EU's GDP by an additional 0.5% by 2030 and create approximately 700 000 new jobs. In cities and regions, the proposed European Urban Initiative,[2] the Intelligent Cities Challenge Initiative,[3] and the Circular Cities and Regions Initiative[4] are expected to provide assistance to cities. Furthermore, the circular economy will be included among the priorities of the Green City Accord, the movement of European cities to engage in action towards meeting the EU's environment objectives.

Source: EC (2019[60]), *Private Investments, Jobs and Gross Value Added Related to Circular Economy Sectors*, https://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=cei_cie010&language=en; EC (2015[61]), EC Circular *Economy Action Plan*, https://ec.europa.eu/environment/circular-economy; EC (2019[62]), *Towards a Sustainable Europe by 2030*, https://ec.europa.eu/commission; European Parliament (2019[63]), *Briefing: Hearings of European Commissioners-designate*, http://www.europarl.europa.eu/.

A number of bottom-up initiatives are stimulating governmental actions towards the circular economy in surveyed cities and regions. This is the case of the region of Lapland (Finland), where the circular economy started to be implemented as a business sector initiative in 2012. To spur competitiveness of industry, linked to the resilience of the region, the industrial sector (e.g. bio-forest, forestry, mining and steel among others) sought support from public authorities concerning the reuse of by-products and residues. The request was well received by the local authorities, which started a discussion on the circular economy, providing technical assistance and promoting collaborations. Increasingly, a number of international organisations, umbrella organisations and foundations are supporting cities and regions in their transition to a circular economy with regards to business and citizen initiatives (e.g. Ellen MacArthur Foundation, C40, Climate KIC, ICLEI, Eurocities, European Investment Bank, etc.).

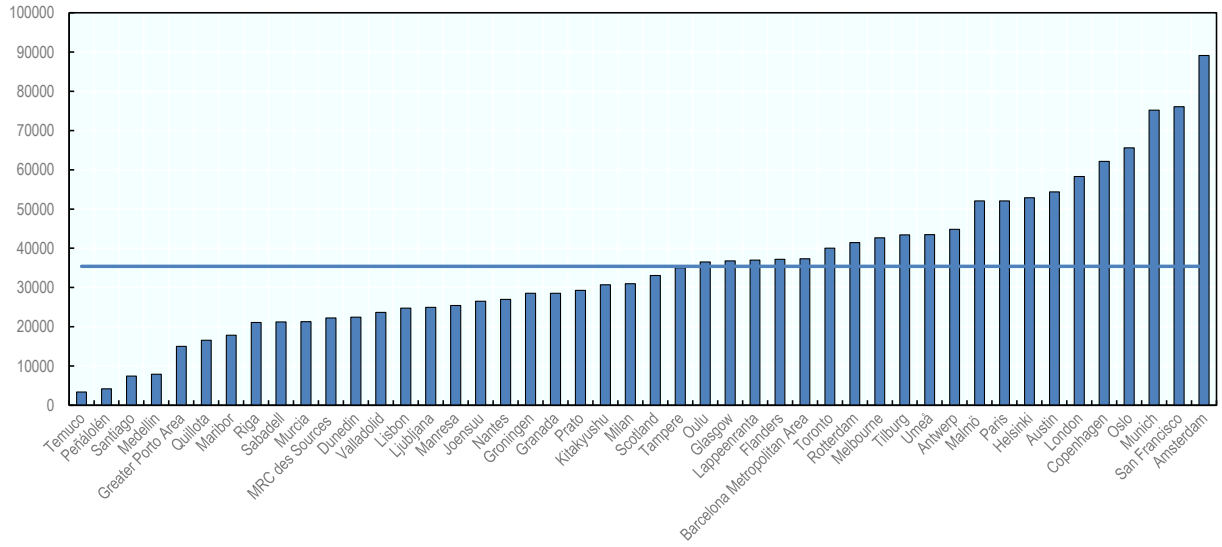
Socio-economic drivers

Socio-economic changes

Changing economic conditions represent a major driver towards the circular economy for 51% of respondents (OECD, 2020[43]). The COVID-19 crisis has put the world on standby, unlike any other economic, social and climate crisis, resulting in a very significant GDP loss for 2020 (4.5% (OECD, 2020[64]). Still, cities are engines of economic growth: projections show that a group of 600 cities will generate nearly 65% of the world's economic growth by 2025 (McKinsey Global Institute, 2012[65]) and that cities tend to generate more income per capita as they increase in size (Bettencourt et al., 2007[66]). While pursuing economic growth, resource efficiency should be improved, as expressed by the concept of *decoupling* (Box 1.5).

Figure 1.6. GDP per capita of surveyed cities and regions

In EUR per capita per year



Note: Data are provided by 46 cities and regions. They refer to the corresponding administrative level to the city or region responding to the Survey (Annex 1.A). Average GDP: EUR 35 380/capita/year. Data refer to most recent available year, which ranges from 2012 to 2019: 2012 [Oslo (Norway)], 2015 [Greater Porto Area (Portugal), Medellin (Colombia), MRC des Sources (Canada), Nantes (France), Peñalolén (Chile), Prato (Italy), Santiago (Chile), Temuco (Chile) and Valladolid (Spain)], 2016 [Antwerp (Belgium), Copenhagen (Denmark), Flanders (Belgium), Glasgow (United Kingdom), Kitakyushu (Japan), Manresa (Spain), Munich (Germany), Oulu (Finland), Riga (Latvia), Rotterdam (Netherlands) and Umeå (Sweden)], 2017 [Amsterdam (Netherlands), Austin (United States), Barcelona Metropolitan Area (Spain), Granada (Spain), Joensuu (Finland), Lisbon (Portugal), Ljubljana (Slovenia), Malmö (Sweden), Milan (Italy), Paris (France), Sabadell (Spain), San Francisco (United States), Tampere (Finland) and Tilburg (Netherlands)], 2018 [Dunedin (New Zealand), Groningen (Netherlands), Helsinki (Finland), Lappeenranta (Finland), London (United Kingdom), Maribor (Slovenia), Melbourne (Australia), Quillota (Chile), Scotland (United Kingdom) and Toronto (Canada)] and 2019 [Murcia (Spain)].
Source: OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Urban GDP per capita can influence the level of domestic material consumption (DMC). DMC per capita has shown a descending trend in most OECD countries since 2000 and the material consumption in the OECD area remains at 19 Gt per year (16% less than in 2005). However, by 2060, the global average per capita income is projected to reach current OECD levels (USD 40 000) with consequences on material use, which is projected to grow by 1.5% per year over the same period (OECD, 2019[67]). At urban level, material consumption in the world is expected to grow from 40 billion tonnes in 2010 to 90 billion tonnes in 2050. (UNEP, 2019[68]). Some scholars suggest that urban DMC per capita is significantly correlated to urban GDP per capita (Malcolm Baynes and Kaviti Musango, 2017[69]). In particular, the emerging middle class is likely to double its share of global consumption from one-third in 2019 to two-thirds by 2050 (Ellen MacArthur Foundation, 2019[47]), with impacts on the increase in domestic consumption and carbon emissions (World Economic Forum, 2017[70]; Wiedenhofer et al., 2016[71]). Other projections show that one billion inhabitants living in cities will reach the global consuming class[5] by 2025. (McKinsey Global Institute, 2012[65]). In the absence of new measures, material consumption by the world's cities will more than double, evolving from 40 billion tonnes in 2010 to approximately 90 billion tonnes by 2050 (World Economic Forum, 2018[72]). Figure 1.6 shows the GDP per capita in cities and regions that have responded to the OECD survey.

The circular economy can also 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[73]). Some activities,

such as those related to the construction and food sector, are projected to bring relevant economic benefits in terms of added value. Projections show that in the city of Amsterdam, for example, strategies for material reuse can bring about a value of EUR 85 million per year within the construction sector and EUR 150 million per year with more efficient organic residual streams (Eurocities, 2017[74]).

Box 1.5. Defining decoupling

The concept of *decoupling* is frequently used to describe an improvement in resource efficiency, usually at the aggregate level of an economy. The literature distinguishes a broad variety of decoupling classifications (e.g. relative decoupling, absolute decoupling, economic decoupling and physical decoupling).

Relative decoupling refers to the condition that takes places when both the value of economic output and the quantity of resource inputs are growing, with the former increasing faster than the latter.

However, absolute decoupling refers to a situation where the value of economic output is growing and the amount of resource inputs used is being diminished. For example, Target 8.4 of SDG 8 on decent work and economic growth includes the absolute decoupling of materials use and environmental degradation from GDP growth.

Source: OECD (2019[24]), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, https://doi.org/10.1787/9789264307452-en.

Job creation is a driver for 4% of surveyed cities and regions. Between 2012 and 2018, the number of jobs related to the circular economy in the EU increased by 5% to reach around 4 million (EC, 2020[75]). Circularity can be expected to have a positive net effect on job creation provided that workers acquire the skills required by the green transition (EC, 2020[58]). Moving from fossil fuel to renewable energy, from landfill to reuse, remanufacturing and recycling, to clean mobility, amongst others, implies changes in the future of jobs, skills, social and economic models. Yet, the transition should be “just” by taking into account people’s social well-being, quality of life and equity. It is estimated that by 2030, the number of additional jobs would exceed 75 000 in Finland, 100 000 in Sweden, 200 000 in the Netherlands, 400 000 in Spain and half a million in France. This is due to the fact that an economy favouring repair, maintenance, upgrading, remanufacturing, reuse, recycling of materials and product-life extension, is more labour intensive than both mining and manufacturing of a linear economy (Wijkman and Skånberg, 2017[76]).

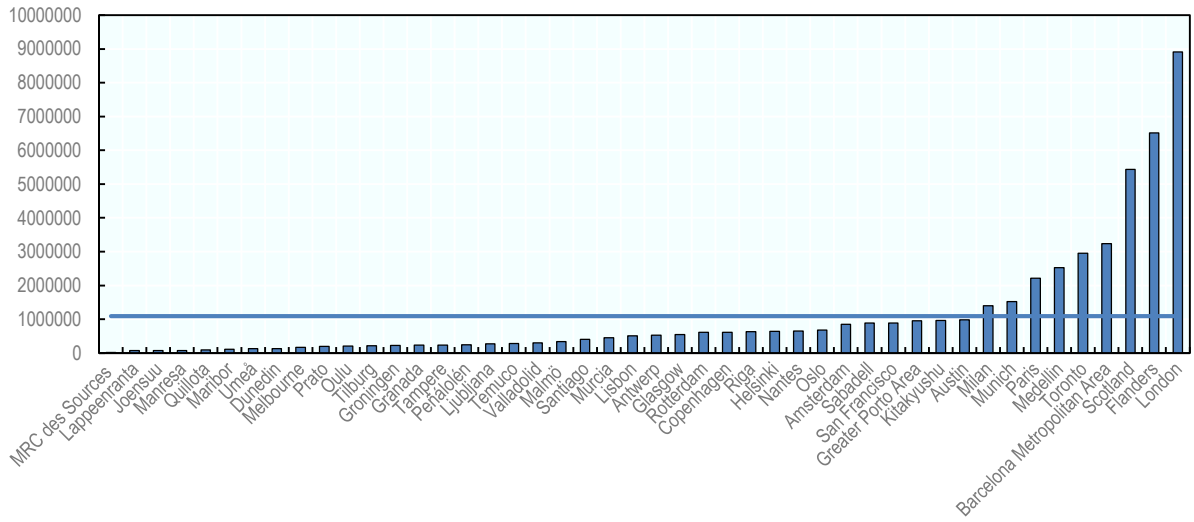
Population

A growing population and higher living standards will drive higher levels of waste production and resources consumption. By 2050, the global population will reach 9 billion people. The proportion of the global population living in cities is projected to reach 55% by 2050 (OECD/EC, 2020[4]). This transition will require a significant expansion of existing cities, as well as the construction of new cities (UNEP, 2018[77]). The total population of the 612 FUAs (see definition in Box 1.3) has grown by 11% between 2005 and 2018 (OECD, 2020[78]). Moreover, the number of new cities of intermediate size is growing rapidly. Between 1990 and 2015, the number of new cities of at least 100 000 inhabitants increased by 1 644 (OECD, 2019[79]). These trends will require the use of biomass, metals, non-metallic materials and fossil fuels to address the needs of food, housing, energy and infrastructure. Cities and regions that responded to the OECD survey represent cities of all size (Figure 1.7): a total of 20% of the sample are cities and regions with more than 1 million inhabitants, 32% with between 500 000 and 1 million and almost half of the sample (48%) represent cities and regions with less than 500 000 inhabitants (Annex 1.A). Regarding waste generation from households, Figure 1.8 presents data from cities and regions that completed the OECD

survey: 17% generate more than 500 kg/per inhabitants/year, 20% remains below 300 kg/per inhabitants/year, 26% between 400 and 300 kg/per inhabitants/year and 37% between 500 and 400 kg/per inhabitants/year. A person living in the OECD area generates on average 520 kg of municipal waste per year (2020); this is 30 kg less than in 2000 but still 20 kg more than in 1990 (OECD, 2020[80]).

Figure 1.7. Population size of surveyed cities and regions

In number of inhabitants



Note: Data are provided by 46 cities and regions. They refer to the corresponding administrative level to the city or region responding to the Survey (Annex 1.A). Average population: 1 089 789 inhabitants. Data refer to the most recent available year, which ranges from 2015 to 2020. 2015 [Barcelona Metropolitan Area (Spain), Kitakyushu (Japan) and Rotterdam (Netherlands)], 2016 [Paris (France) and Maribor (Slovenia)], 2017 [Flanders (Belgium), Granada (Spain), Greater Porto Area (Portugal), Joensuu (Finland), Munich (Germany), Nantes (France), Peñalolén (Chile), Quillota (Chile), San Francisco (United States), Santiago (Chile) and Temuco (Chile)], 2018 [Amsterdam (Netherlands), Austin (United States), Copenhagen (Denmark), Dunedin (New Zealand), Glasgow (United Kingdom), Groningen (Netherlands), Helsinki (Finland), Lappeenranta (Finland), Ljubljana (Slovenia), Lisbon (Portugal), London (United Kingdom), Malmö (Sweden), Manresa (Spain), Melbourne (Australia), Milan (Italy), Oulu (Finland), Scotland (United Kingdom), Tampere (Finland), Tilburg (Netherlands), Toronto (Canada), Umeå (Sweden) and Valladolid (Spain)], 2019 [Medellin (Colombia), MRC des Sources (Canada), Murcia (Spain), Oslo (Norway), Prato (Italy), Riga (Latvia) and Sabadell (Spain)] and 2020 [Antwerp (Belgium)].
Source: OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

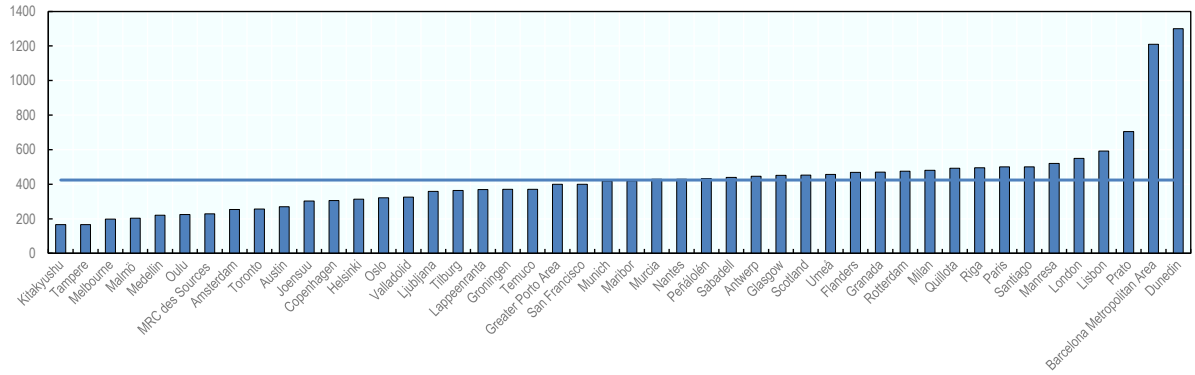
The trend in terms of household size decrease implies less material efficiency. The number of people per household in the EU declined from 3.3 persons in 1960 to 2.36 in 2015, while the OECD average in 2015 stood at 2.46 (OECD, 2020[81]). The share of 1-person households reached 41% in Germany, 38% in the Netherlands and 36% in France in 2018 (Ortiz-Ospina, 2019[82]). The ageing population is one of the drivers of this trend. In OECD countries, the population older than 65 years increased from less than 9% in 1960 to 17.2% in 2018 and is expected to achieve 28% in 2050. By then, this range will represent at least one-quarter of the total population (OECD, 2017[83]). Older generations (population aged 80 and above) are expected to more than double in OECD countries, from 4.6% in 2017 to 10.1% in 2050 (OECD, 2019[84]). The decreasing household size will imply more appliances and installations and an increasing need for housing (EEA, 2015[85]).

Population density is a key factor in areas such as waste management, energy consumption and material consumption, which are relevant for the circular economy. More densely populated countries consume on average less materials. This is the case of Germany, Italy, the Netherlands and the United Kingdom in the EU (EEA, 2015[85]). Regarding the local level, as carbon emissions are closely associated with urban density and structure, compact cities can contribute to reducing GHG emissions by decreasing the new

construction of roads, sewers, water lines and other infrastructure (Ellen MacArthur Foundation, 2019[47]; UNEP, 2018[77]). Studies suggest that there is a correlation between energy consumption efficiency and population density (Morikawa, 2012[86]). Furthermore, density also plays a key role in the waste sector of cities, as low population density might be a limiting factor to achieve higher recycling rates, as the costs of waste collection and transportation are higher in less populated areas. However, a high population density can be a limiting factor, as it requires a more efficient waste management system due to sanitation problems and the scarcity and cost of land (Matsunaga and Themelis, 2002[87]; Montevecchi and Reisinger, 2014[88]).

Figure 1.8. Household waste generation per capita in surveyed cities and regions

In kg per inhabitant per year.



Note: Data are provided by 46 cities and regions. They refer to the corresponding administrative level to the city or region responding to the Survey (Annex 1.A). Average household waste generation: 424 kg/inhabitant/year. Data refer to most recent available year, which ranges from 2014 to 2019: 2014 [Medellin (Colombia)], 2015 [Rotterdam (Netherlands)], 2016 [Antwerp (Belgium), Barcelona Metropolitan Area (Spain), Copenhagen (Denmark), Helsinki (Finland), Milan (Italy), Nantes (France), Prato (Italy) and Tampere (Finland)], 2017 [Dunedin (New Zealand), Flanders (Belgium), Granada (Spain), Joensuu (Finland), Melbourne (Australia), Munich (Germany), Paris (France), San Francisco (United States), Scotland (United Kingdom), Umeå (Sweden) and Valladolid (Spain)], 2018 [Amsterdam (Netherlands), Austin (United States), Glasgow (United Kingdom), Greater Porto Area (Portugal), Groningen (Netherlands), Kitakyushu (Japan), Lappeenranta (Finland), Lisbon (Portugal), Ljubljana (Slovenia), Malmö (Sweden), Manresa (Spain), Maribor (Slovenia), MRC des Sources (Canada), Oslo (Norway), Oulu (Finland), Peñalolén (Chile), Quillota (Chile), Riga (Latvia), Sabadell (Spain), Santiago (Chile), Tilburg (Netherlands) and Toronto (Canada)] and 2019 [London (United Kingdom), Murcia (Spain) and Temuco (Chile)].
Source: OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Technological trends

New business models, technical developments and R&D represent a driver for more than 40% of surveyed cities and regions. New business models in cities are flourishing, from reverse logistics, reuse, leasing and sharing (Chapter 2). Increasingly, cities are considering green infrastructure and decoupling alternatives, such as new electric vehicles, solar panels, smart-grids, retrofitting of buildings, recycling facilities as part of their circular vision (Wijkman and Skånberg, 2016[89]). Many cities and regions host industrial symbiosis processes and clusters, based on the principle that what is waste for one is an input for others. Industrial symbiosis in Kalundborg (Denmark) fosters eco-innovation amongst eight public and private companies to reuse water and energy and recycle materials. In Sweden, the roadmap for industrial symbiosis makes a connection with the urban symbiosis. While the industrial symbiosis allows resources exchanges across companies, urban symbiosis looks at mutual and beneficial exchanges of resources within urban areas and across industries. The Metropolitan Project of Industrial Symbiosis in the Barcelona Metropolitan Area (Spain) co-ordinates industrial symbiosis projects with circular economy initiatives. The Industrial symbiosis in Drummond (Canada) is a network of local companies exchanging resources, such as waste materials, by-products, equipment, space or even energy. Some companies participating in the industrial

symbiosis sell their production waste rather than pay to dispose of it, thus making a double economic profit (OECD, 2020[43]). Nevertheless, increasing recovery, reuse, remanufacturing and recycling of metals, polymers and electronic waste, for example, require large investments and R&D for technological innovation. Discussions of whether solutions are technologically feasible and at which scale are likely to lead towards a second-best state, before being able to realistically achieve an economy that is circular.

References

Accenture (2015), *The circular economy could unlock $4.5 trillion of economic growth*, https://newsroom.accenture.com/news/the-circular-economy-could-unlock-4-5-trillion-of-economic-growth-finds-new-book-by-accenture.htm. [40]

Bettencourt, L. et al. (2007), "Growth, Innovation, Scaling, and the Pace of Life in Cities", http://dx.doi.org/10.1073/pnas.0610172104. [66]

Blomsma, F. and G. Brennan (2017), "The emergence of circular economy: A new framing around prolonging resource productivity", *Journal of Industrial Ecology*, Vol. 21/3, pp. 603-614, http://dx.doi.org/10.1111/jiec.12603. [36]

Boulding, K. (1966), *The Economics of the Coming Spaceship Earth*. [25]

C40 (2011), *Climate Action in Megacities: C40 Cities Baseline and Opportunities*. [12]

C40 Cities (2018), "Municipality-led circular economy case studies". [13]

Circle Economy (2020), *The Circularity Gap Report*, http://www.circularity-gap.world/2020 (accessed on 27 July 2020). [16]

Circle Economy (2019), *The Role of Municipal Policy in the Circular Economy*. [90]

City of Paris (2019), *Deuxième feuille de route de l'économie circulaire*, http://www.paris.fr/pages/economie-circulaire-2756 (accessed on 4 August 2020). [15]

EC (2020), *2030 Climate & Energy Framework*, European Commission, https://ec.europa.eu/clima/policies/strategies/2030_en (accessed on 28 July 2020). [46]

EC (2020), *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe*, European Commission. [58]

EC (2020), *Impact of Shift to Circular Economy*, European Commission. [75]

EC (2019), *A European Green Deal*, European Commission, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed on 31 July 2020). [51]

EC (2019), *Private Investments, Jobs and Gross Value Added Related to Circular Economy Sectors*, European Commission, https://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=cei_cie010&language=en (accessed on 7 November 2019). [60]

EC (2019), *Towards a Sustainable Europe by 2030*, European Commission. [62]

EC (2018), *2018 Circular Economy Package*, European Commission. [57]

EC (2015), *Circular Economy – Overview*, European Commission, https://ec.europa.eu/eurostat/web/circular-economy. [23]

EC (2015), *Closing the Loop - An EU Action Plan for the Circular Economy*, European Commission. [56]

EC (2015), *EC Circular Economy Action Plan*, European Commission, https://ec.europa.eu/environment/circular-economy/index_en.htm (accessed on 7 November 2019). [61]

EEA (2019), *Paving the Way for a Circular Economy: Insights on Status and Potentials*, European Environment Agency, https://www.eea.europa.eu/publications/circular-economy-in-europe-insights (accessed on 27 July 2020). [38]

EEA (2016), *Environmental Indicator Report 2016 - In Support to the Monitoring of the 7th Environment Action Programme*, European Environment Agency, http://www.eea.europa.eu//publications/environmental-indicator-report-2016 (accessed on 29 July 2020). [11]

EEA (2016), *More from Less - Material Resource Efficiency in Europe*, European Environment Agency. [73]

EEA (2015), "Urban sustainability issues - What is a resource-efficient city?", http://dx.doi.org/10.2800/389017. [85]

Ekins, P. et al. (2019), *The Circular Economy: What, Why, How and Where*. [21]

Ellen MacArthur Foundation (2019), *Completing the Picture: How the Circular Economy Tackles Climate Change*. [47]

Ellen MacArthur Foundation (2019), *Introduction to the Circular Economy*. [1]

Ellen MacArthur Foundation (2018), *Ellen MacArthur Foundation*, https://www.ellenmacarthurfoundation.org/circular-economy/concept. [22]

Ellen MacArthur Foundation (2013), *Towards the Circular Economy Vol. 2: Opportunities for the Consumer Goods Sector*, http://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-2-opportunities-for-the-consumer-goods-sector (accessed on 31 July 2020). [41]

Erkman, S. (1997), *Industrial Ecology: An Historical View*, http://dx.doi.org/10.1016/s0959-6526(97)00003-6. [33]

Eurocities (2017), *Full Circle, Cities and the Circular Economy*, http://nws.eurocities.eu/MediaShell/media/2017cities_and_circular_economy-web-spreads.pdf (accessed on 31 July 2020). [74]

European Parliament (2019), "Briefing: Hearings of European Commissioners-designate", Members' Research Service PE, https://epthinktank.eu/commissioner_hearings_2019 (accessed on 7 November 2019). [63]

FAO (2020), *Urban Food Agenda* , Food and Agriculture Organization, http://www.fao.org/urban-food-agenda/en/ (accessed on 30 September 2020). [10]

Frosch, R. and N. Gallopoulos (1989), "Strategies for manufacturing", *Scientific American*, Vol. 261/3, pp. 144-152, http://dx.doi.org/10.1038/scientificamerican0989-144. [31]

IEA (2016), "Cities are in the frontline for cutting carbon emissions", International Energy Agency, http://www.iea.org/news/cities-are-in-the-frontline-for-cutting-carbon-emissions-new-iea-report-finds (accessed on 27 July 2020). [5]

Japanese Ministry of the Environment (n.d.), *Japan's Approach to the 3Rs*, http://www.env.go.jp/recycle/3r/en/approach.html (accessed on 28 July 2020). [59]

Kirchherr, J., D. Reike and M. Hekkert (2017), *Conceptualizing the Circular Economy: An Analysis of 114 Definitions*. [19]

Korhonen, J. et al. (2018), "Circular economy as an essentially contested concept", *Journal of Cleaner Production*, Vol. 175, pp. 544-552, http://dx.doi.org/10.1016/j.jclepro.2017.12.111. [34]

London Waste & Recycling Board (2015), *London - The Circular Economy Capital*, http://www.lwarb.gov.uk/wp-content/uploads/2015/12/LWARB-circular-economy-report_web_09.12.15.pdf (accessed on 4 August 2020). [14]

Lyle, J. (1994), *Regenerative Design for Sustainable Development*. [32]

Malcolm Baynes, T. and J. Kaviti Musango (2017), "Estimating current and future global urban domestic material consumption", http://dx.doi.org/10.1088/1748-9326/aac391. [69]

Matsunaga, K. and N. Themelis (2002), "Effects of affluence and population density on waste generation and disposal of municipal solid wastes", https://www.researchgate.net/publication/228908198_Effects_of_affluence_and_population_density_on_waste_generation_and_disposal_of_municipal_solid_wastes (accessed on 28 July 2020). [87]

McCarthy, A., R. Dellink and R. Bibas (2018), "The Macroeconomics of the Circular Economy Transition: A Critical Review of Modelling Approaches", *OECD Environment Working Papers*, No. 130, OECD Publishing, Paris, https://dx.doi.org/10.1787/af983f9a-en. [20]

McKinsey Global Institute (2012), "Urban world: Cities and the rise of the consuming class", http://www.mckinsey.com/mgi. (accessed on 28 July 2020). [65]

Montevecchi, F. and H. Reisinger (2014), "File note on circular economy package for the Territorial Impact Assessment workshop", http://dx.doi.org/10.2863/11040. [88]

Morikawa, M. (2012), "Population density and efficiency in energy consumption: An empirical analysis of service establishments", *Energy Economics*, Vol. 34/5, pp. 1617-1622, http://dx.doi.org/10.1016/j.eneco.2012.01.004. [86]

OECD (2020), *A Territorial Approach to the Sustainable Development Goals: Synthesis report*, OECD Urban Policy Reviews, OECD Publishing, Paris, https://dx.doi.org/10.1787/e86fa715-en. [54]

OECD (2020), *Environment at a Glance 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/4ea7d35f-en. [80]

OECD (2020), *Functional Urban Areas by Country*, OECD, Paris, http://www.oecd.org/regional/regional-statistics/functional-urban-areas.htm (accessed on 31 July 2020). [55]

OECD (2020), *OECD Economic Outlook, Interim Report September 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/34ffc900-en. [64]

OECD (2020), *OECD Economic Outlook, Volume 2020 Issue 1*, OECD Publishing, Paris, https://dx.doi.org/10.1787/0d1d1e2e-en. [52]

OECD (2020), *OECD Family Database*, OECD, Paris, http://www.oecd.org/els/family/database.htm (accessed on 28 July 2020). [81]

OECD (2020), *OECD Metropolitan Database*, OECD, Paris, https://stats.oecd.org/Index.aspx?DataSetCode=CITIES (accessed on 27 July 2020). [78]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [43]

OECD (2019), *Environment at a Glance Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/ac4b8b89-en. [67]

OECD (2019), "Financing climate objectives in cities and regions to deliver sustainable and inclusive growth", *OECD Environment Policy Papers*, No. 17, OECD Publishing, Paris, https://doi.org/10.1787/ee3ce00b-en (accessed on 31 July 2020). [50]

OECD (2019), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264307452-en. [24]

OECD (2019), *Health at a Glance 2019: OECD Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/4dd50c09-en. [84]

OECD (2019), *OECD Principles on Rural Policy*, OECD, Paris, https://www.oecd.org/fr/regional/oecd-principles-rural-policies.htm (accessed on 27 July 2020). [3]

OECD (2019), *OECD Principles on Urban Policy*, OECD, Paris, https://www.oecd.org/cfe/urban-principles.htm (accessed on 27 July 2020). [2]

OECD (2019), *OECD Regional Outlook 2019: Leveraging Megatrends for Cities and Rural Areas*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264312838-en. [79]

OECD (2019), *OECD Roundtable on the Circular Economy in Cities and Regions*, OECD, Paris, http://www.oecd.org/cfe/regional-policy/roundtable-circular-economy.htm (accessed on 5 August 2019). [39]

OECD (2017), *Health at a Glance 2017: OECD Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/health_glance-2017-en. [83]

OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264273528-en. [48]

OECD (2016), *Water Governance in Cities*, https://www.oecd-ilibrary.org/governance/watergovernance-in-cities_9789264251090-en. [42]

OECD (2012), *OECD Environmental Outlook to 2050: The Consequences of Inaction*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264122246-en. [7]

OECD (1982), "Product durability and product life extension: their contribution to solid waste management", OECD, Paris. [29]

OECD/EC (2020), *Cities in the World: A New Perspective on Urbanisation*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/d0efcbda-en. [4]

Ortiz-Ospina, E. (2019), "The rise of living alone: How one-person households are becoming increasingly common around the world", https://ourworldindata.org/living-alone (accessed on 28 July 2020). [82]

Oxford Economics (2017), *Global Infraestructure Outlook*, https://cdn.gihub.org/outlook/live/methodology/Global+Infrastructure+Outlook+-+July+2017.pdf (accessed on 29 July 2020). [49]

Pearce, D. and R. Turner (1990), *Economics of Natural Resources and the Environment*. [30]

Raworth, K. (2020), *Doughnut Economics*, http://www.kateraworth.com (accessed on 4 August 2020). [17]

Reday-Mulvey, G. and W. Stahel (1977), *The Potential for Substituting Manpower for Energy: Final Report 30 July 1977 for the Commission of the European Communities*, Geneva Research Centre. [28]

Romano, O. (2020), "Resilient people and places: Why cities should embrace the circular economy to shape our post-COVID-19 future", OECD, Paris, http://www.oecd-forum.org/posts/resilient-people-and-places-why-cities-should-embrace-the-circular-economy-to-shape-our-post-covid-19-future (accessed on 29 July 2020). [18]

Stahel, W. (2019), *The Circular Economy - a user's guide*, Routledge. [35]

Stahel, W. (2010), *The Performance Economy: 2nd Edition*. [37]

Stahel, W. (1982), "The product life factor". [26]

Stahel, W. and G. Reday-Mulvey (1981), "Jobs for tomorrow: the potential for substituting manpower for energy", http://www.researchgate.net/publication/40935606_Jobs_for_tomorrow_the_potential_for_substituting_manpower_for_energy (accessed on 27 July 2020). [27]

UN (2020), *Goal 12: Sustainable Development Knowledge Platform*, United Nations, https://sdgs.un.org/goals/goal12 (accessed on 3 August 2020). [53]

UNEP (2019), *Emissions Gap Report 2019*, United Nations Environment Programme, http://www.un.org/Depts/Cartographic/english/htmain.htm (accessed on 28 July 2020). [45]

UNEP (2019), *Global Resources Outlook 2019*, United Nations Environment Programme, http://www.resourcepanel.org/reports/global-resources-outlook (accessed on 31 July 2020). [68]

UNEP (2018), *The Weight of Cities*, International Resource Panel, United Nations Environment Programme. [77]

UNEP (2013), *UNEP-DTIE Sustainable Consumption and Production Branch*, United Nations Environment Programme. [8]

UNEP/IWSA (2015), *Global Waste Management Outlook*. [9]

Wiedenhofer, D. et al. (2016), "Unequal household carbon footprints in China", http://dx.doi.org/10.1038/NCLIMATE3165. [71]

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*, The Club of Rome. [76]

Wijkman, A. and K. Skånberg (2016), *The Circular Economy and Benefits for Society*, The Club of Rome, https://clubofrome.org/publication/the-circular-economy-and-benefits-for-society/. [89]

World Bank (2010), *World Development Report 2010*, http://dx.doi.org/10.1596/978-0-8213-7987-5. [6]

World Bank (2010), *World Development Report 2010*, http://dx.doi.org/10.1596/978-0-8213-7987-5. [44]

World Economic Forum (2018), *Circular Economy in Cities: Evolving the Model for a Sustainable Urban Future*, http://www3.weforum.org/docs/White_paper_Circular_Economy_in_Cities_report_2018.pdf (accessed on 28 July 2020). [72]

World Economic Forum (2017), "Why the middle class can be a weapon against climate change", https://www.weforum.org/agenda/2017/02/why-the-middle-class-can-be-a-weapon-against-climate-change/ (accessed on 28 July 2020). [70]

Notes

[1] Methodological note: Answers from three regions are not included. The OECD Metropolitan Areas Database does not include metropolitan areas for the following survey respondents: Dunedin (New Zealand), Joensuu (Finland), Kemi (Finland) and Velez-Malaga (Spain). The Barcelona Metropolitan Area (Spain) and Sabadell (Spain) are included within the Functional Urban Area of Barcelona (Spain). The communes of Peñalolén (Chile) and Santiago (Chile) are included within the Functional Urban Area of Santiago (Chile).

[2] European Urban Initiative: https://ec.europa.eu/regional_policy/en/newsroom/news/2019/03/20-03-2019-european-urban-initiative-post-2020-the-commission-proposal (accessed 31July 2020).

[3] Intelligent Cities Challenge: https://www.intelligentcitieschallenge.eu/ (accessed 31July 2020).

[4] Circular Cities and Regions Initiative (CCRI): https://ec.europa.eu/research/environment/index.cfm?pg=circular (accessed 31July 2020)

[5] Consuming class is defined as those individuals with an annual income of more than USD 3 600 or USD 10 per day at purchasing power parity (PPP), using constant PPP USD (McKinsey Global Institute, 2012[65]).

Annex 1.A. Key data from surveyed cities and regions

The table below provides a snapshot of the key data collected across cities and regions participating in the OECD Survey on the Circular Economy in Cities and Regions. Data are provided by 44 cities and 2 regions. They refer to the corresponding administrative level to the city or region responding to the survey (Annex A). Four dimensions are represented: level of GDP, population size, the share of recycled waste and CO_2 emissions. The table also reports on the existence or not of a circular economy strategy. Further information on the strategies will be provided in Chapter 2.

Annex Table 1.A.1. Survey responses legend

GDP	Above EUR 50 000 +++	EUR 50 000-30 000 ++	Below EUR 30 000 +	
Population	Above 1 M ▲▲▲▲	1 000 000-500 000 ▲▲▲	500 000-250 000 ▲▲	Below 250 000 ▲
Waste recycled of total waste generated by households	Above the average (31.8% of waste recycled of total waste generated by households) +		Below the average (31.8% of waste recycled of total waste generated by households) -	
Co2 emission	Above the average (5.9 T CO_2/capita/ year) +		Below the average (5.9 T CO_2/capita/ year) -	
Circular economy strategy	Yes	Not yet, but under development	No	

Annex Table 1.A.2. Key data from surveyed cities and regions

Waste generation from households	Cities and regions	Country	GDP (EUR)	Population	Waste recycled of total waste generated by households	CO_2 emissions T CO_2/capita/year	Circular economy strategy
More than 500 kg/inhabitant/year	Dunedin	New Zealand	+	▲	-	+	NOT YET
	Barcelona Metropolitan Area	Spain	++	▲▲▲▲	-	-	YES
	Prato	Italy	+	▲	+		YES
	Lisbon	Portugal	+	▲▲	-	+	NOT YET
	London	United Kingdom	+++	▲▲▲▲	-		YES
	Manresa	Spain	+	▲	+		NO
	Paris	France	+++	▲▲▲▲	-		YES
401-500 kg/inhabitant/year	Santiago	Chile	+	▲▲	-		NOT YET
	Riga	Latvia	+	▲▲▲	-	-	NOT YET
	Quillota	Chile	+	▲	-	-	NOT YET
	Milan	Italy	++	▲▲▲▲	+	-	NOT YET
	Rotterdam	Netherlands	++		-		YES
	Granada	Spain	+	▲			NOT YET
	Flanders	Belgium	++	▲▲▲▲	+	+	YES
	Umeå	Sweden	++	▲	-		NOT YET
	Scotland	United Kingdom	++	▲▲▲▲	+		YES
	Glasgow	United Kingdom	++	▲▲▲	-		NOT YET
	Antwerp	Belgium	++	▲▲▲	+	-	NOT YET
	Sabadell	Spain	+	▲	+	-	NOT YET
	Peñalolén	Chile	+	▲	-		NOT YET
	Nantes Metropolitan Area	France	+	▲▲▲	-		YES
	Murcia	Spain	+	▲▲		-	NOT YET

Waste generation from households	Cities and regions	Country	GDP (EUR)	Population	Waste recycled of total waste generated by households	CO_2 emissions T CO_2/capita/year	Circular economy strategy
	Maribor	Slovenia	+	▲		+	YES
	Munich	Germany	+++	▲▲▲▲	+	+	NOT YET
301-400 kg/inhabitant/year	Greater Porto Area	Portugal	+	▲▲	-	-	NOT YET
	San Francisco	United States	+++	▲▲	+		NOT YET
	Temuco	Chile	+	▲▲	-	-	NO
	Groningen	Netherlands	+	▲			NOT YET
	Lappeenranta	Finland	++	▲	+	-	NOT YET
	Tilburg	Netherlands	++		+		YES
	Ljubljana	Slovenia	+	▲▲▲		+	NOT YET
	Valladolid	Spain	+	▲▲▲		-	YES
	Oslo	Norway	+++	▲▲▲	+		NOT YET
	Helsinki	Finland	+++	▲▲▲	+	-	YES
	Copenhagen	Denmark	+++	▲▲▲	+	-	YES
	Joensuu	Finland	+		+	+	NO
150-300 kg/inhabitant/year	Austin	United States	+++		-		YES
	Toronto	Canada	++	▲▲▲▲	-		NOT YET
	Amsterdam	Netherlands	+++		-	-	YES
	MRC des Sources	Canada	+	▲	-		YES
	Oulu	Finland	++	▲	+	+	NOT YET
	Medellin	Colombia	+	▲▲▲▲	-	-	NOT YET
	Malmö	Sweden	+++	▲▲	+	-	NO
	Melbourne	Australia	++	▲	-	+	YES
	Kitakyushu	Japan	++	▲▲▲	-	+	NO
	Tampere	Finland	++	▲		-	NO

Note: Results based on a sample of 46 cities and regions and desk research for the latest year with available data. From the 51 respondents to the survey, Kemi (Finland), North Karelia (Finland), Phoenix (United States), Turku (Finland) and Vélez-Málaga (Spain) have not been included due to lack of data availability.
Average of waste recycled of total waste generated by households: 31.8%. Cities and regions provided data from different years: 2014 [Medellin (Colombia)], 2015 [Prato (Italy)], 2016 [Antwerp (Belgium), Barcelona Metropolitan Area (Spain), Copenhagen (Denmark), Helsinki (Finland), Joensuu (Finland), Nantes (France) and Quillota (Chile)], 2017 [Amsterdam (Netherlands), Dunedin (New Zealand), Flanders (Belgium), Manresa (Spain), Melbourne (Australia), Munich (Germany), Paris (France) and Umeå (Sweden)], 2018 [Austin (United States), Glasgow (United Kingdom), Greater Porto Area (Portugal), Kitakyushu (Japan), Lappeenranta (Finland), Lisbon (Portugal), Malmö (Sweden), Milan (Italy), MRC des Sources (Canada), Oslo (Norway), Oulu (Finland), Riga (Latvia), Rotterdam (Netherlands), Sabadell (Spain), San Francisco (United States), Scotland (United Kingdom), Tilburg (Netherlands), Toronto (Canada)], 2019 [London (United Kingdom), Peñalolén (Chile), Santiago (Chile) and Temuco (Chile)].
Average of CO_2 Emissions: 5.9 T CO_2/capita/year. Cities and regions provided data from different years: 2010 [Munich (Germany) and Valladolid (Spain)], 2012 [Sabadell (Spain)], 2013 [Milan (Italy)], 2014 [Barcelona Metropolitan Area (Spain) and Temuco (Chile)], 2015 [Dunedin (New Zealand), Flanders (Belgium), Riga (Latvia), Maribor (Slovenia), Medellin (Colombia) and Murcia (Spain)], 2016 [Antwerp (Belgium) and Copenhagen (Denmark)], 2017 [Lisbon (Portugal), Oulu (Finland), Quillota (Chile), Lappeenranta (Finland), Joensuu (Finland), Amsterdam (Netherlands), Kitakyushu (Japan) and Tampere (Finland)] and 2018 [Greater Porto Area (Portugal), Helsinki (Finland), Ljubljana (Slovenia), Malmö (Sweden) and Melbourne (Australia)].
Santiago refers to the Commune of Santiago (Chile), located in the Santiago Metropolitan Region (Chile).
Source: OECD (2020[43]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

2 Cities and regions going circular: Circular economy vision, policies and tools

This chapter provides an overview of roles and responsibilities at the national, regional and local levels of government, co-ordination mechanisms and circular economy long-term visions, based on survey information and desk research. It also provides an overview of the financial and regulatory tools, capacity-building programmes, data and information, stakeholder engagement and business models applied by surveyed cities and regions.

The circular economy in existing policies and strategies

Climate, green and sustainable strategies are linked to the circular economy in 70% of the cities and regions surveyed (OECD, 2020[1]). In Tampere, Finland, much like Helsinki and Oulu, the circular economy is included in the sustainability policy plan of the city, the Carbon-neutral Tampere 2030 Action Plan. In Umeå, Sweden, the circular economy is a means to achieve the city's goal to be fossil-free by 2040, while enhancing innovation and creating the enabling environment for new business models. Transitioning towards a circular economy has been a political priority for the city since the Strategic Plan 2016-28, setting the objective for the city of Umeå to become a circular economy leader. The city of Oslo, Norway, developed an overall vision based on four key issues: public procurement, climate adaptation, waste and consumption. At the national level, Sweden's Rural Policy incorporates the circular economy in one of its four objectives (Ministry of Enterprise and Innovation, 2015[2]).

First attempts to include circular economy principles in policies and strategies relate to waste management or resource management plans. For example, the Resource Efficiency Roadmap to 2030 in Vantaa, Finland, incorporates the notion of the circular economy related to the development of new business models, the built environment sector, the sharing economy and public procurement. Similarly, the Regional Action Plan for the Circular Economy (*Plan Régional d'Action en faveur de l'Economie Circulaire*) of the Centre Val-de-Loire region in France is included within the Regional Plan for Waste Prevention and Management (PRPGD). The waste management corporation of Munich, Germany (*Abfallwirtschaftsbetrieb München,* AWM), in charge of the collection and management of household and commercial waste, has extended its core business of waste management into a resource-efficient circular economy approach in recent years. In North America, some cities have started their transition to the circular economy with a strong focus on the waste sector. Toronto, Canada, has embraced the circular economy as a goal in its Long Term Waste Management Strategy; Phoenix, United States (US), created Reimagine Phoenix to increase the city's waste diversion rate to 40% by 2020 and Austin, also in the US, is advancing towards zero waste through the Austin Resource Recovery Master Plan.

At the regional level, circular-related objectives are included in green growth and regional development agendas. For example, in 2016, the Flemish government, Belgium, adopted the cross-cutting Policy Paper Vision 2050, which is based on seven transition priorities, one of which is the structural transition towards the circular economy. Region Västerbotten, Sweden, initiated several initiatives to promote the circular economy. In October 2019, the County Administrative Board launched the Climate and Energy Strategy, which includes the circular economy as one of the focus areas. Moreover, the circular economy will be part of the Regional Development Strategy of Region Västerbotten, currently under development. In 2018, the Autonomous Region of Andalusia approved the Strategy for Sustainable Development (*Estrategia de Desarrollo Sostenible 2030*) that foresees the transition to the circular economy as one of its objectives. The strategy conceives the circular economy as an opportunity to achieve sustainable goals at the regional level and as a key element of the Green Economy (Regional Government of Andalusia, 2018[3]). In Japan, the 5th Basic Environment Plan foresees a "Regional Circular and Ecological Sphere" to help achieve Sustainable Development Goal (SDG) 11, based on policy coherence and climate-related initiatives.

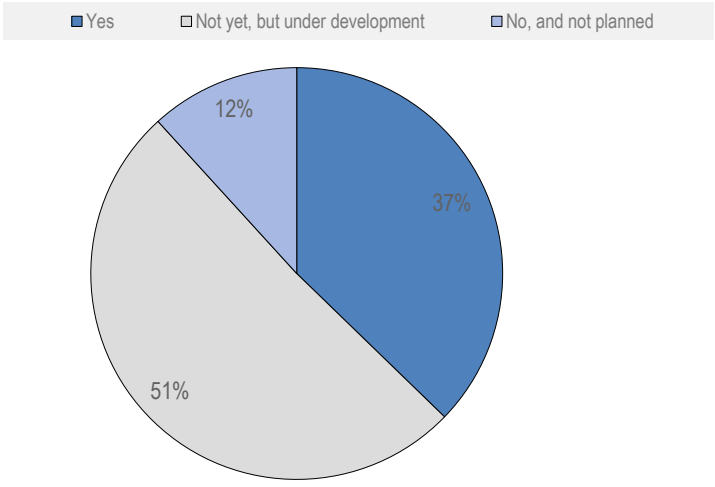
A long-term vision for the circular economy

The following section discusses roles and responsibilities, processes, objectives and actions of dedicated circular economy strategies at the national, regional and local levels of government.

Several governments at various levels have been establishing a circular economy long-term vision. These have taken various forms, such as: strategies (Colombia, Denmark, Finland, the Netherlands, Spain and Sweden, Amsterdam [Netherlands], Paris [France]); roadmaps (Belgium, Chile France and Slovenia, Nantes Metropolitan Area [France], Valladolid [Spain]); action plans (Portugal), frameworks (Italy), white

papers (Norway); bills (France) and programmes (e.g. Barcelona Metropolitan Area [Spain], Rotterdam [Netherlands]). The common point across national, regional or local initiatives is the long-term view, expressed in some cases through specific targets. For example, the Netherlands aims to be fully circular by 2050 and Finland aims to become a world leader in the circular economy by 2025 (Annex 2.A). Circular economy dedicated initiatives, including strategies, are in place in 37% of surveyed cities and regions, while half of the sample is looking forward to developing one (OECD Survey (2020[1]), Figure 2.1).

Figure 2.1. Share of surveyed cities and regions with circular economy initiatives in place

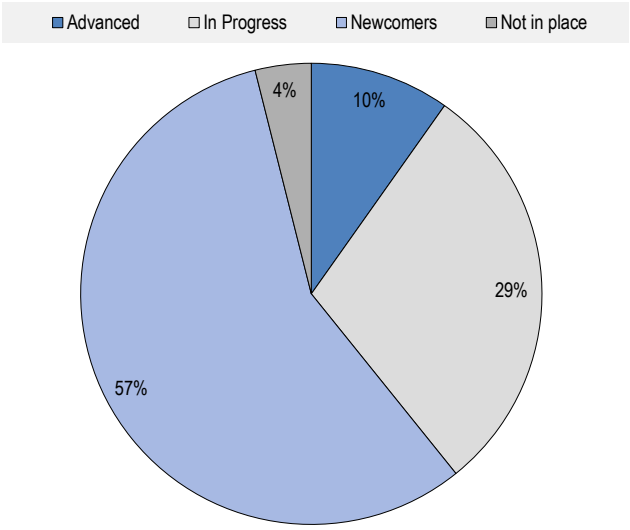


Note: Results based on a sample of 51 respondents that responded "Yes", "Not yet, but under development" and "No, and not planned" to the question on the existence of a circular economy initiative (e.g. a strategy, plan, programme, road map, etc.), intended as a set of actions designed to achieve circular economy long-term goals.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

According to the OECD survey (2020[1]), most of the responding cities and regions perceive themselves at the initial phases of the transition. Only 10% of surveyed cities and regions defined themselves as "advanced", while 39% as "in progress", 57% as "newcomers" and 4% of surveyed cities and regions described the transition towards the circular economy as "not in place" (Figure 2.2, Table 2.1).

"Advanced" are those cities and regions that have developed strategies or roadmaps and engaged a variety of stakeholders. Cities and regions "in progress" are those taking action towards the circular economy, following ad hoc initiatives. Cities or regions in this cluster have recently set specific programmes on the circular economy and/or are starting their implementation. "Newcomers" are cities or regions that recognise the relevance and potential of the circular economy and are exploring options for implementation. These cities have already achieved good results in waste recycling levels (Munich or Phoenix); water reuse (Granada); have signed political commitments to advance towards the circular economy (Milan, Prato); are starting to develop a circular economy strategy (Groningen, Umeå); or have included the circular economy in broader policy plans (Oulu). These cities see in the circular economy a means for reducing environmental impacts while increasing attractiveness and competitiveness.

Figure 2.2. Share of surveyed cities and regions at various levels of advancement towards the circular economy transition



Note: Results based on a sample of 51 respondents that responded "Advanced", "In progress" "Newcomers" and "Not in place" to the question: "What is the level of advancement of the transition from linear to circular in your city or region?".
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Table 2.1. Perceived level of advancement towards the circular economy transition in surveyed cities and regions

Level of advancement	City or region	Country
Advanced	Amsterdam	Netherlands
	Kitakyushu City	Japan
	London	United Kingdom
	Paris	France
	Flanders	Belgium
In progress	Austin	United States
	Barcelona Metropolitan Area	Spain
	Glasgow	United Kingdom
	Greater Porto Area	Portugal
	Kemi	Finland
	Ljubljana	Slovenia
	Malmö	Sweden
	Maribor	Slovenia
	North Karelia	Finland
	Oslo	Norway
	Rotterdam	Netherlands
	San Francisco	United States
	Scotland	United Kingdom
	Toronto	Canada
	Turku	Finland

Level of advancement	City or region	Country
Newcomers	Antwerp	Belgium
	Copenhagen	Denmark
	Dunedin	New Zealand
	Granada	Spain
	Groningen	Netherlands
	Helsinki	Finland
	Joensuu	Finland
	Lappeenranta	Finland
	Lisbon	Portugal
	Manresa	Spain
	Medellín	Colombia
	Melbourne	Australia
	Milan	Italy
	MRC des Sources	Canada
	Munich	Germany
	Murcia	Spain
	Nantes Metropolitan Area	France
	Oulu	Finland
	Peñalolén	Chile
	Phoenix	United States
	Prato	Italy
	Quillota	Chile
	Sabadell	Spain
	Santiago (Municipality)	Chile
	Tilburg	Netherlands
	Umeå	Sweden
	Valladolid	Spain
	Vélez-Málaga	Spain
	Temuco	Chile
Not in place	Riga	Republic of Latvia
	Tampere	Finland

Note: Based on the answers to Question 3.2.: "In your opinion, what is the level of advancement of the transition from linear to circular in your city/region?".
As such, these levels of advancement are not an official OECD assessment but part of a self-assessment from surveying cities and regions.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Who does what

Although the circular economy is not conceptually new, governments at various levels are gradually approaching the development and implementation of long-term strategies for a circular economy. As such, understanding how roles and responsibilities for designing, financing, implementing and monitoring circular economy initiatives are allocated across national, regional and local governments can help identify potential gaps and suggest effective ways forward towards the circular transition. Based on the results of the OECD survey (2020[1]), ministries of the environment in collaboration with other ministries and national agencies have a key role in developing and implementing national circular economy initiatives

(e.g. Belgium, Chile, Colombia, Italy, Japan, New Zealand). At the regional level, technical working groups have been created to kick off the process to develop circular initiatives. This is the case in Catalonia (Spain), Centre Val-de-Loire (France), Scotland (United Kingdom [UK]) and Southwest Finland. At the local level, the increasing number of specific circular economy managers shows the growing relevance of the circular economy in cities (Amsterdam, Netherlands; Brussels, Belgium; Ljubljana, Slovenia; London, United Kingdom; Paris, France; and Rotterdam, Netherlands). The section below provides further details on roles and responsibilities at various levels of government and co-ordination mechanisms.

Often, ministries of the environment have a central role in the circular economy in more than half of the surveyed countries (OECD, 2020[1]). In Chile, Japan and New Zealand, the ministry of the environment is the main body responsible for the circular economy. In other countries, this ministry shares the responsibility with: the Ministry of Industry (Colombia and Denmark); the Ministry of the Economy (Italy); or the Federal Ministry of Jobs, Economy and Consumers (Belgium). In the Netherlands, the Ministry of Infrastructure and Water Management alongside the Ministry of Economic Affairs are the main responsible authorities. The Ministry of Ecological and Solidarity Transition has taken the lead in France while, in Finland, the Finnish Innovation Fund (SITRA) plays a key role. In Australia, there is no national agency responsible for the circular economy – although both the Department of Industry, Science, Energy and Resources (DISER) and the Department of Agriculture, Water and the Environment (DAWE) develop and implement policies consistent with circular economy principles. Local governments generally work in collaboration with state governments under an overarching waste management strategy, although generally there is no explicit reference to the “circular economy”.

Given the holistic characteristics of the circular economy, some countries developed co-ordination bodies across ministries, including also other key stakeholders. An inter-ministerial commission was created in Spain to develop a circular economy strategy towards 2030 (Box 2.1). In 2019, a National Delegation for the Circular Economy was created in Sweden. The delegation is an advisory body to the government and brings together representatives from the public sector, businesses and academia. In Portugal, the action plan was first designed and developed by a technical inter-ministerial group and was later submitted for public consultation before being approved by the Council of Ministers in December 2017.

National circularity strategy processes often involve consultation with subnational and local entities. This is the case of Spain, where, in 2018, the Spanish Circular Economy Strategy incorporated almost 2 000 observations from autonomous regions, the Spanish Federation of Municipalities and Provinces and citizens. In Slovenia, regional consultations and meetings with stakeholders formed the core basis of the circular economy roadmap: the preliminary process included 12 regional consultations, organised in co-operation with the Office of the Prime Minister of Slovenia and the Ministry of the Environment and Spatial Planning, which was further expanded upon through dialogues with carefully chosen stakeholder representatives. In this manner, the roadmap collected almost 100 good practices from all over Slovenia relating to the circular economy. In France, the local administration was one of the major counterparts in its 2018 Roadmap for the Circular Economy. According to the OECD survey (2020[1]), almost two-thirds of respondents considered that frameworks on the circular economy developed by other levels of governments are inspirational for transitioning from linear to a circular economy at the subnational level. They can help build capacities and skills (29%), also provide financial support to set up circular initiatives (27%) and push for data and information at the subnational level (22%).

At the regional level, according to respondents of the survey, the circular economy is driven by public environmental organisations, waste management agencies and economic development organisations. The regional governments that answered the OECD survey (2020[1]) have allocated the responsibility of guiding the circular transition mainly to: regional councils (North Karelia, Finland, through the Regional Council of North Karelia); publicly funded, not-for-profit environmental organisations (Scotland, UK, through Zero Waste Scotland); and public waste agencies (Flanders, Belgium, through the Public Waste Agency of Flanders OVAM).

Box 2.1. The inter-ministerial commission for the Spanish Circular Economy Strategy

The Spanish Circular Economy Strategy (*España Circular 2030*) was jointly promoted in 2018 by the Ministry of Agriculture and Fisheries, Food and the Environment (*Ministerio de Agricultura, Pesca y Alimentación*) and the Ministry of Economy, Industry and Competitiveness (*Ministerio de Economía y Competitividad*, MINECO). An inter-ministerial commission formed by nine ministries and the Economic Office of the President at that time contributed to it, together with the autonomous communities and the Spanish Federation of Municipalities and Provinces (FEMP). After the election in November 2019, the inter-ministerial committee added new ministries (e.g. the Ministry of Education and Vocational Training, *Ministerio de Educación y Formación Profesional*) to the nine previous ones.

The new composition is the following: the Ministry of Agriculture, Fisheries and Food; the Ministry for Ecological Transition and the Demographic Challenge; the Ministry of Economic Affairs and Digital Transformation; the Ministry of Education and Vocational Training; the Ministry of Finance; the Ministry of Health; the Ministry of Industry, Trade and Tourism; the Ministry of the Interior; the Ministry of Labour and Social Economy; the Ministry of Presidency, Relations with Parliament and Democratic Memory; the Ministry of Science and Innovation; the Ministry of Territorial Policy and Civil Service; the Ministry of Transport, Mobility and Urban Agenda; and the Ministry of Universities.

The inter-ministerial commission will continue to meet at least once a year to evaluate and monitor the implementation of the national strategy. The inter-ministerial commission created a working group for autonomous regions responsible for forming other working groups to further implement the strategy.

The Spanish Strategy on the Circular Economy was approved in June 2020 by the Council of Ministers. The strategy is one of the key elements of the Circular Economy Framework (*Marco de Economía Circular*), one of the government's projects that aims to be a lever for economic recovery after the COVID-19 health crisis. The adoption of the Spanish Circular Economy Strategy was foreseen in the Declaration of Climate and Environmental Emergency approved in January 2020, making it one of the priority lines of action, and is consistent with the draft bill on Climate Change and Energy Transition, which sets the goal of achieving climate neutrality by 2050.

In addition, on 2 June 2020, the Council of Ministers approved the draft bill on Waste and Contaminated Soils, which will also addresses the challenge of single-use plastics, and a royal decree to improve the traceability and control of waste shipments.

Source: Government of Spain (2020[4]), *España Circular 2030, Estrategia Española de Economía Circular*, https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/espanacircular2030_def1_tcm30-509532.PDF; and OECD (2020[5]), *The Circular Economy in Valladolid, Spain*, https://doi.org/10.1787/95b1d56e-en.

Regional circular economy action plans and roadmaps also usually benefit from technical working groups. Between 2017 and 2018, in Catalonia, Spain, a working group formed by the Government of Catalonia, administrations and agents developed the Regional Circular Economy Action Plan (*Estrategia de Impulso a la economía verde y a la economía circular*). In the Brussels Region, the Programme for the Circular Economy 2016-20 is co-ordinated by three ministers and four regional administrative bodies (Government of the Brussels-Capital Region, 2016[6]); in 2018, the Public Waste Agency of Flanders (OVAM) set up a national platform for the circular economy, through which the top levels of federal and regional environment departments, economy/innovation departments and finance departments meet twice a year to take decisions in priority policy fields. In North Karelia, Finland, the Regional Council is responsible for the development of the regional circular economy roadmap, in co-ordination with a regional group, composed of representatives from private companies, knowledge institutions and other civil society organisations.

According to the respondents of the OECD 2020 Survey, the circular economy in cities is led by environmental departments. Beyond environmental departments, respondents flagged responsibilities across economic development and urban planning departments, sustainability and waste management utilities and/or related public agencies. The city council or the central municipal administration also hold responsibilities, as well as innovation area offices and public works departments. In Amsterdam and Paris, the transition is led by urban planning and sustainability areas. In London, UK, this responsibility is assigned to the London Waste and Recovery Board (LWARB). The city of Kitakyushu, Japan, has designated the Environmental Industry Promotion Division for the task. Cities under each category are detailed in Table 2.2.

In cities, city managers dedicated to the circular economy are flourishing. The increasing importance of the circular economy is visible by the fact that there are specific circular economy managers in cities (Amsterdam, Netherlands; Brussels, Belgium; Ljubljana, Slovenia; London, United Kingdom; Paris, France; and Rotterdam, Netherlands). Circular economy managers are in charge of promoting the setting and implementation of circular strategies, while also building relations with external actors.

Table 2.2. Public offices responsible for the circular transition in surveyed cities and regions

Responsible office	Cities or regions	Country
Environment	Copenhagen	Denmark
	Joensuu	Finland
	Lisbon	Portugal
	Ljubljana	Slovenia
	Malmö	Sweden
	Melbourne	Australia
	Manresa	Spain
	San Francisco	United States
	Peñalolén	Chile
	Temuco	Chile
	Santiago (Municiplaity)	Chile
Economic development and co-operation	Barcelona Metropolitan Area	Spain
	Dunedin	New Zealand
	Groningen	Netherlands
	Kitakyushu	Japan
	Medellín	Colombia
	Quillota	Chile
	Umeå	Sweden
	Valladolid	Spain
	Riga	Latvia
Dedicated circular economy structure	Austin	United States
	Lappeenranta	Finland
	Nantes Metropolitan Area	France
	Rotterdam	Netherlands
	Kemi	Finland
Urban planning and sustainability	Amsterdam	Netherlands
	Milan	Italy
	Oulu	Finland

Responsible office	Cities or regions	Country
	Helsinki	Finland
	Paris	France
	Tampere	Finland
	Tilburg	Netherlands
Waste management utility company or agency	Greater Porto Area	Portugal
	Munich	Germany
	Oslo	Norway
	Toronto	Canada
	London	United Kingdom
	Maribor	Slovenia
City council/municipal central administration	Glasgow	United Kingdom
	Granada	Spain
	Murcia	Spain
	Prato	Italy
	Turku	Finland
	Vélez-Málaga	Spain
Innovation offices	Antwerp	Belgium
	Sabadell	Spain
Public works	Phoenix	United States

Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Co-ordination amongst municipal departments is key to implement circular economy initiatives. The interdisciplinary characteristic of the circular economy requires cities to avoid working in siloes. Some cities have created dedicated horizontal working groups (Melbourne, Oulu and Toronto). The city of Toronto, Canada, through the Circular Economy and Innovation (CEI) Unit, formed a Cross-Divisional Circular Economy Working Group to co-ordinate and increase the capacity of the City Divisions to implement circular economy initiatives. The working group currently comprises 11 divisions (Solid Waste Management Services, Purchasing and Materials Management, Environment and Energy, Parks, Forestry and Recreation, City Planning, Economic Development and Culture, Corporate Real Estate Management, Toronto Public Health, Transportation Services, Toronto Water, and Engineering and Construction Services). The Metropolitan Area of Barcelona, Spain, created a “Roundtable for the circular economy” (*Mesa de economía circular*) where the city and the metropolitan area co-ordinate actions. The city of Rotterdam, Netherlands, co-created its four-year-long programme on the circular economy, involving all the departments concerned with circularity in the municipality. The Department of Economy in the city of Groningen, Netherlands, is working hand in hand with the water, waste and international affairs Departments to develop a circular economy strategy.

Objectives

Circular economy initiatives can have multiple objectives. According to the OECD survey (2020[1]), cities and regions ranked proposed objectives of the circular economy in the following order: first, to rethink production and consumption patterns; second, to improve environmental quality; third, to create new business models; fourth, to favour behavioural change; and fifth, to boost innovation.

The promotion of sustainable development is a common aim of various national circular economy initiatives, notably within the framework of national and global sustainability agendas such as the SDGs. In the case of Denmark, the circular economy is considered a key step in the government’s plan of action

to contribute ambitiously to the attainment of all 17 SDGs. In Italy, the circular economy strategic framework positions on the issue, in continuity with the commitments adopted under the Paris Climate Change Agreement, the United Nations Agenda 2030 on Sustainable Development, the G7 Communiqué and within the European Union (EU). The circular economy strategy is part of the implementation of the wider National Strategy for Sustainable Development, adopted in 2017, contributing to the objectives of more efficient use of resources and more circular and sustainable patterns of production and consumption. The Slovenian circular economy roadmap is also closely tied to the SDGs and forms a key component of national strategy documents such as *A Vision for Slovenia in 2050* (2020[7]) and the *Slovenian Development Strategy 2030* (2018[8]) as well as Slovenia's *Smart Specialisation Strategy* (2015[9]).

Waste reduction and more efficient and optimal use of resources are key goals in the majority of strategies hereby assessed, with expected positive impacts on the environment and the economy. Among the main environmental goals, waste reduction is the most prominent (e.g. France, the Netherlands, Portugal, Slovenia, Spain). In the Netherlands, the circular economy strategy envisages an (interim) objective of a 50% reduction in the use of primary raw materials (minerals, fossil and metals) by 2030 and a goal to use and reuse raw materials efficiently without any harmful emissions to the environment by 2050. The Netherlands aims to promote the high-quality use of raw materials in existing supply chains and, in cases in which new raw materials are needed, fossil-based, critical and non-sustainably produced raw materials are to be replaced by sustainably produced, renewable and generally available raw materials. France aims to reduce natural resource use related to French consumption by 30% in relation to gross domestic product (GDP) between 2010 and 2030, the amount of non-hazardous waste by 50% between 2010 and 2025, recycle 100% of plastics by 2021 and, in doing so, avoid 8 million additional tons of CO_2 emissions every year. Spain aims to reduce food waste generation in 50% per capita at household and retail level and 20% in production and supply chains starting in 2020, and improve water use efficiency by 10%. One of the main goals of the Slovenian circular economy roadmap is to achieve more self-sufficiency in the provision of raw materials, given the fact that Slovenia is currently importing 71% of the raw materials that are consumed domestically. Through its circular economy strategy, Scotland, UK, aims to reduce its food waste target by 33%. Amsterdam, Netherlands, has established a target of becoming completely circular by 2050 and halving the use of new raw materials and food waste by 50% by 2030, as is the case in Rotterdam, Netherlands.

Carbon neutrality is also a prevailing long-term goal for survey respondents. London, UK, is pursuing circularity in order to make a substantial contribution to the mayor's aspiration to become a zero-carbon city by 2050. The city of Oulu, Finland, is developing a new environmental programme that sets the goal to become carbon-neutral by 2040. The development process of the new plan involved the organisation of several workshops for politicians, officeholders, specialists and residents and the need for creating a circular economy road map has been identified as a priority for the near future. The city of Joensuu, Finland, is planning circular economy actions within the ongoing climate programme that aims to transform Joensuu into a carbon-neutral city by 2025. In Scotland, UK, it is estimated that a more circular economy could reduce carbon emissions by 11 million tonnes per year by 2050.

Stimulating employment is one of the aims of several national, regional and local circular economy strategies. Some countries explicitly recognise the employment benefits that a circular economy industry can offer: estimates in France have shown that up to 300 000 additional jobs may be created, in many cases, through completely new and original professions (French Government, 2018[10]). The entrepreneurial value of creating a critical mass of new business models and structures as well as infrastructure, with a focus on local production and small- and medium-sized enterprises (SMEs), is explicitly recognised by Colombia and Italy in their respective circular economy initiatives. In the case of Rotterdam, Netherlands, 10% of all current jobs are circular, which is higher than the national average of 8.1% and estimations suggest that between 3 500 and 7 000 new jobs will directly contribute to the circular economy. In London, it is estimated that 40 000 new jobs (12 000 net additional jobs) will be created by

2036 in the areas of reuse, remanufacturing and materials innovation (London Waste and Recycling Board, 2017[11]).

Circular economy strategies can pave the way for innovation and expected economic benefits. Some projections show the positive economic impact that the circular economy can have in the economy (e.g. Colombia, Finland, France, Italy) while innovation and social positive effects are also highlighted by a number of strategies. It is estimated that in Scotland, UK, action across eight manufacturing sub-sectors could result in annual cost savings of GBP 0.8-1.5 billion. In the case of Extremadura, Spain, the circular economy strategy is seen as an opportunity to transform industry through the attraction of both national and international investments, strengthen tourism, ensure sustainable rural development, land use planning, urban planning and construction, and improve transport networks and services. London, UK, could receive a net benefit of up to GBP 7 billion a year by 2036 if it accelerates the transition (London Waste and Recycling Board, 2017[11]).

Process

The role of bottom-up public consultation mechanisms is significant on the road to circularity, as a starting point to collect ideas and proposals from stakeholders. In the case of the Finnish roadmap to a circular economy, the process started in 2016 with a general invitation to all citizens to participate in identifying the best pilots, trial ideas and practices. Hundreds of ideas were collected from participants from different sectors, including trade unions, organisations and the corporate field, the Ministry of the Environment, the Ministry of Agriculture and Forestry, the Ministry of Economic Affairs and Employment, environmental organisations, consumers and other stakeholders. This broad stakeholder engagement formed the basis for the key policies, projects and pilots proposed in the initial roadmap published in 2016. Consultation with stakeholders from a wide variety of stakeholders from different sectors was also a key component of the 2019 revision to the plan. The Italian Ministry of the Environment promoted a two-month online consultation on the national strategic document on the circular economy. About 3 900 people took part in the consultations and 300 organisations and institutions provided specific comments on the proposed text. A key step for the development of the Spanish Strategy on the Circular Economy was the “Pact for a circular economy”, engaging the main economic and social stakeholders in Spain towards circular business models. By September 2019, a total of 347 stakeholders had adhered to the pact. The signatories to the “Pact for a circular economy” committed to boosting the transition to the circular economy through ten actions (Government of Spain, 2020[4]). The Circular Economy Strategy of Greater Paris (France) was developed by 240 stakeholders from over 120 different organisations. They were divided in working groups and defined 65 proposals. In Brussels, Belgium, consultations across stakeholder allowed the identification of priority areas for circular economy projects.

In particular, stakeholders from the waste, water and food sector are significant counterparts in many national circular economy initiatives because of their essential role in managing waste. Portugal has carried out extensive dialogue with public entities managing waste, waste management operators, the Portuguese Water Partnership (PPA), the Portuguese Soil Partnership (PPS), water resource planners, river basin managers, water sector managers, irrigator associations, the National Commission to Fight Food Waste and the Directorate General of Food and Veterinary Medicine (DGAV). Spain has engaged in dialogue with waste managers. In Belgium, the Federal Public Services of Public Health and Economy have been integrated into the external working group "actors of the waste policy" of the European Consumer Centre in order to provide a forum for exchange between the federal and regional levels of government and business federations, with a view to strengthening the coherence of waste policies.

Businesses and other economic agents are also usually involved in the development of circular economy strategies. Finland’s 2019 revision to its circular economy strategy has focused on companies and how they can shift from linear to circular business models. The role of unions and employer associations as counterparts in dialogue has also been recognised by Portugal and Spain, amongst others. In the case of Portugal, the financial sector has also been involved in discussions, in particular the commercial and

investment-banking sector. Consultation processes also provide transparency and openness, which foster citizen debate, awareness-raising and the promotion of research and private sector action.

The public consultation process often took different forms, from open stakeholder meetings to digital platforms. For the development of the circular economy roadmap for France, stakeholders worked for two months in four workshops organised around the categories “territories”, “plastics”, “sustainable consumption and production” and “economic instruments”. In parallel to this technical work, an online platform was opened to collect citizens’ opinions, which gathered nearly 1 800 contributions and more than 16 000 votes. In the case of Slovenia, 7 meetings took place physically in 12 different regions, in addition to 7 interactive stakeholder workshops. The roadmap was also presented for consultation at various events in nine European countries. Over 3 000 stakeholders took part in the design of the roadmap, with communication taking place within the framework of the Partnership for Green Economy and through an electronic newsletter. The public consultation process was reinforced through 19 structured interviews with key stakeholders from government departments, economic agents, interest groups and experts from individual fields.

Priorities and actions

The identification of priority areas for action is the result of both public consultations and technical studies. Beyond the public consultation processes described above and further developed in Chapters 2 and 3, governments at various levels and analysed in this report have developed technical studies, in particular on material flows, to identify priority areas. For example, metabolism analyses aim to identify material flows, quantity, imports and exports. Countries that have performed this kind of diagnosis are Colombia, Italy, Portugal, Slovenia and Sweden. At the subnational level, the city of Paris, France, and the city of Rotterdam, Netherlands, have identified priority flows that highly impact the metabolism of the city (Circular Metabolism, 2017[12]; Municipality of Rotterdam, 2013[13]). In 2018, the Northern Netherlands Region carried out a material flow analysis to identify priority areas for the circular economy, showing relevant opportunities for the circular economy across provinces. Many other cities and regions have performed these analyses.

Priority areas can be established by sector or can be transversal in nature, for example:

- In the case of Colombia, there are six lines of action in its 2019 National Strategy for the Circular Economy based on metabolism analyses: i) flow of industrial materials and mass consumption products; ii) flow of packaging materials; iii) flow of biomass; iv) energy sources and flows; v) flow of water; and vi) flow of construction materials.
- The “Circular Economy in the Netherlands by 2050” is based on five priorities: biomass and food; plastics; manufacturing industry; construction sector and consumer goods.
- The Regional Programme for the Circular economy 2016-20 (PREC) in the Brussels-Capital programme includes 111 measures across 4 strategic areas: cross-functional measures (a favourable regulatory framework, direct and indirect aid, innovation, procurement contracts, employment, training, education); sector-based measures (construction, resources and waste, trade, logistics, food); territorial measures; and governance measures (strengthened co-operation between administrations).
- In 2015, the city of Paris held the General Assembly on the Circular Economy, presenting the White Paper on the Circular Economy of Greater Paris, followed by the Circular Economy Plan 2017-20. The plan contained 65 action proposals based on 7 strategies: encourage and support economic players; innovate and experiment; scale up and establish momentum in the region; change attitudes and practices; involve local authorities, businesses and citizens; create a network linking players; and change legislation. In parallel, the city has worked on urban metabolism, through which the following sectors have been identified as highly strategic for the circular economy: the built environment, food, water and energy. The 1st Roadmap adopted in 2017, encompasses 15

actions for: planning and construction; reduction, reuse, repair; support for actors; public procurement and responsible consumption. The 2nd Roadmap was adopted in November 2018. This new roadmap defined 15 actions organised in 5 new themes: exemplary administration; culture; events; sustainable consumption; and education (City of Paris, 2017[14]).

- Developed in 2016, the vision and action agenda "Circular Amsterdam" (Circle Economy et al., 2016[15]) identified two key sectors for which a circular system could hold the greatest economic, social and environmental benefits: construction chain and organic residual streams chain. The city developed the Circular Innovation Program (CIP) with businesses and research institutes and "Amsterdam Circular: learning by doing" with municipal departments. With the Amsterdam Circular 2020-2025, the city of Amsterdam plans to move towards a circular economy by 2050 and aims to use 50% fewer primary raw materials by 2030. The strategy focuses on three value chains to shape the circular economy actions in the city: food and organic waste streams; consumer goods; and built environment (City of Amsterdam, 2020[16]). In addition, the report *The Amsterdam City Doughnut. A Tool for Transformative Action* (2020[17]) defines six key principles for the city: i) embrace the 21st-century goal (meet the needs of all people within the means of the living planet); ii) recognise the potential roles of the household, the commons, the market and the state – and their many synergies – in transforming economies; iii) promote diversity, participation, collaboration and reciprocity; iii) experiment, learn, adapt, evolve and aim for continuous improvement; iv) work in the spirit of open design and share the value created with all who co-create it; v) aim to work with and within the cycles of the living world; vi) do not let growth become a goal in itself.
- In 2017, upon the request of the Mayor of London, the LWARB developed a roadmap to a circular economy by 2036. This date reflected the end date of the London Plan, now updated to 2041. The built environment, food, textiles, electricals and plastics have been chosen as focus areas due to their high environmental impact, retained financial value and potential for reuse. For each sector, the roadmap identified cross-cutting themes, activities, resources and champions.
- Circular Flanders (Flanders Region, Belgium) is a partnership of public authorities, companies, civil society and research institutions created in 2016. In the cross-cutting policy paper "Vision 2050. A long-term strategy for Flanders", the Flemish government has defined six key activities: building networks and co-operation among stakeholders; reducing experimentation risks in the circular economy; developing research through the Policy Research Centre for the Circular Economy; fostering policy co-ordination; stimulating innovation and entrepreneurship; and up-scaling circular economy projects. There focus areas are: i) circular purchasing; ii) circular cities; and iii) circular entrepreneurship.
- The city of Rotterdam, Netherlands, recently launched the Rotterdam Circularity Programme 2019-2023. The four-year programme focuses on four streams: agro-food and green streams; construction; consumer products (e.g. single-use plastics); and healthcare.

The following key actions are often implemented to set up a circular economy system:

- **Improvement of product design, extending the useful life of products:** Italy's circular economy strategic framework focuses on product eco-design whereby material resources are rationalised by replacing non-renewable materials with renewable, recycled, permanent, biodegradable, non-hazardous and compostable materials; and recreating production processes so that more products are made that are able to be easily disassembled, recycled, modular (replacement of parts, the recovery and reuse of systems and sub-systems) and repairable. A similar emphasis is placed on efficient and circular product design in Portugal's circular economy action plan, with a particular focus on boosting manufacturer innovation and responsibility in order to manufacture products that are "designed to last" by encouraging strategies to extend product working life, support the development of a network of repair facilities by establishing partnerships with municipalities to train and disseminate repair and reuse networks. The city of Paris, France, emphasises the need to facilitate the extension of product life cycle and has implemented

measures to recover information technology (IT) and telephone equipment and furniture. It has also promoted the adoption of a charter in cultural venues for the design of eco-responsible events.

- **Repurposing:** Many strategies foresee opportunities for repurposing empty building to reduce the use of raw material to build new buildings and extend the life of existing buildings. For example, Portugal promotes the use of "empty" built space. There are several examples of repurposing at city level, as the city of Prato in Italy (Chapter 3).
- **Sharing:** In the case of Amsterdam, Netherlands, and Paris, France, the local governments have supported local repair and restoration centres and expanded facilities for sharing products amongst citizens. Cities investing in circular transport have focused on shared municipal fleets of cars and bicycles, as well as on developing urban logistic spaces, increasing the attractiveness of the use of public transport, widening sustainable transportation options and building additional bicycle lanes.
- **Redistributing:** London, UK, supports local supermarkets and businesses that redistribute surplus food; the city of Paris, France, supports non-profit organisations collecting unsold food items and redistributing them.
- **Service-based initiatives:** In Rotterdam, Netherlands, the city is promoting circular services through circular procurement. For example, every municipal public tender should challenge businesses and entrepreneurs to supply circular products or services. In a similar way, Nantes Metropolitan Area, France, has included in its circular economy roadmap actions aiming to transform services publicly purchased, promoting the economy of functionality.
- **Sustainable supply:** Paris' (France) 1st Circular Economy Roadmap set the objective of promoting sustainable, organic and responsible product supplies in public entity canteens (e.g. in schools). This objective is linked to the implementation of a more socially and environmentally responsible public procurement scheme and the goal of expanding urban agriculture practices in the city. Scotland's circular economy strategy Making Things Last aims to work with the whole supply chain to investigate, pilot and implement improvements to recovering value from biological resources and providing more sustainable products to improve the economics and environmental impact of the industry. In 2018, the city of Amsterdam, Netherlands, launched the Circular Hotels Leaders Group (*Kloplopergroep*). A total of 12 hotels have started co-operating with actors along their different value chains to incorporate circular principles in their business models (e.g. by exchanging knowledge; joint purchasing and bundling of waste streams for useful applications; using furniture and (replaceable) carpet tiles made from recycled material; repair and reuse of beds; replacing buffet breakfasts by a la carte schemes; making the best of circular purchasing power through collaboration with other hotels, for example contracting rental services of sustainable linen and laundry). The city of Maribor, Slovenia, focuses on sustainable supply in the transport sector. It is planning the creation of a distribution centre for local supply in the city's downtown (already closed to traffic), using alternative delivery forms. Rotterdam, Netherlands, is using a digital market place for building materials, bringing supply and demand of building components together and promoting sustainable supply in the construction sector through it. In London, UK, with the inclusion of the circular economy in the textile supply chain and the reuse and recycling of clothing, the city aims at: reducing the number of textiles sent for disposal; becoming a hub for textile collection, reuse and recycling; and being recognised as a well-known circular economy textile design centre.
- **Responsible consumption:** The Galician Strategy of Circular Economy 2019-2030 (Galicia, Spain) promotes the responsible consumption of resources through the use of products made of recycled or reused materials. To achieve this goal, the region is increasing the visibility of repairing activities, promoting specialised training for the repair of products, and fostering the creation of collaborative spaces to increase the functionality of materials and products. The region of Navarra, Spain, identified the promotion of responsible consumption in the public and private sectors as a key goal of its "Agenda for the development of the Circular Economy 2019-2030". The region

intends to: introduce advanced environmental criteria in public procurement processes to lead by example; promote the shift from private car use to alternative means of transport; and encourage the consumption of products with a low ecological footprint considering their lifecycle.

Economy and finance

The economics of the circular economy can spur new opportunities for growth and innovation. National governments are using favourable tax schemes, phasing out harmful subsidies, and coherently promoting socially responsible purchasing. In the case of Portugal, tax incentives are being assessed to evaluate if they are helpful in reducing the consumption of plastic bags and is considering its extension to other disposable plastic-based products of fossil-fuel origin. It is also analysing the introduction of consumer and/or business subsidies for labour-intensive repair services and the sale of second-hand products, for accredited International Organization for Standardization (ISO)-certified organisations under the Portuguese Quality System (SPQ) and products with accredited certification or eco-labelling (e.g. environmental labels, cradle-to-cradle design). Furthermore, other fiscal action focuses on the discouragement of non-renewable and polluting raw materials. In this vein, Italy is considering the implementation of taxation on carbon emissions (carbon tax), on landfill disposal (landfill tax) and on pollution in general (pollution tax), to encourage the transition to less impactful technologies, promoting reuse, recovery and recycling.

The private sector, and particularly SMEs, are considered a potential driving force for the circular transition; therefore, many dedicated actions promote circular business development**.** One of the main measures is to expand access to financing for those companies that are adopting circular business models. Portugal, for example, is assessing the introduction of financial allocations to award the implementation of circular requirements into products, such as eco-labelling, consumer information on the period of availability of spare parts and repair services, the possibility of repairs by independent bodies or repair manuals for the final consumer, software or product update options, product return incentives and easy repair design. France and the Netherlands made available dedicated funding to the circular economy, by supporting private sector initiatives through the development of circular revenue models and catalysing private funding.

There are several initiatives at the international, national and local levels that seek to accelerate the transition to the circular economy by improving access to finance for circular economy projects:

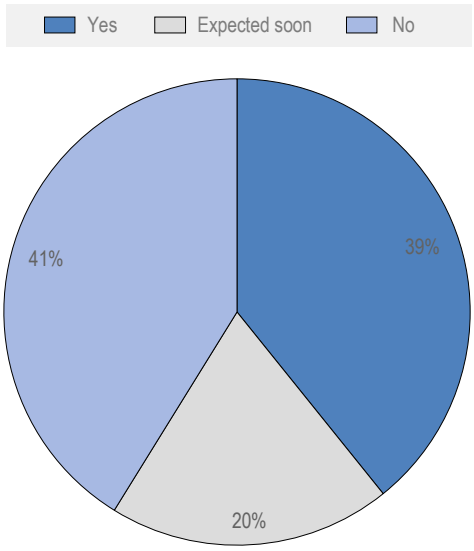
- **Loans**: The European Investment Bank (EIB) offers medium- and long-term loans for large-scale circular economy projects and indirect financing through local banks and other agents for smaller projects, particularly related to SMEs. Circular economy project models can also be financed by the European Fund for Strategic Investments (EFSI),[1] InnovFin[2] and other specific financial instruments. Catalonia's Finance Institute (*Institut Català de Finances*) (Spain) through the "ICF EcoVerde" loan line offers loans targeted to natural or legal entities with headquarters or operations in Catalonia to carry out sustainable and environmentally friendly investments that promote green economy, circular economy and energy efficiency projects, among others (ICT, 2020[18]).
- **Grants**: In 2019, the Ministry of Economic Affairs and Employment of Finland opened a round of applications for development and innovation grants for the circular economy. Some of the more than 100 projects that received economic support are: the introduction of circular economy teaching for all levels of education, which provided more than 70 000 children and students with the opportunity to study the circular economy in 2018-19, and the Kemi-Tornio's circular economy industrial park which is promoting its circular model for heavy industry throughout the country (SITRA, 2019[19]). Between 2017 and 2020, the municipality of Valladolid, Spain, launched three calls for projects to finance circular economy initiatives aiming to stimulate local businesses and entrepreneurial activities, while raising awareness on the circular economy. The local government financed a total of 61 projects (22 and 39 respectively in 2017 and 2018) allocating a

budget of EUR 960 000 (EUR 400 000 and EUR 560 000 respectively in 2017 and 2018). An additional EUR 600 000 were allocated in 2019. The municipality finances between 40% and 85% of the project's total cost. The beneficiaries of the grants are private companies and associations of private companies (OECD, 2020[5]).

- **Revolving funds**: The city of Amsterdam, Netherlands, through the Amsterdam Climate and Energy Fund (ACEF) and the Sustainability Fund invested in more than 65 projects related to climate, sustainability and air quality for a total of EUR 30 million. These are revolving funds, allowing to reinvest revenues within 15 years to fund additional sustainable energy production, energy efficiency or circular economy projects. Each of the funded projects must contribute to the aims of the sustainability agenda approved by the city council in 2015. Regarding the nature of the financing, the ACEF provides funding in the form of loans, warranties and/or share capital, subject to a maximum of EUR 5 million per project.
- **Venture capital and growth capital**: The LWARB supports circular business through the Circular Economy Business Support Programme. The venture capital fund supports circular economy SMEs for scaling up businesses that are already in the market. Moreover, the LWARB through the Circularity European Growth Fund 1, operated by Circularity Capital, seeks investment opportunities in circular businesses with proven cash flow and profit, which need significant capital to scale.

There is a similar share of cities and regions responding to the OECD survey with dedicated budgets for the circular economy (39%) and those without one (41%), while the remaining 20% aims of having it soon (Figure 2.3, Table 2.3).

Figure 2.3. Share of surveyed cities and regions with a dedicated budget for the circular economy



Note: Results based on a sample of 51 respondents that responded "Yes", "Expected soon" and "No, and not planned" to the question on the existence of a dedicated budget for the circular economy.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Table 2.3. Surveyed cities and regions with a dedicated budget for the circular economy

	Cities and Regions
Yes	Amsterdam (Netherlands), Austin (United States), Copenhagen (Denmark), Flanders (Belgium), Kitakyushu (Japan), Lappeenranta (Finland), Malmö (Sweden), Melbourne (Australia), MRC des Sources (Canada), Nantes Metropolitan Area (France), Peñalolén (Chile), Phoenix (United States), Rotterdam (Netherlands), San Francisco (United States), Scotland (United Kingdom), Tilburg (Netherlands), Toronto (Canada), Turku (Finland), Umeå (Sweden), Valladolid (Spain)
Not yet, but expected soon	Dunedin (New Zealand), Greater Porto Area (Portugal), Groningen (Netherlands), Kemi (Finland), Medellín (Colombia), Munich (Germany), Murcia (Spain), Prato (Italy), Santiago (Chile), Vélez-Málaga (Spain)
Not in place	Antwerp (Belgium), Barcelona Metropolitan Area (Spain), Glasgow (United Kingdom), Granada (Spain), Helsinki (Finland), Joensuu (Finland), Lisbon (Portugal), London (United Kingdom), Ljubljana (Slovenia), Manresa (Spain), Maribor (Slovenia), Milan (Italy), North Karelia (Finland), Oslo (Norway), Oulu (Finland), Paris (France), Quillota (Chile), Riga (Latvia), Sabadell (Spain), Tampere (Finland), Temuco (Chile)

Note: Results based on a sample of 51 respondents that responded "Yes", "Not yet but expected soon" and "No" to the existence of dedicated budget for the circular economy.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Economic instruments can be tools for incentivising or discouraging specific behaviours. For example, they could induce more sustainable consumption by means of higher/lower prices; exemptions on VAT can help business use green technologies; incentives on renewable energy can support its wider use. The Extended Producer Responsibility (EPR)[3] schemes can help develop programmes to reuse material or spur innovation. However, according to the European Agency (2016[20]), to date, the efforts have been fundamentally focused on the area of energy, transport and climate, with limited action in relation to issues of pollution and resource use. Some tools are listed below:

- **Discounts on taxes**: To address food waste, in 2018, the city of Milan, Italy, implemented a 20% discount on waste tax for businesses (supermarkets, restaurants, canteens, producers, etc.) that donated their food waste to charities. The action is co-ordinated by different departments of the municipality (fiscal, environmental, food policy). Around 10 000 businesses have benefitted from the tax reduction, with an impact of EUR 1.8 million (OECD, 2020[1]). The city of San Francisco, US, granted discounts on waste fees to businesses using separate sorting collection bins. The city managed to become the one sending the least amount of waste to landfills. With the aim of stimulating the separate disposal of food waste, the city of San Sebastian, Spain, provided households with a specific organic waste bin located in the street and unlockable through a personal magnetic card. The use of this special bin is associated with a 15% bonus on the fee to be paid for the provision of the garbage collection service. In order to get the discount, users have to use this container at least 4 times a month for 10 of the 12 months of the year. The city of Austin, US, offers the opportunity for customers to lower refuse bills by reducing refuse services, providing every household with a large recycling bin and rolling out compost cart services to all customers.
- **Environmental tax**: Kitakyushu City, Japan, applies the "environmental future tax" imposed on the landfill of industrial waste. Since the tax is not levied on intermediate treatments, it is also expected to promote company recycling activities and reduce any waste generated by them. Revenues are used for an environmental technology development grant.
- **Differentiated tariffs**: The Dutch government implements the DIFTAR system, a collecting scheme based on differentiated tariffs, which provides incentives to improve waste separation at source. This scheme enables authorities to charge for the amount of waste generated, while rewarding the effort of people who minimise waste and maximise separate collection. The system has been introduced in several small villages in the Netherlands, as well as in some urban municipalities with over 100 000 inhabitants such as Apeldoorn, Maastricht and Nijmegen.

Regulation

In some countries, there are legislative frameworks promoting the circular economy. In Japan, the Fundamental Law for Establishing a Sound Material-Cycle Society (basic framework law) and the Law for the Promotion of Effective Utilisation of Resources are established at the national level. Under this framework there are specific regulations such as the Containers and Packaging Recycling Law, the Home Appliance Recycling Law, the Food Recycling Law, the Construction Material Recycling Law, the End-of-Life Vehicles Recycling Law and the Recycling Promotion Law of Used Home Appliances. These are legislation and policies to promote the creation of a 3R-oriented society and implement eco-town projects. In France, three consecutive laws, promulgated in 2015 and 2016, made the country the first to ban supermarkets from throwing away or destroying unsold food. The Anti-Waste Law for a Circular Economy, enacted in February 2020, defines four main orientations: i) prevent waste to preserve resources; ii) mobilise industrial businesses to transform production methods; iii) inform for more sustainable consumption patterns; and iv) improve waste collection to combat illegal disposal (Ministry for an Ecological and Inclusive Transition, 2020[21]). The entry into force of these laws increased the amount of food collected by the associations, from 36 000 tonnes in 2015 to 46 000 tonnes in 2017. The food is distributed by charities and food banks. Regulatory amendment aiming to promote the adoption of circular and sustainable models of production and consumption by an environmental tax reform has been signalled as an area of focus in Italy's 2017 strategic framework. The Netherlands aims to foster legislation and regulations that promote flexible and innovative circular economy models and implement producer responsibility in priority sectors. Belgium is focusing on audits of all existing legislation and regulations in order to remove any possible normative obstacles or inconsistencies, as well as on reinforcing control and inspection processes to improve competition conditions between Belgians and third parties.

One of the most powerful tools for the circular economy is public procurement**.** According to the European Commission (EC), the impact of public procurement on the transition to a circular economy is worth around EUR 2 trillion in the EU, around 14% of GDP (EC, 2016[22]). Sustainable procurement taking into account circular criteria can be defined as the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising and, in the best case, avoiding negative environmental impacts and waste creation across their whole life cycle (EU, 2017[23]). Green or sustainable procurement has been adopted in the majority of the OECD countries but circular criteria still need to be developed. Public procurement accounts for approximately 12% of GDP in OECD member countries and subnational governments, including cities, are responsible for around 63% of public procurement (OECD, 2020[24]). As such, regulatory frameworks should be adequate to "increase participation in doing business with the public sector and are key starting points to assure sustainable and efficient public procurement systems" (OECD, 2015[25]). A total of 69% of OECD countries are measuring results of GPP policies and strategies, through the number of public organisations that submit an implementation plan and performance records; the total amount of annual green procurement in economic value and units.

Green public procurement can be an essential tool for the implementation of national, regional and local circular economy initiatives. Almost all OECD countries have developed strategies or policies to support GPP in high-impact sectors such as buildings, food and catering, vehicles and energy-using products. For example:

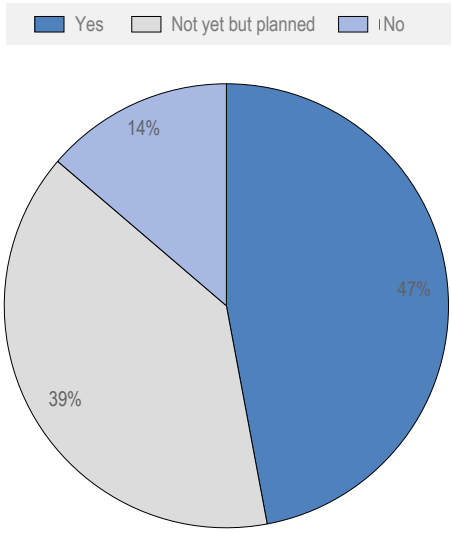
- One of Denmark's focus in its 2018 circular economy strategy is to develop a partnership for GPP and a forum on sustainable procurement. These two initiatives have recently been appointed a joint secretariat for procurement in order to ensure co-ordination. An additional task force on green procurement is planned to be developed to focus on the circular economy and will be expanded to aim – in addition to public institutions – at private enterprises, with the additional creation of an online portal called "The responsible procurer". The Danish government is set to prepare a number

of new total cost and life-cycle tools and will incorporate costs or revenues from waste management and resale in existing and new tools.

- Portugal's circular economy action plan recognises the need to implement a support structure for collaborative development of solutions that adopt circularity principles, their experimentation and monitoring of environmental and economic impacts compared to traditional alternatives, involving all players in the value chain (e.g. through a circular agreement), especially in priority sectors such as the construction sector. This support structure would entail the analysis of the integration of criteria promoting resource circularity in the list of priority goods and services established by the working groups of the National Strategy for Green Public Procurement (ENCPE 2020).
- The region of Flanders, Belgium, implemented the Green Deal Circular Procurement (GDCP) between 2017 and 2019. Inspired by the Dutch Green Deal on Circular Purchasing (launched in 2013), the joint project was signed by 162 participants (companies and organisations), the Flemish Minister of Environment and its initiators Circular Flanders, The Shift, the Association of Flemish Cities and Municipalities (VVSG) and the Federation for a Better Environment (BBL). In total, 108 purchasing organisations, local authorities, companies, financial institutions and 54 facilitators have been involved. During the 2 years of the initiative, the signatories of the GDCP conducted more than 100 circular procurement pilot experimentations, building knowledge and experience, and testing tools and methodologies and new forms of chain co-operation.
- In June 2018, in Toronto**,** Canada, the Solid Waste Management Services and Purchasing and Material Management Divisions, in consultation with the Cross-Divisional Circular Economy Working Group, developed a Circular Economy Procurement Framework to outline how the city may leverage its purchasing power to advance a circular economy. The framework outlines preliminary economic, social and environmental measures of circularity. Potential areas of focus for the development and refinement of measurement tools include the percentage of waste diversion from landfill as a result of procurement activities, CO_2 emission savings, raw materials avoided, the percentage of recycled content and the number of associated jobs created, the number of city staff who have received circular economy training, and the number of asset-sharing activities.

Almost half of the cities and regions surveyed (47%) are incorporating circular economy criteria in their purchase decisions, while 39% stated that they plan to do it and 14% do not (OECD (2020[1]), Figure 2.4, Table 2.4).

Figure 2.4. Share of surveyed cities and regions including circular criteria in public procurement



Note: Results based on a sample of 51 respondents that responded "Yes", "Not yet but expected soon" and "No" to the existence of criteria related to the circular economy included in the purchasing decisions.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Table 2.4. Surveyed cities and regions with circular economy criteria in public procurement

	Cities and regions
Yes	Amsterdam (Netherlands), Antwerp (Belgium), Copenhagen (Denmark), Dunedin (New Zealand), Groningen (Netherlands), Kemi (Finland), Kitakyushu City (Japan), Lappeenranta (Finland), Lisbon (Portugal), Ljubljana (Slovenia), London (United Kingdom), Malmö (Sweden), Melbourne (Australia), Murcia (Spain), Oslo (Norway), Paris (France), Riga (Latvia), Rotterdam (Netherlands), Sabadell (Spain), San Francisco (United States), Tilburg (Netherlands), Toronto (Canada), Umeå (Sweden), Valladolid (Spain)
Not yet, but expected soon	Austin (United States), Barcelona Metropolitan Area (Spain), Flanders (Belgium), Glasgow (United Kingdom), Greater Porto Area (Portugal), Helsinki (Finland), Joensuu (Finland), Maribor (Slovenia), Medellín (Colombia), Munich (Germany), Nantes Metropolitan Area (France), North Karelia (Finland), Oulu (Finland), Peñaloen (Chile), Santiago (Chile), Scotland (United Kingdom), Tampere (Finland), Temuco (Chile), Turku (Finland), Vélez-Málaga (Spain)
Not in place	Granada (Spain), Manresa (Spain), Milan (Italy), MRC des Sources (Canada), Phoenix (United States), Prato (Italy), Quillota (Chile)

Note: Results based on a sample of 51 respondents that responded "Yes", "Not yet but expected soon" and "No" to the question: "Are criteria related circular economy included in your city/region purchasing decisions?".
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Cities are increasingly including circular-related requirements in tenders. For example, public procurement has been applied to:

- **Promote circular economy building developments**: Amsterdam, Netherlands developed the Roadmap for Circular Land Tendering (2017[31]) that includes 32 performance-based indicators for circular economy building developments. Paris, France, is developing a deconstruction/demolition framework agreement, which establishes a deconstruction methodology for construction waste management. Construction tender selection criteria could entail: sorting organisation internally on site; transport of waste to a recycling platform; traceability of the disposal of construction waste;

the rate of recovery of construction waste specifying the nature of waste, the sectors and suppliers. Lisbon's (Portugal) Strategic Plan for Public Procurement is launching building construction contests, public space interventions and increasing the introduction of recycled materials in new constructions.

- **Encourage the use of circular business models**: The city of Ljubljana, Slovenia, aims to foster "product as a service schemes" by renting printers, electric lamps or furniture instead of buying them. 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 service is provided by a start-up that received support from Umeå's BIC Factory business incubator.
- I**ncorporate secondary materials, repair and reuse**: In Paris, France, in 2018, 43% of the city's purchases were linked to the circular economy and 14% of them included "circular economy" criteria. Some examples are: price criteria on household appliances assessed in terms of user cost over eight years (water and energy); reuse/recycling process of used equipment (audiovisual, curtains, clothing); recovery of deposited kitchen equipment; computer recycling market; modular demountable nurseries; retreated tires and eco-responsible office supplies (recyclable and/or rechargeable). Copenhagen, Denmark, and Kitakyushu, Japan, are promoting the use of recycled materials and the extension of the "in-use phase" of uniforms and work-clothes through procurement. In the city of Ljubljana, Slovenia, the public tender for the selection of suppliers of hygienic paper products included the "zero waste" criterion, whereby the hygienic material had to be made of cardboard packaging or cardboard hollow packaging collected in the city.

Some cities adopted specific public procurement provisions to favour the involvement of SMEs and start-ups. Some cities use a modular approach (Antwerp), others engage with local suppliers to help them build capacities (Melbourne) or highly prioritise local job creation (Dunedin). For example:

- In 2015, the city of Antwerp, Belgium, created the Buy-from-Start-up initiative to promote purchases from start-ups. The initiative aimed to innovate traditional tenders, mostly accessible to large companies endowed with resources and capacities to write extensive bids. The initiative encouraged small innovative companies in participating in tenders, unable to do so in traditional tendering process (Open Source Observatory, 2019[26]).
- In Australia, the city of Melbourne's procurement policy stipulates that the council should use procurement to support local businesses and economic diversity by: generating local employment; taking into account the life-cycle impacts of products purchased (purchase, operation and disposal); building relationships and encouraging purchasing from local suppliers, including social enterprises to help build their capacity; exploring, where appropriate and possible, the opportunity to maximise the social benefits of a contract by offering social tenders; and fostering innovation and emerging sectors.
- The Valladolid, Spain, municipal ordinance "1/2018 to Promote Social Efficient Procurement: Strategic, exhaustive and sustainable" includes some specific rules and recommendations to increase the number of SMEs in municipal contracting (Art. 32 and following), such as: providing training and skills to SMEs in public procurement; publishing better information about tendering processes; and breaking the contracts into smaller lots to adapt them to SME management capacity.
- Dunedin City Council, New Zealand, sustainable procurement and contract management practices aims to give preference to those suppliers that can evidence a positive economic footprint in the region. This includes contributing to the sustainability of the local economy, supporting job or market growth, as well as fostering opportunities for SMEs. Nonetheless, currently, any consideration or weighted attribute assigned to sustainable procurement cannot be below 10% of the total.

Capacity building

A total of 55% of surveyed cities and regions are implementing capacity-building initiatives as a necessary condition to advance in the circular economy transition**.** Cities and regions are targeting capacity-building activities inside their own administration (e.g. through public procurement) and towards different stakeholders (e.g. businesses, entrepreneurs or start-ups). For example, the municipality of Umeå, Sweden, supported capacity-building events for public officials, entrepreneurs and the local community. A series of training events "Circular business models strengthen Northern Sweden's competitiveness" took place during 2017-19. Around 50 advisors in circular business and sustainability have been trained in Skelleftea and Umeå, Sweden. Circular Flanders, Belgium, offers a Masterclass on Circular Economy. In four half-day sessions, participants discover the opportunities for their business in a circular economy. The target audience is company directors, sustainability managers, start-ups, entrepreneurs and innovators from all sectors. The Flemish government set incentives to SMEs that participate. Topics discussed during the masterclass are: what is the circular economy, why the circular economy, evolution and policy, key drivers, financing, etc.

Specific skills will be needed for future circular economy-related jobs. The Amsterdam Metropolitan Area (AMA), Netherlands, identified six groups of skills relevant for 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) (Economy Circle / EHERO, 2018[27]). In 2016, the city of Paris, France, conducted research on the current levels of circular economy jobs at the local level. The research identified 66 500 full-time jobs related to the circular economy. Mostly, jobs are associated with energy management, renewable energies, waste incineration with energy recovery and part of the activities related to transport infrastructure (City of Paris, 2019[28]). The Amsterdam Metropolitan Area (AMA), Netherlands, identified digital technology, circular design and lifetime extension as the most relevant sectors for the circular economy in the metropolitan area. The AMA defined seven key circular elements for "directly circular jobs", divided into "core circular jobs" and "enabling circular jobs". "Core circular jobs" are related to activities that prioritise regenerative resources (e.g. renewable energy sector); preserve and extend what is already made (e.g. repair sector); use waste as a resource (e.g. recycling); and rethink business models (e.g. renting or leasing activities). "Enabling circular jobs" aim to create joint value from collaborations (e.g. professional and networking associations); design for the future (e.g. architecture or industrial design); and incorporate digital technology (e.g. digital innovation). "Indirectly circular jobs" are also identified and refer to all other sectors that offer services to circular jobs activities and that create supporting circular activities (e.g. education, government and professional services).

National, regional and local scales co-operate to enhance capacities and learn from good practices. In the Netherlands, the Circular City Deal, promoted by the city of Amsterdam in 2016, aims to strengthen co-operation across cities and the national government. In 2018, the Italian Cities of Bari, Milan and Prato signed a Pact for Circular Economy with the Ministry of Environment, to put in place circular economy strategies and scale up successful practices. The region of Lapland, Finland, is looking for expanding circular and bioeconomy activities in Northern Finland, Northern Norway and Northern Sweden, building bridges for co-operation. In Scotland, UK, Zero Waste Scotland is co-ordinating the development of cross-regional projects and sharing best practice across cities and regions (e.g. Edinburgh, Glasgow, North East Scotland and Tayside).

City-to-city co-operation is a source of inspiration for developing circular economy initiatives and sharing skills. For example, Valladolid, Spain, has benefitted from the exchange with other cities in different networks (e.g. Covenant of Mayors, Eurocities, Michelin Cities, Spanish Network of Intelligent Cities-RECI, etc.). In particular, since 2019, the Circular Lab project benefits from exchanges with other cities in Portugal

and Spain, providing entrepreneurs and start-ups specialised in circular economy business models with operational resources (physical spaces, networking, etc.). It helps develop adequate skills and promotes the integration of the circular economy in the entrepreneurial culture and innovative ideas in all phases of the value chains.

Business models

Results from the OECD survey show that 85% of respondents consider the emergence of new business models as a very relevant or relevant driver (Chapter 1). Drawing from OECD (2019[29]), the results of the OECD survey (2020[1]) and desk research, the business models applied in cities and regions consist of circular supply and collaborative consumption models, service systems, resource recovery business models, hire and leasing:

- **Circular supply models** replace traditional inputs with secondary material. For example, in 2018, the city of San Francisco, US, approved that all carpets installed in city departments would have a "cradle-to-cradle" design. This initiative was approved as part of its objective of reducing the amount of discarded carpets sent to landfill (OECD, 2019[29]).
- **Collaborative consumption** is based on the rental or sharing of products or services across citizens. More than half of the cities and regions with available data responding the survey expressed that their circular economy strategies have incorporated collaborative consumption (57%) and production models such as sharing economy, product-as-a-service, crowdfunding, etc. Twenty-nine percent of cities stated that they plan to include them in the short term and 9% do not foresee that possibility (the list is provided in Table 2.5). Several cities have sharing mobility in place (e.g. Antwerp, Belgium; Lappeenranta, Finland; Lisbon, Portugal; Malmö, Sweden; Milan, Italy; and Paris, France).
- The **service system model** is about paying for the service rather than for the property of the product. The Amsterdam Airport Schiphol rents light as a service, instead of the traditional model of buying light bulbs: Schiphol pays for the light it uses while Philips, the provider, is the owner of all installations and is responsible for performance and durability (Circular Economy Club, 2019[30]).
- **Hire or leasing** of products serves to lengthen their lives for repeated use according to the original objective of their use, before becoming different products through recycling, when possible. For example, for the celebration of the 2021 Olympic Games, the city of Tokyo, Japan, aims at renting and leasing materials after the games. 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.

Table 2.5. Surveyed cities and regions applying collaborative models for the circular economy

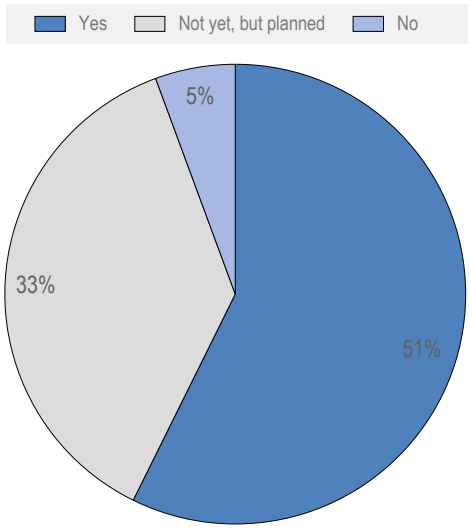
	Cities and regions
Yes	Amsterdam (Netherlands), Austin (United States), Antwerp (Belgium), Flanders (Belgium), Glasgow (United Kingdom), Helsinki (Finland), Lappeenranta (Finland), Lisbon (Portugal), London (United Kingdom), Ljubljana (Slovenia), Maribor (Slovenia), Melbourne (Australia), Milan (Italy), MRC des Sources (Canada), Murcia (Spain), Nantes Metropolitan Area (France), Paris (France), Peñalolén (Chile), Quillota (Chile), Sabadell (Spain), San Francisco (United States), Scotland (United Kingdom), Tilburg (Netherlands), Toronto (Canada)
Not yet, but expected soon	Dunedin (New Zealand), Greater Porto Area (Portugal), Groningen (Netherlands), Kemi (Finland), Medellín (Colombia), Munich (Germany), North Karelia (Finland), Oslo (Norway), Phoenix (United States), Riga (Latvia), Santiago (Chile), Valladolid (Spain), Vélez-Málaga (Spain)
Not in place	Barcelona Metropolitan Area (Spain), Oulu (Finland), Prato (Italy), Rotterdam (Netherlands)

Note: Results based on a sample of 42 respondents that responded "Yes", "Not yet, but expected soon" and "Not in place" to the inclusion of collaborative consumption and production models into a circular economy initiative.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Digitalisation

Digitalisation is one of the enablers of the circular economy. More than half of the surveyed cities and regions consider that digitalisation helps foster the actions foreseen in the circular economy initiatives. While 51% of cities and regions use digital tools to enable the circular economy, 33% of cities and regions are planning to link digitalisation and their circular economy initiatives in the short term (Figure 2.5).

Figure 2.5. Share of surveyed cities and regions using or planning to use digital tools to foster the circular transition



Note: Results based on a sample of 43 respondents that responded "Yes", "Not yet, but expected soon" and "Not in place" to the use of digital tools to foster the circular economy transition.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Table 2.6 shows the initiatives mentioned in the OECD survey, such as: material exchange platforms; tracking of waste for better collection and recycling; open-access tools; raising awareness platforms; and tools to connect business to business and experts. Some cities and regions have developed online platforms on the circular economy (Paris, France; Regional Government of Catalonia, Spain) or to share waste-related information in real time (Milan, Italy; North Karelia, Finland). Austin, US, tested a materials marketplace to foster secondary materials exchanges. Phoenix, US, developed an online Recycle Right Wizard to provide recycling information to local residents and has also launched a digital educational website, Recycle+, which promotes a digital interaction with the residents on recycling best practices through activities, games, resource guides and educational videos. Antwerp, Belgium, is investigating how to link the Internet of Things (IoT) and artificial intelligence (AI) to foster the circular economy transition in particular for the energy and construction sectors and Flanders, Belgium, has developed an online open-access calculation tool to promote deconstruction in the construction sector.

Table 2.6. Examples of digital tools for the circular economy in surveyed cities and regions

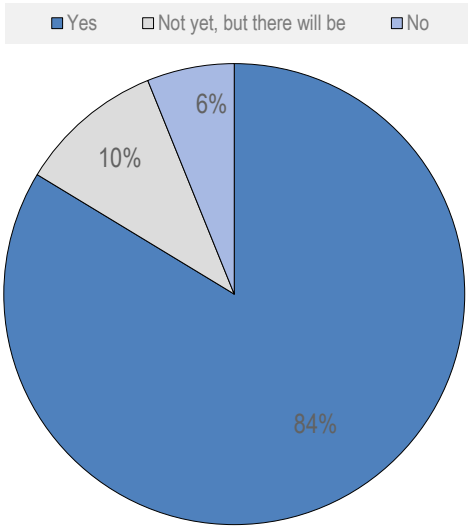
Type of activity	Cities and regions	Initiative	Description
Material exchange platforms	Austin (United States)	Austin Materials Marketplace and Austin Reuse Directory	Online searchable directory to inform residents of nearby outlets to reuse items, such as drop-off locations, pick-up services and resale options.
Tools to connect business to business and experts	Austin (United States)	Austin's Circular Economy Story	Directory of businesses that allow customers to be aware of circular economy initiatives and adopt circular and sustainable consumption patterns (e.g. sharing and renting models).
	Antwerp (Belgium)	Capital of Things initiative	Ecosystem of businesses, research and public actors, aiming to link the IoT with the smart city, the industry 4.0 and the circular economy. It creates value through the connection across education, research, living labs, incubation/acceleration, digital and industrial growth companies, venture capitalists, corporates and international brands.
Open-access tool	Flanders (Belgium)	Totem tool for the construction sector (TOTEM)	Online open-access calculation tool. It is intended to help the advancement towards low-material performance of buildings, as well as low-energy performance.
Tracking of waste for better collection and recycling	Milan (Italy)	The Environmental Meter *(Contatore Ambientale)*	Online tool that allows quantifying the advantages of the correct waste treatment, assess the environmental benefits deriving from an efficient integrated urban waste management system, and to precisely how much water or CO_2 emissions are saved.
Raising awareness platforms	Regional Government of Catalonia (Spain)	Circular Economy Observatory (*Observatorio de Economía Circular de Cataluña*)	The main objective of the portal is to map circular initiatives in Catalonia. It aims to become a reference node in this matter and that provides knowledge and information.
	Paris (France)	Online information platform on the circular economy "Grand Paris Circulaire"	Collaborative platform that brings together initiatives, players, knowledge, tools, news and events of the circular economy in Paris and its metropolitan area.
	Phoenix (United States)	Recycle Right Wizard	Online assistant to help residents find information on how to recycle or dispose of common household items.
	Phoenix (United States)	Recycle+	Online website to digitally interact with residents on recycling best practices through activities, games, resource guides and educational videos.

Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Pilots and experimentation

Circular economy strategies and projects in surveyed cities and regions are often based on experimentation and pilots. Pilots, contrary to long-term strategies and infrastructure, can be a quick source of learning from success and failures that can stimulate circular economy practices now and in the future. This is both an opportunity for creating new knowledge and information, but also a challenge in terms of the human and technical capital needed to design and implement sustainable, efficient and effective circular economy policies. A total of 84% of respondents are using pilots and experimentation as a way to foster the circular economy (Figure 2.6). The pilots presented below aim to test new technologies to foster innovation (Austin), raise awareness (Valladolid), minimise food waste (Dunedin) and encourage public procurement (North Karelia). As a result, the objective is to scale up the experiences and enable them to be financially sustainable after the pilots are over.

Figure 2.6. Share of surveyed cities and regions using pilots and experimentation to foster the circular economy transition



Note: Results based on a sample of 49 respondents that responded "Yes", "Not yet, but there will be" and "No" to the existence of pilots and experimentations for the circular economy.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Some examples include:

- The city of Phoenix, US, collaborates with Arizona State University on circular economy projects. Recent projects include "Reclaimed Asphalt Pavement (RAP)", "Water Conservation Potential of Compost in Parks", "Plastics 3-7 to 3D Filament" and the "Food Waste Reduction Pilot". The purpose of the latter is to reduce food waste and demonstrate how comprehensive multimedia interventions can lead to behaviour change.
- In 2018, the City Council of Valladolid, Spain, and Ecoembes, a non-profit environmental organisation responsible for promoting and managing the system for recycling household packaging waste, started a pilot project of the circular economy in the neighbourhood of La Victoria. The objective of the project was to achieve separate collection by 60% by 2030, in line with European objectives. The initiative began in March 2018 and concluded in February 2019. During this time the percentage of waste disposed of by selective collection rose from 32.8% to 43.5%.
- Since 2012, the city of Dunedin, New Zealand, has been funding waste minimisation pilots such as FoodShare (later called KiwiHarvest).

- The government of North Karelia, Finland, has promoted a co-operation pilot at the procurement process of a student housing building as part of the Circwaste project. Criteria about waste management at the construction site were set in the early phase of the procurement process.

Data and information

The production, update and sharing of timely, consistent, comparable policy-relevant and circular-economy-related data and information is key to inform policymaking and implementation. A total of 14% of the surveyed cities and regions has an information system for the circular economy while 27% of respondents are expecting to have one in the future; the remaining 59% do not have a specific information system (OECD (2020[1]), Table 2.7). Systematic data collection could allow to take circular decisions, measure progress and improve implementation. For instance, in the case of the building sector, data on material for construction would help understand what kind of materials are used for building and how they can be used in the future. Mapping empty buildings would help avoid new constructions and plan alternative use of existing ones; mapping input and output of material flows would help establish priority actions. Overall, improving data and information would help reach a better understanding of what the circular economy is and improve policymaking and implementation. Circular data can create value for local economic development (Box 2.2) and raise awareness. For example, Portugal's circular economy action plans foresee the development of specific tools to communicate to consumers the benefits of extending the useful life of goods/equipment, e.g. information on warranties, repair instructions, replacement parts and eco-labelling.

In general, cities and regions collect data on energy consumption, air quality, waste production and recycling, and the level CO_2 emissions (See Chapter 5); however, the circular economy-related monitoring frameworks that are comparable among cities or regions is still widely missing. Some examples are available: the *Circular Economy framework Monitoring* report by the Greater Porto Area, Portugal, includes indicators such as: the number of tender books with circular criteria (production and consumption); the level of implementation of the Environmental Action Plan; the level of implementation of the training plan; the level of implementation of the biowaste strategy; the recycling rate. Flanders Region, Belgium, developed a monitoring tool to help GDCP buyers to determine circular goals and accompanying strategies for their circular procurement projects, keep track of progress and visualise the effects of their circular procurement projects. Circular Flanders, Belgium, also developed an indicators inventory identifying relevant indicators to monitor the transition to a circular economy and to measure effects of new policy and trends (Circular Flanders, 2019[31]). More information on measurement frameworks is provided in Chapter 5.

Table 2.7. Status of information system for the circular economy in surveyed cities and regions

	Cities and regions
Yes	Greater Porto Area (Portugal), Kemi (Finland), Milan (Italy), MRC des Sources (Canada), Peñalolén (Chile), Santiago (Chile), Umeå (Sweden)
Not yet, but expected soon	Amsterdam (Netherlands), Austin (United States), Flanders (Belgium), Granada (Spain), Joensuu (Finland), Maribor (Slovenia), Metropolitan Area of Barcelona (Spain), Munich (Germany), Oulu (Finland), Quillota (Chile), Rotterdam (Netherlands), Tilburg (Netherlands), Toronto (Canada), Vélez-Málaga (Spain)
No	Antwerp (Belgium), Copenhagen (Denmark), Dunedin (New Zealand), Glasgow (United Kingdom), Groningen (Netherlands), Helsinki (Finland), Kitakyushu (Japan), Lappeenranta (Finland), Ljubljana (Slovenia), London (United Kingdom), Manresa (Spain), Medellín (Colombia), Melbourne (Australia), Nantes Metropolitan Area (France), North Karelia (Finland), Oslo (Norway), Paris (France), Phoenix (United States), Prato (Italy), Riga (Latvia), Sabadell (Spain), Scotland (United Kingdom), Tampere (Finland), Turku (Finland), Valladolid (Spain)

Note: Results based on a sample of 51 respondents that responded "Yes", "Not yet, but expected soon" and "No" to the existence of a specific information system experimentations for the circular economy.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Box 2.2. Circular City Data in New York City, United States

Within the New Lab, the largest urban technological incubator in New York City, three start-ups working on waste collection and mobility and three city agencies working on the same fields took part in a pilot project on circular data. The challenge was to create an incentive system whereby city agencies could access data that start-ups collected. One of the start-ups was able to produce a technologically advanced micro-level mapping of transportation by taxis and of garbage collection through real-time data. These data can inform policymakers and tackle many complex urban challenges. "Circular data" refers to the collection, production, and exchange of data and business insights between a series of collaborators around a shared set of inquiries. Data may be produced by start-ups or by the city and available to the public, start-ups or enterprise companies.

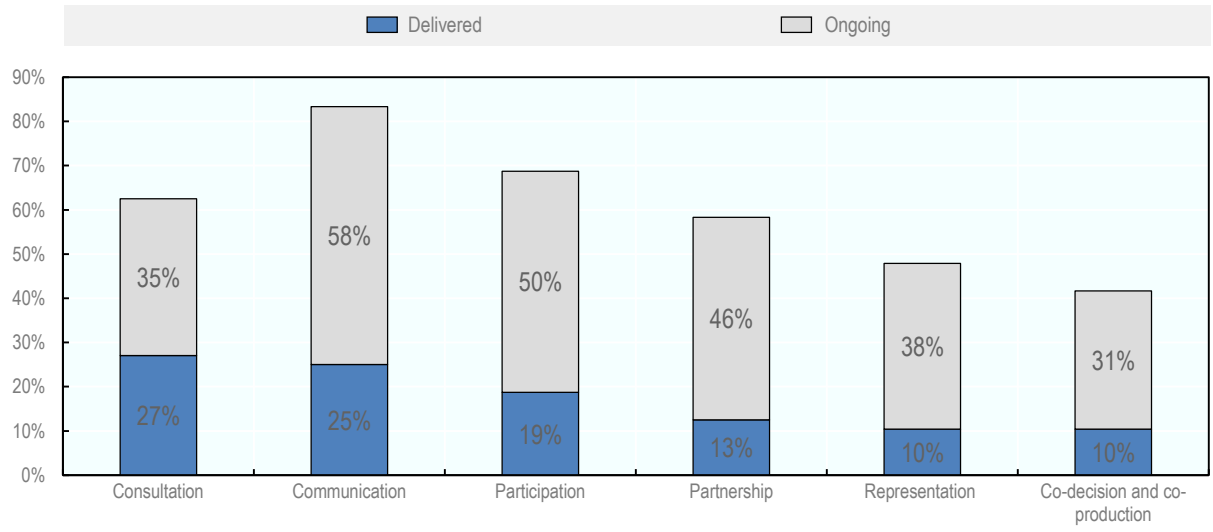
Source: New Lab City (2019[32]), *The Circular City Research Programme. Vol I.*, https://e025fd80-ac50-4e14-b81f-a09b2649b87f.filesusr.com/ugd/c3ad88_696d642dd4cc436dad96afe0369a1877.pdf; OECD (2019[33]), *1st OECD Roundtable on the Circular Economy in Cities and Regions*, http://www.oecd.org/cfe/regionaldevelopment/Round-circul-eco-Highlights.pdf

Stakeholder engagement

The circular economy calls for systemic change, where all players from the public and private sector, from citizens to knowledge institutions play a role. Particularly, the role of citizens as consumers is identified as a major bulwark for the success of circular economy actions. The Netherlands considers citizens a major stakeholder in its 2019 revision of its circular economy roadmap, because of the impact that they can have when adopting more sustainable consumption habits and behaviours. The role of consumer protection organisations and associations are thus significant, as relevant counterparts to national governments in the development of circular economy plans, as is the case in Italy, Portugal and Spain. Consumer-oriented public communication campaigns is essential to raise awareness and include wider segments of the population in a circular action. Countries have also engaged with experts from different fields, research laboratories and centres, academia and technology centres for innovative and evidence-based approaches to the transition to circularity. Chapter 3 provides an in-depth review of stakeholder groups playing a role within the transition to a circular economy.

Engaging stakeholder is key for inclusive and transparent decision-making. Stakeholder engagement "encompasses different levels of governments (multi-level governance), the private sector, regulators, service providers, donor agencies, investors, civil society in its different forms (e.g. citizens, non-governmental organisations, users' movements, etc.) and other relevant constituencies" (OECD, 2015[34]). The involvement of all stakeholders requires active, specific and tailored communication strategies. However, information is not enough; raising awareness about circular economy costs, benefits, challenges and opportunities is equally important. Stakeholders need to be engaged in the projects in order to secure their buy-in, trust and acceptance. Several actors (business, government and civil society) have divergent objectives in moving towards the circular economy. For this purpose, it is important to motivate stakeholders towards common aims; create incentives and framework conditions for building synergies at the right scale and minimising future liabilities for society at large.

Figure 2.7. Type of stakeholder engagement for the circular economy in surveyed cities and regions



Note: Results based on a sample of 48 respondents that responded "Yes, delivered" and "Yes, ongoing" to the type of stakeholder engagement implemented in cities and regions for circular economy-related initiatives.
Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Cities and regions apply different typologies of stakeholder engagement towards the circular transition but mainly stakeholders are engaged through consultation**.** There are various types of stakeholder engagement: *communication* (aims to make the targeted audience more knowledgeable and sensitive to a specific issue); *consultation* (aims at gathering stakeholders' comments, perceptions, information, advice, experiences and ideas); *participation* (stakeholders are associated with the decision-making process and take part in discussions and activities); *representation* (attempts to develop a collective choice by aggregating preferences from various stakeholders, often consists in having stakeholders' perspectives and interests officially represented in the management of a project or of an organisation); *partnership* (consists of an agreed-upon collaboration between institutions, organisations or citizen fora to combine resources and competencies in relation to a common project or challenge to solve); and *co-decision and co-production* (the ultimate levels of stakeholder engagement as they are characterised by a balanced share of power over the policy or project decision-making process) (OECD, 2015[35]). The consultation type of engagement has been described above and an analysis of each group of stakeholders will be provided in Chapter 3. From the cities and regions surveyed (OECD, 2020[1]), 27% have organised consultation activities, followed by communication (25%), participation (19%), partnership (13%) and only represent 10% for co-decision and co-production initiatives (Figure 2.7).

References

Circle Economy et al. (2016), *Circular Amsterdam - A Vision and Action Agenda for the City and Metropolitan Area*, https://assets.website-files.com/5d26d80e8836af2d12ed1269/5ede5a03e4cd056426b86d8b_20152115%20-%20Amsterdam%20scan%20-%20report%20EN%20web%20single%20page%20-%20297x210mm.pdf (accessed on 30 April 2019). [15]

Circular Economy Club (2019), "Renting lighting: Schiphol Airport", https://www.circulareconomyclub.com/solutions/renting-lighting-schiphol-airport/ (accessed on 7 November 2019). [30]

Circular Flanders (2019), *Indicators for a Circular Economy*, https://vlaanderen-circulair.be/en/summa-ce-centre/publications/indicators-for-a-circular-economy (accessed on 7 November 2019). [31]

Circular Metabolism (2017), *The Circular Economy Plan of Paris*, https://www.circularmetabolism.com/input/11 (accessed on 3 December 2019). [12]

City of Amsterdam (2020), *Amsterdam Circular 2020-2025 Strategy*. [16]

City of Paris (2019), *Quantifier les emplois de l"économie circulaire de Paris - Synthèse*. [28]

City of Paris (2017), *Plan Économie Circulaire de Paris: 2e Feuille de Route*. [14]

Doughnut Economics Action Lab (2020), *The Amsterdam City Doughnut. A Tool for Transformative Action*. [17]

EC (2016), "Green public procurement drives the circular economy", Environment for Europeans, European Commission, https://ec.europa.eu/environment/efe/news/green-public-procurement-drives-circular-economy-2016-09-05_en (accessed on 6 March 2020). [22]

Economy Circle / EHERO (2018), *Jobs & Skills in the Circular Economy: State Of Play And Future Pathways*. [27]

EU (2017), *Public Procurement for a Circular Economy - Good Practice and Guidance*, European Union, http://europa.eu/contact (accessed on 13 August 2019). [23]

European Agency (2016), *Development of Guidance on Extended Producer Responsibility (EPR)*, https://ec.europa.eu/environment/archives/waste/eu_guidance/introduction.html (accessed on 5 August 2020). [20]

French Government (2018), *50 measures for a 100% circular economy*, http://www.ecologique-solidaire.gouv.fr/sites/default/files/FREC%20-%20EN.pdf (accessed on 6 June 2019). [10]

Government of Spain (2020), *España Circular 2030, Estrategia Española de Economía Circular*, https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/espanacircular2030_def1_tcm30-509532.PDF (accessed on 31 July 2020). [4]

Government of the Brussels-Capital Region (2016), *Regional Programme for the Circular economy 2016 – 2020 (PREC)*. [6]

Government of the Republic of Slovenia (2018), *Slovenian Development Strategy 2030*. [8]

Government of the Republic of Slovenia (2015), *Slovenia's Smart Specialisation Strategy (S4)*, http://www.onlines3.eu/wp-content/uploads/RIS3_strategy_repository/SI_S4_dokument_2015_october_eng_clean_lekt.pdf. [9]

ICT (2020), *ICF EcoVerde*, Institut Catalan de Finances, http://www.icf.cat/es/productes-financers/prestecs/icf-ecoverda/index.html (accessed on 5 August 2020). [18]

Innovation, Ministry of Enterprise and (2015), *A rural development programme for Sweden*. [36]

London Waste and Recycling Board (2017), *London's Circular Economy Route Map*, http://www.lwarb.gov.uk/wp-content/uploads/2015/04/LWARB-London%E2%80%99s-CE-route-map_16.6.17a_singlepages_sml.pdf (accessed on 5 August 2019). [11]

Ministry for an Ecological and Inclusive Transition (2020), *The Anti-waste Law for a Circular Economy*. [21]

Ministry of Enterprise and Innovation (2015), *A rural development programme for Sweden*. [2]

Municipality of Rotterdam (2013), *URBAN METABOLISM – Rotterdam*, http://www.fabrications.nl/portfolio-item/rotterdammetabolism/ (accessed on 13 February 2020). [13]

New Lab City (2019), *The Circular City Research Programme. Vol I*, New York, United States, https://e025fd80-ac50-4e14-b81f-a09b2649b87f.filesusr.com/ugd/c3ad88_696d642dd4cc436dad96afe0369a1877.pdf. [32]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [1]

OECD (2020), *Public Procurement*, OECD, Paris, https://www.oecd.org/governance/public-procurement/ (accessed on 6 August 2020). [24]

OECD (2020), *The Circular Economy in Valladolid, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/95b1d56e-en. [5]

OECD (2019), *Business Models for the Circular Economy*, OECD Publishing, Paris, https://doi.org/10.1787/g2g9dd62-en. [29]

OECD (2019), *OECD Roundtable on the Circular Economy in Cities and Regions*, OECD, Paris, http://www.oecd.org/cfe/regional-policy/roundtable-circular-economy.htm (accessed on 5 August 2019). [33]

OECD (2015), *OECD Principles on Water Governance*, OECD, Paris, http://www.oecd.org/cfe/regional-policy/OECD-Principles-on-Water-Governance.pdf (accessed on 3 May 2019). [34]

OECD (2015), *OECD Recommendation of the Council on Public Procurement*, OECD, Paris. [25]

OECD (2015), *Stakeholder Engagement for Inclusive Water Governance*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264231122-en. [35]

Open Source Observatory (2019), "'Buy from startups' strategy pays off for City of Antwerp", https://joinup.ec.europa.eu/collection/open-source-observatory-osor/document/buy-startups-strategy-pays-city-antwerp (accessed on 7 November 2019). [26]

Regional Government of Andalusia (2018), *Sustainable Development Strategy for the Autonomous Region of Andalusia 2030*. [3]

SITRA (2019), "The updated Finnish road map to a circular economy offers a new foundation for funding well-being", https://www.sitra.fi/en/news/updated-finnish-road-map-circular-economy-offers-new-foundation-funding-well/. [19]

Slovenia Vision 2050 (2020), *Slovenia Vision 2050*. [7]

Notes

[1] See www.eib.org/en/efsi/index.htm.

[2] See www.eib.org/en/products/blending/innovfin/.

Annex 2.A. Circular economy initiatives across levels of government

The below circular economy initiatives are the results of information provided through the *OECD Survey on the Circular Economy in Cities and Regions* and additional desk research.

Annex Table 2.A.1. Selected circular economy initiatives at the national level

Country	National initiative	Responsible institution
Belgium	Federal Roadmap for a Circular Economy (2016)	• Federal Minister for Jobs, Economy and Consumers • Federal Minister for Energy, the Environment and Sustainable Development
Colombia	National Strategy for the Circular Economy (2019)	• Ministry of the Environment and Sustainable Development • Ministry of Trade, Industry and Tourism
Denmark	Strategy for Circular Economy (2018)	• Ministry of the Environment and Food • Ministry of Industry, Business and Financial Affairs
Finland	Leading the Cycle – Finnish Road Map to a Circular Economy 2016-2025 (2016) Finnish Road Map to a Circular Economy 2.0 (2019) Circular Economy and Bioeconomy Strategy (2017)	• Finnish Innovation Fund (SITRA)
France	Circular Economy Roadmap of France: 50 Measures for a 100% Circular Economy (2018)	• Ministry of Ecological and Solidarity Transition
Italy	Towards a Model of Circular Economy for Italy: Overview and Strategic Framework (2017)	• Ministry for the Environment (MATT) and Ministry for Economic Development (MISE)
Japan	3Rs Framework (Reduce, Reuse, Recycle) Third-phase Material-cycle Society (2010) Fundamental Plan for Establishing a Sound Material-Cycle Society (2013)	• Ministry of the Environment
Netherlands	A Circular Economy in the Netherlands by 2050 (2016)	• Ministry of Infrastructure and Water Management • Ministry of Economic Affairs Relations
Slovenia	Roadmap towards the Circular Economy in Slovenia (2018)	• Ministry of the Environment and Spatial Planning
Spain	Spanish Strategy for Circular Economy: España Circular 2030	• Ministry for Ecological Transition and Demographic Challenge • Ministry of Science and Innovation • Ministry of Agriculture, Fisheries and Food • Ministry of Industry, Trade and Tourism • Ministry of Consumer Affairs • Ministry of Social Rights and Agenda 2030
Sweden	Circular economy - strategy for change in Sweden (2020)	• Ministry of Enterprise and Innovation • Ministry of the Environment

Note: Desk research is based on the information provided by survey respondents and national circular economy initiatives.
Source: OECD (2020[1]), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris; and desk research.

Annex Table 2.A.2. Selected circular economy initiatives at the regional level

Region	Initiative
Araucanía (Chile)	Araucanía Circular 2025
Basque Country (Spain)	Basque Country Circular Economy Strategy 2030
Brussels Region (Belgium)	Regional Programme for the Circular Economy 2016-2020 (PREC)
Catalonia (Spain)	Impulse to the Green Economy and the Circular Economy
Extremadura (Spain)	Extremadura 2030. Green and Circular Economy Strategy
Flanders (Belgium)	Circular Flanders, 2016
Galicia (Spain)	Galician Strategy of Circular Economy 2019-2030
Navarre (Spain)	Agenda for the Development of the Circular Economy in Navarra 2019-2030
North Karelia (Finland)	North Karelia's Circular Economy Roadmap
Scotland (United Kingdom)	Making Things Last: A Circular Economy Strategy for Scotland
South Karelia (Finland)	South-Karelian Road Map to Circular Economy 2018
Southwest Finland (Finland)	Circular Economy in Southwest Finland
Victoria (Australia)	Recycling Victoria: A New Economy

Note: Desk research is based on the information provided by survey respondents and national circular economy initiatives.
Source: OECD (2020[1]), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris; and desk research.

Annex Table 2.A.3. Selected circular economy initiatives at the local level

City	Initiative
Amsterdam (Netherlands)	Amsterdam Circular 2020-2025 Strategy Building Blocks for the New Strategy Amsterdam Circular 2020-2025 (2019) The Amsterdam City Doughnut. A Tool for Transformative Action
Austin (United States)	Austin Circular Economy Program (2019)
Barcelona Metropolitan Area (Spain)	Circular Economy Promotion Programme AMB Circular (2019)
Copenhagen (Denmark)	Circular Copenhagen: Resource and Waste Management Plan 2024 (2019)
Helsinki (Finland)	City of Helsinki's Roadmap for Circular and Sharing Economy (2020)
Lappeenranta (Finland)	City of Lappeenranta Circular Economy Roadmap 2019
London (United Kingdom)	London's Circular Economy Route Map (2019)
Maribor (Slovenia)	Strategy for the Transition to a Circular Economy in the Municipality of Maribor (2018)
Melbourne (Australia)	Waste and Resource Recovery Strategy 2030
Murcia (Spain)	Assessment of the State of Circular Economy in Murcia (2020)
Nantes Metropolitan Area (France)	Circular Economy Roadmap Nantes (2018) (*Feuille de route Economie circulaire Nantes Métropole*)
Paris (France)	Circular Economy Plan 2017-2020 (2017) 1st Roadmap Paris Circular Economy Plan (2017) 2nd Roadmap Paris Circular Economy Plan (2018)
Turku (Finland)	Turku Resource Wisdom Roadmap 2015-2040
Valladolid (Spain)	Valladolid Circular Economy Roadmap (2017-2018)

Note: Desk research is based on the information provided by survey respondents and national circular economy initiatives.
Source: OECD (2020[1]), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris; and desk research.

3 The 3Ps framework: People, policies and places

This chapter develops the 3Ps analytical framework based on three dimensions, People, Policy and Places, highlighting the role of key stakeholders in the transition to a circular economy, the main sectors included in circular economy strategies and the scale at which circular economy initiatives take place.

The 3Ps framework: People, polices and places

The 3Ps (people, policies and places) framework provides a conceptual framework to make circular economy happen in cities and regions.

People are at the centre of a cultural shift towards new business and governance models within a circular economy. The circular economy is a shared responsibility across levels of government and stakeholders. The business sector can determine the shift towards new business models (e.g. using secondary material, recycling, sharing, etc.). Knowledge institutions contribute to boosting innovation and research. Not-for-profit organisations are at the core of bottom-up initiatives in a wide range of sectors, such as food and the built environment, to raise awareness and build capacities. The role of these stakeholder groups is described below.

The circular economy requires a holistic and systemic 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, such as environmental, regional development, agricultural and industrial ones.

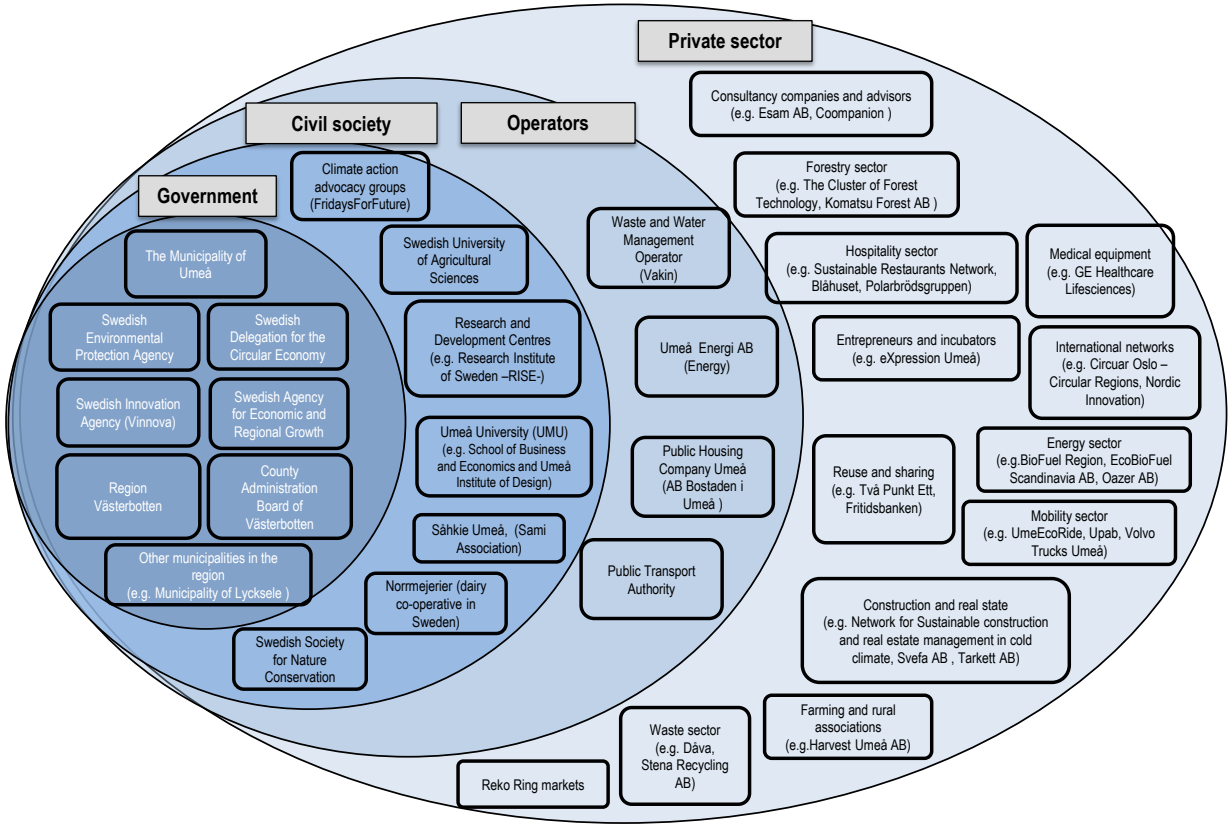
Adopting a functional approach going beyond the administrative boundaries of cities and regions is important for resource management and economic development. Cities and regions are not isolated ecosystems but spaces for inflows and outflows of materials, resources and products, in connection with surrounding areas and beyond. Therefore, linkages across urban and rural areas (e.g. related to agriculture and forestry) are key to promote local production and recycling of organic residuals to be used in proximity of where they are produced and avoid negative externalities due to transport. At the regional level, loops related to a series of economic activities (e.g. to the bioeconomy) can be closed and slowed.

The below sections will report on the main actors (people), sectors (policies) and scales (places) that have been flagged during the OECD Policy Dialogues on the Circular Economy in Cities and Regions (OECD, 2020[1]; 2020[2]; 2020[3]) and on-going in Glasgow (Scotland), Granada (Spain) and Ireland and through the *OECD Survey on the Circular Economy in Cities and Regions* (2020[4]).

People and firms

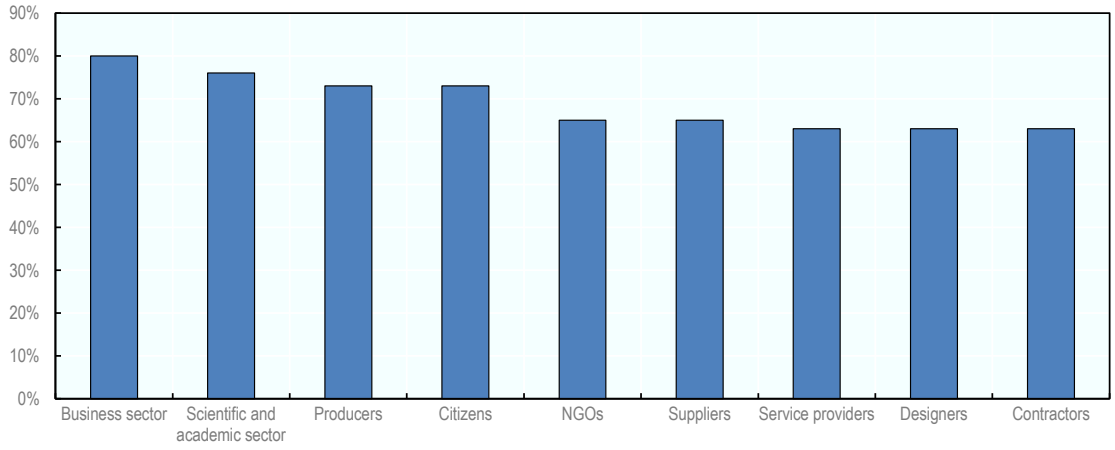
A wide range of stakeholders is involved in the circular economy. Surveyed cities and regions have involved or plan to include in the design and implementation of their circular economy initiative different type of stakeholders. As several actors have divergent objectives in moving towards the circular economy, it is important to motivate stakeholders towards common aims and create incentives and framework conditions for building synergies at the right scale and minimising future liabilities for society at large. The business sector is one of the key players: the transition towards a circular economy will depend on its capacity to shift towards more sustainable business models (e.g. using secondary material, recycling, sharing, etc.). Citizens, on the other hand, make constant consumption choices and can influence production. Figure 3.1 reports the stakeholders' group that participated in the OECD Policy Dialogue on the Circular Economy in Cities and Regions and that are likely to contribute to the transition towards a circular economy in the city of Umeå, Sweden. Respondents of the survey have identified the stakeholder groups contributing to development and implementation of circular economy initiatives, as follows: the business sector (80%), the scientific and academic sector (76%), producers and citizens (73%), non-governmental organisations (NGOs) and suppliers (65%), service providers, designers and contractors (63%) (Figure 3.2).

Figure 3.1. Stakeholders map in Umeå, Sweden



Note: This stakeholder's map is based on the 102 stakeholders that took part during the OECD mission to Umeå, Sweden (18-21 March 2019) and the policy seminar (23 October 2019).
Source: OECD (2020[3]) *The Circular Economy in Umeå, Sweden*, https://dx.doi.org/10.1787/4ec5dbcd-en.

Figure 3.2. Type of stakeholders involved in the development of circular economy initiatives in surveyed cities and regions



Note: Results based on the 51 surveyed cities and regions that responded "Yes" to the question: "Have the following categories of stakeholders been involved (or planned to be) in the design and implementation of the circular economy initiative of your city/region?".
Source: OECD (2020[4]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Business sector

Several national, regional and local circular economy strategies in place recognise the role of SMEs in the transition to a circular economy, as stated in the Dutch, Finnish and Slovenian roadmaps. Small- and medium-sized enterprises (SMEs) have been implementing resource efficiency measures, such as minimising waste, saving energy, water and materials, recycling and reusing materials or waste, while offering green products and services (24% in the EU28, (EC, 2018[5]). Different levels of government can actively support SMEs by: offering them an environment conducive to development (SITRA, 2016[6]); assisting them in developing projects (Government of the Republic of Slovenia, 2018[7]); and channelling financial resources (Dutch Ministry for the Environment and Ministry of Economic Affairs, 2016[8]). In Greece, where the circular economy is part of the country's growth strategy, actions include improving knowledge and linking entrepreneurship and social economy with technological innovation. In Glasgow, the chamber of commerce supports businesses of all sizes interested in a circular economy, through capacity building, co-operation and signposting to finance within the Circular Glasgow Initiative (Box 3.1). Some enabling conditions are key for SMEs to become more circular, such as: cutting red tapes and adapting regulation to innovation (e.g. including smart product design in the European Union [EU] package on circular economy); increasing co-operation across the value chain from design to end users; and innovating governance and finance.

Box 3.1. "Circular Glasgow": Capacity building on the circular economy

Since 2015, the Glasgow Chamber of Commerce hosts Circular Glasgow and is responsible for delivering this initiative alongside Zero Waste Scotland, the Glasgow City Council (United Kingdom) and key stakeholders. Circular Glasgow aims to build best practices and capacity on the circular economy across Glasgow businesses, helping them identify opportunities to support and implement circular ideas. This is done by: workshops and events – a series of knowledge-sharing business-to-business networking events; Circle Assessment – a tool which helps businesses understand opportunities to become more circular; the Circle Lab – an online hackathon event to find a circular solution to local challenges. The Circle Lab sought solutions to make Glasgow's event industry more circular. From over 200 contributions, the 3 winning ideas include a deposit-based reuse system for food and drink containers, circular designs for event marketing and branding, and a scheme that will repurpose organic waste into energy and fertilisers. Ways to turn these ideas into pilot projects are now being explored. The city is currently developing a circular economy roadmap.

Source: Interviews performed within the OECD Policy Dialogue "The circular economy in Glasgow, United Kingdom" between April and July 2020; OECD (2019[9]), *OECD Roundtable on the Circular Economy in Cities and Regions*, www.oecd.org/cfe/regional-policy/roundtable-circular-economy.htm; OECD (2020[10]), "OECD – Nordic Innovation webinars on the circular economy in cities and regions", www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf.

Innovative businesses and start-ups can benefit from incubators to develop circular-related projects through access to finance, capacity building and collaboration. In Umeå, Sweden, incubators are specialised in five main areas: new business models support (Uminova Innovation), creative industries (eXpression Umeå), life sciences (Umeå Biotech), young start-ups (BIC Factory) and sharing economy (Coompanion Nord). Each incubator provides guidance and support (e.g. access to finance, offering training, networking). There is a demand by the municipality to include circular economy projects in the core activities of the incubators while enhancing circular upgrading (valorisation and new business opportunities). Since 2017, the city of Paris, France, launched a circular economy incubator, Paris & Co. The incubator merges big and small companies and start-ups to promote innovative sustainable solutions for the city and enhance the science-industry co-operation (Paris&Co, 2020[11]). In Groningen, Netherlands, the Circular Economy Hub is an incubator for small businesses and start-ups, and as an information centre, repair hub and second-hand shop. The city of Granada, Spain, is part of the "OnGranada technological cluster", created in 2014 by the Business Confederation of Granada, involving private and public sector members (municipal, provincial and regional governments) alongside the university, the chamber of commerce, information and communication technology (ICT) business associations and unions. The cluster is incorporating the circular economy as a new area of specialisation, with a focus on waste reuse and resources efficiency (e.g. optimising the use of water in plant cultivation and irrigation through injections; or seeking to recover waste from olive production to convert it into biofuels) (OECD, forthcoming[12]).

Industrial symbiosis is a way to promote business collaboration and identifying business opportunities. The metropolitan Agency of Barcelona (Spain) designed a Metropolitan Industrial Symbiosis Program that acts as co-ordinator of industrial symbiosis and circular projects while offering municipalities and companies the tools and services for the concentration of data, information and knowledge generated in each of these projects. The Eco Parks in Kitakyushu, Japan, allow recycling waste while producing energy, saving water and creating new business opportunities. In Sweden, the roadmap for industrial symbiosis connects with the urban symbiosis. While the industrial symbiosis allows resource exchanges across companies, urban symbiosis looks at mutual and beneficial exchanges of resources within urban areas and across industries.

Business networks can create synergies within a circular economy. The Network for Sustainable Construction and Real Estate Management in Cold Climates (*Nätverket för hållbart byggande och förvaltande*) launched by the city of Umeå, Sweden, in 2008 brings together 55 members from all segments of the construction supply chain. Sustainability and the circular economy are key topics for the monthly breakfast meetings and at the annual member meeting (Network for Sustainable Construction and Real Estate Management in Cold Climates, 2013[13]). The network has enabled the creation of a public-private partnership PPP to develop, by 2024, the new Tomtebo Strand city district, which incorporates circular economy principles in its structural plan (Municipality of Umeå, 2019[14]). The Sustainable Restaurants Network (*Hållbara Restauranger*) involves 14 restaurants in the city for sustainable practices in the food industry and food waste management. On a wider scale, the North Sweden Cleantech is a regional innovation platform focusing on exporting green technology, clean energy and sustainable solutions through business support and networking. A hundred companies are currently part of the platform. Since 2016, the platform has been organising circular economy capacity building events (North Sweden Cleantech, 2019[15]). In Ireland, the National Platform for Circular Manufacturing Initiative 2020-22, CIRCULEIRE, is the first cross-sectoral industry-led innovation network dedicated to accelerating the zero-carbon circular economy. It is a PPP de-risking and delivering circular business model innovation. The Irish Manufacturing Research (IRM) in collaboration with its strategic partners, the Department of Communications, Climate Action and Environment (DCCAE), the Irish Environmental Protection Agency (EPA), and EIT Climate-KIC and 25 industry members are leading the platform. Some of the sectors involved are: building, furniture, packaging and material reprocessing companies. The programme has a dedicated innovation fund designed to foster cross-sectoral systems integration projects (Irish Manufacturing Research, 2020[16]).

Social enterprises also have an important role to play in the circular transition. They can provide alternative and sustainable business models, empowering people and local communities (Box 3.2). Some examples of circular activities include employing vulnerable people or people with physical, mental or psychological difficulties for repairing, packaging and assembling products and creating eco-products from waste (Robedrijf in Rotterdam, the Netherlands; NGO Cais, Lisbon, Portugal); micro-entrepreneurship for informal waste pickers (*Triciclos*, Santiago, Chile) (Brown, 2020[17]). Quillota, Chile, launched in 2019 an initiative called EcoModa to promote women entrepreneurship while reaching social-related objectives. It aims to create opportunities for female entrepreneurs, from vulnerable areas of the city, through training on eco-technological techniques to reuse and recycle clothes that can be later sold in local markets.

Box 3.2. Social enterprises and the circular economy during the COVID-19 crisis

The OECD defines a social enterprise as “any private activity conducted in the public interest, organised with an entrepreneurial strategy, but whose main purpose is not the maximisation of profit but the attainment of certain economic and social goals and which has the capacity for bringing innovative solutions to the problems of social exclusion and unemployment” (OECD, 1999[18]). While varying national definitions makes international comparisons difficult, national figures indicate the importance of social enterprises. For example, in Belgium, social enterprises account for 17% of private employment. In France, the social and solidarity economy – which includes social enterprises – is made up of almost 200 000 entities in 2014, accounting for 10% of gross domestic product (GDP) and 2.38 million jobs.

The COVID-19 crisis has shown how the circular economy can be applied in the social economy and provide solutions to the mainstream economy. For example, during the COVID-19 crisis, EcoRes, a sustainable innovation lab specialised in the circular economy based in Brussels, Belgium, together with Travie, a social enterprise that employs people with disabilities, provided masks for healthcare

personnel. More than 2 000 people were involved in the whole process and produced 240 000 reusable masks in 1.5 months.

Source: OECD (1999[18]), *Social Enterprises*, http://dx.doi.org/10.1787/9789264182332-en; Brown, E.G. (2020[17]), "Learning from social enterprises creating an inclusive circular economy", https://www.greenbiz.com/article/learning-social-enterprises-creating-inclusive-circular-economy; OECD (2020[19]), "Social economy and the COVID-19 crisis: current and future roles", http://www.oecd.org/coronavirus/policy-responses/social-economy-and-the-covid-19-crisis-current-and-future-roles-f904b89f/.

Knowledge institutions

Academia and research centres contribute to creating technical and non-technical knowledge on the circular economy. Knowledge institutions are working on eco-design, bioproduction processes, modular buildings, etc. For example, in Spain, the University of Valladolid (UVa) and the Technological Agricultural Institute of Castile and León (*Instituto Tecnológico Agrario de Castilla y León*, ITACYL) collaborate on bioeconomy research projects, while a project on the circular economy is underway. In Sweden, the Umeå University School of Architecture has included the circular economy in its sustainable urban development master courses. The municipality of Groningen, Netherlands, the business association WEST and the province of Groningen co-operate within Campus Groningen, one of the biggest campuses in the Netherlands to promote innovation in the energy transition, artificial intelligence, health and, in the future, the circular economy.

Non-governmental organisations

NGOs often carry out capacity-building programmes and raise awareness on circular economy practices. The Umeå branch of the NGO Cradlenet Norr, founded in 2015, organises bi-monthly meetings to raise awareness of circular economy issues, discusses challenges with different stakeholders (e.g. SMEs, municipal authorities, business coaches, university researchers and students), organises specialised field visits and participates in international events and platforms on the circular economy. During 2018 and 2019, the Federation of Neighbourhood Associations of Valladolid (*Federación de Asociaciones Vecinales de Valladolid*) created an online circular observatory to share information on the circular economy and monitor citizens' level of engagement. The organisation also developed an online "monitoring game" to promote reuse, raise awareness on the circular economy and signal the location.

Service providers

Services operators in surveyed cities are moving from providers to promoters of more integrated initiatives interconnecting water with waste, energy, land use within the circular economy approach. Waste and wastewater utilities are in some cases the main agents developing circular economy activities in cities or are important partners in circular economy projects. This is the case of the London Waste and Recovery Board (LWARB), which utilises its own funds to deliver a suite of circular economy programmes, or the Maribor (Slovenia) utilities, which funded the WCYCLE Institute, a major bolster to the circular economy in the area. Within the scope of their circular activities, utilities often focus on recovering and reusing materials from waste and wastewater, reducing emissions and investing in soil management and brownfield development, in addition to their traditional waste collection and recycling services. Utilities and service providers in the cities surveyed follow different management models, including PPP models, in the case of the Barcelona Metropolitan Area (Spain) or Austin (USA), almost completely or completely owned by the municipality and surrounding suburban areas, as in the case of Lappeenranta, Finland or Ljubljana, Slovenia.

One of the utilities' actions within the circular economy consists in the recovery of nutrients, materials and resources from waste for reuse. For example, the urban wastewater treatment system managed by the

municipality of Milan, Italy, specialises in the reuse of wastewater for irrigation, thus reducing the amount of drinking water used and guaranteeing agricultural companies a quality resource. In the city of Granada, Spain, the public-private water utility company transformed the concept of a wastewater treatment plant into a bio-factory by producing energy and new materials (Emasagra, 2019[20]) (see section on "Water" below).

Soil management and brownfield development have been areas of recent development by surveyed utilities. In the region of Flanders, Belgium, the Public Waste Agency of Flanders (OVAM) is working to integrate circular principles in permits and policy instruments such as brownfield reconversion agreements between authorities and utilities. Pilot Back in Circulation (*Terug in Omloop*) projects are being developed to encourage new policy principles such as the circular economy and creating greater links between urban transformations, economic transition and integrated soil remediation.

To engage the wider society in circular economy activities, utilities often invest in communication strategies to educate the public on their activities and environmental impact. Starting in 2013, the service operator in Ljubljana, Slovenia, launched a series of consumer-oriented initiatives and facilities for repair, reuse and exchange. This initiative focused on actions and measures for waste prevention (especially food waste) and responsible consumerism such as through the "Get used to reuse" initiative, which uses song, videos, posters, container stickers, events and workshops in district communities for educational and social purposes. Two of the main goals of the Intermunicipal Waste Management Service of Greater Porto (LIPOR), Portugal are to expand the knowledge about the concept of circular economy (SPEED UP programme) and provide technical knowledge of circular economy dynamics, with specialised integrated training (SCALE UP programme).

Utilities collaborate with other stakeholders to promote circular projects. The city of Prato, Italy, signed an agreement to co-operate closely with waste, water and energy operators and the University of Prato to investigate new operational, innovative and technical actions within the circular economy paradigm. In the case of Munich's Waste Management Co-operation (AWM), Germany, the Halle 2 project involved developing synergies between waste collection and reuse opportunities by opening a second-hand store in 2016, funded by waste collection fees. AWM aims to increase the volume of re-sold items by 100% through information campaigns and stronger co-operation with local companies so that it can eventually cover the annual rent and staff costs of through sales revenue. The Halle 2 project was developed through co-operation agreements with local social enterprises that offer both the specialist expertise needed for the store's repair and reuse services and the employment and training opportunities key to the project's vision. It also worked with educational and community organisations to create activities that would encourage people to be more environmentally aware and active. The Barcelona Metropolitan Area (Spain) is progressively putting in place various projects within the Green and Circular Economy Driving Programme for the Metropolitan Area of Barcelona (2019[21]) (2019), such as the Circular Resources Platform (online platform bringing together professionals working on circular economy topics, good practices taking place in the metropolitan area, aiming to connect them with the local industrial sector) and the Circular Economy Group, a space to co-ordinate strategies and promote collaborative work between different municipalities, administrations and private actors.

Municipal utilities participate in regional, national and international circular economy strategies, in addition to their local outreach. For example, the Helsinki Region Environmental Services Authority (HSY) in Finland provides waste management services for the cities in the capital region and also participates in the city's work on a roadmap for the circular and sharing economy, in addition to taking part in regional and international circular economy projects. The city of Lappeenranta, Finland, promotes the circular economy via the Greenreality Network, a network of energy and environmental companies operating in the South Karelia region by creating growth and new business opportunities for its members as well as the entire area. The network also includes municipalities of the area as well as research and educational institutions. It is co-ordinated by the city of Lappeenranta. Puhas Ltd., the main waste collection and services utility in Joensuu, Finland, is a local partner in the Finnish project Circwaste, which promotes efficient use of

material flows, waste prevention and new waste and resource management concepts, which is funded by the EU LIFE programme. Still in Finland, the city of Oulu is promoting new circular economy businesses by developing new circular economy park Välimaa for several operators and companies. The municipal waste company, Kiertokaari Oy, is boosting circular economy business in the Ruskonniitty area (previously, one of the pilot areas in the CircHubs project). In the Greater Porto Area, Portugal, LIPOR implemented an IMPACT ON project to boost the integrated dynamics of circular economy at the local and national levels by aligning its strategies with the global priorities of the Sustainable Development Goals (SDGs), addressing 11 of the 17 SDGs of the United Nations (UN) Agenda. After this first mapping in 2017, for each one of LIPOR's materially relevant topics, the corresponding SDG was identified, as well as the respective projects within its sustainability agenda.

Policies: Identifying sectors holding potential for the circular economy

Almost all the respondents of the OECD survey (2020[4]) identify the waste sector as key for the circular economy (98%), followed by the built environment (75%), land use and spatial planning (70%), food and beverages and water and sanitation (65%) (Figure 3.3). Table 3.1 shows the list of the sectors included in the ongoing circular economy initiatives in cities and regions that took part in the OECD survey (2020[4]). The following section will describe these five sectors in depth.

Making a sector "circular" implies rethinking value chains and production and consumption processes. Often the circular economy in cities and regions is seen as a synonymous of waste recycling but it is more than that. Common characteristics of various activities going circular are the following: making products and goods last longer through better design; producing products and goods using secondary and reusable material, and renewable energy while reducing atmospheric emissions; distributing products within short miles and consuming them consciously and sustainably; and transforming waste into a resource.

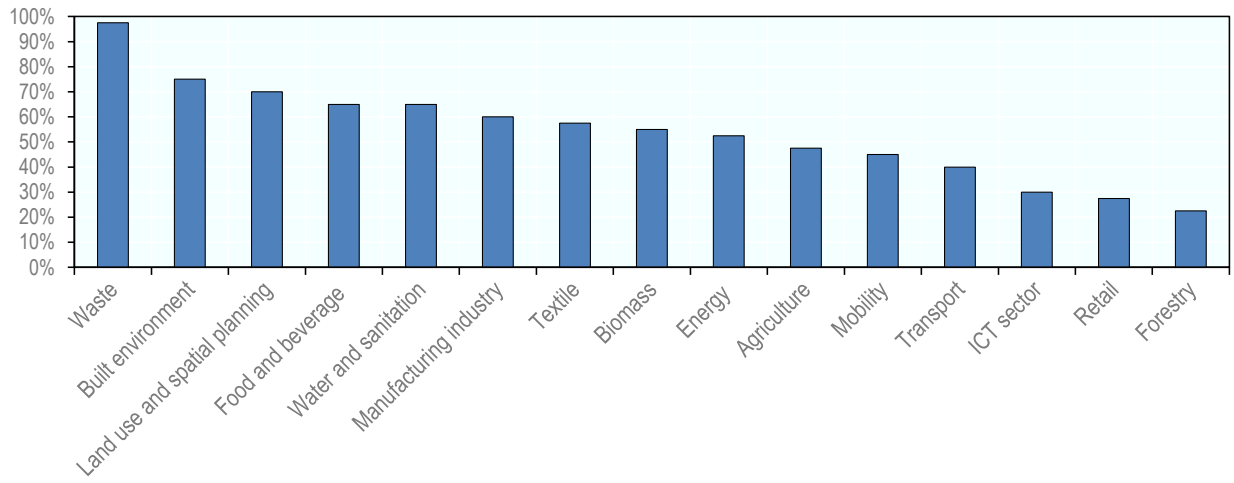
Table 3.1. Sectors included in selected circular economy initiatives at the local and regional levels

Cities and regions	Initiative	Waste	Construction & demolition	Land use & 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)	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓			
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 (United Kingdom)	Circular Glasgow	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		
Tilburg (Netherlands)	Tilburg Circular Agenda 2019	✓	✓	✓	✓	✓	✓			✓						

Cities and regions	Initiative	Waste	Construction & demolition	Land use & spatial planning	Food and beverage	Manufacturing industry	Textile	Water and sanitation	Energy	Biomass	Agriculture	Mobility	Transportation	ICT sector	Forestry	Culture
Valladolid (Spain)	Valladolid Circular Economy Roadmap (2017-2018)		✓	✓	✓	✓	✓	✓		✓		✓				
Maribor (Slovenia)	Strategy for the Transition to a Circular Economy in the Municipality of Maribor	✓	✓	✓				✓	✓			✓	✓			
London (United Kingdom)	London's Circular Economy Route Map	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		

Source: OECD (2020[4]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris; desk research.

Figure 3.3. Share of sectors included in circular economy initiatives in surveyed cities and regions



Note: Results based on a sample of 40 respondents that selected sectors responding to the question: "Which sectors are included in your city/region circular economy initiative?".
Source: OECD (2020[4]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Waste

Cities produce 50% of global waste and it is estimated that globally, by 2050, the levels of municipal solid waste will double (UNEP, 2013[22]; UNEP/IWSA, 2015[23]). As a consequence of the growing population and urbanisation rates, annual waste generation is expected to increase by 70% from 2016 levels to 3.40 billion tonnes in 2050 (World Bank, 2019[24]). Without improvements in the sector, solid waste-related emissions are anticipated to increase to 2.6 billion tonnes of CO_2-equivalent by 2050 worldwide (Kaza et al., 2018[25]). Municipal solid waste represents a small share of total waste generated (about 10%) but its management and treatment often require more than one-third of public sector financial efforts to abate and control pollution (OECD, 2019[26]). In 2018, in the OECD area, the average waste per capita per year generated was of 525 kg: 20 kg more than in 1990 but 35 kg less than in 2000 (OECD, 2019[27]).

While recycling is projected to grow, the share of a landfill in municipal waste treatment remains high in OECD countries. Recycling is expected to become more competitive compared to the extraction of primary materials. However, its share remains ten times smaller than the share of mining (OECD, 2019[28]). Data from 2018 in OECD countries show that in terms of municipal waste, recycling is the second-largest method of treatment (26%), after landfill disposal (39%). Some countries recycle more than one-third of the municipal waste they manage (e.g. Belgium, Germany, Korea, Slovenia). The share of municipal solid waste landfilled in the OECD area decreased from 63% to 42% between 1995 and 2018 (OECD, 2019[27]).

Circular waste implies a series of upstream and downstream activities to prevent waste generation and transform waste into resources, amongst others. A circular waste management system is one where waste generation is prevented; the disposable model is replaced by a recovery one; a market for secondary raw materials is in place and secondary materials would satisfy a prominent percentage of the demand of materials for goods production. A circular waste system would develop and commercialise technology to identify, sort and deliver high-quality raw material. Digitalisation and data management should connect products with waste handling (e.g. through the IoT, labelling, etc.) and the design and production phase should take into account feedback from waste handling and extend the life of products and goods.

Plastics is a key sector for several surveyed circular economy strategies and initiatives. A total of 95% of plastic packaging material value is lost in the global economy annually (around EUR 70-104 billion) (Ellen MacArthur Foundation, 2017[29]). As part of the transition towards a more circular economy, the EC adopted in January 2018 "A European strategy for plastics in a circular economy" (Box 3.3). Many cities are putting in place initiatives to support product design, reuse and recycling. The city of Helsinki, Finland, launched in 2019, the Closed Plastic Circle to develop tendering processes that include criteria that promote the increase of plastic recyclability and its recycling share. The aim is to: create efficient and functioning recycling and collection services for different plastic streams (plastic that is currently not sorted and collected from households or plastic waste produced on construction sites and in service industries); find users and refiners for the collected plastics; and strengthen the recycled plastic markets (Smart Clean, 2019[30]). The Environmental Protection Agency (EPA) in Ireland through the Small Business Innovation Research (SBIR) calls upon companies to find innovative solutions for soft plastics (e.g. packaging). In 2015, LWARB and WRAP, in London, United Kingdom, set up Resource London, a collaborative programme to support London boroughs in their provision of waste and recycling services (e.g. collection of plastic tubs, pots and trays as well as plastic bottles to create harmonisation across the city, contributing to and learning from the Global Plastics Protocol) (LWARB, 2017[31]). The Intermunicipal Waste Management of Greater Porto (LIPOR, Portugal) in 2018, signed a voluntary commitment to circular economy principles and the "Vision for the Circular Economy of Plastics" commitment to enhance technical knowledge and boost integrated dynamics of circular economy at the local and national levels (Impact On) (LIPOR, 2018[32]).

Box 3.3. A European strategy for plastics in a circular economy

In Europe, plastic waste has been rapidly growing in the last 50 years. Since the 1960s, the production of plastics worldwide increased 20 times reaching 322 million tonnes in 2015 and is expected to double by 2040. A total of 25.8 million tonnes of plastic waste are produced in Europea annually while less than 30% is collected for recycling (EC, 2018[33]).

Demand for recycled plastics accounted in 2018 for only around 6% of plastics demand. Plastics production and the incineration of plastic waste give rise globally to approximately 400 million tonnes of CO_2 a year.

"A European strategy for plastics in a circular economy", adopted by the EC in 2018, aims at reaching 55% recycling of plastic packaging waste by 2030. The strategy includes the following measures and actions:

- Improving the economics and quality of plastics recycling, through:
  - Improving product design.
  - Boosting recycled content.
  - Improving separate collection of plastic waste.
- Curbing plastic waste and littering, through:
  - Reducing single-use plastics.
  - Tackling sea-based sources of marine litter.
  - Monitoring and curbing marine litter more effectively.
  - Improving compostable and biodegradable plastics.
  - Curbing microplastics pollution.
- Driving investment and innovation towards circular solutions, through:

- Promoting investment and innovation in the value chain.
- Harnessing global action, through:
  - Focusing on key regions.
  - Multilateral initiatives on plastic.
  - Bilateral co-operation with non-EU countries.
  - International trade.

In May 2018, the EC proposed new EU-wide rules to target the single-use plastic products most often found on Europe's beaches and seas: cotton buds; cutlery, plates, straws & stirrers; sticks for balloons and balloons; food containers; cups for beverages; beverage containers; cigarette butts; bags; crisp packets/sweet wrappers; and wet wipes and sanitary items.

Source: EC (2018[34]), *Single-use Plastics: New Measures to Reduce Marine Litter*, https://ec.europa.eu/environment/waste/pdf/single-use_plastics_factsheet.pdf (accessed 3 August 2020); EC (2018[33]), *A European Strategy for Plastics in a Circular Economy*, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN.

Some surveyed cities focus on the zero-waste concept in their pursuit of the circular economy. For example, Phoenix created Reimagine Phoenix to increase the city's waste diversion rate to 40% by 2020; Austin is advancing towards zero waste through the Austin Resource Recovery Master Plan; and San Francisco aims by 2030 to reduce municipal solid waste generation by 15% and reduce disposal to landfill and incineration by 50%. Phoenix has identified the transition to the circular economy as one of the three main actions to move toward zero waste by 2050. These are: expanding the current recycling programme to remove commonly recycled products from the waste stream (and reducing the number of non-recyclable products from the recycle bins) through public education and awareness campaigns; increasing the number of products recyclable by incubating local businesses to capture new products from the waste stream (e.g. organic waste); and supporting the transition to a circular economy and encouraging the retail industry to provide products that are either 100% recyclable or able to be repurposed at end of life. Austin's Master Plan includes a chapter on reuse and a chapter on economic development, which called for a partnership with the city's Economic Development Department to create green jobs through zero waste, create local end markets for recycled materials, support reuse, promote all forms of waste reduction (not just recycling) and encourage both consumer and business behaviour change to support circularity. San Francisco's Zero Waste Program facilitates the reuse of surplus city-owned material within the government sector and donations to NGOs and schools, and promotes food waste prevention and recovery technologies to facilitate the donation of surplus food.

The waste sector holds challenges and opportunities towards increased "circularity". A number of actions are likely to accelerate the circular transition, from removing harmful subsidies, providing risk-sharing financial instruments (European Union, 2019[35]), but also applying incentivising schemes for separate collection and recycling, such as the pay as you throw system, or differentiated tariffs. Nevertheless, there is a general lack of information and data. In many countries and cities, information remains insufficient to monitor total waste streams, their recovery and the use of secondary raw materials in the economy (World Bank, 2018[36]). Many stakeholders flag that there is uncertainty around the concept of waste and how materials can be reinserted in production processes when they are still reusable but, by law, they are qualified as "waste". In addition, roles and responsibility in the sector are highly fragmented, creating overlaps, gaps and mismanagement.

Built environment

The building sector is responsible for 39% of all carbon emissions worldwide (World Green Building Council, 2017[37]; Ellen MacArthur Foundation, 2020[38]). Demographic and economic growth, increasing

income levels associated with the growing demand for goods, services and housing represent a challenge but also an opportunity to make the sector more circular, reducing its carbon footprint. The circular economy can contribute to reducing the sector's CO_2 emissions by minimising material use and maximising reuse.

Circular building is different from sustainable building: the circular way of building consists of rethinking upstream and downstream processes to minimise waste production and maximise resource use. It also implies new forms of collaborations amongst designers, constructors, contractors, real estate investors, suppliers of low- and high-tech building materials and owners, while looking at the life cycle from construction to end of life. Key phases can be identified as follows: planning, design, construction, operation and end of current life (Stronati and Berry, 2018[39]).

- **Planning** in a circular way implies considering the entire lifecycle of the asset, including alternative use through repurposing and reassembly. Examples are modular approaches so that materials and buildings' blocks can be easily dismantled and reused. The city of Amsterdam, Netherlands, applies smart design for buildings more suitable for the repurposing and reuse of materials and improves efficiency in the dismantling and separation of waste streams to enable high-value reuse and to create a resource bank and marketplace where materials can be exchanged between market players (Circle Economy et al., 2016[40]). The city of Prato, Italy, conceives the circular economy in the built environment sector as a means to "rethinking the city". The objectives are to: create new economic and social opportunities without consuming new resources and green land (following the paradigm of the "zero volume" growth); improve the environmental performance of buildings and infrastructures in their entire life cycle; propose new urban scenarios in line with the most recent regional legislation addressed to the limitation of agricultural land consumption.
- A proper **design** in the project phase takes into account the material choice, the consumption of water and energy in buildings to reduce consumption and minimise waste and possible reuse of buildings. The Public Waste Agency of Flanders (OVAM, Flanders, Belgium) in collaboration with the Walloon Public Service (SPW) and Brussels Environment Agency (Brussels Environment) developed an online open-access calculation tool called "Tool to Optimise the Total Environmental Impact of Materials" (TOTEM). The TOTEM helps architects, designers and builders to assess the environmental impact of building materials to increase the material and energy performance of buildings (Wille, 2013[41]). Amsterdam, Netherlands, promotes circular area development in urban design, an integrated approach to construction, including climate-proof infrastructure, with special attention paid to closing cycles.
- The choice of materials for the **construction** phase entails identifying more sustainable materials and minimising the variety of materials used. In the city of Paris, France, besides meeting all mandatory requirements established in the NF HQE Base, a certification for the construction sector, to be considered circular, construction projects should reach at least 40% of the points established in a "circular economy profile" (e.g. inclusion of a waste management plan, use of recycled materials, development of life-analysis calculations, eco-certification of wood, considering deconstruction processes, establishing synergies with local actors in the surrounding areas, among others) (HGB-GBC, 2017[42]). Material passports and material banks can foster reuse of construction materials and provide constructors and clients with reused materials (Box 3.4).
- The way a site is operated and run also has a direct impact on the circularity of a project. The **operation** phase concerns the use of energy sources and embedded technologies in buildings to enhance resource efficiency. The operation also includes data and innovative technologies as enablers to extending the life assets, which delay the shift towards a second life or the end of life. For example, Paris, France, recovers heat from wastewater to heat and cool public buildings and has also developed a network of non-potable water users to optimise water consumption. Maribor, Slovenia, has deployed a spatial analysis of the use and production of heat in the city to optimise energy use.

- The **end life** of a building would create a new life for the waste material produced. Three levels of circularity can be identified: repurpose an existing asset, components and materials with no major transformations and in the same location; reuse an existing asset for the same purpose, but in a different location; reuse of components and materials of existing assets, in the same and different location (Stronati and Berry, 2018[39]). Particular attention is paid to spatial planning, given the city's relatively strong role as a commissioning authority for public space and in the realisation of its own accommodation and the granting of permits for construction and demolition.

Box 3.4. Material passports for circular buildings

Based on the cradle to cradle design, material passports are digital sets of data describing characteristics of materials and components in products and systems that give them value for present use, recovery and reuse. They represent a tool for the improvement of transparency on the materials used during construction and renovation stages. They are expected to avoid costs related to the investigation of dangerous materials before demolition and enhance better asset management of constructions since public authorities will have clearer information about materials and potential reuse. There are several companies in the Netherlands and Sweden providing material passports to real estate owners.

Source: Cradle to Cradle Products Innovation Institute (2019[43]), *Homepage*, www.c2ccertified.org/; Luscuere, L.M. (2017[44]), "Materials passports: Optimising value recovery from materials", http://dx.doi.org/10.1680/jwarm.16.00016.

Idle capacity of buildings should also be considered for better use of resources. In cities, a number of dismissed buildings can be used as a testbed for the circular economy experimentation or can have a second life, avoiding new constructions. Consumer behaviours are also changing the way spaces and buildings are used. Typically, with the increasing use of online shopping, high streets are rethinking their purpose. Empty buildings in the city centre can have an alternative use for social activities. A dataset on empty buildings can help to map these available spaces. In Groningen, Netherlands, a project of using the disused sugar factory aims to create a "zero-waste" neighbourhood: The *De Loskade* is projected to be a "removable" and "short stay" neighbourhood. As a "pop-up" neighbourhood, temporary properties will be dismantled after the rental period that ends in 2030 and rebuilt in other areas. Extensive pilots and testing are taking place at *De Loskade*, for example gas-free installations and off-the-grid and energy-efficient homes (Municipality of Groningen, 2019[45]; Van Wijnen, 2019[46]).

Land use and spatial planning

Land use and spatial development policies have critical importance in creating more sustainable cities (European Environment Agency, 2015[47]). Carbon emissions and energy consumption are closely linked to the urban form, as several key sectors related to urban density have a considerable impact on energy consumption (e.g. transport and building sector) (Kamal-Chaoui and Robert, 2009[48]). Cities have an important role to play, as while the demand for energy continues to keep an increasing trend, there are opportunities to expand or replace energy infrastructures with renewable energy technologies (IEA, 2009[49]). Circular spatial planning policy should aim to shape the physical structure of a city in order to support local circular material flows**.** Urban planners should take into account the spatial and infrastructure requirements that circular economy activities (reuse, collection, distribution or resources and material flows) could have in each relevant sector (water, bioeconomy, built environment, recycling) (Ellen MacArthur Foundation, 2019[50]).

Cities can use different tools to foster circular urban planning: from land use regulation to urban planning and circular land tenders. The city of Amsterdam, Netherlands, developed a "Roadmap Circular Land Tendering" for land allocation, primarily for new-build circular projects. The Roadmaps is planned to be used for tenders also for transformation, renovation and demolition (in Amsterdam Smart City (2018[51])). Another example in the city is the development of a circular neighbourhood, the *Circular Buiksloterham*. Once one of the most polluted areas in the city, it is now turning into a circular area for living and working. Some of the policies adopted by the city include the development and construction of circular and sustainable buildings, receiving sustainable energy supply generated at the local level, the experimentation with smart grid solutions, and the creation of parking spaces for bicycles and shared mobility options (Municipality of Amsterdam, 2018[52]).

Food

Cities are major food consumers, but also food waste producers. A total of 2.9 billion tonnes are annually destined to cities (resulting 0.5 billion of tonnes wasted) (Ellen MacArthur Foundation, 2019[53]). According to the Ellen MacArthur Foundation (2019[54]), achieving a regenerative food system in cities will entail an annual reduction of greenhouse gas emissions by 4.3 billion tonnes of CO_2-equivalent and the generation of annual benefits worth USD 2.7 trillion by 2050. This is very relevant, taking into account that by 2050, cities will consume 80% of food (FAO, 2020[55]). Various experiences show that circular food systems in cities and regions are based on strengthening synergies across the food value chain, from production to distribution and waste handling.

Some cities promote local food production. Paris, France, is planning to relocate part of its food production to reduce transport cost and related greenhouse gas emissions. In Maribor, Slovenia, a digital platform (INNO RURAL) connects local food producers and customers to shorten delivery routes and share information on what products are sold and where (e.g. markets localised on Google maps). The concepts of urban agriculture and collective composting have also been developed in several cities within the context of closing the urban food loop. In Brussels, Belgium, in order to increase the urban food production, the 2015 Food Strategy Plan provides access to crops in areas above ground such as rooftops and cellars (Brussels-Capital Region Government, 2015[56]). Nantes Metropolitan Area in France has deployed a Territorial Food Project since 2018 to promote local, sustainable and accessible food for all.

Many surveyed cities set up initiatives to reduce food waste within the hospitality, food service and wholesale sectors**.** In the case of London, United Kingdom, measures include: promoting the Sustainable Food Cities Network; supporting public authorities (GLA family and London boroughs) and private companies that procure catering contracts promoting the food waste hierarchy; strengthening policies for dedicated space for food waste (and all other recyclables) in all new housing developments. In 2017, the city of Umeå, Sweden, created the Sustainable Restaurants Network to connect restaurants with local producers and to guide citizens towards sustainable choices. Examples at the national level are provided in Box 3.5.

Box 3.5. Food waste and the circular economy in France and Ireland

Preventing food waste actions in France

Two consecutive laws, promulgated in 2015 and 2016 respectively, made France the first country in the world to ban supermarkets from throwing away or destroying unsold products. The "Energy transition for green growth" law *(Loi n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte),* which includes "the fight against waste and the promotion of the circular economy: from product design to recycling", and the Law on Combating Food Waste *(Loi n° 2016-138 du 11 février*

2016 relative à la lutte contre le gaspillage alimentaire) are the two main instruments to reduce food waste in the country. The anti-waste law for a circular economy (*Loi n° 2020-105 du 10 février 2020 relative à la lutte contre le gaspillage et à l'économie circulaire*), approved by the French National Assembly in February 2020, prohibits the destruction of non-food unsold products and increases the sanctions in case of non-compliance with the ban on food waste. For example, food distributors are obliged to propose a donation agreement to food aid organisations for the return of their unsold still-consumable food, when food stores are bigger than 400 m^2.

The entry into force of the law increased the amount of food collected by the associations, from 36 000 tonnes in 2015 to 46 000 tonnes in 2017. The food is distributed by charities and food banks.

Food waste prevention in Ireland

The Irish Environmental Protection Agency (EPA) defined three consumer-led programmes regarding food waste prevention:

- Stopfoodwaste.ie: The programme addresses households and businesses to raise awareness on food waste behaviour and shopping habits.
- The Food Waste Charter: Its initial focus was the grocery sector working with large grocery chains. The programme covered about 70% of the market. Each grocery chain is starting to measure their food waste production and taking action. The programme is in its starting phase but has potential to grow. The EPA is looking to extend the programme to food waste generated by hotels, catering operations, canteens, and other actors.
- A third programme reports on legislative targets. The programme works on gathering data and evidence for food waste and the changes that are needed to meet the defined food waste targets by 2030.

Source: ADEME (2019[57]), *Réduire le gaspillage alimentaire*, https://www.ademe.fr/expertises/dechets/passer-a-laction/eviter-production-dechets/dossier/reduire-gaspillage-alimentaire/cadre-reglementaire; Ministry for the Ecological and Inclusive Transition (2019[58]), *The Anti-waste Law for the Circular Economy*; Le Figaro (2018[59]), "Loi anti-gaspillage alimentaire : quel bilan après 18 mois ?", https://www.lefigaro.fr/economie/le-scan-eco/2018/10/16/29001-20181016ARTFIG00007-loi-anti-gaspillage-alimentaire-quel-bilan-apres-18-mois.php; Ministry for the Ecological and Inclusive Transition (2020[60])(2020), "The anti-waste law in the daily lives of the French people, what does that mean in practice?", https://circulareconomy.europa.eu/platform/sites/default/files/anti-waste_law_in_the_daily_lives_of_french_people.pdf.

In a circular economy, food waste should be reduced as much as possible or transformed into usable products for agriculture. For example, the city of Groningen, Netherlands, launched Food Battle Groningen to raise awareness on reducing food waste. Local not-for-profit organisations are taking the lead in this sector by pushing the demand towards local food consumption, reducing food waste and promoting urban agriculture. In Finland, the food market is one of the circular priorities and plans include creating a market for organic recycled nutrients, minimising food waste by creating specific incentives and support biogas systems and other renewable energy solutions in agriculture in order to replace the use of fossil fuels. Slovenia has also prioritised the food system and taken action to implement the zero-waste concept in food consumption by: customising menus in public institutions, installing compost containers and informing, educating and integrating different stakeholders around the importance of ecological and sustainable agriculture, the conservation of soil and water quality and the revitalisation of degraded land. The city of Toronto, Canada, has put in place the Urban Harvest programme to help reduce food waste and benefit the broader community by collecting surplus fruit and vegetables from residents' backyards and redistributing them to local food banks and programmes. The city of Guelph 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 aims

to make the most of its distinctive characteristics (the presence of major agri-food industry players, agriculture research institutions and a developed household organic waste collection scheme) to: grow food regeneratively and locally when possible; minimise food waste; and design and market healthier food products (Government of Canada, 2020[61]).

Water

Applying circular principles to the water sector is not new. Yet there is room for improvement and significant investments are foreseen to avoid linear lock-in now and in the future. Overall, significant investment is required to renovate and improve water infrastructure, such as water supply networks. According to the OECD (2016[62]), a total of 92% of surveyed cities (48 cities from OECD and non-OECD countries) reported significant challenges in terms of updating and renewing water infrastructure. Due to obsolete infrastructure and leakages in water supply systems, an average of 21% of water is lost before distribution. Globally, by 2050, the required investment for water supply and sanitation is estimated at USD 6.7 trillion (OECD, 2018[63])(OECD, 2016). As the future water infrastructure still has to be constructed, there is an opportunity to avoid linear lock-in based on the “take-make-dispose” logic.

In the water sector, circular economy practices can help improve environmental quality, while generating business opportunities and enhancing social well-being. Managing water in a circular way implies: reducing the use of water in the production cycles; ensuring more sustainable water flows; reusing water for specific purposes taking into account the effects on health and the environment; generating energy and recovering a wide variety of materials from wastewater treatment.

Cities have incorporated water and sanitation into their circular economy initiatives. For example, Amsterdam, Netherlands, focuses on closing local nutrient cycles. It combines water reuse techniques with educational programmes and procurement tools; the Barcelona Metropolitan Area, Spain, prioritises the creation of a water cluster and provided funds for research and development (R&D) in the sector. It promotes the creation of a water cluster with different stakeholders and adopts an intersectoral approach, in relation to the interplay of the water sector with others, such as food and design. Water-related initiatives in Flanders, Belgium, consist of supporting companies in closing water loops and facilitating demonstration projects. The Partnership Circular Flanders created spaces for stakeholder collaboration with a strong technical innovation approach. In Rotterdam, Netherlands, actions concentrate in the health sector through filtering wastewater, while Paris is advancing in wastewater energy recovery to heat and cool public buildings and using technology to monitor water consumption in green public spaces (Romano and Cecchi, 2020[64]) (Box 3.6).

Box 3.6. Water in selected circular economy strategies in cities and regions

In Amsterdam, Netherlands, the strategy Amsterdam Circular 2020-2025 (City of Amsterdam, 2020[65]) identified the need to close local nutrient cycles from biomass and water flows. Water reuse allows nutrient recovering (e.g. phosphates from sewage) and reduces the use of synthetic fertilisers in the city and its surroundings. The city intends to raise awareness on the benefits of water reuse targeting students and citizens. A single-person household consumes 52 000 litres of water per year (on average 133.4 per day) (Waternet, 2019[66]). The strategy includes the creation of closed water cycles in buildings to reduce the consumption of drinkable water. Circular procurement is signalled as a key tool to promote these changes. Key stakeholders identified in the strategy are the utility companies, to facilitate innovation for nutrient recovery from wastewater, and public housing associations for the implementation of closed water systems in buildings. The strategy foresees the use of organic waste

and wastewater sludge as fertilisers in local (peri-)urban farming to close local nutrient cycles, reduce transportation costs and increase the water absorption capacity of the city by expanding green spaces.

In the Rotterdam's Circularity Programme 2019-2023 (2019) (Netherlands), water is a key part of the health sector focus, one of the four strategic sectors identified in the circular strategy (alongside construction, green streams such as organic waste, and consumer goods). The city is working with hospitals to make the healthcare sector more sustainable by filtering medicine residues (e.g. medicine waste, hormone disruptors' remnants and cleaning agents) from wastewater and using them to generate energy (biogas through anaerobic digestion). Two hospitals in the city are already doing this (the Franciscus Gasthuis and the Erasmus MC).

The Barcelona Metropolitan Area (Spain), in its Green and Circular Economy Promotion Programme (2019), incorporates the water sector as key for the circular economy, along with solar energy, energy efficiency, recycling and food. The programme provides funding for R&D and the development of pilot projects, including water management. It identifies innovation opportunities related to water in the food sector (using alternative resources like rainwater or groundwater for efficient irrigation), in the chemistry, energy and resources sectors (through innovation in wastewater treatment and resource recovery), and in the design sector, promoting a water-saving culture (cisterns, wells, irrigation channels).

As part of the Circular Economy Plan of Paris 2017-2020, the city of Paris, France, incorporates the "cradle to cradle" approach for specific material flows: water, food, phosphate, waste, electricity and heating. Water-related applications of the circular economy in the plan apply to the energy and waste management material flows. They consist of providing heating to public buildings using heat recovery from wastewater to 16 public institutions and exploring more sustainable ways of cooling buildings in the city. As of now, the heating system connected to Paris' non-potable water network is extracting energy from water to cool the City Hall building. Rationalising water use (e.g. meters in green areas) and remotely monitoring public water fountains also helps to prevent leaks and optimise consumption.

The Partnership Circular Flanders (2017) supports companies in closing water loops and facilitating demonstration projects. The Flanders European Waterhub has been created to develop, test and upscale water-related innovative projects in a real-life setting (e.g. filtering and water reuse solutions are being explored to reduce water use in the textile sector).

Source: Romano and Cecchi (2020[64]), "Water and the circular economy in cities: Observations and ways forward", GWSI Paper Series' on water security and Sustainable Development Goals, UNESCO i-WSSM and UNESCO Headquarters; City of Amsterdam (2020[65]), *Amsterdam Circular 2020-2025 Strategy*, https://www.amsterdam.nl/en/policy/sustainability/circular-economy/; OECD (2020[4]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Water can be treated for reuse in recharging aquifers, supplying agricultural systems, as well as for refrigeration in industrial processes, irrigation of parks and gardens, street washing and even for drinking water. For example, in Singapore, in 2003, the Public Utilities Board (PUB), Singapore's national water agency, introduced NEWater, high-grade reclaimed water produced from treated used water, which exceeds the drinking water standards set by the World Health Organization and the United States Environmental Protection Agency. NEWater is used primarily for non-potable industrial purposes at wafer fabrication parks, industrial estates and commercial buildings (OECD, 2016[62]). In the city of Granada, Spain, the bio-factory transformed the concept of a wastewater treatment plant by producing energy and new materials (OECD, forthcoming[12]). In 2019, the bio-factory almost reached its 100% energy self-sufficiency goal: 18.91 million m^3 of treated water have been reused for irrigation and for the maintenance of the minimum ecological flow of the local Genil River. In addition, from the 16 525 metric tonnes of fresh sludge material produced in the bio-factory in 2019, 14.3% was reused for compost and 85.7% for direct application in the agricultural sector (Emasagra, 2019[20]). A similar example exists in Santiago, Chile, where three bio-factories – La Farfana, La Florida and Mapocho-Trebal – located in the metropolitan

region, currently treat 100% of the wastewater of Greater Santiago. The bio-factories allow a clean portion of water to be returned to the Mapocho River and the rest to the farmers on the metropolitan region.

The 3Ps analytical framework (people, policies and places) can help diagnose key governance components to enable circularity in the water sector. As for the "people" component, water operators can determine the shift towards new business models (e.g. fostering water reuse, decentralised water solutions, etc.). Citizens, on the other hand, can make choices regarding water consumption and waste prevention. On "policies", the application of circular principles to water entails fostering policy coherence between water and energy (e.g. energy recovery from sludge sewage treatment), water and agriculture (e.g. wastewater sludge used as organic fertiliser) or water and construction (e.g. wastewater sludge as input for construction materials). Finally, on "places", linkages across urban and rural areas (e.g. related to bioeconomy, agriculture and forestry) are key when it comes to recycling organic residuals to be used in proximity of where they are produced and to avoid negative externalities due to transport. The use of wastewater sludge generated in cities could provide compost and organic fertiliser to (peri-)urban farms and contribute to closing local nutrient cycles (Wielemakera, Weijmaab and Zeemanab, 2018[67]; Romano and Cecchi, 2020[64]).

Places: Circular economy initiatives at various scales

Circular economy initiatives take place at various scales, varying from a micro-level, such as a neighbour, to the metropolitan and regional levels, where in some cases, linkages across urban and rural areas are particularly relevant. In 2012, the OECD and the EC elaborated the concept of functional urban areas to define metropolitan areas reflecting commuting zones, in terms of connections between cities and surrounding areas. By looking at the "functions" beyond the administrative boundaries of cities, policies can more efficiently respond to specific issues. The circular economy is a complex concept, which, according to the activity, sector and value chains, can take place at various scales. As such, the "functionality" should be taken into account for policies development and implementation at the right scale.

At the neighbourhood level, projects take the form of pilots, testing the effectiveness of technologies but also responses from citizens. For example, in 2018, the City Council of Valladolid and Ecoembes started a circular economy pilot project in the neighbourhood of La Victoria. The objective of the project was to achieve separate collection by 60% by 2030, in line with the European objectives. The initiative began in March 2018 and concluded in April 2019. During this time, the rate of separate collection rose from 32.8% to 51.3% (Valladolid Municipality, 2018[68]).

Some projects test their feasibility on university campus. The EPA in Ireland set up a partnership with the Irish University Association to develop the Campus Waste Project. Since the end of 2019, the EPA works with seven universities in Ireland with a focus on waste generation, in particular in relation to food and plastic waste. The agency is working to track and monitor the waste generated in the public bins located throughout the campus, the food service areas and in campus accommodation. The EPA conceives a university campus as a small, medium-sized town. Results from the project could inform interventions in city neighbourhoods or towns and help improve waste prevention. In 2018, the city of Valladolid, Spain, and Ecoembes through the Sterling Project installed ten intelligent yellow containers for plastic containers and cans on the Valladolid Campus. These containers are equipped with filling, temperature and humidity sensors. Through an application, the containers are able to automatically identify the users who use them. Each time the Sterling container is used, the user will receive a Sterling point. Each month, participants who have accumulated 10 or more Sterling points can win 1 of the 3 gift cards (equivalent to EUR 20) offered by the project organisers. The project benefitted from municipal grants launched in 2018 (Valladolid Municipality, 2018[68]).

Circular-related projects at metropolitan area and regional levels focus on industrial symbiosis, amongst others. The Barcelona Metropolitan Area (ABM), Spain, is putting in place the Metropolitan Project of

Industrial Symbiosis, co-ordinating industrial symbiosis projects with circular economy initiatives at the metropolitan level. The Municipalité Régionale de Comté des Sources (Canada) and the economic development organisation Synergie Estrie foster industrial symbiosis projects through the networking of businesses in the region by exchanging by-products from their industrial activities, such as residual materials, water, energy and resources, both material and intangible, called synergies.

Due to economy of scale, some surveyed service operators operate on a metropolitan level. They embrace circular economy principles in their activities. In Umeå, Sweden, to reach economy of scale, water and waste services are operated across several municipalities. Since 2016, Umeå's public waste and water company, Vakin, started acting as water provider in the municipality of Vindeln (Sweden) and has broadened its responsibilities with the mandate of promoting capacity development in the region towards closing the loops in the water and waste sectors. Dunedin, New Zealand, provides and manages development, infrastructure and community services across its district. The city has a statutory responsibility to promote effective and efficient waste management and minimisation within it and currently provides waste and diverted material services and facilities in both urban and rural areas. In Milan, Italy, the water utility company manages the purification plants that are in charge of the reuse of wastewater for irrigation in the rural areas adjacent to the urban core, reducing water consumption. The utility is investing in recovering nutrients and energy from the water plants (e.g. by producing biomethane from wastewater, the recovery of fertilisers and phosphorus).

At the regional level, some identified initiatives are related to the food sector and bioeconomy. The Lisbon and Tagus Valley Regional Development Co-ordination Commission, Portugal, launched the process for developing a regional strategy with a particular focus on the circularity of food and building materials in the metropolitan area and the region. The Castile and León's Circular Bioeconomy Strategy is the first regional bioeconomy strategy in Spain. One of the objectives is to promote the demand and development of markets related to the bioeconomy. The strategy incorporates circular economy principles such as applying life cycle analysis, promoting product-as-a-service business models, fostering reuse and repair actions, recycling and reusing organic waste (Government of Castile and León, 2019[69]).

The metabolic connection between urban and rural areas creates opportunities for collaboration within the circular economy approach. For example, in the province of Groningen, Netherlands, the Local Making Space project (2019-2020) aims to set up a local value chain and establish a link between creative industries in the city and its rural area. The initiative aims to create new products from renewable resources available within the territory of the province (House of Design, 2019[70]). In Tampere, Finland, a local sustainable development company (Eco fellows) is co-ordinating rural-urban partnerships related to biogas. They work as a hub that brings together different actors that have not usually been in contact before (farms, power plant operators, logistics, etc.). In Kitakyushu City, Japan, a food recycling loop between rural-urban areas has been established to use compost generated in urban areas as fertilisers in rural areas or as a source of energy for the city. In Valladolid, Spain, the Municipal Food Strategy (Alimenta Valladolid, 2018[71]) intends to improve the co-ordination between urban and rural areas and create employment opportunities whereby the city can act as an agro-incubator for responsible consumption and local production. It foresees the creation of a "land bank" *(banco de tierras*) that the municipality could rent to local producers at affordable costs. Moreover, the municipality is planning actions to improve the measurement, traceability and quality of organic waste from urban (e.g. hotel and restaurant sector) and rural areas. The city of Lisbon, Portugal, created spaces for local producers to sell their products in the city (e.g. food market areas where it is possible to purchase products of local origin or organic or sustainable production). This measure aim to encourage the growth of the number of producers and farms in the surrounding areas.

References

Ademe (2019), *Réduire le gaspillage alimentaire*, https://www.ademe.fr/expertises/dechets/passer-a-laction/eviter-production-dechets/dossier/reduire-gaspillage-alimentaire/cadre-reglementaire (accessed on 6 November 2019). [57]

Alimenta Valladolid (2018), *Valladolid's Food Strategy*, http://www.alimentavalladolid.info/ (accessed on 11 June 2019). [71]

Amsterdam Smart City (2018), *Roadmap Circular Land Tendering*, https://amsterdamsmartcity.com/projects/roadmap-circular-land-tendering (accessed on 6 November 2019). [51]

Brown, E. (2020), "Learning from social enterprises creating an inclusive circular economy", https://www.greenbiz.com/article/learning-social-enterprises-creating-inclusive-circular-economy. [17]

Brussels-Capital Region Government (2015), *Good Food Strategy - Towards a Sustainable Food System in the Brussels-Capital Region*, http://document.environnement.brussels/opac_css/elecfile/BRO_GoodFood_Strategy_ENGL.pdf (accessed on 30 April 2019). [56]

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). [40]

City of Amsterdam (2020), *Amsterdam Circular 2020-2025 Strategy*. [65]

Cradle to Cradle Products Innovation Institute (2019), *Homepage*, http://www.c2ccertified.org/. [43]

Dutch Ministry for the Environment and Ministry of Economic Affairs (2016), *A Circular Economy in the Netherlands by 2050*, http://www.government.nl/binaries/government/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050/17037+Circulaire+Economie_EN.PDF. [8]

EC (2018), *A European Strategy for Plastics in a Circular Economy*, European Commission, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN. [33]

EC (2018), *Flash Eurobarometer 456 – SMEs, Resource Efficiency and Green Markets*, European Commission. [5]

EC (2018), *Single-use Plastics: New Measures to Reduce Marine Litter*, European Commission, https://ec.europa.eu/environment/waste/pdf/single-use_plastics_factsheet.pdf (accessed on 3 August 2020). [34]

Ellen MacArthur Foundation (2020), *The Circular Economy In Detail*, http://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail (accessed on 27 July 2020). [38]

Ellen MacArthur Foundation (2019), *Cities and Circular Economy for Food*. [53]

Ellen MacArthur Foundation (2019), *Cities and Circular Economy for Food*. [54]

Ellen MacArthur Foundation (2019), *Planning for Compact, Connected Cities*, http://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities (accessed on 6 November 2019). [50]

Ellen MacArthur Foundation (2017), *The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action*, https://www.ellenmacarthurfoundation.org/assets/downloads/publications/NPEC-Hybrid_English_22-11-17_Digital.pdf. [29]

Emasagra (2019), *Emasagra*. [20]

European Environment Agency (2015), "Urban sustainability issues - What is a resource-efficient city?", http://dx.doi.org/10.2800/389017. [47]

European Union (2019), *Report on Sustainable Finance for a Circular Economy*, http://dx.doi.org/10.2779/171661. [35]

FAO (2020), *Urban Food Agenda* , http://www.fao.org/urban-food-agenda/en/ (accessed on 30 September 2020). [55]

Government of Canada (2020), *City of Guelph and Wellington County, Ontario*. [61]

Government of Castile and León (2019), *Castile and Leon's Bio-economy Strategy*, http://www.redei.es/images/2018/Estrategia_ICE_Bioeconom%C3%ADa.pdf (accessed on 11 June 2019). [69]

Government of the Republic of Slovenia (2018), *Slovenian Development Strategy 2030*. [7]

HGB-GBC (2017), *Circular Economy for HQE Sustainable Construction*. [42]

House of Design (2019), *Homepage*, http://www.houseofdesign.nl/en/ (accessed on 26 July 2019). [70]

IEA (2009), *Cities, Towns and Renewable Energy: Yes In My Front Yard*, OECD Publishing, Paris, https://doi.org/10.1787/9789264076884-en. [49]

Irish Manufacturing Research (2020), *CIRCULÉIRE – The National Platform for Circular Manufacturing*. [16]

Kamal-Chaoui, L. and A. Robert (2009), "Competitive Cities and Climate Change", *OECD Regional Development Working Papers*, No. 2009/02, OECD Publishing, Paris, https://doi.org/10.1787/218830433146 (accessed on 5 August 2020). [48]

Kaza, S. et al. (2018), *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*, World Bank, http://dx.doi.org/10.1596/978-1-4648-1329-0. [25]

Le Figaro (2018), "Loi anti-gaspillage alimentaire : quel bilan après 18 mois ?", https://www.lefigaro.fr/economie/le-scan-eco/2018/10/16/29001-20181016ARTFIG00007-loi-anti-gaspillage-alimentaire-quel-bilan-apres-18-mois.php (accessed on 7 November 2019). [59]

LIPOR (2018), *LIPOR is committed to transition from waste to resource management*. [32]

Luscuere, L. (2017), "Materials passports: Optimising value recovery from materials", *Proceedings of the Institution of Civil Engineers - Waste and Resource Management*, Vol. 170/1, pp. 25-28, http://dx.doi.org/10.1680/jwarm.16.00016. [44]

LWARB (2017), *London's Circular Economy Route Map*, https://www.lwarb.gov.uk/wp-content/uploads/2015/04/LWARB-London%E2%80%99s-CE-route-map_16.6.17a_singlepages_sml.pdf. [31]

Metropolitan Area of Barcelona (2019), *Estrategia de Impulso a la economía verde y a la economía circular*, http://mediambient.gencat.cat/web/.content/home/ambits_dactuacio/empresa_i_produccio_sostenible/economia_verda/impuls/IMPULS-EV_150519.pdf. [21]

Ministry for the Ecological and Inclusive Transition (2020), *The anti-waste law in the daily lives of the French people, what does that mean in practice?*, https://circulareconomy.europa.eu/platform/sites/default/files/anti-waste_law_in_the_daily_lives_of_french_people.pdf. [60]

Ministry for the Ecological and Inclusive Transition, Anti-Waste Law for a Circular Economy (2019), *The Anti-waste Law for the Circular Economy*. [58]

Municipality of Amsterdam (2018), *Buiksloterham: Circular City District*, https://www.amsterdam.nl/projecten/buiksloterham/circulair/ (accessed on 6 November 2019). [52]

Municipality of Groningen (2019), "Proposal - City of Groningen for Circular and regenerative cities: Focus on industrial areas as regenerative drivers for the cities of the future". [45]

Municipality of Umeå (2019), *Tomtebo Beach - A New Neighborhood with People and Sustainability in Focus*, http://www.umea.se/umeakommun/byggaboochmiljo/ (accessed on 28 January 2020). [14]

Network for Sustainable Construction and Real Estate Management in Cold Climates (2013), *Umeå. More Sustainable Buildings*, http://hallbarahus.se/wp-content/uploads/2019/02/NHB_Broschyr_April_2013.pdf (accessed on 5 March 2020). [13]

North Sweden Cleantech (2019), *About Us*, https://northswedencleantech.se/en/about-us/ (accessed on 28 January 2020). [15]

OECD (2020), "OECD - Nordic Innovation webinars on the circular economy in cities and regions", OECD, Paris, http://www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf (accessed on 30 July 2020). [10]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [4]

OECD (2020), "Social economy and the COVID-19 crisis: Current and future roles", OECD Policy Responses to Coronavirus (COVID-19), OECD, Paris, http://www.oecd.org/coronavirus/policy-responses/social-economy-and-the-covid-19-crisis-current-and-future-roles-f904b89f/. [19]

OECD (2020), *The Circular Economy in Groningen, the Netherlands*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/e53348d4-en. [2]

OECD (2020), *The Circular Economy in Umeå, Sweden*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/4ec5dbcd-en. [3]

OECD (2020), *The Circular Economy in Valladolid, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/95b1d56e-en. [1]

OECD (2019), "Circular economy - Waste and materials", in *Environment at a Glance Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/f5670a8d-en. [26]

OECD (2019), *Environment at a Glance Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/ac4b8b89-en. [27]

OECD (2019), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264307452-en. [28]

OECD (2019), *OECD Roundtable on the Circular Economy in Cities and Regions*, OECD, Paris, http://www.oecd.org/cfe/regional-policy/roundtable-circular-economy.htm (accessed on 5 August 2019). [9]

OECD (2018), "Financing water: Investing in sustainable growth", *OECD Environment Policy Papers*, No. 11, OECD Publishing, Paris, https://dx.doi.org/10.1787/bf67ec4e-en. [63]

OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264251090-en. [62]

OECD (1999), *Social Enterprises*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264182332-en. [18]

OECD (forthcoming), *The Circular Economy in Granada, Spain*, OECD Publishing, Paris. [12]

Paris&Co (2020), *Homepage*, https://www.parisandco.com/ (accessed on 13 February 2020). [11]

Romano, O. and L. Cecchi (2020), "Water and the circular economy in cities: Observations and ways forward", GWSI Paper Series' on water security and Sustainable Development Goals, UNESCO i-WSSM and UNESCO Headquarters. [64]

SITRA (2016), *Finnish Road Map to a Circular Economy 2016-2025*, http://www.sitra.fi (accessed on 7 November 2019). [6]

Smart Clean (2019), "Closed Plastic circle in Helsinki Region and Lahti", http://smartclean.fi/en/2019/02/11/closed-plastic-circle-in-helsinki-region-and-lahti/. [30]

Stronati, D. and A. Berry (2018), "Circular economy - Think piece for the built environment sector", https://www.mca.org.uk/wp-content/uploads/sites/60/2019/02/Circular_Economy_Thought_Leadership_final.pdf. [39]

UNEP (2020), *Cities and Climate Change*, United Nations Environment Programme, http://www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change (accessed on 5 August 2020). [72]

UNEP (2013), *UNEP-DTIE Sustainable Consumption and Production Branch*, United Nations Environment Programme. [22]

UNEP/IWSA (2015), *Global Waste Management Outlook*. [23]

Valladolid Municipality (2018), "El Ayuntamiento y Ecoembes impulsan un proyecto piloto de economía circular para lograr el correcto depósito del 60% de los residuos en un año", http://www.valladolid.es/es/actualidad/noticias/ayuntamiento-ecoembes-impulsan-proyecto-piloto-economia-cir (accessed on 7 June 2019). [68]

Van Wijnen (2019), *Circulariteit - Van Wijnen - Meer dan bouwen*, https://www.vanwijnen.nl/thema/circulariteit-2/ (accessed on 5 June 2019). [46]

Waternet (2019), *Average water use*, http://www.waternet.nl/en/service-and-contact/tap-water/average-water-use/. [66]

Wielemakera, R., J. Weijmaab and G. Zeemanab (2018), "Harvest to harvest: Recovering nutrients with new sanitation systems for reuse in urban agriculture", *Resources, Conservation and Recycling*, Vol. 128, pp. 426-437. [67]

Wille, D. (2013), *Environmental Profile of Building Elements*, OVAM, https://www.ovam.be/sites/default/files/FILE1368696514672Environmental_profile_buildig_elements_LR.pdf (accessed on 6 November 2019). [41]

World Bank (2019), *Solid Waste Management*, https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management (accessed on 8 November 2019). [24]

World Bank (2018), *What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050*, http://hdl.handle.net/10986/30317. [36]

World Green Building Council (2017), *Global Status Report 2017*, https://www.worldgbc.org/news-media/global-status-report-2017 (accessed on 6 November 2019). [37]

4 Governance gaps

This chapter describes the main challenges that surveyed cities and regions are facing or are likely to face when transitioning from a linear to a circular economy. There are five main categories of gaps: financial, regulatory, policy, awareness and capacity. The chapter builds on the results of the *OECD Survey on the Circular Economy in Cities and Regions*, as well as on the case studies of the OECD Programme on the Circular Economy in cities and Regions carried out in Groningen, (Netherlands), Umeå (Sweden) and Valladolid (Spain) and on-going in Glasgow (United Kingdom), Granada (Spain) and Ireland.

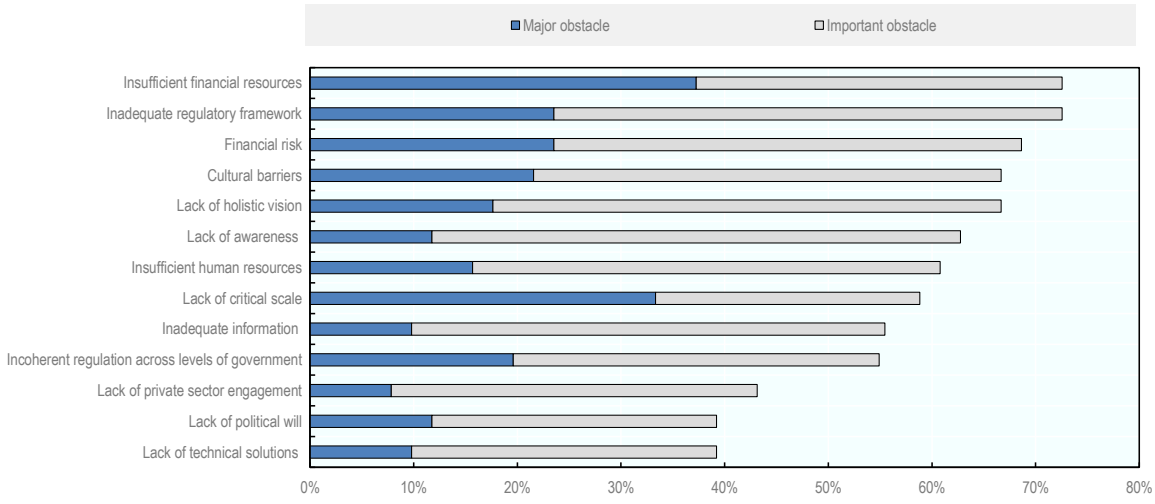
The transition to a circular economy does not come without obstacles. Matching biological and technical cycles of cities and regions and the various ways in which resources can be repurposed and reused, from water to energy and mobility, is a complex task for integrated master plans, reflecting interests and motivations within a very complex urban society. From a business perspective, there is no efficient secondary market for most of the collected household waste. Still, virgin materials are less expensive than secondary products. The uncertainties in terms of economic benefits prevent the circular economy happening on the ground. Circular economy initiatives are devoting more attention to the downstream process rather than to the upstream one, while well-designed products can reduce waste generation in the first place. Moreover, activities foreseen by a circular economy face some reluctance and scepticism, as in the case of reuse. Collaboration along a value chain, upstream and downstream, is challenging as, in reality, these actors either compete or do not interact on the market. This collaboration can be best established at a regional and urban scale, as local and regional authorities can play a very important role in launching new market interactions (OECD, 2020[1]).

Major obstacles for surveyed cities and regions transitioning towards circular economies are not technical but of an economic and governance nature. Insufficient financial resources, inadequate regulatory frameworks, financial risks, cultural barriers and the lack of a holistic vision are amongst the major obstacles identified by more than one-third of the interviewed stakeholders in the OECD survey (2020[2]) (Figure 4.1). Technical solutions exist and are well known. However, to put them in place, the legal framework should be updated, financial resources should be adequate and data and information shared, amongst others.

Cities and regions face five major categories of gaps:

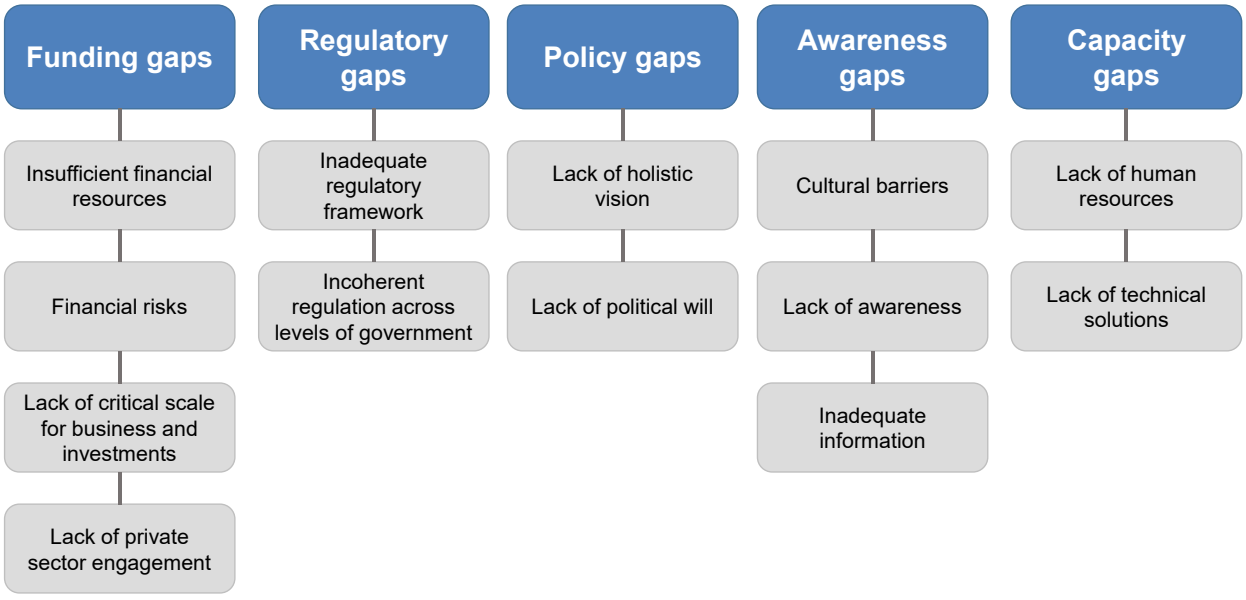
- **Funding gaps**: The transition towards a circular economy implies investments and adequate incentives to make the economic and financial case for the circular economy. Cities and regions responding to the OECD survey (OECD, 2020[2]) face constraints in terms of insufficient financial resources (73%), financial risks (69%), lack of critical scale for business and investments (59%), and lack of private sector engagement (43%).
- **Regulatory gaps**: Inadequate regulatory framework and incoherent regulation across levels of government represent a challenge for respectively 73% and 55% of the surveyed cities and regions.

Figure 4.1. Main obstacles to the circular economy in surveyed cities and regions



Note: Results based on a sample of 51 respondents that indicated obstacles as being "Major" and "Important".
Source: OECD (2020[2]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Figure 4.2. Governance gaps for a circular economy in surveyed cities and regions



Source: OECD (2020[2]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

- **Policy gaps**: A lack of holistic vision is an obstacle for 67% of surveyed cities and regions. This can be due to poor leadership and co-ordination. Other policy gaps concern the lack of political will (39%).
- **Awareness gaps**: Cultural barriers represent a challenge for 67% of surveyed cities and regions along with lack of awareness (63%) and inadequate information (55%) for policymakers to take decisions, businesses to innovate and residents to embrace sustainable consumption patterns.
- **Capacity gaps**: Lack of human resources and of technical solutions represent a challenge for 61% and 39% of surveyed cities and regions.

Funding gaps

Shifting from a linear to a circular economy is going to require a significant amount of investment, but cities and regions report inadequacy of financial resources. Investment gaps are usually bridged through public funds, as well as taxes and subsidies. In Joensuu, Finland, for example, the lack of financial resources devoted primarily to circular economy efforts represent a major obstacle in helping entities transition away from a linear economy. In Phoenix, United States, limited financial resources hinder the design and implementation of additional circular economy-related projects and programmes. In Groningen, Netherlands, due to the lack of financial resources for innovators, only small-scale low-risk projects can actually materialise with limited impacts in terms of job creation and positive environmental effects.

Funding allocation may face difficulty in relation to the fuzziness of the concept of the circular economy. Beyond the amount of funds needed, which is limited in cities in most cases, there is a lack of proper understanding of how to most efficiently use the funds. For example, start-ups boosting innovation that could spur the circular economy cannot apply to available funds as their projects are not explicitly related to “circular economy projects”, even if they could contribute to creating innovation technology or circular business models (Jonker and Montenegro Navarro, 2018[3]).

Cities and regions use public funds to start up circular projects, however, scaling them up is complex due to limited access for companies to alternative financial sources. For example, in Valladolid, Spain, the local government financed a total of 61 projects (22 and 39 respectively in 2017 and 2018), allocating a budget

of EUR 960 000 (EUR 400 000 and EUR 560 000 in 2017 and 2018 respectively). The municipality financed between 40% and 85% of the project's total cost. The beneficiaries of the grants were private companies, associations of private companies, non-profit entities or research centres based in the municipality of Valladolid. An additional EUR 600 000 are assigned for 2019-21 (this amount represents 0.17% of the annual budget of the city) (OECD, 2020[4]). Most of the projects have an experimental nature. Their profitability is uncertain. Entrepreneurs face high investment risks and access to loans is not always guaranteed. In Valladolid, innovative circular economy projects rely very much on business angels such as ethical banks (Fiare,[1] Triodos)[2], financial agencies (Finova)[3] or private equity firms, willing to promote and finance circular-economy-related projects. However, after the initial experimental phase, the challenge for innovators is how to make their projects economically sustainable in the medium and long terms (OECD, 2020[4]). In London, United Kingdom (UK), the LWARB offers support and access to finance. The main concern is how to scale this help and make a significant impact on business creation. Companies are often reluctant in changing procedures and forms of financing related to loss of efficiency compared to the competition that continues to work in linear logic. There are difficulties in scaling up pilot projects and experimentation.

Vertical and horizontal co-ordination for funding allocation is complex. In Groningen, Netherlands, provincial and regional funds directly related to the circular economy have not been allocated yet. Possibly, the city could benefit in the future from funds from the national government, which, in 2019, allocated an additional EUR 22.5 million in total for sustainable and circular initiatives consequent to the definition of the circular economy strategy. However, it is unclear what the procedures are to access these funds. The funding is linked to the envelope of EUR 300 million that the government makes available annually for the climate. In fact, the government strongly believes that the circular economy is needed to achieve climate goals and that waste is a resource (OECD, 2020[5]). In Antwerp, Belgium, financial resources are spread across different departments. However, there is a lack of clear view on the budget allocation of different projects that might fall under the circular economy.

Shifting from a linear to a circular economy presents financial risks for economic actors. This is somehow related to the critical scale of activities taking place in cities of different sizes, due to market size, population, material flows, etc. Often, the scale at which the circular economy initiative is established does not reflect the complexity of interactions between different spheres, policies and actors. Also, de-risking circular investment opportunities requires adequate regulatory frameworks but also clarity in the project presentation and execution. It is important to strengthen the involvement of established big business players as accelerating agents for the transition. In Glasgow, UK, the city is trying to stimulate more established businesses to integrate the circular economy into their business models. Some large corporations' leaders could further embrace end-of-life concepts, introducing ideas such as repurposing, reusing or remanufacturing. In Flanders, Belgium, for example, the need for funding projects covering the entire product/value chains has been highlighted.

Regulatory gaps

Surveyed cities and regions claim the need to develop and adapt the regulatory framework to enable the transition towards the circular economy. A range of stakeholders, from waste operators to constructors, finds regulations related to material reuse inadequate for the transition from a linear to a circular economy. There is uncertainty around the categorisation of waste streams and how materials can be reinserted in production processes when they are still reusable but by law qualified as waste. One of the biggest obstacles for implementing circular economy is the definition of "waste" in national legislations. Other regulatory barriers are related to second-hand materials, land allocation, water reuse, demolition material reuse, especially to allow pilots and experimentations. Examples of barriers concern, for instance, the lack of clear rules for the use of sludge, reclaimed water and recycled waste (according to the type) in accordance with health and ecological standards. In Europe, the current eco-design directive strongly focuses on energy-related areas and to a lesser extent on materials and typology of products in a broader

perspective. During the implementation of the BRICK-BEACH Project on beach regeneration in Vélez-Málaga, Spain, one of the biggest obstacles that emerged was the inadequacy of local regulation to manage waste and reuse/recycle materials.

Some national governments are taking actions towards adapting existing regulations to emerging needs related to the circular economy. In the Netherlands, the legal and regulatory framework at the national level is expected to be adapted in order to make the country an economy without waste in 2050, as defined by the National Circular Economy Strategy. For example, since 2016, the national government adopted a flexible approach for amendments of the National Waste Management Plan to anticipate the changes required by the transition. Another example is the national Smart Regulation programme (*Ruimte in Regels*) that runs up to 2020, according to which the government co-operates with entrepreneurs to promote sustainable innovations within the current legislation (Ministry of Infrastructure and the Environment/Ministry of Economic Affairs, 2016[6]). For example, in 2017, companies in the wind energy sector contacted the Smart Regulation programme helpdesk specialised in the chemistry sector to raise the issue of the restrictive regulations regarding the inability to reuse plastic turbine blades for windmills after their replacement. This plastic is now used as an input in the car and ship industry (Ministry of Economic Affairs, 2017[7]; OECD, 2020[5]).

Survey results point to the need to strengthen national-level legislation in enhancing the circular economy transition in public procurement. For example, in Ireland, setting mandatory requirements for green public procurement (GPP) could represent an opportunity for the public sector to lead by example. GPP represents 10% of Ireland's gross domestic product (GDP) (OECD, 2020[8]). In other cases, while environmental criteria have been added to the selection process, in practice, the price is still the prevailing selection method. In Valladolid, Spain, the city approved "Municipal Ordinance 1/2018 to Promote Social Efficient Procurement: Strategic, Exhaustive and Sustainable". The ordinance incorporated environmental dimensions in municipal procurement that entail that the subject and pricing of municipal contracts should consider life cycle criteria or the most innovative, efficient and sustainable solutions. Nonetheless, the award criteria in public procurement procedures in Valladolid are the following: 60% driven by price and 40% driven by an "improvement criterion" (of which 20% is related to social aspects). Moreover, when introducing environmental criteria, there is the risk for tenders to go empty or that participating companies would complain about the possible threat of anti-rivalry clauses, claiming that only big companies can meet some of the specific requirements. There is also a difficulty in verifying the information provided by the participants in tenders when it comes to environmental dimensions (OECD, 2020[4]). In Ljubljana, Slovenia, legal constraints public procurement hinder innovative projects to occur.

Policy gaps

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. When interactions and complementarities are overlooked, the lack of a systemic approach might lead to the implementation of fragmented projects in the short to medium run, rather than sustainable policies in the long run. In many cases, the transition is mainly focused on enabling niche-level techno-economic experimentations, while more systemic socio-economic agendas have not yet been connected to circular economy debates.

A holistic view at the city strategy level may help break these silos to some extent. The city of Groningen, Netherlands, set up environmentally sustainable initiatives that can help build a narrative on the circular economy, from waste to mobility and energy. However, these initiatives are still fragmented and would benefit from greater inter-relations with the aim of achieving common socio-economic and environmental objectives (OECD, 2020[5]). As such, there is room to maximise synergies and opportunities related to the use of natural, financial and human resources. In Valladolid, Spain, three main challenges were identified that reflect those of many other European cities (OECD, 2020[4]):

- *Coherence across existing policies and plans*: Valladolid is implementing different policies and programmes (e.g. Smart City programme, urban sustainable mobility, green infrastructure, district heating, circular economy) that would benefit from a more holistic approach and greater co-ordination to close loops. Currently, it is not clear how the mentioned policies coherently connect to one another. For example, the New General Urban Plan (2019) that promotes a compact city model could be linked to various actions in complementary sectors that foster circularity in the city, from mobility to infrastructure.
- *Coherence across current and future circular projects*: At the moment, there is the risk of delivering isolated circular economy actions while missing the long-term vision. It is not clear how the selected projects will be contributing to the overall vision of the city of Valladolid.
- *Coherence across EU funded projects and circular economy planned initiatives*: The city heavily relies on European funds for policy innovation. However, initiatives can result in fragmented actions, which could be short-medium-term oriented. The municipality conceives the European projects as a way of experimenting with new policies without using local taxpayers' money and as an opportunity to foster public-private partnerships under the "consortium agreement" model. For example, the REMOURBAN project that focused on improving buildings' energy-efficiency was applied to the FASA district but was not integrated into a city level strategy. The same happened with the biomass district heating system that the municipality installed in the FASA neighbourhood that was not part of a broader plan. The municipality would benefit from clarifying how to maximise synergies between these initiatives and those planned within the circular economy approach.

In some surveyed cities, the mandate in terms of who is responsible for the design and implementation of a circular economy strategy amongst the city administration is not clear. A lack of leadership could lead to fragmented initiatives on the circular economy and weak accountability. Therefore, clarifying "who will do what" would serve as a reference for various stakeholders in identifying the focal point (office/departments) to go to for projects and investments. In many cases, roles and responsibilities in setting and implementing long-term visions for the circular economy are allocated to waste management or environmental departments, once again missing the multi-dimensional perspective of the circular economy. Several departments are likely to be involved in circular-economy-related activities, therefore co-ordination should be strengthened. The challenge is how to create more uniform policies in order to promote circular solutions throughout the city organisation.

Awareness gaps

Cultural barriers are an important obstacle, prevalent within the business community, among governments and residents, that prevent the necessary behavioural shifts required to transition to a circular economy. Some circular-economy-related activities, for example reuse, are barely conceived as valuable options to reduce consumption and therefore waste generation. There is a problem of acceptance that is due to lack of awareness but also trust in terms of quality of the reused products and goods. Many cities and regions have for this reason put in place a system of quality certificates. For example, the programme Revolve Re-use by Zero Waste Scotland set up reuse quality standards for reuse shops, which are endowed with a dedicated logo that is recognisable by consumers (Zero Waste Scotland, 2020[9]).

Embracing circular economy principles still represents an exception. Changing "business as usual" is not an easy task. To accelerate the circular economy transition, there is the need to build knowledge and understanding of the concept, costs and benefits of the circular economy and what it would entail for various activities and sectors. Poor awareness of circular economy practices amongst key players can hinder opportunities for scaling them up. One of the main issues is to involve a great number of people and not only the "happy few". Attitudes and resistance to change is also a major challenge (OECD, 2020[5]). For example, although the city's strategy and the Carbon-neutral Helsinki 2035 Action Plan includes targets

and actions regarding circularity, not all actors are prepared to start implementing them (City of Helsinki, 2018[10]). The city of Milan, Italy, believes that such changes have to be human-centred.

The concept of the circular economy is not yet clear to many. In Umeå, Sweden, many stakeholders use the circular economy as a synonym for recycling. There is a form of scepticism across stakeholders that have been implementing environmental and sustainable practices and do not see the value-added in the circular economy approach. In Valladolid, Spain, more than 70% of companies from a total of 70 companies surveyed in 2018 declared that they do not know the meaning of the circular economy. They associate the term with minimising waste production, recycling and reusing and state that they are already implementing these processes in a regular way (EDUCA, 2018[11]). On the other hand, 85% of consumers in Valladolid do not know what the circular economy means and only 52% of consumers expressed they "always" or "regularly" separate waste (EDUCA, 2018[11]). While separate waste collection is compulsory, there is no enforcement on waste collection. The lack of waste separation generates extra costs to the municipality at the collection and treatment steps. In Ireland, only 50% of business leaders were acquainted with the term circular economy according to the survey launched in 2019 by the Environment Protection Agency and the Irish Business Employers Confederation (IBEC, 2019[12]).

In many cities, there is room for more systematic data collection that could allow taking circular decisions, measuring progress and improving implementation. For example, data on material consumption are available both at the global and national levels and less at local level. It is often difficult to account for consumption-based emissions within the city's administrative boundaries. Circular economy indicators have a tendency to focus on materials, solid waste, energy flows and environment, but there is less emphasis on the economic and social dimensions. Evaluation and monitoring frameworks for the circular economy are common challenges for cities. Only a few existing strategies are accompanied by a monitoring framework (see Chapter 5).

Capacity gaps

Capacities in many municipalities should match the needs of the circular economy transition, in terms of skills and human resources. Antwerp, Belgium, highlighted in the survey the lack of human resources dedicated specifically to the circular economy, which is a challenge to advance with the transition. The Metropolitan Area of Barcelona, Spain, reports the need for technicians with specific knowledge of the circular economy. In Umeå, Sweden, where the circular economy is a relatively new concept for the city, major activities relied so far on external consultants for carrying out investigations and ad hoc studies. There are several initiatives in place to build capacity and knowledge on the circular economy, organised by not-for-profit and public organisations (Chapter 2). However, while informative, workshops and events may often remain generic, while some actors, such as in the business sector, would benefit from more specific and practical input, including through peer-to-peer learning.

References

City of Helsinki (2018), *The Carbon-neutral Helsinki 2035 Action Plan*. [10]

EC (2020), *Life-cycle Costing*, European Commission, https://ec.europa.eu/environment/gpp/lcc.htm (accessed on 4 August 2020). [13]

EDUCA (2018), *Asociación de Empresas y Profesionales EDUCA*, http://www.educavalladolid.es (accessed on 4 August 2020). [11]

IBEC (2019), "New Ibec survey shows just half of businesses understand the Circular Economy", http://www.ibec.ie/connect-and-learn/media/2019/08/14/new-ibec-survey-shows-just-half-of-businesses-understand-the-circular-economy (accessed on 4 August 2020). [12]

Jonker, J. and N. Montenegro Navarro (2018), "Circular city governance - An explorative research study into current barriers and governance practices in circular city transitions in Europe". [3]

Ministry of Economic Affairs (2017), *Better Regulation: Towards a Responsible Reduction in the Regulatory Burden 2012-2017*, Government of the Netherlands, http://www.government.nl/documents/reports/2017/08/22/better-regulation-towards-a-responsible-reduction-in-the-regulatory-burden-2012-2017 (accessed on 4 August 2020). [7]

Ministry of Infrastructure and the Environment/Ministry of Economic Affairs (2016), *Accelerating the Transition to a Circular Economy*, Government of the Netherlands, http://www.government.nl/topics/circular-economy/accelerating-the-transition-to-a-circular-economy (accessed on 4 August 2020). [6]

OECD (2020), "OECD - Nordic Innovation webinars on the circular economy in cities and regions", OECD, Paris, http://www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf (accessed on 30 July 2020). [1]

OECD (2020), "OECD interviews with the local team of Ireland", Unpublished, OECD, Paris. [8]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [2]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [14]

OECD (2020), *The Circular Economy in Groningen, the Netherlands*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/e53348d4-en. [5]

OECD (2020), *The Circular Economy in Valladolid, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/95b1d56e-en. [4]

Zero Waste Scotland (2020), *Establishing Re-use and Repair in Scotland*, https://www.zerowastescotland.org.uk/circular-economy/establishing-reuse-repair (accessed on 5 August 2020). [9]

Notes

[1] For more information: www.fiarebancaetica.coop/ (accessed on August 2020).

[2] For more information: www.triodos.es/es (accessed on August 2020).

[3] For more information: http://web.finnovaregio.org/ (accessed on August 2020).

5 Measuring the circular economy in cities and regions

This chapter collects and analyses measurement frameworks for the circular economy, based on the OECD Inventory of Circular Economy Indicators. It identifies scope and scales of the measurement framework, as well and measurement challenges. It concludes with a selection of indicators to set and implement circular economy strategies.

Why measure the circular economy?

As "one cannot improve what cannot be measured", policymakers, practitioners and scholars urge the need of measurement frameworks for the circular economy. There are four key objectives in measuring the state of the art, progress and impacts of a circular economy: raise awareness; make the case for the circular economy; trigger actions; monitor performance and evaluate results (Figure 5.1):

Figure 5.1. Main objectives of circular economy measurement frameworks

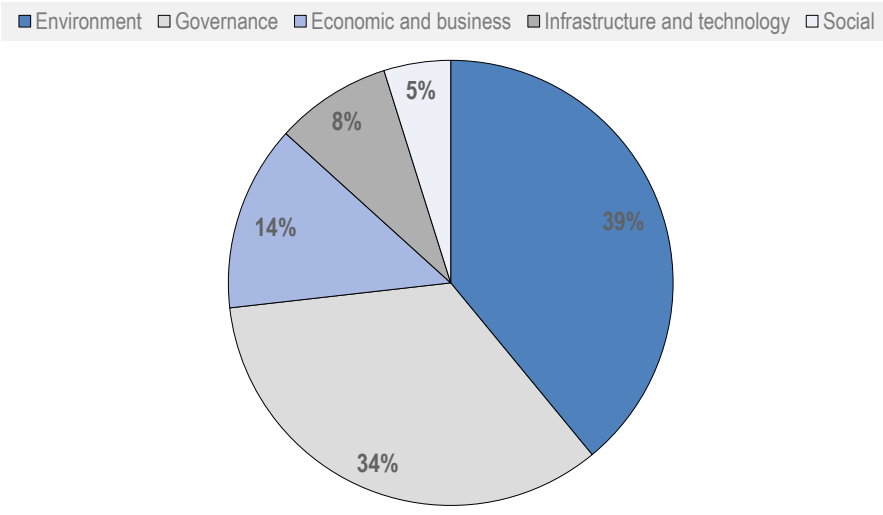
- **Raise awareness of the circular economy and related opportunities**. Results from the *OECD Survey on the Circular Economy in Cities and Regions* suggest that the lack of awareness is a relevant obstacle for the implementation of circular economy initiatives for 63% of respondents (OECD, 2020[1]). As such, measuring progress and impacts of circular-economy-related initiatives can help raise awareness towards more sustainable production and consumption patterns.
- **Make the case for a circular economy**. The circular economy is expected to generate jobs, reduce negative environmental impacts while sustaining economic growth and increasing social well-being. A good understanding of benefits and costs by type of activity and/or sectors contributes to establish priorities, allocate financial resources and stimulate innovation and co-operation. Some key sectors, such as waste, food, the built environment and water hold great potential in applying circular economy principles from an environmental, economic and social point of view (Chapter 3). Moreover, productive processes can benefit from cost-saving and increased resource efficiency.
- **Trigger actions**. Adequate information can help design circular economy strategies and support policymakers in setting policy priorities. For examples, some circular economy strategies have been built on the basis of urban metabolism analyses (Chapter 2).

- **Monitor performance and evaluate results**. Measurement frameworks enable to assess the performance and progress of circular economy initiatives, in order to detect what works, what does not and the state of advancement. The evaluation of the results helps identify what can be improved in the future.

What to measure

The OECD Inventory of Circular Economy Indicators collected more than 400 circular-economy-related indicators, between 2018 and 2020 (Box 5.1). The inventory classifies circular economy indicators into five main categories (Figure 5.2):

Figure 5.2. Categories of circular economy indicators



Note: The graph refers to the 474 indicators belonging to 1 of the 5 categories.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

- **Environment** (39%): Collects indicators with a direct impact on the ecosystem, such as emissions, output material process and production and consumption.
- **Governance** (34%): Focuses on indicators related to education, capacity building and regulation, among others.
- **Economic and business** (14%): Includes those indicators expressed in monetary units such as the value-added of the circular economy and the public investment in circular economy projects, as well as those indicators specifically focusing on activities performed by and within companies.
- **Infrastructure and technology** (8%): Covers all the indicators that aim to measure the existence of tools, technologies and spaces that boost the circular economy.
- **Jobs** (5%): Gathers indicators associated with employment and human resources.

Additionally, collected indicators are further classified in 33 sub-categories and 11 sectors (Box 5.1).

Box 5.1. The OECD Inventory of Circular Economy Indicators

The OECD Inventory of Circular Economy Indicators collected 474 circular-economy-related indicators, between 2018 and 2020. Collected indicators belong to 29 circular economy studies of which 8 are applied at the national level, 8 at the regional level and 11 at the local level (Annex 5.A). The OECD inventory includes indicators signalled by respondents of the *OECD Survey on the Circular Economy in Cities and Regions* (OECD, 2020[1]). As per the geographical scope, most of the indicators are from European sources but the inventory also includes available sources from North and South America (Canada, Chile and Colombia).

The OECD inventory gathers input, process and output indicators employed by governments at different levels, in particular to monitor and evaluate the progress of existing circular economy strategies. The inventory provides an overview of circular economy measurement frameworks. It helps identify measurement gaps and can be a source of inspiration for governments wishing to develop or use indicators to improve circular-economy-related policies.

The inventory is intended to be a dynamic tool to be frequently and regularly updated given the progress made by countries, regions and cities in developing circular economy strategies and related measurement frameworks.

In order to provide a clear reading of the scope of the collected indicators, they have been classified into five main categories (economy and business; environment; governance; infrastructure and technology; and jobs), 33 sub-categories and 11 sectors (Table 5.1).

Table 5.1. Categories and sub-categories of indicators from the OECD Inventory

Category	Sub-category
Economy and business	• Added value • Business • Economic efficiency • Economic structure • Gains and revenues • Investments • Productivity • Savings
Environment	• Efficiency • Emissions • Output material process • Production and consumption • Savings • Use • Other
Governance	• Awareness-raising • Capacity building • Collaboration • Education • Financing • Innovation, pilots and experiments • Monitoring and evaluation • Public procurement • Regulation • Stakeholder engagement

	• Strategy and initiatives • Other
Infrastructure and technology	• Area • Equipment • Facilities • Products and services • Other
Jobs	• Jobs and human resources

Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

In addition to categories and sub-categories, indicators are categorised according to the sector to which they belong. However, when indicators do not relate to a specific sector or relate to the "circular economy" in general, they have be categorised as "not sector-specific". Sectors with representation equal or below 1% of the OECD inventory have been included in the "Other" category. The 11 sectors are the following: air; built environment; energy; food; public administration; resources and materials; reuse, repair, share; waste; water; not sector-specific; and other (agriculture, culture, forest, industry, land use, mobility, textile and tourism).

Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris; OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

According to the sample collected within the OECD Inventory of Circular Economy Indicators, environmental indicators prevail (39%). Environmental indicators have been divided into sub-categories, following the categorisation applied by the European Commission (EC) (2018[3]) and the European Environment Agency (EEA) (2016[4]) as much as possible:

- **Output material process** indicators prevail (36% of all the environmental indicators). This sub-category includes indicators measuring the various phases of waste and material that can be reused and transformed into resources (e.g. material collected for the reuse of building materials and collection of plastics; objects recovered in reuse centres and materials and waste recovered) (OECD, forthcoming[2]).
- **Production and consumption** (27%) cover materials and resources that have been used in the economy, mostly in the generation of waste measured in several sectors (e.g. construction waste, food waste, waste generation from commerce and industry, municipal waste). The consumption of resources is also included within this sub-category: energy consumption, domestic material consumption, consumption of virgin materials and water consumption.
- The sub-category of **use** (14%) describes those indicators on the utilisation and reuse of resources (e.g. amount of resources used and put back into the system; direct resource use; and direct land use), as well as several use rates (e.g. circular material use rate and reuse of packaging waste).
- **Savings** (12%) refers to indicators mentioning the consumption avoidance and savings of different resources such as energy, food, raw materials and clothing (e.g. food waste avoided through a circular consumption and energy saved by energy efficiency programmes).
- **Emissions indicators** (9%), mainly measure the generation of greenhouse gases and CO_2 emissions from different activities. In some cases, these indicators concern the circular economy in a broad sense and do not refer to specific sectors (e.g. CO_2 emissions per capita), while other indicators are associated to specific activities and areas (e.g. emissions related with the consumption of materials; CO_2 savings as a result of procurement activities the carbon impact of waste generation).

- Other indicators from this category analyse **efficiency** (2%), which measures the achievement of the maximum output from a given level of resources used to carry out an activity (OECD, 2013[5]). Efficiency-related indicators in the sample focus on the energy sector (e.g. energy efficiency, energy intensity and energy efficiency in buildings and homes).

Governance indicators represent approximately one-third of the sample, with the sub-categories of awareness-raising, as well as innovation, pilots and experiments being those with the highest representation (14% each):

- **Awareness-raising** indicators mainly refer to the number of awareness-raising campaigns and events organised for different areas (e.g. food waste reduction, plastic use reduction and water reuse). However, indicators account also for other ways of raising awareness and disseminating circular economy principles in the format of workshops, events, publications, guidelines and platforms**.**
- Regarding **innovation, pilots and experiments**, these indicators primarily include indicators related to the implementation of research and development (R&D) pilots and projects: e.g. the creation of an innovation platform for the circular economy, the number of experimental and pilot projects, the number of circular-economy-related R&D projects and the number of actors involved in experimental projects.
- **Strategy and initiatives** (12%) indicators generally monitor the number of initiatives adopted (e.g. agro-ecological initiatives, projects incorporating smart design, green and circular initiatives and number of water reuse projects). Furthermore, they analyse the different circular initiatives adopted by local authorities, as well as the steps for their adoption, the level of implementation and the number of documents created.
- **Public procurement** (11%): This category includes indicators linked to the inclusion of circular and green criteria in the purchasing of goods, services and works by governments. Several indicators account for the volume of public procurement that includes circular and/or ecological criteria (measured as a percentage of total procurement, number of tenders or total amount in euros). Other indicators address the number of identified legal barriers for the implementation of green public procurement (GPP), or the number of companies informed about circular-economy-related public procurement opportunities.
- **Capacity building** (9%) indicators address the number of training courses on the circular economy, and the different activities to build knowledge of the circular economy. Indicators distinguish the training courses aimed at municipal staff (e.g. city staff trained in circular economy and circular procurement principles; and the number of training modules created for municipal staff). Other examples of this sub-category are: training courses and their level of implementation in the circular economy, conferences and seminars for improving skills, support programmes and guides.
- **Regulation** (9%): Indicators within this category focus on the creation and update of the existing regulation to boost the circular economy and the identification and removal of identified regulatory barriers. Indicators not only focus on the results and achievements (e.g. new laws and updates to boost the circular economy; removed regulatory barriers the number of legislative obstacles identified and resolved laws and regulation for the adaptation of the private sector to the circular economy) but also on the entire process (e.g. number of working group meetings to work on better legislation and the number of circular policy advisers developing circular regulations).
- **Education** (8%) indicators measure to what extend the circular economy is included in educational policies and curriculum. Examples of this sub-sector are: the number of students trained in the circular economy fields of activity; mainstreaming education for sustainable development into regional education policies; and the number of schools and universities that responded to the call for projects on circular economy education.

- **Stakeholder engagement** (8%) indicators mainly focus on actions to engage with key actors involved in all phases of the circular economy initiative (design, implementation and monitoring). Some examples include: the number of the circular economy vision-forming meetings, the number of actors mobilised, the number of collaborative projects implemented by circular economy networks and the number of meetings for circular projects.
- The inventory also collects indicators on **collaboration** (6%) activities, involving all actions related to co-operation among different actors (e.g. institutions) for synergies, projects and workshops to boost a circular economy. Indicators measure the way collaboration frameworks are built, by monitoring the number of meetings of working groups to boost the circular economy. Other indicators aim to measure the implementation of the collaboration frameworks such as the number of collaborative projects implemented, or the implementation of identified synergies.
- Few indicators deal with the **monitoring and evaluation** (5%) of circular economy initiatives and actions (e.g. follow-up and monitoring of the results of circular economy programmes and studies of the establishment of charges and life-cycle and cost-benefit studies).
- **Financing** (4%) indicators refer to all the economic support provided by governments to conduct a circular initiative (e.g. financial resources mobilised for experiments, the budget amount assigned to calls for projects and budget of pilot public contracts in the circular economy).

Economy and business indicators specifically tailored to the circular economy represent 14% of the share and include 8 specific sub-indicators:

- The sub-category of **business** (30%) encompasses those indicators that specifically refer to the performance of companies and the introduction of business models such as new revenue models related to the circular economy and the number of companies implementing product-as-a-service business models.
- The sub-category indicator of **investments** (16%) covers the public and private investment in R&D, goods and projects related to the circular economy. Some examples include: public expenditure on R&D related to the circular economy and the amount invested in circular economy projects.
- **Savings** (12%) measures all financial resources saved in certain circular actions (e.g. money saved, in comparison with purchasing new) through the reuse of building materials; reduced costs through the implementation of green procurement; and the economic savings due to the reuse of furniture of the local administration and waste reduction.
- **Productivity** (12%) measures the amount of economic output generated per unit of material.
- **Added value** (11%) incorporates indicators related to the value generation created by the circular economy and circular activities (e.g. the economic value of the resources used and gross value added [GVA] generated).
- **Economic efficiency** (8%) includes materials and energy intensity, measured in monetary terms.
- **Gains and revenues** (6%) measure revenues obtained through performing actions closely related to the circular economy (e.g. turnover on circular products and economic gains of the reduction of the digital impact in the public administration).
- **Economic structure** (5%) includes indicators such as the weight of the green economy in gross domestic product (GDP) and GDP per total greenhouse gas (GHG) emissions.

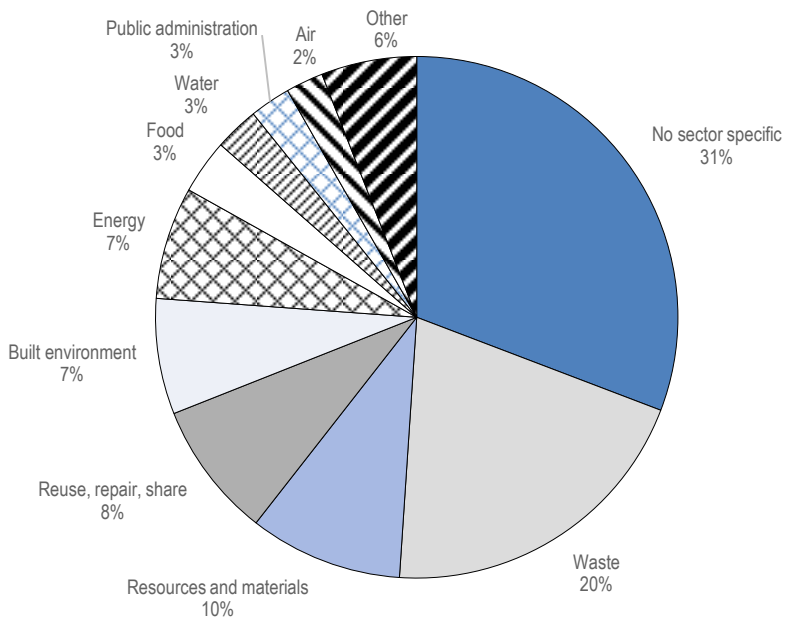
Infrastructure and technology indicators correspond to 8% of the inventory. ***Facilities*** (61%) includes all indicators linked to centres mainly dedicated to reuse, repair and share activities. Some examples include: the number of reuse centres in the city; the number of repair cafés; the number of donation and sharing spaces; and the number of repair and reuse centres created. The ***area*** sub-category (18%) aims to measure the space within cities that have adopted any kind of circular initiative or criteria. Examples include the share of the city covered by experimental areas, the districts incorporating circular economy principles and the public space recovered for sustainable models. The primary measurement unit for this

sub-category is the share of space in terms of total local space. ***Equipment*** (13%) covers all the devices and bins installed in cities for sustainable waste management (e.g. number of bins allocated, water dispensers installed in the city and waste collection devices). Finally, the remaining indicators address ***products and services*** (8%) (e.g. new circular products and share of circular products in the total number).

Indicators related to jobs represent 5% of the sample. These indicators mainly relate to ***employment and human resources***. Indicators distinguish between employment within circular economy generic activities and job creation in specific circular economy sectors such as the sharing economy, the reuse and repair sector and the forestry sector. Most indicators specifically relate to jobs and some examples include: the number of green jobs created and secured, the net circular job growth, and the number of jobseekers having been employed as a result of circular economy training. A few indicators also refer to human resources: human resources mobilised for experiments in the building sector; the number of people actively working on the development of a circular vision; and the number of local co-ordinators recruited for the development of territorial synergies.

The OECD inventory distinguishes 11 sectors (Table 5.2). Mostly, indicators from the inventory do not refer to any specific sector (not sector-specific, 31% of the OECD inventory) but rather to the circular economy in the broadest sense of the term. Contrary to other indicators, they may be objective-driven rather than data-driven, as they have been created specifically to measure the progress of circular economy initiatives. Examples of these indicators are: the number of companies that received financial assistance related to the circular economy; and the number of city contracts evaluated using circular economy principles. The remaining sectors are the following (Figure 5.3):

Figure 5.3. Indicators by sector



Note: Data refer to 474 collected indicators.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

- The **waste** sector represents 20% of the inventory. Mostly, indicators are related to the environment category (71%; Figure 5.4). Indicators concern both waste generation and management. Waste indicators also distinguish across categories of waste, such as biowaste, plastics and electrical waste. Waste treatment differentiates across landfill, incinerated waste, recycled waste and the number of composting plants created.

- Indicators on **resources and materials** represent 9% of the framework, measuring material flows (exports and imports), the self-sufficiency of materials and the recovery of materials. These indicators are prevalently included in the environmental category (78%).
- A total of 8% of the sample refer to **repair, reuse and share**, which mainly covers the categories of infrastructure and technology (35%), environment (28%) and governance (20%). This sector includes indicators on impacts and results from the reuse and repair of several objects and materials (e.g. objects redirected/repaired from recycling centres; the number of goods reused internally in the local administration; and the ratio of products repaired to new products sold). Additionally, it addresses the infrastructure that promotes and enables repair and reuse. Examples of the latter are: the number of reuse centres in the city; the number of recycling centres organised; and collaborative spaces equipped with materials and equipment to encourage repair. Other indicators cover the governance approach of the sector, including indicators such as the number of meetings of a working group to boost sharing or the number of projects realised for the sharing economy.
- A total of 7% of indicators are devoted to the **built environment**, of which 44% belongs to the governance category (Figure 5.4). Indicators cover the whole life cycle of buildings, from the design (e.g. construction works with circular design and projects incorporating smart design) to end of life (e.g. recovery rate of construction and demolition waste). Other indicators refer to the use and consumption of materials (e.g. construction and demolition waste usage rate, the recovery rate of construction and demolition waste, the recovery rate of construction waste as material). Several indicators also address the existence of circular-economy-related certifications for buildings (e.g. number of companies with certification based on life cycle or eco-design, percentage of construction projects applying to certification programmes and the inclusion of eco-designed products).
- There is a small number of **energy**-related indicators (7%), most of them classified in the environmental category (85%). The existing indicators mostly relate to energy consumption levels (e.g. biofuel consumption; energy efficiency in buildings and homes; and electrical energy consumption), energy recovery (e.g. percentage of used lubricant oils collected and treated for energy recovery) and energy valorisation (e.g. the number of projects implemented for the valorisation of energy).
- **Food** (7%) is another relevant sector for measuring circularity, especially in terms of waste: the amount of food waste generated, the number of food recovery-redistribution actions and food waste avoided through a circular consumption.
- **Water**-related indicators (3%) mainly focus on water regeneration and wastewater, mainly belonging to the environmental category (46%). Some examples from the inventory are: regenerated water used as a source of water supply; the percentage of urban wastewater treated/total wastewater generated; and the number of approved water reuse projects per year.
- Few measurement frameworks have started to monitor the role of the **public administration** as a driver for the circular economy (3%). Governance is the primary category within this sector (58%). Some examples of the indicators are: the number of municipal staff trained on the circular economy; the economic savings from the reuse of furniture and equipment of the local administration; and the number of municipal staff actively working on the development of a circular vision.
- Indicators related to the sub-category **air** (2%) refers to emissions of CO_2 and GHG, and are all included in the environmental category (100%). However, according to the OECD survey, cities and regions tend to have difficulties in the collection of reliable data for measuring emissions.
- **Other** sectors (6%): This group encompasses the sectors with few additional indicators (with representation equal or below 1% of the OECD inventory) and includes the following sectors, ordered by their share in the inventory: land use (e.g. new districts incorporating the principles of

the circular economy); textile (e.g. clothing recycled per year and savings made by not replacing items of clothing); culture (e.g. collected materials and objects in pilot projects within cultural facilities and Identification of pilot operations in the cultural sector); industry (e.g. working group meetings with major industry players for better regulatory alignment as a boost to the circular economy); agriculture (seed banks and agro-ecological initiatives); mobility (car sharing and use of private vehicles in cities); forestry (direct jobs associated with the forest/wood sector); and tourism (number of tourism enterprises and productivity of the sustainable tourism sector).

Table 5.2. Examples of indicators by sector

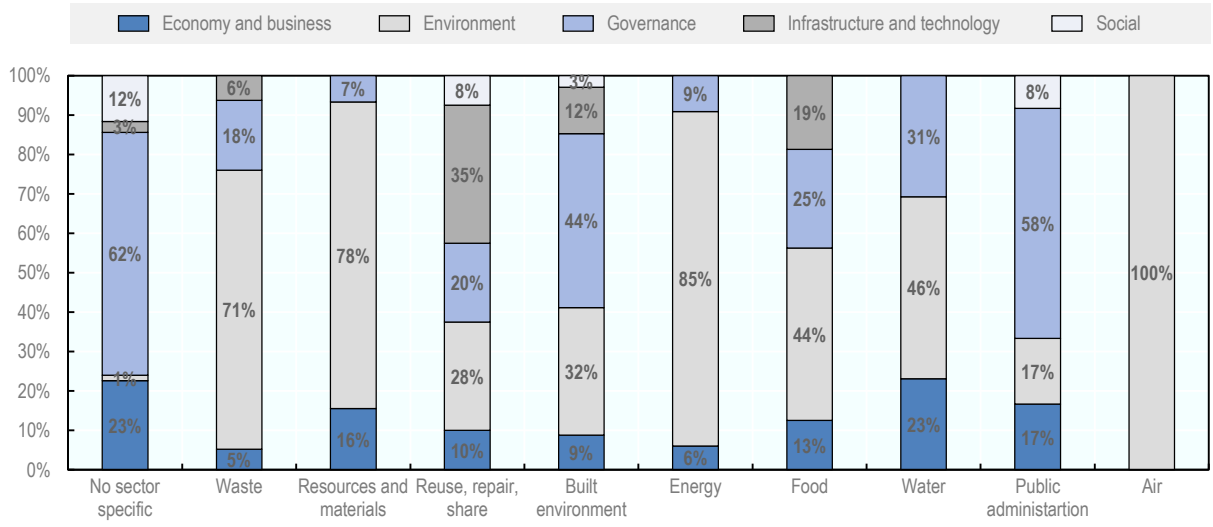
Sector	Selected indicators
Not sector-specific/Circular economy	• Circular jobs • Economic growth of the circular economy • Public procurement contracts with an environmental clause and/or criteria
Air	• GHG emissions per capita
Built environment	• Construction works with circular design • Financial resources mobilised for experiments on the building sector • Voluntary agreements signed reuse of building components
Energy	• Energy consumption (primary, final, electrical, biofuels) • Energy efficiency • Projects for the valorisation of energy resources
Food	• Food recovery-redistribution actions • Food waste avoided through a circular consumption
Public administration	• Economic savings from the reuse of furniture and equipment of the local administration • Number of municipal staff trained in the circular economy • Number of municipal staff actively working on the development of a circular vision
Resources and materials	• Circular material use rate • Material flows per capita
Reuse, repair, share	• Availability of repair, reuse and share areas (repair cafés, shops offering repair services, collection points for reuse of materials, reuse centres) • Projects for the sharing economy • Objects collected, recovered and repaired
Waste	• Generation of municipal waste per capita • Waste avoided through collection and recovery of objects • Percentage of recovered waste over generated waste
Water	• Regenerated water used as a source of water supply • Wastewater treated/total wastewater generated • Water reuse projects per year
Other	• Agriculture: Number of agro-ecological initiatives • Culture: Identification of pilot operations in the cultural sector • Forest: Direct jobs associated with the forest/wood sector • Industry: Working-group meetings with major industry players for better regulatory alignment as a boost to the circular economy • Land use: New districts incorporating the principles of the circular economy • Mobility: Car sharing and use of private vehicles in cities • Textile: Clothing recycled per year • Tourism: Number of eco-facilities related to the touristic sector

Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

Figure 5.4 shows the distribution of the sectors across the categories. Energy (85%), resources and materials (78%) and waste (71%) are predominantly included in the “environment” category. Indicators not

sector-specific (62%), public administration (58%) and built environment (44%) belongs to the "governance" category. Regarding the category "infrastructure and technology", indicators refer to reuse, repair and share (35%), food (19%) and built environment (12%). Finally, the "job" category is composed of indicators referring to not sector-specific (12%), public administration (8%) and repair, reuse and share (8%) indicators.

Figure 5.4. Composition of sector indicators by category



Note: The graph refers to the 474 indicators.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

At which scale

The literature refers to three main scales at which measurements are carried out: micro (such as a product or company), meso (such as eco-industrial parks and industrial symbiosis) and macro (such as a city, province, region, or nation) levels (Moraga et al., 2019[6]; Ekins et al., 2019[7]; Alaerts et al., 2018[8]). The following section will focus on the macro-level indicators collected within the OECD Inventory of Circular Economy Indicators. Increasingly, surveyed cities have designed indicators to measure the performance and outputs of their respective action plans, roadmaps and strategies (e.g. Amsterdam [Netherlands], Paris [France] and Toronto [Canada]). At the regional level, some strategies include a set of performance indicators that in many cases are aligned with the Circular Economy Monitoring Framework of the EC. Regarding the national level, some of the recently approved strategies (e.g. Colombia and Spain in 2020) have also included indicators to monitor the results of their initiatives.

National level

The first part of this section focuses on the work carried out by European institutions, collecting data at the national level. The second part will focus on specific country examples.

Following the approval of the Circular Economy Package (EC, 2015[9]), the EC made available in 2018 a monitoring framework that aims to measure the progress of the circular economy in all stages of the life cycle of resources, products and services (Box 5.2). The monitoring framework complements the existing Resource Efficiency Scoreboard (EC, 2014[10]) and Raw Materials Scoreboard (EC, 2016[11]). It does not include social innovations, eco-innovations, sharing economy initiatives, the level of greening of the main economic sectors, new business models' implementation, eco-design and architecture initiative (Avdiushchenko, 2018[12]). New data on food waste and GPP are expected to be available in 2022.

The EC New Circular Economy Action Plan launched in 2020, one of the building blocks of the European Green Deal, calls for an update and improvement of the monitoring framework (EC, 2020[13]). As such, it is expected to focus on material footprints, additional critical sectors (e.g. constructions, plastics, textiles, and electronics), the design of sustainable products, innovation, value-added change and its implication on the climate neutrality ambition of the EU (OECD, 2020[14]). This European framework does not concern cities and regions. When it comes to measuring circularity at the subnational scale, there are some considerations to be taken into account, such as: i) the difficulty in applying national indicators (e.g. food production and trade flows) at the local scale; and ii) the lack of suitability of some circular economy national indicators for the local level. However, the inclusion of a chapter on cities and regions in the New Circular Economy Action Plan represents a considerable step towards a deeper understanding of how cities and regions will be able to support the new initiative and vice versa (De la Fuente in OECD (2020[14])).

Box 5.2. The European Commission Circular Economy Monitoring Framework

The monitoring framework is composed of ten indicators, some of which are disaggregated into sub-indicators, capturing four key areas of the circular economy: production and consumption; waste management; secondary raw materials; and competitiveness and innovation.

Table 5.3. Indicators included in the EC Circular Economy Monitoring Framework

Key areas	Indicators
Production and consumption	1. EU self-sufficiency for raw materials 2. Green public procurement 3. Waste generation a. Generation of municipal waste per capita b. Generation of waste excluding major mineral waste per GDP unit c. Generation of waste excluding major mineral waste per domestic material consumption unit 4. Food waste
Waste management	5. Recycling rates a. Recycling rate of municipal waste b. Recycling rate of all waste excluding major mineral waste 6. Recycling/recovery for specific waste streams a. Recycling rate of overall packaging waste b. Recycling rate of plastic packaging waste c. Recycling rate of wooden packaging d. Recycling rate of electrical and electronic waste (e-waste) e. Recycling of biowaste per capita f. Recovery rate of construction and demolition waste
Secondary raw materials	7. Contribution of recycled materials to raw materials demand a. End-of-life recycling input rates b. Circular material use rate 8. Trade in recyclable raw materials
Competitiveness and innovation	9. Private investments, jobs and GVA related to circular economy sectors a. Gross investment in tangible goods b. Number of persons employed c. Value-added at factor cost 10. Number of patents related to recycling and secondary raw materials

Source: EC (n.d.[15]), "Measuring progress towards a circular economy in the European Union – Key indicators for a monitoring framework", https://ec.europa.eu/environment/circular-economy/pdf/monitoring-framework_staff-working-document.pdf.

The EEA identifies possible indicators to measure each of the phases related to the use of goods and materials (EEA, 2016[4]):

- **Material input**: Domestic material consumption (DMC) or raw material consumption (RMC); the proportion of material losses in key material cycles; diversion of waste from landfill; share of secondary raw materials in material consumption; and share of sustainability-certified materials in use.
- **Eco-design**: Durability or lifetime compared with an industry average for a similar product; time and number of necessary tools for disassembly; the proportion of recycled material in new products; and share of materials where safe recycling options exist.
- **Production**: Material use for production compared to GDP (potentially by sector); input of substances that are classified as hazardous; waste generation; generation of hazardous waste in production processes; involvement of companies in circular company networks; and share of remanufacturing business in the manufacturing economy.
- **Consumption**: Environmental footprint of consumption; material footprint per euro spent; actual average lifetime of selected products; market share of preparing for reuse; and repair services related to sales of new products and waste generation (consumption activities).
- **Waste recycling**: Recycling rates for different types of wastes/materials; recycled material quality compared with virgin material quality; turnover of key recyclables; and environmental effects and cost/revenues of municipal waste management in Europe.

Although several countries have developed circular economy strategies at a national level, few of them have set up a monitoring framework yet. Generally speaking, many of these indicators focus on waste management. For examples, in France, the “10 Key Indicators for Monitoring the Circular Economy” launched in 2017, includes a set of 10 indicators for waste management, consumer demand and behaviour and supply from economic stakeholders. The measurement framework focuses on waste management (five out of ten indicators). Examples of national monitoring frameworks and related indicators are reported in Table 5.4.

Table 5.4. A selection of indicators from national monitoring frameworks

Country	Category				
	Economy and business	Environment	Governance	Infrastructure and technology	Jobs
Colombia		• Energy intensity • Greenhouse gas reduction	• Number of innovative projects for the use of residual biomass		
France	• Household spending on product repair and maintenance • Resource productivity	• DMC per capita	• Ecolabel holders		• Employment in the circular economy
Italy	• Economic value of the resources used	• Environmental impact of the resources used			
Netherlands	• Value-added of the circular economy • Economic growth of the circular economy • Material productivity	• CO2 consumption footprint • Direct resource use	• Circular economy vision-forming meetings • Legal and regulatory barriers to the circular economy	• Share of circular products in total number of products	• Circular economy employment • Number of people actively working on the development of a circular vision
Portugal	• Amount invested in circular economy projects	• Reduced emissions through green public procurement	• Awareness actions on the circular economy and their	• Repair cafés and/or local actions realised	• PhD and post-PhD grants and contracts in scientific

	• Reduced costs through GPP vs. the traditional option	• Reduced waste through green public procurement	respective impact directives adopted for research and innovation on the circular economy • Number of partnerships with municipalities		employment
Slovenia	• GDP per total greenhouse gas emissions • Material productivity	• Share of renewable energy in gross final energy consumption			
Spain		• Contribution of GHG in the waste sector		• Preparation for reuse	

Note: The Spanish National Circular Economy Strategy, España Circular 2030, includes, together with other indicators, the set of indicators of the EC Circular Economy Monitoring Framework. In order to avoid duplications, those indicators from the EC have not been included in the OECD inventory.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

Indicators are generally used to monitor the progress on the targets that have been selected in their corresponding initiatives. In Portugal, the Action Plan for Circular Economy in Portugal 2017-2020 contains indicators to measure the progress of the ten lines of action set out in its strategy for the macro, meso and micro levels (Government of Portugal, 2017[16]). In Colombia, the National Strategy for the Circular Economy presents a series of indicators to measure the progress of the circular economy in the country and the level of execution of the established actions. The indicators are organised within specific areas such as industrial material flow, flow of packaging materials, biomass, energy, water and construction material flow (Government of Colombia, 2019[17]).

Across various European countries, the national monitoring systems are mostly based on the EC Monitoring Framework. In Spain, the Circular Economy Strategy of Spain, approved in 2020, collects a series of indicators proposed by the EU. Furthermore, it also contains two additional indicators compared to the EU framework: the contribution of GHG in the waste sector measured in CO_2-eq (kt) and the preparation for reuse of waste (Government of Spain, 2020[18]). In the Netherlands, the monitoring system for the circular economy, “Circular economy: What we want to know and can measure”, is also inspired by EC proposals for monitoring the circular economy (Netherlands Environmental Assessment Agency, 2018[19]). The strategy includes a wide variety of suggested indicators and an overview of relevant indicators to measure progress in the circular transition. Similarly, in Italy, the report *Towards a Model of Circular Economy for Italy* (Government of Italy, 2017[20]) refers to the set of indicators proposed by the EC for the macro level and suggests a set of aspects that are necessary to be considered for the micro level: environmental impacts, resources used and economic value of resources. The roadmap towards the circular economy in Slovenia also includes the monitoring framework of the EU, in addition to indicators from the Slovenian Development Strategy 2030 (material productivity; share of renewable energy in gross final energy consumption; and GDP per total GHG emissions) (Government of Slovenia, 2018[21]).

Indicator frameworks for some national strategies are yet to be developed or are in development. In Finland, following the *Finnish Road Map to a Circular Economy 2016-2025* (SITRA, 2016[22]), circular economy indicators are in development and they aim at describing the progress of Finland’s circular economy. This framework will gather information concerning new perspectives of the circular economy such as the sharing economy, circular economy resource loops and systemic changes. This set of indicators is also part of indicator service that describes social development. In Belgium, the government launched the Federal Roadmap for a Circular Economy strategy (Federal Government of Belgium, 2014[23]), which is a first step in the development of a roadmap for more efficient use of resources. One of the objectives set by the strategy is the development of indicators, target setting and data collection.

Regional level

There are few initiatives and related indicator frameworks at the regional level. Examples form the OECD Inventory indicate that regions rely often on available frameworks (EC monitoring framework and set of indicators of the Sustainable Development Goals, e.g. SDG 12). Examples of indicators are reported in Table 5.5.

Some measurement frameworks are devoted to measuring the "transition" to the circular economy. For example, the Regional Programme in Circular Economy 2016-202" of Brussels-Capital (Belgium) includes a set of 15 proposed indicators (Government of the Brussels-Capital Region, 2016[24]). These frameworks focus on measuring actions that should trigger the transition to the circular economy, such as: the number of companies that have received financial assistance related to the circular economy, the budget allocated to these businesses and the budget and number of pilot public contracts in circular economy developed in the Brussels-Capital region. Other indicators concern the number of legislative and normative obstacles identified and addressed, as well as the number of legislative and normative incentives created, the number of people and students trained in the circular economy fields of activity, the number of seminars organised on the circular economy within the framework of the strategy and the pilot cases implemented through calls for projects. The remaining indicators comprise the number of companies aware of Brussels public procurement opportunities, the number of jobseekers having been employed as a result of circular training and also the number of new districts incorporating the principles of the circular economy. With the support of the United Nations Environment Programme, the Brussels-Capital region is working on the definition of a set of indicators that not only focuses on the actions that trigger the circular transition but also on the way the transition has an impact on resources flow (e.g. total water consumption per capita; percentage of water loss; and per capita generation of construction and demolition waste) and the quality of life of inhabitants (e.g. share of existing circular economy jobs and new created circular economy jobs) (UNEP, 2019[25]).

Table 5.5. A selection of indicators from regional monitoring frameworks

Region	Category				
	Economy and business	Environment	Governance	Infrastructure and technology	Jobs
Brussels-Capital Region (Belgium)	• Economic operators supported in circular economies		• Budget of pilot public contracts in a circular economy • Students trained in the circular economy fields of activity	• New districts incorporating the principles of the circular economy	• Jobseekers who have been employed as a result of training on the circular economy
Catalonia (Spain)*	• Weight of the green economy in GDP • Efficiency in resource productivity	• Environmental quality			• Green employment rate
North Karelia (Finland)		• Recycling rate of construction waste • Separate collection rate of construction waste			
Scotland (United Kingdom)		• Carbon impact of waste • Total amount of waste produced by construction and demolition			

Note: * Suggested indicators.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

Several regional indicators aim to measure the results and impacts of their circular economy strategies. The Autonomous Community of Catalonia, Spain, launched in 2015 the Promoting the Green and Circular Economy in Catalonia strategy. Its monitoring system, under development, will distinguish between the result indicators and impact indicators. Result indicators are expected to monitor the progress of the planning and deployment of actions, while impact indicators will assess the impact of the strategy in terms of the green economy. Some indicators are: resource productivity efficiency, green economy weight in GDP, environmental quality, resource productivity efficiency and energy efficiency of buildings (Regional Government of Catalonia, 2015[26]).

Some indicator frameworks relate to the SDGs. This is the case of the *Extremadura Green and Circular Economy 2030* strategy, which is endowed with its own monitoring and evaluation model based on the set of indicators from the SDGs monitoring framework (Regional Government of Extremadura, 2017[27]), Furthermore, the Agenda for the Development of the Circular Economy in Navarre 2030 also suggests the use of indicators from SDG 12 for measuring the target of extending the culture of sustainability. The OECD developed indicators to measure progress towards the achievement of the SDG 12 in cities and regions (OECD, 2020[28]).

The waste sector is very relevant for most regional level indicator frameworks (Table 5.5). For example, the *Making Things Last: A Circular Economy Strategy for Scotland* gathers three waste-related indicators: the total amount of waste produced by sectors (household; commerce and industry; and construction and demolition); the amount of waste produced by sectors per unit of GVA; and the carbon impact of waste (the whole-life impacts of waste including the benefits of prevention and recycling) (Scottish Government, 2016[29]). Similarly, in North Karelia, the Roadmap of the Circular Economy of North Karelia includes four indicators in the field of construction and waste: recovery rate of construction waste as material; recycling rate of construction waste; separate collection rate of construction waste; and construction waste.

The local level

Several circular economy strategies in cities are accompanied by indicator frameworks. Their main purpose is to assess how the city is performing towards the achievement of targets. Specific examples are reported below (Table 5.6).

Table 5.6. A selection of indicators from local monitoring frameworks

City	Category				
	Economy and business	Environment	Governance	Infrastructure and technology	Jobs
Amsterdam (Netherlands)	• Net added value of the circular economy	• CO2 emissions reduction • Material savings			• Net circular job growth
Greater Porto Area (Portugal)			• Number of tender with circular criteria • Level of implementation of a training plan on the circular economy • Level of implementation of the Environmental Action Plan		
Paris	• Value creation of circular economy	• CO2 avoided from the recovery and	• Number of actors involved in circular	• Percentage of Paris' territory	• Number of jobs created from reuse

City	Category				
	Economy and business	Environment	Governance	Infrastructure and technology	Jobs
(France)	models • Economic savings from recovery and reuse of materials	reuse of materials • Energy consumption savings	experimental projects • Number of awareness-raising activities carried out for plastic use reduction • Public procurement contracts with a circular economy dimension	covered by experimental areas for the recovery and reuse of building materials • Number of collection points for reuse of materials	activities • Number of jobs created by promoting circular consumption in the city
Toronto (Canada)	• Cost savings	• Waste reduction • Raw materials avoided	• Number of city contracts evaluated using circular economy principles		• Number of green jobs created and secured
Turku (Finland)		• Greenhouse gas emissions per capita • Share of renewable energy in district heating			

Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

Some cities use impact and performance indicators to measure the achievements of the proposed actions of their strategies. For example, the city of Paris, France proposes a performance indicator for each of the 15 actions included in the 1st Roadmap Paris Circular Economy Plan (City of Paris, 2017[30]), such as: planning and construction; waste reduction, reuse, reuse, reuse or repair; support for local actors; public procurement; and responsible consumption. In the 2nd roadmap, there are 2 indicators for each of the 15 established actions (one achievement indicator and one impact indicator) (City of Paris, 2019[31]). The city of Amsterdam, Netherlands, measures its circularity level through three main indicators: value retention, economic and ecological impacts. Each of these measures is composed of two additional sub-indicators. Value retention is measured by raw material efficiency (understood as the waste reduction in the production of goods, measured in kilograms of waste per EUR 1 000 output) and by the use of renewable resources (percentage of imports consisting of biomass compared to total imports). The economic impact is measured in added value per person and the percentage of circular services in the economy (the proportion of the added value in an economy that is generated by services focused on product design, rental, repair and recycling). The environmental impact is measured by environmental costs (EUR per kilogram), water pollution, CO_2 emissions, toxicity and land and by CO_2 emissions (CO_2 kilograms per person). These three indicators, which have been developed by a programme of the Ministry of Infrastructure and the Environment of the Netherlands, are comparable with the national level (Circle Economy et al., 2016[32]). In Toronto, Canada, the indicators from the Circular Economy Procurement Implementation Plan and Framework focus on the impacts and results of procurement activities. These proposed metrics address the environmental (e.g. CO_2 savings as a result of procurement activities), social (e.g. number of green jobs created and secured), economic (e.g. cost savings) and governance areas (e.g. number of city staff trained on circular economy procurement principles).

A variety of cities uses environmental, governance and waste-related indicators. For example, in the Greater Porto Area, Portugal, the *Circular Economy Framework Monitoring* internal report of the Intermunicipal Waste Management of Greater Porto (LIPOR) includes indicators in terms of governance

(number tenders with circular criteria), capacity building (implementation of training plan on the circular economy) and waste (recycling rates). In Milan, Italy, the *Contatore Ambientale* tool measures some environmental and energy areas (e.g. CO_2 emissions, water consumption, electrical energy consumption and consumption of secondary and virgin materials). In Turku, Finland, the municipality has some circular economy indicators available from the Resource Wisdom Roadmap and the Strategic Programme of Competitiveness and Sustainable Growth. Examples are mostly related to the environment (GHG emissions per capita and share of renewable energy in district heating) and waste (waste streams to landfills and exporting landfill waste). Available indicators in Munich (Germany), Peñalolén (Chile) and Tilburg (Netherlands) are mostly focused on waste (e.g. residual waste, waste separation, waste recovery through inclusive recycling programmes, recycling rates and monitoring of results from recycling programmes).

The Urban Agenda Partnership on Circular Economy identified a number of indicators that can be useful for cities to assess their transition to the circular economy. The Urban Agenda Partnership on Circular Economy found 140 indicators for circular economy transition in cities. The categories used to classify the collected indicators correspond to those from the EU Monitoring Framework (Box 5.2) to adapt it at the local level. It also includes two overarching indicators on GHG and the availability of a circular economy strategy at the local level (Urban Agenda Partnership on Circular Economy, 2019[33]).

Main challenges of the existing measurement frameworks

Although the development of measurement frameworks for the circular economy is still incipient, some common obstacles and challenges can be observed, such as:

- Lack of an agreed definition of the circular economy. It is difficult to build an indicator framework if it is not clear what it intends to measure. It is important to understand and define what to measure, the reasons for doing it and the target audience before establishing an indicator framework. The different definitions of the circular economy may result in different ways of measuring it.
- Lack of harmonisation of indicators. There is no harmonised measurement framework contributing to a deeper understanding of the circular economy and its evaluation over time (Blomsma and Brennan, 2017[34]). The existence of a broad variety of indicators makes it difficult to assess the robustness and reliability of the information provided (OECD, 2020[14]). Although there may be some indicators in common amongst the analysed monitoring frameworks, there is a lack of a sufficiently elaborated and consensual methodology for the monitoring and evaluation of the processes of the circular economy. For instance, several indicators (e.g. on recycling and waste management) may underlie the same or similar messages but be accounted through different methodologies or units (e.g. what is included and excluded in the definition of waste-related areas, such as household and municipal waste, can differ between municipalities).
- Incomplete information. There are data gaps and inconsistencies in statistical reporting, mainly due to the fact that some of the dimensions of the circular economy have not historically been reflected in statistical databases (Ekins et al., 2019[7]).
- Lack of integration at the macro-micro-meso levels. The lack of integration between the macro-micro-meso levels entails the risk of leading to conflicting strategies (Ekins et al., 2019[7]). There is a need to link indicators from different levels, as it is currently not clear how to connect them.
- There is a strong focus on waste but little on closing loops. Most indicator systems are focused on recycling and collection rates as well as on the 3R[1] or the 9R[2] (Saidani et al., 2019[35]). Some of the indicators used to measure circularity (e.g. waste collection and recycling rate) may give a misleading indication of progress, as they do not necessarily show how the primary consumption of materials is reduced and optimised (Haupt, Vadenbo and Hellweg, 2017[36]). The EEA highlights that the current work on circular indicators has mainly focused on waste management and material

resource efficiency. Related to this, the identified statistics on waste and material flows are not enough to assess many of the circular-economy-related aspects such as material losses and the qualitative aspects of recycling. The EEA report also emphasises the need for more consistent data in terms of business trends and eco-design, the sharing economy and repair and reuse. Furthermore, it suggests that counting with better descriptive indicators for industrial symbiosis, waste prevention and social aspects would result in more valuable insights to measure progress (EEA, 2016[4]).

- Available indicators are mostly data-driven rather than objective-driven. Several monitoring frameworks are marked by data availability, resulting in some cases in an over-representation of sectors with greater availability of information (e.g. waste-related indicators).
- Existing indicators focus mainly on physical characteristics such as design, production and waste management, lacking the analysis of the use of products. Generally, indicators do not focus on the intelligent use of goods (addressing relevant factors such as planned obsolescence and easing repair); instead, they report on the production and wasted resources.
- There is a lack of a systemic approach of the circular economy indicators. In order to move towards a system change, it is necessary for indicators to measure and control several factors (e.g. from urban planning to materials consumption) and not limiting to very specific sectors such as waste management (Wijkman in OECD (2020[14]).

Selected indicators for setting and implementing a circular economy strategy

According to the phases of the circular economy strategy, from its development to its implementation, Table 5.7 suggests key indicators contained in the *OECD Survey on the Circular Economy in Cities and Regions* (2020[1]). As such, when developing a circular economy strategy, it is important to take into account the co-ordination across municipal and regional departments, the involvement of stakeholders for an inclusive and participative process, select several projects for the achievement of established targets and identify sources of funding. When the strategy has been set and implemented, key results concern the creation of businesses and jobs, the number of products procured according to circular criteria, as well as environmental conditions such as waste diverted from landfill.

Table 5.7. Selected indicators for circular economy strategies in cities and regions

Phase	Type of indicator	Indicators for the circular economy strategy: inputs, process and output
Setting the strategy	Process	No. of public administrations/departments involved
	Process	No. of stakeholders involved
	Input/process	No. of actions identified to achieve the objectives
	Input/process	No. of projects to implement the actions
	Process	No. of projects financed by the city/regional government/Total number of projects
	Process	No. of projects financed by the private sectors/Total number of projects
	Process	No. of staff employed for the circular economy initiative and implementation within the city/region/administration
Implementing the strategy	Environmental output	Waste diverted from landfill (T/inhabitant/year or %)
	Environmental output	CO_2 emission saved (T CO_2/capita or %)
	Environmental output	Raw material avoided (T/inhabitant/year or %)
	Environmental output	Use of recovered material (T/inhabitant/year or %)
	Environmental output	Energy savings (Kgoe/inhabitant/year or %)
	Environmental output	Water savings (ML/inhabitant/year or %)

Phase	Type of indicator	Indicators for the circular economy strategy: inputs, process and output
	Socio-economic output	No. of new circular business (e.g. companies, start-up, etc.) created to implement the circular economy initiative
	Socio-economic output	No. of businesses (e.g. companies, start-ups, etc.) adopting circular economy principles
	Socio-economic output	Economic benefits (e.g. through additional revenue and costs saving) (EUR/year)
	Socio-economic output	No. of employees of new circular business
	Socio-economic output	No. of jobs created from circular activities
	Governance output	No. of companies coached by the city/region to adopt circular economy principles
	Governance output	No. of contracts awarded by the purchasing department of the city/region that include a circular economy criterion/ Total number of contracts
	Governance output	City/region % of public investment dedicated to the circular economy initiative/total public investment by the city/region

Source: OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris; OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

References

Alaerts, L. et al. (2018), "Towards a circular economy monitor for Flanders: A conceptual basis". [8]

Avdiushchenko, A. (2018), "Toward a Circular Economy Regional Monitoring Framework for European Regions: Conceptual approach", http://dx.doi.org/10.3390/su10124398. [12]

Blomsma, F. and G. Brennan (2017), "The emergence of circular economy: A new framing around prolonging resource productivity", *Journal of Industrial Ecology*, Vol. 21/3, pp. 603-614, http://dx.doi.org/10.1111/jiec.12603. [34]

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). [32]

City of Paris (2019), *2nd Roadmap of the Circular Economy Plan for Paris*, https://cdn.paris.fr/paris/2019/07/24/58d790111b39273c144ddc19744a1b5c.pdf (accessed on 7 November 2019). [31]

City of Paris (2017), *1st Roadmap of the Circular Economy Plan for Paris*. [30]

EC (2020), *New Circular Economy Strategy*, European Commission, https://ec.europa.eu/environment/circular-economy/ (accessed on 30 July 2020). [13]

EC (2018), *EU Monitoring Framework for the Circular Economy*, European Commission, https://ec.europa.eu/eurostat/web/circular-economy/indicators (accessed on 7 November 2019). [3]

EC (2016), *Raw Materials Scoreboard*, European Commission, https://op.europa.eu/en/publication-detail/-/publication/1ee65e21-9ac4-11e6-868c-01aa75ed71a1/language-en (accessed on 7 November 2019). [11]

EC (2015), *EU Action Plan for the Circular Economy*, European Commission, https://ec.europa.eu/environment/circular-economy/index_en.htm (accessed on 7 November 2019). [9]

EC (2014), *EU Resource Efficiency Scoreboard 2014*, European Commission, http://europa.eu (accessed on 7 November 2019). [10]

EC (n.d.), "Measuring progress towards a circular economy in the European Union – Key indicators for a monitoring framework", European Commission, https://ec.europa.eu/environment/circular-economy/pdf/monitoring-framework_staff-working-document.pdf. [15]

EEA (2016), *Circular Economy in Europe*, European Environment Agency, https://www.eea.europa.eu/publications/circular-economy-in-europe (accessed on 7 November 2019). [4]

Ekins, P. et al. (2019), *The Circular Economy: What, Why, How and Where*. [7]

European Investment Bank (2020), *The EIB Circular Economy Guide*, http://www.eib.org/attachments/thematic/circular_economy_guide_en.pdf. [37]

Federal Government of Belgium (2014), *Vers une Belgique pionnière de l'économie circulaire*, https://economie.fgov.be/fr/publicaties/vers-une-belgique-pionniere-de (accessed on 30 July 2020). [23]

Government of Colombia (2019), *National Strategy for the Circular Economy*. [17]

Government of Italy (2017), *Towards a Model of Circular Economy for Italy*. [20]

Government of Portugal (2017), *Leading the Transition*, https://pixabay.com/ (accessed on 7 November 2019). [16]

Government of Slovenia (2018), *Roadmap Towards the Circular Economy in Slovenia*, http://www.svrk.gov.si/ (accessed on 7 November 2019). [21]

Government of Spain (2020), *España Circular 2030, Estrategia Española de Economía Circular*. [18]

Government of the Brussels-Capital Region (2016), *Regional Programme for the Circular economy 2016-2020 (PREC)*. [24]

Haupt, M., C. Vadenbo and S. Hellweg (2017), "DDo we have the right performance indicators for the circular economy?: Insight into the Swiss waste management system", *Journal of Industrial Ecology*, Vol. 21/3, pp. 615-627, http://dx.doi.org/10.1111/jiec.12506. [36]

Moraga, G. et al. (2019), "Circular economy indicators: What do they measure?", *Resources, Conservation and Recycling*, pp. 452-461, http://dx.doi.org/10.1016/j.resconrec.2019.03.045. [6]

Netherlands Environmental Assessment Agency (2018), "Circular economy: What we want to know and can measure", http://dx.doi.org/10.4236/JEP. [19]

OECD (2020), *A Territorial Approach to the Sustainable Development Goals: Synthesis report*, OECD Urban Policy Reviews, OECD Publishing, Paris, https://dx.doi.org/10.1787/e86fa715-en. [28]

OECD (2020), "OECD - Nordic Innovation webinars on the circular economy in cities and regions", OECD, Paris, http://www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf (accessed on 30 July 2020). [14]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [1]

OECD (2016), *Policy Guidance on Resource Efficiency*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264257344-en. [38]

OECD (2013), *OECD Glossary of Statistical Terms - Efficiency Definition*, OECD, Paris, https://stats.oecd.org (accessed on 3 August 2020). [5]

OECD (forthcoming), *OECD Inventory of Circular Economy Indicators*, OECD, Paris. [2]

Regional Government of Catalonia (2015), *Promoting the Green and Circular Economy in Catalonia*, http://www.gencat.cat/dogc (accessed on 7 November 2019). [26]

Regional Government of Extremadura (2017), *Extremadura 2030*. [27]

Saidani, M. et al. (2019), "A taxonomy of circular economy indicators", *Journal of Cleaner Production*, Vol. 207/1, pp. 542-559, https://hal.archives-ouvertes.fr/hal-01954800 (accessed on 31 July 2020). [35]

Scottish Government (2016), *Making Things Last: A Circular Economy Strategy for Scotland*, https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/ (accessed on 7 November 2019). [29]

SITRA (2016), *Finnish Road Map to a Circular Economy 2016-2025*, http://www.sitra.fi (accessed on 7 November 2019). [22]

UNEP (2019), *Brussels Capital Region: Circular Economy Transition*, United Nations Environment Programme. [25]

Urban Agenda Partnership on Circular Economy (2019), "Indicators for circular economy (CE) transition in cities"*, Issues and Mapping Paper (Version 4)*. [33]

Notes

[1] 3Rs: Reduce, Reuse and Recycle (OECD, 2016[38]).

[2] 9Rs: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose and Recycle (European Investment Bank, 2020[37]).

Annex 5.A. List of monitoring frameworks included in the OECD Inventory of Circular Economy Indicators

Annex Table 5.A.1. List of monitoring frameworks included in the OECD Inventory of Circular Economy Indicators

Scale	Author	Monitoring framework
Country	Colombia	National Strategy for the Circular Economy (2019)
	European Union	Monitoring Framework for the Circular Economy (2019)
	France	10 Key Indicators for Monitoring the Circular Economy (2017)
	Italy	Towards a Model of Circular Economy for Italy - Overview and Strategic Framework (2017)
	Netherlands	Circular Economy: What We Want to Know and Can Measure (2018)
	Portugal	Leading the Transition [Action Plan for a Circular Economy in Portugal: 2017-2020] (2017)
	Slovenia	Roadmap Towards the Circular Economy in Slovenia (2018)
	Spain	Spanish Strategy for Circular Economy: España Circular 2030 (2020)
Region	Basque Country (Spain)	Basque Country Circular Economy Strategy 2030 (2019)
	Brussels-Capital Region (Belgium)	Regional Programme for the Circular Economy 2016 – 2020 (PREC) (2016)
	Catalonia (Spain)	Promoting the Green and Circular Economy in Catalonia (2015)
	Extremadura (Spain)	Extremadura 2030. Green and Circular Economy Strategy (2018)
	Galicia (Spain)	Galician Strategy of Circular Economy 2019-2030 (2019)
	Navarre (Spain)	Agenda for the Development of the Circular Economy in Navarra 2019-2030 (2019)
	North Karelia (Finland)	Roadmap of the Circular Economy of North Karelia (2018)
	Scotland (United Kingdom)	Making Things Last A Circular Economy Strategy for Scotland (2016)
City	Amsterdam (Netherlands)	Circular Amsterdam – A Vision and Action Agenda for the City and Metropolitan Area (2016)
	Barcelona (Spain)	The Green and Circular Economy of Barcelona City Council (2019)
	Bilbao (Spain)	Circular Bilbao and Bizkaia (2018)
	Greater Porto Area (Portugal)	Circular Economy Framework Monitoring Report (NA)
	Paris (France)	Paris Circular Economy Plan: 2017-2020 (2017)
		1st Roadmap Paris Circular Economy Plan (2017)
		2nd Roadmap Paris Circular Economy Plan (2018)
	Peñalolén (Chile)	Inclusive Recycling Programme (2013)
	Peterborough (United Kingdom)	Measuring the Circular Economy: Developing an Indicator Set for Opportunity (2018)
	Toronto (Canada)	Circular Economy Procurement Implementation Plan and Framework (2018)
	Turku (Finland)	Resource Wisdom Roadmap

Note: The cities of Milan (Italy), Munich (Germany), Quillota (Chile) and Tilburg (Netherlands) provided circular economy indicators through the *OECD Survey on the Circular Economy in Cities and Regions* (2020[1]). However, indicators are not included in specific strategies/initiatives.
Source: OECD (forthcoming[2]), *Inventory of Circular Economy Indicators*, OECD, Paris.

6 Getting the governance of the circular economy right: Checklist for Action and Scoreboard

This chapter presents a Checklist for Action for cities and regions transitioning to the circular economy. It aims to support decision-makers in promoting, facilitating and enabling the transition to the circular economy. The Checklist is accompanied by the OECD Scoreboard on the Governance of the Circular Economy, a tool for cities and regions to self-assess the existence and functioning of enabling conditions for circular economy policies, initiatives, strategies and programmes. It concludes with recommendations on the role of national governments.

Promoting, facilitating and enabling the circular economy

Moving towards a circular system is an opportunity for rethinking production and consumption patterns; improving environmental quality and resource efficiency; creating new business models; promoting citizens and business acceptance and awareness on the circular economy through awareness change; and boosting innovation, as identified by surveyed cities and regions (OECD, 2020[1]). All actors have a role to play in the transition towards the circular economy: policymakers can use several policy levers, ranging from strategy development to capacity building, economic incentives and regulation, amongst others. As such, the transition is not just a way to optimising the present linear system, using green and clean techniques for production. It is about changing relations across value chains and identifying synergies across sectors.

The circular economy can be implemented if proper governance conditions are in place. As such, the Checklist for Action, based on 12 key governance dimensions, provides guidance to governments to promote, facilitate and enable the circular economy. While this Checklist is devoted to cities and regions, these dimensions can be applicable at all levels of government. The 12 dimensions are grouped into three clusters corresponding to the complementary roles of cities and regions as promoters, facilitators and enablers of the circular economy (Figure 6.1; Table 6.1):

- **Promoters**: Cities and regions can promote the circular economy acting as a role model, 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 and regions 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).*); and
- **Enablers**: Cities and regions create the enabling conditions for the transition to a circular economy to happen, e.g.: identify the regulatory instruments that need to be adapted to foster the transition to the circular economy (*regulation*); help mobilise financial resources and allocate them efficiently (*financing*); adapt human and technical resources to the challenges to be met (*capacity building*); support business development (*innovation*); and generate an information system and assess results (*data and assessment*).

The checklist is based on an extensive literature review on the governance of the circular economy, and draws on the key framework provided by the OECD Principles on water governance and their related governance indicators and self-assessment framework (2015[2]; 2018[3]). The Checklist also includes insights from several case studies on the circular economy carried out in select cities and regions (2020[4]; 2020[5]; 2020[6]).

The Checklist for Action is accompanied by the OECD Scoreboard on the Governance of the Circular Economy, which helps governments identify the level of advancement towards the implementation of each of the 12 governance dimensions, distinguishing across: i) newcomers, when the governance condition is planned or in development; ii) in progress, when the governance condition is in place and not implemented, or in place and partly implemented; iii) advanced, when the governance condition is in place, functioning and objectives are achieved. The scoreboard can be used on a voluntary basis by interested countries, regions and cities, according to the objective of the assessment itself. As such, governments can also assess specific dimensions. The tool is not meant to benchmark countries, regions and cities .A visual representation of the Scoreboard is provided in Figure 6.2. The in depth description of the methodology is provided below in this Chapter.

Figure 6.1. The governance of the circular economy in cities and regions: A Checklist for Action

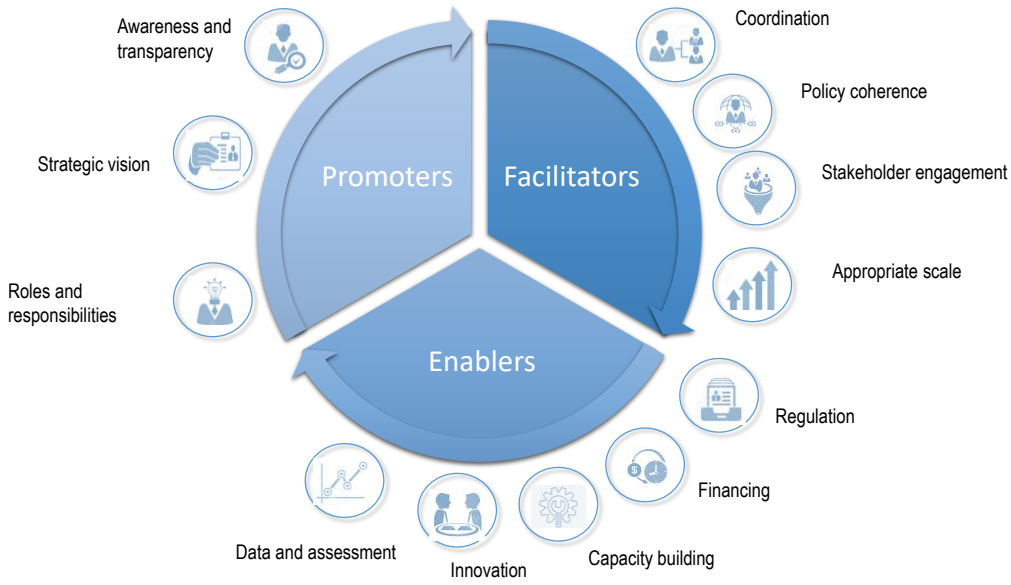


Figure 6.2. The OECD Scoreboard on the Governance of the Circular Economy

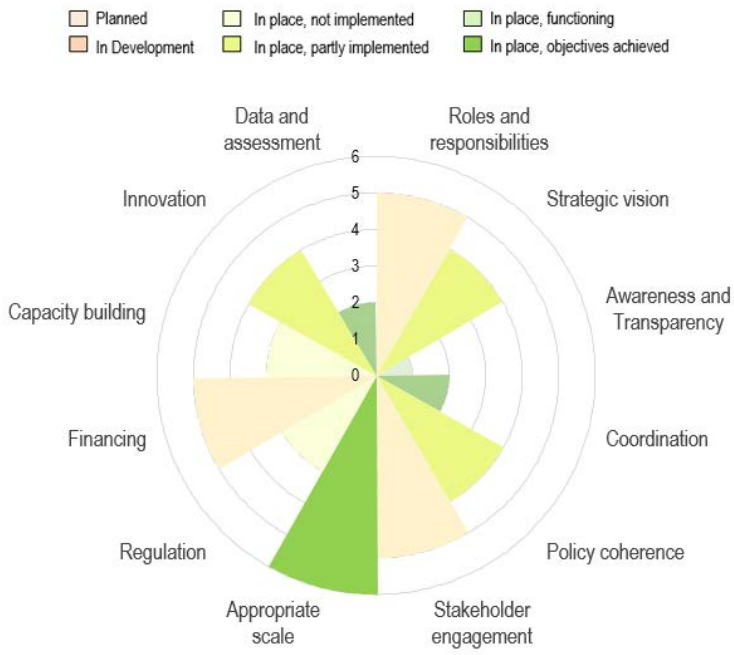


Table 6.1. The governance of the circular economy in cities and regions: A Checklist for Action

Role	What	Why	How
Promoters	Roles and responsibilities	Define who does what and lead by example	• Establish clear roles and responsibilities • Apply circular models within the government according to the "practice what you preach" principle • Prevent waste generation in municipal events and daily activities • Promote the use of secondary materials, sustainable products and build in a circular manner from roads to buildings • Adopt business models shifting from ownership to services • Implement green public procurement including circular economy principles
	Strategic vision	Develop a circular economy strategy with clear goals and actions	• Inform the strategy by an analysis of stocks and flows • Map existing circular-economy-related initiatives • Define clear and achievable goals, actions and expected outcomes • Allocate necessary financial and human resources • Share and co-create with stakeholders to build consensus and vision • Link the strategy with various sectoral strategies • Regularly monitor and evaluate results
	Awareness and transparency	Promote a circular economy culture and enhance trust	• Develop clear communication • Create spaces for dialogues and practice exchange • Set up communication campaigns to show the impacts of the circular economy, how citizens and different actors can contribute to it and share success stories • Develop a dedicated website to share knowledge, good practices concerning the circular economy • Organise events for knowledge sharing, networking and the promotion of the circular economy at the local level, as well as conferences and seminars at schools and universities • Use social media to provide quick updates and information on the topic and related events • Promote certificates, labels and awards that can enhance trust and lead to more conscious production and consumption choices
Facilitators	Co-ordination	Implement effective multi-level governance	• Strengthen co-ordination across levels of governments • Consider the following options: ○ Create ad hoc co-ordination bodies, such as committees, commissions, agencies or working groups ○ Organise ad hoc meetings for city-province-region-state co-ordination ○ Develop joint projects on the circular economy ○ Create shared databases and information systems ○ Set contracts/deals with the national government as tools for dialogue, for experimenting, empowering and learning

Role	What	Why	How
	Policy coherence	Foster system thinking	• Identify synergies across policies and plans (e.g. climate adaptation, mobility, land use) • Strengthen co-ordination across policies and governmental departments (horizontal co-ordination) • Embrace adjustments throughout the policy cycle, with implications on how institutions, processes, skills and actors are organised
	Stakeholder engagement	Facilitate collaboration amongst public, not-for-profit actors and businesses	• Engage with academia and research centres to build knowledge, experiments and carry out specific analyses on flow, stocks and material input and outputs • Find solutions to close, narrow and slow the loops, for example digitalising information and data • Create interactive online platforms to encourage stakeholders to exchange information with each other on their needs and monitor the activities and updates of the platform • Provide opportunities for collaboration through multi-stakeholder platforms • Stimulate demand for new solutions (e.g. modular buildings) to be developed through joint actions between knowledge centres and the business sector • Identify possible pilots and experimentations that would involve research and development (R&D) and university departments, based on the needs of the municipality or the regional government (e.g. circular activities in sector such as mobility, tourism, food, waste, bioeconomy, etc.) • Collect academic and business proposals to put in place circular activities with social impact and consider support for implementation (e.g. financial support for students) • Create coworking spaces for cross-fertilisation amongst several actors
	Appropriate scale	Adopt a functional approach	• Facilitate territorial linkages between urban and rural areas • Facilitate neighbourhood or community-based plans and initiatives • Experiment circular economy projects at small scales (e.g. a university campus, a neighbourhood, a city district) • Identify industrial and urban symbiosis opportunities • Evaluate partnerships with local or metropolitan service operators to apply the circular economy at the metropolitan level
Enablers	Regulation	Identify the regulatory instruments that need to be adapted to foster the transition to the circular economy	• Identify cases in which it is possible to adapt the regulation (e.g. land use, permits) at the local level • Establish a dialogue with the national government on needed regulatory frameworks updates when the responsibility goes beyond that of cities and regions • Implement green public procurement • Establish clear requirements in tenders to foster the use of circular economy principles • Apply a life cycle analysis approach • Carry out market analysis and stimulate demand • Stimulate a dialogue among the governmental departments and areas involved in promoting the circular transition • Consider dividing public tenders into lots that enable SMEs and local entrepreneurs to participate in tenders

Role	What	Why	How
			• Create a monitoring and evaluation framework for green public procurement
	Financing	Help mobilise financial resources and allocate them efficiently	• Facilitate access to finance and broaden the range of financial instruments for entrepreneurship • Liaise with the national government's departments to clarify existing funding opportunities and with other cities to learn about their experience in catalysing financial resources • Create a scheme to offer subsidised loans or credit guarantees to companies following circular economy principles, in co-operation with private and semi-public financial institutions • Explore putting in place rewards to companies through corporate income tax, reduced VAT on products labelled as circular
	Capacity building	Adapt human and technical resources to the challenges to be met	• Develop training programmes on the circular economy within municipal departments and for the private sector • Review and analyse the required skills and capacities for carrying out all the activities associated with designing, setting, implementing and monitoring the strategy
	Innovation	Support business development	• Create spaces for experimentation • Stimulate demand by being a launching customer • Create stakeholder networks for material chains • Create incubators to promote circular economy projects • Establish a single window for the circular economy for businesses • Promote public-private partnerships
	Data and assessment	Generate an information system and assess results	• Collect data and information on the circular economy • Generate open data sources • Make relevant data publicly accessible, understandable and updated regularly • Monitor and evaluate targets and goals of a circular strategy in the short, medium and long terms • Use the monitoring framework to identify how "circular" the city or the region is and what works, what does not work and what can be improved

Promoters

In their aim to promote the circular economy, governments can act as a role model for businesses and citizens. This can be done through: i) clarifying roles and responsibilities; ii) promoting a circular economy strategic vision; and iii) raising awareness and transparency.

Roles and responsibilities: Define who does what and lead by example

Clear roles and responsibilities should be established in terms of who does what in policymaking (e.g. priority setting and strategic planning) and implementation (e.g. financing and budgeting, data and information, stakeholder). Some cities, for example, have started their transition under the leadership of deputy mayors with clear roles and responsibilities in promoting and implementing a circular economy (e.g. Groningen, Paris). Others have created dedicated offices to the circular economy (Chapter 2). This can pave the way for the government to act as a role model, leading by example.

There are several ways through which a city or region can lead by example, such as: prevention of waste generation (e.g. plans to prevent waste production; reducing the use of paper or banning one-use plastics like cups in municipal events and daily activities), the promotion of the use of secondary materials and sustainable products and the introduction of circular economy principles in the construction of roads and buildings. The government can also adopt business models shifting from ownership to services (e.g. product-as-a-service model through public procurement: pay for a lighting service adapted to the municipality's needs rather than buying light bulbs and appliances; lease a furniture service instead of buying specific furniture, etc.) and adopt green public procurement (GPP), including circular economy principles (e.g. reuse, durability, reparability, purchase of second-hand or remanufactured products).

For instance, since 2015, the city of Amsterdam, Netherlands, has been implementing the Learning by Doing Programme that 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. For the celebration of the 2020 Olympic Games, the city of Tokyo, Japan, aims to rent and lease materials after the games. It is important to clearly communicate to the citizens the goals, all of the circular initiatives that are being promoted by the city or regional council and the progress made (e.g. percentage of one-use plastic saved in one year, etc.).

Strategic vision: Develop a circular economy strategy with clear goals and actions

Developing a strategy on the circular economy would serve to build a robust vision, define priorities and allocate funds. The vision would help overcome the fragmentation of existing initiatives and go beyond political cycles. The strategy should build on: i) an analysis of stocks and flows; ii) map 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) monitoring and evaluation framework (Figure 6.3). The strategy should also be linked with different sectoral strategies (e.g. climate change, waste, energy, etc.).

The strategy can be initiated by a specific municipal or regional department, taking the lead in performing a variety of activities, such as engaging stakeholders and co-ordinating municipal and regional departments. Examples of leading departments are available in Chapter 2.

The circular economy maximises the use of stocks (assets, capitals) comprising natural, human (work and acquired skills), cultural (material and immaterial), financial and manufactured capitals. Measuring the quality and quantity of these stocks is key. (Stahel in OECD (2020[7])). Several cities and regions carry out metabolism analyses as one of the first steps for developing a circular economy strategy. For example, the urban metabolism study in Paris aimed to assess its material flows (Circular Metabolism, 2017[8]). The

analysis aims to: i) develop deeper knowledge on the material flows in the city or region; ii) identify the city's priorities based on the analysis of consumption and production trends and material flows; iii) identify key sectors potentially able to implement circular economy principles and practices. The municipality could establish co-operation ties with the university to carry out the analysis, which should be regularly updated. The scale at which the analysis could be carried out could overcome the city's administrative boundaries and cover the metropolitan area and region for example.

Figure 6.3. Steps for developing a strategic vision for a circular economy

Source: Author's elaboration based on governments' responses to OECD (2020[1]), *OECD Survey on the Circular Economy in Cities and Regions*, OECD, Paris.

Mapping existing circular initiatives would help identify circular sectors, learn from existing experiences and explore potential cross-sector synergies and their common features. In general, it is possible to identify key sectors (e.g. built environment, tourism, food, etc.) that could generate relevant economic, environmental and social impacts; and establish priorities and possible partners, as well as activities that can be relevant in shifting from a linear to a circular system (e.g. eco-design, services rather than ownership). Mapping can be carried out through an online platform to upload initiatives and register projects in the field of the circular economy. It could take the form of an open-source database. It can be also carried out through offline platforms, gathering inputs from stakeholders through regular meetings, surveys, interviews and public consultations. A communication campaign to reach out to all stakeholders will be needed. Some examples of mapping circular initiatives include the city of Austin, United States (US), that created a directory of businesses allowing customers to participate in the circular economy (Austin's Circular Economy Story, 2020[9]). In the region of Flanders, Belgium, Circular Flanders is mapping the range of financing instruments available for the circular economy (OVAM, 2019[10]). Circular Oslo-Circular Regions applies a multi-stakeholder methodology and technology to map circular initiatives and identify environmental, economic and social impact. This methodology will be replicated within the Circular Regions Network and the data collected will be open source (Circular Oslo - Circular Regions, 2020[11]).

The strategy should define clear and achievable goals and actions. As highlighted in Chapters 1 and 2, generally speaking, the goals are related to achieving environmental, economic and social impacts. The strategy can establish specific goals by type of activity and sector.

For the actions to be implemented, it is important to consider human and financial resources. As such, the administration should ensure adequate financial resources by linking the strategic plan to multiannual budgets and mobilising private sector financing, if need be.

The circular economy is a shared responsibility across a range of stakeholders, who need to be involved from phase zero of the strategy to build consensus and vision. The implementation of the circular economy strategy is not just the responsibility of the municipality or a regional government. Innovative thinkers and motivated entrepreneurs can be consulted to start pioneering activities, for example in the agro-food and bioeconomy sectors. Architects, urbanists and representatives from the creative industry sector can help in the eco-design and the built environment, etc. (e.g. designers can help the early stage of a strategy on

the circular economy, identifying appropriate materials and link the demand and how people tend to use resources). As such, cities or regions leading the circular transition should create participation spaces for stakeholders throughout the different implementation phases of the circular economy strategy, such as multi-stakeholder fora, workshops, breakfast meetings on the circular economy, etc. To engage properly stakeholders, inspiring guidance can be retrieved from the OECD Checklist on stakeholder engagement for inclusive water governance (OECD, 2015[12]):

- Mapping all stakeholders that have a stake in the outcome or are likely to be affected, as well as their responsibility, core motivations and interactions.
- Defining the ultimate line of decision-making, the objectives of stakeholder engagement and the expected use of inputs.
- Using stakeholder engagement techniques, ensuring the effective representation of all stakeholders in the process.
- Allocating proper financial and human resources and sharing needed information for result-oriented stakeholder engagement.
- Regularly assessing the process and outcomes of stakeholder engagement to learn, adjust and improve accordingly.
- Embedding engagement processes in clear legal and policy frameworks, organisational structures/principles and responsible authorities.
- Customising the type and level of engagement to the needs and keep the process flexible to changing circumstances.
- Clarifying how the inputs will be used.

Regularly monitoring the progress of the strategy's implementation and evaluate its impacts, it is important to make improvements and communicate the results to the public. As such, several output indicators can be taken in into account, such as those indicated in Chapter 5:

- Waste diverted from landfill (T/inhabitant/year or %).
- CO_2 emission saved (T CO2/capita or %).
- Raw material avoided (T/inhabitant/year or %).
- Use of recovered material (T/inhabitant/year or %).
- Energy savings (Kgoe/ inhabitant/ year or %).
- Water savings (ML/inhabitant/year or %).

Awareness and transparency: Promote a circular economy culture and enhance trust

Practices enhancing transparency and information can: remove cultural barriers in recycling and reuse of materials; promote a trustworthy environment for companies to co-operate along the value chain; increase social acceptance; and lead to more conscious choices, creating a market for circular products and services.

Promoting a circular economy culture would consist of raising awareness on the circular economy among citizens, businesses and relevant actors and encourage sustainable production and consumption practices. This can be done through targeted communication, such as:

- Communication campaigns to show the impacts of the circular economy (compared to a linear system), how citizens and different actors can contribute to it and share success stories.
- A dedicated website to share knowledge and good practices concerning the circular economy.
- Events for knowledge sharing, networking and the promotion of the circular economy at the local level, as well as conferences and seminars in schools and universities.

- Use of social media to provide quick updates and information on the topic and related events.

For example, the city of Valladolid, Spain, organises "circular weekends", during which entrepreneurs connect with each other and join forces on circular projects (OECD, 2020[6]). The London Waste and Recycling Board (LWARB), United Kingdom (UK), has started recruiting circular economy ambassadors in different companies and local authorities to share the benefits of the circular economy for each economic sector and to raise awareness at the workplace (LWARB, 2017[13]). In North Karelia, Finland, a regional co-ordination group organises seminars in different topics related to the circular economy for raising awareness. Several cities and regions use online platforms, such as an online portal on the circular economy (Paris, France) and waste-related information in real time (waste operators in North Karelia, Finland). The city of Austin, US, created a materials marketplace to foster secondary materials exchanges; Phoenix, US, developed an online Recycle Right Wizard to provide recycling information to local residents.

Certificates, labels and awards can enhance trust and lead to more conscious production and consumption choices. Local and regional governments could consider introducing a label for local circular activities, for example related to food (e.g. restaurants), construction or other sectors. The introduction of these labels could be a means to incentivise businesses to produce, make and distribute according to circular economy principles while providing consumers with information to make conscious consumption choices. Awards can also incentivise businesses, non-governmental organisations (NGOs) and civil society to contribute to the transition to a circular economy. Criteria for labelling could be formulated following detailed studies by universities and research centres. They could include: the use of recycled materials; development of life cycle analysis; a plan for material transformation; eco-design, etc. There are several examples of labels and certificates granted when products are produced locally, with little or no packaging, reduced energy consumption, waste properly treated according to the best available options, etc. For example, the French Roadmap for the Circular Economy includes the deployment of voluntary environmental labelling in five pilot sectors (furnishing, textile, hotels, electronic products and food products). More precisely, it aims to provide higher visibility of the existing environmental labels, such as NF Environment in France (a collective certification label for producers that comply with environmental quality specifications) and the European ecolabel, as well as the development of a quality label for second-hand products (French Government, 2018[14]). The Amsterdam Made certificate was developed at the request of the Amsterdam City Council. Its main objective consists in informing consumers about products that are made in the Amsterdam area, while simultaneously seeking to boost creativity, innovation, sustainability and craftsmanship. OrganiTrust® is a worldwide certification body that issues certificates on the circular economy in the following sectors: food contact material, personal care and cosmetics, furniture, toys, textiles and fabrics, electronics, building materials, medical safety equipment and household chemicals and detergents. Moreover, it also provides this certification to some service activities, such as transport, construction, telecommunications, cleaning and parking. Once the product or service has achieved the certification, it must be renewed annually (Organi Trust, 2019[15]).

Facilitators

The circular economy transition calls for co-operation between stakeholders and citizens, across levels of government and public offices. Cities and regions can play the role of facilitators by: i) implementing effective multi-level governance co-ordination; ii) enhancing policy coherence and systemic thinking; iii) fostering stakeholder engagement; and iv) adopting a functional approach to identify the appropriate scale for action.

Co-ordination: Implement effective multi-level governance

Co-ordination across levels of government is important to address common circular economy-related issues; align objectives; and avoid asymmetries or lack of information between the actors at the local, regional and national levels. The following tools could be taken into account:

- Ad hoc co-ordination bodies, such as committees, commissions, agencies or working groups.
- Ad hoc meetings for city-province-region-state co-ordination.
- Joint projects on the circular economy.
- Shared databases and information systems.
- Contracts/deals with the national government as tools for dialogue, for experimenting, empowering and learning.

Examples of co-ordination across levels of government include: the Spanish national circular economy strategy, which created an inter-ministerial body that includes the national government, the Autonomous Regions and the local governments through the Spanish Federation of Municipalities and Provinces (FEMP); and the Public Waste Agency of Flanders (OVAM), which in 2018 set up a national platform for the circular economy, through which the top levels of federal and regional environment departments, economy/innovation departments and finance departments meet twice a year to decide on common action in priority policy fields (OECD, 2020[1]). In the Netherlands, the *Circular City Deal*, promoted by the city of Amsterdam in 2016, aims to strengthen co-operation across cities and the national government. The section below on the role of national governments provides further insights on the vertical co-ordination.

Policy coherence: Foster system thinking

The variety of actors, sectors and goals makes the circular economy systemic by nature. It implies integration across often siloed policies (e.g. environmental, regional development, agricultural, industrial policies). Synergies across climate adaptation policies and plans, mobility, land use and service provision could benefit from the implementation of circular economy principles, whereby resources are used at their foremost and waste is minimised. A systems approach refers to a set of processes, methods and practices that aim to affect systems change. For cities and regions, this approach implies:

- Developing a vision and related strategies to transform the system in the face of changing circumstances.
- Mobilising a broad range of actors to achieve a common good rather than narrow institutional interests.
- Facing constant adjustment throughout the policy cycle, with implications on how institutions, processes, skills and actors are organised.

For this to happen, certain conditions should be in place, such as the existence of a champion committed to change; capacity to experiment; ability to engage with internal and external stakeholders; and sufficient resources to delay a business-as-usual approach (time, capital, etc.). Understanding problems and needs requires identifying underlying gaps and synergies across sectors and actors and connecting the dots (Hynes, Lees and Müller, 2020[16]). Municipal or regional departments should co-ordinate in order to: strengthen synergies across departments to avoid duplications, overlaps and grey areas; clarify targets and expectations of the circular economy initiatives; and develop a common narrative throughout the departments, while aligning targets.

There are several international experiences to foster co-ordination across municipal departments (horizontal). The cities of Melbourne (Australia), Oulu (Finland) and Toronto (Canada) created dedicated horizontal working groups (Chapter 2). The city of Toronto created a Cross-Divisional Circular Economy Working Group which is now comprised of 11 divisions to co-ordinate and increase the capacity of city divisions for implementing the circular economy initiatives. The working group's mandate is to provide informed input, ideas and feedback during the development of the city's circular economy initiatives. Convening this cross-divisional groups helps the city identify sector-related trade-offs as they move forward with circular economy implementation.

Stakeholder engagement: Facilitate collaboration amongst public, private and not-for-profit actors

According to the OECD (2015[12]), "collaboration between institutions, organisations or citizen fora to combine resources and competencies in relation to a common project or challenge to solve can take place at various scales and they are often characterised by a joint agreement of the stakeholders involved to share the risks and the benefits". Local or regional governments can facilitate information, experience exchange and agreements amongst public, not-for-profit actors, knowledge institutions and businesses to foster synergies and innovation. For example, academic research could be related to local needs towards a circular economy transition and connected with the local productive ecosystem of small- and medium-sized enterprises (SMEs).

Cities and regions can:

- Engage with academia and research centres to build knowledge, experiments and carry out specific analyses on flow, stocks and material input and outputs.
- Find solutions to close, narrow and slow the loops, for example digitalising information and data.
- Create interactive online platforms to encourage stakeholders to exchange information with each other on their needs and monitor the activities and updates of the platform.
- Provide opportunities for collaboration through multi-stakeholder platforms.
- Stimulate demand for new solutions (e.g. modular buildings) to be developed through conjoint actions between knowledge centres and business sector.
- Identify possible pilots and experimentations that would involve R&D and university departments, based on the needs of the municipality or regional government (e.g. circular activities in sectors such as mobility, tourism, food, waste, bioeconomy, etc.).
- Collect academic and business proposals to put in place circular activities with social impact and consider support for implementation (e.g. financial support for students).
- Create coworking spaces for cross-fertilisation amongst several actors.

For example, the city of Phoenix, US, created together with Arizona State University a Resource Innovation and Solutions Network (RISN) incubator for accompanying businesses in the shift towards the circular economy.

Appropriate scale: Adopt a functional approach

A functional approach goes beyond administrative boundaries of cities and regions and leads to finding solutions at the most relevant and appropriate scale. As such, the circular economy can reinforce and create opportunities across urban and rural areas, as well as close or narrow loops at regional levels. Cities and regions can also support initiatives at the micro level (e.g. neighbour or districts) in order to test experiments and pilots. Some actions to foster these linkages can consist of: exploring possible scales to implement the circular economy principles and demonstration projects (e.g. a neighbourhood, a city district, industrial parks, the metropolitan area, the surrounding rural areas, etc.); identifying industrial and urban symbiosis opportunities; or evaluating partnerships with local or metropolitan service operators to apply circular economy principles (e.g. waste and water services, infrastructure).

Local governments can facilitate neighbourhood or community-based plans and initiatives, which in most cases are experimental in nature. Identifying places, areas and communities to experiment and share tools among neighbours for small-scale initiatives can be a first step to foster change at the local level, test the viability of circular initiatives with a lower risk, stimulate the creation of new ideas and circular business models and share knowledge on circular economy practices. In Paris, France, since 2010, the Urban Lab has accompanied more than 200 experiments and consolidated a methodology to support effective experimentation in four main stages: i) definition of the experimental project and its evaluation; ii) search

for the experimental site; iii) deployment of experimentation; and iv) evaluation and transformation. To facilitate access to these experimental sites, the Urban Lab is based on a legal framework that has been working over ten years, including a public space occupancy agreement and a ready-to-use legal framework (Paris&Co, 2019[17]).

Local and regional administrations have a key role to facilitate an urban-rural dialogue in order to involve farmers, SMEs, consumers, businesses and knowledge institutions in the circular transition and foster new cross-cutting solutions (e.g. some key sectors include the bioeconomy, food, biomass, construction, agriculture and chemistry). This would strengthen a territorial approach of the circular economy, integrating rural areas as part of the solution, in order to foster regional changes in production and consumption practices. There are international experiences connecting urban-rural areas in this field. Kitakyushu City, Japan, has established a food-recycling loop between rural-urban areas, while in Tampere, Finland, eco fellows are co-ordinating rural-urban partnerships related to biogas. They work as a hub that brings together different actors that have not been in contact before (farms, power plant operators, logistics etc.) (Chapter 3).

Enablers

Cities and regions can act as enablers of the transition, providing the conditions for the circular economy to happen in practice. To this end, cities and regions can: i) adapt and update regulatory instruments to foster the transition to the circular economy; ii) mobilise and efficiently allocate financial resources for circular economy initiatives; iii) develop training programmes to foster human and technical capacities; iv) support business innovation; and v) generate an information system and assess impacts of policies and strategies.

Regulation: Identify the regulatory instruments that need to be adapted to foster the transition to the circular economy

The transition to the circular economy would require proper regulation in key sectors such as waste, water, food and building and construction, to name a few. Identifying available tools (such as specific requirements for land use), environmental permits (e.g. for decentralised water, waste and energy systems) and regulation for pilots and experimentation would clarify potential regulatory uncertainties across different legal entities, gaps and future needs. This could imply a dialogue with the national government when the responsibility goes beyond that of cities and regions. Also, it would be key to identify cases in which it is possible to adapt the regulation (e.g. land use, permits) at the local level. For example, the city of Amsterdam, Netherlands, developed tenders for land allocation, primarily for new-build projects (Roadmap Circular Land Tendering, city of Amsterdam, 2019) and supported the creation of a circular neighbourhood, the Circular Buiksloterham. Once one of the most polluted areas in the city, it is now turning into a circular area for living and working. The type of innovations and solutions promoted by these experiences in terms of urban planning and land tendering (e.g. circular construction, change of land use) helped overcome the actual administrative, legal and financial obstacles that they face.

GPP regulations could be supportive of eco-efficiency and eco-design, reducing the negative environmental impacts of public purchases at the local level. GPP can steer the market and should be systematically implemented.

International examples can inspire innovative procurement for the circular economy in cities and regions (Chapter 2). Key actions include:

- Establishing clear requirements in tenders to foster efficient material use and reuse, quality and maintenance (e.g. use of secondary materials in publicly purchased goods). For instance, the city

of Ljubljana, Slovenia, and the city of Paris, France, have adopted a scheme for responsible public procurement and introduced environmental criteria in tenders.

- Applying the life cycle analysis to look beyond short-term needs and consider the longer-term impacts of each purchase. The analysis provides broader evidence on the importance of dimensions besides price that should be taken into account to make procurement decisions more circular.
- Stimulating a dialogue between the main actors, the procurement officials and potential contractors, in order to incorporate circular requirements for suppliers and design tenders to promote circularity. This would strengthen the relation across suppliers, those in charge of preparing the tenders and those who manage the contracts once in place. According to Wijkman (2019[18]), "if cities increase their demands specifically for circular solutions, it naturally becomes more attractive for designers and producers to offer circular products and services. However, procurers often lack the knowledge of how to incorporate relevant circular requirements for suppliers and how to design tender documents to promote circularity. The same is often true among market players like designers, manufacturers and retailers. Hence, to make circular procurement possible, a dialogue between the main actors – the procurement officials and potential contractors – will be crucially important. Such a dialogue goes against the conventional practices within public procurement".
- Carrying out market analysis and stimulating demand. Pre-tenders can help with the pre-analysis of the market and stimulate innovation, avoiding tenders that do not receive any offer from the market. For example, Italy launched the framework contract on "integrated energy management services" for heating services including improved energy efficiency, consumption reduction and CO_2 emission avoidance. At that time, pre-procurement market consultations were carried out, using online questionnaires addressed to businesses and the main trade associations (OECD, 2014[19]).
- Stimulating a dialogue among the governmental departments (e.g. economic, environmental, urban planning and waste departments) involved in promoting the circular transition can be key to overcome capacity and co-ordination gaps within the procurement area.
- Considering divide public tenders into lots that enable SMEs and local self-employed workers to participate can be a way to upscale innovative circular projects. For example, Austria, through its' Action Plan on Public Procurement Promoting Innovation, calls for public authorities to procure in lots and define qualification and award criteria in a way that gives SMEs a chance to participate in competitions. The Korean government prioritises the purchase of technology products developed by SMEs. The federal government in Germany has recently launched a tool that uses algorithms, public statistical data, information of the specific industry on the procurement in question to suggest the best way to split tenders into smaller parts (OECD, 2018[20]).
- Creating 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. For example, the city of Toronto, Canada (OECD, 2020[1]) has developed a Circular Economy Procurement Implementation Plan and Framework to use its purchasing power as a driver for waste reduction, economic growth and social prosperity.

Financing: Help mobilise financial resources and allocate them efficiently

Cities and regions can facilitate access to finance and broaden the range of financial instruments for supporting circular businesses, considering the available funding options and budget capabilities, from grants to venture capital. For example, the city of Amsterdam, Netherlands, used revolving funds to support more than 65 projects related to climate, sustainability and air quality for a total of EUR 30 million (C40 Cities, 2016[21]). Moreover, the LWARB supports circular businesses through the Circular Economy

Business Support Programme. This venture capital and growth capital fund supports circular economy SMEs that are already in the market (LWARB, 2019[22]). Circular economy principles could become evaluation criteria in funding related to local or regional development and innovation.

Creating financial incentives would support businesses and a behavioural shift. An option would be, for example, to create a scheme to offer subsidised loans to SMEs or credit guarantees to circular economy companies, in co-operation with private and semi-public financial institutions (e.g. banks, business funds). The idea would be for the municipality/public fund to compensate the financial institution for part of the interest rates or provide guarantees on collateral, to attach a value to the "public good" created by circular economy companies. Other tools are: rewards to companies through the corporate income tax (e.g. based on the waste generation level, water and energy consumption, use of recycled materials as raw materials); reduced value added tax (VAT) on products labelled as circular (e.g. easy to recycle and reuse, proximity).

Capacity building: Adapt human and technical resources to the challenges to be met

Training programmes can be distinguished between training for public administrations and those for the private sector and civil society, to enable business opportunities and raise awareness. Training can be related to technical issues for specific sectors, from agro-food to construction and demolition, or to the use of tools for enhancing the circular economy, from creating ad hoc strategies, to improving GPP.

Circular economy strategies, projects and proposals in cities are often based on experimentation and pilots. This is both an opportunity for creating new knowledge and information, but also a challenge in terms of the human and technical capital needed to design and implement sustainable, efficient and effective circular economy policies. One way for cities to share knowledge and build capacities is through city-to-city learning, offered by dedicated networks.

In the context of the development of a circular economy strategy, a first step for cities and regions would consist in reviewing and analysing the required skills and capacities for:

- Setting a circular economy strategy that is realistic, result-oriented, tailored and coherent with national and regional objectives.
- Co-ordinating across different levels of government, ensuring complementarities and achieving economies of scale across boundaries.
- Engaging stakeholders in the planning process of circular economy strategy.
- Ensuring adequate financial resources by linking strategic plans to multi-annual budgets and to mobilise private sector financing.
- Collecting and analysing data, monitoring progress and carrying out evaluations.

Training can also provide entrepreneurs and employees with deeper knowledge and tools to succeed in their circular projects and discover business opportunities in a circular economy. For example, the Public Waste Agency of Flanders (OVAM), Belgium, as part of Flanders Circular offers a Masterclass on Circular Economy. In four half-day sessions, participants discover the opportunities for their business in a circular economy. The 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.

Innovation: Support business development

Innovation in the circular economy is not only related to sustainable technologies but also new partnerships (public-private) and new business models. Local and regional governments can support market innovation and business development through a variety of initiatives, such as:

- Creating spaces for experimentation. Cities and regions could provide experimental spaces that could also be labelled (e.g. Circular Innovation Spaces) to attract stakeholders, such as

entrepreneurs and scientists. For example, Amsterdam's "free zones" provide suitable spaces to test decentralised renewable electricity generation and smart grids.

- Stimulating demand by being a launching customer. Cities and regions 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. The local/regional government can stimulate this demand by seeking for solutions. If the solution provided by a project is successful, the municipality or region can invest in it, being the first customer of innovative products and goods. For example, the Dutch national government applied the Circular Challenge Project: the government supports financially profitable business cases and can act as a "launching customer" (Ministry of Infrastructure and the Environment/Ministry of Economic Affairs, 2016[23]). The Start-up in Residence (San Francisco, US) connects start-ups and businesses to provide solutions to the city's problems through transparent selection processes.
- Creating stakeholder networks for material chains. Cities or regions can provide stakeholder networks with the opportunity to develop business plans and fund new innovative ideas. For example, in Tilburg, Netherlands, a network for the textile sector aims to facilitate exchanges among entrepreneurs, producers, retailers, as well as educational institutes, local governments and banks. It is key to share experiences across experts in each sector (e.g. tourism, construction, waste, etc.) to have a better understanding of what can be done, where the gaps are and how they can be overcome.
- Creating incubators to promote circular economy projects. An incubator could support innovative projects related to the circular economy by: providing management and business assistance; promoting connections with strategic partners in the private, public and academic sectors; facilitating access to financial opportunities (investors, loans, public programmes); and providing a physical space for the projects to develop. For example, London set up a programme called Advance London to start up and scale up businesses related to the circular economy, while Paris created Paris & Co to promote innovative sustainable solutions for the city and enhance the science-industry co-operation.
- Establishing a single window for the circular economy for businesses. This window should offer all services, information and administrative support regarding circular economy projects for businesses, to reduce transaction costs for entrepreneurs and SMEs willing to be part of the transition. The initiative Start-up Slovenia, established in 2014, mobilises a network of mentors from various backgrounds to provide entrepreneurs and young firms with tailored advice. Nowadays some start-ups also work within the circular economy field (OECD, 2019[24]).

Data and assessment: Generate an information system and assess results

A wide range of data can support the monitoring and evaluation of policies, programmes and strategies, as well as help reach a better understanding of what the circular economy is and improve policymaking and implementation. For instance, in the case of the building sector, data on materials for construction would help understand what kind of materials are used for building and how they can be used in the future (Chapter 3). Mapping empty buildings would help avoid new constructions and plan alternative use of existing ones; mapping input and output of material flows would help establish priority actions.

Digitalisation plays an important role in this case, as big data, the Internet of Things and blockchain tools can provide real-time information, enable material traceability and foster reuse through online platforms and applications. Cities and regions can generate open data sources, make collected data publicly accessible, understandable and updated regularly. For example, the Circular City Data Programme is a project promoting a collaboration between start-ups, city agencies and larger firms to collect, produce, access and exchange circular data aiming to build new and sustainable social, economic and environmental models in New York City, US (New Lab City, 2019[25]).

The local or regional government can take into account the following types of data:

- Environmental data (e.g. resources, waste and circulation processes), flows (water, energy, products, food, transportation, information, people) and social data (circular jobs created).
- Data on empty buildings, materials used for construction and waste streams.
- Data on circular economy existing initiatives, as well as laws and regulations that can foster the transition from the linear to the circular economy.

The role of national governments in supporting the transition to a circular economy

Cities and regions can play an important role in the transition towards a circular economy given their ability to enable new business models, such as those within the framework of the sharing economy. They play a central role in key infrastructure sectors such as waste prevention, management and recycling, urban transport and water supply and sanitation. Regions, on the other hand, hold responsibilities on regional development, industrial policy and economic growth, amongst others. However, to achieve circular economy goals, subnational governments need to be supported by an enabling framework that national governments can establish effectively.

National governments can accompany the transition. Regulatory, financial and economic instruments are needed to transition to the circular economy. It is crucial to set the right policy and regulatory frameworks in place at all levels. For example, there are relatively few instances of regulatory requirements on the eco-design of products that seek to promote material efficiency or circularity. Eco-design regulations should go beyond energy-related areas and consider materials and typology of products in a broader perspective (Ekins et al., 2020[26]). The OECD (2016[27]) shows that extended producer responsibility (EPR) schemes can increase incentives for eco-design. In order to decrease material use and prevent pollution, some countries have employed single-use plastic bags.

It is important to correct misleading incentives, remove harmful subsidies and count environmental externalities in the pricing. Taxes on the extraction or use of natural resources are rarely implemented. Even where they are (e.g. Denmark, Sweden and the UK), they have had limited effects on encouraging more efficient resource use and recycling of secondary materials due to low tax rates (Söderholm in Ekins et al. (2020[26])). A renewal in the taxation of emissions and natural resource consumption and directing tax incomes to lighter taxation of employment and entrepreneurship would greatly facilitate and enhance the transition, as well as identify subsidies with harmful environmental impacts (Wijkman, 2019[18]). Environmentally related taxes are increasingly being used in OECD economies and can provide significant incentives for innovation, as firms and consumers seek new, cleaner solutions in response to the price put on pollution. These incentives also make it commercially attractive to invest in R&D activities to develop technologies and consumer products with a lighter environmental footprint. Some of the tools available are: environment-related taxes, fees and charges (increase the cost of polluting products or activities); tradeable permits (used to allocate emission or resource exploitation rights); deposit-refund systems (places a surcharge on the price of potentially polluting products and is refunded when returned successfully, avoiding waste generation) (OECD, 2020[28]). The OECD (2016[29]) calls for applying mixes of policy instruments to ensure a coherent set of incentives for resource efficiency along the product value chain.

The education sector is also identified as a major booster for the dissemination of circular economy principles. Circular economy principles can be integrated in career training programmes of teachers, senior and middle management, public officials, etc., as well as in educational programmes in schools and academic curricula.

Countries pursuing the circular economy can promote research that aims to foster innovation and technology acquisition, while increasing the competitiveness of the industrial sectors. Focusing on research and innovation creates solutions – in products, services, business models, consumption/use, behaviour – with lower emissions and resource intensity. Countries could support digital and robotic circular options that improve recycling through traceability and sorting of materials and rationalise circular business models. However, both public, commercial and private data sources pose significant regulatory and ethical challenges.

National strategies on the circular economy can help cities and regions develop their own vision based on common targets and objectives, as well as learn from one another. The circular economy can be a game-changer for countries, regions and cities if able to put in place integrated and interconnected policies. In most of the cases, a circular economy represents an emerging concept, difficult to understand. Projects and programmes, sometimes very ambitious in theory, cannot be easily carried out in practice: this may be due to the lack of specific skills and human resources; financial resources or incoherent regulation across levels of government. Learning by doing, though, can help rethink the overarching governance and economic models that would lead to a transition from a linear to a circular economy. Therefore, any attempts are worth the effort to create the right incentives, stimulate innovation and generate adequate data and information. Exchanging practices across levels of government can help investigate and overcome obstacles.

The OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions

What for

The OECD Scoreboard on the Governance of the Circular Economy is intended as a self-assessment tool based on the 12 key governance dimensions that would enable a circular economy system to take place. Transitioning from a linear to a circular economy requires governance conditions to be put in place, from regulation to financing, information sharing, stakeholder engagement and policy evaluation, amongst others. While the identified governance conditions are not exhaustive, understanding whether these conditions exist and are well implemented is key for policymakers to assess what works, what does not and what can be improved.

The OECD scoreboard offers to cities and regions undertaking the assessment:

1. An *overview* of the current situation concerning 12 governance dimensions, to make decisions based on facts and clear objectives. The scoreboard allows countries, regions and cities to evaluate whether the necessary enabling conditions are in place, could be improved or missing.
2. G*uidance* for improvement: Governments carrying out the self-assessment will be able to identify the policy areas in which action is needed to promote, facilitate and enable the circular transition. Once the main challenges have been identified, the scoreboard can help governments identify the relevant policy actions to make progress from newcomers to advanced. The scoreboard allows governments to identify their level of advancement towards each of the identified governance conditions at the time of the evaluation (baseline) and measure progress over time.
3. A tool for *dialogue*, since the self-assessment is based on a multi-stakeholder participative process (see section “How to carry out the self-assessment”). The multi-stakeholder process on which the self-assessment is based can help improve policies and tools thanks to the feedback received and proposals for improvement. It can also help raise awareness of the opportunities of circular transition and build consensus on the main challenges and potential ways forward.

The OECD Scoreboard on the Governance of the Circular Economy is the result of several consultations with stakeholders and experts. Nonetheless, this represents a first attempt to accompany governments towards the transition. Further development can be foreseen in the future (Box 6.1).

Box 6.1. Key steps to develop the OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions

The OECD Scoreboard on the Governance of the Circular Economy presented in this chapter is the result of the analysis of existing circular economy strategies collected in the OECD Inventory of Circular Economy Indicators, discussions on dedicated platforms and the OECD online workshop "Measuring circularity in cities and regions through the OECD scoreboard".

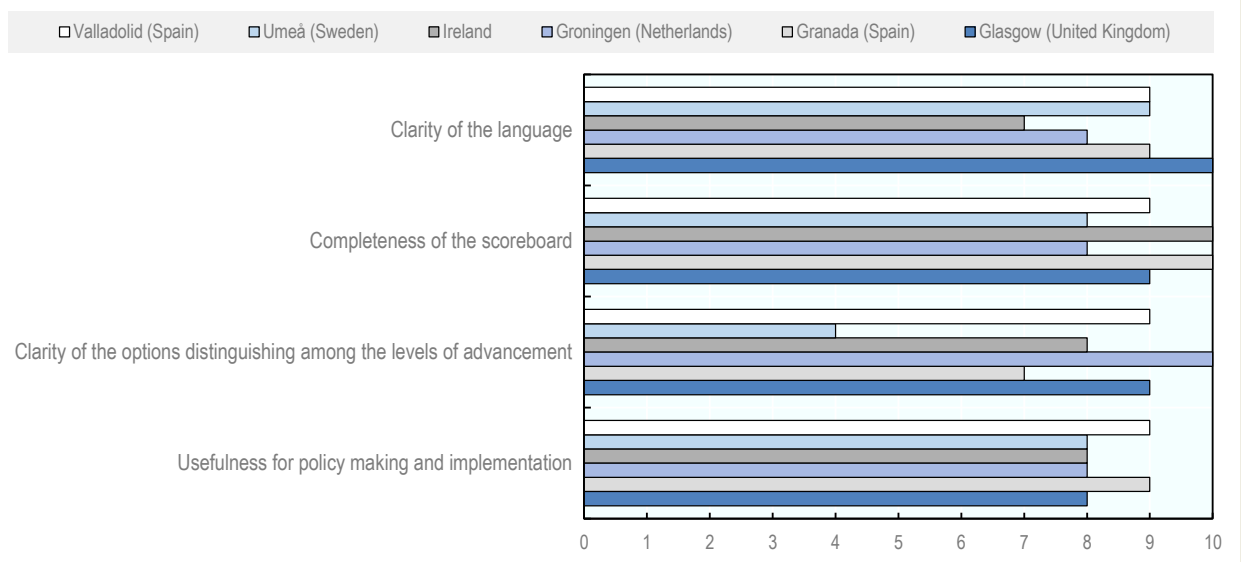
The OECD Inventory of Circular Economy Indicators (Chapter 5) shows that a variety of input, process, output and outcome indicators exists to measure the implementation of circular economy strategies. However, there is no comprehensive tool to accompany decision-making and assess the level of advancement towards a series of governance dimensions that are key to make sure that a transition to the circular economy can effectively and efficiently take place. This is the aim of the OECD Scoreboard on the Governance of the Circular Economy.

The OECD Scoreboard on the Governance of the Circular Economy has been discussed on dedicated platforms and benefitted from the feedback provided by circular economy specialists, public officials and key stakeholders that participated in:

- The 1st OECD Roundtable on the Circular Economy in Cities and Regions, which took place at the OECD Headquarters, Paris, on 4 July 2019.
- The webinar "What's new on the circular economy in cities and regions and how to measure circularity?" (31 March 2020).
- The online workshop "Measuring circularity in cities and regions through the OECD scoreboard" (12 July 2020).

The workshop brought together the six OECD case studies, namely on: Glasgow, UK; Granada, Spain; Groningen, Netherlands; Valladolid, Spain; Umeå, Sweden; and the National Government Ireland. It aimed to discuss the clarity and usefulness of the scoreboard, the relevance of the key governance dimensions to improve decision-making, methodological issues towards disaggregated or composite indicators and visualisation options. Representatives from the six case studies expressed overall consensus on the relevance of the key governance dimensions included in the preliminary version of the scoreboard, its completeness and suggested visualisation. Figure 6.4 shows how each case study ranked the clarity (8.7 on average), completeness (9 on average), and usefulness for policymaking (8.3 on average) of the OECD scoreboard in a 0-10 scale to the questions detailed.

Figure 6.4. Feedback received on the scoreboard from the OECD Case Studies



It was suggested to clarify the aim of the scoreboard as a policy measurement framework, further disaggregate the levels of advancement (*newcomers, in progress, advanced*) and provide guidance on how to perform the assessment.

How to carry out the assessment

To carry out the self-assessment, the following procedure is recommended (Figure 6.5): i) identify the lead team to co-ordinate the self-assessment; ii) set objectives and scope of the assessment; iii) map stakeholders; iv) organise targeted workshops with key stakeholders to perform the assessment, and; v) repeat the process once a year.

Figure 6.5. A five-step self-assessment methodology

- **Identify the lead team to co-ordinate the self-assessment**. To ensure the achievement of a successful self-assessment process, a lead team should be clearly identified to co-ordinate the whole process. It can be a municipal or regional department, a dedicated office or agency, etc. In practice, the lead institution should have the convening power to gather stakeholders and to thoughtfully plan and manage the entire self-assessment process. In addition to ensuring knowledge and capacity to carry out the assessment, the lead institution should be motivated and able to promote and put in practice the proposals for change, as a result of the assessment. The lead institution should also take into account the need for human and financial resources to carry out the assessment and organise multi-stakeholder workshops.
- **Set objectives and scope of the assessment**. Several objectives can trigger the assessment of the OECD Scoreboard on the Governance of the Circular Economy. The self-assessment is a tool for dialogue among stakeholders to identify policies and governance instruments that are

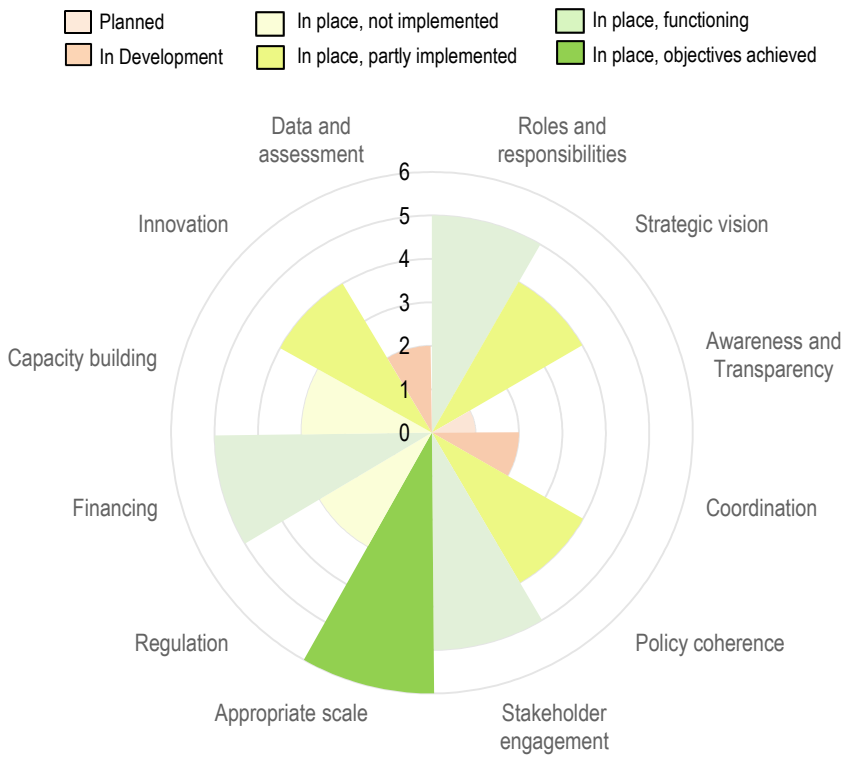
performing well or where adjustments are needed. More specifically, the self-assessment can be carried out to: promote collective thinking among stakeholders; share knowledge and address asymmetries of information across governments and stakeholders; foster learning across stakeholders involved in the circular economy; identify gaps in existing policies, institutions and instruments; develop critical thinking on who does what and how.

- **Map stakeholders**. Horizontal co-ordination (across departments) is important to get in-depth information about the current work in specific areas that can be related to a circular economy system. Collectively responding to scoreboard questions can be a way to raise awareness among the government structures, engage new areas with the circular transition and avoid siloes. Beyond governmental departments, public, private and non-profit actors can improve the quality and representativeness of the self-assessment process. It would be important to also take into account their responsibilities, core motivations and interactions. The lead team responsible to co-ordinate the assessment should then map and engage stakeholders in the assessment and take into account input to define priorities and actions.
- **Organise targeted workshops with key stakeholders to perform the assessment**. The workshops can be platforms in which stakeholders can share, compare and confront their views and achieve consensus. Stakeholder groups have a key role as "do-ers" of the circular economy. The number of meetings may change depending on the opportunities for stakeholders to provide input in between the workshops and to build consensus on the assessment and actions needed. During each workshop:
  - Allow time to present the OECD scoreboard dimensions and key concepts.
  - Discuss and agree on the score for the level of advancement achieved for each governance dimension. For each governance dimension in the scoreboard, the respondent should enter in the cell on the right of each table a score or "not applicable (N/A)", when information is not available or not applicable. The potential scores that may be given for each question range from 1 to 6 or N/A, corresponding respectively to:
    - Newcomers: Planned (1); In development (2).
    - In progress: In place, not implemented (3); In place, partly implemented (4).
    - Advanced: In place, functioning (5); In place, objectives achieved (6).
  - Respondents are encouraged to provide further information considered relevant, or web-links to further document the responses. Also, liaising with statistical offices and other areas producing data is key for the process and future policymaking decisions related to the circular transition.
  - For each dimension, respondents can evaluate how satisfactory the implementation of each governance dimension, by selecting the icon corresponding to the level of satisfaction of the process (not satisfactory; to be improved; satisfactory).
- **Consider repeating this process once a year**. The scoreboard can serve as a baseline against which to compare a second assessment, which could occur a year after to verify changes and improvements. Repeating the evaluation annually may help engage stakeholders throughout time. It should be taken into account, though, that changes in governance may take more than one year to be put in place.

The following provide two possible visualisations of the results. Figure 6.6. shows the graph visualisation that provides an overview of the level of circularity of a city or region for each the 12 circular economy governance dimensions of the checklist. This helps identify which dimensions the city or region is better performing and where further action is needed. Figure 6.6 presents the traffic light system visualisation (red for "Newcomer", yellow for "In progress" and green for "Advanced") that shows at a glance in which areas the government performing the self-assessment would need to improve.

Figure 6.6. Visualisation of the OECD scoreboard results

A. Graph



B. Traffic light system

	Roles and responsibilities	*Strategic vision*	*Awareness and Transparency*	*Coordination*	*Policy coherence*	*Stakeholder engagement*	*Appropriate scale*	*Regulation*	*Financing*	*Capacity building*	*Innovation*	*Data and assessment*
City												

Source: Author's elaboration

The OECD Scoreboard on the Governance of the Circular Economy in Cities and Regions

Roles and responsibilities

Roles and responsibilities	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is the city (or region) a role model for the transition towards the circular economy?						
	There is a political commitment to transition from a linear to a circular economy. Circular economy initiatives are planned.	The government is in the process of clarifying who does what and how to lead the transition towards the circular economy.	There is clear leadership and the government is identifying how to be a role model and lead by example.	The government starts implement a range of actions leading towards circular economy models, from preventing waste generation, use secondary material, etc.	There is commitment and leadership. The government is "putting in practice what it preaches" through concrete examples and activities.	The government adopts circular economy principles in all policies and activities. It is a role model for citizens and businesses and leads by example. Roles and responsibilities are clearly allocated across municipal/ regional departments.
Additional information:						Score: [Enter score]
Level of satisfaction of "Roles and responsibilities": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Strategic vision

Strategic vision	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is a strategic vision for the transition towards the circular economy developed and implemented?						
	The government is planning to develop a circular economy strategy, based on clear political willingness, leadership and co-ordination across departments. The lead institution is mapping all concerned stakeholders to engage them in the circular transition.	The circular economy strategy is in development, through the performance of technical analyses of urban stocks and flows, mapping of the existing circular initiatives in various sectors, definition of goals and actions, stakeholder engagement mechanisms to co-create the strategy.	A circular economy strategy is in place, establishing priorities, goals and actions. Financial and human resources are being consolidated.	A circular economy strategy is in place and partially implemented. Stakeholders are engaged.	A circular economy strategy is in place. Actions are performed by public, private and not-for-profit actors. Financial, regulatory and other gaps are being checked and overcome, when possible.	A circular economy strategy is in place with specific goals consistently achieved and periodically monitored and revised.
Additional information:						Score: [Enter score]
Level of satisfaction of “Strategic vision”: Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Awareness and transparency

Awareness and transparency	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is a circular economy culture promoted?						
	The government identifies means to raise awareness on the circular-economy-related opportunities. This can take the form of a social media campaign, events and communication campaign.	The government is establishing structured information points, such as a dedicated website and plans workshops with key stakeholders, to discuss obstacles and opportunities of the transition to the circular economy.	Communication campaigns, stakeholders mapping and the identification of spaces for dialogues for collaboration are identified but not yet operative.	The government puts in place dedicated awareness campaigns for stakeholder's groups and identifies ways to enhance collaboration, dialogue and strengthen the market space (e.g. through dedicated spaces, labels, certificates).	Information on the circular economy opportunities flows and stakeholders are informed. This information is regularly updated.	Stakeholders are informed, clear communication is in place. Producers and consumers are aware of the opportunities and of the means made available by the government to boost the transition towards a circular economy.
Additional information:						Score: [Enter score]
Level of satisfaction of "Awareness and transparency": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Co-ordination

Co-ordination	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Are co-ordination mechanisms across levels of government (e.g. regional, national, supranational) to implement circular economy initiatives in place?						
	Synergies across levels of governments are identified, to align objectives and find solutions to regulatory, financial, information issues, amongst others.	Representatives from various levels of governments are kept informed and specific circular economy co-ordination mechanisms across levels of government can be developed for regular updates.	Circular economy co-ordination mechanisms across levels of governments are developed and opportunities for collaboration identified but not yet implemented.	Circular economy co-ordination mechanisms across levels of governments are in place and representatives are working together on joint projects, pilots, experimentation.	Circular economy co-ordination mechanisms across levels of governments are in place and deliver concrete results. Experiments are scaled up and consolidated.	Circular economy co-ordination mechanisms across levels of governments are functioning and leading to actions, which are monitored and revised.
Additional information:						Score: [Enter score]
Level of satisfaction of "Co-ordination": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Policy coherence

Policy coherence	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is the circular economy initiative linked to other strategies, plans and programmes developed by the local or regional government (e.g. smart, green, sustainable, etc.)?						
	The circular economy can be a means to achieve objectives stated in existing strategies (e.g. green, carbon-neutral, etc.). These strategies are identified.	The government is developing co-ordination mechanisms to map needs and priorities across various departments in charge of policies for which circular economy principles and actions can help achieve the expected objectives (e.g. climate change, housing, energy, urban planning, etc.).	While needs, synergies and priorities are identified, implementation is lacking due to conflicting interests and a lack of a system thinking.	Coherence across policies and departments is in place, through co-ordination mechanisms, information sharing and joint projects. This concerns some sectors and, to a lesser extent, others.	Circular economy principles are embedded in strategies, plans and programmes, maximising synergies across municipal departments.	Departments favour co-ordination and link circular principles to key strategies as business as usual. Grey areas, overlaps, conflicting objectives are avoided. Results are monitored and checked for further improvement.
Additional information:						Score: [Enter score]
Level of satisfaction of "Policy Coherence": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Stakeholder engagement

Stakeholder engagement	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is collaboration across the public, private and not-for-profit sectors fostered to boost the transition?						
	The government is planning to promote collaboration with knowledge institutions, businesses and start-ups to work on prioritised areas related to the circular economy at the local or regional level.	The government is establishing a dialogue with businesses and knowledge institutions to find innovative circular solutions to local or regional problems that require knowledge building and entrepreneurial initiative (e.g. from material sorting to a modular building).	Agreements are established but collaboration is not yet implemented.	Collaboration with knowledge institutions and private and not-for-profit actors are in place and partly implemented. As such, results are not yet achieved or only partially achieved with specific stakeholder's categories.	The collaboration is paving the way for an ecosystem in which knowledge institutions, government, businesses and civil society find fertile ground for collaboration, beyond specific projects. As such, this collaboration is supported by the government through the creation of coworking shared spaces for cross-fertilisation amongst several actors and the organisation of events and workshops.	Stakeholders are actively engaged in the transition towards a circular economy, as its implementation is a shared responsibility. The government facilitate contacts and collaboration.
Additional information:						Score: [Enter score]
Level of satisfaction of "Stakeholder engagement": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Appropriate scale

Appropriate scale	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Are circular economy initiatives implemented at the most appropriate scale?						
	According to the characteristics of various sectors (e.g. mobility, built environment, water, etc.), the government is exploring how to facilitate collaboration across value chains and at the most appropriate scale.	The government supports the conceptualisation of circular demonstration projects, experiments and pilots at various scales and makes available spaces, areas, facilities and/or financial support.	Small-scale initiatives are identified, for example at the neighbourhood or community-based level. Functional approaches across urban and rural areas are taken into account.	Circular economy initiatives are experimented at various scales and favour urban-rural linkages, where appropriate.	Circular economy initiatives are embedded in a territorial approach, considering functional rather than administrative boundaries.	Circular economy initiatives are embedded in a territorial approach, considering functional rather than administrative boundaries. Results are monitored and follow-up initiatives are considered.
Additional information:						Score: [Enter score]
Level of satisfaction of "Appropriate scale": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Regulation

Regulation	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Is regulation fit to foster the transition to a circular economy?						
	The government identifies regulatory gaps, obstacles and considers solutions.	The government develops or adapts regulation to enhance the transition towards a circular economy (e.g. plastic, energy use, secondary material). Stakeholders are consulted.	The update of regulations for various or specific sectors (e.g. from land planning to food) is in place but not yet implemented.	Regulation is conducive of circular economy practices in an experimental way. It can be further scaled up.	Regulation is fit to foster the circular economy transition in various sectors.	Regulation is fit to foster the circular economy transition. A dialogue across levels of government is established when responsibilities are shared. Results are monitored and initiatives scaled up.
Additional information:						Score: [Enter score]
Level of satisfaction of "Regulation": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Financing

Financing	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Are financial resources mobilised and efficiently allocated?						
	Financial instruments and/or a dedicated budget for circular economy initiatives and projects are planned.	The creation of a dedicated budget and/or the setup of financing mechanisms for the circular economy are in development (e.g. multi-annual budgets).	Financial instruments are in place but resources not yet allocated.	Financial instruments are in place and partly implemented. Private sector financing is mobilised, if need be.	Financial instruments are in place and functioning (e.g. schemes to offer subsidised loans or credit guarantees to circular economy companies, in co-operation with private and semi-public financial institutions).	Financial instruments are well functioning and impacts are monitored (e.g. promoting systematic recognition of good practices through project audits).
Additional information:						Score: [Enter score]
Level of satisfaction of "Financing": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Capacity building

Capacity building	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Does human and technical capacity match the challenges for setting and implementing a circular economy system?						
	The government is reviewing and analysing the required skills and capacities for carrying out all activities associated with implementing the circular economy.	Specific capacity-building, training or educational programmes for the circular economy are planned. They can be related to green public procurement, resources management, etc.	Some initial capacity-building experiences for the circular economy are in place but they are still fragmented and soft (e.g. workshops, seminars).	Existence of specific capacity-building programmes on the circular economy and/or activities associated with specific aspects of the circular economy and related sectors.	Specific capacity-building programmes are in place. They are result-oriented and tailored to different needs and stakeholders. They focus on developing new skills and technical competencies.	Specific capacity-building programmes are implemented. They contribute to creating new skills, technical competencies and new jobs opportunities.
Additional information:						Score: [Enter score]
Level of satisfaction of "Capacity building": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Innovation

Innovation	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Are tools in place to support circular business innovation?						
	The government identifies urban or regional problems (e.g. waste sorting, modular building, packaging, etc.) that can be solved through innovative approaches (e.g. new business models) and is preparing calls for projects to foster circular business models.	The government calls start-ups and businesses to provide solutions to urban or regional problems through transparent selection processes. If the solution provided by a project proves successful, the local or regional government can invest in it or becomes its launching customer, for example.	The enabling environment for supporting circular business innovation is in place (e.g. regulation, funds) but not yet implemented.	The enabling environment for supporting circular business innovation is in place (e.g. regulation, funds), implemented on an experimental basis (e.g. launching customer).	A variety of instruments to support the transition towards the circular economy for both big and small enterprises are in place (e.g. networks, spaces, incubators, etc.)	The enabling environment for supporting circular business is in place (e.g. regulation, funds) and functioning. The local or regional government provides additional tools, such as co-creation spaces, networks, single window for businesses and capacity-building programme.
Additional information:						Score: [Enter score]
Level of satisfaction of "Innovation": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

Data and assessment

Data and assessment	Level of advancement (1-6) [NA=0]					
	Newcomer		In progress		Advanced	
	Planned (1)	In development (2)	In place, not implemented (3)	In place, partly implemented (4)	In place, functioning (5)	In place, objectives achieved (6)
Are data and information collected and available to explore circular economy-related opportunities?						
	The government plans to collect data conducive to circular economy-related decisions (e.g. inventory of empty buildings, circular economy-related initiatives, circular jobs, etc.).	The collection of data by sector or type of activity is in development, thanks to the collaboration of various stakeholders.	Inventories and/or dataset are available and circular-economy-related policies and decisions are likely to be informed by robust and up-to-date data.	Data are being systematically collected and shared in a user-friendly manner.	Data is publicly available and citizens and businesses informed of the opportunities related to circular business models and behaviours. Digital tools are used to stimulate collaboration and interaction across stakeholders (e.g. open data, web portal).	Data is systematically used and updated to inform the public policy design and implementation and promote circular business models.
Additional information:						Score: [Enter score]
Level of satisfaction of "Data and assessment": Please select the icon corresponding to the level of satisfaction:						
	▲ Satisfactory	► To be improved	▼ Not satisfactory			

References

Austin's Circular Economy Story (2020), *Austin's Circular Economy Story*, https://kumu.io/ARRCircularEconomy/austins-circular-economy-story. [9]

C40 Cities (2016), *C40 Good Practice Guides: Amsterdam - Sustainability Fund and Amsterdam Climate and Energy Fund*, http://www.c40.org/case_studies/c40-good-practice-guides-amsterdam-sustainability-fund-and-amsterdam-climate-energy-fund (accessed on 6 June 2019). [21]

Circular Metabolism (2017), *The Circular Economy Plan of Paris*, https://www.circularmetabolism.com/input/11 (accessed on 3 December 2019). [8]

Circular Oslo - Circular Regions (2020), *Circular Oslo - Circular Regions*, https://circularoslo.com/. [11]

Ekins, P. et al. (2020), *Circular economy: What, why, how and where*, A concept paper for the OECD, OECD, Paris. [26]

French Government (2018), *50 Measures for a 100% Circular Economy*, http://www.ecologique-solidaire.gouv.fr/sites/default/files/FREC%20-%20EN.pdf (accessed on 6 June 2019). [14]

Hynes, W., M. Lees and J. Müller (eds.) (2020), *Systemic Thinking for Policy Making: The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st Century*, New Approaches to Economic Challenges, OECD Publishing, Paris, https://dx.doi.org/10.1787/879c4f7a-en. [16]

LWARB (2019), *Circular Economy Investment for Businesses in London*, London Waste and Recycling Board, http://www.lwarb.gov.uk/what-we-do/circular-london/circular-economy-investment-for-businesses/ (accessed on 5 August 2019). [22]

LWARB (2017), *London's Circular Economy Route Map*, London Waste and Recycling Board, http://www.lwarb.gov.uk/wp-content/uploads/2015/04/LWARB-London%E2%80%99s-CE-route-map_16.6.17a_singlepages_sml.pdf (accessed on 5 August 2019). [13]

Ministry of Infrastructure and the Environment/Ministry of Economic Affairs (2016), *Accelerating the Transition to a Circular Economy*, http://www.government.nl/topics/circular-economy/accelerating-the-transition-to-a-circular-economy (accessed on 4 August 2020). [23]

New Lab City (2019), *The Circular City Reasearch Programme, Vol I*, New York, United States, https://e025fd80-ac50-4e14-b81f-a09b2649b87f.filesusr.com/ugd/c3ad88_696d642dd4cc436dad96afe0369a1877.pdf. [25]

OECD (2020), *Green Growth and Taxation*, OECD, Paris, http://www.oecd.org/greengrowth/greengrowthandtaxation.htm (accessed on 6 August 2020). [28]

OECD (2020), "OECD – Nordic Innovation webinars on the circular economy in cities and regions", OECD, Paris, https://www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf. [7]

OECD (2020), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris. [1]

OECD (2020), *The Circular Economy in Groningen, the Netherlands*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/e53348d4-en. [5]

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

OECD (2020), *The Circular Economy in Valladolid, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/95b1d56e-en. [6]

OECD (2019), *Regions in Industrial Transition: Policies for People and Places*, OECD Publishing, Paris, https://dx.doi.org/10.1787/c76ec2a1-en. [24]

OECD (2018), *Implementing the OECD Principles on Water Governance: Indicator Framework and Evolving Practices*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264292659-en. [3]

OECD (2018), *SMEs in Public Procurement: Practices and Strategies for Shared Benefits*, OECD Public Governance Reviews, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264307476-en. [20]

OECD (2016), *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264256385-en. [27]

OECD (2016), *Policy Guidance on Resource Efficiency*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264257344-en. [29]

OECD (2015), *OECD Principles on Water Governance*, OECD, Paris. [2]

OECD (2015), *Stakeholder Engagement for Inclusive Water Governance*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264231122-en. [12]

OECD (2014), "Smart Procurement - Going green: Best practices for green procurement- Italy", Integrated Energy Management Services, OECD, Paris, http://www.oecd.org/gov/ethics/gpp-procurement-Italy-IEMS.pdf (accessed on 6 June 2019). [19]

Organi Trust (2019), *Circular Economy and Organic Certification*, https://organitrust.org/ (accessed on 11 June 2019). [15]

OVAM (2019), *CIRCULAR FLANDERS Together towards a circular economy Kick-off Statement*, http://www.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/Circular%20Flanders%20Kick-Off%20Statement.pdf. [10]

Paris&Co (2019), *Urban Lab*, https://urbanlab.parisandco.paris/. [17]

Wijkman, A. (2019), "Circular economy in cities requires a systems approach". [18]

Annex A. Respondents of the OECD (2020) Survey on the Circular Economy in Cities and Regions

Cities and regions	Country	Department/Organisation	Respondents
Amsterdam	Netherlands	Urban Planning and Sustainability	Eveline Jonkhoff, Program Manager Circular Economy
Antwerp	Belgium	Business & Innovation Energy & Environment (EMA)	Sophie Deckers, Project Manager SME & Industry Jana Deforche, Consultant European Subsidies
Austin	United States	Austin Resource Recovery/City of Austin	Natalie Betts, Circular Economy Program Manager
Barcelona Metropolitan Area	Spain	Economic Development Agency	Xavier Casas Masjoan, Former Director Anna Hernández Bonancia, Director
Copenhagen	Denmark	Technical and Environmental Administration	Susanne Lindeneg, Project Manager Mette Skovgaard, Project Manager
Dunedin	New Zealand	Dunedin City Council	Jinty Mactavish, Principal Policy Advisor Sustainability
Flanders	Belgium	Public Waste Agency of Flanders (OVAM) and Circular Flanders	Sofie Bouteligier, Policy Officer at International Policy Unit OVAM Veerle Labeeuw, Facilitator Circular Economy in Circular Flanders Pieter Vervinckt, Policy Officer at International Policy Unit OVAM
Glasgow	United Kingdom	Glasgow City Council Glasgow Chamber of Commerce Zero Waste Scotland Zero Waste Scotland	Colin Hughes, Policy Officer Cheryl McCulloch, Senior Project Manager Cheryl Robb, Stakeholders & Partnerships Manager Laura Blair, Cities and Regions Sector Manager
Granada	Spain	City of Granada/EMASAGRA (Water and sanitation company of the city of Granada)/Suez	Francisco Aranda Morales, Economy, Investee Companies and Finance Area Chief Coordinator at the Municipality of Granada

Cities and regions	Country	Department/Organisation	Respondents
			Dolores Ayllón Moreno, Sustainable Development and Innovation at EMASAGRA Agustin Castillo-Martinez, General Coordinator of Public Works and Urban Development at the Municipality of Granada Gonzalo Jimenez Espinosa, Sustainable Development and R&D Director of EMASAGRA Federico Sánchez Aguilera, Managing Director at EMASAGRA Clemente Vergara, Sustainable Development Project Manager at Suez
Greater Porto Area	Portugal	LIPOR Intermunicipal Waste Management of Greater Porto	Susana Lopes, Senior Technician, International Business Unit, Lipor Diana Nicolau, Senior Technician, Communication, Marketing and Sustainability Unit, Lipor
Groningen	Netherlands	Economic Department	Anne Helbig, Policy Advisor Floor de Jong, Co-ordinator of International Affairs Aline Otten, Economic Affairs Manager
Helsinki	Finland	The Urban Environment Division/Environmental Protection Unit	Leona Silberstein, Environmental inspector
Joensuu	Finland	Environment Unit	Jari Leinonen, Environment Protection Manager
Kitakyushu City	Japan	Environmental Industry Promotion Division	Junichi Sono, Director
Kemi	Finland	Digipolis	Kari Poikela, Head of Circular Economy Centre
Lappeenranta	Finland	City of Lappeenranta Environment Unit	Salme Muurikka, Environmental Officer
Lisbon	Portugal	Municipal Directorate of Environment, Green Spaces, Climate and Energy/Lisbon Municipality	Victor Vieira, Direction Advisor
Ljubljana	Slovenia	Department for Environmental Protection	Zala Strojin Božič, Circular Economy Manager
London	United Kingdom	London Waste and Recycling Board (LWARB)	James Close, Head of the Circular London Programme
Malmö	Sweden	Department of Environment	Hanna Axelsson, Project Secretary
Manresa	Spain	Manresa City Council	Sònia Puyol, Development and European Projects Senior Officer at City Promotion Department Pol Valero, Head of Environment and Sustainability Department
Maribor	Slovenia	WCYCLE Institute Maribor	Igor Kos, Consultant
Medellín/Antioquia	Colombia	Cooperation and Investment Management – Cooperation and Investment Agency of Medellín and the Metropolitan Area	Carlos Andrés Villarreal Restrepo
Melbourne	Australia	City of Melbourne Council	Nikki Jordan, Team Leader Sustainability Integration

Cities and regions	Country	Department/Organisation	Respondents
Milan	Italy	Urban Economy and Labour Department	Lucia Scopelliti, Head of the Economic Planning Unit
MRC des Sources	Canada	Les Sources Regional County Municipality (Synergie Estrie)	Karine Thibault, Circular Economy Coordinator
Munich	Germany	Abfallwirtschaftsbetrieb München (AWM)	Guenther Langer, Head of Executives Office
Murcia	Spain	Technology Centre for Energy and Environment (CETENMA) City of Murcia	Francisca Sánchez, EU Project Office Responsible Martín Soriano, R&D Project Coordinator Manuel Valls Sevilla, Municipal Engineer in European Programmes Department
Nantes	France	Local Community	Eric Provost, Circular Economy Project Manager
North Karelia	Finland	Regional Council of North Karelia	Aino Heikura, Project Manager
Oslo	Norway	Agency for Waste Management	Håkon Jentoft, Senior Executive Advisor
Oulu	Finland	Urban and Environmental Services	Satu Pietola, Environmental Specialist
Paris	France	Urban Ecology Agency	Yann Francoise, Head of the Climate-Energy and Circular Economy Division Anita Ravlic, Responsible for Managing the Circular Economy
Peñalolén	Chile	Municipality of Peñalolén	Caroll Owen, Coordinator Unit Strategic Functions Management
Phoenix	United States	City of Phoenix Public Works Department	Ginger Spencer, Public Works Director
Prato	Italia	Municipality of Prato	Valerio Barberis, Deputy Mayor of Municipality of Prato Letizia Benigni, Project Officer at the Municipality of Prato Leonardo Borsacchi, Professor at the University of Florence, Italy
Quillota	Chile	Municipality of Quillota	Francisco Marchant Lopez, Local Economic Development Unit Manager
Riga	Latvia	Riga City Council City Development Department	Jurijs Grizāns, Senior Project Manager of Strategic Management Division
Rotterdam	Netherlands	Rotterdam Circular/City of Rotterdam	Nadia Lopes, Senior Project Leader
Sabadell	Spain	Sabadell City Council	Oriol Llevot, Head of the Innovation Section
San Francisco	United States	San Francisco Department of the Environment	Soko Made, City Government Zero Waste Senior Coordinator
Santiago	Chile	Municipality of Santiago	Isabel Margarita Aguilera Contreras, Environment Manager
Scotland	United Kingdom	Zero Waste Scotland	Cheryl Robb, Circular Economy Sector Manager
Tampere	Finland	Urban Environment and Infrastructure Services/Sustainable City	Tommi Halonen, Circular Economy Specialist Kari Kankaala, Environment and Development Manager

Cities and regions	Country	Department/Organisation	Respondents
Temuco	Chile	Directorate of Directorate of Environment, Sanitation, Ornament and Public Lighting	Eduardo Araneda Schüler, Head of the Environment Department Sergio Otth Silva, Professional Environment, Sanitation, Ornament and Public Lighting
Tilburg	Netherlands	Municipality of Tilburg	Robert Kint, Advisor Circular Economy
Toronto	Canada	Solid Waste Management Services Division	Meaghan Davis, Manager (Acting), Circular Economy and Innovation Jeffrey Kamara, Senior Project Manager, Circular Economy and Innovation
Turku	Finland	Central Administration	Tiina Vikman, Senior Specialist
Umeå	Sweden	Business Department	Philip Näslund, Project Manager Liv Öberg, Coordinator for Circular Economy Sussane Thurén, Development Strategist Laura Vidje, Sustainability Consultant
Valladolid	Spain	Area of Finance, Public Function and Economic Promotion	Jesús Gómez Pérez, Manager of the Agency of Innovation and Economic Development Rosa Huertas Gonzalez, Director of the Innovation, Economic Development, Employment and Trade Department Ana Isabel Page Polo, Coordinator of Economic Promotion and Employment Gloria San José Fernández, Project Manager Alicia Villazán Cabero, Project Manager
Vélez-Málaga	Spain	Municipality of Vélez-Málaga	Gorka Espina Sancho, Project Financial Manager UIA02-306-Brick-Beach

OECD Urban Studies

The Circular Economy in Cities and Regions

SYNTHESIS REPORT

Cities and regions play a fundamental role in the transition from a linear to a circular economy, as they are responsible for key policies in local public services such as transport, solid waste, water and energy that affect citizens' well-being, economic growth and environmental quality. This synthesis report builds on the findings from 51 cities and regions contributing to the OECD Survey on the Circular Economy in Cities and Regions and on lessons learnt from the OECD Policy Dialogues on the circular economy carried out in Groningen (Netherlands), Umeå (Sweden), Valladolid (Spain) and on-going in Glasgow (United Kingdom), Granada (Spain), and Ireland. The report provides a compendium of circular economy good practices, obstacles and opportunities, analysed through the lens of its 3Ps analytical framework (*people, policies and places).* It concludes with policy recommendations, a Checklist for Action and a Scoreboard to self-assess the existence and level of implementation of enabling governance conditions to foster the transition towards the circular economy in cities and regions.

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