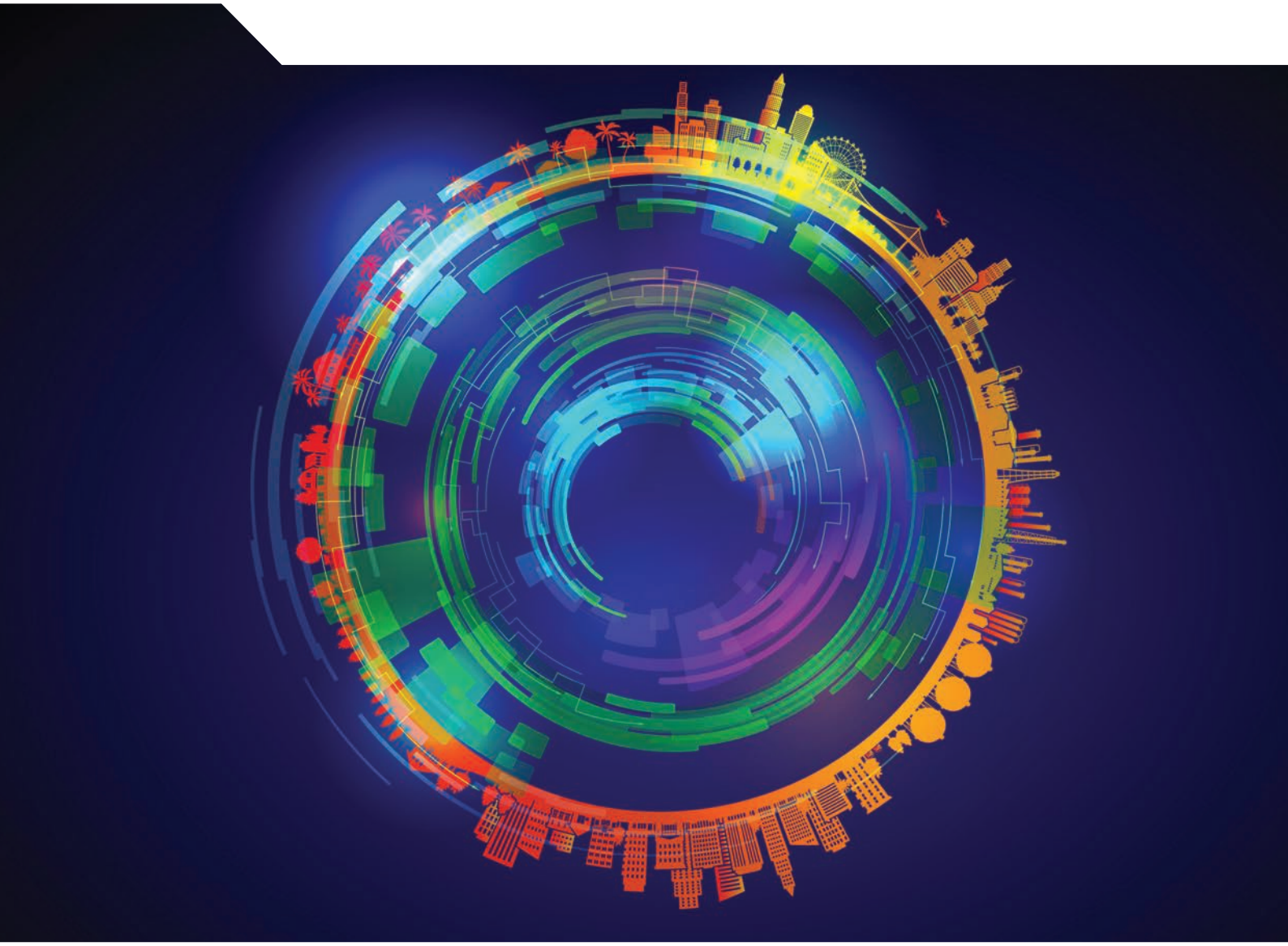
OECD Urban Studies

The Circular Economy in Glasgow, United Kingdom



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Foreword

Like many cities around the world, the COVID-19 pandemic has hit the city of Glasgow hard, with profound health, economic and social impacts. As of September 2021, Glasgow registered the highest number of COVID-19-related deaths in Scotland (1633 in total and 257 deaths per 100 000 inhabitants), almost twice as many as in other big cities in Scotland, such as Edinburgh (852 in total, 161 deaths per 100 000 inhabitants). The impact on the economy has also been severe. Although Glasgow's economy is expected to grow by 3.4% in 2021, following the 6.7% fall in 2020, it will remain below pre-crisis levels until at least next year. Similarly, although government support has been key to avoiding significant increases in unemployment, unemployment rates (for Scotland as a whole) remained above pre-crisis levels in July 2021 (4.3% vs 3.7% in February 2020).

Although the immediate focus of policy has been on mitigating the impacts of the crisis on health, the economy and society, the COVID-19 crisis has also accelerated and stimulated reflections on how to: rethink urban policies towards more sustainable production and consumption; make cities more liveable; strengthen the sense of community; access digital technology; and enhance collaboration across value chains.

A post-industrial city, Glasgow aims to grasp the opportunities presented by these reflections, and drive urban regeneration, by becoming the first circular city in Scotland, through innovative solutions to achieve carbon neutrality by 2030. Combined with goals of social justice, a search for more resilient local economies and incentives for citizens to share and repair more, to limit resource waste, this will require supportive and enabling regulations, investments, new forms of collaboration and partnerships as well as a cultural shift towards a more resourceful and less wasteful society. The UN Climate Change Conference (COP26) (Glasgow, November 2021) will seal the commitment of the city towards its transformation into a green city.

The OECD Programme on the Circular Economy in Cities and Regions supports national, regional and local governments through evidence-based analysis, multi-stakeholder dialogues, policy recommendations and customised action plans. The programme relies on a consortium of cities and countries engaged in peer-to-peer dialogues and knowledge-sharing activities, including Glasgow (United Kingdom), Granada (Spain), Groningen (Netherlands), Montreal (Canada), Tallinn (Estonia), Umeå (Sweden), Valladolid (Spain) and Ireland.

This report summarises the findings from a 20-month policy dialogue between the OECD and the city of Glasgow, to develop a vision for its transition to a circular economy. Glasgow's circular path is primarily driven by collaboration between the Glasgow Chamber of Commerce, through its Circular Glasgow initiative, Zero Waste Scotland and Glasgow City Council. Early findings of this report and the interviews carried out with more than 60 stakeholders from the public, private and not-for-profit sectors informed the 1st Circular Economy Route Map for Glasgow, launched in 2020.

Acknowledgements

This report was prepared by the OECD Centre for Entrepreneurship, SMEs, Regions and Cities (CFE) led by Lamia Kamal-Chaoui, Director, as part of the Programme of Work and Budget of the Regional Development Policy Committee (RDPC). It is the result of a 20-month policy dialogue with more than 60 stakeholders from public, private, not-for-profit sectors and representatives from the city of Glasgow, United Kingdom (see list in Annex B).

The report and underlying policy dialogue were led 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 and co-ordinated by Oriana Romano and Ander Eizaguirre, policy analyst, with contributions from Juliette Lassman and Melissa Kerim, also policy analysts in the CFE.

The OECD Secretariat is grateful for the high level of commitment and support from: Councillor Susan Aitken, Leader of Glasgow City Council; Iain Gulland, Chief Executive Officer at Zero Waste Scotland, and Alison McRae, Senior Director at the Glasgow Chamber of Commerce. Warm thanks are also extended to the local team including Colin Hughes, Policy Officer (Glasgow City Council), Cheryl Robb, Stakeholders and Partnerships Manager (Zero Waste Scotland), Laura Blair, Sector Manager – Cities & Regions (Zero Waste Scotland) and Cheryl McCulloch, Senior Project Manager (Glasgow Chamber of Commerce). Special thanks are also due to Anna Richardson, City Convener for Sustainability and Carbon Reduction (Glasgow City Council) and Gavin Slater, Head of Sustainability (Glasgow City Council).

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This report builds on interviews conducted during the online missions (27-30 April and 22-25 June 2020) and the policy seminar (22 July 2021), as well as insights from an OECD Survey on the Circular Economy in Cities and Regions and desk research. Interim findings and progress results were presented at the launch event of the OECD synthesis report on the Circular Economy in Cities and Regions (4 November 2020) and the 3rd OECD Roundtable on the Circular Economy in Cities and Regions (18-19 May 2021). Thanks are also due to stakeholders who shared written comments.

The report was submitted to Regional Development Policy Committee delegates for approval by written procedure under the cote CFE/RDPC/URB(2021)18. The final version was edited and formatted by Eleonore Morena and François Iglesias and Pilar Philip prepared the manuscript for publication.

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Abbreviations and acronyms

ADS	Architecture and Design Scotland
ALEO	Arm's Length External Organisation
BEIS	Business, Energy and Industrial Strategy
CAN	Circular Arts Network
CEIP	Climate Emergency Implementation Plan
CMT	Carbon Management Team
CNCA	Carbon Neutral Cities Alliance
CO_2	Carbon dioxide
COP26	United Nations Climate Change Conference 2021
COVID-19	Coronavirus disease 2019
DAERA	UK Department of Agriculture, Environment and Rural Affairs
DEFRA	UK Department for Environment, Food and Rural Affairs
DMC	Destination managements company
EPR	Extended producer responsibility
EU	European Union
EUR	Euro
GBP	Pound sterling
GDP	Gross domestic product
GEL	Glasgow Economic Leadership
GERG	Glasgow Economic Recovery Group
GHG	Greenhouse gas
GPP	Green public procurement
GRREC	Glasgow Recycling and Renewable Energy Centre
GSEN	Glasgow Social Enterprise Network
GVA	Gross value added
GWh	Gigawatt hours
IFSD	International Financial Services District
KPI	Key performance indicator
LCA	Life cycle analysis
LEZ	Low emission zones
LWARB	London Waste and Recycling Board
NGO	Non-governmental organisation
NIC	National Infrastructure Commission
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay as you throw
PCO	Professional congress organiser
RISN	Resource Innovation and Solutions Network
RWS	Resources and Waste Strategy
SEC Centre	Scottish Exhibition and Conference Centre
SEPA	Scottish Environment Protection Agency
SMEs	Small- and medium-sized enterprises
UK	United Kingdom
UKRI	UK Research and Innovation
USD	United States dollar
YES	Young Enterprise Scotland
ZWS	Zero Waste Scotland

Executive summary

Drivers of the circular economy in Glasgow

Glasgow aims to be the first circular city in Scotland with a view to meeting carbon neutral goals by 2030. The motivation for doing so is, of course, grounded in addressing environmental challenges but the benefits from the transition also reflect opportunities to tackle demographic and socio-economic challenges.

Glasgow is expected to see its population grow by 4.2% by 2043 and, in response, the City Council has a target of 25 000 new homes by 2025. This presents an opportunity to increase resource efficiency in the building sector and, in particular, to embody net zero carbon targets from the planning phase. These plans can also address challenges related to the types of homes needed too. Single-person households are expected to increase to 45% by 2043. Compared to 2- 4 person households, single-person households consume on average per capita more electricity (between 23% and 77%), more gas (between 38% and 54%) and use close to 50% more land.

In addition, the share of Glasgow's population living within 500 metres of derelict land is double the average for Scotland (28.4%), which has negative impacts on health, the environment, the economy and social cohesion. Rehabilitating these industrial areas into green spaces, therefore, provides a significant opportunity to improve the quality of life of local communities.

Addressing environmental challenges and transitioning towards carbon-neutrality, leveraging on a circular economy, also provides an important vehicle to boost the economy, create jobs and, in turn, address social challenges. Glasgow is one of the poorest cities in Scotland, with half of its residents (44%) living in the 20% most deprived neighbourhoods.

Opportunities to unlock the potential of the circular economy

The transition towards the circular economy in Glasgow can also build on several of its assets, including digitalisation, tourism and SMEs.

As Scotland's most technologically advanced city and the second in the UK, Glasgow is well-placed to leverage digitisation to set up material exchange platforms, to track waste for better collection and recycling, to develop open-access tools and applications to engage citizens and raise awareness, and to connect businesses across the value chain.

A major international gateway to Scotland, Glasgow can also leverage opportunities generated by the tourism sector – 2.3 million tourists in 2018 generated GBP 662 million for the local economy – as well as the events industry to engage related industries such as energy, water, waste management, food and transport, in moving towards a more sustainable and low-carbon economy.

Finally, as SMEs prevail in Glasgow's business fabric, a shift from a linear to a circular economy can capitalise on the ability their size confers to adapt and innovate, to enhance future-proof business innovation and collaborations. There is in particularly strong potential in sectors such as manufacturing, food and beverages, which provided over 117 500 jobs in 2016 (30% of Glasgow's workforce) and generated over GBP 5.5 billion (27%) of Glasgow's GDP.

A beneficial partnership model to accelerate the circular transition

Glasgow's path towards the circular economy is primarily driven by the collaboration between the Glasgow Chamber of Commerce, through its Circular Glasgow initiative, Zero Waste Scotland and the Glasgow City Council. Since 2015, this partnership has facilitated several activities, including: exploratory studies to track inflows and outflows of materials in the city to identify consumer footprints; events on the circular economy to raise awareness and facilitate collaborations; and workshops and circular economy platforms to crowdsource ideas, such as the Circle Lab Challenge. In 2019, the Glasgow Chamber of Commerce launched the Circular Glasgow Network, a platform facilitating collaboration across 175 companies from diverse sectors. After five years of accumulated knowledge, practice and experimentation, in 2020, Glasgow City Council presented the *Circular Economy Route Map for Glasgow*, whose design and implementation were guided by the findings of this OECD report, with the objective of fostering local value chains and jobs while promoting community empowerment.

Governance challenges

Nevertheless, transitioning to a circular economy in Glasgow will require overcoming a number of policy, engagement and capacity gaps. First, there is a need to move from siloes to system thinking within and across municipal departments. Strategic plans and policy frameworks such as the *City Development Plan* or the *Resource and Recycling Strategy 2020-2030* are not yet aligned with the *Circular Economy Route Map*. Second, residents and large corporations have been largely missing in consultation initiatives so far, which have mainly targeted SMEs. Third, important capacity gaps prevail amongst public officers to adopt efficient green public procurement and circular economy practices due to the mismatch between public officials in charge of *drafting* tenders and those *managing* contracts, especially with respect to evaluations of how contracts perform after they have been awarded.

Making the transition happen: policy recommendations

The city of Glasgow can play an important role as promoter, facilitator and enabler of the circular economy through a collective and co-ordinated approach across stakeholders and levels of government:

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

- Establish a transversal working group across municipal departments and continue to strengthen the relationship between the city, Zero Waste Scotland and the Glasgow Chamber of Commerce;
- Lead by example, embedding circular economy principles in daily municipal activities and practices such as separate waste collection, water reuse and ban on single use plastics;
- Build a circular vision of key sectors with strong potential, especially tourism, the built environment, food and the events industry (e.g. conferences, concerts and festivals);
- Raise awareness of residents and key economic actors through communication campaigns;
- Promote the use of labels and certifications to increase trust.

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

- Align local targets on the circular economy with regional ones for a coordinated vision across levels of government;
- Mainstream circular economy principles across strategic policy documents such as Glasgow's City Development Plan, the Resource and Recycling Strategy 2020-30, the Liveable Neighbourhood Plan, the Climate Emergency Implementation Plan (CEIP) and the Glasgow Economic Strategy 2016-23;
- Further involve stakeholders in strengthening and consolidating the circular vision of the city;
- Engage property developers and relevant actors in experimentations and pilots to transform deprived neighbourhoods into circular areas, and to take stock of the location, condition and barriers for reuse of existing derelict land.

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

- Identify regulatory bottlenecks to circular economy practices, such as using secondary materials in new buildings or implementing modular off-site construction models, and initiate a dialogue with the regional government to overcome them, if need be;
- Set incentives for effective implementation of green public procurement with circular economy criteria, while making it accessible to new entrants and SMEs with circular economy activities;
- Explore fiscal tools and funding options to boost the transition to a just circular economy;
- Foster capacity building for the circular economy in all municipal departments, and promote training on circular business models for entrepreneurs and youth;
- Develop an "incubator" to support the creation of new business models and innovations geared towards the circular economy;
- Provide a digital marketplace, matchmaking tools and on line and offline networking platforms to generate collaborations across large companies and SMEs applying circular economy principles;
- Develop digital maps and material flow analyses to understand material input and output;
- Monitor and assess progress on the Circular Economy Route Map.

1 Socio-economic and environmental trends in Glasgow, United Kingdom

This chapter provides an overview of the rationale for the circular economy transition in the city of Glasgow, United Kingdom (UK), by looking at the main socio-economic and environmental data and trends. As a post-industrial city, Glasgow seeks to create the conditions for a sustainable future, through the circular economy, by generating local jobs and enhancing the sense of community. The city has been severely impacted by the health and economic consequences of the COVID-19 pandemic, as the Scottish city with the greatest decline in gross value added (GVA) in 2020.

Drivers for a circular economy in Glasgow, UK

For cities and regions, the circular economy represents an opportunity to rethink production and consumption models, services and infrastructure. As the places where people live and work, consume and dispose, cities and regions play a fundamental role in the transition to the circular economy. By 2050, the global population will reach 9 billion people, 55% of which will be living in cities, high-density places of at least 50 000 inhabitants (OECD/EC, 2020[1]). 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[2]), release up to 70% of greenhouse gas (GHG) emissions (World Bank, 2010[3]), consume 80% of food (FAO, 2020[4]) and produce 50% of global waste (UNEP, 2013[5]). 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[6]). There are many definitions of the circular economy (Box 1.1). According to the OECD (2020[7]), in cities and regions, the circular economy implies a systemic shift, whereby: *services* (e.g. from water to waste and energy) are provided making efficient use of natural resources as primary materials and optimising their reuse; *economic activities* are planned and carried out in a way to close, slow and narrow loops across value chains; and *infrastructure* is designed and built to avoid linear locks-in (e.g. district heating, smart grid, etc.).

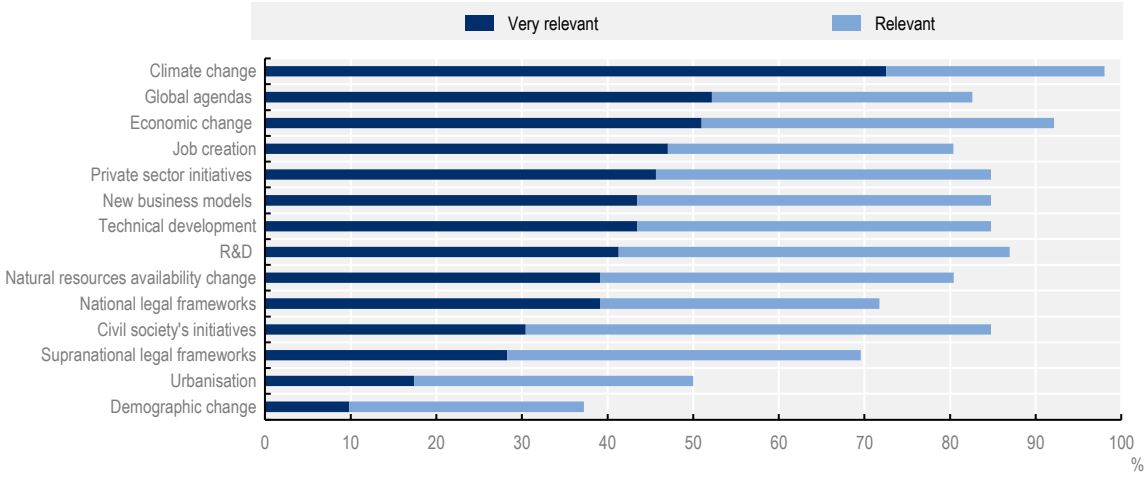
Box 1.1. Definitions of the circular economy

- 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[8]).
- 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[9]).
- 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[10]).
- 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[11]).
- 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[12]).

Source: EC (2015[11]), *Circular Economy – Overview*, https://ec.europa.eu/eurostat/web/circular-economy; Ellen MacArthur Foundation, (2018[10]), *What is a circular economy?, www.ellenmacarthurfoundation.org/circular-economy/concept* ; Ekins, P. et al. (2019[9]), *The Circular Economy: What, Why, How and Where*; McCarthy, A., R. Dellink and R. Bibas (2018[13]), "The Macroeconomics of the Circular Economy Transition: A Critical Review of Modelling Approaches", http://dx.doi.org/10.1787/af983f9a-en; OECD (2019[12]), *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[8]), *Conceptualizing the Circular Economy: An Analysis of 114 Definitions*.

According to the results of the OECD Survey on the Circular Economy in Cities and Regions, major drivers for transitioning to a circular economy are environmental (climate change, 73%), institutional (global agendas, 52%) and socio-economic ones (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 1.1) (OECD, 2020[14]). In line with these results, the circular economy in Glasgow is perceived as a socio-economic paradigm that can help tackle climate change, generate positive economic impact in the city and improve the use of natural resources (e.g. land use) (OECD, 2020[14]). Figure 1.2 shows the words that the city, through the OECD Survey on the Circular Economy in Cities and Regions (OECD, 2020[14]), associates with the circular economy concept (the larger the word in the figure, the greater the importance). These words are: "system change", "innovation", "green growth", "partnerships" and "business model". The section below describes the socio-economic and environmental characteristics of the city, setting the basis for a transition from a linear to a circular economy.

Figure 1.1. 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[14]), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris.

The city of Glasgow, UK, aims at becoming the first circular city in Scotland[1]. In Glasgow, whose Gaelic name, *Glaschu*, means "dear green place", the transition aims to be simultaneously "green" and "just", generating socio-economic opportunities through the localisation of the economy, facilitating access to jobs, reducing spatial inequalities by promoting place-based initiatives across the city, and bringing social benefits to the most vulnerable groups. This is very relevant during the post-COVID-19 crisis, which also hit Glasgow in terms of increased unemployment and required local and national responses (Box 1.2). By July 2021, although Scotland recorded a lower unemployment rate than the UK (4.3% and 4.8% respectively), employment had not yet recovered to the pre-COVID-19 level (unemployment rate of 3.7% in February 2020) (ONS, 2020[15]). The OECD report on cities' policy responses to COVID-19 (2020[16]) showed that the crisis strikingly exposed inequality across people and places, especially in large cities, where vulnerable groups such as migrants, the poor, women and the elderly were hit hard. Failing to address these inequalities not only hinders the effectiveness of green policies, it also reduces the social buy-in and participation in the circular economy transition.

Figure 1.2. Tag cloud on the circular economy in Glasgow, UK



Note: The respondent had 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 the circular economy in your context, ranking from 1 (most important) to 5 (less important)".
Source: Own elaboration based on the city of Glasgow's answers to OECD (2020[14]), *OECD Survey on Circular Economy in Cities and Regions*, OECD, Paris.

Box 1.2. Responses to the COVID-19 crisis in Glasgow, Scotland and the UK

The city of Glasgow, UK, ranked first in terms of caseload and number of deaths in Scotland (1 633 deaths as of September 2021). Data report a reduction of the GVA for the city of Glasgow for 2020 (-6.7%) and a slow recovery in 2021 (3.4%) (KPMG, 2020[17]).In response to the economic consequences of the pandemic, the city created the COVID-19 Recovery Group. The group is composed of members from the Glasgow Economic Leadership, the Glasgow Partnership for Economic Growth, the Glasgow Economic Commission and external experts from several institutions including the private sector (e.g. Glasgow Chamber of Commerce) and academia (e.g. University of Glasgow, University of Strathclyde) and has taken several actions as a recovery strategy (Glasgow City Council, 2020[18]). Some of the actions include: i) the creation of a City Centre Task Force, to stimulate growth in the city centre after restrictions were lifted; ii) the management of grants made available by the Scottish Government to support businesses affected by the pandemic; and iii) the provision of economic and advisory support for newly unemployed people due to the pandemic (Glasgow City Council, 2021[19]).

In the UK, the government announced in November 2020 a GBP 12 billion stimulus package as part of the government's *Ten Point Plan for a Green Industrial Revolution* aiming to benefit the green economy in terms of carbon capture, hydrogen, nuclear, electric vehicles and renewable energy. However, the initiative does not specify how the UK Government plans to boost activities such as reuse, remanufacturing, repair and high value (UK Government, 2020[20]).

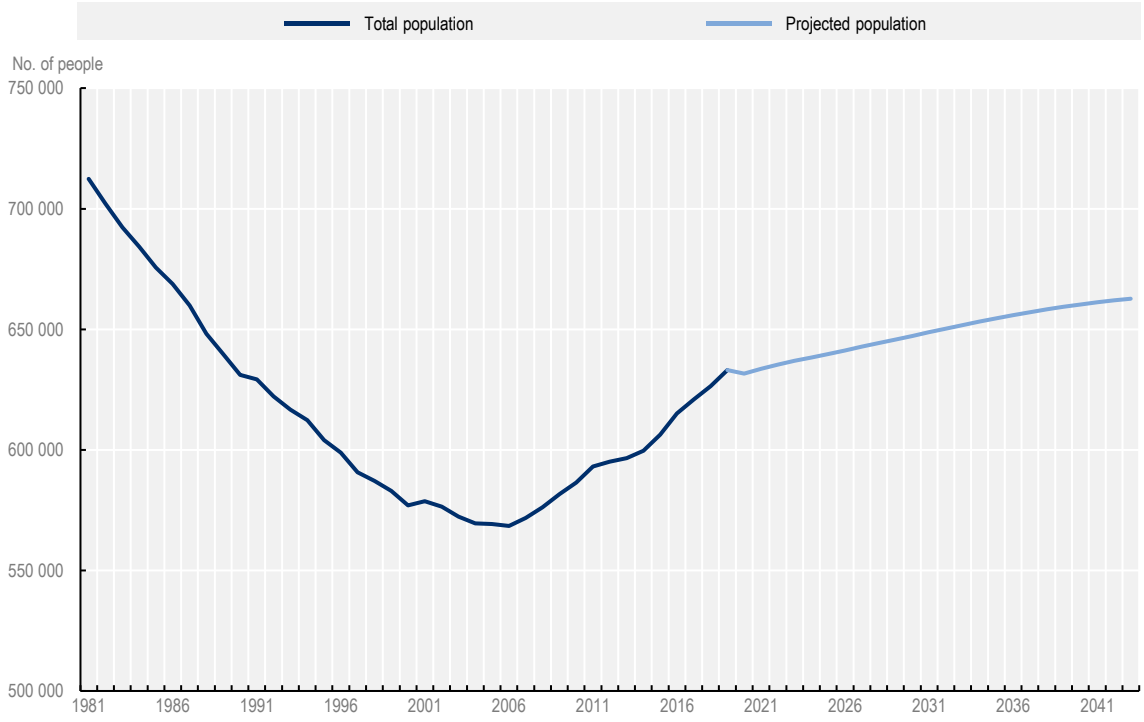
Source: National Records of Scotland (2021[21]), *Deaths Involving Coronavirus (COVID-19) in Scotland*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/general-publications/weekly-and-monthly-data-on-births-and-deaths/deaths-involving-coronavirus-covid-19-in-scotland; Glasgow City Council (2020[18]), "Post-Pandemic Economic Recovery Plan for Glasgow to be developed", https://www.glasgow.gov.uk/article/25869/Post-Pandemic-Economic-Recovery-Plan-for-Glasgow-to-be-developed (accessed on 29 November 2020); Glasgow City Council (2021[19]), "Council updated on economic recovery progress and plans in Glasgow", http://www.glasgow.gov.uk/index.aspx?articleid=26836; KPMG (2020[17]), *Hard times: UK Economic Outlook*, https://home.kpmg/content/dam/kpmg/uk/pdf/2020/06/uk-economic-outlook-june.pdf (accessed on 29 November 2020); UK Government (2020[20]), "The ten point plan for a green industrial revolution", https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution (accessed on 29 April 2021).

Demographic trends

Located along the north and south banks of the River Clyde in West Central Scotland, Glasgow is the third-largest city in the UK. In 2020, Glasgow was home to 633 120 inhabitants, projected to increase by 4.2% by 2043 (National Records of Scotland, 2020[22]) (Figure 1.3). In 2017, Glasgow was the most densely populated area in Scotland with 3 555 inhabitants per km^2, way above the average level in Scotland (70 inhabitants per km^2) (National Records of Scotland, 2019[23]). Following the collapse of the traditional industrial sectors from the 1970s, the city experienced a drastic population decrease of approximately 100 000 inhabitants between 1981 and 1994 (a reduction of 14.1%), due to massive emigration in search of employment opportunities. The recent population growth is due to the positive balance between birth and death rate since 2007 and the increased inward migration to the city (Understanding Glasgow, 2020[24]): total net migration in Glasgow increased from 2006 onwards, with a yearly average net migration of 4 000 people by 2019, mainly from overseas (National Records of Scotland, 2020[25]). Glasgow shows the most ethnically diverse population in Scotland, where the non-UK born population rose from 6% in 2001 to 12% in 2011 (Understanding Glasgow, 2020[24]).

Population growth, combined with changes in household structure, will require new infrastructure and demand for services. To accommodate the growing population, Glasgow City Council set the target of building 25 000 new houses between 2015 and 2025 through the Housing Strategy 2017-2022 (Glasgow City Council, 2017[26]). The total number of households is projected to increase in Glasgow by 16% between 2016 and 2041, slightly higher than the estimated growth in Scotland (13% for the same period) (National Records of Scotland, 2019[27]). In particular, there is an increasing trend of single-adult households, which will represent almost half (45%) of all households in Glasgow by 2043, an increase of 16% compared to 2018 (Understanding Glasgow, 2020[24]; National Records of Scotland, 2020[28]). The average household size is forecasted to decrease from 2.15 people to 2.00 people during the same period (National Records of Scotland, 2020[29]). On the one hand, the need for new housing is an opportunity to apply circular economy principles to the building and maintenance of infrastructure (see Chapter 2). On the other hand, the decline in household size implies a reduction in terms of material efficiency as the common household services, including appliances and installations, are shared by a smaller number of individuals (EEA, 2016[30]). Some studies also suggest that single-person households consume more electricity (between 23% and 77%) and more gas (between 38% and 54%) and use close to 50% more land in comparison with households composed of 2 or 4 people (Williams, 2005[31]). Per capita levels of waste generation also tend to grow as household sizes decrease (OECD, 2011[32]).

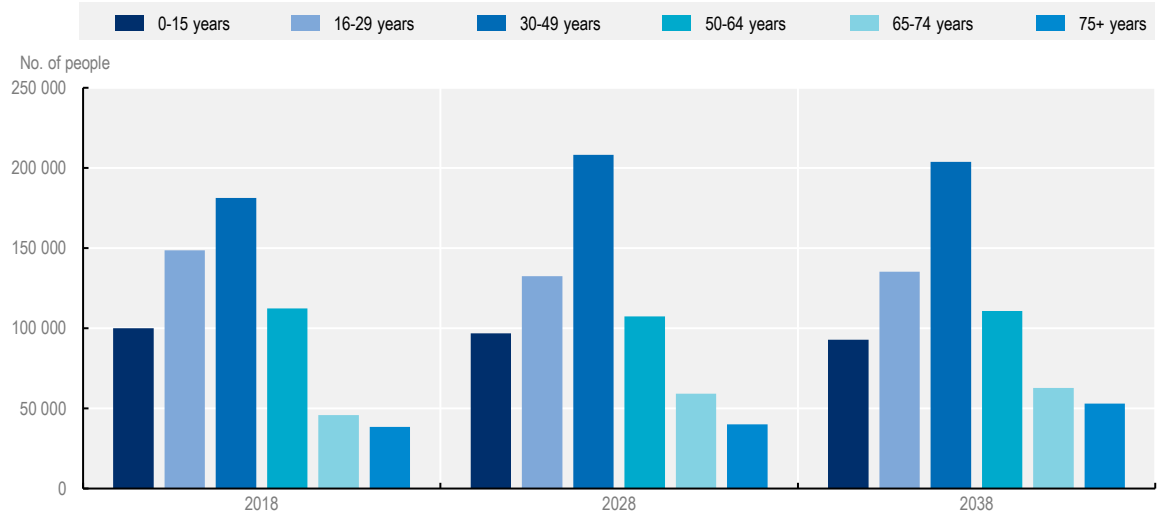
Figure 1.3. Population trends in Glasgow, UK, 1981-2043



Note: Last update of the projections: 24 March 2020.
Source: National Records of Scotland (2018[33]), *Scotland's Population 2017 – The Registrar General's Annual Review of Demographic Trends*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/stats-at-a-glance/registrar-generals-annual-review (accessed on 10 December 2020); National Records of Scotland (2020[34]), *Population Projections for Scottish Areas (2018-based)*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/sub-national-population-projections/2018-based (accessed on 10 December 2020).

The population in Glasgow is ageing, potentially bringing changes in energy consumption. Today, Glasgow is a predominantly young city, with less than a third of its citizens being over 50 years old. However, by 2038, the age ranges of 65-74 and over 75 will experience the highest increases (36.9% and 37.7% for the same period of time) (Figure 1.4). An older population is expected to consume higher levels of home-related services, such as heat, gas and other fuels (EC, 2008[35]). On the contrary, younger population groups are expected to decline by 7.1% (0-15 years) and 9.0% (16-29 years) between 2018 and 2038, mainly as a consequence of the continuous drop of birth rates in the city, which registered a 27% decline between 1991 and 2019 (National Records of Scotland, 2020[36]). This decline contrasts with the fact that, in 2018, Glasgow was the fifth city in the UK with the highest student retention rate after graduation (46%) and the highest in Scotland (Centre for Cities, 2019[37]).

Figure 1.4. Population trends in Glasgow, UK, 2018 2028 and 2038, by age group



Source: National Records of Scotland (2018[33]), *Scotland's Population 2017 – The Registrar General's Annual Review of Demographic Trends*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/stats-at-a-glance/registrar-generals-annual-review (accessed on 10 December 2020).

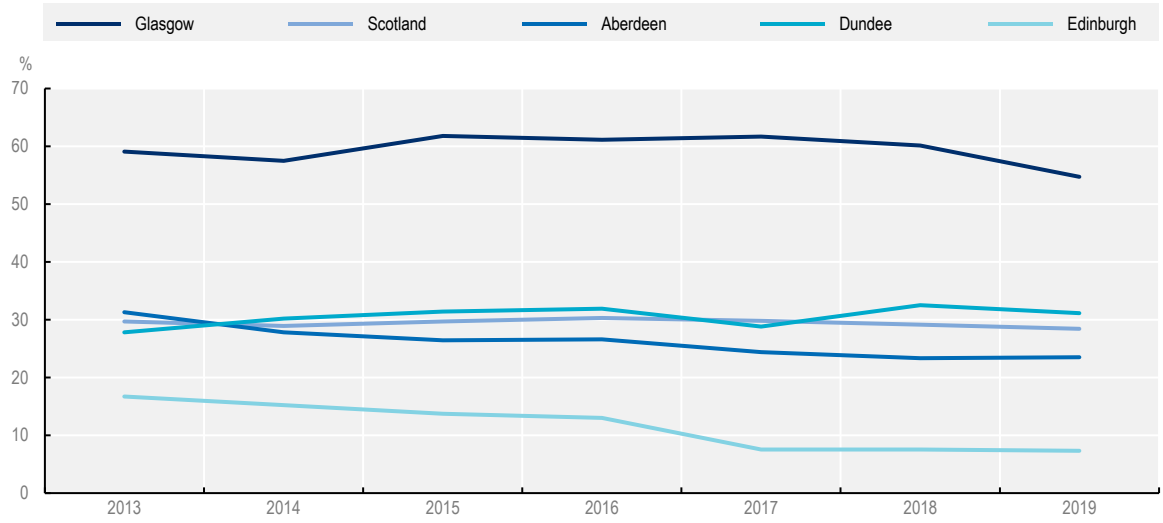
Living standards and inequalities

Unequal and low health standards and life expectancy are significant challenges for the city, giving rise to the so-called "Glasgow effect".[2] The concept was first introduced by Walsh et al. (2010[38]) and describes the higher levels of poor health experienced in Glasgow attributed to severe social and economic deprivation (e.g. unemployment, low levels of education) and the presence of a negative physical environment, mainly vacant and derelict land, having a negative impact on health (Walsh et al., 2016[39]). For both males and females born in 2016-18, life expectancy is the lowest in Scotland (73.4 for males and 78.7 for females). These life expectancy levels are below the average in the UK (81.3 in 2018) and in the OECD-36 (80.7 in 2017) (National Records of Scotland, 2019[40]; OECD, 2019[41]). According to the OECD Regional Well-Being data (2020[42]), health is the main issue for Scotland (4.9/10), ranking last among the 12 regions[3] of the UK. In Glasgow, there are considerable health disparities among neighbourhoods. For instance, between 2008 and 2012, the male life expectancy at birth in the wealthy neighbourhoods of Cathcart and Simshill (where income deprivation only concerns 6.6% of inhabitants) was 81 years, 15 years higher than in the neighbourhoods of Ruchill and Possilpark (with 35% of its inhabitants in income deprivation). For females, the gap was slightly lower between both neighbourhoods (84.3 years and 73.1 years respectively) (Understanding Glasgow, 2020[43]).

The adverse physical environment has been identified as one of the major reasons to explain the excess of mortality of Scotland in comparison to the UK that goes beyond socio-economic causes. In 2019, more than half of the population in Glasgow lived within 500 metres of a derelict site (54.7%). Glasgow shows a high concentration of vacant and derelict land, as a consequence of the industrial legacy, which negatively impacts on health, environment, economy and social cohesion of the nearby areas (Scottish Land Commission, 2020[44]; Glasgow City Council, 2020[45]). The share of the population living within 500 metres of derelict land in Glasgow represents double the share in Scotland (28.4%) and only 11.7% of Glaswegians lived further than 1 kilometre from derelict land, while the case for almost half of the Scottish population (47.6%) (Figure 1.5). The most affected areas are those located in the north and east of the city. Other Scottish councils with the highest share of people living within 500 m of derelict land for the same year were North Lanarkshire (75.2%), Inverclyde (57.5%) and West Dunbartonshire (57.3%), all part

of the Glasgow City Region (Scottish Government, 2020[46]). In 2018, the Scottish Land Commission and the Scottish Environment Protection Agency (SEPA) established the Vacant and Derelict Land Taskforce to work towards reusing the sites, improving wellbeing and reducing crime (Scottish Land Commission, 2020[47]). Glasgow City Council, through its Neighbourhoods, Regeneration and Sustainability Department, plans to launch a programme to re-establish productive use of brownfield and derelict land, which would receive funding from the Scottish Government's Vacant and Derelict Land Fund. Some ways to do so are: rehabilitation and decontamination of old brownfield and industrial areas; new and improved green spaces to serve communities in areas of deprivation; research and development of sites for food cultivation; and continued investment and projects with Clyde Gateway and the Glasgow Canal Regeneration Partnership (Glasgow Canal Regeneration Partnership, 2014[48]).

Figure 1.5. Estimated share of population living within 500 m of derelict land in Scotland, 2013-19



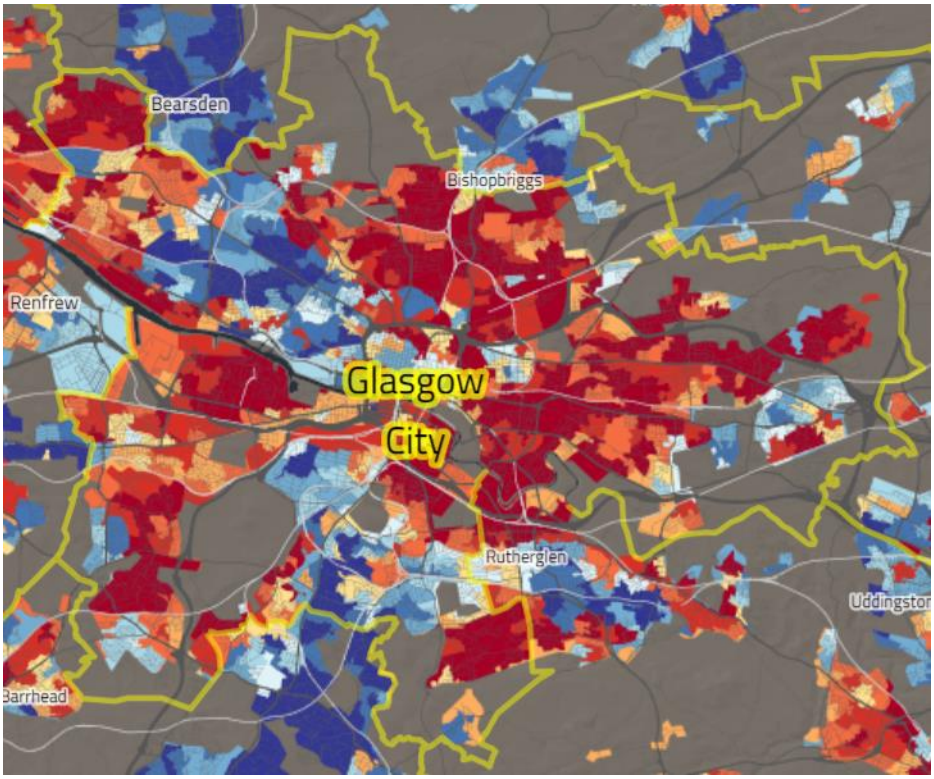
Source: Scottish Government (2020[46]), *Scottish Vacant and Derelict Land Survey 2019*, https://www.gov.scot/publications/scottish-vacant-derelict-land-survey-2019/ (accessed on 4 December 2020).

The circular economy stands as an opportunity to improve health standards in Glasgow, as it can carry positive health implications. For instance, the reduction of the use of landfills and incineration, the reduction of waste generation and the increase of the use of clean energy can positively impact citizens' health. The successful implementation of these actions could result in reduced air pollutants, GHG and other emissions, improving specific health areas such as those related to cardiovascular and respiratory problems (WHO, 2018[49]). In addition, donations and food banks to reduce food waste could help the urban poor.

Glasgow is one of the most deprived cities in Scotland, experiencing significant inequality within the city. Almost half of Glasgow's residents (44%) live in the 20% of most deprived areas in Scotland. In contrast, only 12% of the population live in the least deprived 20% of areas in Scotland (Figure 1.6). According to the Scottish Index of Multiple Deprivation 2020, 10 areas of Glasgow[4] have more than two-thirds of the population among the 5% most deprived areas of Scotland (Scottish Government, 2020[50]). In the city, more than one-third of all children lived under the poverty line in 2017 (GCPH, 2020[51]). In 2016, 19% of children lived in workless households, 6.5% higher than the Scottish average (12.5%). Approximately, one in five Glaswegians live in the second poorest quintile of Scotland's areas and there are significant disparities in terms of child poverty among neighbourhoods (from areas with more than half of children in poverty or vulnerable to poverty to other areas where the share is below 5%) (Understanding Glasgow, 2020[24]). The Poverty Leadership Panel, created in 2013, launched the People Make Glasgow Fairer

Strategy in 2016, which focused on four main areas: welfare reform; child poverty; housing; and employment and training (Glasgow City Council, 2019[52]). The circular economy is estimated to create job opportunities, 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 mining and manufacturing of a linear economy (Wijkman in OECD (2020[7])).

Figure 1.6. Deprivation in Glasgow, UK, by areas



Note: The Scottish Index of Multiple Deprivation is a relative measure of deprivations. It divides Scotland into 6 976 data zones and ranks them from the most deprived zone in Scotland (ranked 1) to the least deprived zone in Scotland (ranked 6 976). The map displays the deciles by deprivation ranking: Most deprived decile; Second most deprived decile; Third most deprived decile; Fourth most deprived decile; Fifth most deprived decile; Sixth most deprived decile; Seventh most deprived decile; Eighth most deprived decile; Ninth most deprived decile; and Tenth most deprived decile.

Source: Scottish Government (2020[50]), *Scottish Index of Multiple Deprivation 2020: Introduction*, https://www.gov.scot/publications/scottish-index-multiple-deprivation-2020/pages/5/ (accessed on 4 December 2020). Terms of Use: Open Government Licence. Contains Scottish Government & Ordnance Survey data © Crown copyright & database right 2012-2020.

Economic trends

Glasgow has undergone a transition from an industrial to a post-industrial city during the last 40 years and, since 2016, the city has embarked on a circular transition (Box 1.3). In the 19th century, Glasgow's economy relied on shipbuilding and heavy industry. However, in the 20th century, the city went through a revitalisation process, leading towards a transformation in the 21st century. During the second half of the 20th century, the rapid de-industrialisation and economic decline that took place in the city produced a substantial loss of employment and population. Nevertheless, during the last years of the century, Glasgow experienced a renaissance, whereby it became the centre of innovation, education, tourism and culture. Glasgow was designated European Capital of Culture in 1990 and British City of Architecture and Design in 1999 (OECD, 2002[53]). Since 2015, Glasgow has started its journey towards the circular economy

transition, which is foreseen to bring a positive economic impact for the city. Projections show that the circular economy could boost the economy of the UK by GBP 75 million (WRAP UK, 2020[54]). In Scotland, the annual cost savings linked to the circular economy could amount to GBP 3 billion (Ellen MacArthur Foundation/Zero Waste Scotland/Scottish Enterprise, 2014[55]).

Glasgow represents one of the fastest-growing economies in the UK. However, the COVID-19 pandemic slowed down this pace, while Brexit will pose challenges to the economic future of Glasgow. In 2014, the city was the fastest growing city in the UK, with 7% GVA growth. However, due to the COVID-19 pandemic, Glasgow registered the greatest economic decline (-10.4% annual GVA growth) in Scotland in 2020 (Glasgow Chamber of Commerce, 2021[56]). The Glasgow Economic Strategy prioritises 10 key sectors for economic growth by 2023: digital technology; finance and business services; creative economy; low carbon; health and life sciences; engineering, design and advanced manufacturing; tourism and events; universities and colleges; social enterprise; and childcare and social care (Glasgow City Council et al., 2019[57]). The impact of a hard Brexit is estimated to be close to 4%-5% of gross domestic product (GDP) 2 years after the conclusion of the transition period, which expired on 31 December 2020 (OECD, 2020[58]). According to the city council, many of the sectors that could be exposed to declining trade with the EU are crucial for Glasgow's economy such as retail and wholesale, transport and warehousing, and other professional services. The exportation sector to the EU is projected to sustain almost 20 000 jobs in Glasgow through direct and indirect demand to the economy of the city (Glasgow City Council et al., 2019[57]).

Box 1.3. Selected examples of post -industrial cities shifting to green cities

Several cities transitioned from industrial cities to green ones:

- **Bilbao, Spain**: During the 19th and 20th centuries, Bilbao's economy was characterised by steel industry and shipbuilding, and it became one of the most important ports in Europe. In 1973, the economic crisis seriously affected the industry and, as a consequence, the city gave rise to an ambitious rehabilitation plan. In 1992, through the society for the urban regeneration of Bilbao and its surroundings, called Bilbao Ría 2000, the city started a radical transformation into an icon of services, tourism and culture. This conversion has led to numerous awards, such as the 1st Lee Kuan Yew World City Prize (2010).
- **Essen, Germany**: The city, historically well-known for its coal mines, iron and steel plants, suffered a negative impact on the quality of water and air due to the closure of these facilities in the 1980s. Since then, the city began its transition towards an economy based on services, trade and higher education. The urban redevelopment project Green Centre (*Gruene Mitte*) was part of the transformation. As a result of the efforts taken by the city, the European Commission designated Essen as the European Green Capital for 2017 and the European Capital of Culture in 2010 representing the whole Ruhr metropolitan area.
- **Malmö, Sweden**: The city of Malmö, which was commonly known for its industry based on shipyard and heavy industry, has undergone a transformation to a modern sustainable city since the beginning of the 21st century. This evolution is especially relevant in the Western Harbour district, which has been converted from a contaminated, disused shipping yard to a green suburb of knowledge and sustainable living. Another example within the Swedish city is the refurbished Augustenborg "Eco City", which housed local industry workers and was becoming deteriorated and unappealing. The city council conducted a project to upgrade the existing household buildings making them more thermally efficient.
- **Pittsburgh, United States**: The city has reconstructed its economy since its steel industry collapsed, resulting in the loss of some 150 000 manufacturing jobs in the 1980s and a 30%

population decline between 1970 and 1990. The city made efforts to improve its environmental sustainability and, due to the urban environmental transformation that the city has undergone, it became in 2019 the third most liveable city in the United States according to the Global Liveability Index. The index, developed by the Economist Intelligence Unit, covers five main categories: stability; healthcare; culture and environment; education; and infrastructure.

Source: Climate Action (2013[59]), "Malmö – From industrial waste land to sustainable city", https://www.climateaction.org/climate-leader-papers/ilmar_reepalu_mayor_city_of_malmoe_sweden (accessed on 28 April 2021); Bloomberg (2017[60]), "COP23: How cities can transition from industrial to sustainable", https://www.bloomberg.com/news/articles/2017-11-13/cop23-how-cities-can-transition-from-industrial-to-sustainable (accessed on 28 April 2021); Our World (2017[61]), "Essen's award-winning blueprint for greening the post-industrial city", https://ourworld.unu.edu/en/essens-award-winning-blueprint-for-greening-the-postindustrial-city (accessed on 28 April 2021); Bizkaia Talent (2020[62]), *Bilbao, de ciudad industrial a capital cultural*, https://www.bizkaiatalent.eus/pais-vasco-te-espera/apuesta-de-futuro/industrial-cultural-servicios/ (accessed on 28 April 2021).

The finance sector plays a key role in Glasgow's economy, as the city is the main location of finance and business services in Scotland. In 2019, Glasgow was the third-largest financial market in the UK and home to some of the most prominent business and financial organisations. The sector employs more than 50 000 Glaswegians. In 2001, Glasgow City Council and Scottish Enterprise launched the International Financial Services District (IFSD) to attract and host financial and business service companies (Glasgow City Council, 2020[63]). In 2018, the city hosted 3 355 companies in the sector, which registered a turnover of GBP 2.1 billion and a GVA of GBP 1.6 billion (Invest Glasgow, 2019[64]). The financial sector has started seizing the opportunities and scaling the circular economy. Between 2016 and 2020, the number of private market funds (including venture capital, private equity and private debt funds) with a focus on the circular economy has increased 10-fold (from 3 to 30). Moreover, assets managed by public equity funds addressing the circular economy skyrocketed from USD 0.3 billion in January 2020 to USD 2 billion in August 2020 (Ellen MacArthur Foundation, 2020[65]). The Bank of Scotland recognises the circular economy as a pillar for rebuilding after the effects of the COVID-19 pandemic (Bank of Scotland, 2020[66]).

As Scotland's most technologically advanced city and the 2nd in the UK, Glasgow has great potential to advance its circular transition through digitisation (CBRE, 2020[67]). In 2017, the digital technology industry in Glasgow generated a turnover of more than GBP 1 billion, hosting more than 500 companies specialised in innovative technology and accounting for 33 000 jobs (Invest Glasgow, 2019[68]). The city plans to collaborate with the digital industry to attract investments in digital infrastructure, including 5G technology, to boost economic growth and increasing digital penetration (Glasgow City Council et al., 2019[57]). In 2013, Glasgow was awarded GBP 24 million investment from the UK Government Innovate UK project to develop digital and data infrastructure initiatives to make it an interconnected smart city. The impact of the programme has been a return on the investment of GBP 144 million. The project included initiatives in the field of intelligent street lights and maximised the potential of open data (UK Government, 2017[69]). As the sector with the highest growth in Scotland by 2024, Scotland's technological sector is forecasted to grow twice as fast as the overall economy (38% vs. 17.5%) in terms of GVA (Stelmain, 2018[70]). The significance of this sector in the city can be an opportunity for Glasgow's circular transition. According to the OECD (2020[7]), 51% of surveyed cities and regions use digital tools to enable the circular economy, and 33% of cities and regions are planning to link digitalisation and their circular economy initiatives in the short term. Some of the opportunities arising from the use of digitisation include: material exchange platforms; tracking of waste for better collection and recycling; open-access tools; awareness-raising platforms; and tools to connect business across the value chain.

As a major international gateway for Scotland, tourism is a key sector in Glasgow's economy with considerable potential to be a driver for the circular transition in the city. In 2018, Glasgow attracted 2.3 million international and domestic tourists, generating GBP 662 million for the local economy (Invest Glasgow, 2020[71]; Glasgow City Council, 2019[72]). In 2019, Glasgow City Council launched the Glasgow

Tourism and Visitor Plan to 2023, aiming to achieve a turnover of GBP 771 million and the creation of 6 600 new jobs (Glasgow City Council et al., 2019[57]). As the first United Nations Educational, Scientific and Cultural Organization (UNESCO) City of Music since 2008, Glasgow welcomes an average of 130 music events per week, the highest in the UK. In 2017, Glasgow hosted more than 2 400 creative companies, the fifth-highest in the UK, 25% more than in 2013. This business growth resulted in more than 20 000 people being employed and GBP 1.45 billion in revenue in 2017 (Invest Glasgow, 2020[73]). The tourism and the creative industry sectors are linked to many services (e.g. energy, water, waste management, food and transport) that can contribute, if wisely managed, to a more sustainable and low-carbon economy (OECD, 2013[74]).

Glasgow is the UK's leading retail destination in terms of spending potential after London, and it ranks 11th in Europe. The sector generates annually a GVA of GBP 763 million and it employs approximately 35 000 people in Glasgow (Invest Glasgow, 2020[71]). Glasgow's main retail offer is concentrated within one square mile in the city centre, also known as the Style Mile, which, in 2020 and 2021, suffered the consequences of the lockdowns due to the COVID-19 crisis. Linked to the retail and fashion sector, there is a growing potential of the second-hand market in the city, following the national trends. In 2013, there were 461 000 jobs in circular economy activities in the UK, 32 600 of them in the retail sale of second-hand goods (LWRB, 2015[75]). In general, the popularity of second-hand is on the raise as more people look to shop ethically and embrace the circular economy (World Economic Forum, 2020[76]).

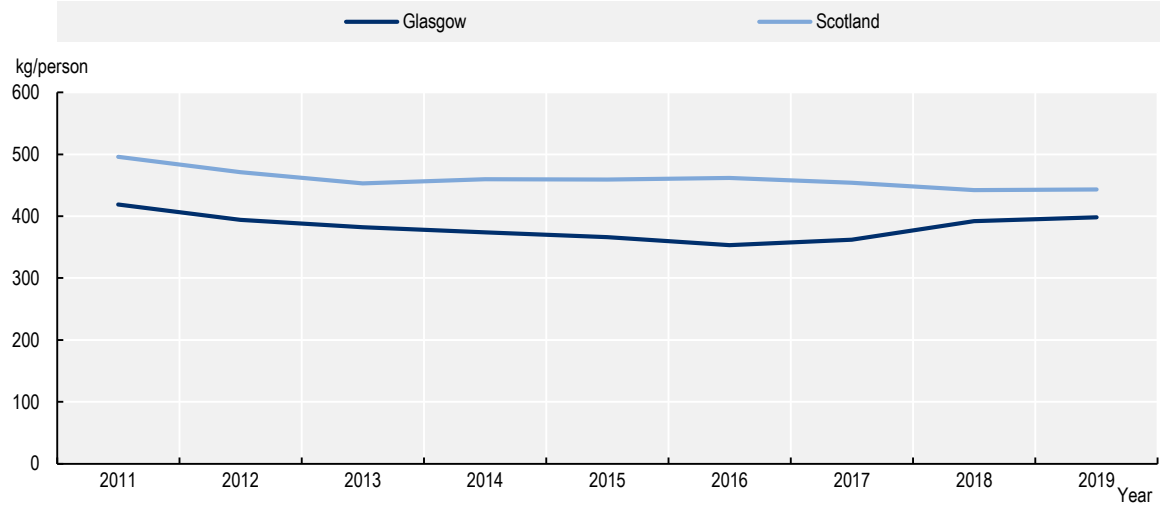
SMEs prevail in Glasgow's business fabric and they have been the main target of circular-economy-related initiatives set up in the city so far through awareness-raising initiatives, financial support and capacity building programmes. Of the total of existing companies in March 2020, 85% had less than 10 employees and only 3% had more than 50 employees, which is very similar to the UK and Scotland (2% for both) (ONS, 2020[77]). The rate of business start-ups in Glasgow has decreased slightly since 2016, from 63.7 start-ups for every 10 000 adults in 2016 to 58.4 in 2018. The proximity to university and talent, as well as the business opportunities available in the city, are identified as the most valued factors for entrepreneurship activities in the city (Tech Nation, 2018[78]). In recognition of the efforts made by the city to boost entrepreneurship, together with Lombardy, Italy, and Małopolska, Poland, Glasgow was awarded European Entrepreneurial Region in 2016 by the European Committee of the Regions (CoR). Glasgow became the second city to receive this recognition after Lisbon, Portugal, in 2015 (CoR, 2016[79]). The Glasgow Economic Strategy set the objective of creating 50 000 new jobs by 2023. Yet many people have insecure and low-quality jobs. Before the COVID-19 pandemic, Glasgow was the Scottish city with most people receiving Universal Credit, a financial support provided by the UK Government for people looking for work or on a low income. The COVID-19 crisis has boosted the number of applications in Glasgow compared to pre-pandemic levels, from 33 656 beneficiaries to 52 946 between February and April 2020 (Weakley and Waite, 2020[80]).

The transition to the circular economy in Glasgow can be a potentially powerful tool to stimulate job creation in the city. The shift towards a circular economy can generate local employment as repair, maintenance, upgrading, remanufacturing, reuse, recycling of materials and product-life extension are more labour intensive than mining and manufacturing (Wijkman and Skånberg, 2017[81]). Glasgow is the Scottish city with the highest number of jobs linked to the circular economy (34 782 jobs and 8.3% of total) (Circle Economy, 2020[82]). Moreover, business practices with an important potential in the field of the circular economy, such as the health, education, manufacturing and food and beverages sectors provided in 2016 over 117 500 jobs, almost 30% of Glasgow's workforce, and had an economic value of over GBP 5.5 billion (27% of Glasgow's total economy) (Circle Economy, 2016[83]).

Environmental trends

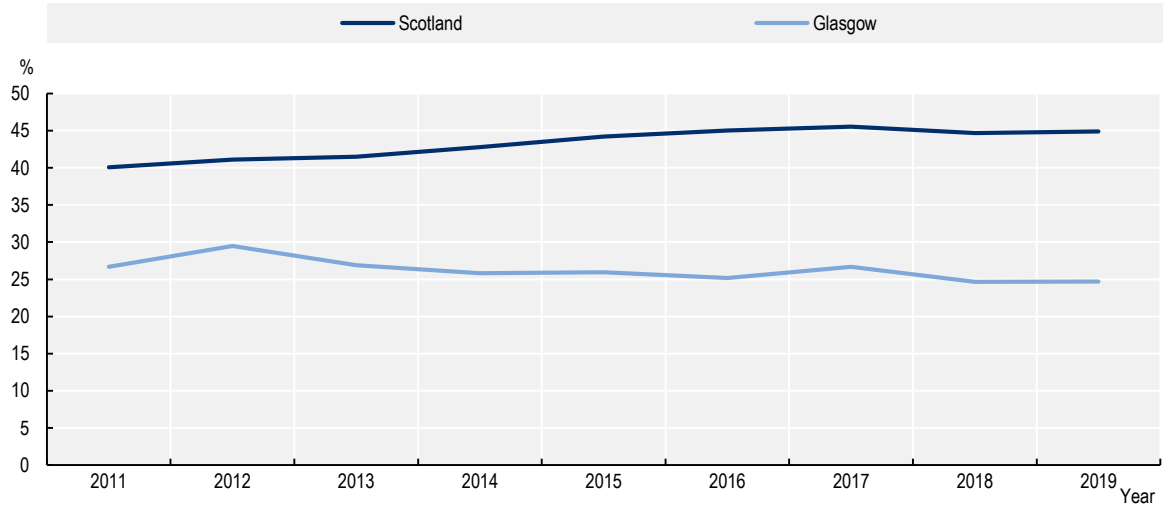
The generation of per capita household waste has decreased in recent years; however recycling is still low. Between 2011 and 2019, the per capita household waste generated in Glasgow has decreased by 5.0%. In 2019, Glasgow's households generated 398 kg per person, which is slightly below the Scottish average, 443 kg per person. However, Glasgow registered an increasing trend since 2016, when it reached its lowest point since 2011 with 353 kg per person (Figure 1.7). Only 24.7% of the total household waste generation is recycled in the city, being the local authority with the lowest rate in Scotland (excluding the Scottish islands) and well below the Scottish average (44.9% in 2019) and the levels of the United Kingdom (45.0% in 2018) (Figure 1.8) (Government Statistical Service, 2020[84]; SEPA, 2020[85]). Almost half of waste generated in Glasgow's households is sent to landfill (49% in 2019), which is much higher than the average in Scotland (31.3%) and it stands above the levels of the main Scottish cities such as Aberdeen (17.7%), Edinburgh (4.5%) and Dundee (6.9%) (SEPA, 2019[86]). The city has been put in place measures to improve the efficiency of its waste management system and increase its recycling rates. Some of the measures of the "Tackling Glasgow's Waste – Cleansing Waste Strategy and Action Plan 2015 to 2020" included the construction of a residual waste treatment plant, which occurred in 2019 (Glasgow Recycling and Renewable Energy Centre - GRREC). The plant will divert 90% of all Glasgow's waste from landfill and save 90 000 tonnes of CO_2 emissions per year (Glasgow City Council, 2019[87]). Other initiatives carried out by the city included the expansion of recycling points over the city and a communications strategy for recycling (Glasgow City Council, 2010[88]). Further information on waste management is provided in Chapter 2.

Figure 1.7. Household waste generation in Glasgow and Scotland, United Kingdom, 2011-2019



Note: Household waste generated includes waste collected by local authorities at the door ("kerbside collection"), waste from sites such as recycling collection bins at supermarkets ("Bring" sites), and waste collected from households at local authority drop-off points ("Civic amenity sites").
Source: Scotland's Environment (2020[89]), Household Waste.

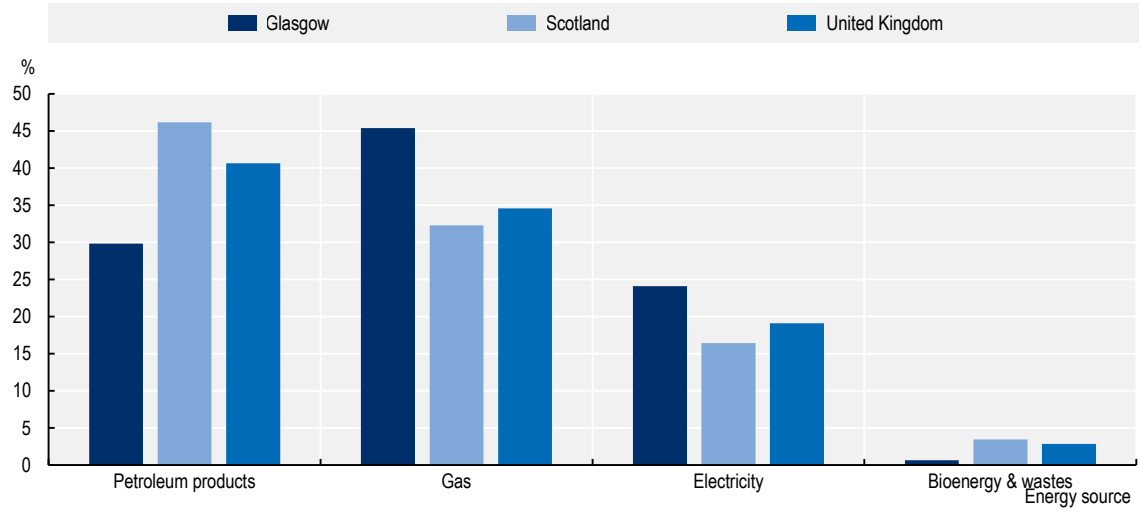
Figure 1.8. Household waste recycling rates in Scotland and Glasgow, United Kingdom, 2011-2019



Note: Household waste means waste generated by households. Waste from households includes household collection rounds, other household collections such as bulky waste collections, waste deposited by householders at Household Waste Recycling Centres (HWRCs) and recycling points / bring banks (SEPA, 2011[90]).
Source: SEPA (SEPA, 2019[86]), Scottish Household waste – summary data 2019.

The total energy consumption in Glasgow (measured in GWh) reduced by 18.2% between 2005 and 2018, lower than Scotland (15.0%) and United Kingdom (15.8%) for the same period. This decrease is also steeper than the average of the EU. Some of the reasons of this decrease could include improvements in energy efficiency, a reduction of energy-intensive heavy industries and a higher consumer awareness (Smart Business, 2018[91]). Regarding the energy distribution by origin (Figure 1.9), gas is the major source in Glasgow, accounting for approximately a half of the total consumption (45.4%), followed by petroleum products (29.8%) and electricity (24.1%). Coal, manufactured fuels and bioenergy account for less than 1% in total. These figures diverge from the situation in Scotland and United Kingdom, where petroleum products are the main energy source (46.1% and 40.6% respectively) and gas represents approximately one third of the consumption (32.3% and 34.5% respectively). Furthermore, both Scotland and United Kingdom show a lower consumption of electricity (16.4% and 19.1%), while the use of bioenergy is more prevalent (3.4% and 2.8%) than in Glasgow (0.6%) (Government of the United Kingdom, 2020[92]).

Figure 1.9. Energy consumption (GWh) by source in selected areas in 2018

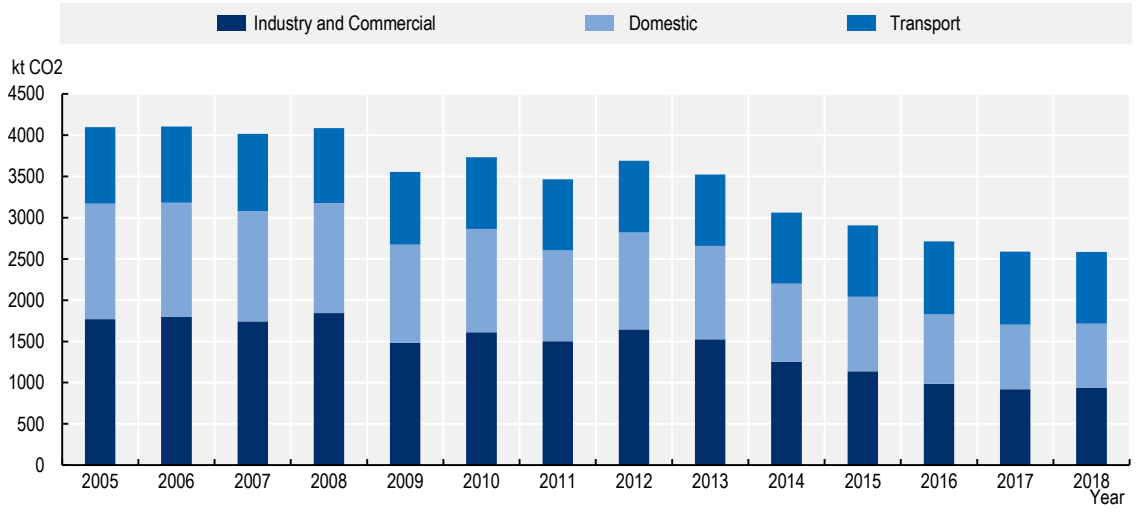


Note: Coal and petroleum products include consumption in the following sectors: Heat Generation, Energy Industry use, Industry, Public administration, Commercial, Agriculture, Miscellaneous. Manufactured fuels includes only manufactured solid fuels and not derived gases.
Source: Government of the United Kingdom (2020[92]) Total final energy consumption at regional and local authority level: 2005 to 2018.

Glasgow's CO_2 emissions per capita have remained below the levels of Scotland and the United Kingdom in the last 14 years. CO_2 emissions per capita have sharply decreased since 2005[5] (from 7.2 tonnes/capita in 2005 to 4.1 tonnes/capita in 2018), below both the regional and national averages (5.3 tonnes/capita and 5.2 tonnes/capita respectively). In 2018, CO_2 emissions were similarly distributed among the three main sectors in Glasgow: industry and commercial sector (36%), domestic sector (30%) and transport (36%). However, while emissions from the transport sectors have remained stable between 2005 and 2018, those produced by the consumption and commercial sectors respectively shrank by 47% and 44%. (Figure 1.10). The city has already achieved the objective set in the Energy and Carbon Masterplan (2015), which set out the target of reducing Glasgow's carbon dioxide emissions by 30% by 2020 from 2006 levels (Glasgow City Council, 2014[93]). According to the latest available data for 2018, emissions dropped by 37% from 2006 levels (Government of the United Kingdom, 2020[94]).

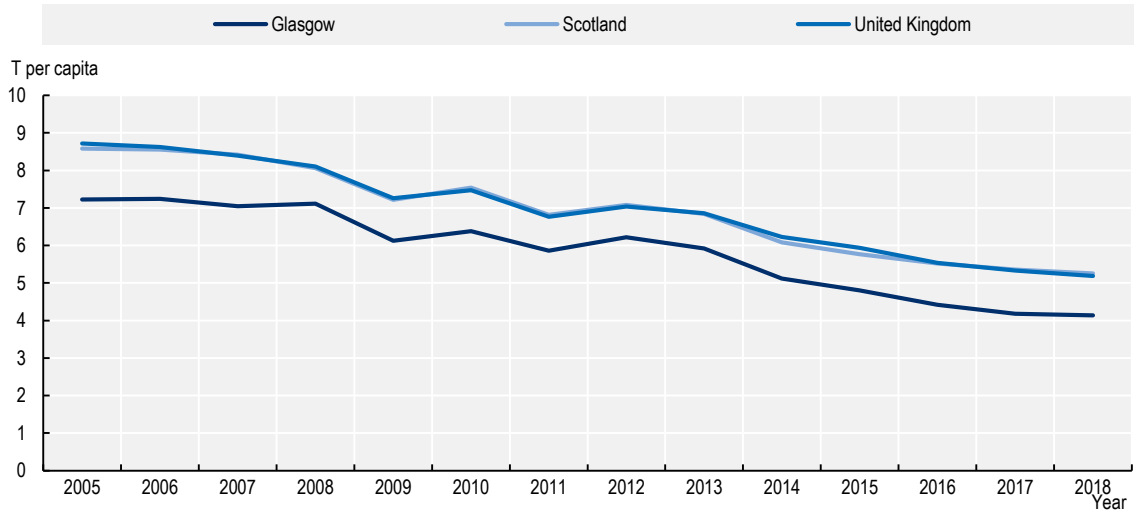
Continuing the recent positive trend, the city expects to become the first carbon neutral city in United Kingdom by 2030 (Figure 1.11), while Scotland and United Kingdom plan to achieve carbon neutrality by 2045 and 2050 respectively (Glasgow City Council, 2019[95]) (Scottish Government, 2019[96]). Considering that the use of materials accounts for up close to two thirds of global greenhouse gas emissions, there is a significant opportunity to potentially reduce emissions through effective material management policies, prevention of material consumption, eco-design and reuse.

Figure 1.10. Total CO2 emissions in Glasgow, United Kingdom, 2005-2018



Source: Government of the United Kingdom (2020[94]), UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018.

Figure 1.11. CO2 per capita emissions in Glasgow, Scotland and United Kingdom, 2005-2018



Source: Government of the United Kingdom (2020[94]), UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018.

Road traffic is the main source of air pollution in the city and one of the main environmental concerns. Glasgow was the Scottish city with the highest traffic volume in 2018 (measured in million vehicle kilometres), representing a 14% increase since 1998 (Transport Scotland, 2019[97]). However, alternative means of transport are not convenient and affordable for all. While approximately half (46%) did not own a car, 74% of households in Glasgow did not have access to a bike in 2018, above the Scottish average (65%). Access to a bike in Glasgow varies across the city, and people in lower income areas are less likely to cycle. Furthermore, public transport is not accessible for everyone, as more than half (55%) of Glaswegians consider local bus service is not value for money (Glasgow City Council, 2020[98]). In 2017 Glasgow registered a higher mean population exposure to PM2.5 (Micrograms per cubic metre) than the main Scottish cities (8.4 in Glasgow; 6.9 in Edinburgh; 6.5 in Dundee; and 6.2 in Aberdeen). However, despite being 16% above the Scottish average, it remained well below the OECD standard (12.5) and the

United Kingdom (10.4) (OECD, 2020[99]). In order to reduce pollution levels, Glasgow introduced Scotland's first Low Emission Zones in the city centre in 2018. This measure aims at reducing pollution levels and it is being implemented in two phases: the first one only applying to local service buses, with the full implementation targeting all vehicles. As the temporary pause in plans to implement Low Emission Zones (LEZ) in Scotland due to the COVID-19 pandemic, the full implementation of the LEZ is likely apply to all vehicles by 2023, requiring emission standards to all vehicles. The COVID-19 pandemic is considerably affecting the CO_2 emissions levels in the city. While the confinement measures introduced in the United Kingdom in March 2020 have had a considerable effect on the traffic levels and air quality, traffic levels increased sharply when lockdown restrictions were lifted, occasionally exceeding the pre-confinement standards (Scottish Environment Protection Agency, 2020[100]).

References

Bank of Scotland (2020), *The Future of Corporate Sustainability*, https://business.bankofscotland.co.uk/business-resource-centre/insights-and-ideas/future-of-corporate-sustainability.html (accessed on 27 April 2021). [66]

Bizkaia Talent (2020), *Bilbao, de ciudad industrial a capital cultural*, https://www.bizkaiatalent.eus/pais-vasco-te-espera/apuesta-de-futuro/industrial-cultural-servicios/ (accessed on 28 April 2021). [62]

Bloomberg (2017), "COP23: How cities can transition from industrial to sustainable", https://www.bloomberg.com/news/articles/2017-11-13/cop23-how-cities-can-transition-from-industrial-to-sustainable (accessed on 28 April 2021). [60]

CBRE (2020), *Tech Cities*, https://www.cbre.co.uk/research-and-reports/tech-cities (accessed on 4 December 2020). [67]

Centre for Cities (2019), "Movement of students and graduates to and from Glasgow". [37]

Circle Economy (2020), *Circular Jobs Monitor - Jobs & Skills in the Circular Economy Programme*, https://www.circle-economy.com/circular-jobs-initiative/monitor (accessed on 28 April 2021). [82]

Circle Economy (2016), *Circular Glasgow - A Vision and Action Plan for the City of Glasgow*, Glasgow Chamber of Commerce, Glasgow City Council, Zero Waste Scotland. [83]

Circular Glasgow (2018), *Glasgow's ambition to become Scotland's first circular city*. [101]

Climate Action (2013), "Malmö – From industrial waste land to sustainable city", https://www.climateaction.org/climate-leader-papers/ilmar_reepalu_mayor_city_of_malmoe_sweden (accessed on 28 April 2021). [59]

CoR (2016), *European Entrepreneurial Region Award*, Committee of the Regions, https://cor.europa.eu/en/engage/Documents/EER/EER-Awards-2016/Glasgow_City_UK-Application_Form.pdf (accessed on 4 December 2020). [79]

EC (2015), *Circular Economy – Overview*, European Commission, https://ec.europa.eu/eurostat/web/circular-economy. [11]

EC (2008), *Environment and Ageing - Final Report*, European Commission, https://ec.europa.eu/environment/enveco/others/pdf/ageing.pdf (accessed on 7 May 2021). [35]

EEA (2016), *Urban Sustainability Issues: What Is a Resource-efficient City*, European Environment Agency, https://op.europa.eu/en/publication-detail/-/publication/15ad5a5b-b50e-11e5-8d3c-01aa75ed71a1/language-en (accessed on 27 April 2021). [30]

Ekins, P. et al. (2019), *The Circular Economy: What, Why, How and Where*. [9]

Ellen MacArthur Foundation (2020), *Financing the Circular Economy - Capturing the opportunity*, https://ellenmacarthurfoundation.org/financing-the-circular-economy-capturing-the-opportunity (accessed on 27 April 2021). [65]

Ellen MacArthur Foundation (2019), *Introduction to the Circular Economy*. [6]

Ellen MacArthur Foundation (2018), *Ellen MacArthur Foundation*, https://www.ellenmacarthurfoundation.org/circular-economy/concept. [10]

Ellen MacArthur Foundation/Zero Waste Scotland/Scottish Enterprise (2014), *Scotland and the Circular Economy*, https://www.zerowastescotland.org.uk/content/scotland-and-circular-economy-report (accessed on 9 June 2021). [55]

FAO (2020), *Urban Food Agenda* , Food and Agriculture Organization, http://www.fao.org/urban-food-agenda/en/ (accessed on 30 September 2020). [4]

GCPH (2020), *Family and Child Poverty*, https://www.gcph.co.uk/children_and_families/family_and_child_poverty (accessed on 4 December 2020). [51]

Glasgow Canal Regeneration Partnership (2014), *Canal Action Plan 2015-2020*. [48]

Glasgow Chamber of Commerce (2021), “Scottish cities to avoid worst impact of economic downturn in pandemic”. [56]

Glasgow City Council (2021), “Council updated on economic recovery progress and plans in Glasgow”, http://www.glasgow.gov.uk/index.aspx?articleid=26836. [19]

Glasgow City Council (2020), *A Public Conversation on transport in Glasgow Public Conversation on Transport!*. [98]

Glasgow City Council (2020), “Funding of programme to reduce vacant and derelict land in Glasgow approved”, https://www.glasgow.gov.uk/article/26297/Funding-of-programme-to-reduce-vacant-and-derelict-land-in-Glasgow-approved (accessed on 4 December 2020). [45]

Glasgow City Council (2020), *International Financial Services District*, https://www.glasgow.gov.uk/article/17150/International-Financial-Services-District (accessed on 4 December 2020). [63]

Glasgow City Council (2020), “Post-Pandemic Economic Recovery Plan for Glasgow to be developed”, https://www.glasgow.gov.uk/article/25869/Post-Pandemic-Economic-Recovery-Plan-for-Glasgow-to-be-developed (accessed on 29 November 2020). [18]

Glasgow City Council (2019), *Council Sets Target Of Carbon Neutral Glasgow by 2030*, https://www.glasgow.gov.uk/article/25066/Council-Sets-Target-Of-Carbon-Neutral-Glasgow-by-2030 (accessed on 1 December 2020). [95]

Glasgow City Council (2019), *Glasgow Recycling and Renewable Energy Centre opens officially*, http://www.glasgow.gov.uk/article/24884/Glasgow-Recycling-and-Renewable-Energy-Centre-opens-officially (accessed on 3 December 2020). [87]

Glasgow City Council (2019), *Poverty Leadership Panel*, https://www.glasgow.gov.uk/article/17559/Poverty-Leadership-Panel (accessed on 4 December 2020). [52]

Glasgow City Council (2019), "Record year for international visitors to Glasgow", https://www.glasgow.gov.uk/article/23040/Record-Year-for-International-Visitors-to-Glasgow (accessed on 4 December 2020). [72]

Glasgow City Council (2017), *Glasgow's Housing Strategy 2017-2023*. [26]

Glasgow City Council (2014), *Energy and Carbon Masterplan*. [93]

Glasgow City Council (2010), *Tackling Glasgow's Waste-Cleansing Waste Strategy and Action*. [88]

Glasgow City Council et al. (2019), *Glasgow Economic Strategy 2016-2023 Refresh*, https://www.glasgow.gov.uk/CHttpHandler.ashx?id=48028&p=0 (accessed on 1 December 2020). [57]

Government of the United Kingdom (2020), *Total final energy consumption at regional and local authority level: 2005 to 2018*, https://www.gov.uk/government/statistics/total-final-energy-consumption-at-regional-and-local-authority-level-2005-to-2018 (accessed on 10 December 2020). [92]

Government of the United Kingdom (2020), *UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018*, https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018 (accessed on 9 December 2020). [94]

Government Statistical Service (2020), *UK Statistics on Waste*. [84]

IEA (2016), "Cities are in the frontline for cutting carbon emissions, new IEA report finds", International Energy Agency, http://www.iea.org/news/cities-are-in-the-frontline-for-cutting-carbon-emissions-new-iea-report-finds (accessed on 27 July 2020). [2]

Invest Glasgow (2020), *Creative Economy*. [73]

Invest Glasgow (2020), *Retail Prospectus*, http://investglasgow.com/wp-content/uploads/2020/03/2020_Retail_Prospectus.pdf (accessed on 4 December 2020). [71]

Invest Glasgow (2019), *Digital Technology Sector*. [68]

Invest Glasgow (2019), *Glasgow Financial & Business Services*, http://investglasgow.com/wp-content/uploads/2019/09/Glasgow-Financial-and-Business-Services.pdf (accessed on 4 December 2020). [64]

Kirchherr, J., D. Reike and M. Hekkert (2017), *Conceptualizing the Circular Economy: An Analysis of 114 Definitions*. [8]

KPMG (2020), *Hard times: UK Economic Outlook*, https://home.kpmg/content/dam/kpmg/uk/pdf/2020/06/uk-economic-outlook-june.pdf (accessed on 29 November 2020). [17]

LWRB (2015), *Employment and the Circular Economy - Job Creation through Resource Efficiency in London*, London Waste and Recycling Board, http://www.wrap.org.uk (accessed on 12 February 2020). [75]

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. [13]

National Records of Scotland (2021), *Deaths Involving Coronavirus (COVID-19) in Scotland*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/general-publications/weekly-and-monthly-data-on-births-and-deaths/deaths-involving-coronavirus-covid-19-in-scotland. [21]

National Records of Scotland (2020), *Births Time Series Data*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/births/births-time-series-data (accessed on 10 May 2021). [36]

National Records of Scotland (2020), *Estimates of Households and Dwellings in Scotland*. [28]

National Records of Scotland (2020), *Household Projections for Scotland (2018-based)*. [29]

National Records of Scotland (2020), *Local Area Migration*, National Records of Scotland. [25]

National Records of Scotland (2020), *Mid-2019 Population Estimates Scotland*, http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/mid-2019 (accessed on 3 December 2020). [22]

National Records of Scotland (2020), *Population Projections for Scottish Areas (2018-based)*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/sub-national-population-projections/2018-based (accessed on 10 December 2020). [34]

National Records of Scotland (2019), *Life Expectancy in Scottish Areas 2016-2018*, http://www.nrscotland.gov.uk (accessed on 1 December 2020). [40]

National Records of Scotland (2019), *Mid-2017 Population Estimates Scotland*, National Records of Scotland. [23]

National Records of Scotland (2019), *Scotland's Population: The Registrar General's Annual Review of Demographic Trends*. [27]

National Records of Scotland (2018), *Scotland's Population 2017 - The Registrar General's Annual Review of Demographic Trends*, https://www.nrscotland.gov.uk/statistics-and-data/statistics/stats-at-a-glance/registrar-generals-annual-review (accessed on 10 December 2020). [33]

OECD (2020), *Metropolitan areas*, https://stats.oecd.org/Index.aspx?DataSetCode=CITIES (accessed on 10 December 2020). [99]

OECD (2020), *OECD Economic Outlook, Volume 2020 Issue 1*, OECD Publishing, Paris, https://dx.doi.org/10.1787/0d1d1e2e-en. [16]

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

OECD (2020), *Scotland*, OECD Regional Well-Being, OECD, Paris, https://www.oecdregionalwellbeing.org/UKM.html (accessed on 1 December 2020). [42]

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

OECD (2020), *United Kingdom Economic Snapshot*, OECD, Paris, http://www.oecd.org/economy/united-kingdom-economic-snapshot/ (accessed on 4 December 2020). [58]

OECD (2019), *Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264307452-en. [12]

OECD (2019), "Life expectancy by sex and education level", in *Health at a Glance 2019: OECD Indicators*, OECD Publishing, Paris, https://dx.doi.org/10.1787/6303de6b-en. [41]

OECD (2013), "Green Innovation in Tourism Services", *OECD Tourism Papers*, No. 2013/1, OECD Publishing, Paris, https://dx.doi.org/10.1787/5k4bxkt1cjd2-en. [74]

OECD (2011), *Greening Household Behaviour: The Role of Public Policy*, OECD Studies on Environmental Policy and Household Behaviour, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264096875-en. [32]

OECD (2002), *Urban Renaissance: Glasgow: Lessons for Innovation and Implementation*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264199378-en. [53]

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. [1]

ONS (2020), "Labour market in the regions of the UK: May 2020", Statistical bulletins, Office for National Statistics. [15]

ONS (2020), *UK Business: Activity, Size and Location*, Office for National Statistics, http://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation (accessed on 4 December 2020). [77]

Our World (2017), "Essen's award-winning blueprint for greening the post-industrial city", https://ourworld.unu.edu/en/essens-award-winning-blueprint-for-greening-the-postindustrial-city (accessed on 28 April 2021). [61]

Scotland's environment (2020), *Household Waste*, https://www.environment.gov.scot/data/data-analysis/household-waste/. [89]

Scottish Environment Protection Agency (2020), *Glasgow's Low Emission Zone*, http://www.scottishairquality.scot/air-quality/pollutants#no2 (accessed on 3 December 2020). [100]

Scottish Government (2020), *Scottish Index of Multiple Deprivation 2020: Introduction*, https://www.gov.scot/publications/scottish-index-multiple-deprivation-2020/pages/5/ (accessed on 4 December 2020). [50]

Scottish Government (2020), *Scottish Vacant and Derelict Land Survey 2019*, https://www.gov.scot/publications/scottish-vacant-derelict-land-survey-2019/ (accessed on 4 December 2020). [46]

Scottish Government (2019), *Scotland to become a net-zero society*, https://www.gov.scot/news/scotland-to-become-a-net-zero-society/ (accessed on 9 December 2020). [96]

Scottish Land Commission (2020), *Recommendations from the Vacant and Derelict Land Taskforce*. [47]

Scottish Land Commission (2020), "The impact of vacant and derelict land", https://www.landcommission.gov.scot/news-events/news-blog/the-impact-of-vacant-and-derelict-land (accessed on 4 December 2020). [44]

SEPA (2020), *Household waste data*, https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/household-waste-data/ (accessed on 9 December 2020). [85]

SEPA (2019), *Scottish Household waste – summary data 2019*, https://www.sepa.org.uk/media/532167/2019-household-waste-commentary.pdf (accessed on 3 December 2020). [86]

SEPA (2011), *ZERO WASTE PLAN-GUIDANCE FOR LOCAL AUTHORITIES Use of Data to Support the Zero Waste Plan-Local Authority Recycling Targets, Landfill Diversion and the Landfill Allowance Scheme*, http://www.scotland.gov.uk/Publications/2010/06/08092645/0 (accessed on 10 December 2020). [90]

Smart Business (2018), *UK Energy Consumption Decline - Despite a Growing GDP*, https://smarterbusiness.co.uk/blogs/uk-energy-consumption-decline-despite-a-growing-gdp/ (accessed on 10 December 2020). [91]

Stelmain (2018), *Why Choose Glasgow for Your Rented Office Space?*, http://stelmain.com/blog/why-choose-glasgow-your-rented-office-space (accessed on 4 December 2020). [70]

Tech Nation (2018), *Glasgow*, https://technation.io/insights/report-2018/glasgow/ (accessed on 4 December 2020). [78]

Transport Scotland (2019), *Scottish Transport Statistics*. [97]

UK Government (2020), "The ten point plan for a green industrial revolution", https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution (accessed on 29 April 2021). [20]

UK Government (2017), "Glasgow a world-leading smart city with support from Innovate UK", https://www.gov.uk/government/case-studies/glasgow-a-world-leading-smart-city-with-support-from-innovate-uk (accessed on 4 December 2020). [69]

Understanding Glasgow (2020), *Neighbourhood Profiles: Cathcart and Simshill*, https://www.understandingglasgow.com/profiles/neighbourhood_profiles/2_south_sector/55_cathcart_and_simshill (accessed on 1 December 2020). [43]

Understanding Glasgow (2020), *Overview*, The Glasgow Indicators Project, http://www.understandingglasgow.com/indicators/population/overview (accessed on 1 December 2020). [24]

UNEP (2013), *UNEP-DTIE Sustainable Consumption and Production Branch*, United Nations Environment Programme. [5]

Walsh, D. et al. (2010), "It's not 'just deprivation': Why do equally deprived UK cities experience different health outcomes?", *Public Health*, Vol. 124/9, pp. 487-495, http://dx.doi.org/10.1016/j.puhe.2010.02.006. [38]

Walsh, D. et al. (2016), "History, politics and vulnerability: Explaining excess mortality in Scotland and Glasgow". [39]

Weakley, S. and D. Waite (2020), "The COVID-19 crisis and universal credit in Glasgow", Policy Scotland Working Paper, University of Glasgow. [80]

WHO (2018), *Circular Economy and Health: Opportunities and Risks*, World Health Organization, https://www.euro.who.int/en/publications/abstracts/circular-economy-and-health-opportunities-and-risks-2018 (accessed on 27 April 2021). [49]

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*. [81]

Williams, J. (2005), "One-person households – A resource time bomb?", *WIT Transactions on Ecology and the Environment*, Vol. 81, https://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/81/14806 (accessed on 27 April 2021). [31]

World Bank (2010), *World Development Report 2010*, http://dx.doi.org/10.1596/978-0-8213-7987-5. [3]

World Economic Forum (2020), "This is how UK charity shops are thriving", https://www.weforum.org/agenda/2020/01/uk-second-hand-circular-economy/ (accessed on 4 December 2020). [76]

WRAP UK (2020), *Six-point Plan for Post-COVID Growth*, https://wrap.org.uk/buildbackbetter (accessed on 3 December 2020). [54]

Notes

[1] Cllr Susan Aitken's speech at the 2018 Circular Economy Hotspot Scotland held in Glasgow (Circular Glasgow, 2018[101])

[2] See https://www.gcph.co.uk/assets/0000/0801/GCPH_Briefing_Paper_25_for_web.pdf.

[3] The 12 regions included in the OECD Regional Well-Being data are: East Midlands, East of England, Greater London, North East England, North West England, Northern Ireland, Scotland, South East England, South West England, Wales, West Midlands and Yorkshire and The Humber.

[4] Central Easterhouse, Glenwood South, Drumchapel North, Milton West, North Barlanark and Easterhouse South, Wyndford, Crookston South, Drumry East, and Parkhead West and Barrowfield.

[5] 2005 is the earliest year for which data is available. Source: Government of the United Kingdom (2020[92]), Total final energy consumption at regional and local authority level: 2005 to 2018.

2 Towards the circular economy in Glasgow, United Kingdom

In Glasgow, the transition towards the circular economy is led by a partnership formed by the Glasgow Chamber of Commerce, through its Circular Glasgow initiative, Zero Waste Scotland and Glasgow City Council. To date, the circular economy in Glasgow strongly focused on supporting small- and medium-sized enterprises (SMEs) in their circular transition through awareness-raising initiatives and events, financial support and capacity building programmes. This chapter details the main components of the existing circular economy initiatives promoted in the city of Glasgow, Scotland and in the United Kingdom at large. It identifies the state of the art of the circular economy in the city and the key actions of the main sectors for the circular transition in the city, namely: waste, food, spatial planning and the built environment, and events and tourism.

The circular economy in the United Kingdom

There are a number of circular economy initiatives in the United Kingdom (UK). In 2020, the UK Department for Environment, Food and Rural Affairs (Defra), the UK Department of Agriculture, Environment and Rural Affairs (DAERA), the Welsh Government and the Scottish Government jointly launched a "Circular Economy Package policy statement" as a response to the new Circular Economy Action Plan adopted by the European Commission (EC) (Box 2.1). The statement establishes the goal of reaching a 65% municipal recycling rate by 2035. In addition, the UK Research and Innovation (UKRI), a non-departmental public body sponsored by the UK Department for Business, Energy and Industrial Strategy (BEIS), announced in November 2020 the setting-up of five circular economy centres aiming at addressing how the reuse of waste materials in the textile, construction, chemical and metal industries can be beneficial for both the environment and economy (UK Research and Innovation, 2020[1]). The launch of these projects is expected to contribute to the achievement of the net-zero emissions target in the UK by 2050. The centres will be run under the framework of the GBP-30-million UKRI Interdisciplinary Circular Economy programme. The Interdisciplinary Centre for the Circular Chemical Economy, which will aim at reducing the fossil reliance of the chemical industry in the UK, will involve seven British universities, including Heriot-Watt University in Edinburgh.

Box 2.1. Institutional drivers for a transition to a circular economy

According to the OECD Survey on the Circular Economy in Cities and Regions (2020), global agendas and supranational strategies are relevant or very relevant for 83% and 70% of 51 surveyed cities and regions. Regarding the global agendas, 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, 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.

In terms of supranational strategies, in Europe, the EC's circular economy frameworks are key drivers for the circular transition. After the European Circular Economy Package in 2015, the European Commission adopted in 2020 the New Circular Economy Action Plan, as one of the building blocks of the European Green Deal. The Plan 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 production.

Source: European Commission (2020[2]) , Circular economy action plan (CEAP), https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en ; OECD (2020[3]), The Circular Economy in Cities and Regions: Synthesis Report, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/10ac6ae4-en.

At the regional level, England, Scotland and Wales developed circular-economy-related initiatives, including in the form of strategies, to go beyond the concept of recycling:

- The Welsh Government launched in March 2021 its circular economy strategy "Beyond Recycling: A strategy to make the circular economy in Wales a reality". The strategy sets the objective of achieving carbon neutrality and reaching zero waste by 2050 (Welsh Government, 2021[4]).

- In England, the *Litter Strategy for England* and the *Resources and Waste Strategy (RWS)* address England's ambition to transition towards a circular economy through the promotion of product reuse and the minimisation of waste generation (UK Government, 2017[5]; 2018[6]).
- In 2016, the Scottish Government adopted its circular economy strategy "Making Things Last: A circular economy strategy for Scotland", which prioritises four main areas: i) food and drink, and the broader bio-economy; ii) remanufacture; iii) construction and the built environment; and iv) energy infrastructure. The strategy builds on Scotland's zero waste and resource efficiency agendas, discouraging the use of single-use materials and minimising waste (Box 2.2) (Scottish Government, 2020[7]). In 2019, the Scottish Government also launched a public consultation to develop Scotland's circular economy bill. The circular economy is also seen as a means to reach the goals set out in the Climate Change Bill and its amendments. The bill sets a target of net-zero greenhouse gas (GHG) emissions by 2045 and intermediary goals: 70% emissions reduction by 2030 and 90% by 2040 (Scottish Government, 2019[8]). Due to the COVID-19 outbreak, the Scottish Government decided to postpone the discussion in the parliament until further notice and it will be introduced during the 2021-26 parliamentary term. Other initiatives carried out in Scotland include the approval of the Deposit and Return Scheme for Scotland Regulations by the Scottish Parliament in May 2020, to be launched in July 2022 (Scottish Government, 2020[9]). This framework is expected to achieve the following impacts: a daily reduction of 34 000 littered plastic bottles; an additional 76 000 recycled tonnes per year; and an emission cut of 4 million tonnes over 25 years (Zero Waste Scotland, 2020[10]). The Scottish Government also made available funds to implement circular economy projects. It provides funds to Zero Waste Scotland, a not-for-profit environmental organisation leading waste-reducing initiatives funded also by the European Regional Development Fund (ERDF), and to the Scottish Environment Protection Agency (SEPA), in charge of regulating the treatment and disposal of waste (SEPA, 2019[11]).

Box 2.2. Making Things Last: A circular economy strategy for Scotland

In 2016, the Scottish Government launched the circular economy initiative "Making Things Last: A circular economy strategy for Scotland", which established key goals for Scotland in the transition towards a circular economy. The initiative is based on the progress made in zero waste and resource efficiency programmes and prioritises four main sectors: i) food and drink, which has the potential to save between GBP 500 million and GBP 803 million per year in Scotland, implementation of bio-economy opportunities and a circular approach in the beer, whisky and fish sectors; ii) remanufacture, contributing GBP 1.1 billion to economic growth each year; iii) construction and the built environment, responsible for approximately 50% of total waste in Scotland, which can have a positive impact on resource energy; and iv) energy infrastructure, with opportunities for reusing material and equipment, as well as considerable potential for added value.

The strategy includes all of the stages to close and narrow loops in Scotland: from waste prevention, through design, reuse, repair and remanufacture to waste transformation through recycling;; recovering value from biological resources and energy recovery.

The plan concludes with a summary of waste and resource targets and measures set by the Scottish Government and the European Union (EU Waste Framework Directive (2008[12])). In particular, by 2025, targets are the following:

- Reduction of waste arising by 15% against the 2011 baseline of 13.2 million tonnes.
- Waste sent to landfill must remain 5% of all waste.
- 70% recycling/composting and preparing for reuse of all waste.
- Reduction of all food waste arising in Scotland and on-farm losses of edible products.

Source: Scottish Government (2016[13]), "Making Things Last: A circular economy strategy for Scotland", https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/ (accessed on 1 December 2020); EU (2008[12]), *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098 (accessed on 11 December 2020).

Circular economy initiatives in Glasgow, UK

Glasgow aims to become a circular city leader, as part of its profound transformation journey to transition from being a post-industrial city to becoming a carbon-neutral city by 2030. Being one of the greatest industrial cities of the world in the 19th century, whose economy has been long characterised by heavy and manufacturing industry, Glasgow aims to regenerate its post-industrial landscape (e.g. vacant and contaminated land) and create the conditions for a sustainable and just future. As such, the circular economy can result in a system where people can access local jobs and where green business practices contribute to achieving zero carbon goals. In 2019, the Glasgow City Council issued a Declaration of Climate Emergency to become a carbon-neutral city by 2030, aiming to reach the goal before the rest of Scotland and the UK, which are set to become carbon neutral by 2045 and 2050 respectively (Glasgow City Council, 2019[14]). Glasgow City Council established a Climate Emergency Working Group, which published a report containing61 recommendations to tackle climate change, through energy use, roads and transport, development, infrastructure and planning, waste management and food (Glasgow City Council, 2019[15]; 2019[16]). In 2021, Glasgow City Council launched an implementation plan of these recommendations through the Climate Emergency Implementation Plan (CEIP) and evaluated the level of advancement in terms of guidelines provided by the working group (Glasgow City Council, 2021[17]). The

Declaration of Climate Emergency, the carbon neutrality target for 2030 and the hosting of the United Nations (UN) Climate Change Conference (COP26) in November 2021 have contributed to strengthening the commitment of the city towards a significant and long-lasting change. Glasgow sees the organisation of the COP26 as an opportunity to show the potential of the city in its transformation to become carbon neutral and create an enduring legacy beyond the conference. Glasgow is also a member of the Carbon Neutral Cities Alliance (CNCA), a global group of 22 cities aiming to achieve carbon neutrality by 2050 (CNCA, 2020[18]).

Glasgow's circular path is a shared responsibility, primarily driven by the collaboration between the Glasgow Chamber of Commerce, through its Circular Glasgow initiative, Zero Waste Scotland and Glasgow City Council. The Glasgow Chamber of Commerce put in place the Circular Glasgow initiative, which aims to build best practice and capacity with regards to the circular economy mainly within the private sectors in Glasgow. In 2019, the Glasgow Chamber of Commerce launched the Circular Glasgow Network, a platform for businesses from a broad variety of sectors for collaboration and connection, which comprises 175 companies (Circular Glasgow, 2020[19]). Since 2015, this partnership between the Chamber of Commerce, Zero Waste Scotland and Glasgow City Council put in place a number of activities, consisting of: exploratory studies to track inflows and outflows of materials in the city and identify consumer footprints (Circle Economy, 2016[20]); events on the circular economy to raise awareness and facilitate collaborations; and workshops and circular economy platforms to crowdsource ideas (e.g. Circle Lab Challenge) (Table 2.1 and Figure 2.1). After five years of acquired knowledge, practice and experimentations, in 2020, Glasgow City Council launched the *Circular Economy Route Map for Glasgow*.

The route map, which was informed by the previous draft of this report and interviews organised within the OECD policy dialogue on the circular economy in Glasgow, UK, emphasises the goal of localising the economy through creating local jobs and promoting community empowerment (Box 2.3). The strategy identifies key sectors for transition in the city (remanufacturing, repair, sharing, packaging, waste and food and beverages) and sets out concrete actions to be developed before 2030. Some of the key actions include: building a social economy vision for the city, working towards a just transition and developing a mapping of existing public procurement activities that include circular criteria.

Figure 2.1. Timeline of circular economy initiatives in Glasgow, Scotland and the UK, 2016-21

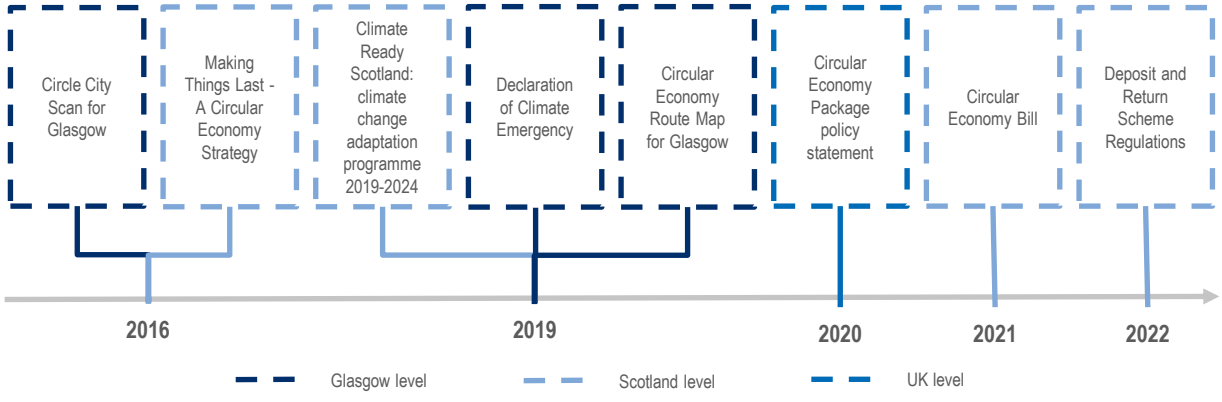


Table 2.1. Circular economy initiatives in Glasgow, UK

Category	Initiative	Promoter	Year
Policy framework	Circular Economy Route Map for Glasgow	Glasgow City Council	2020
Economy and finance	Climate Action Fund	National Lottery Community Fund	2013
	Circular Economy Investment Fund	Zero Waste Scotland	2018
	Co-operative and Social Enterprise Fund	Glasgow City Council	2018
Awareness-raising	Circular Economy awareness-raising/steering forum	Glasgow City Council Apparel Xchange	2020
	Circular Glasgow Network	Glasgow Chamber of Commerce (Circular Glasgow)	2019
	Circle Lab	Glasgow Chamber of Commerce (Circular Glasgow)	2018
	Circular Economy Hotspot Scotland	Glasgow Chamber of Commerce (Circular Glasgow) Zero Waste Scotland	2018
	Circular Glasgow Showcase Event	Glasgow Chamber of Commerce (Circular Glasgow)	2018
	Glasgow: Towards a Circular City	Glasgow Chamber of Commerce (Circular Glasgow)	2018
	Smart Sustainable Cities: Glasgow	Glasgow City Council Foreign and Commonwealth Office of the UK Government	2019
	Circular Hub	Glasgow Chamber of Commerce (Circular Glasgow) Ilka	2019
Capacity building	Circular Economy (CE) Challenge	Young Enterprise Scotland	2018
	Circular Glasgow Ambassadors	Glasgow Chamber of Commerce (Circular Glasgow)	2019
	Climate Emergency Training	Glasgow City Council	2020
	Partnership with the London Waste and Recycling Board (LWARB)	Glasgow Chamber of Commerce	2020
Monitoring and evaluation	Automatic Meter Reader	Glasgow City Council (Carbon Management Team)	2019
	Circle Assessment	Glasgow Chamber of Commerce (Circular Glasgow)	2017
	Circle City Scan	Circle Economy Glasgow Chamber of Commerce Glasgow City Council Zero Waste Scotland	2016

Box 2.3. Circular Economy Route Map for Glasgow, UK

Adopted in 2020 by Glasgow City Council, the route map is based on eight guiding principles of the circular economy: recognising residual value; supporting the sharing economy; community sharing; reducing consumption and promoting reuse; behavioural change; developing the "second-hand" market; encouraging eco-design: and ending planned obsolescence.

The route map includes 30 key actions divided into six themes: i) policy action; ii) planning action; iii) production action; iv) people action; v) private action; and vi) public action.

1. **Policy** actions include among others: the creation of a city sustainability/city green charter for Glasgow to raise awareness and enable circular business; the development of indicators to measure circularity; and the establishment of partnerships at the global, European, national and regional levels.
2. **Planning** actions address several areas such as: supporting the development of circular construction framework through a statement; exploring opportunities to pilot projects for the reuse of construction materials; and organising circular fora targeting the construction and textile sector.
3. **Production** actions focus on the prioritisation of the remanufacturing sector through the review of existing local policies, pilot projects for repair and maintenance, and a waste audit to evaluate the volume and category of waste generated.
4. **People** activities include making unused properties available for innovation and entrepreneurship linked to the circular economy and creating a support programme for circular economy start-ups, providing funding, networking opportunities and advice.
5. **Private** actions address, among others, the establishment of an exchange business platform; the analysis of the waste generated in key events within the city; and the development of a city-wide scheme that supports companies taking sustainable actions.
6. Finally, **public** actions include: mapping existing procurement activities within the city council; supporting greening of unused vacant and derelict land; developing a recommendation report to make sure that the Just Transition principles are included in each circular action; and based on the results of the metabolic analysis for Glasgow in 2016, developing circular initiatives in the healthcare sector.

Source: Glasgow City Council (2020[21]), *Circular Economy Route Map for Glasgow 2020-2030*.

To date, the circular economy approach in Glasgow strongly focused on the role of businesses, mainly SMEs, to integrate the circular economy principles within their activities. This work translated into meaningful and clear messages for all businesses, such as future-proof business innovation, economic savings, collaborations, product development and customer loyalty. Business practices with an important potential in the field of the circular economy, such as in the health, education, manufacturing and food and beverages sectors, provided in 2016 over 117 500 jobs, almost 30% of Glasgow's workforce, and had an economic value of over GBP 5.5 billion (27% of Glasgow's total economy) (Circle Economy, 2016[20]). In 2019, 21 000 jobs in Glasgow, representing 6% of total employment of the city of Glasgow, were linked to circular economy activities. So far, Circular Glasgow has engaged with more than 650 business representatives, largely from SMEs.

Economy and finance

While there is yet no assigned budget for circular-economy-related activities in the city, some funding programmes dedicated to circular business development are currently in place. Zero Waste Scotland administers the GBP-18-million Circular Economy Investment Fund supported by the Scottish Government and the ERDF. The fund aims at providing Scotland-based SMEs with investments ranging from GBP 50 000 to GBP 1 million and tools for the development and growth of circular economy initiatives (one-to-one support, market assessment, lifecycle analysis, communications and marketing) (Zero Waste Scotland, 2020[22]). These businesses have put in place solutions for reusing electrical products, valorisation and waste recovery and repair, in Glasgow (Table 2.2) and across Scotland (Annex A). The Climate Action Fund and the National Lottery Community Fund have also been providing funds for rental and repairing activities (e.g. the Southside Tool Library and the Repair Café Glasgow respectively) (National Lottery Community Fund, 2020[23]). Since 2021, Glasgow City Council provides up to GBP 25 000 of support through the Co-operative and Social Enterprise Fund. The financial support aims to expand the social enterprises and existing co-operatives in Glasgow, as well as facilitate co-operative start-up businesses. Within this framework, some social enterprises promote the reuse of goods (Glasgow City Council, 2020[24]; Co-operative Glasgow, 2017[25]).

Table 2.2. Circular Economy Investment Fund investment projects in Glasgow, UK, 2019

Company	Objective/Project description	Funding	Website
EGG Lighting and Tree Green	Create a light fitting with a modular design suitable for use in warehouses. The investment in this project is to finance a test in warehouse conditions before its full market release.	GBP 24 457	http://www.egglighting.com/
Jaw Brew	Take the waste grains from brewing for a high energy food bar. The funding is for a project to trial the potential market for this new product.	GBP 14 900	www.jawbrew.co.uk/
Mackie Transmissions	Develop a solenoid controller to test remanufactured automatic transmissions.	GBP 58 426	hwww.mackie-transmission.com/
Revive Eco	Recovering used coffee grounds to recycle them and create high-value bio-oils, to be applied in sectors such as cosmetics, pharmaceuticals and food.	GBP 234 358	https://revive-eco.com/
Total Homes Co-operative	Issue housing authorisations for housing associations in Glasgow, ensuring that appliances, furniture and other property are reused.	GBP 312 385	www.total-homes.com/

Source: Zero Waste Scotland (2020[26]), *Circular Economy Investment Fund - Past Projects*, https://www.zerowastescotland.org.uk/content/circular-economy-investment-fund-past-projects (accessed on 11 December 2020).

Awareness raising and capacity building

A number of events on the circular economy are organised in Glasgow, mainly to promote collaborations and raise awareness within the private sector. SMEs are considered a potential driving force for the circular transition. The main awareness-raising initiatives that have been carried out in the city, whether organised by the municipality or by other partner institutions, have been mainly focused on SMEs. The emphasis on this segment is particularly relevant due to its prevalence in the economic structure of the city, as detailed in Chapter 1. Examples are reported below:

- The “Glasgow: Towards a circular city” summit: The Glasgow Chamber of Commerce through its Circular Glasgow initiative, hosted the event in 2018, focusing on the built environment and gathering 60 relevant stakeholders from the city (Circular Glasgow, 2019[27]).
- The Circular Glasgow Showcase event: In 2018, Circular Glasgow gathered six local companies to share information on their business models based on circular approaches (Box 2.4) (Circular Glasgow, 2018[28]).
- The Circular Economy Hotspot Scotland: This 3-day international event aimed at showing Scotland’s progress on the transition towards a circular economy. Organised by Zero Waste Scotland and the Glasgow Chamber of Commerce and hosted in Glasgow in 2018, it gathered 400 participants (Zero Waste Scotland/Circular Glasgow, 2018[29]). During the event, the First Minister of Scotland, Nicola Sturgeon, announced an investment of GBP 700 000 for 3 circular business: i) Total Homes, an association providing housing authorisations for housing associations in Glasgow, which promotes the reuse of household electrical equipment, furniture and other equipment; ii) Revive Eco, a Glasgow-based company that creates environmentally friendly products from used coffee grounds; and iii) Angus 3D, a start-up working with 3D printing technology for the reduction of waste in the design process and the extension of the use of machinery by manufacturing parts from 3D scans (Resource, 2018[30]).

Other relevant events and webinars organised under the umbrella of the Glasgow Chamber of Commerce addressed a broad variety of sectors with significant potential in the transition towards the circular economy, such as manufacturing, infrastructure and food and drink. For instance, in 2019, in partnership with Clydesdale Bank and the Adam Smith Business School at the University of Glasgow, the Glasgow Chamber of Commerce held one of its flagship Glasgow Talks events on innovation and the potential of the circular economy within the construction sector (Circular Glasgow, 2020[31]). Another initiative to raise awareness on the circular economy was the building of a “circular hub”. Circular Glasgow partnered in 2019 with a local design studio, “ilka”, to establish an information hub to inspire citizens to rethink, reuse, repair and recycle. The hub welcomed visitors and provided information on the circular economy, the role of the business in Glasgow during the transition and the potential role citizens can take to adopt a more sustainable lifestyle (Circular Glasgow, 2019[32]). Due to the COVID-19 pandemic in 2020, many events organised by Circular Glasgow turned to a virtual format, such as “Construction and the circular economy” and “Creating a circular workplace” in May 2020, “Manufacturing and the circular economy” in June 2020, and “Circular Glasgow Network webinar: In conversation with Circle Economy” in October 2020.

Glasgow City Council also promoted awareness-raising activities on the circular economy. In December 2019, in collaboration with the Commonwealth Office of the UK Government, the city council hosted a 3-day event, with representatives from 20 European cities, on circular economy awareness and smart and sustainable cities. In February 2020, the city council and the clothing reuse social enterprise Apparel Xchange, organised a circular economy forum to raise awareness of the impacts of the textile sector in the city. The event welcomed participants from different public departments and authorities (e.g. economic development and waste), the private sector, academia and social enterprises. The debate spotlighted the problems arising from wasteful consumption and disposal of clothing and as outlined in Glasgow’s circular strategy, will be the basis for the development of a Circular Textiles Forum in 2021. The forum, planned to be organised in partnership with a broad variety of stakeholders (e.g. Ellen McArthur Foundation, the LWARB, Zero Waste Scotland), aims to reform the city’s approach to clothing supplies and textile waste.

Box 2.4. Glasgow-based companies transforming their business models towards the circular economy

During the organisation of the Circular Glasgow Showcase event, the following companies shared experiences of their transition towards a circular economy:

- **Scottish Leather Group**: As the largest leather manufacturer in the UK, the company tried to achieve an almost closed-loop process, reducing waste sent to landfill, using renewable energy and the energy recovery from generated waste.
- **Revive Eco** is a local company that tackles coffee waste, creating several products from used coffee for a wide range of sectors such as food and drink, cosmetics, pharmaceuticals and household products. The main feature of this work is the substitution of palm oil with coffee waste.
- **EGG Lighting** is a Glasgow-based company that designed a unique type of light fitting where only the LED and driver parts needed to be replaced.
- **Bottle of Ginger** is a community-led soft drinks company that produces zero-waste ginger beer. The beverage is sold in bottles that are distributed and collected for cleaning and refilling.
- **Spruce Carpets** is the only social enterprise in Scotland that specialised in carpet reuse. Accredited with a Revolve certification, the floor coverings they produce are made out of end-of-season and reused carpets to avoid them becoming waste.
- **Jaw Brew** is a craft microbrewery launched in Glasgow in 2014. Along with a Scottish bakery, Aulds, Jaw Brew produces beers from bread rolls. Furthermore, the waste generated in the brew (grains and bread) is sent to local farms as cat food.

Source: Circular Glasgow (2020[33]), , *Scottish Leather Group*, https://www.circularglasgow.com/story/scottish-leather-group/ (accessed on 28 April 2021); Sustainable by Nature (2020[34]), *Homepage*, https://www.sustainablebynature.co.uk/ (accessed on 28 April 2021); Jaw Brew (2020[35]), *Circular Economy*, https://www.jawbrew.co.uk/about/circular-economy (accessed on 28 April 2021); Spruce Carpets (2020[36]), *What We Do*, http://sprucecarpets.org.uk/about-us/what-we-do/ (accessed on 28 April 2021); OECD (2020[37]), *OECD Interviews with Stakeholers in Glasgow*, OECD, Paris.

New ideas on the circular economy have also been promoted through challenges, capacity-building initiatives and partnerships:

- **Challenges**: Led by the Glasgow Chamber of Commerce through the Circular Glasgow initiative, Glasgow hosted in March 2018 the first challenge on Circle Lab,[1] reaching over 600 000 people across 13 countries. The challenge called for solutions and ideas on the way SMEs could improve the economic, environmental and social consequences of the main conferences and events that are hosted in the city. Participants submitted more than 200 ideas. The three winning ideas were: i) a system for reusing bottles, containers and cutlery throughout the site; ii) the transformation of organic waste into new food, energy or fertilisers; and iii) the digitalisation, reuse and design of marketing materials for event organisations and exhibitions (Circular Glasgow, 2018[38]; 2018[39]). Another example is the Circular Economy (CE) Challenge, a six-week programme promoted by the Glasgow-based charity Young Enterprise Scotland, which works in primary and secondary schools to let young students familiarise themselves with circular economy principles and their benefits. Under the lens of the circular economy, the programme provides students with tools to create a company, conduct market research and advertise their products and services (YES, 2020[40]; Circular Glasgow, 2020[41]).

- **Capacity building**: The Glasgow Chamber of Commerce nominated 24 ambassadors from large companies and SMEs across Glasgow to share their experience and knowledge of the circular economy. Ambassadors promote circular economy communication and messaging as well as events across their networks. The city council set up a Carbon Literacy course to provide elected officials and officers with skills related to the circular economy.
- **Partnerships**: In February 2020, the Glasgow Chamber of Commerce and the LWARB established a partnership to help businesses apply circular economy principles. Both institutions share best practices, learnings and case studies of projects from businesses across both cities and help businesses connect with other organisations (LWARB, 2020[42]).

Green public procurement (GPP)

Despite the progress made in recent years, GPP including circular economy principles is not yet fully implemented in Glasgow City Council. Currently, the existing GPP policy is limited and even if it includes the use of sustainable materials as a requirement, it only represents 10% of purchase decisions. In March 2020, Glasgow City Council created a Sustainable Steering Group, which gathers staff involved in procurement within the city council such as corporate procurement, Sustainable Glasgow and carbon reduction groups, social work and education. The main objective of the group is to ensure that the objectives of the various city initiatives (e.g. *Circular Economy Route Map for Glasgow*, climate implementation plan, carbon reduction policies) are duly incorporated into the procurement process, ultimately improving the city's environmental performance. The group is currently revising the sustainable procurement policy to ensure the adequate promotion of circular principles, the inclusion of more detailed targets and the alignment with national and regional procurement policies. Furthermore, the new policy will be complemented by a capacity-building programme for council staff in order to provide them with the necessary skills to assess and apply sustainability requirements in public procurement processes. Moreover, Glasgow City Council uses an online tool to reuse and reallocate office furniture, through which, in 2020, it saved almost 250 tonnes of CO_2 and avoided the generation of 8.5 tonnes of waste (Warp It, 2020[43]). At the regional level, Zero Waste Scotland is a partner in a GPP programme named ProCirc (2018-22), partly funded by the EU North Sea Region Interreg Programme (Zero Waste Scotland, 2020[44]). The project will develop a circular economy procurement toolkit to help buy circular products and services and create a community of practice that could also benefit the city of Glasgow in the future. Furthermore, Zero Waste Scotland has played a considerable role in the promotion of sustainable practices and circular criteria in the procurement processes of Scottish local authorities. To do so, it provides procurers and staff from public authorities with capacity learning and mentoring resources (Box 2.5).

Box 2.5. Initiatives for sustainable public procurement by Zero Waste Scotland

Zero Waste Scotland is actively involved in the promotion of sustainable public procurement and, to do so, it makes available a set of resources to the public sector:

- **Mentoring programme**: To support selected procurement across Scotland's public sector with the highest potential in terms of scale or replicability. Through this initiative, public authorities are able to include circular economy outcomes within specifications and other stages of the procurement process.
- **Online learning resources**: The online course "Introduction to sustainable public procurement in Scotland" introduces the concept of sustainable public procurement. The module lasts 20 minutes and it is certified upon completion.
- **Procuring for repair, reuse and remanufacturing**: Launched in 2016 by Zero Waste Scotland, the guidance aims at supporting the circular transition by helping those in charge of

the implementation specification and procurement of products, equipment and services to integrate the benefits of the circular economy, mainly focused on repair, reuse and remanufacturing.

- **Learning and collaboration between procurers from different countries**: Zero Waste Scotland is one of the partners of the ProCirc programme, funded by the EU North Sea Region Interreg Programme. It provides support to procurers on how to embed circular economy principles in procurement strategy, the tendering process and contact management. Between 2014 and 2020, ProCirc carried out 30 pilot projects with a combined value of EUR 40 million to highlight circular opportunities within procurement for several sectors (e.g. construction, infrastructure, furniture, textiles and information and communication technology [ICT]). Each pilot aims to reduce 20%-25% of raw materials, waste and CO_2 emissions.

Source: North Sea Region (2020[45]), *ProCirc*, https://northsearegion.eu/procirc/ (accessed on 28 April 2021); Interview with Claire Guerin, Sector Manager – Sustainable Procurement, Zero Waste Scotland; Zero Waste Scotland (2016[46]), *Procuring for: Repair, Re-use and Remanufacturing*.

Stakeholder engagement

The city of Glasgow engages stakeholders towards the circular economy through communication, consultations, collaborations and events (see above and Box 2.6). For the development of its *Circular Economy Route Map for Glasgow*, Glasgow City Council targeted a variety of groups within the private sector, such as food and beverages, construction, manufacturing and events and benefited from the multi-stakeholder process set up by the OECD Programme on the Circular economy in Cities and Regions. Glasgow City Council also conducted a mapping of stakeholders working on the circular economy, from universities and community organisations to small and large companies in the private sector (OECD, 2020[47]).

Box 2.6. Stakeholder engagement: Definitions and categories

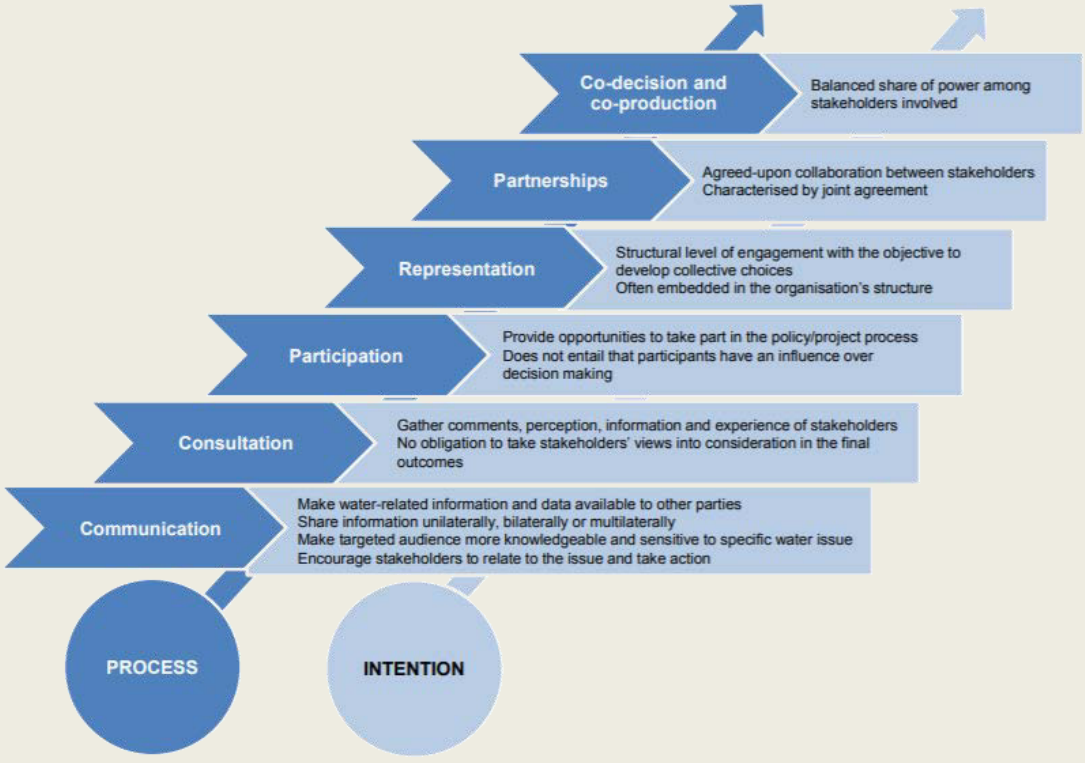
Stakeholders "encompass different levels of governments (multi-level governance), the private sector, regulators, service providers, donor agencies, investors, civil society in its different forms (e.g. citizens, non-governmental organisations, users' movements, etc.) and other relevant constituencies" (OECD, 2015[48]). According to OECD, 2015 there are six types of stakeholder engagement, each of them with different objectives:

- **Communication** to make the targeted audience more knowledgeable and sensitive to a specific issue.
- **Consultation** to gathering stakeholders' comments, perceptions, information, advice, experiences and ideas.
- **Participation**, whereby 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.

- **Co-decision and co-production** are the ultimate levels of stakeholder engagement as they are characterised by a balanced share of power over the policy or project decision-making process.

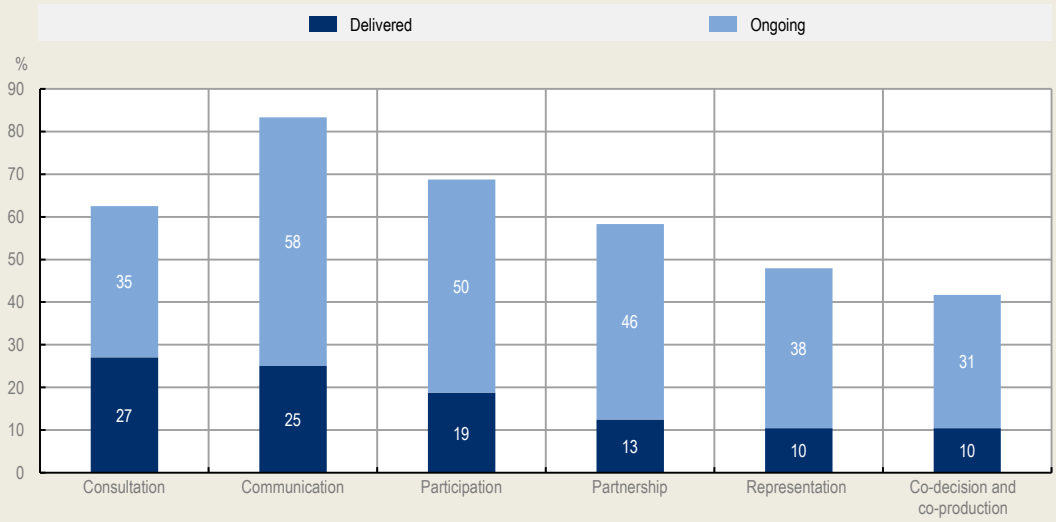
Results of the OECD Survey on the Circular Economy in Cities and Regions, show that stakeholders are primarily engaged through consultation (27%), followed by communication (25%), participation (19%), partnership (13%) and co-decision and co-production initiatives (10%) (OECD, 2020[3]).

Figure 2.2. Categories of stakeholder engagement



Source: OECD (2015[48]), *Stakeholder Engagement for Inclusive Water Governance*, https://doi.org/10.1787/9789264231122-en.

Figure 2.3. 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 (2015[48]), *Stakeholder Engagement for Inclusive Water Governance*, https://doi.org/10.1787/9789264231122-en; OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://dx.doi.org/10.1787/10ac6ae4-en.

Monitoring and evaluation

There are some monitoring and evaluation tools in place in Glasgow that aim to help businesses and stakeholders measure circularity, to better understand what the circular economy is and to improve its implementation. More than 50 businesses in Glasgow have used the Circle Assessment tool with the Circular Glasgow team at the Glasgow Chamber of Commerce to analyse their waste streams and identifying opportunities towards the circular economy (Circular Glasgow, 2020[49]). Within Glasgow City Council, the Carbon Management Team (CMT) is in charge of monitoring, reporting and carrying out projects that contribute to the reduction of carbon emissions within the city council. For instance, as buildings represent approximately 70% of the council's carbon emissions, the CMT installed in 2019 an Automatic Meter Reader (AMR). This software automatically collects data which is sent through an energy monitoring software tool for analysis and tracking by the CMT (Glasgow City Council/Resource Efficient Scotland/Zero Waste Scotland, 2013[50]). Moreover, Glasgow City Council plans to conduct a compulsory carbon impact assessment for every initiative taken by all municipal departments. In 2016, the Glasgow Chamber of Commerce commissioned a metabolic study to track inflows and outflows of material and to identify circular economy opportunities for the city of Glasgow. The study showed that the food and drinks sector produced a high consumer footprint (Circle Economy, 2016[20]). The development of a monitoring and evaluation framework to measure circularity is envisaged by the city in its circular economy route map (Glasgow City Council, 2020[21]). While there are some initiatives in progress to monitor progress towards the achievement of circular economy targets, there is still room for improvement. In fact, the OECD Inventory of Circular Economy Indicators (2020[51]) identified that the majority of circular economy indicators at the local level focuses on the environmental dimension (39%), followed by governance (34%), economy and business (14%), infrastructure and technology (8%) and jobs (5%).

The 3Ps analytical framework: People, policies and places

The below section identifies the opportunities for the circular economy in Glasgow based on the 3Ps framework: people, policies and places, which was adapted from a previous application to water governance in cities (OECD, 2016[52])to the field of circular economy (OECD, 2020[3]):

- **People**: The circular economy is a shared responsibility across levels of government, stakeholders and firms. As such, it is key to identify the actors that can play a role in the transition and allow the needed cultural shift towards different production and consumption pathways, new business and governance models. For example, the business sector can determine the shift towards new business models (e.g. renting, reusing, sharing, etc.). Citizens, on the other hand, make constant consumption choices and can influence production.
- **Policies**: The circular economy requires a holistic and systemic approach that cuts across sectoral policies. As somebody's waste can be a resource for somebody else, the circular economy provides the opportunity to foster complementarities across policies. The variety of actors, sectors and goals makes the circular economy systemic by nature. It implies a wide policy focus through integration across often siloed policies, from environmental, regional development, agricultural and industrial ones. Identifying these key sectors and possible synergies is the first step to avoid the implementation of fragmented projects over the short-medium run, due to the lack of a systemic approach.
- **Places**: 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, adopting a functional approach going beyond the administrative boundaries of cities is important for resource management and economic development. Linkages across urban and rural areas (e.g. related to bioeconomy, agriculture and forest) are key to promote local production and recycling of organic residuals to be used in proximity of where they are produced, to avoid negative externalities due to transport.

People and firms

Social enterprises

Social enterprises apply circular principles by keeping resources value, promoting sustainable consumption and avoiding waste to landfill, while saving CO_2 emissions. In Glasgow, social enterprises increased by 60% between 2013 and 2019 (growing from 509 to 811) (GSEN, 2019[53]; 2013[54]). In 2018, Glasgow hosted 12.5% of all social enterprises within Scotland, which generated GBP 800 million per year (GSEN/Glasgow City Council, 2018[55]). There are several ongoing community-led circular economy initiatives based in Glasgow, working in various sectors to promote reuse, repair and sharing activities (Box 2.7), such as those interviewed during the OECD missions in 2020:

- Apparel Xchange works with primary and secondary schools to gather and reuse pre-owned clothing and school uniform, footwear and accessories. The community also offers reuse, resale and recycling services to reduce the sustainable impact of the clothing sector and since 2018, its work has resulted in savings of 8.5 CO_2 Eqt (ApparelXchange, 2020[56]).
- Bike For Good is a Glasgow-based cycling charity, founded in 2010 and since then, it has been selling and servicing refurbished bikes, conducting maintenance courses, providing bicycle training and running community projects (Circular Glasgow, 2020[57]).
- The Glasgow Social Enterprise Network (GSEN) provides members with several services, including knowledge-sharing, peer learning and access to events and training. In 2019, GSEN organised Scotland's Social Enterprise Week, which aimed at showcasing how the social

enterprises were pushing towards the adoption of a more sustainable community (GSEN, 2020[58]; Circular Glasgow, 2019[59]).

- Established in 2020, the Pram Project runs free community repair events. The project originated from the Singing Rock Centre, which aimed at giving a new life to used prams. Since its establishment, the initiative has received the donation of over 100 prams destined to be repaired (Repair Café Glasgow, 2020[60]).
- The Repair Café in Glasgow focuses on waste reduction and social cohesion through repair, upgrade and maintenance of a wide range of products. The Repair Café has organised several awareness-raising events in the city and it estimates that since the opening of the facility in 2017, a total of 151 kg of waste and 1.2 tonnes CO_2 emissions have been saved (Repair Café Glasgow, 2020[61]).
- South Seeds, the community social enterprise based in the Southside area of Glasgow, works with the local community to improve the overall appearance and liveability of the area. One of their initiatives is the Southside Tool Library. Opened in 2018, it serves 400 borrowers. The library supplies tools for a broad variety of topics such as carpentry, sewing and gardening and is funded by the National Lottery Community Fund (South Seeds, 2020[62]).
- Young Enterprise Scotland (YES) is a charity that works to inspire young people to learn and succeed through enterprise in Scotland. Some of the initiatives supported by YES include the Circular Economy Challenge, which is designed to introduce students to the benefits and principles of the circular economy through practical examples and interaction with business ambassadors (YES, 2020[40]).

Social enterprises contribute to put in practice circular economy principles of reusing, repairing and sharing while carrying out social functions. Many of the employees work on a voluntary basis and the activities strongly rely on the availability of dedicated funds. As such, financial sustainability seems to be the major obstacle to their survival and for the viability of their business models. Challenges are described in Chapter 3.

Box 2.7. Repair regulation in the EU

In March 2020, within the new EU Circular Economy Action Plan, the EC announced, "A New Circular Economy Action Plan for a Cleaner and More Competitive Europe", which aims at introducing the "right to repair" by 2021 into EU product manufacturing policies. The Plan includes actions to provide consumers with complete information on products in terms of durability and environmental impact. In March 2021, the European Commission introduced new regulations in eco-design that aimed at strengthening the right to repair of consumers. For instance, manufacturers will have to make key parts available after 10 years of the production of certain products (dishwashers, washing machines and refrigerators).

According to this regulation, manufacturers will be obliged to design devices (e.g. phones, tablets and laptops) in order to remain useful for a longer period of time as well as making spare parts easily available for longer. The "right to repair" also includes the update of obsolete software. Under the new plan, products should be more durable, reusable, upgradeable and made of more recycled materials.

Source: EC (2020[63]), *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe*, https://ec.europa.eu/environment/circular-economy/; EC (2021[64]), Ecodesign omnibus regulation, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0341&from=EN

The business sector

Large corporations

Many large corporations in Glasgow have been implementing circular principles as part of their business operations, and have succeeded in the adoption of new business models. Large corporations are taking actions towards: achieving carbon neutrality (e.g. Scottish Leather Group Technology); repurposing buildings and use of recycled materials (e.g. Balfour Beatty); improving energy and water efficiency (e.g. Scottish Water); increasing the use of secondary materials; fostering recycling, repairing and reusing processes; and raising awareness on the topic (e.g. Edrington and Hewlett Packard).

There are examples of new circular business models in companies based in Glasgow, such as service system models and hiring, which result in the increase of resource efficiency. For instance, Hewlett Packard (HP), an IT hardware company, implemented the "devices-as-a-service" and "instant ink" business models. "Devices-as-a-service" aims at optimising the resources life management of devices with flexible repair services and payment systems. The "instant ink" service is based on the number of materials printed by customer per month, who receives new cartridges before they run out of ink. The service also covers the recycling and shipping of cartridges. The company has also organised circular economy seminars to raise awareness among its employees, in co-operation with Zero Waste Scotland. As a way to engage with the community, HP works with local SMEs that employ young vulnerable people and recycle materials in Scotland. The Warp It reuse online network loans products (e.g. from chairs to printing cartridges) and allows public and private users to freely **advertise** unwanted items and **claim** available products. The platform matches users with compatible needs and keeps track of the environmental, financial and social benefits achieved. It can help lower procurement costs, reduce items disposed of in landfills and expand the life use of products keeping their value.

Several Glasgow-based companies apply circular principles to their production processes. For instance, the alcoholic drink manufacturer Edrington (whisky sector) fully reuses casks for whisky maturation. The Scottish Leather Group Technology Ltd. produces its leather with by-products from the beef and dairy sectors (Sustainable by Nature, 2020[34]). This is in line with the target set by the company to be net zero and send zero waste to landfill by 2025. Scottish Water uses smart design that is being applied to maintenance, material use (e.g. replacing concrete water tanks with metal ones in a water treatment plant) and repurposing the grit found in the wastewater system. This material, which is generally removed during the treatment process, will be used as a building material for the built environment sector instead of being sent to landfill.

Water and energy efficiency is also part of the circular economy strategy for large companies. Scottish Water launched in 2020 the *Net Zero Emissions Routemap*, which includes the commitment of emitting net-zero emissions by 2040. Due to the energy and emissions-intensive work of the company, the strategy has prioritised five main areas of action: i) energy efficiency; ii) low-carbon construction practices; iii) the use of low-carbon energy products; iv) storage of unavoidable emissions; and v) investment in renewable energy (Scottish Water, 2020[65]). In 2018, Scottish Water signed a Sustainable Growth Agreement with the SEPA to maximise resource recovery from Scotland's wastewater and reintroducing it into the system (SEPA, 2018[66]; Scottish Water/SEPA, 2020[67]).

Some common obstacles are preventing the circular transition among large corporations in Glasgow. Two main barriers have been highlighted by large corporation representatives during the OECD missions in 2020. First, the current definition of waste and "end of life" prevents materials from being reused for new products. Second, budget restrictions are extremely relevant in the contractual requirements and commercial agreements for large companies, while material specifications are not a priority. Consequently, the incentives to use sustainable materials are low (Chapter 3).

Small- and medium-sized enterprises (SMEs)

The SMEs community in Glasgow adopts circular economy business models, such as:

- **Return-refill-repeat scheme**: For example, the company Beauty Kitchen, based on the cradle-to-cradle principles, produces reusable sustainable cosmetic packaging and offers return and refill services, according to the so-called "return-refill-repeat" scheme. All packaging is fully recyclable and 50 refill stations are already functioning in Glasgow.
- **Product-as-a-service**: The Egg Lighting Company designs and manufactures LED lighting with the lighting-as-a-service business model, which consists in paying for a lighting service instead of for the ownership of light bulbs.
- **Reuse**: The company Re-Tek provides an information technology (IT) collection service and repairs, refurbishes and resells them (e.g. computers, laptops). The company is also involved in projects aiming to remove metals (e.g. tantalum and cobalt) for reuse, involving community organisations and charities.
- **Create value from waste**: The start-up Revive-Eco creates value from food waste. It harvests coffee grounds, produces soil fertiliser and is starting to extract oil from grounds for use in other industries (e.g. as palm oil replacement). Zero Waste Scotland, through its Circular Economy Investment Fund, provides economic support to this project.

SMEs effectively act as external innovators of larger companies to bring new innovations to market. For example, they can push larger companies to embrace circular initiatives such as the installation of refill stations and the application of the reverse logistics model. Furthermore, the existence of good practices that show the economic feasibility of circular business models, serves as a role model and inspiration for other SMEs in the adoption of these initiatives.

Access to funding and the existing regulatory barriers are the major challenges SMEs face. The exploration of new business models, such as "product-as-a-service" can be challenging for some SMEs as they must acquiring the asset first and a return on investment is a lengthier process. The transaction cost from a linear ownership model to a more circular model based on the use can require additional funding for the first stages of SMEs. Moreover, existing legislation is also perceived as an obstacle for some SMEs. A fit for purpose regulation (e.g. waste, reuse of electronic devices) could be a relevant way of moving towards circularity. In addition, despite increasing sustainability awareness from consumers, SMEs perceive the need to engage them and deliver messages in a simple, clear and scalable way, as consumer engagement is one of the key factors for change.

Knowledge institutions and universities

Universities are a very relevant asset for the city of Glasgow, as they can help promote and increase the skills needed for the transition to the circular economy. Through the diverse research and pilot programmes, universities and other knowledge institutions have established collaborations to advance towards the transition to the carbon-neutral and circular economy. Some examples are reported below:

- The University of Glasgow, the fourth oldest English-speaking university in the world, founded in 1451, has been exploring the circular economy from a consumer-centric perspective. Some of the research areas include: disposal, resale and donation, the potential of digitalisation for the circular economy and sustainable consumption for clothing. The university also runs its own sustainable procurement programme and, in 2020, launched a consultation on a climate change strategy and action plan for the University of Glasgow (2020[68]; 2020[69]; 2020[70]). The University of Glasgow and the University of Strathclyde take part in the Climate Ready Clyde project, a cross-sector initiative that aims at understanding and addressing the risks posed by climate change to the Glasgow City Region (Climate Ready Clyde, 2020[71]; 2020[72]).

- The City of Glasgow College and Glasgow Caledonian University, in partnership with Zero Waste Scotland developed a project that embeds circular economy into curriculum delivery in construction-related subjects. The course on "Circular economy and the construction sector" addresses the major introductory principles of the circular economy, how circular criteria can be applied in the construction sector and potential solutions to reduce waste generation through the application of circular economy principles from the early stages of the construction phase (City of Glasgow College, 2020[73]).
- The University of Strathclyde is making progress in research on the circular economy. For instance, the Department of Mechanical and Aerospace Engineering is involved in the research of a range of major fields of the circular economy such as the effectiveness and recyclability of material flows, mainly glass fibre composites (Ellen MacArthur Foundation, 2019[74]). Furthermore, the Institute for Future Cities of the University of Strathclyde analyses the role of cities and the economic, environmental, social and technological challenges they face (University of Strathclyde, 2020[75]).

Consumers

Consumers in Scotland are increasingly paying attention to the environmental impacts of their consumption choices. According to a survey conducted by Zero Waste Scotland and Revolve in 2019, approximately half of Scottish consumers state that second-hand shopping is a relevant factor to tackle climate change and almost the same are in favour of buying second-hand if the quality and cleanliness of materials are assured (Zero Waste Scotland, 2019[76]).

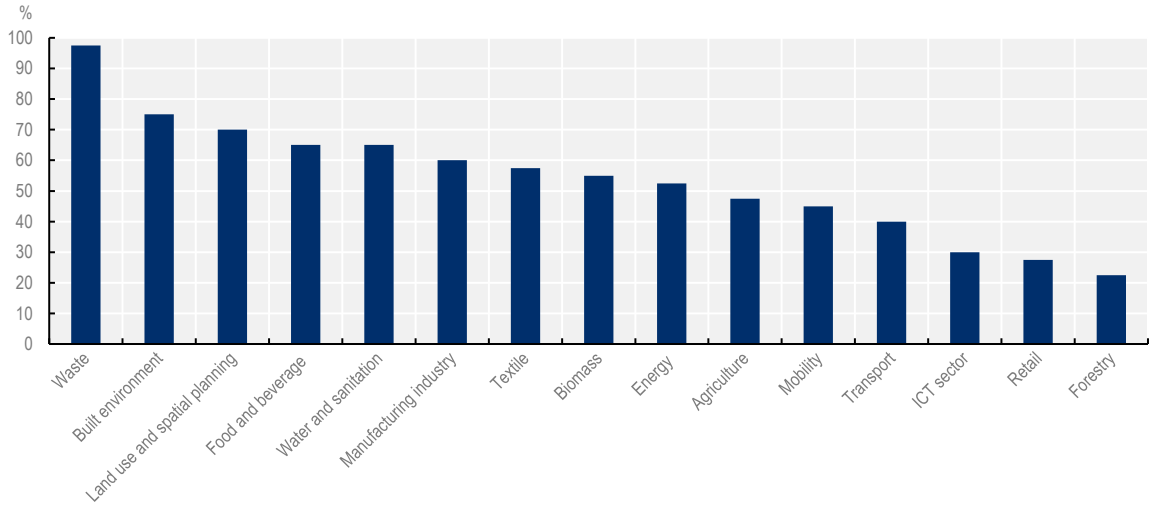
For the second-hand clothing sector, lack of trust in terms of quality standards seems to be one of the main obstacles for its wider use (OECD, 2020[37]). However, certifications can be used to fill this gap. For example, the Revolve standard is a quality certification for second-hand stores in Scotland, which is issued by Zero Waste Scotland. The main objective of Revolve is to provide shops that meet requirements in terms of safety, cleanliness and service with support and evidence that can help build consumer trust. The certification assures that the items on sale have been previously subject to a quality and safety check and it also aims to support local businesses while having a positive environmental impact. In 2020, there were 120 Revolve-certified stores in Scotland, 31 of which were located in Glasgow. Added to the acquisition of the standard, certified stores receive: additional support in terms of promotion of stores through press, website and social media channels; training to meet and keep the Revolve certification; support on customer service, visual merchandising and marketing campaigns; and access to Revolve brand and campaign materials to raise awareness and trust among customers (Zero Waste Scotland, 2020[77]).

Policies: Identifying sectors holding potential for the circular economy

All sectors are concerned in a circular economy but some have higher potential. Often the circular economy in cities and regions is seen as synonymous with waste recycling but it goes beyond that. For cities and regions, 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.) (OECD, 2020[3]). Making a sector "circular" implies rethinking value chains and production and consumption processes. "Circularity" entails that any output can be an input for something else within and across sectors. It aims to: make products and goods last longer through better design; produce goods using secondary and reusable materials, and renewable energy, while reducing atmospheric emissions; produce and distribute products locally and consume them in a conscious and sustainable manner; and transform waste into a resource. According to the OECD (2020[3]), cities and regions identify the waste sector as key in their progress towards a circular economy (98%), followed by

the built environment (75%), land use and spatial planning (70%), food and beverages and water and sanitation (65%) (Figure 2.4). Below, specific attention will be dedicated to those sectors that more prominently came out from the discussion with various stakeholders in the city of Glasgow, such as waste, food, spatial planning and built environment and events and tourism.

Figure 2.4. Share of cities including specific sectors in circular economy initiatives



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

Below, some sectors that emerged predominantly during interviews with stakeholders from the city of Glasgow are reported. This description does not aim to be exhaustive of the sectors that can contribute to the circular economy transition; however, it provides an overview of those activities that hold high potential in the city.

Waste

Approximately half (49%) of the total waste generated by households in Glasgow was sent to landfill in 2019 and only one-quarter (24.1%) was recycled (SEPA, 2019[11]). As in 2011, Glasgow was among the five Scottish cities with the lowest recycling rate and the second-highest in terms of landfill, the city's response was to build the Glasgow Recycling and Renewable Energy Centre (GRREC) in 2019 to boost recycling while producing energy. The GRREC annually manages 200 000 tonnes of residual waste and diverts 90% from landfill. The new treatment facility is expected to contribute approximately 10%-12% to the city's household recycling rate and produce energy for approximately 26 500 households per year. The centre has created over 250 new jobs, including 17 apprentices, supporting local social enterprises, and SMEs throughout the building programme and its implementation (Viridor, 2020[78]). The local authority collects different waste streams each week from households. The council provides a network of over 650 sites across the city where materials can be deposited for recycling which covers paper, glass and plastics (Glasgow City Council, 2020[21]; 2020[79]).

In 2016, the city launched a food waste collection service on a trial basis, which has subsequently been rolled out across the city. Currently, 300 000 households citywide receive the food waste collection service, which almost covers all households in the city. The implementation of the service to flatted properties received GBP 2.3 million of funding support from Zero Waste Scotland (Glasgow City Council, 2020[80]).

Food and garden waste are treated in an anaerobic digester for biogas or transformed into compost, which is eventually used in agriculture, regeneration projects, horticulture and landscaping projects.

According to the OECD (2020[3]), 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 is conceived as a valuable resource, where citizens reduce waste generation (e.g. organic, technological, etc.), "pay as you throw" (PAYT) schemes are in place, waste fractions, included organic ones, are collected separately and the final treatment and disposable model is replaced by a recycling and recovery model. In circular waste management, a market for secondary raw materials is in place, substance traceability and information flows are established and accepted by the main market players and secondary materials satisfy a prominent percentage of the demand for materials for goods production (OECD, 2020[3]).

Glasgow City Council foresees several concrete actions to make the waste sector more circular, along with planned initiatives by the Scottish government. The Scottish framework influencing waste management in cities is the following : i) the Zero Waste Plan launched by the Scottish Government in June 2010(Box 2.2); ii) the approval of waste regulations from the Scottish Government in 2012, which introduced a number of measures to achieve the Scottish target of recycling 70% of all waste generated in the region; and iii) the development of the Zero Waste Taskforce to complement the Zero Waste Plan, which prioritised communications, quality of the collected materials and public procurement (Glasgow City Council, 2010[81]). In 2021, Glasgow City Council launched a new waste strategy (Resource and Recycling Strategy 2020-30), which replaced the previous strategy that set out a plan for the management of waste for 2010-20 (*Tackling Glasgow's Waste – Cleansing Waste Strategy and Action Plan*). The new strategy aims to support the implementation of the *Circular Economy Route Map for Glasgow* (mainly the actions related to waste management and recycling) and the Scottish Government's Circular Economy Bill by promoting behavioural change and reducing consumption levels. The new waste strategy also foresees the introduction of a textile collection service and awareness-raising campaigns on the reuse of household goods (Glasgow City Council, 2021[82]). Moreover, Scotland's resource and recycling industry is planned to undergo a transformation in the coming years with the introduction of the Deposit Return Scheme in 2022, the upcoming Review of the Household Charter for Recycling and the entry into force of the Packaging Extended Producer Responsibility (Packaging EPR) in 2023. Additionally, the city council will conduct waste audits within the council to measure the amount and category of waste produced, which will serve as a basis for future domestic policy (Glasgow City Council, 2020[21]).

Food

The food sector is closely linked to the objective of the city council to become carbon neutral by 2030, as approximately 30% of GHG emissions in Glasgow originate from the food system, in particular due to the energy consumed during the growing, harvesting, transporting and packaging processes. The food sector holds considerable potential for Glasgow's circular transition as it is responsible for more than 5 000 jobs in Glasgow (Glasgow City Council, 2020[83]).

The city's food strategy will embed sustainable and circular principles, consisting in avoiding food waste, amongst others. Glasgow City Council together with a team of food associations (Glasgow Centre for Population Health, Glasgow Food Policy Partnership, Glasgow Community Food Network and NHS Greater Glasgow and Clyde) launched in 2021 a long-term food strategy, the Glasgow City Food Plan 2021-31. The aim of the strategy is to deliver a just, resilient and environmentally friendly food system in Glasgow and prioritises six main topics: i) food poverty; ii) community food; iii) food procurement and catering; iv) food economy; v) environment and food waste; and vi) children and young people (Glasgow City Council, 2020[84]; 2020[85]; 2021[86]). It is worth noticing that, given the relevance of the sector for the city, Glasgow City Council is a member of the industry trade association Scotland Food and Drink (Glasgow

City Council et al., 2019[87]). The city council also incentivises local and healthy food production, through the Environmental Business Awards.

Local communities actively promote sustainable farming practices and foster local food production in Glasgow through awareness-raising and capacity-building initiatives. For example, South Seeds, a community-led organisation, has conducted gardening capacity-building sessions to teach local residents how to grow fruit and vegetables. It promoted the "adopt-a-bed scheme" for urban gardening in a disused tennis court (South Seeds, 2017[88]). The environmental charity Urban Roots, located in South Glasgow, involves local people in growing their own food. Some of the results of the work has been the transformation of abandoned and derelict land into green gardens for the growing of food (Urban Roots, 2020[89]). The charity offers a variety of training courses on environmental and food-related programmes on growing, cooking and permaculture. Moreover, several social enterprises in Glasgow promote sustainable food production and consumption. The Community Growing Partnership aims to increase access to locally grown fruit and vegetables. The Glasgow Community Food Network was established in 2017 to bring together practitioners and organisations in the private, public and third sectors along with other interested individuals to develop urban farming in Glasgow. The network contributed to the Glasgow City Food Plan (Glasgow City Council, 2021[86]) .

Preventing food waste can foster food security in the city. In Glasgow, there is a large community of food banks, pantries and social enterprises that seek to help those who cannot access food, while tackling food waste. The existence of these initiatives is particularly relevant in Glasgow, a city where close to 10% of adults experienced food insecurity (5% for severe food insecurity) in 2018 (NHS, 2019[90]). This issue has been intensified with the COVID-19 outbreak and lookdowns, as in the UK, food insecurity increased from 3.8% in a pre-COVID-19 scenario to 15.6% during the first 2 weeks of lockdown (Understanding Glasgow, 2020[91]). For example, FareShare Glasgow and the West of Scotland provides food surplus to approximately 80 community groups and charities within Glasgow and its surrounding areas (FareShare, 2019[92]). Due to the COVID-19 crisis, the demand for these services has quadrupled in the Glasgow area compared with 2019, with 72 000 people receiving food from charity (HeraldScotland, 2020[93]).

By November 2020, the city of Glasgow hosted three food pantries in different locations of the city (Castlemilk, Govanhill and Ruchazie):

- Ruchazie Food Pantry, located in northeast Glasgow, the first food pantry in the city in 2020, aims at reducing food surplus and social inequalities (Community Enterprise, 2020[94]).
- The People's Pantry is a community located in the Govanhill area of Glasgow. The pantry provides support to people facing food insecurity and helps reduce food waste and negative environmental impacts. Members can use the pantry by paying GBP 2.50 per shop and in exchange have access to a minimum of GBP 15 worth of food and other essential items. The project was launched by the Govanhill Baths Community Trust along with other organisations in the area (Crowfunder, 2020[95]; Neighbourly, 2020[96]).
- Castlemilk Community Food Pantry provides fresh, nutritional, good quality food at a subsidised rate. The community receives and distributes surplus food, provided through partnerships, such as with Fareshare Glasgow.

According to various experiences, 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 production. The city of Paris, France, for example, is planning to relocate part of its food production, to reduce the average distance travelled by food from its production to the Parisian consumer, which is currently 660 km: an issue in terms of environmental impact but also a threat of shortages in case of shock or blocked transport. Many cities set up initiatives to reduce food waste within the hospitality, food service and wholesale sectors. 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. The city of Groningen, Netherlands, launched the Food Battle Groningen to raise awareness on reducing

food waste. 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 (OECD, 2020[3]). Examples of policy frameworks against food waste in France are reported below (Box 2.8).

Spatial planning

One of the historical key priorities in Glasgow is the urban regeneration of vacant and derelict lands. While there are many activities already in place to increase the environmental sustainability of these areas, the focus on maximising resource use is still lacking. Glasgow City Council is responsible for local land use and planning applications (OECD, 2017[97]). The Property and Land Services group of Glasgow City Council planned to conduct an audit of the vacant and derelict lands in 2021. However, due to the release of a new Vacant and Derelict Land register for the city, the audit has been has been postponed. The objective of the audit was to identify the areas with greater potential for regeneration and circular economy-related activities within the city, such as storage options and material reuse, eco-parks, urban farming, rewilding and regenerative initiatives, crops for biofuel and carbon sinks (Glasgow City Council, n.d.[98]). The idea of prioritising the renewal of abandoned land, also known as "brownfield first", originated from the need to reduce health inequalities within the city. It consists in reinforcing existing communities and building in more sustainable locations where there are amenities. The city created a taskforce for land recovery and it acknowledges the need for a strategic approach to land reuse. A successful example is the decontamination process of a depreciated site for the construction of the Athletes Village for the 2014 Commonwealth Games in the East End of Glasgow. The Games Village was initially used as an accommodation facility for the athletes taking part in the games and was subsequently transformed into a residential area (RMJM, 2014[99]; ADS, 2014[100]).

Box 2.8. Food waste prevention 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 circulair*e), approved by the French National Assembly in February 2020, strengthens the fight against food waste by setting ambitious targets. For instance, by 2025, the food distribution and catering sectors (supermarkets, canteens, etc.) will have to reduce food waste by 50% compared to 2015 levels. Moreover, retailers are obliged to donate their unsold food products to charities, while the law prohibits the disposal or spoiling of unsold food. The new law reinforces penalties for the destruction of unsold but edible food and also the introduction of a national anti-food-waste label (*label national anti-gaspillage alimentaire*), which aims at promoting initiatives to reduce food waste and guide consumer choices.

Source: ADEME (2019[101]), *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[102]), *The Antiwaste Law for the Circular Economy*; Ministry for the Ecological and Inclusive Transition (2020[103]), "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; The Independent (2020[104]), "FoodCloud total income increased to €4.8m after 'transformative year'", https://www.independent.ie/business/irish/foodcloud-total-income-increased-to-48m-after-transformative-year-39486812.html, Food Cloud (n.d.[105]), *Homepage*, https://food.cloud/; Business in the Community Ireland (2020[106]), "Leading retailers and FoodCloud launch first national food appeal to support communities affected by Covid-19", https://www.bitc.ie/newsroom/news/leading-retailers-and-food-cloud-launch-national-food-appeal-to-support-communities-affected-by-covid-19/.

Due to the issues raised from the derelict land of the city and the difficulties for the population in terms of access to housing, there are 67 local housing associations in Glasgow, driven around poverty and affordability for their tenants. The Two Banks (Les Deux Rives) district industrial symbiosis initiative that took place in Paris, France, can be inspirational for Glasgow in terms of creating synergies across different neighbourhoods and tackle the existing inequalities in certain areas (Box 2.9).

Box 2.9. *Les Deux Rives* district project in Paris, France

The "*Quartier Les deux rives*" (Two Banks District), located in the east of the city, considered the first "circular district" in Paris, is a project led by Paris City Council in collaboration with some companies located in that district.

The aim of the initiative is to bring companies together to jointly design innovative solutions for the management, operation and development of their activities in the 4th largest business district in Paris, on a 350-hectare area between Gare d'Austerlitz, Gare de Lyon, Bercy and Tolbiac. The Two Banks District relies on a digital collaboration platform, connecting large companies, entrepreneurs, non-governmental organisations (NGOs), citizen groups and policymakers to share best practices and co-create solutions.

In particular, the project enables more than 30 companies to share equipment and services and recycle and upcycle waste in a synergetic way, reducing disposable food packaging, aggregating carpool services and collectively managing waste.

In the future, the project will explore how to further generate positive spill overs and social value for underprivileged citizens.

Source: Les Deux Rives (2020[107]), *Les Deux Rives, Quartier circulaire*, https://lesdeuxrives.paris/ (accessed on 30 April 2021); OECD Interview with Paris City Council on 27 July 2020.

The built environment

In Glasgow, the city's housing strategy sets the target of building 25 000 homes by 2025. As such, new constructions can potentially include circular principles in the planning, operation and end-of-life phases (Glasgow City Council, 2017[108]). Glasgow will establish a circular economy framework for the built environment, issuing a *Circular Economy Statement*. This declaration will address the development of a local material passport for public construction activities within the city and a commitment to end the demolition of buildings. The city recognises the reuse of the construction materials as one of the areas of action for the short term. Under the framework of an experimentation pilot project on public procurement carried out with the Ellen MacArthur Foundation, and in collaboration with Glasgow Chamber of Commerce, Zero Waste Scotland and the SEPA, Glasgow City Council will launch, at the end of 2021, a

pilot project to promote the reuse of materials within the built environment sector (Glasgow City Council, 2020[21]).

In Scotland, the built environment sector is responsible for 50% of total waste (Scottish Goverment, 2016[13]). As such, the construction industry is starting to take a longer-term view and progressively embodying carbon net zero targets from the planning phase. There are some initiatives in this sense. Strathclyde University is leading a project, in co-operation with Glasgow City Council and other stakeholders from the city, to develop a climate-neutral district. The project will identify potential solutions to build a 100% renewable energy system for energy, heat, transportation systems, climate adaptation, welfare and social inclusion within the area (Climate Ready Clyde, 2020[109]; University of Strathclyde, 2020[110]). In 2020, Architecture and Design Scotland (ADS) helped local authorities prioritise carbon reductions and climate action while working towards decarbonisation and contributing to the improvement of the citizens (ADS, 2020[111]). Another example of the application of circular economy in the built environment in Glasgow was the retrofitting of the Woodside Multi-storey Flats project, located in the Woodside area. The project, in collaboration with the Queens Cross Housing Association, consisted of the refurbishment of three blocks of flats built in the 1960s, instead of opting for its demolition. One of the primary objectives of the refurbishment was to alleviate the fuel scarcity of around 800 residents and provide residents with a reduction of heating and water bills, through solar thermal panels installed on the rooftop (Collective Architecture, 2019[112]; ADS, 2020[113]).

Repurposing properties is a priority for Glasgow City Council. City Property Glasgow, a dedicated arm's length external organisation (ALEO) of Glasgow City Council, is in charge of the management of all of the properties belonging to the city (800 in total). Glasgow City Council sees the possibility of maximising the use and making profitability from its estate in order to provide hubs, workspaces and premises for circular economy actors. Shared premises and facilities, Wi-Fi, Internet broadband and equipment can help lower costs and liabilities, while providing partners and start-ups with space to grow and develop. Furthermore, Glasgow is facing difficulties in terms of keeping the city centre as the pillar of the local economy. Despite being the main retail destination in the UK after London, the retail business in the city centre is facing several challenges in countering the increasing competition from shopping centres located outside of the city as well as online services. This scenario, combined with the potential negative impacts of COVID-19 on businesses located in the city, will require exploring opportunities to make use of existing buildings and spaces.

Due to the potential of the built environment sector, Glasgow City Council applies economic instruments for incentivising the responsible use of energy in buildings. As such, it foresees tax reductions through the Council Tax Energy Efficiency Discount Scheme, which offers citizens who have carried out loft and cavity wall insulation works in their homes the opportunity to apply for a discount. This reduction varies depending on the number of energy efficiency measures carried out and their cost (Glasgow City Council, 2020[114]).

The built environment sector faces several challenges and obstacles in Glasgow. First, there is a lack of legislative drivers towards the circular economy, given that the Scottish circular economy bill does not include the built environment sector. Building standards in Scotland are not yet encouraging the circular economy in the sector. Second, the financial framework does not encourage extending the use of buildings, as higher taxes are applied to refurbishment activities than to new constructions. Other identified barriers affect the monitoring processes. For example, non-material variation after planning can lead to the use of cheaper materials rather than using reused or recycled sources.

Events and tourism

Glasgow is a well-known business events destination, hosting over 500 conferences a year attracting approximately 150 000 delegates and generating an economic impact of GBP 140 million. The city is one of the most popular conference destinations in Europe and is the British city that hosts the greatest number of international delegates in the UK, after London (Glasgow Tourism and Visitor Plan, 2020[115]). By 2022,

the city aims at carrying out an assessment in terms of carbon emissions, waste generation and energy consumption in three main events.[2] Glasgow's Tourism and Visitor Plan will conduct an analysis of the potential impact on the tourism and hospitality sector of the implementation of a Transient Visitor Levy. The study has been postponed due to the COVID-19 pandemic (Glasgow City Council et al., 2019[87]). Glasgow will host the COP26 in 2021, an event projected to host more than 30 000 delegates and visitors from all over the world (Glasgow Tourism and Visitor Plan, 2019[116]). Hosting this conference in a post-industrial city is sealing the city's commitment to becoming into a green city. There are several international examples of the organisation of big events such as the Olympic Games, festivals, congresses that embed circular economy principles, as seen in Box 2.10.

Box 2.10. Circular economy principles for the Olympic Games

2020 Olympic Games in Tokyo, Japan

For the celebration of the 2020 Olympic Games, which took place during the summer of 2021 due to the COVID-19 pandemic, the city of Tokyo, Japan, hired equipment instead of buying it. As such, Tokyo 2020 rented close to 65 000 computers and tablets, as well as 19 000 desks and chairs. Furthermore, the close to 5 000 medals that were awarded during the Olympic Games were manufactured using extracted materials from electronic devices gathered from people and communities across Japan. The organising committee also used recycled household plastic waste and marine waste to manufacture the medal ceremony podiums.

2024 Olympic Games in Paris, France

In view of minimising the event's carbon footprint, the city of Paris will use 95% of existing or temporary venues. The organising committee, whose ambition is to propose the 1st Circular Economy Games, launched its Zero Waste Strategy for the games in 2017. The strategy foresees the reuse or recycling of 100% of the temporary infrastructure after the games in the country. For instance, the Olympic and Paralympic Village will become an eco-district for the benefit of the local population.

Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en; Olympic News (2020[117]), Showcasing a sustainable society: Tokyo 2020 releases its Sustainability Pre-Games Report", https://www.olympic.org/news/showcasing-a-sustainable-society-tokyo-2020-releases-its-sustainability-pre-games-report (accessed on 29 April 2021); Paris 2024 (2017[118]), "Paris 2024 unveils its "Target Zero Waste" strategy for the Games", https://youtu.be/O_aKqRaP_5M (accessed on 29 April 2021); Tokyo 2020 (2020[119]), "Tokyo 2020 Olympic and Paralympic Games Sustainability Pre-Games Report Unveiled, https://tokyo2020.org/en/news/tokyo-2020-olympic-and-paralympic-games-sustainability-pre-games-report-unveiled (accessed on 29 April 2021).

A number of initiatives exist to reduce the environmental impacts of mass events taking place in the city. In 2019, all event venues and 31% of the hotels in the city were sustainability certified, alongside 40% of professional congress organisers (PCOs) and destination management companies (DMCs). The Scottish Event Campus (SEC) holds the highest award possible – the Gold Award – for Green Tourism and provides free city bike hire for delegates. Moreover, some 40% of Glasgow's hotels have achieved a Green Tourism award. Glasgow was the first British city to join the Global Destination Sustainability Index[3] on sustainable conference cities in 2016 and ranked fourth in 2019, after Gothenburg (Sweden), Copenhagen (Denmark) and Zurich (Switzerland). Examples of circular economy principles applied to the hospitality sector, such as restaurant and hotel networks in Amsterdam, Netherlands, and Umeå, Sweden, are reported in Box 2.11.

Box 2.11. Examples of circular economy initiatives in the hospitality sector

Restaurants and hotels hold significant potential to become more sustainable and circular through the management of their food waste. There are several initiatives that seek to unlock this potential at the international level:

- In order to tackle food waste, the Irish Hotels Federation, the Restaurants Association of Ireland and the Local Authority Prevention Network conducted in 2017 a seminar on "Turning food waste into profit". Furthermore, the Irish Hotels Federation supported the Prevent and Save programme and Ireland's Pledge on Plastic Waste run by the environmental not-for-profit organisation, Repak. On average, food waste generates a EUR 24 000 annual loss for Irish restaurants and EUR 150 000 for hotels.
- 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).
- In 2017, the city of Umeå, Sweden, created the Sustainable Restaurants Network (*Hållbara Restauranger*), which involves 14 restaurants in the city for sustainable practices in the food industry and food waste management. The network also aims at connecting restaurants with local producers while providing advice and information to citizens about sustainable consumption.

Source: Green Hospitality (2017[120]), "Turning food waste into profit", https://greenhospitality.ie/turning-food-waste-profit/; OECD (2020[3]), The Circular Economy in Cities and Regions: Synthesis Report, https://doi.org/10.1787/10ac6ae4-en; OECD (2021[121]), *The Circular Economy in Granada, Spain*, https://doi.org/10.1787/5f8bd827-en.

Large music events are increasingly prioritising green practices, such as the reduction of single-use plastics and food waste, with the potential of applying circular business models. In 2008, Glasgow was declared the first United Nations Educational, Scientific and Cultural Organization (UNESCO) City of Music in the UK and is the Scottish city hosting the highest number of music events, with a weekly average of 130. The live music sector brought in GBP 1.1 billion to the UK in 2018, including GBP 443 million to Scotland (Statista, 2020[122]). City centre parks and surrounding areas host music festivals, which are increasingly embracing green practices due to an environmentally aware audience. The event called T in the Park was the first carbon-neutral festival in the UK in 2008, which initially took place in Strathclyde Country Park. Linked to Glasgow's plastic strategy, the events industry aims at reducing the amount of plastic, through the ban of any plastic reusable products by the end of 2021. Most of the live events organised in Glasgow apply sustainable practices, such as deposit refund schemes to reduce the amount of used plastics.

The cultural sector holds the potential to conduct initiatives that address circular principles in Glasgow. For instance, the Scottish Contemporary Art Network and the Glasgow-based Sculpture Placement Group have created the Circular Arts Network (CAN). This online platform is intended to facilitate the redistribution of surplus, used and spare materials, the exchange of expertise and labour and the co-ordination of transport to benefit the local art community. Users mainly come from artistic sectors such as stage, screen,

music, visual arts, dance, craft, etc. The functioning of the tool is based on a simple process in which users upload a photo of their surplus, specifying where and when it can be collected (CAN, 2020[123]).

Places: The circular economy network of cities

The links between Glasgow and other Scottish cities can set the basis for a city network on the circular economy. Zero Waste Scotland is co-ordinating the development of cross-regional projects and sharing best practices across five areas in Scotland: Edinburgh, Glasgow, Highlands and Islands, North East Scotland and Tayside. This partnership can potentially lead to a network that connects the circular cities, resulting in shared learnings and best practices across Scotland (Zero Waste Scotland, 2020[124]).

In 2020, Glasgow City Council and Zero Waste Scotland formed a partnership with the Scottish Cities Alliance (SCA) to advance on the circular transition and agreed to initiate a city-to-city collaboration by sharing information on waste management. The Scottish cities that form this alliance (Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling) have agreed on a series of short-, medium- and long-term objectives and priorities to make the circular economy happen in Scotland through awareness raising, capacity building and innovation, among others (Box 2.12).

Box 2.12. Scottish Cities Alliance's targets for the circular economy

The Scottish Cities Alliance (SCA) is a partnership composed of Scotland's seven cities (Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling) and the Scottish Government, which aims at working together on the promotion of economic development. The partnership, which focuses on four main workstreams (smart cities, hydrogen, investment promotion and policy), embarked in 2020 on the circular economy by setting up a partnership with Glasgow City Council and Zero Waste Scotland. This collaboration has identified a series of preliminary and tentative actions and priorities for moving towards the circular economy by 2030:

- Short term (2020-22)
  - Revision of the existing circular economy initiatives led by Zero Waste Scotland to identify how SCA member cities can add value and provide support.
  - Building on the work of Zero Waste Scotland and the circular economy strategy of the Scottish Government, development of a joint circular economy action plan.
  - Development of a joint approach to circular economy innovation, building on existing initiatives in Scotland.
- Medium term (2022-25)
  - Development of an action plan for each city with common themes to enable cities to share knowledge and information through peer learning across the member cities.
  - Design and delivery of circular economy education strategy across the city councils of the seven member cities.
  - Broadening the understanding of opportunities from the circular economy across council departments and other agencies through campaigns and capacity building.
- Long term (2025-30)
  - Joint collaboration to attract investment in waste reprocessing services/facilities.
  - Monitoring progress on the impact of the joint circular economy action plan, modifying the approach accordingly.

In 2020, the Scottish city of Dundee, a member city of the alliance, used the OECD Scoreboard on the Governance of the Circular Economy to identify the level of advancement towards a circular economy. The tool enabled the city to gather stakeholders, engage different departments, understand the state of the art of the circular transition in the city and receive valuable information to design the future vision.

Source: Glasgow City Council (2021); Scottish Cities Alliance (2021[125]), *Homepage*, https://scottishcities.org.uk/ (accessed on 3 March 2021); OECD (2021[126]), *Highlights on the 3rd OECD Roundtable on the Circular Economy in Cities and Regions*, OECD, Paris.

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. [101]

ADS (2020), "Press release: Designing for a changing climate - Publication launched", Architecture and Design Scotland, https://www.ads.org.uk/press-release-designing-for-a-changing-climate-publication-launched/ (accessed on 4 December 2020). [111]

ADS (2020), "PSCF2020: Woodside Multi-storey flats – Presentation by Rupert Daly, Collective Architecture", Architecture and Design Scotland, https://www.ads.org.uk/pscf2020_woodsideflats/ (accessed on 4 December 2020). [113]

ADS (2014), *Commonwealth Games Village*, Architecture and Design Scotland, https://www.ads.org.uk/commonwealth-games-village/ (accessed on 4 December 2020). [100]

ApparelXchange (2020), *ApparelXchange: Second Hand, Quality Children's Clothing*, https://www.apparelxchange.co.uk/ (accessed on 4 December 2020). [56]

Business in the Community Ireland (2020), "Leading retailers and FoodCloud launch first national food appeal to support communities affected by Covid-19", https://www.bitc.ie/newsroom/news/leading-retailers-and-food-cloud-launch-national-food-appeal-to-support-communities-affected-by-covid-19/. [106]

CAN (2020), *About Us*, Circular Arts Network, https://www.canarts.org.uk/about-us/ (accessed on 4 December 2020). [123]

Circle Economy (2016), *Circular Glasgow - A Vision and Action Plan for the City of Glasgow*, Glasgow Chamber of Commerce, Glasgow City Council, Zero Waste Scotland. [20]

Circular Glasgow (2020), *Bike For Good*, Glasgow Chamber of Commerce, http://www.circularglasgow.com/glasgows-circular-social-enterprise-champions/ (accessed on 9 December 2020). [57]

Circular Glasgow (2020), *Circular Economy Tools*, Glasgow Chamber of Commerce. [49]

Circular Glasgow (2020), *Circular Glasgow Network*, Glasgow Chamber of Commerce, https://circularglasgow.com/circular-glasgow-network/ (accessed on 9 December 2020). [19]

Circular Glasgow (2020), *Events*, Glasgow Chamber of Commerce, https://circularglasgow.com/events/?pg=1 (accessed on 11 December 2020). [31]

Circular Glasgow (2020), *Scottish Leather Group*, Glasgow Chamber of Commerce, https://www.circularglasgow.com/story/scottish-leather-group/ (accessed on 28 April 2021). [33]

Circular Glasgow (2020), *Young Enterprise Scotland - The Circular Economy Challenge*, Glasgow Chamber of Commerce, https://circularglasgow.com/case_study/young-enterprise-scotland/ (accessed on 11 December 2020). [41]

Circular Glasgow (2019), "A journey through Circular Glasgow", Glasgow Chamber of Commerce, https://circularglasgow.com/circular-glasgow-journey/ (accessed on 3 December 2020). [27]

Circular Glasgow (2019), *Circular Hub*, https://www.circularglasgow.com/circular-hub/ (accessed on 9 December 2020). [32]

Circular Glasgow (2019), "Glasgow's circular social enterprise champions", Glasgow Chamber of Commerce, https://circularglasgow.com/glasgows-circular-social-enterprise-champions/ (accessed on 4 December 2020). [59]

Circular Glasgow (2018), *Circle Lab*, Glasgow Chamber of Commerce, https://www.circularglasgow.com/glasgow-becomes-first-city-to-launch-challenge-on-circle-lab/ (accessed on 11 December 2020). [39]

Circular Glasgow (2018), "Circular Glasgow shortlisted at the Circulars 2019", Glasgow Chamber of Commerce, https://circularglasgow.com/circular-glasgow-shortlisted-circulars-2019/ (accessed on 11 December 2020). [38]

Circular Glasgow (2018), *Showcase Event*, Glasgow Chamber of Commerce. [28]

City of Glasgow College (2020), *Circular Economy & the Construction Sector*, https://www.cityofglasgowcollege.ac.uk/circular-construction (accessed on 3 December 2020). [73]

Climate Ready Clyde (2020), *Climate Ready Clyde*, https://www.sustainabilityexchange.ac.uk/files/uog_and_strathclyde_climate_ready_clyde.pdf (accessed on 3 December 2020). [72]

Climate Ready Clyde (2020), "Delivering a climate neutral, climate resilient Glasgow City Innovation District", http://climatereadyclyde.org.uk/delivering-a-climate-neutral-climate-resilient-glasgow-city-innovation-district/ (accessed on 4 December 2020). [109]

Climate Ready Clyde (2020), *Who We Are*, http://climatereadyclyde.org.uk/who-we-are/ (accessed on 3 December 2020). [71]

CNCA (2020), *Carbon Neutral Cities Alliance Members*, Carbon Neutral Cities Alliance, https://carbonneutralcities.org/cities/ (accessed on 1 December 2020). [18]

Collective Architecture (2019), *Woodside Multi Storey Flats*, https://www.collectivearchitecture.com/projects/woodside-multi-storey-flats (accessed on 4 December 2020). [112]

Community Enterprise (2020), *Ruchazie Food Pantry*, https://communityenterprise.co.uk/our-impact/ruchazie-food-pantry (accessed on 4 December 2020). [94]

Co-operative Glasgow (2017), *Glasgow Co-operative & Enterprise Fund - Information and Guidance for Applicants*, https://www.gsen.org.uk/files/cgbdf-2017-2018-information.pdf (accessed on 10 December 2020). [25]

Crowfunder (2020), *Govanhill Community Food Pantry*, https://www.crowdfunder.co.uk/govanhill-food-pantry (accessed on 4 December 2020). [95]

EC (2021), *Ecodesign omnibus regulation*, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0341&from=EN. [64]

EC (2020), *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe,*, European Commission, https://ec.europa.eu/environment/circular-economy/. [63]

Ellen MacArthur Foundation (2019), *Profiled Universities*, https://www.ellenmacarthurfoundation.org/our-work/activities/universities/profiled-universities (accessed on 3 December 2020). [74]

EU (2008), *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)*, European Union, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098 (accessed on 11 December 2020). [12]

European Commission (2020), *Circular economy action plan (CEAP)*, https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en. [2]

FareShare (2019), "FareShare Glasgow to provide 430,000 more meals each year to people in need", https://fareshare.org.uk/news-media/news/fareshare-glasgow-to-provide-430000-more-meals-each-year-to-people-in-need/ (accessed on 4 December 2020). [92]

Food Cloud (n.d.), *Homepage*, https://food.cloud/. [105]

Glasgow City Council (2021), *Climate Emergency Implementation Plan (CEIP)*, https://www.glasgowconsult.co.uk/Project/861. [17]

Glasgow City Council (2021), *Glasgow City Food Plan 2021-2031*, http://www.gcph.co.uk/assets/0000/8206/FINAL_GLASGOW_CITY_FOOD_PLAN__June_2021_.pdf. [86]

Glasgow City Council (2021), *Resource and Recycling Strategy 2020-30*. [82]

Glasgow City Council (2020), *Bins and Recycling*, https://www.glasgow.gov.uk/recycling (accessed on 3 December 2020). [79]

Glasgow City Council (2020), *Circular Economy Route Map for Glasgow 2020-2030*. [21]

Glasgow City Council (2020), *Consultation Hub*, https://www.glasgow.gov.uk/consultations (accessed on 9 December 2020). [85]

Glasgow City Council (2020), *Co-operative and Social Enterprise Fund*, https://www.glasgow.gov.uk/co-operativeglasgow (accessed on 10 December 2020). [24]

Glasgow City Council (2020), *Council Tax Energy Efficiency Discount Scheme*. [114]

Glasgow City Council (2020), *Food Waste Recycling*, http://www.glasgow.gov.uk/article/16560/Food-Waste-Recycling (accessed on 3 December 2020). [80]

Glasgow City Council (2020), *Glasgow City Food Plan – Good Food For All*, http://goodfoodforall.co.uk/home/glasgow-city-food-plan (accessed on 3 December 2020). [83]

Glasgow City Council (2020), *Glasgow City Food Plan: Public Consultation - October to December 2020*, https://www.glasgowconsult.co.uk/UploadedFiles/Glasgow%20City%20Food%20Plan%20consultation%20paper%20final%20(PDF%20Version).pdf (accessed on 1 December 2020). [84]

Glasgow City Council (2019), "Climate emergency group sets out a path to carbon neutral Glasgow", http://www.glasgow.gov.uk/article/24899/Climate-Emergency-Group-Sets-Out-a-Path-to-Carbon-Neutral-Glasgow (accessed on 1 December 2020). [15]

Glasgow City Council (2019), "Council sets target of carbon neutral Glasgow by 2030", https://www.glasgow.gov.uk/article/25066/Council-Sets-Target-Of-Carbon-Neutral-Glasgow-by-2030 (accessed on 3 December 2020). [14]

Glasgow City Council (2019), "The report and recommendations of Glasgow City Council's Climate Emergency Working Group". [16]

Glasgow City Council (2017), *Glasgow's Housing Strategy 2017-2023*. [108]

Glasgow City Council (2010), *Tackling Glasgow's Waste-Cleansing Waste Strategy and Action*. [81]

Glasgow City Council (n.d.), *Vacant and Derelict Land Survey Map*, https://glasgowgis.maps.arcgis.com/apps/webappviewer/index.html?id=9cfdd87310fe4d1fb9a13f76befe8b81 (accessed on 26 February 2021). [98]

Glasgow City Council et al. (2019), *Glasgow Economic Strategy 2016-2023 Refresh*, https://www.glasgow.gov.uk/CHttpHandler.ashx?id=48028&p=0 (accessed on 1 December 2020). [87]

Glasgow City Council/Resource Efficient Scotland/Zero Waste Scotland (2013), *Carbon Management Plan*. [50]

Glasgow Tourism and Visitor Plan (2020), *Business Tourism*, https://glasgowtourismandvisitorplan.com/support-for-business/business-tourism/ (accessed on 4 December 2020). [115]

Glasgow Tourism and Visitor Plan (2019), "United Nations Climate Change Summit to be held in Glasgow", https://glasgowtourismandvisitorplan.com/news-and-media/2019/september/united-nations-climate-change-summit-to-be-held-in-glasgow/ (accessed on 4 December 2020). [116]

Green Hospitality (2017), *Turning food waste into profit*, https://greenhospitality.ie/turning-food-waste-profit/. [120]

GSEN (2020), *Homepage*, Glasgow Social Enterprise Network, https://www.gsen.org.uk/ (accessed on 4 December 2020). [58]

GSEN (2019), *Social Enterprise in Glasgow*, Glasgow Social Enterprise Network. [53]

GSEN (2013), *Social Enterprises in Glasgow*, Glasgow Social Enterprise Network, http://www.gsen.org.uk/files/GSEN---Scale-as-well-as-Substance.pdf (accessed on 3 December 2020). [54]

GSEN/Glasgow City Council (2018), *Social Enterprise Strategy for Glasgow 2018 to 2028*, Glasgow Social Enterprise Network. [55]

HeraldScotland (2020), "Coronavirus: FareShare Glasgow serves millions of meals to Scots during lockdown", https://www.heraldscotland.com/news/18771330.coronavirus-fareshare-glasgow-serves-millions-meals-scots-lockdown/ (accessed on 4 December 2020). [93]

Jaw Brew (2020), *Circular Economy*, https://www.jawbrew.co.uk/about/circular-economy (accessed on 28 April 2021). [35]

Les Deux Rives (2020), *Les Deux Rives, Quartier circulaire*, https://lesdeuxrives.paris/ (accessed on 30 April 2021). [107]

LWARB (2020), "Glasgow Chamber of Commerce and LWARB promote circular economy", Circular Glasgow, https://www.circularglasgow.com/partnership-between-glasgow-and-london-launched-to-help-the-uk-achieve-ambitious-year-of-climate-change/ (accessed on 11 December 2020). [42]

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. [103]

Ministry for the Ecological and Inclusive Transition (2019), *The Antiwaste Law for the Circular Economy*. [102]

National Lottery Community Fund (2020), "£14 million of National Lottery funding goes to tackle climate change across the UK", https://www.tnlcommunityfund.org.uk/news/press-releases/2020-08-17/14-million-of-national-lottery-funding-goes-to-tackle-climate-change-across-the-uk (accessed on 3 December 2020). [23]

Neighbourly (2020), *The People's Pantry - Information*, https://www.neighbourly.com/project/5e8f0a6dc7ac89479c728be0/information (accessed on 11 December 2020). [96]

NHS (2019), *2017/18 Adult Health and Wellbeing Survey*, National Health Service. [90]

North Sea Region (2020), *ProCirc*, https://northsearegion.eu/procirc/ (accessed on 28 April 2021). [45]

OECD (2021), *Highlights on the 3rd OECD Roundtable on the Circular Economy in Cities and Regions*, OECD, Paris. [126]

OECD (2021), *The Circular Economy in Granada, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/5f8bd827-en. [121]

OECD (2020), *OECD Interviews with Stakeholers in Glasgow*, OECD, Paris. [37]

OECD (2020), *OECD Inventory of Circular Economy Indicators*, OECD, Paris. [51]

OECD (2020), "OECD-Nordic Innovation webinars on the circular economy in cities and regions - Highlights", OECD, Paris, http://www.oecd.org/cfe/regionaldevelopment/highlights-2nd-OECD-roundtable-circular-economy.pdf (accessed on 30 July 2020). [47]

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

OECD (2017), *Land-use Planning Systems in the OECD: Country Fact Sheets*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264268579-en. [97]

OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264251090-en. [52]

OECD (2015), *Stakeholder Engagement for Inclusive Water Governance*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264231122-en. [48]

Olympic News (2020), "Showcasing a sustainable society: Tokyo 2020 releases its Sustainability Pre-Games Report", https://www.olympic.org/news/showcasing-a-sustainable-society-tokyo-2020-releases-its-sustainability-pre-games-report (accessed on 29 April 2021). [117]

Paris 2024 (2017), "Paris 2024 unveils its "Target Zero Waste" strategy for the Games", https://youtu.be/O_aKqRaP_5M (accessed on 29 April 2021). [118]

Repair Café Glasgow (2020), *About*, https://repaircafeglasgow.org/about/ (accessed on 11 December 2020). [61]

Repair Café Glasgow (2020), *The Pram Project*, https://repaircafeglasgow.org/the-pram-project/ (accessed on 11 December 2020). [60]

Resource (2018), "Circular economy in Scottish regions worth £1bn", https://resource.co/article/circular-economy-scottish-regions-worth-1bn-12930 (accessed on 11 December 2020). [30]

RMJM (2014), *Athletes Village for Commonwealth Games 2014*, https://www.rmjm.com/portfolio/athletes-39-village-for-2014-commonwealth-games-scotland/ (accessed on 4 December 2020). [99]

Scottish Cities Alliance (2021), *Homepage*, https://scottishcities.org.uk/ (accessed on 3 March 2021). [125]

Scottish Goverment (2016), "Making Things Last: A circular economy strategy for Scotland", https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/ (accessed on 1 December 2020). [13]

Scottish Government (2020), *Deposit Return Scheme*, https://www.gov.scot/policies/managing-waste/deposit-return-scheme/ (accessed on 3 December 2020). [9]

Scottish Government (2020), *Managing Waste: Resource Efficiency*, https://www.gov.scot/policies/managing-waste/resource-efficiency/ (accessed on 3 December 2020). [7]

Scottish Government (2019), "Climate change action", https://www.gov.scot/news/climate-change-action-1/ (accessed on 3 December 2020). [8]

Scottish Water (2020), *Net Zero Emissions Routemap*, https://scottishwaternetzero.co.uk/ (accessed on 3 December 2020). [65]

Scottish Water/SEPA (2020), *Sustainable Growth Agreement*. [67]

SEPA (2019), "Scottish household waste – Summary data 2019", Scottish Environment Protection Agency, https://www.sepa.org.uk/media/532167/2019-household-waste-commentary.pdf (accessed on 3 December 2020). [11]

SEPA (2018), *Scottish Water Sustainable Growth Agreement*, Scottish Environment Protection Agency, https://www.sepa.org.uk/one-planet-prosperity/sustainable-growth-agreements/scottish-water-sga/ (accessed on 3 December 2020). [66]

South Seeds (2020), *Southside Tool Library*, https://southseeds.org/tools/ (accessed on 4 December 2020). [62]

South Seeds (2017), *Want Space to Grow Veg This Year?*, http://southseeds.org/need-space-to-grow-veg-this-year/ (accessed on 9 December 2020). [88]

Spruce Carpets (2020), *What We Do*, http://sprucecarpets.org.uk/about-us/what-we-do/ (accessed on 28 April 2021). [36]

Statista (2020), *Live Music Industry in the United Kingdom (UK)*, https://www.statista.com/topics/6065/live-music-industry-in-the-uk/ (accessed on 4 December 2020). [122]

Sustainable by Nature (2020), *Homepage*, https://www.sustainablebynature.co.uk/ (accessed on 28 April 2021). [34]

The Independent (2020), "FoodCloud total income increased to €4.8m after 'transformative year'", https://www.independent.ie/business/irish/foodcloud-total-income-increased-to-48m-after-transformative-year-39486812.html. [104]

Tokyo 2020 (2020), "Tokyo 2020 Olympic and Paralympic Games - Sustainability pre-games report unveiled", https://tokyo2020.org/en/news/tokyo-2020-olympic-and-paralympic-games-sustainability-pre-games-report-unveiled (accessed on 29 April 2021). [119]

UK Government (2018), *Resources and Waste Strategy for England*. [6]

UK Government (2017), *Litter Strategy for England*, http://www.gov.uk/government/publications/litter-strategy-for-england. [5]

UK Research and Innovation (2020), "Circular economy centres to drive UK to a sustainable future", https://www.ukri.org/news/circular-economy-centres-to-drive-uk-to-a-sustainable-future/ (accessed on 3 December 2020). [1]

Understanding Glasgow (2020), *Impact of Covid-19*, https://www.understandingglasgow.com/indicators/poverty/food_insecurity/impact_of_covid (accessed on 27 April 2021). [91]

University of Glasgow (2020), *Draft Climate Change Strategy*, http://www.gla.ac.uk/myglasgow/sustainability/climatechangestrategy/consultation/ (accessed on 3 December 2020). [68]

University of Glasgow (2020), *Facts and Figures*, http://www.gla.ac.uk/explore/facts/ (accessed on 3 December 2020). [69]

University of Glasgow (2020), *Sustainable Procurement Programme*, https://www.gla.ac.uk/myglasgow/procurementoffice/sustainableprocurement/ (accessed on 3 December 2020). [70]

University of Strathclyde (2020), *About the Hunter Centre for Entrepreneurship*, https://www.strath.ac.uk/business/huntercentreforentrepreneurship/aboutthehuntercentreforentrepreneurship/ (accessed on 3 December 2020). [75]

University of Strathclyde (2020), *Provision of a Feasibility Study for a Climate Neutral Glasgow City Innovation District*, https://www.publiccontractsscotland.gov.uk/search/show/search_view.aspx?ID=APR384949 (accessed on 4 December 2020). [110]

Urban Roots (2020), *Homepage*, https://www.urbanroots.org.uk/ (accessed on 9 December 2020). [89]

Viridor (2020), *Glasgow Recycling & Renewable Energy Centre*, https://www.viridor.co.uk/energy/energy-recovery-facilities/glasgow-rrec/ (accessed on 3 December 2020). [78]

Warp It (2020), *Performance League Tables - Top 10s*, https://getwarpit.com/leagues (accessed on 9 December 2020). [43]

Welsh Government (2021), "Beyond Recycling: A strategy to make the circular economy in Wales a reality". [4]

YES (2020), *The Circular Economy Challenge*, https://yes.org.uk/programmes.php?id=3 (accessed on 9 December 2020). [40]

Zero Waste Scotland (2020), *Circular Economy in Cities and Regions*, https://www.zerowastescotland.org.uk/circular-economy/cities-and-regions (accessed on 4 December 2020). [124]

Zero Waste Scotland (2020), *Circular Economy Investment Fund*, https://www.zerowastescotland.org.uk/circular-economy/investment-fund (accessed on 3 December 2020). [22]

Zero Waste Scotland (2020), *Circular Economy Investment Fund - Past Projects*, https://www.zerowastescotland.org.uk/content/circular-economy-investment-fund-past-projects (accessed on 11 December 2020). [26]

Zero Waste Scotland (2020), *Circular Procurement*, https://www.zerowastescotland.org.uk/circular-economy/circular-procurement (accessed on 9 December 2020). [44]

Zero Waste Scotland (2020), *Deposit Return Scheme*, https://depositreturnscheme.zerowastescotland.org.uk/ (accessed on 3 December 2020). [10]

Zero Waste Scotland (2020), *What is Revolve?*, https://www.zerowastescotland.org.uk/content/what-revolve (accessed on 29 April 2021). [77]

Zero Waste Scotland (2019), "New figures show shift in scots second hand culture as revolve network provides greater quality and choice", http://www.zerowastescotland.org.uk/press-release/new-figures-show-shift-scots-second-hand-culture-revolve-network-provides-greater. [76]

Zero Waste Scotland (2016), *Procuring for: Repair, Re-use and Remanufacturing*. [46]

Zero Waste Scotland/Circular Glasgow (2018), *Circular Economy Hotspot Scotland - Event Summary*, http://www.circulareconomyhotspot.scot/summary-of-event/ (accessed on 3 December 2020). [29]

Notes

[1] Circle Lab is an online platform, set up by Circle Economy in the Netherlands and supported by the Ebay Foundation. It aims at engaging a community of cities, businesses and citizens worldwide to address global challenges with circular solutions.

[2] These events are: i) RNSMT, a three-day major music festival on Glasgow Green next to the city centre; ii) the All-Energy Conference, a three-day energy seminar in the SEC Centre; and iii) the Summer Sessions, a three-day music festival in Bellahouston Park.

[3] The index is calculated by the Global Destination Sustainability Movement, a platform that aims at enabling destinations to become more attractive. It was founded by the International Congress and Convention Association (ICCA), MCI, IMEX Group, European Cities Marketing (the association for tourist boards, convention bureaux and city marketing organisations in Europe) and Gubi Consulting. The ranking specifically recognises the People Make Glasgow Greener strategy, which aims at helping conference organisers in the organisation of a conference in the city and which is aligned with Glasgow's Tourism and Visitor Plan to 2023. The index presents the limit of ranking members only. Therefore, many cities notoriously known as international touristic destinations are not included in the ranking. Nevertheless, it helped to push the event and tourism sector in the city to become greener (from the 7th position ranking in 2016 to the 4th in 2019). The index also measures sustainable procurement and supply services of all services connected to the touristic experience: sustainability certificates in airports, green mobility facilities, hotels holding green certificates and restaurants awarded with a Taste Our Best certificate. The index also considers waste to landfill, pollution produced and corruption index, amongst others (Taste Our Best, https://www.visitscotland.com/es-es/see-do/food-drink/taste-our-best/).

3 Governance challenges to the circular transition

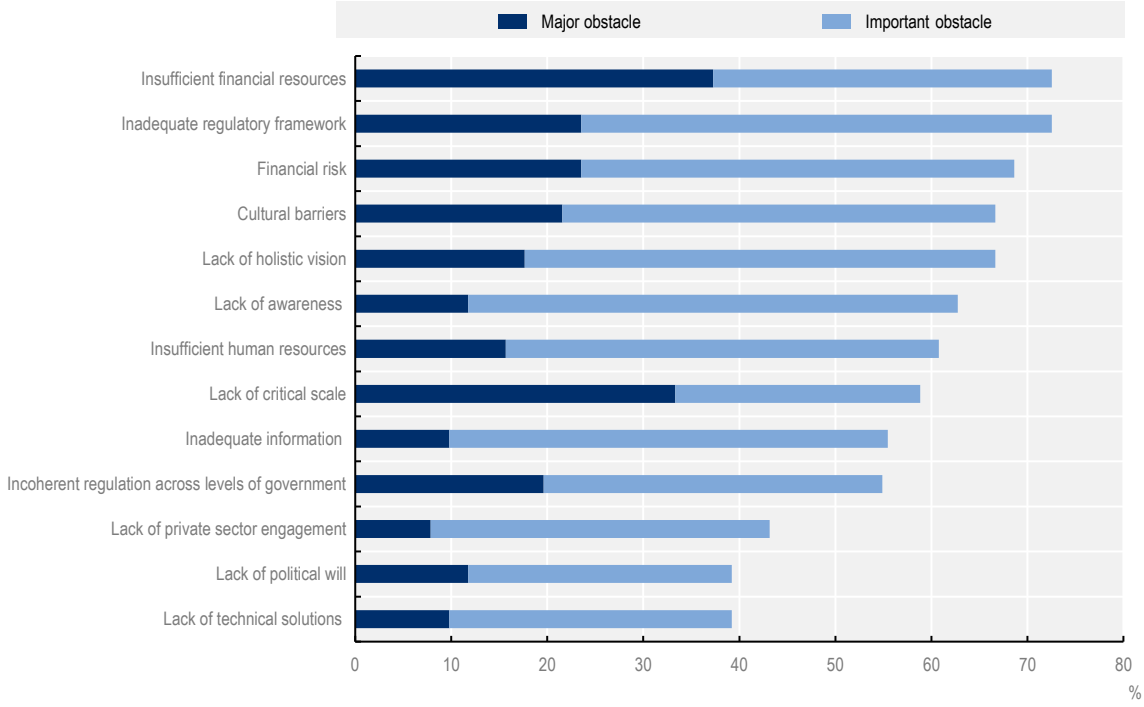
This chapter describes the main challenges that Glasgow, United Kingdom, is facing in the transition from a linear to a circular economy. The main governance gaps relate to the lack of a systemic approach to the circular transition and the need to reinforce the role and leadership of the city council. Other obstacles include the weak co-ordination across municipal departments, the difficulties to involve large companies in the circular transition, the lack of a dedicated budget for the circular economy and the lack of implementation of green public procurement (GPP), among others.

Governance gaps to the circular economy in cities

Building on the OECD framework *Mind the Gaps: Bridge the Gaps* (Charbit and Michalun, 2009[1]) and the OECD report *Water Governance in OECD Countries: A Multi-level Approach* (2011[2]), the OECD report on the *Circular Economy in Cities and Regions* (2020[3]) identified five types of governance gaps cities face when designing and implement a circular economy (Figure 3.1). In particular, 51 surveyed cities and regions highlighted the following gaps:

- **Funding gaps**: According to the OECD Survey on the Circular Economy in Cities and Regions (2020[4]), cities and regions 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.
- **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**: 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.

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

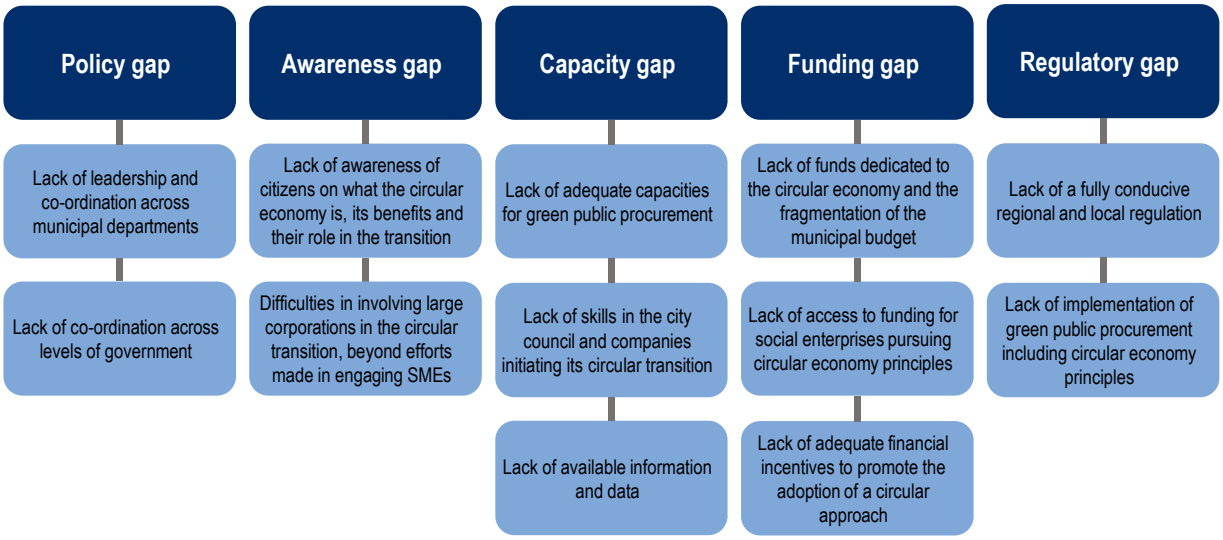


Note: Results based on a sample of 51 respondents that indicated obstacles as being "Major" and "Important".
Source: OECD (2020[3]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

Governance gaps in Glasgow, United Kingdom

A number of obstacles emerged during the OECD missions (27-30 April and 22-25 June 2020), such as policy, awareness, capacity, funding and regulatory gaps. They are described below (Figure 3.2).

Figure 3.2. Governance gaps for a circular economy in Glasgow, UK



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

Policy gaps

There is no clear leadership within Glasgow City Council to accelerate the transition towards the circular economy, while policies are conceived in silos and lack system thinking. The Neighbourhoods, Regeneration and Sustainability department has been in charge of developing the circular economy route map of the city. However, its leading and co-ordination role across municipal departments is still to be clarified. As it is often the case at the municipal level, co-ordination between municipal departments is challenging, with the risk of missing the opportunities arising from the inclusion of circular economy principles in various planning tools. These opportunities are of a socio-economic nature, as well as environmental ones. There are several plans and strategies that could be connected with the circular economy, enhancing co-ordination across municipal departments:

- Glasgow's City Development Plan, developed by the Spatial Planning Department in 2017, explores amongst others, Glasgow's vision for land use, the reuse of existing buildings, the capture and reuse of energy, the ParkPower project and the urban food and community gardens. The development plan contains policies about construction processes and how the city aims to embed sustainability (Glasgow City Council, 2017[5]).
- The city's Waste Policy for 2020 to 2030, developed by the Neighbourhoods, Regeneration and Sustainability Department's Waste Unit, aims at minimising waste sent to landfill, applying the European Union (EU) waste hierarchy. The Resource and Recycling Strategy 2020-30 aims to move from waste to resource management, including circular economy principles in procurement.
- The Liveable Neighbourhoods Toolkit, launched in 2021 by the Neighbourhoods, Regeneration and Sustainability Department, consists of creating a template for an ideal neighbourhood to be applied in the 56 neighbourhoods in Glasgow, UK (Glasgow City Council, 2021[6]). The department

is also in charge of developing a new local transport strategy and a city centre transformation plan at the same time.

- The Climate Emergency Implementation Plan (CEIP), launched in 2021, sets the basis for the achievement of the objective to become a carbon neutral city by 2030. The Plan prioritises key areas such as transport, natural environment and biodiversity and energy, and also highlights the relevance of social justice in the implementation of the planned 59 actions by 2030 (Glasgow City Council, 2021[7]).
- Glasgow's Economic Strategy 2016-23, launched in 2016 by Glasgow City Council, in partnership with the Glasgow Chamber of Commerce and Glasgow Economic Leadership, identifies ten key areas for the economic development in the city. Some of these themes address skills, health, education and employment opportunities and support for key sectors of the city (e.g. tourism and events, digital technology, creative industries, etc.).

Awareness gaps

There is a lack of citizen awareness of what the circular economy is, its benefits and their role in the transition. Waste separation is poorly performed at the household level, due to a lack of proper incentives to shift behaviours. Moreover, there is no clear understanding of users overall of how the waste management system works and the process after they separate their waste. There is a general reticence towards second-hand products. For example, rental garments are not perceived as clean. Access to repair services is limited and lacks affordability, compared to the process of acquiring new products. Despite the efforts made by the Glasgow Chamber of Commerce and partner institutions (i.e. Zero Waste Scotland and Glasgow City Council) to raise awareness and support the private sector in the transition to the circular economy, it is still not very clear to many companies of different size what the circular economy is and how they can take advantage of the opportunities arising from the circular transition. The chamber of commerce is struggling to involve large corporations in the circular transition. The latter claim that some of their activities are performed within a global value chain, impeding the closure of loops and direct control over operations along the value chain. Finally, despite consumers' increasing sustainability awareness, SMEs tend to consider that much remains to be done to properly engage consumers and deliver messages in a simple, clear and scalable way. Glasgow would need to move from a business-led approach to a holistic one that would include the entire city.

Capacity gaps

The city of Glasgow, UK, will need to build and strengthen internal capacities to accelerate the transition. While Zero Waste Scotland is highly technically specialised in waste and resource management and the chamber of commerce has an important network through which to create a community of practice on the circular economy, the city would need to build the technical and human capacities required for the transition, lead by example by incorporating circular economy principles in daily practices and enhance co-ordination across departments. Regarding public procurement, in Glasgow City Council, there is a disconnection between public officials in charge of drafting the tenders and those managing the contracts. In general, there is a strong focus on the tender, with less attention paid to how the contract is performing once it has been awarded. In addition, system skills (capacities to understand, evaluate and enhance) and technical skills (competencies to design, plan and accelerate the transition engaging a variety of stakeholders) are also lacking.

Related to technical capacities within the city council and across sectors is the ability to produce and analyse data. For example, data gaps are particularly evident in the built environment sector, where there is a lack of information about the materials used in the construction sector and the way to make data

available for modular repurposing. Data gaps are partly explained because some of the dimensions of the circular economy have not been historically measured.

Funding gaps

The lack of funds dedicated to the circular economy and the fragmentation of the municipal budget may have an impact on the feasibility and financial sustainability of circular economy initiatives in Glasgow, UK. Transitioning from a linear to a circular economy requires a significant amount of investment and financial resources. However, while there is funding available from national, regional sources and European institutions, there is no specific budget specifically allocated to circular economy initiatives at the city level. Moreover, the city council is experiencing budget constraints and there is competition for funds between different areas.

Access to funding is a major obstacle, particularly for social enterprises pursuing circular economy principles, as financing tools are not necessarily suited for sustainable business models. The exploration of new business models, such as “product as a service”, can be challenging for some SMEs as they must acquire the asset first and a return on investment is a lengthier process. The transaction cost for SMEs to move from a linear ownership model to a more circular model based on use can require additional funding in the first stages. Social enterprises based in Glasgow, for example, involved in circular economy activities such as repairing and reusing, rely very much on external funding, which is limited in time. As such, these enterprises, which pursue social and environmental functions, call for various streams of income as grant funds are not sustainable sources in the long-term.

There is a lack of adequate financial incentives to promote the adoption of a circular approach in Glasgow, UK. For large companies, budget restrictions are extremely relevant in contractual requirements and commercial agreements, while material specifications have a minor role in the allocation of contracts. Therefore, incentives to use secondary materials are low. Regarding the built environment sector, there are no incentives for constructors to perform a life cycle analysis and extend the use of buildings, as higher taxes are applied to refurbishment activities than to new constructions. As such, the focus is very much on de-risking rather than on opportunities from the value of future assets. Currently, in the UK, refurbishing and redeveloping existing buildings is subject to a reduced VAT tax of 5%, while the building of a new house or flat is exempted from VAT (UK Government, 2019[8]).

Regulatory gaps

Regional and local regulations are not yet fully conducive to circular-related innovations in various sectors, including the built environment and waste. For example, in Scotland, the Circular Economy Bill does not include the building sector. The National Infrastructure Commission (NIC) raised this point in relation to the need of moving beyond energy efficiency when it comes to construction and aiming for low-carbon and renewable resources (NIC, 2019[9]). At the local level, planning policy regulations do not indicate which material to use nor require to provide information on the origin of the materials. Building standards in Scotland mainly focus on energy efficiency. Similarly, at the local level, Glasgow City Council aims at increasing energy efficiency standards in different areas of the council (e.g. spatial planning, development and regeneration services) and within the building stock owned by the city. However, there seems to be a mismatch between building standards at the regional and local levels. One of the main challenges is to make sure that building standards allow achieving planning policy outcomes. Circular economy principles such as the reuse of secondary materials in new buildings or implementing modular off-site construction models are not encouraged by the current regulations.

A range of stakeholders finds some regulations in relation to waste management unclear, especially in terms of transforming waste into resources. For instance, the Scottish Environment Protection Agency (SEPA) conceives as waste all items collected as such. However, the definition of various types of waste and end of life is preventing the reuse of waste as secondary material in new products. There are some international examples of national governments taking action towards adapting the existing regulatory frameworks to emerging needs related to the circular economy. For example, in the Netherlands, the legal and regulatory framework is being adapted in order to make the country an economy without waste by 2050, as defined by the National Circular Economy Strategy. In Belgium, the government is undertaking audits of all existing legislation and regulations in order to remove any possible normative obstacles to the development of a circular economy (OECD, 2020[3]).

Public procurement does not fully exploit the potential of the circular economy in products and services by and from the municipality. Currently, life cycle analysis (LCA) is not integrated into procurement decisions, though it would help prevent negative environmental impacts. Furthermore, each municipal department negotiates its own procurement arrangements, each with its own different demands and specific supplier lists. As such, processes are fragmented and do not include circular economy principles, even though furniture supplies and suppliers, information and communication technology (ICT) equipment provision and disposal could reflect circular practices, in terms of renting, moving from ownership to services, using second-hand furniture, etc. Key performance indicators (KPIs) are not used to identify how the contract is performing. Examples of different applications of public procurement and ongoing related initiatives are illustrated in Box 3.1.

Box 3.1. Public procurement for the circular economy: International practices

Cities are increasingly including circular-related requirements in tenders. Some of the objectives of these activities are:

- **Promote circular economy building developments**: The city of Amsterdam, Netherlands, developed a Roadmap Circular Land Tendering (2017[10]) 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 onsite; 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. The Strategic Plan for Public Procurement from the city of Lisbon, Portugal, 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.
- **Incorporate 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 (audio-visual, curtains, clothing); recycled kitchen equipment; computer recycling market; modular demountable nurseries; retreated tires and environmentally friendly 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 sanitary paper products included the "zero waste" criterion, whereby sanitary products had to be made of cardboard packaging or cardboard hollow packaging collected in the city.

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

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

References

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

Glasgow City Council (2021), *Climate Emergency Implementation Plan (CEIP)*, https://www.glasgowconsult.co.uk/Project/861. [7]

Glasgow City Council (2021), *Liveable Neighbourhoods Toolkit*, http://www.glasgow.gov.uk/CHttpHandler.ashx?id=53409&p=0. [6]

Glasgow City Council (2017), *City Development Plan*, https://www.glasgow.gov.uk/cdp (accessed on 10 December 2020). [5]

Municipality of Amsterdam (2017), *Roadmap Circular Land Tendering*, https://amsterdamsmartcity.com/projects/roadmap-circular-land-tendering (accessed on 28 January 2020). [10]

NIC (2019), "New report underlines need to tackle carbon emissions from homes", National Infrastructure Commission, https://nic.org.uk/news/new-report-underlines-need-to-tackle-carbon-emissions-from-homes/ (accessed on 11 December 2020). [9]

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

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

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

UK Government (2019), *VAT for Builders*, https://www.gov.uk/vat-builders (accessed on 9 December 2020). [8]

4 Policy recommendations

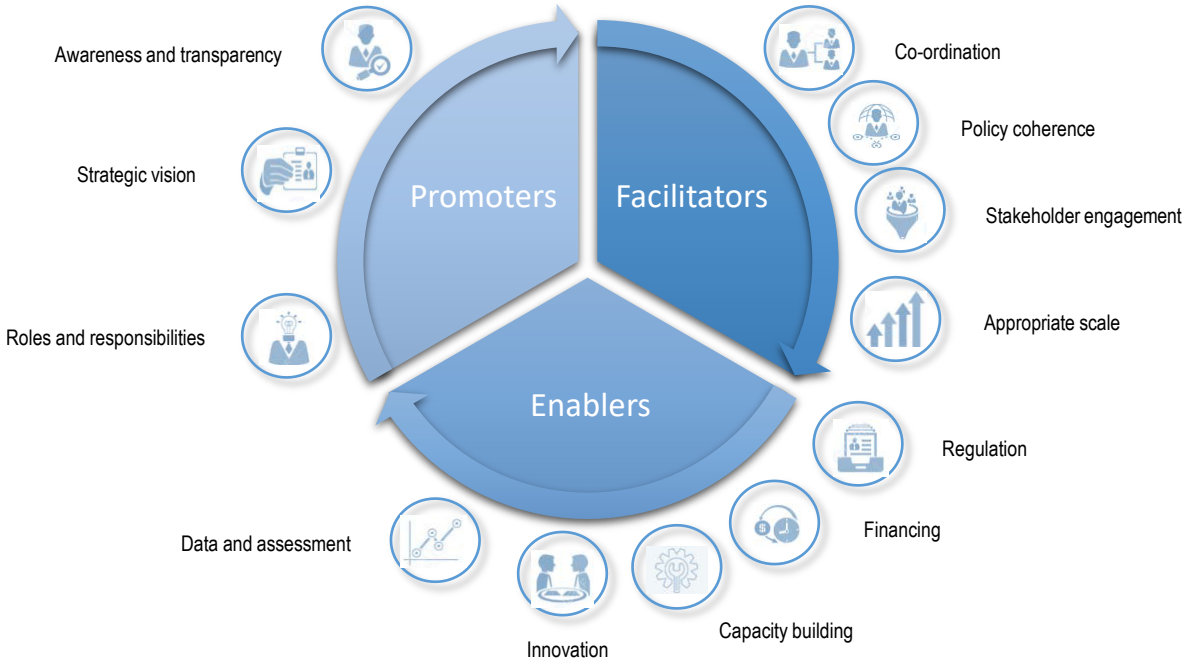
In response to the challenges identified in Chapter 3, this chapter suggests policy recommendations to implement the circular economy in the city of Glasgow, United Kingdom. In particular, Glasgow can act as: i) promoter, defining roles and responsibilities and leading by example; ii) facilitator, creating opportunities for collaborations across stakeholders; and iii) enabler, implementing the necessary regulatory and financial conditions, to accelerate the transition from a linear to a circular economy.

The governance of the circular economy in cities and regions

According to the OECD, cities can act as promoters, facilitators and enablers of the circular economy (Figure 4.1) (OECD, 2020[1]).

- **Promoters**: Cities 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).
- **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).

Figure 4.1. The governance of the circular economy in cities and regions: A Checklist for Action



Source: OECD (2020[1]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

This chapter presents policy recommendations and related actions for the city of Glasgow, UK, as a result of the interviews with more than 60 stakeholders, during the OECD virtual missions (27-30 April and 22-25 June 2020) and a policy seminar on 22 July 2021 (Table 4.1), and on the basis of international best practice. The 12 governance dimensions for each cluster (promoter, facilitator and enabler) build on the

Checklist for Action for cities and regions transitioning to the circular economy (OECD, 2020[1]). These governance dimensions were inspired by the OECD Principles on Water Governance (OECD, 2015[2]) and they are accompanied by the OECD Scoreboard on the Governance of the Circular Economy, developed thanks to the collective efforts of several cities, involved in the OECD Programme on the Circular Economy in Cities and Regions as case studies (OECD, 2021[3]; 2020[4]; 2020[5]; 2020[6]).

It is important to note that:

- **Actions are neither compulsory nor binding**: Identified actions address a variety of ways to implement and achieve objectives. However, they are neither compulsory nor binding. They represent suggestions, for which adequacy and feasibility should be carefully evaluated by the city of Glasgow, involving stakeholders as appropriate. In turn, the combination of more than one action can be explored, if necessary.
- **Prioritisation of actions should be considered**: Taking into account the unfeasibility of addressing all recommendations at the same time, prioritisation is key. As such, steps taken towards a circular transition should be progressive. Table 4.1 provides an indicative timetable for actions (short, medium and long term) based on the discussion and results of the Policy Seminar on the Circular Economy in Glasgow held on 22 July 2021.
- **Resources for implementation should be assessed**: The implementation of actions will require human, technical and financial resources. When prioritising and assessing the adequacy and feasibility of the suggested actions, the resources needed to put them in practice should be carefully evaluated, as well as the role of stakeholders that can contribute to the implementation phase.
- **The proposed actions should be updated in the future**: New potential steps and objectives may emerge as actions start to be implemented.
- **Several stakeholders should contribute to their implementation**: Policy recommendations and related actions should be implemented as a shared responsibility across a wide range of actors. Based on the results of the Policy Seminar on the Circular Economy in Glasgow held on 22 July 2021, Table 4.1 provides an indicative selection of actors that can contribute to each of the proposed actions.

Table 4.1. Suggested policy recommendations, actions and sequence for the circular economy in Glasgow, UK

Role	Governance dimension	Action	Short-term	Medium-term	Long-term	Selected leading actors
Promoter	Roles and responsibilities	Establish a transversal working group across municipal departments and continue to strengthen the relationship between the city, Zero Waste Scotland and the Glasgow Chamber of Commerce.		X		Glasgow City Council
		Lead by example, embedding circular economy principles in daily municipal activities and practices such as separate waste collection, water reuse and ban on single use plastics.	X			Glasgow City Council Zero Waste Scotland Chamber of Commerce
	Strategic vision	Build a circular vision of key sectors with strong potential: tourism and events industry. • Promote eco-design for events and venues. • Promote renting, sharing and in service-based business models. • Promote collaboration across the supply chain. • Prevent food and plastic waste.		X		Glasgow City Council Scottish Government Zero Waste Scotland Chamber of Commerce Business sector Social enterprises Civil society and non-governmental organisations (NGOs)
		Build the circular vision on key sectors: the built environment. • Apply smart design to new construction. • Develop a circular profile of buildings. • Consider the idle capacity of empty buildings for better use of resources. • Plan the end of life of buildings and infrastructure.		X		
		Build the circular vision on key sectors: food. • Promote food waste reduction. • Engage the local community on urban agriculture. • Enhance food security.		X		
	Awareness and transparency	Raise awareness of residents and key economic actors through communication campaigns.	X			Glasgow City Council Zero Waste Scotland Chamber of Commerce
		Promote the use of labels and certifications to increase trust.		X		Glasgow City Council Universities
Facilitator	Co-ordination	Align local targets on the circular economy with regional ones for a coordinated vision across levels of government.		X		Glasgow City Council Scottish Government
		Strengthen collaboration across the municipal departments.		X		Glasgow City Council
	Policy coherence	Mainstream circular economy principles across strategic policy documents.			X	Glasgow City Council

Role	Governance dimension	Action	Short-term	Medium-term	Long-term	Selected leading actors
	Stakeholder engagement	Further involve stakeholders in strengthening and consolidating the circular vision of the city.		X		Glasgow City Council Zero Waste Scotland Chamber of Commerce Business sector Social Enterprises Universities and knowledge institutions Local communities
	Appropriate scale	Engage property developers and relevant actors in experimentations and pilots to transform some deprived neighbourhoods into circular areas, and to take stock of the location, condition and barriers for reuse of existing derelict land.		X		Glasgow City Council Scottish Government Universities and knowledge institutions Social Enterprises
		Strengthen the link between the city and the surrounding rural areas.			X	Glasgow City Council
Enabler	Regulation	Identify regulatory bottlenecks to circular economy practices , such as using secondary materials in new buildings or implementing modular off-site construction models, and initiate a dialogue with the regional government to overcome them, if need be.		X		Glasgow City Council Scottish Government
		Set incentives for effective implementation of green public procurement with circular economy criteria, while making it accessible to new entrants and SMEs with circular economy activities.	X			Glasgow City Council
	Financing	Explore fiscal tools and funding options to boost the transition to a just circular economy.		X		Scottish Government Glasgow City Council
	Capacity Building	Foster capacity building for the circular economy in all municipal departments, and promote training on circular business models for entrepreneurs and youth.	X			Glasgow City Council Zero Waste Scotland Chamber of Commerce
	Innovation	Develop an “incubator” to support the creation of new business models and innovations geared towards the circular economy.		X		Zero Waste Scotland Chamber of Commerce
		Provide a digital marketplace, matchmaking tools and networking platforms to generate collaborations across large companies and SMEs applying circular economy principles.		X		Glasgow City Council Chamber of Commerce
	Data and assessment	Develop digital maps and material flow analyses to understand material input and output.		X		Glasgow City Council Universities and knowledge institutions
		Monitor and assess progress on the Circular Economy Route Map.			X	Glasgow City Council Universities and knowledge institutions

Promoter

Roles and responsibilities

It is important to establish clear roles and responsibilities within Glasgow City Council in terms of who does what in policymaking (e.g. priority setting and strategic planning) and implementation of the Circular Economy Route Map for Glasgow. The Neighbourhoods, Regeneration and Sustainability Department took the lead in drafting the route map, advancing a number of proposals towards new circular business models in repairing, reusing and remanufacturing, amongst others. The next steps are to determine how to move forward in the implementation (e.g. financing and budgeting, data and information, and stakeholder engagement) and how to co-ordinate with other municipal departments since the circular economy foresees a systemic change.

The following actions are proposed:

- Establish a transversal working group across municipal departments and continue to strengthen the relationship across the city, Zero Waste Scotland and the Glasgow Chamber of Commerce. A first step could consist in selecting in each municipal department a focal point to be part of the group, identify existing gaps, and define possible synergies across the departments, for example in relation to: efficient resource use; eco-design; and sustainable waste management. The group could appoint a co-ordinator. Moreover, Glasgow City Council could strengthen the relationship with Zero Waste Scotland and the Glasgow Chamber of Commerce through: i) building capacities within the city staff and political representatives; ii) financing circular economy-related initiatives; and iii) strengthening collaborations with the business sector.
- Lead by example, embedding circular economy principles in daily activities and practices. Glasgow could start introducing circular economy principles by: i) reducing the amount of waste generated (e.g. diminishing the use of paper, banning one-use plastics like cups in municipal events and daily activities); ii) adopting business models shifting from ownership to services (e.g. leasing a furniture service instead of buying new); and iii) encouraging the use of secondary materials (e.g. using recycled plastics for office furniture) (Box 4.1). Moreover, Glasgow City Council could support the development of repair cafés, local swap shops and repairer banks, encouraging local and/or traditional repair activities and creating opportunities for skills development and jobs.

Box 4.1. Actions taken by cities to lead by example on the circular economy

There is a growing number of cities that are aiming at becoming role models to trigger behavioural and business change in the city. Some cities have set themselves the specific objective of leading by example to show the feasibility of the circular transition with specific actions. Examples are reported below:

Waste management reduction

- The city of Gothenburg, Sweden, applies a waste management strategy to its Gothenburg Cultural Festival in which the use of single-use packaging is banned.

Shift from ownership to services

- The municipality of Bollnäs, Sweden, has applied what the local government calls “functional public procurement” (*funktionsupphandlingen*) to rent light as a service in municipal pre-schools and schools.

- The city of Ljubljana, Slovenia, aims to foster "product as a service" schemes by renting printers, electric lamps or furniture instead of buying them.
- In Oulu, Finland, public libraries have extended their services from borrowing traditional items (e.g. books, e-books, audiobooks, music, films, etc.) to skis, skates and other sports equipment.

Use of secondary materials

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

Source: OECD (2020[1]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en; Eurocities (2019[7]), "Tackling the problem of plastic pollution in cities".

Strategic vision

The Circular Economy Route Map for Glasgow represents the first attempt to identify a series of actions to promote the circular economy transition in the city. The route map strongly focuses on the need to foster local jobs, strengthen the sense of community and develop business opportunities linked to the circular economy. As mentioned in Chapter 2, some sectors have high potential within the long-term vision of the circular economy in the city. These sectors are the event and tourism, built environment and food.

Regarding the **tourism and events** industry, the city could promote the following actions:

- *Eco-design for events and venues*, in view of building infrastructure and equipment with secondary materials (e.g. recycled plastic chairs) or through reused furniture and with repurposing in mind.
- *Renting, sharing and in service-based business models*. Renting equipment for events, hospitality and catering enables it to be kept in use for longer, at competitive prices and minimising waste reduction (for example contracting rental services of sustainable linen and laundry); use sharing services such as mobility; and replace ownership with services, for example renting lights as services rather than buying light bulbs makes the owner of all installations responsible for the performance and durability of the service.
- *Collaboration across the supply chain*. Including circular economy principles in the supply chain of the events and tourism sector aims at: i) fostering local production to reduce the imports of raw materials, focusing on loops and shorter supply chains; ii) creating job opportunities in repairing, maintaining, recycling and reuse; iii) reducing import of primary material; and iv) establishing collaboration to minimise waste production and scale up best practices through know-how exchange. For example, in Amsterdam, a total of 12 hotels have started co-operating with actors along their different value chains to incorporate circular principles in their business models. As such, they jointly purchase and bundle waste streams, contract rental services and share information to provide more sustainable products and services.
- *Preventing plastic waste*. To reduce plastic waste in events and catering, some practices consist in: i) replacing plastics cutlery with reusable or biodegradable versions; ii) encouraging attendants to bring their own reusable bottles; and iii) providing water in glass bottles.

Regarding the **built environment**, the city could:

- *Apply smart design to new construction*. A smart design consists in using materials with low environmental impact, increasing the material and energy performance of buildings and planning

for end-of-life repurposing or reuse of materials when dismantling. In this case, the waste stream can be separated to enable high-value reuse and create a resource bank and marketplace where materials can be exchanged between market players.

- *Develop a circular profile of buildings*. When planning for construction, materials should be identified to develop plans for the end of life of the building and use recycled material when possible. In this case, material passports can be useful. Based on 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 (Cradle to Cradle Products Innovation Institute, 2019[8]; Luscuere, 2017[9]). In the city of Paris, France, 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[10]).
- *Consider the idle capacity of empty buildings for better use of resources*. Glasgow can use the 800 properties currently not in use in the city, first to avoid new unnecessary construction sites and second, to be used as a testbed for the circular economy experimentation or for circular-economy-related activities (such as repairing cafés). In Groningen, Netherlands, a project in a disused sugar factory aims to create a "zero-waste" neighbourhood: 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 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 (OECD, 2020[1]).
- *Plan the end of life of buildings and infrastructure*. Three levels of circularity can be identified: i) repurposing an existing asset, components and materials with no major transformations and in the same location; ii) reusing an existing asset for the same purpose but in a different location; iii) reusing components and materials of existing assets, in the same and different location (Stronati, 2018[11]).

Regarding the **food** sector, the city can:

- *Promote food waste reduction*. In restaurants and canteens, this is possible by replacing buffets with a la carte schemes for example and selling food at a low price on platforms and donating it to food banks. Other solutions to reduce the amount of waste generated could consist of the design of targeted awareness-raising initiatives such as "challenges". For instance, the city of Groningen, Netherlands, launched Food Battle Groningen, a challenge reducing food waste in which more than 250 households participated (OECD, 2020[1]).
- *Engage the local community on urban agriculture*. This could be done by designing initiatives to stimulate urban agriculture. Glasgow City Council could also make use of some of the existing derelict and vacant land by building small plots for vegetable gardens that could be rented to citizens at low prices or used for free, in accordance with certain regulations. For example, 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 (OECD, 2020[1]).
- *Enhance food security*. Glasgow could support food security through food banks, pantries and social enterprises based in the city; which work on improving access to food and tackle food waste.

Glasgow could communicate and share good practices of social enterprises on food security and organise workshops to engage local communities. An inspirational example could be the city of Guelph, Canada, which aims to create an inclusive food-secure ecosystem by 2025 to give access to affordable, nutritious food, building on the presence of major agri-food industry players and agriculture research institutions (OECD, 2020[1]).

Awareness and transparency

Targeted communication campaigns could raise awareness of residents and economic actors with the objective to: i) encourage sustainable consumption habits; ii) inform of circular initiatives and encourage participation; and iii) promote reuse and recycling of equipment and appliances. The communication should take into account the different demographic and socio-economic conditions of the residents and reach them with customised messages and the most appropriate means, including social media. There are different examples of awareness-raising initiatives: 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) (OECD, 2020[1]).

Furthermore, the city could promote the use of labels and certifications to increase trust. There are already several certifications in place, such as the Revolve certification for second-hand products (used by more than 115 stores in Scotland), B Corporation certification that measures social and environmental performance (with more than 3 000 certified companies in more than 70 countries) and Cradle to Cradle[1] (B Corporation, 2021[12]). However, there still an issue in these standards effectively reaching customers as they are only allocated to producers or retailers requesting them. Glasgow City Council could first identify the certifications on second-hand goods and reused materials already in place and, if appropriate to certify closed loops, include them as criteria in public procurement processes. In Glasgow and the surrounding area alone, there are more than 40 Revolve-certified establishments. In the longer term, the city could consider apply the Made in Glasgow label to products and services locally produced, which enhance resource efficiency, reduce waste and close loops. The Amsterdam Made certificate was for example developed at the request of 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 (OECD, 2020[1]). 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[13]).

Facilitator

Co-ordination

Aligning local targets on the circular economy with regional ones for a coordinated vision across levels of government. In Scotland, the circular economy is expected to reduce carbon emissions by 11 million tonnes per year by 2050. By 2025, the Scottish circular economy strategy aims to reduce waste by 15% against the 2011 baseline of 13.2 million tonnes; keep the share of waste sent to landfill at 5%; reach 70% recycling and composting, and prepare for reuse of all waste; reduce all food waste arising in Scotland and on-farm losses of edible products. A multi-level dialogue can help clarify the role of the city of Glasgow in that transition and to harmonise goals and targets. For example, Glasgow can play a role in recovering value from biological resources and promoting sustainable production and consumption. An inspiring example of such multi-level coordination can be found in Spain, where the Federation of Municipalities and

Provinces (FEMP) takes part in an inter-ministerial co-ordination body across national, regional and local governments.

Strengthening collaboration across the municipal departments of Glasgow can also contribute to avoiding duplications and aligning funds. Departments that should be primarily involved to implement the Route Map are: the Spatial Planning Department, the Regeneration and Sustainability Department and the City Property Glasgow. In order to strengthen collaboration within the local government, the city could: i) identify how municipal departments can relate to the circular economy in their policies (e.g. public procurement, environment, innovation, etc.); consider setting inter-departmental programmes on the circular economy and ad-hoc coordination meetings; iii) allocate funds for cross sectoral actions across departments, aiming at preventing wasting resources and optimising resource efficiency. At international level, some cities (Rotterdam, the Netherlands) established specific teams in charge of coordinating their circular transition, or set up a co-ordination body within the metropolitan area (e.g. Metropolitan Area of Barcelona, Spain) (OECD, 2020[1]).

Policy coherence

Glasgow should mainstream circular economy principles across strategic policy documents. As such, a holistic approach would help connect energy, heating, transport networks and natural cycles and biodiversity. Glasgow City Council could align the circular economy agenda with other relevant initiatives in the city, such as the Declaration of Climate Emergency to become the first carbon-neutral city in the UK by 2030, Glasgow's City Development Plan, the Resource and Recycling Strategy 2020-30, the Liveable Neighbourhoods Toolkit, the Climate Emergency Implementation Plan (CEIP) and the Glasgow Economic Strategy 2016-23. To do so, Glasgow City Council could identify synergies and potential overlaps between the initiatives and co-ordinate through an ad hoc working group, as suggested above.

Glasgow's Housing Strategy 2017-22 set the objective of bringing empty properties back into use, a goal that could be linked to the need for building restructuring in Glasgow. The reallocation of empty properties to be assigned to community projects that struggle to pay their rent could be an interesting area to explore by Glasgow City Council, as a way to localise the economy applying circular economy principles. There are 800 empty properties in Glasgow, which are neither properly used nor profitable. In order to take advantage of these empty facilities, a number of them could be allocated to shops that apply circular criteria (e.g. the use of recycled materials, reusable materials). These spaces could create job opportunities for the people enrolled in circular economy capacity training programmes (Glasgow City Council, 2017[14]).

Integrated policies could take into account localisation and retention: in the first case, this would imply generating products and goods locally, with systems to be operated at the local level to reduce losses in transactions and minimise negative environmental impacts. Second, it could retain used products in the local economy as much as possible (use of assets, resource plans, retain energy locally). For example, there are links with Glasgow's Development Plan in terms of expanding or replacing energy infrastructures with renewable energy technologies and supporting local circular material flows. Other opportunities linked to Glasgow's Food Strategy include the reduction of transport costs and greenhouse gas (GHG) emissions through the promotion of local food production. Vertical and urban farming is related to the spatial planning policy of the city.

Stakeholder engagement

As a shared responsibility across stakeholders, Glasgow could further involve stakeholders in strengthening and consolidating the circular vision of the city. The responsibility for the implementation of the Circular Economy Route Map is not limited to the three institutions that are leading the circular transition in the city (i.e. Glasgow City Council, Zero Waste Scotland and Glasgow Chamber of Commerce) but

requires the involvement of all stakeholders. Glasgow could establish collaborations around the circular economy with relevant players, including the following:

- **Universities**: Glasgow could identify potential pilot projects that would involve university departments based on the city's challenges and needs (e.g. economic and health inequalities, regeneration of vacant and derelict land and urban planning). Other ways to collaborate with local academic institutions could consist in signing collaboration agreements or integrating the circular economy into existing educational programmes. Universities could also collaborate with Glasgow City Council to explore the criteria for circular certifications (e.g. life-cycle analysis and material reuse).
- **Youth**: Involving citizens in the circular transition of Glasgow is key to achieve willingness and commitment, as they make constant consumption choices and can influence production. As such, Glasgow could set up initiatives for young people in social and environmental projects, especially in the case of those struggling to get into the labour market. Many social enterprises are already doing this. However, a formalised and systematic inclusion of young people to make Glasgow circular would have a value-added to the circularity of the city in the long run.
- **Large companies and SMEs**: While most efforts to date have focused on SMEs, Glasgow has the opportunity to continue this work and engage with large companies. So far, Circular Glasgow has engaged with more than 650 business representatives, largely SMEs. Building on its experience in supporting SMEs, Glasgow could actively engage large companies, which have already started to adopt circular business models. To this end, it would be necessary to adapt the narrative by identifying the different needs across different categories of companies (e.g. access to funding, sensitiveness to indirect costs and anticipated payback period, flexibility to adapt the business model).
- **Social enterprises**: Social enterprises play a key role in putting into practice circular economy principles such as reusing, repairing and sharing while carrying out social functions. Given their significant social impact on the city and their wide experience in circular economy activities, Glasgow could look for opportunities to collaborate with them to learn from good practices that can inspire other SMEs. Glasgow City Council could provide support to local social enterprises by:
  - Mapping all social enterprises working in the city, as well as the services they provide.
  - Disseminating a survey across all social enterprises in Glasgow, identifying the main gaps and challenges of social enterprises and how Glasgow City Council can help.
  - Promoting the participation of social enterprises in public procurement.
  - Collaborating with knowledge institutions to design training initiatives for social enterprises.

Another reason for strengthening stakeholder engagement is to broaden the network of actors who are involved in the transition to the circular economy in Glasgow. For example, it would be important to ensure that consultation processes for documents related to the circular economy involve the most diverse range of stakeholders possible. However, putting into practice the above-mentioned actions will require additional human resources to those already in place.

Appropriate scale

One of the problems Glasgow is facing is derelict areas. Their transformation could include circular economy principles at the appropriate scale. Glasgow shows a high concentration of vacant and derelict land as a consequence of its industrial legacy, which negatively impacts on the health, environment, economy and social cohesion of nearby areas. In 2019, 55% of the population in Glasgow lived within 500 metres of a derelict site (54.7%) (Scottish Land Commission, 2020[15]; Glasgow City Council, 2020[16]). Glasgow City Council is now rehabilitating and decontaminating old brownfield and industrial areas, making new and improved green spaces and fostering research and development of sites for food cultivation.

These areas can become experimentations and pilots for circular economy practices. As such, the city could:

- Engage property developers and relevant actors in experimentations and pilots to transform some deprived neighbourhoods (e.g. Ruchill and Possilpark) into circular areas. Glasgow could follow the example of Amsterdam, Netherlands, which developed a circular neighbourhood, Circular Buiksloterham. This former ship construction site and one of the most polluted areas in the city is now turning into a circular area through the development and construction of circular and sustainable buildings, receiving sustainable energy supply generated at the local level, experimenting smart grid solutions and creating parking spaces for bicycles and shared mobility options (Box 4.2).
- Take stock of the location, condition and barriers for reuse of existing derelict land based on circular economy principles. A possible solution could consist in developing specific agricultural production in the derelict areas. In order to do so, Glasgow could collaborate with universities to analyse the land requirements for urban farming. Derelict land could also be used for the construction of new housing, thus contributing to the objective of adapting the city to an increasing population and to the changes in the structure of households, which will require the construction of 25 000 new houses between 2015 and 2025. This should be done following circular economy principles, looking at the life cycle from construction to end of life.
- In addition to establishing eco-parks, urban farming, rewilding and regenerative initiatives in derelict areas, nature-based solutions could be further explored to deliver additional and desired ecosystem services, while containing the phenomenon of flash floods occurring in Glasgow.

Moreover, Glasgow could aim at strengthening the link between the city and the surrounding rural areas, by fostering urban-rural synergies for the circular economy. As such, building on the experience of the Scottish Cities Alliance (SCA), Glasgow could explore opportunities to form partnerships with municipalities in rural areas in order to advance on the circular transition.

Box 4.2. Circular Buiksloterham, Netherlands

De Ceuvel is a former industrial site located in Buiksloterham, Amsterdam North, which was transformed into a residential area, applying circular economy principles. In 2010, given financial constraints following the 2008 economic crisis to concretise the urban regeneration project foreseen by the municipality, the city of Amsterdam, owner of the land, set up a tender for a ten-year lease of the De Ceuvel land, claiming the compatibility with the sustainable urbanisms concept as one of the criteria.

Meanwhile, individuals (rather than housing corporations or developers) were given the opportunity to buy a small number of houses in a non-polluted area of Buiksloterham at an affordable price. Buyers built houses using environmental-friendly and sustainable practices. In 2012, a team of architects won the tender developing an innovative concept to reshape De Ceuvel, which officially opened in 2014. In 2015, citizens, de Alliantie and AGV/Waternet, in addition to the municipality of Amsterdam, several real estate developers and organisations, signed the “Manifesto for a Circular Buiksloterham”. To implement it, a living lab for circular and urban development was created. The lab was the precursor of De Ceuvel as a Cleantech Playground, a platform for people for innovation and creativity. In 2017, it has been named the most sustainable initiative in the Netherlands.

Nowadays De Ceuvel is a unique space where 17 old houseboats have been transformed into offices and creative spaces. Each boat is equipped with a dry toilet, which saves water and produces compost. The quality of the compost has been analysed to make sure the fertiliser can be used without incurring health risks. The type of innovations and solutions promoted by these experiences in terms of urban

planning and land tendering (e.g. circular construction, changing of land use regulations) helped overcome the actual administrative, legal and financial obstacles that they face.

Source: Municipality of Amsterdam (Municipality of Amsterdam, 2018[17]), Buiksloterham: Circular City District, https://www.amsterdam.nl/projecten/buiksloterham/circulair/ https://oecd-opsi.org/wp-content/uploads/2019/02/WP2.3-report-fin.pdf

Enabler

Regulation

In collaboration with relevant stakeholders, Glasgow City Council could identify regulatory bottlenecks to circular economy practices, such as using secondary materials in new buildings or implementing modular off-site construction models, and initiate a dialogue with the regional government to overcome them, if need be. Chapter 3 identified regulatory barriers in the built environment sector, waste and public procurement. For example, some relevant regulatory frameworks do not specifically address the circular economy within the built environment sector (e.g. the latest draft of the upcoming Scotland's Circular Economy Bill does not include the built environment sector). Other challenges in terms of regulation include the prevention of reusing waste as a secondary material in new products.

The city could set incentives for effective implementation of green public procurement with circular economy criteria, while making it accessible to new entrants and SMEs with circular economy activities. The inclusion of circular economy criteria in public procurement processes can help to remove perceived barriers to reused/recycled products. In this regard, the message to private companies and citizens could stimulate a behavioural change. In order to do so, the following actions can be taken into account:

- Establishing targets with regard to the circular economy: e.g. second-hand furniture of clothes.
- Co-ordinating across departments to analyse the potential of the circular economy: e.g. education, spatial planning, etc.
- Including the potential community benefit into the contracts.
- Developing more sophisticated processes to incorporate different business models (e.g. rental, product-as-a-service models) into tenders.
- Creating demand in the market based on the need of the administration and allowing market development: a circular solution can be developed during the duration of the contract. In other words, the company may not offer a certain service at the beginning of the contract but could work with the supplier to achieve a target (e.g. refurbish/remanufacture furniture).
- Building capacity on the contract management, not only on the tender definition.
- Developing metrics and environmental data to analyse the results.
- Expanding the existing public procurement regulation to assess the full life cycle of products, from design to end of life.
- Increasing the importance of the use of sustainable materials in the purchasing decision, beyond the current 10% of the existing GPP policy. Moreover, the Sustainable Steering Group could ensure that the objectives included in the Circular Economy Route Map for Glasgow are duly incorporated into the procurement process.

Given the predominance of SMEs in Glasgow's economy, making public procurement accessible to new entrants and SMEs carrying out circular economy activities is key. As per the OECD Recommendation of the Council on Public Procurement (2015[18]), this requires providing "clear guidance to inform buyers' expectations (including specifications and contract as well as payment terms) and binding information

about evaluation and award criteria and their weights (whether they are focused specifically on price, include elements of price/quality ratio or support secondary policy objectives)". Glasgow City Council could provide them with the necessary tools (e.g. offering advice and information on regulation and providing administrative support). Moreover, participating in public procurement processes can be particularly risky for SMEs, due to the uncertainty of local government payment timing. This lack of security could negatively affect the liquidity of SMEs. Additionally, suppliers often need to obtain a certificate attesting to the performance of the contract from contracting authorities. Glasgow City Council can promote the participation of SMEs by setting proportionate financial requirements and advance payments before the completion of the contract to ensure their participation in tenders and to overcome potential limitations in terms of time, funding and capacity due to their infrastructure (OECD, 2018[19]). Another potential solution could consist in dividing the tenders into slots and perform the early market engagement to understand what companies are looking for and how they could do to help solve a city problem. Furthermore, when introducing new models such as life-cycle assessment into public procurement processes, some SMEs may find it difficult to deliver the data required to participate due to their limited technical capacity. Therefore, Glasgow City Council could provide SMEs with solutions (e.g. online platform, ad hoc training courses) to ensure their participation in these processes.

Financing

Glasgow City Council could explore fiscal tools and funding options to boost the transition to a just circular economy. There is a range of international practices that Glasgow could consider in accordance with its institutional framework and fiscal power (OECD, 2020[1]):

- *Discounts on taxes*: In 2018, the city of Milan, Italy, developed actions to address food waste, including 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). The city of San Francisco, United States (US), granted discounts on their waste fees to businesses when using separate sorting collection bins, which results in San Francisco being the US city with the least amount of waste going to landfills.
- *Environmental tax*: Kitakyushu City, Japan, applies a tax called the "environmental future tax". It is a special local-purpose tax imposed on the landfill of industrial waste. Since the tax is not imposed on intermediate treatments, it is also expected to promote the recycling activities of companies and reduce any waste generated by them. This tax is used for an environmental technology development grant.
- *Tourist city/accommodation tax*: This tax is generally paid by the tourist per night spent in a hotel or accommodation facility. In Milan, Italy, the tourist city tax came into effect in 2012, when hotels and other accommodation models started to levy this city tax on their customers. In Iceland, the revenue of the accommodation tax is dedicated to promoting the development, maintenance and protection of nature-based tourist attractions under public ownership (OECD, 2014[20]).

In addition, to support the development of projects on the circular economy by local enterprises, Glasgow could consider different options for funding. For example, the city of Valladolid, Spain, between 2017 and 2020, 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 in 2017 and 2018 respectively) allocating a budget of EUR 960 000 (EUR 400 000 and EUR 560 000 in 2017 and 2018 respectively). 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 were private companies and associations of private companies. Another example is the Circular Economy Business Support programme by the London Waste and Recycling Board (LWARB). The venture capital fund supports circular economy SMEs for scaling up

businesses that are already in the market. Furthermore, the LWARB through the Circularity European Growth Fund operated by Circularity Capital, seeks investment opportunities in circular businesses with proven cash flow and profit, which need significant capital to scale. Notably, while, the city can provide funds to start up circular businesses, it is equally important to set up the enabling conditions for these businesses to be mainstreamed within the local economy, allowing a just transition (Box 4.3).

Box 4.3. A just transition to a circular economy

A "just transition" implies putting in place the necessary policies and social dialogue frameworks to advance the green transition and leave no one behind, generating prosperity for society as a whole from an inclusive approach, while at the same time protecting workers and generating quality jobs.

The transition to a circular economy implies a profound systemic transformation in the functioning of the world's economies, which is likely to lead to changes within and across economic sectors, affecting different places differently. While the number of jobs is expected to increase in some sectors, such as renewable energy, for other sectors the transition may be challenging. Regions whose economies depend on activities that are expected to either decline or to transform in the future could be particularly affected.

In addition, technological change through digitalisation, automation and other Industry 4.0 technologies with great potential to increase resource productivity, optimise production systems and reduce waste, can also potentially exacerbate wage inequality and displace workers and jobs. Preparing for the reskilling of large numbers of workers will be a major challenge in the coming years and decades.

The path to positive equality outcomes involves carefully considering who might be affected by a given policy and involving these groups or communities in the decision-making process and policy implementation through means such as community consultation. Policy measures with potentially negative impacts on household incomes or livelihoods should be accompanied by corresponding mitigation measures, such as exemptions, subsidies, compensation for losses and concrete support to assist affected individuals and communities.

Some of the actions that local governments can take to move towards a just transition include:

- Considering the introduction of active employment policies including well-targeted subsidies to enable workers to access education and acquire skills that improve their employability through work experience and training.
- Assessing measures to support businesses and workers severely affected by the transition to environmentally sound economies.
- Exploring and identifying an effective combination of taxes, subsidies, incentives, guaranteed prices and loans to encourage the transition to economically sustainable activities.
- Strengthening the resilience of enterprises, in particular SMEs, to avoid disruption of economic activity and loss of assets, jobs and income.
- Offering financial incentives (grants, low-interest loans and tax incentives) to companies that adopt environmentally friendly practices such as energy-saving and efficiency measures and measures aimed at clean energy sources.

Source: Chatham House (2020[21]), Promoting a Just Transition to an Inclusive Circular Economy; OECD (2020[22]), Managing Environmental and Energy Transitions for Regions and Cities, OECD Publishing, Paris, https://doi.org/10.1787/f0c6621f-en; ILO (2015[23]), Guidelines for a Just Transition Towards Environmentally Sustainable Economies.

Capacity building

Providing public officials and city leaders with adequate knowledge and skills on the circular economy through capacity building initiatives is essential. The acquired skills (e.g. in terms of eco-design, public procurement, circular business models) could allow embedding the circular economy principles throughout public policy strategies, plans and decisions. As such, the city could:

- *Foster capacity building for the circular economy in all municipal department*. Due to the systemic nature of the circular economy, skills related to the circular economy should be developed in all municipal areas and should not be limited to the Neighbourhoods, Regeneration and Sustainability Department. Other departments and arm's length external organisations (City Property Glasgow, City Building Glasgow, the Spatial Planning Department and Waste Management Department) should also have adequate technical and human capacities in developing circular business models and designing public procurement processes that include circular criteria. The economy and public procurement departments should build capacities in terms of strategic planning for the circular economy too. Moreover, in order to take advantage of the opportunities arising from public procurement, public officials need to be aware of models that go beyond the mere purchase of a product or service. To this end, Glasgow City Council could collaborate with local universities to analyse the required skills and capacities for the implementation of the Circular Economy Route Map and for the setting up of a public procurement that includes circular economy criteria. Having identified capacity needs within the municipality, Glasgow should collaborate with local universities and partners (e.g. Zero Waste Scotland, Glasgow Chamber of Commerce) to develop targeted capacity-building programmes such as ad hoc weekly workshops and intensive courses.
- *Promote training on circular business models for entrepreneurs and youth*. Glasgow City Council and its partners, the Glasgow Chamber of Commerce and Zero Waste Scotland, could set up ad hoc capacity-building and mentoring programmes for entrepreneurs to promote the development of skills across the value chain, especially for some key sectors such as tourism, food and construction. Training programmes could take different forms (e.g. academies, training, webinars, workshops, events and conferences). Glasgow City Council could also collaborate with local universities to develop the targeted capacity-building programmes. For example, in Valladolid, while the chamber of commerce is providing capacity-building programmes, enriching consulting services offered to enterprises with a component on the circular economy practices is seen as another way to promote innovation (OECD, 2020[4]). Providing capacity learning opportunities is especially relevant in a post-pandemic scenario, where there is significant potential to equip those who have lost their jobs with the skills needed for jobs related to the green and circular economy (e.g. associated with reuse, remanufacturing, materials innovation and energy recovery). Training programmes in digitisation and technical skills can be of significant support to young people seeking to join the labour market. For instance, digital skills are essential for preventive and predictive maintenance practices in the industrial sector.

Innovation

Glasgow City Council could develop an “incubator” to support the creation of new business models and innovations geared towards the circular economy. There are several incubators and business support programmes in the city but none of them are devoted to circular economy businesses (e.g. Biocity, Business Glasgow, Glasgow City Innovation District, Jobs & Business Glasgow, Tontine business accelerator programme, UHatch). For example, in Groningen, Netherlands, a Circular Economy Hub is planned as an incubator space for small businesses and start-ups, and as an information centre, repair hub and second-hand shop (OECD, 2020[5]). The city of Phoenix, US, together with Arizona State University, created a Resource Innovation and Solutions Network (RISN) Incubator for accompanying businesses in the shift towards a circular economy (OECD, 2020[1]). In 2017, the city of Paris, France,

launched a circular economy incubator, Paris & Co, hosting 19 start-ups to promote innovative sustainable solutions for the city.

The city could provide a digital marketplace, matchmaking tools and networking platforms to generate collaborations across large companies and SMEs applying circular economy principles (e.g. rethink the local supply with SMEs, vertical and horizontal integration, input reverse logistic). There are several examples of digital tools that can be used to connect different actors. For instance, the city of Austin, US, has a directory of businesses (Austin's Circular Economy Story) that allow customers to be aware of circular economy initiatives and adopt circular and sustainable consumption patterns. In Antwerp, Belgium, there is an ecosystem that connects companies from a variety of sectors, such as education, research, living labs, acceleration, digital and industry (OECD, 2020[1]).

Data and assessment

Glasgow could also develop digital maps and material flows analyses to understand material input and output. A digital footprint of buildings and flows would enable the city to analyse buildings in connection with energy, heating and transport networks, and embed them in other city policies (e.g. how does the biodiversity city plan relate to specific assets). For example, Glasgow City Council could explore the solutions that big data, the Internet of Things (IoT), machine learning and blockchain tools can provide to the circular economy (e.g. real-time information to make last-mile logistics more efficient) (Box 4.4). The construction sector in particular would benefit from the digital mapping of key information on construction material to be able to analyse their reuse and assess whether a building can be repurposed or whether it can be deconstructed.

Box 4.4. Digitalisation as an enabler for the circular economy

Digitalisation can boost the transformation towards a more sustainable circular economy by providing accurate real-time information on the availability, location and condition of goods, among others. The following digital tools can help boost the circular transition:

- **Blockchain** is a distributed append-only database, which is capable of storing any type of data and is replicated across many locations operated jointly by all users. Once added to the blockchain, a record is encrypted and cannot be changed or deleted without the knowledge of all participants. Some ways blockchain can support the circular economy are:
  - Enhance information flows along the value chain and improve the transparency and traceability for producers, consumers and recyclers.
  - Help manage information for waste recycling, material reuse and energy use reduction. Blockchain can also help trace the origin of raw materials and provides essential data in order to promote sustainability within supply chains.
- **Artificial Intelligence** (AI) includes the ability of machines and systems to acquire and apply knowledge, and carry out intelligent behaviour. AI applications hold many promises for the circular economy, creating value in terms of productivity gains, improving and automating decision-making, saving costs and enabling better resources. Some practical examples of the opportunities to support a circular economy are:
  - The recognition of specific materials through AI and their handling improves the quality and thereby also the amount of secondary materials that can be further reused, thus reducing the demand for and dependence on virgin materials (and the externalities related to their sourcing and production).

- AI can also be useful in the process of conducting predictive maintenance, as it can notify when a product requires reparation.

- **The Internet of Things** (IoT) is the inter-networking of physical devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals. Through accurate and remote monitoring, IoT technology ensures that products are managed more efficiently, especially regarding end-of-life collection, remanufacturing and recycling.
  - Many cities have started to use "smart bins", which are enabled with IoT sensors to track real-time the level of waste in the bin, providing key information for the collection process.
  - By automatically and remotely monitoring resources and products along the whole value chain, connected devices can generate valuable data and information that may enable resource efficiency improvements or better end-of-life management.
  - In the built environment, cities have started to implement IoT monitoring for predictive maintenance or to optimise transport flows with adaptive signal control systems.

Source: IFC (ICF, 2017[24]) Beyond Fintech: Leveraging Blockchain for More Sustainable and Inclusive Supply Chains; and OECD (OECD, 2019[25]), Digitalisation and the circular economy.

A measurement framework in Glasgow would enable monitoring and assessing the progress on the Circular Economy Route Map. Furthermore, the measurement of the progress made and the impacts of the circular economy initiative could help raise awareness as well as give a better understanding of the benefits and opportunities of the circular economy. The monitoring framework could measure the progress made in different dimensions (e.g. economy and business, environment, governance and infrastructure and technology), as well as the results of key sectors for Glasgow's transition such as waste, resources, repair and reuse activities, or the built environment.

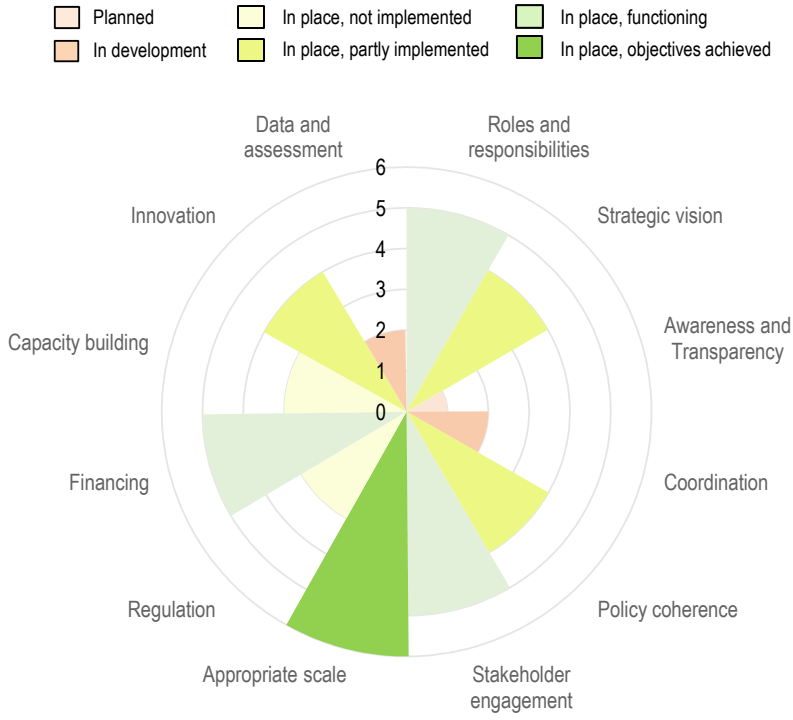
Moreover, Glasgow could conduct a self-assessment of the state of the art of the circular economy in the city through the OECD Scoreboard on the Governance of the Circular Economy. This tool is intended as a self-assessment tool based on the 12 key governance dimensions that would enable a circular economy system to take place (Box 4.5).

Box 4.5. Methodology of the OECD Scoreboard on the Governance of the Circular Economy

The OECD Scoreboard on the Governance of the Circular Economy is a self-assessment tool of governance conditions to evaluate the level of advancement towards a circular economy in cities and regions. Its purpose is to accompany cities and regions in identifying gaps and assessing progress to improve policies and self-assess the existence and level of implementation of enabling conditions. It is composed of 12 key dimensions, whose implementation governments and stakeholders can evaluate based on a scoreboard system, indicating the level of implementation of each dimension: Newcomer (Planned; In development), In progress (In place, not implemented; In place, partly implemented) and Advanced (In place, functioning; In place, objectives achieved). These dimensions include: 1) Roles and responsibilities; 2) Strategic vision; 3) Awareness and transparency; 4) Co-ordination; 5) Policy coherence; 6) Stakeholder engagement; 7) Appropriate scale; 8) Regulation; 9) Financing; 10) Capacity building; 11) Innovation; 12) Data and assessment. The visualisations of the results (Figure 4.2) provide an overview of the level of circularity of a city or region for each of the 12 circular economy governance dimensions.

Figure 4.2. Visualisation of the OECD scoreboard results

A. Graph



B. Traffic light system



Source: OECD (2020[1]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en

To carry out the self-assessment, the following procedure is recommended (Figure 4.3): i) clearly identify the lead team to co-ordinate the self-assessment; ii) set objectives and scope of the assessment in advance; iii) map stakeholders that will play a key role in a circular economy system: governmental departments, public, private and non-profit actors; iv) organise targeted workshops with key stakeholders to share, compare and confront views and achieve consensus; and v) repeat the process once a year to verify changes and improvements and to keep stakeholders engaged.

Figure 4.3. A five-step self-assessment methodology



Source: OECD (2020[1]), *The Circular Economy in Cities and Regions: Synthesis Report*, https://doi.org/10.1787/10ac6ae4-en.

References

B Corporation (2021), *Certified B Corporation*. [12]

Chatham House (2020), "Promoting a just transition to an inclusive circular economy", https://www.chathamhouse.org/2020/04/promoting-just-transition-inclusive-circular-economy-0/4-towards-just-circular-economy. [21]

Cradle to Cradle Products Innovation Institute (2019), *Homepage*, http://www.c2ccertified.org/. [8]

Eurocities (2019), "Tackling the problem of plastic pollution in cities". [7]

French Government (2018), *Circular Economy Roadmap of France: 50 Measures for a 100% Circular Economy*. [13]

Glasgow City Council (2020), "Funding of programme to reduce vacant and derelict land in Glasgow approved", https://www.glasgow.gov.uk/article/26297/Funding-of-programme-to-reduce-vacant-and-derelict-land-in-Glasgow-approved (accessed on 4 December 2020). [16]

Glasgow City Council (2017), *Glasgow's Housing Strategy 2017-2022*. [14]

HGB-GBC (2017), *Circular Economy for HQE Sustainable Construction*. [10]

ICF (2017), "Beyond Fintech: Leveraging blockchain for more zustainable and inclusive supply chains", *EMCompass*, International Finance Corporation, World Bank Group, https://www.ifc.org/wps/wcm/connect/85fb81a9-632c-4c98-86fc-2a0619996562/EM+Compass+Note+45+final.pdf?MOD=AJPERES&CVID=lXyrVyb. [24]

ILO (2015), *Guidelines for a Just Transition Towards Environmentally Sustainable Economies*, International Labour Organization, https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_432859.pdf. [23]

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. [9]

Municipality of Amsterdam (2018), *Buiksloterham: circular city district*, https://www.amsterdam.nl/projecten/buiksloterham/circulair/ (accessed on 6 November 2019). [17]

OECD (2021), *The Circular Economy in Granada, Spain*, OECD Urban Studies, OECD Publishing, Paris, https://doi.org/10.1787/5f8bd827-en. [3]

OECD (2020), *Managing Environmental and Energy Transitions for Regions and Cities*, OECD Publishing, Paris, https://dx.doi.org/10.1787/f0c6621f-en. [22]

OECD (2020), *The Circular Economy in Cities and Regions: Synthesis Report*, OECD Urban Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/10ac6ae4-en. [1]

OECD (2020), *The Circular Economy in Groningen, the Netherlands*, OECD Urban Studies, OECD Publishing, Paris, https://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. [6]

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

OECD (2019), *Digitalisation and the Circular Economy*, OECD, Paris. [25]

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. [19]

OECD (2015), *OECD Principles on Water Governance*, OECD, Paris. [2]

OECD (2015), *OECD Recommendation of the Council on Public Procurement*, OECD, Paris, http://www.oecd.org/gov/public-procurement/recommendation/. [18]

OECD (2014), *OECD Tourism Trends and Policies 2014*, OECD Publishing, Paris, https://dx.doi.org/10.1787/tour-2014-en. [20]

Scottish Environment Protection Agency (n.d.), *Glasgow City centre (Potentially Vulnerable Area 11/16)*, https://www2.sepa.org.uk/FRMStrategies/pdf/pva/PVA_11_16_Full.pdf. [26]

Scottish Land Commission (2020), "The impact of vacant and derelict land", https://www.landcommission.gov.scot/news-events/news-blog/the-impact-of-vacant-and-derelict-land (accessed on 4 December 2020). [15]

Stronati, D. (2018), "Circular economy-think piece for the construction industry", https://mottmac.sharepoint.com/sites/Sustainability/Shared (accessed on 9 December 2020). [11]

Note

[1] The Cradle to Cradle Certified Product Standard is rooted in the Cradle to Cradle® design principles established by William McDonough and Dr Michael Braungart. The certification considers five environmental categories: material health, material reuse, renewable energy and carbon management, water stewardship, and social fairness (Cradle to Cradle Products Innovation Institute, 2019[8]) .

Annex A. Circular Economy Investment Fund investments in Scotland, United Kingdom by 2019

Company	Location	Objective/Project description	Funding	Website
Angus 3D Solutions Ltd	Brechin (United Kingdom)	Support an additive manufacturing project for the development of metal printing in the local Scottish engineering community.	GBP 175 000	hwww.angus3dsolutions.co.uk/
3F Bio	Glasgow (United Kingdom)	Demonstrate at scale a new manufacturing technology to produce bulk high protein food, ethanol and animal feed using a zero waste fermentation process.	GBP 318 360	www.3fbio.com/
Blythswood Care	Evanton (United Kingdom)	Deliver a new innovative circular economy 'Bric-a-Brac Plus' collection service for Scottish charity shops. This service will collect and re-use Scottish charity shops' unsold large and small Bric-a-Brac and other unsold items.	GBP 98 553	https://blythswood.org/
Circulogic	NA	This circular economy consultancy business is introducing a national golf club take back and refurbishment scheme.	GBP 55 591	www.circulogic.uk/
Cirkel	NA	Develop a bed linen subscription service towards funding readiness by testing and analysis in a real-world context.	GBP 15 000	https://cirkel.co/
Community Resources Network Scotland (CRNS)	Stirling (United Kingdom)	Develop a consortium furniture re-use operation across Scotland.	GBP 99 509	www.crns.org.uk/
Deepdale Hire	Orkney Islands Council (United Kingdom)	Testing of a prototype barrier block, using recovered container glass.	GBP 12 500	http://deepdalehire.co.uk/
Hamilton Waste	Edinburgh (United Kingdom)	Investment in their mattress recovery operation involving the deconstruction and reprocessing of used mattresses in Edinburgh. The aim is to recover 2 000 tonnes of end of life mattresses with identified end markets for the constituent parts.	GBP 117 678	https://www.hamiltonwaste.com/
Hydroklear	Kilbirnie (United Kingdom)	A new innovative process that will recover copper from spent lees in whisky production, which will then be used to manufacture copper based chemicals.	GBP 177 129	http://hydroklear.co.uk/
Impact Laboratories	Grangemouth (United Kingdom)	Development of an online portal and testing for the standardisation for polymer recycling in Scotland, as part of the Scottish Plastics Recycling Centre.	GBP 107,796	https://www.impact-solutions.co.uk/impact-laboratories-plastic-experts/
Impact Recycling	Grangemouth (United Kingdom)	Implement an innovative business model for equipment lease in waste polymer treatment.	GBP 97 800	https://www.impact-solutions.co.uk/impact-recycling/

Industrial Nature	Edinburgh (United Kingdom)	Commercialise of a hemp line construction block.	GBP 19 833	https://www.indinature.co/
Ingenza	Roslin (United Kingdom)	Implement a carbon neutral approach to convert a gaseous waste stream, into known as succinate, which can be used in medicine and food.	GBP 191 393	www.ingenza.com/
Marine Biopolymers	Ayrshire (United Kingdom)	Produce nano cellulose from waste seaweed, a material used in industries as food and drink, textiles and pharmaceuticals	GBP 156 710	http://www.marinebiopolymers.co.uk/
Move On	Edinburgh (United Kingdom)	Investigate on the post construction timber re-use and behaviour change in the construction sector.	GBP 146 450	https://www.moveon.org.uk/
Pennotec	Edinburgh (United Kingdom)	Commercialise chitin extraction from crustacean shell waste.	GBP 203 303	https://pennotec.com/
Pi Polymers	Perth and Kinross (United Kingdom)	The project will work on the large post-consumer rigid plastics through the use of mixed infrared optical type rigid polymers	GBP 574 750	
Recycling Technologies	Perth and Kinross (United Kingdom)	Develop a low sulphur HFO replacement from residual waste plastic, which can be developed into a commercially viable hydrocarbon product used as a heavy fuel oil alternative or used to make virgin plastic.	GBP 1 000 000	https://recyclingtechnologies.co.uk/
Universal Resource Trading	Cwmbran (United Kingdom)	Re-use of university R&D equipment across Scotland.	GBP 91 609	https://www.unigreenscheme.co.uk/
WEEE Solutions	Linwood (United Kingdom)	Supply, at volume, a process of repair and re-use WEEE machinery into the market - to businesses, third sector organisations and councils.	GBP 133 786	www.weee.co.uk/
Xanthella	Oban (United Kingdom)	Investigate on algal production from whisky by-products.	GBP 581 507	www.xanthella.co.uk/

Annex B. List of stakeholders consulted during the policy dialogue

Institution	Name
ACS CLOTHING LTD	Anthony Burns
Apparel Xchange	Izzie Eriksen
Architecture and Design Scotland	Heather Claridge
Balfour Beatty	Poul Wend Hansen
Beauty Kitchen	Stuart Chidley
Collective Architecture	Chris Stewart
Construction Scotland Innovation Centre	Douglas Morrison
Conventions Bureau, Glasgow Life	Aileen Crawford
Creative Entrepreneurs Club	Rachael Brown
DF Concerts	Fiona Ellis
Edrington	Lindsay McGarvie
EGG	Brian O'Reilly
Glasgow Caledonian University	Alec Wersun
Glasgow Caledonian University	John Lennon
Glasgow Chamber of Commerce	Lisa McConnell
Glasgow City Council	Alan Davidson
Glasgow City Council	Andy Dale
Glasgow City Council	Andy Mouat
Glasgow City Council	Christine Francis
Glasgow City Council	Colin Hughes
Glasgow City Council	Duncan Booker
Glasgow City Council	Forbes Barron
Glasgow City Council	Gary Stewart
Glasgow City Council	Gary Walker
Glasgow City Council	Gillian Dick
Glasgow City Council	Isabel Brown
Glasgow City Council	Joe Brady
Glasgow City Council	Julie Robertson
Glasgow City Council	Marc Queen
Glasgow City Council	Marshall Poulton
Glasgow City Council	Paola Pasino
Glasgow City Council	Richard Watson
Glasgow City Council	Ronnie Regan
Glasgow City Council	Scott Armstrong
Glasgow Community Food Network	Mark Fitzpatrick
GRAHAM Group	Sophie McKichan
HP	Lorna Johnstone
HP	Mark Dempsey
Ice Cream Architecture	Sarah Frood
Repair Cafe Glasgow	Jon Dawes
Re-Tek	Billy McPherson
Revive Eco	Fergus Moore
Scottish Leather Group Technology	Warren Bowden
Scottish Water	Mark Williams
South Seeds	Jo Hartga

South Seeds	Lucy Gillie
St Enoch Centre	Anne Ledgerwood
Strathclyde Business School	John Anderson
UNISON Glasgow City	Stuart Graham
University of Glasgow	Katherine Duffy
University of Strathclyde	Kevin Kane
Young Enterprise Scotland (YES)	Geoff Leask
Zero Waste Scotland	Claire Guerrin
Zero Waste Scotland	Elaine Dale
Zero Waste Scotland	Fiona Craig
Zero Waste Scotland	Helen Lavery
Zero Waste Scotland	Linda McIntosh
Zero Waste Scotland	Nick Ribbons
Zero Waste Scotland	Paul Doherty
Zero Waste Scotland	Samantha Moir

OECD Urban Studies

The Circular Economy in Glasgow, United Kingdom

The transition to a circular economy in Glasgow is part of a broader journey of the city aiming to transition from being one of the greatest industrial places in the world back in the 19th century, to becoming a carbon-neutral city by 2030. The 2020 Glasgow Circular Economy Route Map seeks to enable a system where people can access local jobs and where green business practices contribute to achieving zero carbon goals. This new path, primarily driven by the collaboration between Glasgow Chamber of Commerce, Zero Waste Scotland and Glasgow City Council, can also contribute to the recovery from the COVID-19 pandemic, which severely affected the local economy. This report summarises the findings from a 20-month policy dialogue between the OECD, the city of Glasgow and several stakeholders, presenting the state of the art of the circular transition, the main challenges and the ways forward for the implementation of the city's Route Map.



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