



PYXERA Global

CIRCULAR CLEVELAND

A roadmap towards an inclusive circular city



Cleveland
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CITY OF CLEVELAND
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FOREWORD

Cities are engines of economic growth and centres of culture, innovation, and learning. They are where consumer trends start and consumer habits evolve. At the same time it is well documented that cities consume 75% of the world's natural resources, produce 50% of global waste and contribute 60-80% of greenhouse gas emissions. Our urban centres are grappling with the effects of our current take-make-waste economy. The circular economy allows us to respond to these challenges by rethinking how we use materials, leading to wholly new ways of creating value. It offers us an opportunity to eliminate waste and pollution from cities, circulate products and materials in cities at their highest value, and regenerate natural systems in and around cities.

The Ellen MacArthur Foundation recognises the potential for cities to be key drivers of the transition to a circular economy. City governments are uniquely positioned to enable, lead, and collaborate with stakeholders across the city to create liveable and resilient urban spaces where businesses and communities can thrive.

The City of Cleveland's Circular Economy Roadmap paints a picture full of circular economy opportunities for the city's inhabitants that will not only result in economic benefits, but significant environmental and social benefits as well. These include cleaner air and water, new community assets such as housing and green spaces, reduced waste and associated disposal costs, and new job opportunities. Based on existing data in North America 1, capturing 100,000 tonnes of materials in circular economy opportunities has the potential to generate \$2.4 million - \$3.4 million in economic benefits and 300-500 jobs in the economy. Data from cities around the world indicates that the repair, recycling and remanufacturing of materials has the potential to create up to 200 times more jobs compared to landfill and incineration 2.

The Roadmap provides an ambitious vision for the circular economy transition in the city. The Roadmap sets a direction of travel for city stakeholders to orientate and prioritise action. Extensive engagement with community ambassadors and city stakeholders has resulted in a highly actionable roadmap that prizes community efforts alongside those of the city government and the private sector. As a result, this world-leading approach has real potential to realize an inclusive circular economy transition in Cleveland.



Sarah O'Carroll
Cities Lead, Ellen MacArthur Foundation

From Ambassadors and Grantees:

Why do we have trash cans in every room in our home? It wasn't that long ago when people only had one trash can for an entire household and there was no such thing as weekly garbage pickup by the city. But we have fallen victim to consumerism. Buy, get bored, trash it, replace, and repeat. A circular economy means keeping waste to a minimum. I'm encouraged from a consumer point of view that people are buying second-hand goods and engaging with creativity to keep products alive longer by upcycling or investing in sustainable clothing to stop depleting our natural resources. We have a long way to go, but with consumer education and civic responsibility, we can lessen landfills and battle the triple threat of climate change, biodiversity loss, and pollution in our city.



Paula Coggins
Executive Director, Oh Sew Powerful Inc.

"The more we use, the less we waste increasing our viability and footprint as a city and urban communities."

Circular Cleveland and all of its components help measure the growth and success that typically may not be afforded by an otherwise impoverished inner city. The ability to exchange, repair, and redistribute goods within our communities give us a sense of belonging, contribution, and value. A lot of who we are is gauged on what's given back by those who grow up and they're here currently.

Creating a circular economy aids in meeting the needs of our city and the people who reside in it. It also provides opportunities for investment from both the voices of influence and those who may not have much to say but are still willing to do. The principles of Circular Cleveland will leave no person, organization, community partner, or government official feeling inadequate or invaluable in whatever part or role they play in the process from planning to promoting to providing services and support to our residents. Circular Cleveland in its growing capacity is an all inclusive rounded effort geared towards the success of our city and residents as a whole.



Trish Robinson,
Executive Director, RHUB Inc.

EXECUTIVE SUMMARY

1. TOWARDS AN INCLUSIVE CIRCULAR CLEVELAND

The development and implementation of a circular economy in Cleveland builds upon the positive momentum created by the [Climate Action Plan](#) and on local progress and experience. Increasingly, communities are recognizing that their climate action goals are inextricably linked with more effective use of resources in a circular economy. Not only that, but a circular economy also offers job creation and investment opportunities. Currently, Central Ohio's recycling industries employ an estimated 5,000 workers with a payroll of \$235 million, producing nearly \$1.3 million in revenues in 2016. While it is still early to report with confidence the job creation effects of the circular economy, examples from other cities show that the circular economy can contribute strongly to the local economy and lead to an increase in jobs. [ReLondon](#) reported that by 2030, the circular economy could result in an increase of ±4% of total jobs in the city of London.



Beyond sheer economic value, the circular economy is a vital tool for climate action. In fact, the [International Resource Panel](#) wrote in 2020 that the material efficiency enabled by a circular economy is absolutely necessary to reach our climate goals under the Paris Agreement. To this point, the [Ellen MacArthur Foundation estimates](#) that by adopting the principles of the circular economy – eliminating waste and pollution, circulating products and materials, and regenerating nature – we can reduce global emissions by about 45% (especially emissions associated with industry, agriculture, and land use). In short, the energy transition and the transition to a circular economy can and do go hand in hand. In this spirit, the circular economy framework aims primarily at creating an economy that functions within planetary boundaries by reframing the way we think about resources and “waste.”

While mitigating climate change and eliminating waste & pollution are critical components of the city's circular vision, authentically and meaningfully engaging local community members to be the owners and drivers of the recommended strategy is a hallmark of the Circular Cleveland foundation. Designated by the Ellen MacArthur Foundation as an inclusive circular city, Cleveland is the first city explicitly to drive inclusive and equitable community engagement as a priority in driving the creation of the roadmap, ensuring that all recommendations explicitly apply to the lives and livelihoods of Cleveland residents.

This strategy was created through a year-long process with extensive support and consultation from engaged residents and community organizations. From an analysis of the local context, four focus areas were highlighted for which a detailed roadmap and list of circular actionable interventions were developed: Circular Manufacturing, Remediating Pollution, Circular Built Environment, Getting More Value From Resources. This report provides local organizations, companies and the municipality with specific actions to build towards a circular economy that will benefit all and the environment.

2. POSITIONING THE CIRCULAR ECONOMY IN CLEVELAND

Key insights

Prior to building an action plan for the city to become circular through multiple stakeholder engagements, local data analysis, and research, our team gathered some key insights that are worth highlighting. Some key strengths are presented, that are valuable assets to stimulate circularity in Cleveland. In addition, some challenge areas are identified that could benefit from further attention or resources. Some of the key highlights include:

¹ Source: [“The Circular Economy at Work: Jobs and Skills for London's Low Carbon Future”](#)

 <h3>Main strengths</h3>	<h4>STRATEGIC LOCATION</h4>  <p>Due to Cleveland's strategic location on the Cuyahoga River and the Lake Erie shore the city functions as an industrial hub, providing many employment and economic opportunities. The location also presents potential for the deployment of renewable energy, such as wind turbines in Lake Erie.</p>	<h4>MUNICIPAL CONTROL OF VACANT LAND</h4>  <p>The City of Cleveland publicly owns a large number of undeveloped vacant lots.</p>
<h4>GREEN SPACES</h4>  <p>The City counts an array of small to large scale programs to green the city (e.g. Cleveland Metroparks Masterplan, free tree installation, community garden resources, Cleveland Tree Plan, urban farming).</p>	<h4>STRONG COMMUNITY NETWORKS</h4>  <p>The City has many active community initiatives and engagement processes, including those of Cleveland Neighborhood Progress and Neighborhood Connections. This provides a strong starting point for collaboratively owned and managed assets.</p>	<h4>SUSTAINABLE MATERIAL MANAGEMENT ORGANIZATIONS</h4>  <p>Sustainable resource management organizations Cleveland currently counts multiple sustainable resource management organizations such as Rebuilders Xchange, Rust Belt Riders, RET3, Upcycle Parts Shop, PCs for People, Hunger Network, and other mutual aid networks.</p>
<h3>Main challenges</h3> 	<h4>POLLUTION</h4>  <p>Cleveland has a large number of vacant but polluted lands and brownfields as well as air and water pollution. A strong focus should be placed on regenerating polluted areas by working across sectors and building a thriving environment for the local community and biodiversity.</p>	<h4>ABSENCE OF DATA TRANSPARENCY</h4>  <p>Across the city and across all sectors (e.g. built environment, manufacturing, community), there is little data available on resource flows and associated impacts.</p>
<h4>SYSTEMIC RACISM</h4>  <p>The current system in Cleveland perpetuates systemic racism and inequities, which is a strong barrier for equitable circular development.</p>	<h4>RECYCLING AND WASTE</h4>  <p>After implementing curbside recycling in Cleveland, the contamination rate of waste fractions was too high and the program stopped. The absence of curbside recycling led to the presence of a large quantity of recyclable materials in the mixed waste stream. During the summer of 2022, the City of Cleveland slowly began reintroducing the program on an opt-in voluntary basis and smaller scale.</p>	<h4>CONSTRUCTION & DEMOLITION MATERIALS EMISSIONS</h4>  <p>The embedded CO₂-emissions of the construction materials used in Cleveland are a particular challenge, representing nearly 35% of all the City's emissions.</p>

3. DEFINING THE EMPOWERING ENVIRONMENT IN CLEVELAND

The highlighted strengths and challenges serve as a starting point for developing a circular strategy in Cleveland. A systemic change towards a more circular economy requires new structures of collaborations and organization. The leaders of the circular movement must work together to set the empowering environment in Cleveland. The following seven principles should first be addressed to empower the community to transition (Figure 1).



Figure 1 Key principles for the creation of an empowering environment.



For each of the principles, a set of actions and sub-action is proposed that help to build the empowering environment for systemic change in the years to come. The following table provides an overview of these key actions.

 PRINCIPLE 1: THE CITY DRIVES THE CIRCULAR TRANSITION	
P1.1	The City of Cleveland adopts the Circular Cleveland Roadmap and drives Circular Cleveland.
P1.2	The City addresses circularity in all departments.
P1.3	Ensure the appropriate legislation and regulations to facilitate circularity are enacted.
P1.4	The Cleveland Climate Action Plan (CAP) is updated.
P1.5	Data on waste inputs and outputs is collected and monitored.
 PRINCIPLE 2: COMMUNITY ENGAGEMENT	
P2.1	Local community and Circular Cleveland Ambassadors are prioritized
P2.2	Develop and promote community ownership of vacant lands.
P2.3	Develop support mechanisms for a cross sectoral transition
 PRINCIPLE 3: PRIVATE SECTOR ENGAGEMENT	
P3.1	A Private Sector Engagement Strategic Plan needs to be created and acted upon.
 PRINCIPLE 4: BOOST LOCAL ASSETS	
P4.1	Local universities/colleges and K-12 schools should be positioned and capacitated to create and implement education programs.
P4.2	As Cleveland is a leader in Healthcare, the sector must be engaged as an implementation partner of the circular economy.
 PRINCIPLE 5: SECURE FUNDING	
P5.1	Fundraise for the development of circular solutions in Cleveland.
 PRINCIPLE 6: TRANSPARENCY OF URBAN FLOWS	
P6.1	Monitor resources and material flows in the city through baseline assessment of existing assets and flows.
P6.2	Increase the transparency of collected data.
 PRINCIPLE 7: REGIONAL COLLABORATION	
P7.1	Create regional collaboration on Cleveland's transition to a circular economy.

4. FOCUS AREAS AND THEIR ACTIONS

The circular economy touches on many topics that have a significant impact on the residents of Cleveland. For this roadmap, four priority topics were selected based on their potential to address social and economic issues along with environmental concerns. Each focus area presents its actions on its own roadmap (see Chapter 04, 05, 06, and 07 for the complete roadmaps), which is followed by a detailed explanation of every action and sub-action proposed. To better understand the implication required for each, most of the sub-actions are supported by a best practice. The Circular Cleveland strategy focuses on the following four focus areas:

<p> CIRCULAR MANUFACTURING</p> <p>The high impacts of Cleveland's industries on resource consumption, waste generation, pollution and CO₂-emissions require a concerted reduction effort among local stakeholders.</p> <ul style="list-style-type: none"> • A1. (Co-)fund/subsidize and promote impact assessments on current industrial activities and procurement (e.g. CO₂-emissions, waste, energy, air and water toxicity). • A2. (Co-)develop clear impact reduction goals and targets with main industries. • A3. Bring together local industries and institutions with high waste flows (e.g. metal and food manufacturing, water treatment plants) in roundtable worksessions to advance circular innovation and organization. • A4. Turn Cleveland's Industrial Valley into a Circular Valley. 	<p> REMIEDIATING POLLUTION</p> <p>Cleveland's industrial historical and current activities have resulted in polluted areas that still affect the health of citizens and biodiversity in the region and must be addressed immediately. Remediating Pollution is a foundational pillar that is also addressed in the other three focus areas.</p> <ul style="list-style-type: none"> • B1. Use nature-based solutions to remediate and regenerate the most polluted areas. • B2. Track pollutants in Cleveland's air, water, and soils and target actions based on this data. • B3. Turn public vacant lands into green community assets. • B4. Address (paint) lead contamination • B5. Reduce transportation pollution by promoting active and green transportation (e.g. bikes, walking, public transport). • B6. Prevent more pollution in the city.
<p> CIRCULAR BUILT ENVIRONMENT</p> <p>The built environment sector consumes an extensive amount of resources including raw materials, as well as energy and water which makes it one of the key leverage points to decrease the city's CO₂-emissions.</p> <ul style="list-style-type: none"> • C1. Adopt circular building, renovation and demolition standards (legal norms). • C2. Leverage public procurement for the circular design, construction, and renovation in municipal buildings and public infrastructure (prioritizing renovation of existing building stock). • C3. Develop a shared knowledge of circular principles among key sector stakeholders and create supportive policies that allow for the financing of circular buildings. • C4. Get the enabling infrastructure in place to stimulate the use of secondary building materials. • C5. Pilot decentralized renewable energy systems throughout the city. • C6. Develop affordable (and circular) housing through Community Land Trusts. • C7. Work with zoning to build high density areas/projects and avoid low density housing. 	<p> GETTING MORE VALUE FROM RESOURCES</p> <p>The circular economy transition aids the City's existing goals and objectives on stimulating local food production and reducing waste. The key objective of this focus area is to preserve and extend the value of products and materials, such as consumer goods and organic waste, throughout their useful life, and to create value from them at the end of their life.</p> <ul style="list-style-type: none"> • D1. Promote the consumption of products that are circular, locally-produced, second-hand, or otherwise environmentally preferable. • D2. Minimize the use of non-recyclable packaging materials. • D3. Decrease food waste from businesses. • D4. Leverage urban food production to transform city-owned vacant lands into valuable community assets. • D5. Promote reuse, repair, sharing, and recycling programs and businesses. • D6. Pilot and scale innovative circular technologies within the city to extract the most value of resources (e.g. high-quality organic waste processing, biomaterials manufacturing from feedstocks) and evaluate, replicate and scale-up existing initiatives. • D7. Develop a transparent participatory budgeting program and set up initiatives to inform residents about and engage them in the program.

Introduction

INTRODUCTION OF THE INCLUSIVE CIRCULAR CLEVELAND PROJECT

The City of Cleveland has embarked on an ambitious journey towards becoming North America's leader in designing and implementing an inclusive circular economy. As part of the wider 30-month Circular Cleveland initiative funded by the [Robert Wood Johnson Foundation](#), the City and [Cleveland Neighborhood Progress](#) (CNP) are working with local champions to develop a blueprint to enable an inclusive circular economy in the Great Lakes region. The transition towards a more sustainable economy in Cleveland, building on existing initiatives such as the [Climate Action Plan](#), could help the city overcome the social and environmental challenges it is facing. This effort aims to shift the current economy into a fundamentally sustainable state by becoming resource-efficient and by building the foundation of a healthy environment in which all of its inhabitants can thrive. The development of this

economic model must go beyond a focus on sustainable material use to include innovations in access to resources, an equitable distribution of the benefits and burdens of new economic models, and new social and business models to support a society that is ecologically, socially and economically sustainable and just. Falling under [Sustainable Development Goal](#) (SDG) 12, this model is also highly beneficial for SDGs 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16 and 17.

Our team is composed of [PYXERA Global](#), [Metabolic](#), and the binational [Council of the Great Lakes Region](#) (CGLR). The [Ellen MacArthur Foundation](#) supports the partnership in developing a strategic roadmap towards an inclusive circular economy.

AN INCLUSIVE CIRCULAR CLEVELAND

The development and implementation of an integrally sustainably and inclusive economy in Cleveland builds upon the positive momentum created by the [Climate Action Plan](#) and on the knowledge previously acquired. This Climate Action Plan was updated in 2018, through strong participation from a wide range of local stakeholders. The Climate Action Plan captures the strategy for addressing key climate challenges. The Circular Cleveland strategy functions as an extension to the existing Climate Action Plan, and aims primarily at creating an economy that functions within planetary boundaries by keeping materials in circulation at their highest value for the longest time. The reduced dependency on raw materials and waste generation for economic growth shifts away from the "take-make-waste" linear economic model while limiting consumption, toxicity, and waste to the benefit of society. Reframing the way we think about resources and "waste" in a more collaborative manner, can create various opportunities where the waste of one can become another's treasure. This will lead to the creation of new jobs, equitable communities, and environmental benefits.

To ensure that the city roadmap is truly representing the needs of the local community, Cleveland became the first city to authentically and meaningfully engage Cleveland citizens, gaining knowledge from those most affected on the development of the strategic implementation. This inclusive approach is unique to the City of Cleveland as it was the first city publicly to build inclusion and equity in its scope to ensure true community alignment.

Circular Cleveland

Cleveland Climate Action Plan

WHAT DOES THE CIRCULAR ECONOMY MEAN TO LOCAL STAKEHOLDERS?

In a series of worksessions, stakeholders from across many different sectors came together to evaluate the key challenges and opportunities for more circularity in Cleveland. Circular economy is primarily understood as an inclusive model to build stronger and more resilient communities. Key elements discussed involved:

- the need for physical infrastructure to process resources;
- increased incentive programs through financial regulations and educational processes;
- insight into available materials, and;
- collaboration to develop tools for including circular strategies in construction efforts.



Figure 2 Visual notes from Workshop I, August 2021



A READING GUIDE

This document serves as a guide for implementing specific initiatives to make Cleveland a circular city. Chapter 2 presents an integral approach towards creating a strategy that is rooted in an understanding of resource flows and areas of biggest impact to residents and the planet. It presents some of the key barriers and opportunities for further stimulating a circular economy in Cleveland. Next, Chapter 3 presents an implementation guide that facilitates the creation of the best empowering environment for the transition towards this sustainable economy. It proposes specific actions that can help build systemic change over the years to come. Chapter 4-7 each correspond to the four focus areas for Cleveland: Circular Manufacturing, Circular Built Environment, Remediating Pollution, and Getting More Value From Resources, and provide a more in-depth approach that requires collaboration between community organizations, businesses, city government and regional partners. For each focus area, a roadmap is presented that places the presented actions and sub-actions in time. Hopefully this document can serve as a strategic source of inspiration to boost the transition to a circular economy in the years to come.



An integral approach towards a circular Cleveland

The Circular Cleveland initiative builds upon the city's unique characteristics, strengths, challenges, and surroundings and takes these as a point-of-departure to enhance the circular economy in the years to come. The process of creating the roadmap was divided into four key steps:

STEP

1

UNDERSTANDING THE CURRENT STATE OF THE CITY

During the first phase of the project, a series of workshops, analyses of material flows and interviews helped to sketch a picture of what the circular economy in Cleveland currently looks like. A clear understanding of the current state serves as a powerful starting-point for moving towards a desired future. The full material flow analysis and its interpretation can be found in the Appendix. In summary, the three key questions that were evaluated in the first phase of the project were:



How do materials currently flow through the city of Cleveland, and what are opportunities to close resource loops locally?



What other opportunities and challenges exist around the consumption, production and processing of materials?



What local champions are already stimulating the transition to a circular economy?

STEP

2

IDENTIFYING THE KEY PRINCIPLES TO CREATE AN EMPOWERING ENVIRONMENT IN CLEVELAND

A systemic change towards a more circular economy requires new structures of collaboration and organization. Based on the initial findings on the current initiatives, networks and policies, as well as on findings from previous work with other cities, seven principles have been identified. These principles and their accompanying actions provide specific starting points for building an empowering context for a circular economy in Cleveland (Figure 1). These principles are further explored in chapter 3 of this document.

STEP
3

SELECTING FOCUS AREAS FOR A CIRCULAR CLEVELAND

To provide a more actionable strategy that addresses the topics most relevant to local residents, businesses, and government while also addressing the largest environmental impacts, four focus areas were selected based on the landscape analysis previously conducted (see Appendix I and II) that address key elements of a circular economy, such as resource consumption, waste production, local value generation and the need for safe, just, and thriving communities. For these focus areas, a set of theme-specific actions was identified that are more tailored towards specific initiatives and stakeholders. The four focus areas that are explored in-depth are:

 CIRCULAR MANUFACTURING

Industry in Cleveland has a large impact on resource consumption (approx. 7,160,000 tons a year), extensive waste production (approx. 520,779 tons), pollution and CO₂-emissions (around 55% of all CO₂-emissions of Cleveland). We must work with the local industry sector to decrease the impact of existing industries, as well as attract new industrial actors that function in line with the earth's ecological boundaries.

 REMEDIATING POLLUTION

Cleveland's industrial history and its current manufacturing activities resulted in extensive polluted areas. The city was ranked the 6th worst city for asthma sufferers in 2021, and extensive elevated blood lead levels in children (10.7% of children born in 2012). The health of citizens and the biodiversity of the region must be addressed as a priority when envisaging a circular future.

 CIRCULAR BUILT ENVIRONMENT

The circular built environment sector consumes an extensive amount of impactful resources including raw materials (119,000 tons). These building materials used annually in the city emit more than 20,000 tons CO₂-equivalent of embedded emissions and the sector is responsible for about a third of annual global greenhouse gas emissions. Apart from reducing the impact from local industries, stimulating green building and energy efficiency is the single largest leverage point for decreasing Cleveland's CO₂-emissions.

 GETTING MORE VALUE FROM RESOURCES

The City's existing goals and objectives around the stimulation of local food production and waste reduction are complemented with a special focus on circularity. The key objective of this focus area is to increase the value generated by products and materials, such as consumption goods and organic waste. This is especially relevant in Cleveland, where many residents across the city live in food insecure neighborhoods or live without access to healthy food.

STEP
4

IDENTIFYING SPECIFIC ACTIONS FOR A CIRCULAR CLEVELAND

A key component of the project was to co-create a specific set of actions to start advancing a circular economy in the coming years. Many stakeholders in and around the city contributed through a series of focus groups, a survey and stakeholder reviews, to come to a first set of actions that can further enhance the transition of Cleveland towards a more circular, inclusive city. These actions build upon existing momentum from local stakeholders, including Circular Cleveland Ambassadors, and address a range of diverse instruments and actors (e.g. governments, community-based organizations, private organizations). To assure that the selected actions also contribute to a more inclusive and just city, they were evaluated by local community champions through the framework of the [Climate Action Plan Racial Equity Tool](#). This framework includes an evaluation of the methods of engagement, data and accountability, disproportionate impacts, economic opportunities and language. A reflection on the application of the [Racial Equity Tool](#) in this project can be found in the Appendix.

To exemplify the successful implementation of the proposed (sub-)actions, a set of "best practice examples" was selected. A list of key partners was also included to drive the actions forwards and to facilitate the ownership distribution of the different activities. While not explicitly stated for each action, it is implied that the City of Cleveland will be involved and that Cleveland Neighborhood Progress will assist in the community engagement of all listed actions. The proposed actions, sub-actions, goals and supporting best practices are presented in chapters 4-7 of this document.



Creating an empowering environment to enable systemic change in Cleveland

IMPLEMENTATION PROCESS & FRAMEWORK



Figure 3 Key principles for the creation of an enabling environment.

The transition towards a circular economy requires extensive and authentic efforts to create new circular processes, networks of collaboration, knowledge and infrastructures. This chapter presents a set of guiding principles that can contribute to improving the empowering context for the circular transition in Cleveland. For each of the principles, a set of specific actions are presented that will help to build an empowering environment for systemic change in the next 3-6 months, to give Circular Cleveland the necessary runway for success and scale. It is important to note that the principles can overlap, and some actions may fit within multiple principles.



PRINCIPLE #1: THE CITY DRIVES THE CIRCULAR TRANSITION

For Circular Cleveland to truly prosper, it is essential that the City of Cleveland plays a leading role with the local community in creating an enabling environment to catalyze the circular transition. The success of Circular Cleveland requires a coordinated set of actions over a number of years and will depend on an integrated approach supported by strong leadership from the

public sector, civil society, private sector and community residents. A systems-change approach is needed to tackle barriers and to take advantage of opportunities as they present themselves. In addition, the City must review and implement procurement and policy to enable a successful transition that will achieve prosperity while minimizing negative environmental effects.



P1.1 The City of Cleveland adopts the Circular Cleveland Roadmap and drives Circular Cleveland.

SUB-ACTIONS

- 1.1.1 The Circular Cleveland Roadmap is adopted by the City.
- 1.1.2 The Mayor appoints a Circularity Officer to lead in and be accountable for the implementation of the Actions as outlined in the Roadmap.
- 1.1.3 A cross-departmental circular economy task force should be established within the City of Cleveland, temporarily owned by the City Office of Sustainability, to act as a liaison between the city and (existing) local initiatives.
- 1.1.4 The City convenes a Circular Cleveland Working Group for the implementation of the Circular Cleveland Roadmap. Participants of this working group include members from the City of Cleveland, local nonprofits, private sector, academia, and residents - Circular Cleveland Ambassadors.
- 1.1.5 The Roadmap is revisited on an annual basis in order to prioritize short, medium and long term goals within the City.

P1.2 The City addresses circularity in all departments.

SUB-ACTIONS

- 1.2.1 Circular practices and innovative actions are incorporated into City departmental work plans, starting with Office of Sustainability, Economic Development, and Division of Waste Collection.
- 1.2.2 The Department of Economic Development coordinates with the Council of the Great Lakes Region (CGLR) to attract circular investors to Cleveland.
- 1.2.3 Training on the main principles of a circular economy is offered to all city employees to increase awareness and to encourage collaboration between departments.
- 1.2.4 The City reviews its municipal waste management plan and develops a municipal waste reduction program that expands recycling and composting access, while also creating a local material exchange.
- 1.2.5 The City provides training and conducts outreach campaigns to small and medium-sized enterprises, and industrial actors about the opportunities and tradeoffs in sustainability, decarbonization practices, and knowledge on the circular economy model (also in accordance with the U.S. Securities and Exchange Commission's rules on [climate disclosure](#)).
- 1.2.6 Development of a public communications strategy emphasizing the benefits and opportunities in transitioning to an inclusive circular economy is prioritized, including the development of a Circular Cleveland brand.

P1.3 Ensure the appropriate legislation and regulations to facilitate circularity are enacted.

SUB-ACTIONS

- 1.3.1 Complete a policy review to identify existing policies that prevent the implementation of circular practices and make plans to roll them back. Introduce legislation for new circular policies.
- 1.3.2 Advocate for state level policy change to enhance circular economy growth.
- 1.3.3 City departments begin to align their procurement policies towards circular goals and create demands through a Circular Procurement Framework.
- 1.3.4 Align local tax structures, and other innovative financing models to enable circularity.

P1.4 The Cleveland Climate Action Plan (CAP) is updated.

SUB-ACTIONS

- 1.4.1 The CAP incorporates the Principles and Focus Areas of the Circular Cleveland Roadmap
- 1.4.2 The CAP update prioritizes equity in its development and implementation and learns from its many partners about innovative equity tools for success.

P1.5 Data on waste inputs and outputs is collected and monitored.

SUB-ACTIONS

- 1.5.1 A standardized data collection method is developed to assess all waste inputs and outputs in order to establish a baseline and to be continually monitored.
- 1.5.2 Data gaps are identified and a plan is devised to fill those gaps.
- 1.5.3 The quality of data collected is continually improved.

PRINCIPLE #2: COMMUNITY ENGAGEMENT

As “inclusive engagement” is a primary differentiator of the Circular Cleveland platform, historically marginalized communities and neighborhoods in Cleveland and the region should be the primary benefactor of the circular transition. To ensure that community needs are being aligned, we recommend the positioning of [Cleveland Neighborhood Progress](#) as a key implementation partner and convener of Circular Cleveland. [Neighborhood Connections](#) and the Office of Sustainability’s Sustainable Cleveland will be critical implementation partners given their connections to key community stakeholders and

influencers, the co-management and execution of the Circular Ambassadors program, implementation of community grants, and the familiarity and ownership of the Circular Cleveland brand.

Additional implementation strategies include developing a public communications strategy in partnership with the City underlining the benefits and opportunities in transitioning to an inclusive circular economy, establishing a Circular Cleveland brand, and referring to and building on existing racial equity guidelines the City already employs.



Photo credits: Cleveland Financial District by Thom Sheridan

P2.1 Local community and Circular Cleveland Ambassadors are prioritized.

SUB-ACTIONS

- 2.1.1 Create an action plan on to best engage Circular Cleveland Ambassadors, including a continued and increased source of funding, and capacity-building and team-building trainings.
- 2.1.2 Select an additional Circular Cleveland Ambassador cohort from additional Cleveland neighborhoods.
- 2.1.3 Create a neighborhood plan for each neighborhood with the assistance of the Circular Cleveland Ambassadors.
- 2.1.4 Create an open source roadmap for Circular Cleveland Ambassadors to engage on that carries on the vision and funding opportunities.
- 2.1.5 Support local community development corporations with their local neighborhood strategies, to advance economic, real estate, workforce and sustainable development and quality of life goals through a circular economy lens.

P2.2 Develop and promote community ownership of vacant lands.

SUB-ACTIONS

- 2.2.1 Support the Sustainable Cleveland Vital Neighborhoods Working Group in educating residents and creating Community Land Trusts (democratic, non-profit organizations that own and develop land for the benefit of the community) for sustainable and circular energy generation, urban food production, affordable housing, and/or community enterprises.
- 2.2.2 Support local nonprofit organizations working on the development of solutions to challenges to the acquisition of vacant land by residents and improve communication with residents.

P2.3 Develop support mechanisms for a cross sectoral transition.

SUB-ACTIONS

- 2.3.1 Develop a fundraising plan from local private sector actors to provide financial support to secure a future vision/work ([PYXERA Global & Metabolic will support](#)).
- 2.3.2 Create a coordinator position within a local nonprofit to support the actions implemented by the City and to work with the private sector in transitioning to a circular economy.
- 2.3.3 Training programs and outreach campaigns are coordinated with the City directed towards small and medium-sized enterprises, and industrial actors highlighting the opportunities and tradeoffs in sustainability, decarbonization practices, and knowledge of the circular economy model.

PRINCIPLE #3: PRIVATE SECTOR ENGAGEMENT

The private sector is a key ally in empowering Circular Cleveland’s vision and it is crucial that they are key stakeholders moving forward. Private sector engagement is critical in unlocking funding opportunities, co-creating programs in Cleveland, and advocating for Circular Cleveland programming to local, state and federal officials.



P3.1 A Private Sector Engagement Strategic Plan needs to be created and acted upon.

SUB-ACTIONS

- 3.1.1** Identify and rank the most active companies in Circular Cleveland stakeholder meetings and the companies who were not involved in Circular Cleveland but should engage according to the 4 focus areas:
 - Conduct a mini Corporate Social Responsibility (CSR)/Environmental, Social and Corporate Governance (ESG) assessment on relevant companies and align their social strategy (ESG priorities, priority social issues) to the four focus areas.
 - Develop a fundraising plan for Cleveland Neighborhood Progress (CNP) to raise funds (see below).
- 3.1.2** Create multi-stakeholder (public, private, and community organizations, residents, and small and medium-sized enterprises) driving groups within each focus area consisting of, and connected to, existing projects. Each driving group can formulate a clear vision and goals as part of the larger circular strategy.
- 3.1.3** Map the nonprofits/social enterprises that are engaged in each of the focus areas that companies can provide charitable grants to.
- 3.1.4** Identify pro-bono areas of support that companies can provide.

PRINCIPLE #4: BOOST LOCAL ASSETS

For each action in the roadmap, it is important to identify an organization or someone doing similar work and empower them to implement the Circular Cleveland actions, rather than creating new organizations.



Photo credits: Case Western Reserve University.

P4.1 Local universities/colleges and K-12 schools should be positioned and capacitated to create and implement education programs.

SUB-ACTIONS

- 4.1.1** Develop professional education programs to simulate knowledge on circular economy; circular curricula; lower-education (the [Circular Economy Online Module from Delft](#) is a good starting point).
- 4.1.2** Help create school curricula that include circularity (design, production, repair, sustainability) (e.g. programs offered by [Ohio City Bicycle Co-op](#)). Key institutions to engage with include but are not limited to the [Top Science State \(Case Western Reserve University\)](#); [Cleveland State University](#); the department of [Biomimicry at University of Akron](#); community colleges with vocational programs.
- 4.1.3** Encourage universities, schools and colleges to adopt circular campus management practices and to support student led circular activities.

P4.2 As Cleveland is a leader in Healthcare, the sector must be engaged as an implementation partner of the circular economy.

SUB-ACTIONS

- 4.2.1** Liaise with [Cleveland Clinic](#), the [University Hospital System](#), and [MetroHealth](#) and explore their internal respective sustainability footprint and existing circular programs they are piloting.
- 4.2.2** Identify circular economy trends with leading healthcare companies ([J&J](#), [Medtronic](#), etc.) and link [Cleveland Clinic/University Hospital System](#) as a potential circular pilot.

PRINCIPLE #5: SECURE FUNDING

Continued funding opportunities are needed to implement circular solutions. Cleveland and Cleveland [Neighborhood Progress](#) (CNP) should lean on partners that can help identify additional and continued funding such as the Circular City Coalition ([PYXERA Global](#),

[Metabolic](#), [Enel](#), [Rheaply](#), & [First Mile](#)), [Council of the Great Lakes Region](#), the [Robert Wood Johnson Foundation](#), local private sector companies, and charitable donors closely connected with Cleveland.



P5.1 Fundraise for the development of circular solutions in Cleveland.

SUB-ACTIONS

5.1.1 [Cleveland Neighborhood Progress](#) (CNP) devises a fundraising campaign with potential support from the [Circular City Coalition](#) to support operating costs of managing Circular Cleveland.

5.1.2 Building off the fundraising campaign described in step P5.1.1, start actively seeking funds from Private Sector entities to support the four identified Focus Areas, Circular Cleveland ambassadors, and social organizations in the historically disinvested neighborhoods and communities in Cleveland (for example, [Donor Advised Fund](#)).

5.1.3 Expand fundraising efforts to include philanthropic funding. Starting with a tiered ranking of the individual, family, and organizational donors in the Cleveland area that would be potentially interested in supporting Circular Cleveland, then build and execute a fundraising strategy to make contact and build support from these donors.

PRINCIPLE #6: TRANSPARENCY OF URBAN FLOWS

The development of targeted action for every city or organization requires a deep understanding of the current state. Existing asset and material flows should be quantified as part of a baseline assessment. Furthermore, the city should continuously monitor changes in resource flows and assets owned and

available to track the progress of their initiatives. To monitor and highlight the different ways in which different socio-economic and racial communities are affected by circular policies, data should explicitly be gathered and evaluated with respect to race, ethnicity, gender, income, sexual orientation, age and language.



P6.1 Monitor resources and material flows in the city through baseline assessment of existing assets and flows.

SUB-ACTIONS

6.1.1 Improve regular, (centralized) monitoring and data collection processes for procurement, consumption, and material flows with their associated environmental impacts.

6.1.2 Provide guidelines and training to key actors on how to efficiently track their resources in a standardized manner.

6.1.3 Facilitate private sector entities in sharing information to assist in creating closed loop material flows. A neutral third party can make reporting easy to reduce burden on sharing info, by putting together a template.

P6.2 Increase the transparency of collected data.

SUB-ACTIONS

6.2.1 Set up a digital platform for storing/exchanging information about materials flows in every sector in Cleveland (e.g. built environment, industrial, commercial, residential).

6.2.2 Create an easily accessible inventory and map vacant properties (public and private) within the city, with copious data and functionality.

PRINCIPLE #7: REGIONAL COLLABORATION

The City of Cleveland and Cuyahoga County are situated in the bi-national Great Lakes region, North America's economic engine. The city and the county are the home for more than 107 million people across eight states, from New York to Minnesota, and the Canadian provinces of Ontario and Quebec. Moreover, the region is situated on the shores of Lake Erie and the Great Lakes, the largest surface freshwater system on the planet. The Circular Economy Roadmap as well as the city's involvement in the [Ellen MacArthur Foundation](#) and the Circular Great Lakes Initiative of the [Council of the Great Lakes Region](#) will position the Cleveland-area as a regional leader in the transition to an inclusive circular economy and a catalyst for regional partnerships. The roadmap can

serve as a process guide and inspiration for other Great Lakes cities and counties wishing to learn about the fundamentals of a circular economy and the pathways for the responsible production and consumption of materials, as outlined in Sustainable Development Goal 12. The Greater Cleveland Partnership can play a critical and influential role to convene relevant parties.

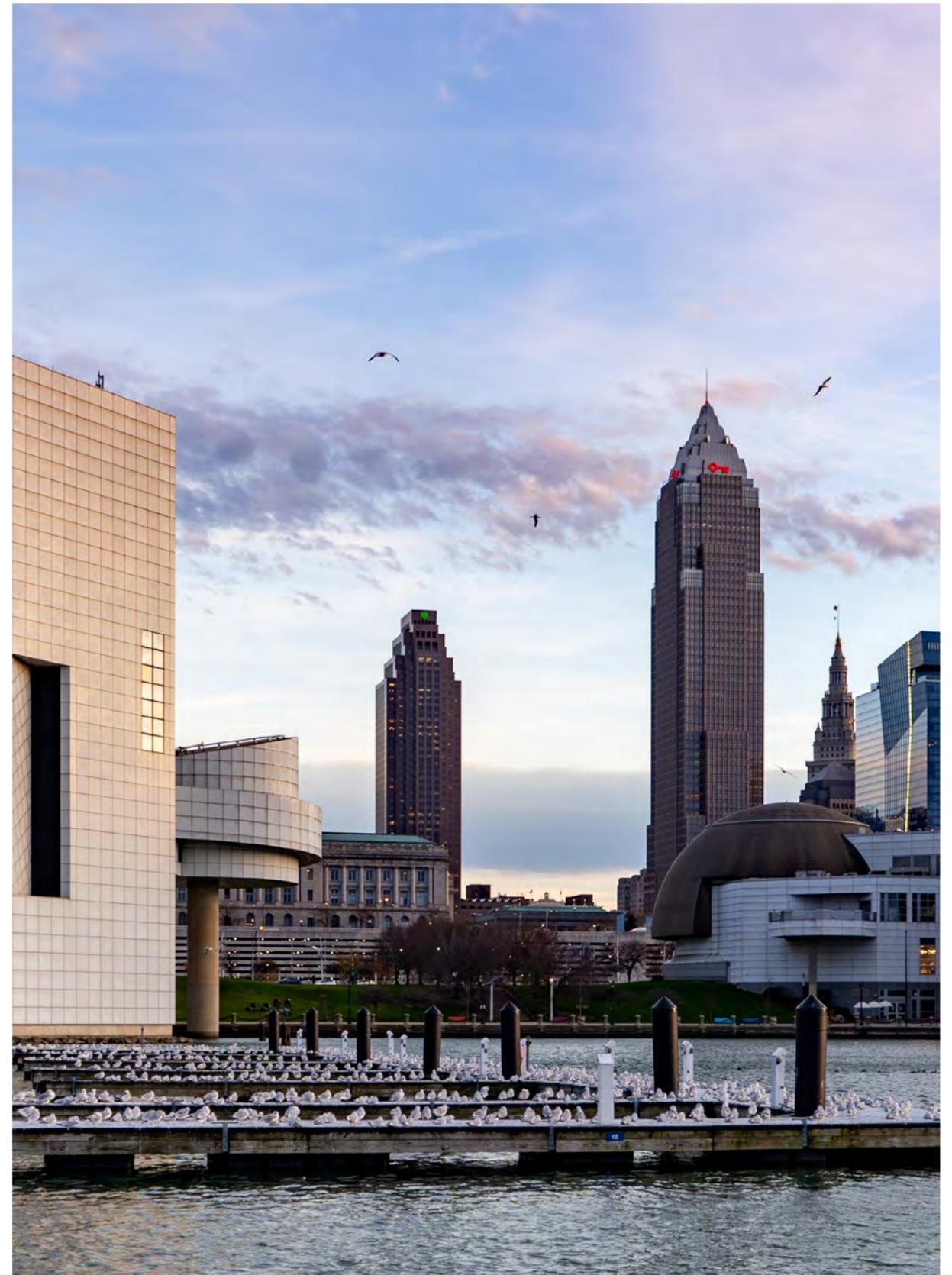
Below, we present a few examples on how Cleveland's transition to a circular economy can be lifted up to align with efforts underway in the bi-national Great Lakes region and beyond. More examples of how to promote regional collaboration will be shown throughout each focus area.



P7.1 Create regional collaboration on Cleveland's transition to a circular economy.

SUB-ACTIONS

- 7.1.1 Articulate City's ambitions to become more circular through a circular economy strategy to raise awareness (e.g. best practice: [Green Deals Netherlands](#)).
- 7.1.2 Align policy and procurement incentives between city and county to promote actions such as reuse and repair.
- 7.1.3 Lobby the City and State to commit increased resources to stimulate the regional transition towards a circular economy.



Circular manufacturing

4.1. INTRODUCTION & INSIGHTS

4.1.1 DESCRIPTION OF THE FOCUS AREA

Local industry in Cleveland has a large impact on resource consumption, waste production, and CO₂-emissions. The Material Flow Analysis (see appendix) showed that the industrial sector is estimated to produce around 521,000 ton of waste (48% of total waste in Cleveland), and is responsible for approximately 55% of the city's CO₂-emissions. Therefore, this sector must be an important focus in the Cleveland circular economy roadmap. A key element for moving towards a cleaner manufacturing sector is switching towards clean, renewable energy sources. However, despite having made progress in terms of reducing their energy consumption and emissions, Cleveland's industries have lowered their waste diversion rates from 2010 to 2016. Hence, manufacturers must double-down their efforts to maximize their diversion rates while meeting high air quality standards. We must work with the local industry sector to decrease the impact of existing industries, as well as attract new industrial actors that function in line with the earth's ecological boundaries. The roadmap will stipulate strategies for decreasing the impact of material use, expanding local, clean energy production, and stimulating material symbiosis among local industries.

5.1.2 CURRENT STATE IN CLEVELAND

What is working?

- **Strategic location.** Cleveland, strategically located on the Cuyahoga River and the shore of Lake Erie, offers a multi-modal transportation network including trains, planes, trucks, and ships.
- **Food industry.** There are more than 370 food processing and manufacturing establishments in Northeast Ohio which makes the food and agriculture industry among Ohio's top industries. Between 2007 and 2018, the sector has seen a 29% employment growth.



- **Industrial networks.** Cleveland is home to *MAGNET*, a non-profit consulting group focused on growing Northeast Ohio's manufacturing industry to unlock local prosperity, as well as the Cleveland Industrial Retention Institute (CIRI), American Chemical Association and the Ohio Manufacturing Association.
- **Metal industry density.** Cleveland alone counts 44 of the 200 largest Northeast Ohio metal product suppliers and end-users.



What can be improved?

- **Investments for industrial energy efficiency.** The City of Cleveland has done some pilots around increasing the energy efficiency of their municipal infrastructure (e.g. public lighting, buildings) and plans on investing more towards bike infrastructures, however, to lower the overall impacts of the city, more investment could be targeted at reducing the energy usage of local industries.
- **Metal production.** The majority of materials produced (steel and metals) are highly impactful materials for the environment (i.e. CO₂-emissions) and their production in the region accounts for 10% of overall U.S. output of steel.
- **Plastic production.** In addition to metal production, Northeast Ohio is a significant part of the state of Ohio's polymers and related materials manufacturing base and value chain, with major brands like the Goodyear Tire and Rubber Company, Lubrizol, and PPG, as well as associated academic programs and centers of excellence like Case Western Reserve University and the University of Akron. The sector is strongly fossil fuel dependent and must transition to produce cleaner, recyclable materials. Northeast Ohio companies and higher education institutions can lead the way.
- **Limited focus on industrial activities.** Current policies constrain the focus on making existing industry more sustainable, attracting new sustainable (circular) businesses, or stimulating research on preserving the value of local industrial waste.
- **Low availability of data.** Little data on resource flows and associated impacts. Data collection is largely performed on a voluntary basis which does not allow good insights on the overall material flows in the city.

4.2. GETTING STARTED: AN ACTION TOOLKIT

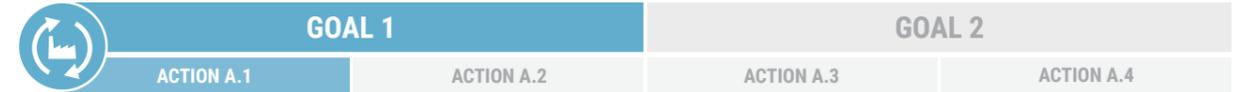
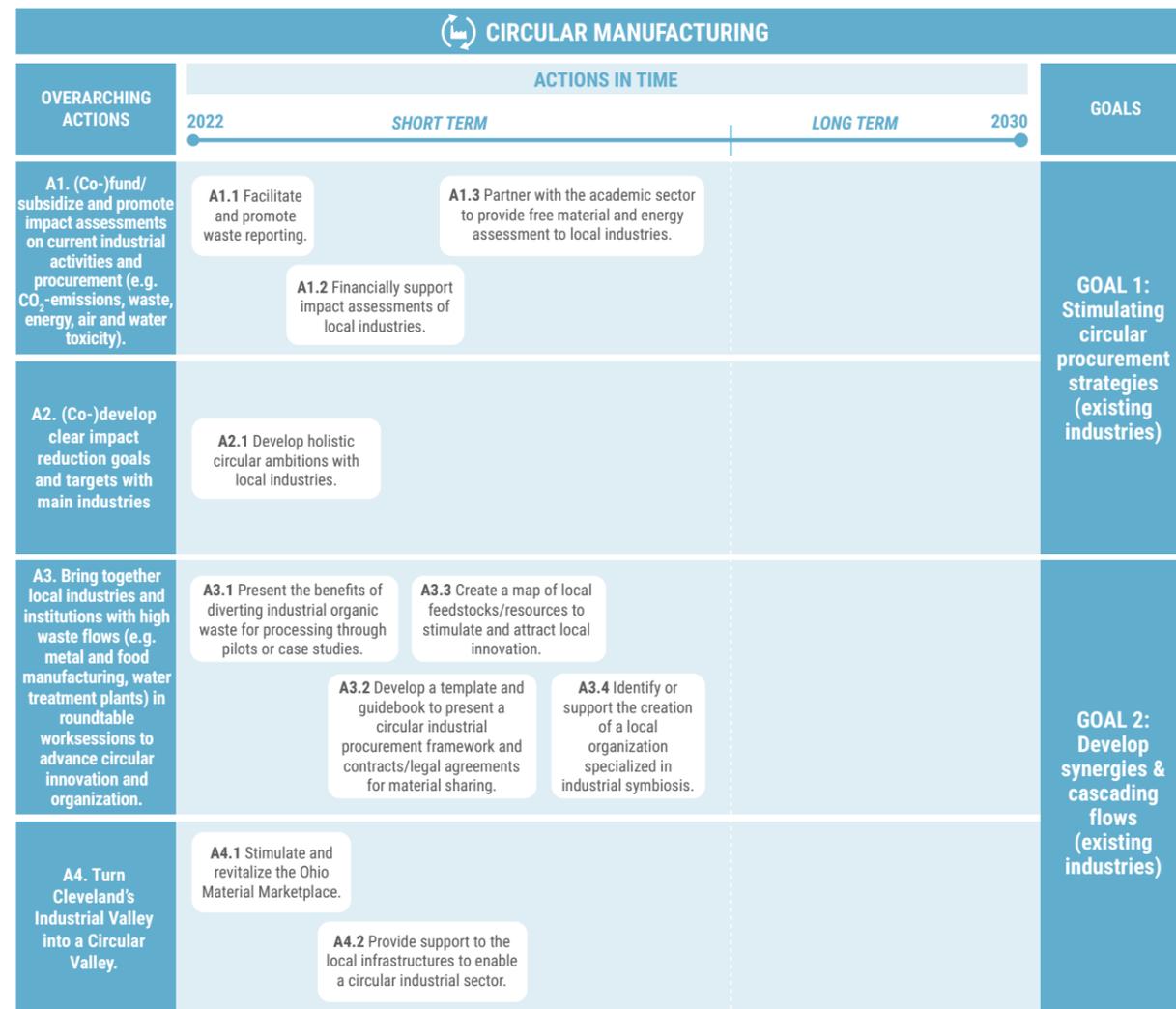
The following two goals can serve as a guide to transition towards more circular local industries in Cleveland. For each of the goals a set of actions and sub-actions is presented.

Goal #1: Stimulate circular procurement strategies (existing industries).

Goal #2: Develop synergies & cascading flows (existing industries).

4.3. A CIRCULAR ROADMAP

The roadmap below provides a visual summary of all the actions. It provides a blueprint for local policy makers, community organizations, residents and businesses to identify key actions that can start driving the circular transition.



GOAL 1: STIMULATING CIRCULAR PROCUREMENT STRATEGIES (EXISTING INDUSTRIES)



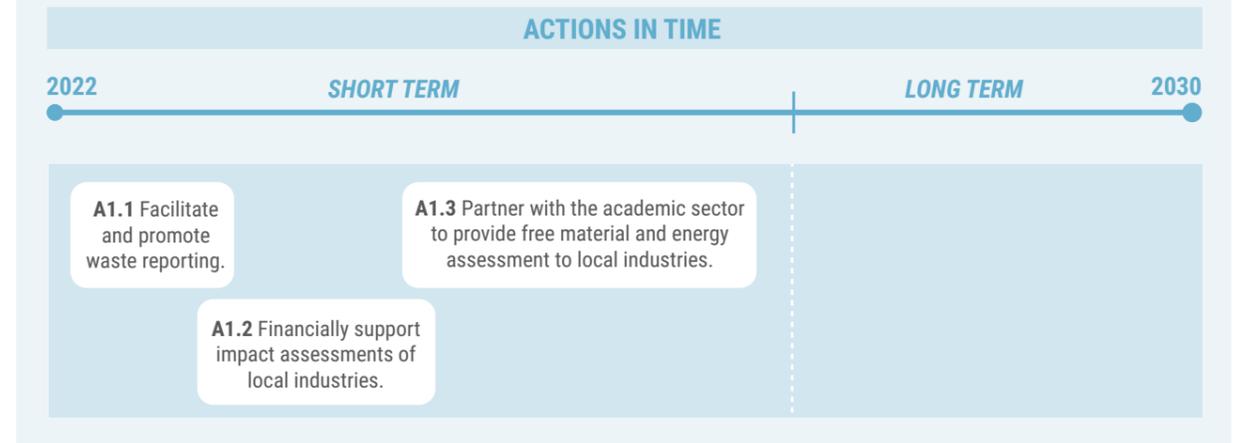
A1. (Co-)fund/subsidize and promote impact assessments on current industrial activities and procurement (e.g. CO₂-emissions, waste, energy, air and water toxicity).

Work with local and regional learning institutions and researchers to offer impact assessments to map the resource flows and environmental impact of local industry. Support the [Industrial Assessment Center at the Case Western Reserve University](#) by linking them to industrial actors in Cleveland, and by setting aside funding to act upon identified points of improvement.

These assessments can be an effective way to reach energy and material consumption, and waste reduction.

Key Partners:

Greater Cleveland Partnership (GCP), Case Western Reserve University (CASE), Cuyahoga County College (Tri-C), MAGNET.



A1.1 Facilitate and promote waste reporting.

Description:

On the short term, stimulate voluntary waste reporting and circularity assessments by developing incentives (e.g. within this city government election cycle of four years). On the long term, mandate waste reporting.

Best practice:

[The Environmental Public Health Act of Singapore:](#) This act mandates all owners of a work place in Singapore to report their waste data since 2014, including registration of all waste disposed or recycled and information on waste management systems. The mandatory waste reporting was extended to large industrial sites in 2021.



A1.2 Financially support impact assessments of local industries.

Description:

Create a municipal program to allocate funds to perform impact assessments of local industries. Local industries of all types and sizes should benefit from this fund.

A1.3 Partner with the academic sector to provide free material and energy assessment to local industries.

Description:

Work with additional local universities and the Greater Cleveland Partnership to join the Federal Department of Energy's *Industrial Assessment Centers* network, following *Case Western Reserve University*, to provide free assessments to more local industries.

Best practice:
University of Dayton energy assessments: Since partnering with the Industrial Assessment Center, the University of Dayton has helped over 1,000 manufacturers with free energy assessments. On average, one assessment has cost-effectively reduced annual energy use by 11%.



A2. (Co-)develop clear impact reduction goals and targets with main industries.

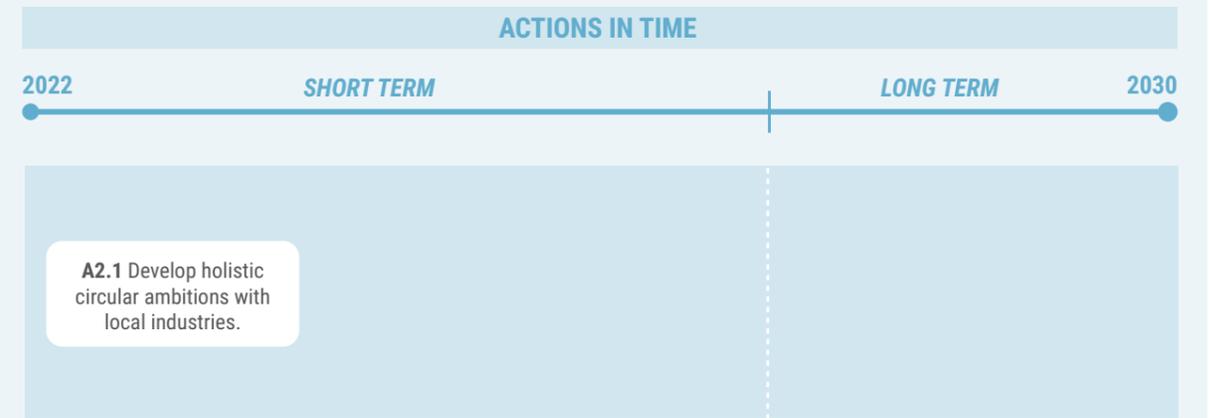
The City can articulate ambitions to become more circular by publishing a circular economy strategy with specific goals, and using this momentum to facilitate aligned and tangible circular economy commitments (goals, indicators and targets) from local industrial partners. Targets, based on transparent resources baseline data, could address, for example, direct and indirect CO₂-emissions; amount of virgin materials consumed; high quality reuse of waste flows. To prevent city-wide data gaps, the City should collaborate with all

departments to establish a standardized monitoring structure. These clear targets aim to facilitate impactful, streamlined action. The U.S. Securities and Exchange Commission new rules will positively affect the implementation of this action.

Key Partners:

GCP, MAGNET, Manufacturing Works, Team NEO.

Others to be involved: Food sector.



A2.1 Develop holistic circular ambitions with local industries.

Description:

Co-create concrete and holistic circular ambitions with local industries and governments, to align individual goals and indicators. Ambitions can be formulated around topics such as the direct and indirect CO₂-emissions; amount of virgin materials consumed; high quality reuse of waste flows; energy consumption per ton produced material; design for circularity; deposit return systems).

Best practice:
Better Plants Program: The U.S. Department of Energy set up the program to start voluntary partnerships between government, industries and organizations. By setting clear energy, water and waste reduction goals, they commit to reducing their energy input. In return, partners receive support through resources, assistance and recognition. Industries could connect with Cleveland Cliffs, an existing partner of the Program.





GOAL 1

ACTION A.1

ACTION A.2

GOAL 2

ACTION A.3

ACTION A.4

GOAL 2: DEVELOP SYNERGIES & CASCADING FLOWS (EXISTING INDUSTRIES)



A3. Bring together local industries and institutions with high waste flows (e.g. metal and food manufacturing, water treatment plants) in roundtable worksessions to advance circular innovation and organization.

Bring together local industries to collaboratively explore the potential to exchange resources and thereby reduce waste being sent to landfill or incineration. As a next step, support the creation of an organization within the city that has a goal to identify potential synergies and co-create processes with industries (e.g. building upon efforts of the [Ohio ByProduct Synergy Group](#)).

Key partners:

Manufacturing Works, Cleveland Industrial Retention Initiative (CIRI), Ohio Restaurant Association (ORA), Grind2Energy, Kent State University (KSU), Tri-C, Case, Cleveland State University (CSU).

Others to be involved: Restaurants, breweries, universities.

ACTIONS IN TIME

2022 SHORT TERM LONG TERM 2030

A3.1 Present the benefits of diverting industrial organic waste for processing through pilots or case studies.

A3.3 Create a map of local feedstocks/resources to stimulate and attract local innovation.

A3.2 Develop a template and guidebook to present a circular industrial procurement framework and contracts/legal agreements for material sharing.

A3.4 Identify or support the creation of a local organization specialized in industrial symbiosis.

A3.1 Present the benefits of diverting industrial organic waste for processing through pilots or case studies.

Description:

Provide support to pilot locally or share successful case studies and benefits of organizations currently diverting their organic waste to process them.

Best practice:

[The Biocycler](#): Architect Chris Maurer of redhous studio is teaming up with NASA, MIT and the University of Akron to create the Biocycler, a machine that uses living organisms to bind construction waste into durable bricks. The project shows that biological technology can be a factor in today's construction market and helps lighten the construction industry's footprint.



GOAL 1

ACTION A.1

ACTION A.2

GOAL 2

ACTION A.3

ACTION A.4

A3.2 Develop a template and guidebook to present a circular industrial procurement framework and contracts/legal agreements for material sharing.

Description:

Facilitate the industrial procurement of circular materials and material sharing by developing templates and/or guidebooks with logistical details, benefits, and case studies. Build upon previous work from the Ellen MacArthur Foundation on [Circular Economy Procurement](#).

Best practice:

[Regional guidebook on circular procurement](#): To create awareness on circular procurement among regional stakeholders and guide them in this, Portugal developed a guidebook on circular procurement. The book provides tools and suggestions on how to implement circular procurement effectively and boosts participation of stakeholders in the process.



A3.3 Create a map of local feedstocks/resources to stimulate and attract local innovation.

Description:

Map and present the local feedstocks/resources (e.g. organic waste, industrial waste) available to local universities and companies R&D to stimulate and attract local innovation.

A3.4 Identify or support the creation of a local organization specialized in industrial symbiosis.

Description:

Support the growth of an organization within the city that has a goal to identify potential synergies and co-create processes with industries (e.g. [Synergie Montréal](#)). The Ohio By-Product Synergy Network can be a starting point. Support the sharing of materials and exchanges of feedstocks/waste between local industries and the community by supporting the creation or expansion of a manufacturing collaborative (e.g. [Cleveland Industrial Retention Initiative](#), [Ohio Materials Marketplace](#)).

Best practice:

[Synergie Montréal](#): The organization is Greater Montréal's first joint initiative to support Montreal businesses in the transition to the circular economy. Since its implementation, Synergie Montréal has extended its field of action from the east of Montreal to the entire agglomeration, achieving more than 125 synergies between companies and organizations.





GOAL 1

ACTION A.1

ACTION A.2

GOAL 2

ACTION A.3

ACTION A.4

A4. Turn Cleveland's Industrial Valley into a Circular Valley.

Cleveland's Industrial Valley, a neighborhood and site of manufacturing, is transitioned into a clean, circular hub. Materials are exchanged locally, and clean technologies assure a healthy local environment for Cleveland's residents.

Key partners:

City of Cleveland, Manufacturing Sector - Manufacturing Works, MAGNET, Business Growth Collaborative, Ohio Materials Market Place, and Logistics Sector, Data Development firms, local sustainability firms, Financial Institutions.

Others to be involved: Logistics sector, data development firms, local sustainability firms, financial institutions.

ACTIONS IN TIME

2022 SHORT TERM LONG TERM 2030

A4.1 Stimulate and revitalize the Ohio Material Marketplace.

A4.2 Provide support to the local infrastructures to enable a circular industrial sector.

A4.1 Stimulate and revitalize the Ohio Material Marketplace.

Description:

Replicate, improve, or activate the model of the [Ohio Materials Marketplace](#) in a central location in Cleveland for manufacturing and make it more robust and collaborate with existing organizations (e.g. [MAGNET](#), [MANUFACTURING WORKS](#), [Greater Cleveland Partnership](#)). Create a meaningful vision of how the city can reinvent itself as the Re-Manufacturing Hub of the Great Lakes Region and attract new investments.

A4.2 Provide support to the local infrastructures to enable a circular industrial sector.

Description:

Identify and fund the creation of necessary local infrastructure to enable a circular industrial sector (e.g. The [Marshall Plan for Middle America](#), industries, government, State Brownfield remediation dollars). Potential infrastructures to explore include a clearing house/resource hub of waste streams from industry, in a central location, and infrastructure to store bioproducts/waste products to make them available when needed.

Best practice:

[The Marshall Plan for Middle America](#): This roadmap is created through the joint scientific efforts of academic and policy researchers. The roadmap aims to build a regional, multi-sectoral coalition of stakeholders to drive investment in infrastructure and energy diversification that will catalyze more equitable economic recovery while laying a foundation for the Ohio Valley to be a global leader in cleaner energy resources and circular economy practices.



4.4. OBJECTIVES & INDICATORS

To evaluate whether or not progress is occurring across the desired pathways, we can use a set of indicators. The following indicators provide a starting point to give insight into the progress towards a more circular city in the years to come.

OBJECTIVES	INDICATORS
Local industries use circular criteria in their procurement	Share (%) of private procurement from circular products/services
Industries in Cleveland consume sustainably sourced biobased and secondary materials	Material/resource intensity: Share (%) of input material that are biobased or secondary
Waste flows from local industries are processed at high value	Increased recycling rates of waste from local industries
Increase feedstock conversion in the region for the use of secondary materials generated in Cleveland	Share (%) of secondary materials used as feedstock
	Number of organizations using bi-product of a local organization as feedstocks
Improve information flows on waste between stakeholders and the City	Qualitative assessment of the quality of information flows



Remediating pollution



5.1. INTRODUCTION & INSIGHTS

5.1.1 DESCRIPTION OF THE FOCUS AREA

Cleveland's industrial history and its current manufacturing activities have resulted in extensive polluted areas. Among others, Cleveland is ranked as the 6th worst U.S. city in terms of air quality. While prioritizing the health of citizens and the biodiversity of the region, tackling and remediating pollution must be one of the focus areas. Environmental justice is at the core of the discussion to ensure a fair and excellent living environment for all Cleveland's residents. The roadmap builds upon the strategies suggested in the *Climate Action Plan* from a circular perspective, and proposes additional policies and programs that can regenerate Cleveland's polluted areas for a healthy, thriving environment.

5.1.2 CURRENT STATE IN CLEVELAND

What is working?

- **Understanding of environmental justice.** Environmental justice and environmental protection has been in the political agenda since the last burning of Cuyahoga River in 1969. Approaching the 2021 citywide elections, an *extensive document* has been put in place by more than a dozen organizations to inform the new administration about the needs of Clevelanders.
- **Strong focus on active mobility.** The City is quickly developing infrastructure (e.g. approximately 100 miles of new bicycle facilities in the last decade) and adopting urban development norms that contribute to a walking, biking and public transportation-friendly city. A new Complete and Green Streets ordinance was also recently adopted by the City while the RTA recently published their *2020 Strategic Plan*.
- **Municipal control of vacant land.** Many vacant lots in Cleveland are under public control and can serve as a resource for inclusive socio-economic development. The *Climate Action Plan* has proposed to develop a community-wide collaboration plan for vacant land reuse and, since 2013, a pilot tree planting was completed and the lands hold some of the largest urban farms and greenhouses in the country.

What can be improved?

- **Vacant polluted lands and brownfields.** Cleveland has a large number of vacant but polluted lands and brownfields. A strong focus should be placed on regenerating those polluted areas and bringing a thriving environment for the local biodiversity.
- **Exposure to pollution.** Many residents across the city are still subject to lead exposure in the form of paint or in water pipes in their household. Air quality was shown to be one of the worst compared to other metropolitan areas with a rating of F and C for ozone and particle pollution respectively (*American Lung Association*). This can be explained, within others, by the high use of single occupancy vehicles and the extensive presence of industries in the region.
- **Systemic racism.** The current system in Cleveland perpetuates systemic racism and inequities, as minorities are more affected by pollution impacts. This is a strong barrier for equitable circular development and the equitable distribution of benefits.
- **Nutrient loading in Lake Erie.** Despite efforts taken by the U.S. and Canada to reduce phosphorus pollution in Lake Erie, it remains the subject of significant agricultural runoff from nonpoint sources (especially in the western Lake Erie basin). This runoff degrades the water quality and ecological functioning of the lake.

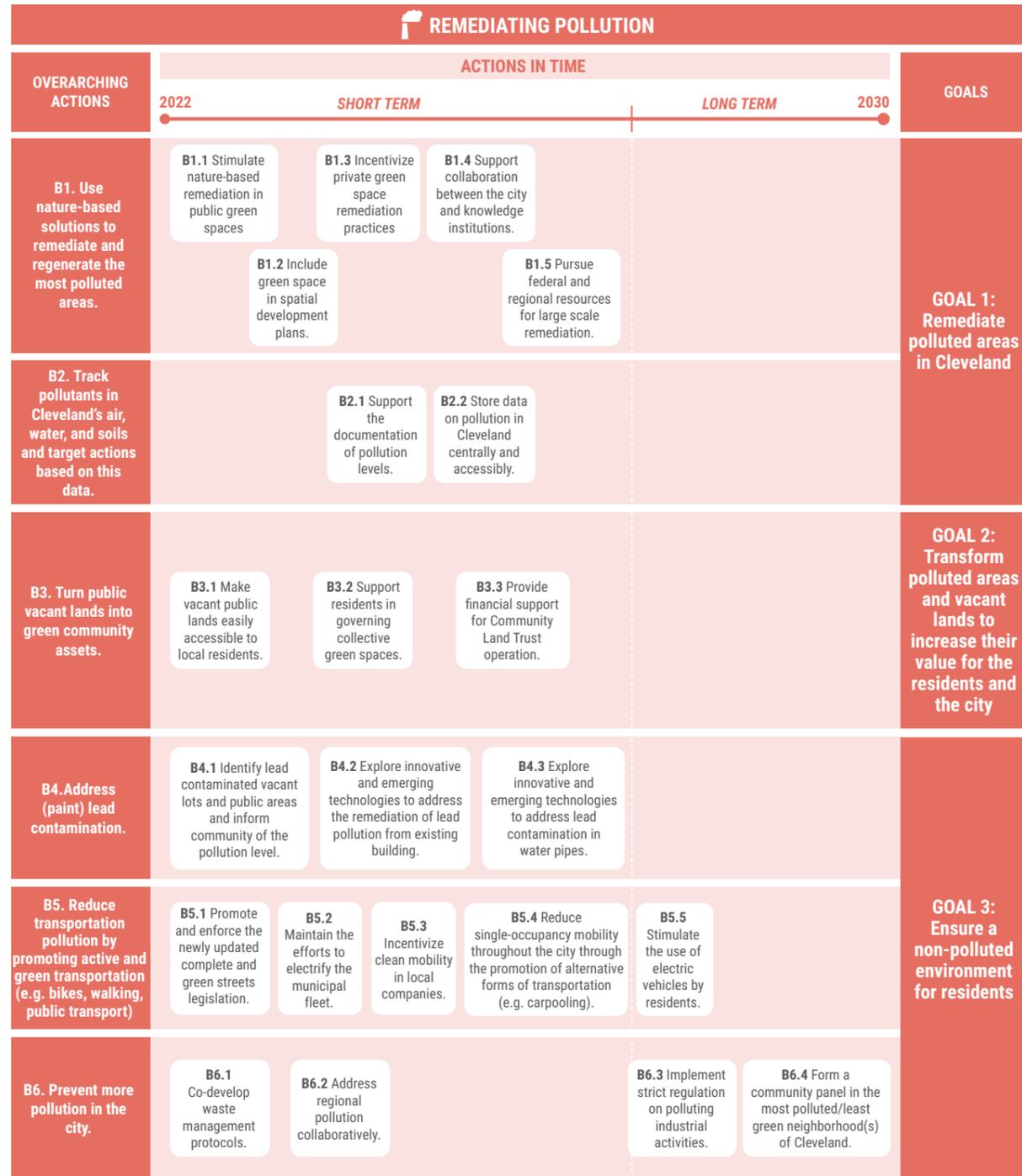
5.2. GETTING STARTED: AN ACTION TOOLKIT

The following three goals can serve as a guide to address pollution from a circular economy perspective in Cleveland. For each of the goals a set of actions and sub-actions is presented.

- Goal #1: Remediating polluted areas in Cleveland.**
- Goal #2: Transform polluted areas and vacant lands to increase their value for the residents and the city.**
- Goal #3: Ensure a non-polluted environment for residents.**

5.3. A CIRCULAR ROADMAP

The roadmap below provides a visual summary of all the actions and sub-actions previously described. It provides a blueprint for local policy makers, community organizations, residents and businesses to identify key actions that can start driving the circular transition.



GOAL 1	GOAL 2	GOAL 3
ACTION B.1	ACTION B.2	ACTION B.3
		ACTION B.4
		ACTION B.5
		ACTION B.6

GOAL 1: REMEDIATING POLLUTED AREAS IN CLEVELAND



B1. Use nature-based solutions to remediate and regenerate the most polluted areas.

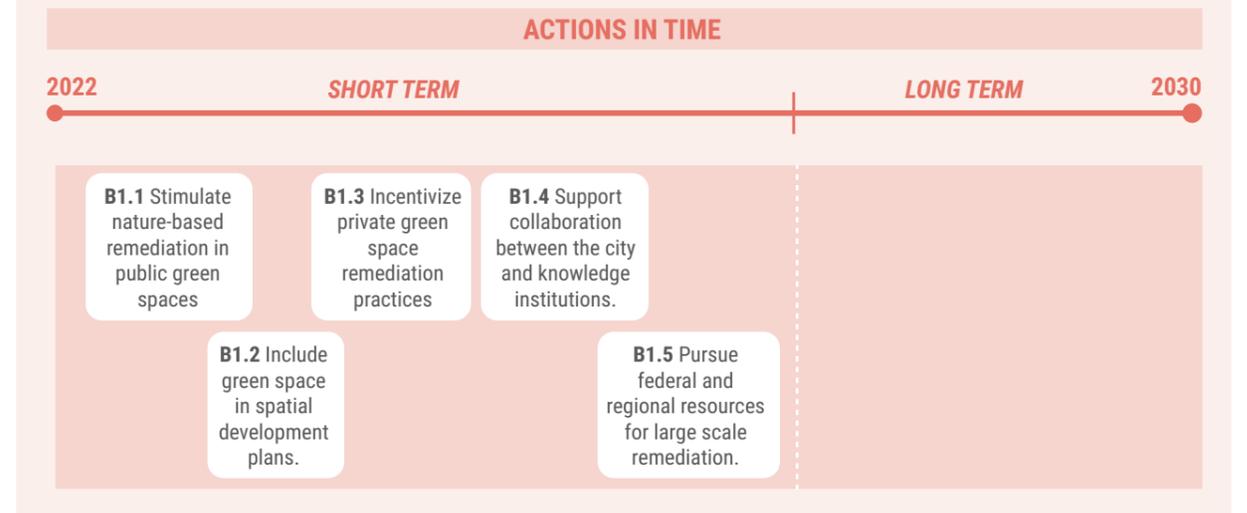
Some plants have the potential to clean up polluted soils – such as reducing lead levels through phytoremediation. Thriving green spaces using these plants should become a requirement in spatial development plans, with the objective to remediate Cleveland's most polluted neighborhoods. They can also be incorporated into existing development initiatives (e.g. through green walls, *Rid-All Green Partnership*'s Biochar, phytoremediating bushes, green roofs and other permaculture principles). Potentially apply to *Great Lakes Restoration Initiative* and National Fish and Wild Life grants funding for green stormwater initiatives.

Key Partners:

Trust for Public Land (TPL), Rid-All Green Partnership, Cleveland Parks + Greenspace Coalition, Cuyahoga County Soil and Water Conservation District (Cuyahoga SWCD), Participatory Budgeting Cleveland (PB Cle), Kent State Cleveland Urban Design Collaborative (CUDC), Cleveland Tree Coalition, University of Akron Biomimicry Research and Innovation Center (UAKron BRIC).

Others to be involved:

Large landowners in Cleveland, community gardens, land banks, universities, community residents.



GOAL 1		GOAL 2		GOAL 3	
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

B1.1 Stimulate nature-based remediation in public green spaces.

Description:

Adopt nature-based remediation strategies on public green spaces in the most polluted neighborhoods to clean both air and soil (e.g. green walls, phytoremediating bushes, green roofs, rain gardens, air filtering plants). These can also serve as Living Labs, showcasing the production of biobased materials etc.

Best practice:

Nature-based solutions in Budapest: To face increasing environmental challenges such as air and water pollution, the city of Budapest invested in nature-based solutions. Throughout the city, so-called pocket parks are established, where concrete public gardens are transformed into green areas. Similarly, renovation of community gardens and existing green spaces with innovative techniques such as green infrastructure and natural water retention help take control over the city's pollution.



B1.2 Include green space in spatial development plans.

Description:

Include thriving green space as a requirement in spatial development plans (tendering guidelines).

Best practice:

Minneapolis Green Zones: In 2017, the city of Minneapolis approved a resolution to establish two green zones in the city. Since then, the city has designated two areas, located in vulnerable and low-income communities that are heavily impacted by pollution, as green zones.



B1.3 Incentivize private green space remediation practices.

Description:

Create a program subsidizing or stimulating the use of air and soil filtering plant species in landscaping on private property.

Best practice:

The HSP Incentives Program: This program provides financial incentives to California growers and ranchers to implement conservation management practices that sequester carbon, reduce atmospheric greenhouse gases (GHGs), and improve soil health.



GOAL 1		GOAL 2		GOAL 3	
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

B1.4 Support collaboration between the city and knowledge institutions.

Description:

Develop partnerships between the city and colleges (including currently forming AgTech and sustainable agricultural business incubators) to promote and adopt innovative nature-based solutions in Cleveland (e.g. collaborate with [Urban Drawdown](#) to implement activities). Stimulate knowledge and thoughts process in young people to invite them in. Learn from and build on the City of Cleveland's active participation in the [Great Lakes Marine Debris Action Plan](#) on marine debris initiatives, and [Circular Great Lakes](#) initiative, which focus on collaborative research, education, policy, prevention and action activities in the marine environment.

Best practice:

Nature-Based-Solution Living Lab: The Lab at the University of Salford is part of the EU-funded IGNITION Project, where climate mitigation measures are showcased and piloted. Across the university campus several installations are tested, ranging from green-blue roofs, living walls and rain gardens. The Living Lab is well-integrated into engineering university courses and stakeholders are kept up to date at all times through the real-time data dashboard.



B1.5 Pursue federal and regional resources for large scale remediation.

Description:

Cleveland pursues federal and regional resources in coordinated efforts, e.g. [Great Lakes Restoration](#) Initiative funds for green stormwater initiatives.

GOAL 1		GOAL 2	GOAL 3		
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

B2. Track pollutants in Cleveland's air, water, and soils and target actions based on this data.

The City should constantly measure air and water quality at multiple strategic locations and publish the data. Integrate chemical soil testing (e.g. contaminants) into all construction processes. Set clear goals for different types of pollutants (e.g. soil pollution with heavy metals; particle pollution; ozone). Build upon the air quality sensors distributed by [Cleveland Neighborhood Progress](#) (CNP), [Digital C](#) and the City and support citizen science initiatives to identify and monitor the most polluted areas. This data should inform political action that directly addresses the communities most affected by this issue.

Key Partners:

Key Partners: Northeast Ohio Areawide Coordinating Agency (NOACA), DigitalC, IoT Collaborative (IoT), Cleveland Water Alliance (CWA), Black Environmental Leaders (BEL), Cleveland Metropolitan School District (CMSD), Environmental Health Watch (EHW).

Others to be involved:

Community Development Corporations, community groups and residents, philanthropy, university, healthcare systems.

ACTIONS IN TIME



GOAL 1		GOAL 2	GOAL 3		
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

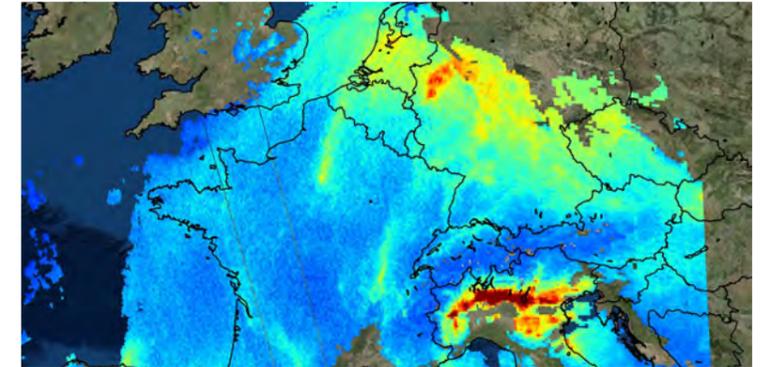
B2.1 Support the documentation of pollution levels.

Description:

Provide residents and community organizations with the tools and skills to document the pollution they experience through citizen science projects and programs. This can include air pollution, soil pollution, drinking water pollution as well as freshwater pollution.

Best practice:

Sentinel Citizen: It is a pilot project that develops a prototype of a local air pollution forecast, focusing on direct citizens empowerment. By combining citizen science air quality data from Waag's Hollandse Luchten with satellite data and the global atmospheric forecasting model, Sentinel Citizen establishes accessible pollution documentation.



B2.2 Store data on pollution in Cleveland centrally and accessibly.

Description:

Provide a central repository to collect and store information on pollution in Cleveland, accessible to residents and students.

Best practice:

Helsinki Region Environmental Services HSY: On their website, the air quality in the Helsinki metropolitan area and in Uusimaa can be monitored in real time at specific locations. Their map service shows the air quality where you currently are or where you are going. You can also check how the air quality is predicted to change over the next few hours.



GOAL 2: TRANSFORM POLLUTED AREAS AND VACANT LANDS TO INCREASE THEIR VALUE FOR THE RESIDENTS AND THE CITY



B3. Turn public vacant lands into green community assets.

Community Land Trusts are democratic, non-profit organizations owning and developing land for the benefit of the community. These ownership structures have the potential to contribute to more socially just and ecologically strong cities by encouraging community ownership and investment in neighborhoods, by driving local workforce, and by increasing the number and quality of open spaces in the city.

Key partners:

Western Reserve Land Conservancy (WRLC), TPL, Cleveland Seed Bank (CSB), Ohio State Extension - Cuyahoga County (OSU Extension), CSU Urban Affairs and GIS.

Others to be involved: Community development corporations, Community groups and residents, philanthropy.

ACTIONS IN TIME



B3.1 Make vacant public lands easily accessible to local residents.

B3.2 Support residents in governing collective green spaces.

B3.3 Provide financial support for Community Land Trust operation.

B3.1 Make vacant public lands easily accessible to local residents.

Description:

Build on the [Climate Smart Cities Cleveland](#) mapping portal to publish an accessible and transparent inventory of public vacant land, and the community organizations and individuals currently managing community gardens and public spaces and providing clarity around the process. Highlighting public vacant lands, combined with a land bank disposition policy, can stimulate the development of the site into a public asset.

Best practice:

Hamilton County Landbank: The Landbank works to sell properties to people and organizations with a transformative vision, collaborate with communities and local government to ensure properties are repositioned in alignment with community plans, and operate a market-rate housing program as well as a historic structure stabilization program to prepare properties for new owners.



B3.2 Support residents in governing collective green spaces.

Description:

Set up a driving group to support and educate residents in the process of collectively governing public common green spaces. Collaborate with Western Reserve Land Conservancy's Cleveland Vacant Land Opportunity Tool (CLEVLOT). Collaborate with the [Sustainable Cleveland Vital Neighborhoods Working Group](#) to create participatory governance capacity for CLT(s). Work with the [Central Ohio Community Land Trust](#), [Grounded Solutions Network](#), [Center for Community Progress](#), [Trust Public Land](#), and [Cuyahoga Land Bank](#).

Best practice:

LEDNet's Green Space Cluster:

This network focuses on supporting boroughs in developing and collectively maintaining green spaces across London. The network engages in the development of new partnerships and actively supports community engagement in green space management, by ensuring access to learning opportunities on best practices.



B3.3 Provide financial support for Community Land Trust operation.

Description:

Provide subsidies in combination with impact objectives when allocating vacant land (e.g. assuring community ownership; objectives to remediate soil)(possibly link to [Brownfields Cleanup Grants](#)).

GOAL 3: ENSURE A NON-POLLUTED ENVIRONMENT FOR RESIDENTS

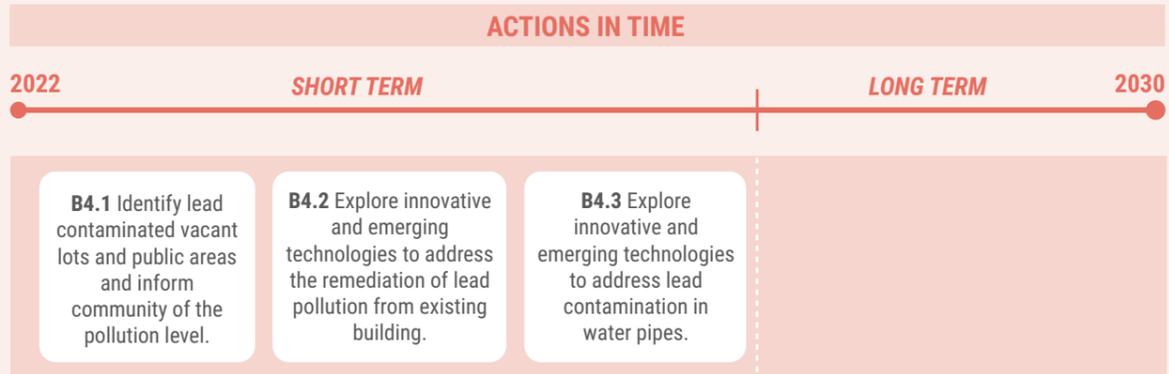


B4. Address (paint) lead contamination.

Subsidize or otherwise incentivize the inspection of buildings to remove any risk of toxic contaminants such as lead. Priority should be given to the most affected low-moderate income areas, and public areas (e.g. schools, libraries).

Key partners:

Lead Safe Cleveland Coalition (Lead Safe CLE), redhouse studio, Sears think[box], Home Repair Resource Center (HRRC), CHN Housing Partners.



B4.1 Identify lead contaminated vacant lots and public areas and inform community of the pollution level.

Description:

Inspect public areas (such as school and libraries) and vacant lots for lead pollution, and remove pollutants. Share the information on each polluted site to raise awareness from the users.

B4.2 Explore innovative and emerging technologies to address the remediation of lead pollution from existing building.

Description:

Evaluate the waste stream generated during the lead abatement and remediation processes. Identify environmentally sustainable alternatives in the remediation process. Explore the use of emerging technologies to address remediation processes.

B4.3 Explore innovative and emerging technologies to address lead contamination in water pipes.

Description:

Identify lead-contaminated water pipes throughout Cleveland and use innovative technologies to remediate them.

B5. Reduce transportation pollution by promoting active and green transportation (e.g. bikes, walking, public transport).

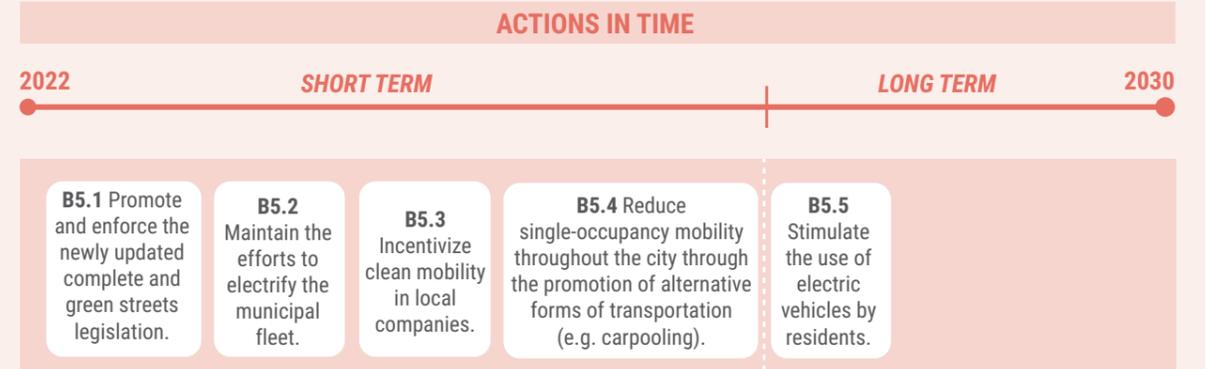
Increase focus on complete streets with safe and accessible forms of active mobility (e.g. safe and green cycling and pedestrian infrastructures, public transport). In addition, scale to electric vehicle charging stations for both bikes and cars, building on [NOACA's Transportation Improvement Program](#), on the City's efforts, and provide green incentives to engage. Funding can come from [Biden's Build Back Better Framework](#) and [OH EPA Grants](#). Public transport should also be electrified to reduce emissions in the city and single-occupancy vehicles should be minimized through the

increased transit service and frequency, which builds on the [RTA's Framework for the Future](#).

Key partners:

Bike Cleveland, Great Cleveland RTA (RTA), Power A Clean Future Ohio, Sway Mobility, EVNoire, Clevelanders for Public Transit (CLE for Transit), Cuyahoga County, Cleveland Metroparks, Ohio Department of Transportation (ODOT).

Others to be involved: Private business including commercial logistics companies.



B5.1 Promote and enforce the newly updated complete and green streets legislation.

Description:

Actively implement the newly updated "complete and green street" legislation that would task city officials with incorporating transit, walking, biking, trees, stormwater management, and public safety in new road projects. Over time, expand the implementation of complete and green streets in accordance with the updated [Active Transportation Plan](#) and other guiding documents.

Best practice:

[Policy of the National City, California](#): Promote the design of complete neighborhoods that are structured to be family-friendly, encourage walking, biking, and the use of mass transit, foster community pride, enhance neighborhood identity, ensure public safety, improve public health, and address the needs of all ages and abilities.



GOAL 1		GOAL 2		GOAL 3	
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

B5.2 Maintain the efforts to electrify the municipal fleet.

Description:

Continue to work towards replacing the public vehicle fleet with electric vehicles or to convert it with non-vehicular solutions when appropriate (e.g. e-bikes) and towards installing more EV charging stations (e.g. city passenger vehicles). Incorporate the life-cycle cost analysis of alternative ownership models (e.g. rental) into an annualized cash flow budget model.

Best practice:

A2Zero: As part of A2Zero, Ann Arbor City is aiming to transition to a community-wide carbon neutrality by 2030. The city's Green Fleets Team has rolled out a vehicle electrification plan, with the ambition to have a 90% public electric fleet by 2025.

B5.3 Incentivize clean mobility in local companies.

Description:

Support and incentivize companies to promote non-car commute policies and incentivize telework or bike to work programs.

Best practice:

San Francisco Climate and Sustainability Report: The city offers its employees incentives for choosing sustainable mobility options. Examples are a free shared bike fleet, developing a renewable energy vehicle fleet and supporting employees in public transport commute.

B5.4 Reduce single-occupancy mobility throughout the city through the promotion of alternative forms of transportation (e.g. carpooling).

Description:

Encourage, promote, and invest in alternative sustainable transportations to reduce the emphasis on single occupancy automobiles within the city. Land use policies incentivizing greater density or transit-oriented development and including affordable housing requirements should be adopted to enhance places that are conveniently accessible by walking, biking, and transit (e.g. Mayor Bibb's 15-minute City Initiative).

Best practice:

Smart Shared Green Mobility Hubs: eHUBS are on-street locations that bring together e-bikes, e-cargo bikes, e-scooters and/or e-cars, offering users a wide range of options to experiment and use in various situations.

B5.5 Stimulate the use of electric vehicles by residents.

Description:

Create incentives for electric vehicle purchasing and ensure adequate charging infrastructure around the city. Incentives and infrastructure should be designed to help Cleveland's Low-Moderate Income (LMI) residents switch to electric vehicles by incorporating/mandating EV sharing and subsidized charging infrastructure in development plans.

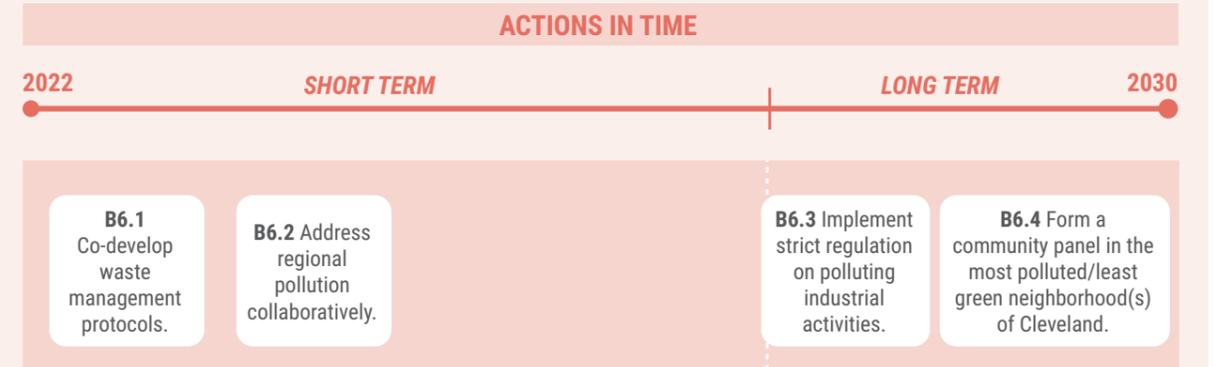
GOAL 1		GOAL 2		GOAL 3	
ACTION B.1	ACTION B.2	ACTION B.3	ACTION B.4	ACTION B.5	ACTION B.6

B6. Prevent more pollution in the city.

Stimulate, mandate, or incentivize local industries to capture and remediate their local pollution, such as particulates, ozone or water contaminants (e.g. use eco-efficient technologies or filters), focussing on the most polluting plants. Permitting is a potentially valuable instrument to leverage.

Key partners:

CNP, Cuyahoga SWCD, Cuyahoga Solid Waste District (Cuyahoga SWD).



B6.1 Co-develop waste management protocols.

Description:

(Co-)develop strict waste management and emission protocols with companies to ensure that all pollutants in or around Cleveland are safely captured and treated (e.g. air quality and toxic chemicals).

B6.2 Address regional pollution collaboratively.

Description:

Strengthen regional collaboration to address regional pollution. This primarily involves air pollution from regional industries, as well as soil contamination and water pollution that affect the waterways and Lake Erie.

Best practice:

C40 Clean Air Cities Declaration:

In 2019, 35 mayors from cities around the world committed to work together to form an unparalleled global coalition for clean air. As part of the declaration, the cities commit to develop and implement ambitious pollution reduction targets and clean air policies, and publicly report progress on achieving these goals.



**GOAL 1**

ACTION B.1

ACTION B.2

GOAL 2

ACTION B.3

GOAL 3

ACTION B.4

ACTION B.5

ACTION B.6

B6.3 Implement strict regulation on polluting industrial activities.**Description:**

Mandate all new developments and industrial activities to capture pollutants through the implementation of more strict regulation. Permits are a key instrument to use for this.

Best practice:**Thanet Industrial Air Pollution:**

Regulations made under the Environmental Permitting Regulations 2010 of England and Wales require a range of industrial processes, within the district council of Thanet, with the potential to cause pollution to obtain a permit before operating.

**B6.4 Form a community panel in the most polluted/least green neighborhood(s) of Cleveland.****Description:**

Address pollution collaboratively with local Cleveland neighborhoods to address the most critical and basic needs.

5.4. OBJECTIVES & INDICATORS

To evaluate whether or not progress is occurring across the desired pathways, we can use a set of indicators. The following indicators provide a starting point to give insight into the progress towards a more circular city in the years to come.

OBJECTIVES	INDICATORS
Cleveland is a city with clean air and a low exposure to pollutants	The number of days that the Air Quality Index for Cleveland is below moderate (e.g. unhealthy, very unhealthy, hazardous)
	Percentage (%) and distribution of residents suffering from asthma
	Share of people (%) that have access to polluting sensors and monitoring data
Reduce transportation pollution by promoting green transportation	Number of EV charging permits being used
	Percentage and distribution of people that use green transportation
	Share of public fleet replaced by EVs
Soil is healthy and contains little to no pollutants	The total area of brownfields in the city of Cleveland (ha)
	Share (%) of organic matter in soil
	Numbers and (native) species density of soil life
	Quantity of local compost or biochar distributed on Cleveland's lands (tons)
Cleveland minimizes the use of toxic substances in industry	Use of toxic substances used in industry in ton per dollar
Land is used as a public asset to the benefit of local communities	Total area of land under direct community control (e.g. through CLT constructions)
	Distribution of physical and mental health benefits among local communities
	Number of regenerative projects in local communities
	Budget (\$) invested in green community assets
Reduce (paint) lead contamination	Share (%) of buildings free from lead-based paint ; Share of people (%) with elevated lead levels
Maintain an up-to-date climate change strategy	Years since the city's climate change strategic plan was updated (CRI)
Restore and grow Cleveland's green infrastructure and tree canopy, and support biodiversity.	Change (%) in tree canopy in high energy burden and disinvested communities
	Reduced number of days with heat island effect
Increase community participation in (learning about) nature-based solutions and pollution	Number of educational projects or programs on nature-based solutions and pollution in the city
	Number of people participating in nature-based solutions

Circular built environment

6.1. INTRODUCTION & INSIGHTS

6.1.1 DESCRIPTION OF THE FOCUS AREA

Comfortable and affordable housing, and safe, convenient infrastructure are important elements for making Cleveland a thriving city to live in. The built environment has a strong environmental impact; the sector is responsible for about a third of annual global greenhouse gas emissions. The Material Flow Analysis (see Appendix) showed that in Cleveland specifically, building materials used annually in the city emit more than 20,000 tons CO₂-equivalent of embedded emissions. Given the extensive amount of impactful resource consumption by the built environment, the strong link to energy consumption and environment impacts from commercial and household heating, and the expected increase in urban population, the built environment is another key focus area to stimulate a circular economy. Not considering local industries, stimulating green building and energy efficiency and decarbonization is the single largest leverage point for decreasing Cleveland's CO₂-equivalent emissions, as mentioned in the *Climate Action Plan*. The following insights provide a quick insight into the current state of the built environment in relation to principles of the circular economy.

6.1.2 CURRENT STATE IN CLEVELAND

What is working?

- **Green spaces.** Cleveland counts a number of plans to implement new parks and green spaces (e.g. *Cleveland Metroparks Masterplan*) as well as extensive small-scale and place based programs to support green space development (e.g. free tree installation, community garden resources, Cleveland Tree Plan) with a focus on vacant land.
- **Strong community networks.** The City has many active community organizations. This provides a strong starting point for collaboratively owned and managed spaces.
- **Built environment challenges.** There are currently several challenges offered in the city that aim to reduce energy loss in the built environment (e.g. *Architecture 2030 Challenge for Planning*, put in motion by *Cleveland 2030 District*, Annual Green Building Challenge).
- **Salvaging building materials.** Local initiatives such as *Rebuilders Xchange* work to salvage and repurpose building materials in Cleveland.
- **Cleveland's Green Building Tax Abatement.** The City of Cleveland offers a tax abatement if construction meets certain sustainability standards.

What can be improved?

- **Vacant polluted lands and brownfields.** Cleveland has a large number of vacant but polluted lands and brownfields. A strong focus should be placed on regenerating those polluted areas and bringing a thriving environment for the local biodiversity.
- **Emissions from construction materials.** Looking at the embedded CO₂-emissions of construction materials, concrete is responsible for 33% of total emissions, followed by steel (19%).
- **Limited data on construction & demolition waste.** Currently waste from construction and demolition is limitedly reported on, which makes it difficult to reuse these materials.
- **Low price of virgin materials.** The low price of virgin materials (e.g. new concrete) can be cheaper than repurposing used building materials making the economics of new construction more lucrative to meet the demand and profitability.
- **Non-binding construction standards.** The City has little or not very ambitious binding policy on the environmental impact of the built environment. Through the *Cleveland 2030 District* or the *Green Building Standard Handbook*, building owners are stimulated to contribute to sustainable construction, efficient building operation, and area development, however, these incentives are not aggressive enough nor carefully enforced. Building codes could also be updated to improve the efficiency of buildings (construction and renovation) and reduce their environmental impacts.

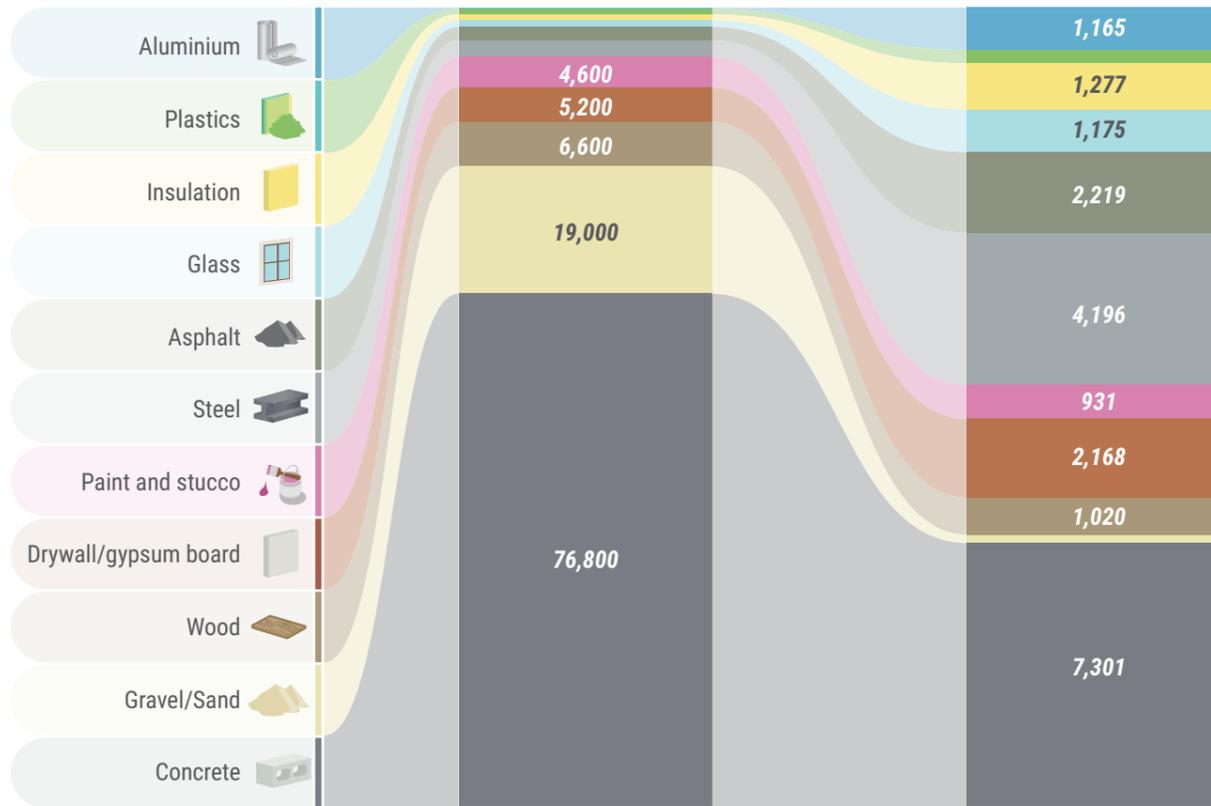


Figure 4 Use of construction materials in Cleveland and their embedded CO₂-impact.

WEIGHT (tons)

EMBEDDED IMPACT (tons CO₂e)

6.2. GETTING STARTED: AN ACTION TOOLKIT

The following two goals can serve as a guide to move towards a more circular built environment in Cleveland. For each of the goals a set of actions and sub-actions is presented.

- Goal #1:** Promote circular building and construction practices across the sector.
- Goal #2:** Promote the high-value processing and exchange of materials and resources.

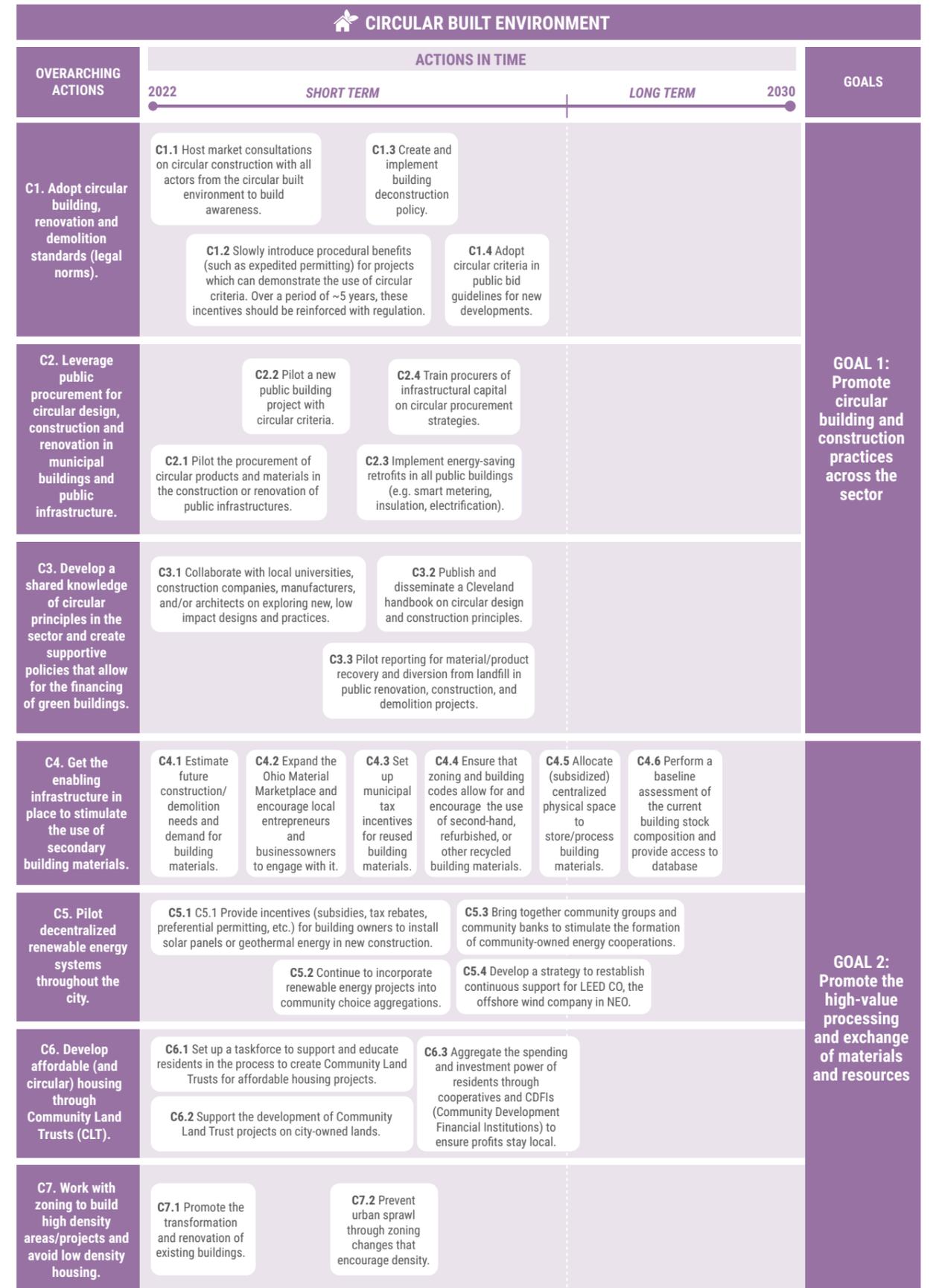
Circular building:

A building that is developed, used and reused without unnecessary resource depletion, environmental pollution and ecosystem degradation. It is constructed in an economically responsible way and contributes to the wellbeing of people and other inhabitants of this earth. Here and there, now and later. Technical elements are demountable and reusable, and biological elements can also be brought back into the biological cycle.

6.3. A CIRCULAR ROADMAP

The roadmap below provides a visual summary of all the actions. It provides a blueprint for local policy makers, community organizations, residents and businesses to identify key actions that can start driving the circular transition.

¹ This sector should align itself with new and progressive roadmaps and policies such as the *Cleveland 2030: A Housing Equity Plan* and get circular practices included in the *Cleveland Green Building Manual* to potentially explore tax credit opportunities. This should be developed over the years.



GOAL 1: PROMOTE CIRCULAR BUILDING AND CONSTRUCTION PRACTICES ACROSS THE SECTOR



C1. Adopt circular building, renovation and demolition standards (legal norms).

Work in partnerships with all actors of the built environment (e.g. developers, architects, contractors, landlords, engineers, clients) to educate them about the circular built environment and to set ambitious but actionable benchmarks, and to introduce procedural benefits (e.g. expedited permitting, financial incentives) for circular projects (e.g. designed for disassembly, environmentally preferable materials). In the long-term, the City can require new public and private developments to meet sustainability standards. Building upon existing efforts of [Cleveland 2030 District](#), the key objective of

these standards are to assure sustainable buildings in terms of both energy performance and the impact of materials and construction.

Key partners:

VCC, Cleveland 2030 District (CLE 2030), American Institute of Architects (AIA), Urban Land Institute (ULI), U.S. Green Building Council Ohio (USGBC-NEO), Rebuilders Xchange (RBX), Greater Cleveland Habitat for Humanity (Cleveland Habitat), Team NEO.

ACTIONS IN TIME



C1.1 Host market consultations on circular construction with all actors from the circular built environment to build awareness.

C1.3 Create and implement building deconstruction policy.

C1.2 Slowly introduce procedural benefits (such as expedited permitting) for projects which can demonstrate the use of circular criteria. Over a period of ~5 years, these incentives should be reinforced with regulation.

C1.4 Adopt circular criteria in public bid guidelines for new developments.

C1.1 Host market consultations on circular construction with all actors from the circular built environment to build awareness.

Description:

Engage with all actors of the local built environment sector through workshops, programs, or roundtable (e.g. developers, architects, contractors, and landlords) to share knowledge and best practices amongst all major actors in the city. Providing educational and guiding resources to facilitate the move towards a circular built environment.

Best practice:

Finnish Public Procurement Legislation: In Finland, a legislation enables circular procurement. Prior to launching a procurement, the law stimulates market consultation, where parties are informed and consulted. Such consultation facilitates the development and identification of new solutions that promote circularity in the construction sector.



C1.2 Slowly introduce procedural benefits like expedited permitting for those projects which can demonstrate the use of circular criteria.

Description:

Prioritize the projects and developments which can show circular practices by providing procedural benefits such as expedited permitting. Circular building practices can include using material passports (transparency of materials and components used), innovative environmentally preferable materials, and/or designing for modularity and disassembly. Requiring passports for new construction will help to monitor the flow of construction materials over time. It will enable future builders to have reliable information about potential materials that can be recovered during demolition and will stimulate design for disassembly.

Best practice:

Madaster: Online platform that allows property data to be stored. The platform provides an identity to the materials present in buildings, allowing for potential high-value reuse. Under the EU's BAMB project a similar platform has been created, with the aim of providing a one-stop-shop for a circular building sector.



C1.3 Create and implement building deconstruction policy.

Description:

To capture most value from the existing built environment in Cleveland, set up clear guidelines on deconstruction practices. Those can include the prioritization of renovation to deconstruction, the setting up of a recycling/reusing requirement of the deconstruction waste, or the mandate deconstruction/salvage walkthrough before demolition permits are issued.

Best practice:

Pittsburgh's Deconstruction Ordinances: The City included deconstruction ordinances in their new city-led deconstruction policy that is to replace the less environmentally friendly demolishing policy. Consisting of ten principles, ranging from waste management plans to incentivizing participation in building trades, the deconstruction policy is first to undergo a piloting period.



C1.4 Adopt circular criteria in public bid guidelines for new developments.

Description:

Including circular standards (e.g. material used, energy consumption/distance of material traveled) in bidding guidelines for public building projects that are aligned with the city's goals and ambitions. Public bid criteria help to reduce emissions of the building sector, while strengthening the capacity within the local building industry for green building and leading by example for private actors. A set of circular criteria for circular buildings and construction can be found in [EMF's circular public procurement guide](#).

Best practice:

City of Amsterdam's Circular Tendering: The city of Amsterdam has applied the principles of circular tendering (i.e. the circular performance of a building project) to six circular housing projects.



C2. Leverage public procurement for the circular design, construction, and renovation in municipal buildings and public infrastructure (prioritizing renovation of existing building stock).

Leverage the power of the municipality and its assets (built environment and infrastructures) to implement circular practices and procure circular materials or designs from local and circular suppliers. The City should work with local suppliers, designers, and contractors to showcase circular practices. The key objective is to both support local circular initiatives, as

well as leading by example by decreasing the impact of the municipal organization.

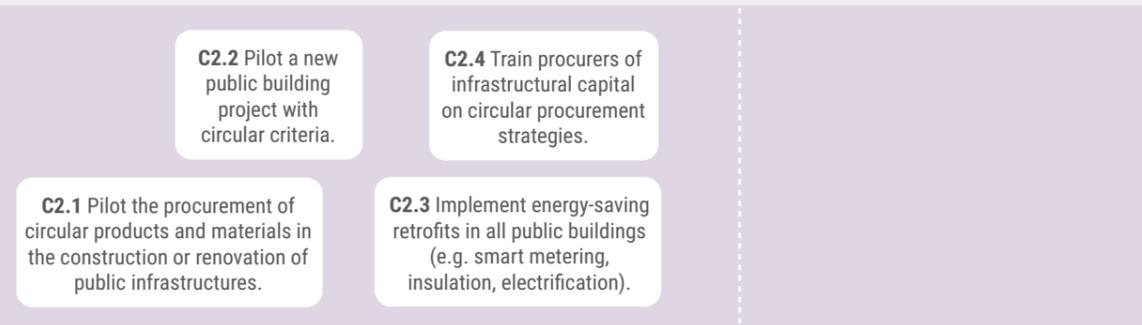
Key partners:

CNP, GCP, CLE 2030, RBX.

Others to be involved: Finance ecosystem, local land banks.

ACTIONS IN TIME

2022 SHORT TERM LONG TERM 2030



C2.1 Pilot the procurement of circular products and materials in the construction or renovation of public infrastructures.

Description:

Ensuring all new infrastructure construction projects use a maximum level of recycled and locally sourced material. City's infrastructures (e.g. roads, bridges) using large amounts of largely impactful materials, such as concrete, should be leveraged to reduce the impacts of the sector. Overcoming sourcing challenges should be a priority for implementation.

Best practice:

ProCirc: EU-funded transnational project in the North Sea region, where circular procurement for public infrastructure is experimented with. As part of this pilot, the city of Malmö has procured circular streetsigns, a highway in the Netherlands will be rebuilt with circular materials, and Scotland has set up a pilot to procure circular materials for new playgrounds.



C2.2 Pilot a new public building project with circular criteria.

Description: Showcase circular practices and their benefits by piloting their integration in the construction of a new public building to be built within the City. To properly understand the current state, perform a baseline and an intervention life-cycle assessment (LCA) as well as a cost analysis. Such practices can include using construction and demolition waste or remaining components in the construction of new infrastructure, using bio-based materials, or mapping the materials used through a material passport to store data on the lifecycle and impacts of the materials.

Best practice:
MUNCH building: In 2016, the city of Oslo started a pilot to build a new museum. Following the FutureBuilt criteria, a set of circular construction standards, Oslo's skyline now features MUNCH. The building consists of low-carbon concrete, recycled steel and aluminium, and its life-cycle impact was assessed for the planning, construction and operational phase.



C2.3 Implement energy-saving retrofits in all public buildings (e.g. smart metering, insulation, electrification).

Description: Building on and learning from the City's current energy saving policies, install technologies that increase electric efficiency over a strong and well coordinated weatherization program (e.g. installing LED lighting, light sensors, heat recovery, monitoring, water saving taps and consumer feedback). All these technologies can reduce energy usage by 20%.

Best practice:
London RE:FIT: The city of London set up the RE:FIT program, which acts as a commercial model to implement building-specific energy efficient works in public buildings. The program has so far supported for retrofitting over 660 of London's public sector buildings, generating estimated CO₂ savings of 32,000 tonnes per annum. RE:FIT aims to retrofit at least 40% of London's public-owned buildings by 2025.

C2.4 Train procurers of infrastructural capital on circular procurement strategies.

Description: Infrastructure (e.g. roads, pavements, bridges) consume extensive materials, with a relatively high associated impact on the environment. Procurers of infrastructural capital can include criteria to stimulate the adoption of low-impact materials (in relation to the embedded CO₂-emissions) as well as bio-based materials.

Best practice:
Circular Procurement Academy: Since its establishment in 2016 in the Netherlands, the Academy has successfully trained various public organizations on the principles of a circular economy in their procurement processes. In the academy sessions, a combination of knowledge sharing and learning through experience is applied.

C3. Develop a shared knowledge of circular principles among key sector stakeholders and create supportive policies that allow for the financing of circular buildings.

Workshops, programs, and guidebooks (e.g. standard waste reporting structure, deconstruction/salvage walk-throughs) can all help to inform parties active in the built environment on how to integrate circularity in design and practice. Together with knowledge institutions, new knowledge and practices can be generated and applied in local building projects. Over time, a "Circular Building hub" could be built: a physical space to store and process materials, collaborating with or learning from [Rebuilders Xchange](#), [Deconstruction](#)

[Cleveland](#) and [Habitat for Humanity](#). In this space best circular practices can be showcased and training can be hosted, potentially in combination with a central knowledge platform.

Key partners: CASE, CSU, AIA, redhouse studio, VCC, Cleveland Owns, USGBC-NEO, CLE 2030.

Others to be involved: Sustainability consultants.



C3.1 Collaborate with local universities, construction companies, manufacturers, and/or architects on exploring new, low impact designs and practices.

Description: Publish and disseminate a Cleveland handbook on circular design and construction principles with information about local regulations, incentives and circular economy local and international best practices. Existing documents can be leveraged to create this handbook, such as the [Circular Building Toolkit](#).

Best practice:
The Green Village: Knowledge- and educational institutions, entrepreneurs, government bodies and civilians can research, experiment, validate and demonstrate their sustainable innovations. The Green Village is an "open air laboratory" at TU Delft Campus, exempt of standard rules and regulations, with a focus on the built environment where testing takes place on neighborhood, street and building level. By paying attention to technical, corporate, social and policy-based challenges, we help innovative parties accelerate from theory to practice.



C3.2 Publish and disseminate a Cleveland handbook on circular design and construction principles.

Description:
Publish and disseminate a Cleveland handbook on circular design and construction principles with information about local regulations, incentives and circular economy local and international best practices.

C3.3 Pilot reporting for material/product recovery and diversion from landfill in public renovation, construction, and demolition projects.

Description:
Promote the reporting of the materials salvaged from public renovation and demolition projects and their current diversion pathways (e.g. reused, recycled, stored) in a small number of local projects. Share this information with local actors to promote innovation and reuse (e.g. connect building reuse piloting initiatives with *VAPAC*, *Cleveland Housing Network* (CHN), and *Slavic Village EcoDistrict Project*).

Best practice:
LA Metro: Metro projects are required to give preference to recyclable and recycled products for construction materials to the maximum extent feasible. A fun aside - turn old vinyl banners that once signified construction sites or new programs into reusable tote bags!



GOAL 2: PROMOTE THE HIGH-VALUE PROCESSING AND EXCHANGE OF MATERIALS AND RESOURCES

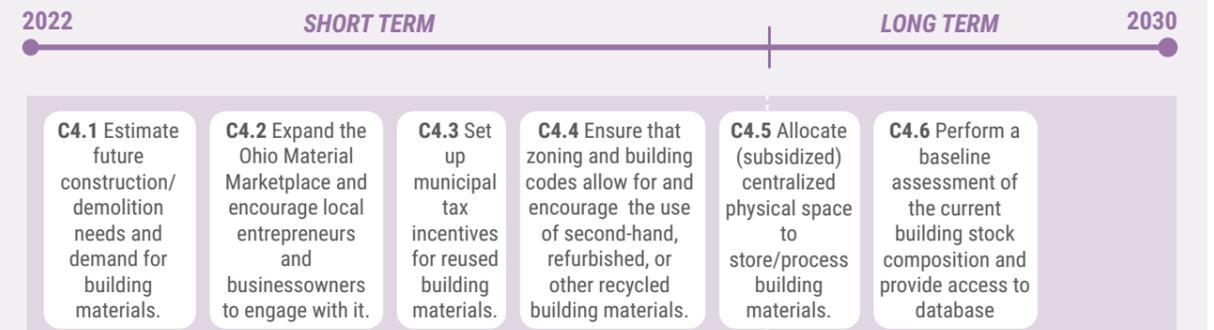


C4. Get the enabling infrastructure in place to stimulate the use of secondary building materials.

Buildings contain many elements (e.g. doors, window frames, good quality wood in the form of structural elements, floors, and trims) that can potentially be reused at the end of a buildings lifetime. To allow this reuse, enabling infrastructure must be created to identify, store, process and repurpose secondary materials and products from Cleveland's buildings.

Key partners:
OMM, WRLC, RBX, Cleveland Habitat ReStore, Cuyahoga SWD.
Others to be involved: Landbanks.

ACTIONS IN TIME



C4.1 Estimate future construction/demolition needs and demand for building materials.

Description:
Use models, such as the Urban Mining Model or a harvest map, to give insights into the availability of building and construction materials. Then, urban mining, which is the process of recovering and reusing a city's materials, can be employed. Storing spaces should be identified and made available to allow material exchanges.

Best practice:
Dutch urban mining studies: The urban mining potential of a few Dutch cities, including Rotterdam and Utrecht, has been assessed. Urban mining is the process of recovering and reusing a city's materials. These materials may come from buildings, infrastructure, or products that have become obsolete.





GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C4.2 Expand the Ohio Material Marketplace and encourage local entrepreneurs and business owners to engage with it.

Description:

Investigate on the functioning of the current Ohio Material Marketplace and find out the needs and the opportunities to make it more attractive and widely used.

Best practice:

The Ohio Materials Marketplace:

An initiative of the Ohio Environmental Protection Agency with support from the United States Business Council for Sustainable Development, is one option to recover and reuse construction and demolition materials. A free, online platform, the Ohio marketplace aims to help find reuse solutions for hard-to-recycle waste and by-product materials.



C4.3 Set up municipal tax incentives for reused building materials.

Description:

Incentivize the use of reused materials in the city by providing municipal tax rebates, providing additional municipal tax abatement, tax-free zones, or zero (local) sales tax for circular building materials.

Best practice:

Boston Building Resources:

The Reuse Center at Boston Building Resources, is a nonprofit storefront for building materials and environmental products, located in Massachusetts. By donating building materials to Boston Building Resources the materials will be reused and donors can receive a tax deduction.



GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C4.4 Ensure that zoning and building codes allow for and encourage the use of second-hand, refurbished, or other recycled building materials.

Description:

Investigate the regulations in place regarding the reuse of second-hand, refurbished, or other recycled materials and identify the key markets for salvaged materials. If required, adjust zoning requirements and building codes.

Best practice:

United States Green Building Council (USGBC): As part of the World Green Building Council, the USGBC offers a wide range of resources relating to sustainability in the built environment, such as its work on green building codes. The USGBC supports (the most current version of) robust green codes in the built environment, encourages optional stretch codes such as net zero codes, and supports its community in model code development.



C4.5 Allocate (subsidized) centralized physical space to store/process building materials.

Description:

Funding and creation of collection and distribution centers for salvaged building materials, which can play a central role in the logistics of the construction sector as repositories for new and excess building materials. Cleveland should leverage its established organization Rebuilder's Xchange to scale the reuse of materials.

Best practice:

ReBuilding Center, Seattle: Located in Seattle, the Rebuilding Center is North America's largest hub for salvaged building materials. Apart from diverting building materials from the landfill, the center focuses on community training in carpentry, plumbing and repair.



C4.6 Perform a baseline assessment of the current building stock composition and provide access to database

Description:

Gather available data on the current city's building stock (e.g. building type, year built, type of ownership, transfer detail, code violation, building certifications, type and year of permits). Leverage this database to target the city's efforts to make the built environment more circular.

Best practice:

Buildings Baseline Study: This report lays out a detailed, city-wide energy and emissions analysis for the City of Mountain View. By utilizing over half a dozen datasets, this report presents key metrics for assessing and benchmarking electricity and natural gas consumption and resultant emissions for both the residential and commercial building sectors.





GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C5. Pilot decentralized renewable energy systems throughout the city.

A decentralized smart grid allows the production of energy anywhere on the grid from renewable sources. Storage is also decentralized; individual buildings or neighborhoods have their own batteries and other storage infrastructure to deal with fluctuations in supply and demand on a local scale.

Key Partners:

Cleveland Owns, Hough Community Solar Garden, Solar United Neighbors Ohio (SUNO), Cuyahoga County, VCC.

Others to be involved: Large land owners, green banks

ACTIONS IN TIME



C5.1 C5.1 Provide incentives (subsidies, tax rebates, preferential permitting, etc.) for building owners to install solar panels or geothermal energy in new construction.

C5.3 Bring together community groups and community banks to stimulate the formation of community-owned energy cooperations.

C5.2 Continue to incorporate renewable energy projects into community choice aggregations.

C5.4 Develop a strategy to reestablish continuous support for LEED CO, the offshore wind company in NEO.

C5.1 Provide incentives (subsidies, tax rebates, preferential permitting, etc.) for building owners to install solar panels or geothermal energy in new construction.

Description:

Facilitate the adoption of distributed energy systems in the city to build resiliency and to reduce the city's reliance on conventional energy sources. A first step could be to cover the full cost of a solar consultation of any interested resident/business or to coordinate collective purchasing of solar panels to bring the costs down for homeowners. Installing geothermal energy can be developed and facilitated in new construction and housing.

Best practice:

Colorado Renewable Energy Mitigation Program (REMP): Carbon fee program designed in 1999 to mitigate the environmental impacts and greenhouse gases produced by large homes. Under REMF, homeowners and commercial property owners who choose to install energy using systems such as snowmelt, outdoor pools, spas, or large square footage have the option of installing a renewable energy system on site, or choosing a mitigation payment option instead. Installing solar photovoltaics (PV), solar water heating, or geothermal heat pump systems are examples of renewable energy projects that can earn on-site renewable credits toward REMF fees.



GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C5.2 Continue to incorporate renewable energy projects into community choice aggregations.

Description:

There is currently an **agreement** between the City of Cleveland and the Northeast Ohio Public Energy Council (NOPEC) that provides 100% clean energy at a competitive price to their clients. Incorporate more local/regional renewable energy physical projects into the aggregation and continue to expand on CPP's advanced energy portfolio goals of 25% by 2025, to incorporate more renewables in their supply mix.

C5.3 Bring together community groups and community banks to stimulate the formation of community-owned energy cooperations.

Description:

Leverage contaminated lands or vacant lands to produce energy while preserving the ownership and value within residents and local organizations, while complying to PUCO legislation. Advocate for virtual net metering with CPP. Identify and install community solar projects on vacant and/or contaminated land. A similar competition as the **NEO Commuter Choice Awards** could be implemented.

Best practice:

Eigg Electric: On the Isle of Eigg, off the Scottish West coast, citizens established a community owned, managed, and maintained company which provides electricity for all island residents from the renewable sources of water, sun, and wind on vacant land across the island.



C5.4 Develop a strategy to reestablish continuous support for LEEDCO, the offshore wind company in NEO.

Description:

Work alongside regional actors in NEO to bring back to life an off-shore wind farm in Lake Erie such as **LEEDCO**.



GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C6. Develop affordable (and circular) housing through Community Land Trusts (CLT).

Proper and affordable housing is a basic amenities for all. To decrease strong market forces that increase housing prices, housing can be developed through community owned structures such as a Community Land Trust (i.e. democratic, non profit organizations owning and developing land for the benefit of the community).

Key Partners:

Near West Land Trust, VCC, Cleveland Owns, Local Initiative Support Corporation (LISC), Enterprise Community Partners (ECP).

Others to be involved: Local philanthropy, community development corporations.

ACTIONS IN TIME

2022 SHORT TERM LONG TERM 2030

C6.1 Set up a taskforce to support and educate residents in the process to create Community Land Trusts for affordable housing projects.

C6.2 Support the development of Community Land Trust projects on city-owned lands.

C6.3 Aggregate the spending and investment power of residents through cooperatives and CDFIs (Community Development Financial Institutions) to ensure profits stay local.

C6.1 Set up a taskforce to support and educate residents in the process to create Community Land Trusts for affordable housing projects.

Description:

Collaborate with the *Sustainable Cleveland Vital Neighborhoods Working Group* to facilitate the formation of a group of motivated stakeholders to take on forward the tasks of educating and supporting the community in the development of Community Land Trusts (i.e. nonprofit corporation owning land or building on behalf of a local community) that will provide more affordable housing options.

Best practice:

The Douglas Community Land Trust: As a key recommendation of the Equitable Development Plan in Washington D.C., the Douglas CLT has become an important part of the housing affordability toolkit. Working together with the CLT Advisory Committee, the Douglas CLT sets out to raise awareness and educate community members on the concept in order to create community engagement.



GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C6.2 Support the development of Community Land Trust projects on city-owned lands.

Description:

Leverage the numerous publicly-owned vacant lands to offer residents the opportunity to become engaged in their community and develop affordable housing options through the creation of CLTs. The municipality of Cleveland can donate city-owned land and grants or low interest loans for developing and financing the CLT projects.

Best practice:

New York Interboro Community Land Trust: The New York City Department of Housing Preservation and Development granted funding to the CLT project. This initiative sets out to establish CLT's on public owned lands and develop affordable housing on those sites. This new CLT model for permanently affordable homeownership has had successful projects across New York City and seeks to expand its businesses.



C6.3 Aggregate the spending and investment power of residents through cooperatives and CDFIs (Community Development Financial Institutions) to ensure profits stay local.

Description:

Support residents to spend and invest in local cooperatives and CDFIs to preserve local ownership of the city's assets and to ensure profits remain local (e.g. cooperative ownership of green housing, solar arrays, wind turbines).

Best practice:

City of Cambridge Community Electricity Aggregation: The program offers Cambridge electricity customers more renewable electricity by creating a new local solar project. Community solar makes it easy for businesses and residents to access the financial benefits of local solar power.





GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C7. Work with zoning to build high density areas/projects and avoid low density housing.

Develop higher density housing within the urban boundaries, while preventing the sprawl of low density units, to develop lively communities and protect surrounding natural areas. Reach this goal by adjusting the current zoning guidelines and by promoting the development of cooperative ownership green housing for residents.

Key Partners:
NOACA, CNP, VCC.

Others to be involved: Community development corporations.

ACTIONS IN TIME

2022 SHORT TERM LONG TERM 2030

C7.1 Promote the transformation and renovation of existing buildings.

C7.2 Prevent urban sprawl through zoning changes that encourage density.

C7.1 Promote the transformation and renovation of existing buildings.

Description:

Explore the options for transformation and renovation of buildings, instead of demolition and new construction. Retrofitting buildings for new purposes (e.g. office buildings for housing/industrial buildings for living labs) prevents the use of large quantities of materials and extends the lifespan of the existing urban building stock. The Planning Department can identify upcoming high profile renovation capital projects to raise awareness.

Best practice:

C40's Clean Construction Program: As part of the program, C40 and Buro Happold developed a report with interventions that incentivize recovery of existing buildings over new build construction in the City of Toronto. Interventions include end of life demolition assessment to encourage renovation.



GOAL 1

ACTION C.1

ACTION C.2

ACTION C.3

ACTION C.4

ACTION C.5

ACTION C.6

ACTION C.7

GOAL 2

C7.2 Prevent urban sprawl through zoning changes that encourage density.

Description:

The city adjusts zoning requirements to prevent urban sprawl to efficiently use available land. Land is a scarce good, that has competing uses (e.g. living, natural area, renewable energy generation, leisure). Compact cities decrease the impact of transportation, and allow for the maintenance or creation of natural areas that stimulate biodiversity and contribute to climate adaptation and mitigation.

Best practice:

Portland's Landmark Zoning Reform: In 2020, the Portland city council approved the "Residential Infill Project", a package of amendments to the city's zoning code that legalizes up to four homes on nearly any residential lot and sharply limits building sizes. The amendment helps Portland in overseeing their urban growth boundaries.



6.4. OBJECTIVES & INDICATORS

To evaluate whether or not progress is occurring across the desired pathways, we can use a set of indicators. The following indicators provide a starting point to give insight into the progress towards a more circular city in the years to come.

OBJECTIVES	INDICATORS
Reduce the use of primary materials in the built environment sector	Share (%) of primary resource demand by weight in relation to the total resource consumption of the built environment
Construction materials are managed sustainably	Share (%) of material from construction site which is reused on the same level of complexity
The municipality decreases the energy consumption of public buildings through retrofits and behavioral changes	Total energy consumption of public buildings
The city possesses relevant infrastructure for the storage, processing and exchange of building materials	Tons of materials recycled through local building hubs or exchange points. Number of participants in market consultations on circular construction hosted by the city
Buildings use renewable energy	Fraction of the energy mix coming from renewables (%)
Public infrastructure is purchased with the use of circular criteria	Share (%) of public infrastructure procurement (by \$) that included circular procurement criteria (e.g. renovation over deconstruction, sustainable material use, building for deconstruction)

Getting more value from resources

7.1. INTRODUCTION & INSIGHTS

7.1.1 DESCRIPTION OF THE FOCUS AREA

The [Climate Action Plan \(2018\)](#) lays out goals and objectives to stimulate local food production and reduce waste. This circular economy action plan builds upon the formulated Focus Areas in the [Climate Action Plan](#), and adds additional goals and objectives focused on the topic of a circular economy. The Material Flow Analysis (see Appendix) demonstrated that approximately 56% of Cleveland's waste is sent to the landfill, in the form of solid waste from both households, commercial actors and industries. A large fraction of this waste could potentially be further valued. Therefore, maximizing the value from Cleveland's waste, with an emphasis on organic resources, is the last key focus area. Building on Cleveland's strong industrial background, extensive space, and strong local agricultural initiatives, the roadmap and implementation guide will leverage those assets to generate more local value out of material flows.

7.1.2 CURRENT STATE IN CLEVELAND

What is working?

- **Climate Action Plan.** Many significant recommendations to implement a circular economy in the city (e.g. food waste reduction, energy efficiency, clean energies, vacant land strategies).
- **Bottom-up initiatives.** Cleveland is working hard to facilitate bottom-up community initiatives and raising awareness of circular practices within its community (e.g. [Circular Cleveland Ambassadors](#), [Circular Cleveland Community Grants](#), [Neighborhood Connections Up Action Grants](#), Cleveland Action Fund, [PCs for People](#), [RET3](#), [Fix it Clinics](#)).
- **Food.** Cleveland counts many community programs focusing around reducing food waste (e.g. [Hunger Network](#), [Rust Belt Riders](#)) and equal access to local and healthy food (e.g. [Farm Fare](#), BBistro at Bridgeport Place, [Central Food Kitchen and Hub](#)).
- **Strong focus on promoting urban agriculture.** A zoning code update in 2010 permits agriculture as a principal use on vacant residential lots. The city uses Urban Zoning Overlays to remove barriers to urban farming, drafted a regulation to create Urban Agriculture Overlay Districts for more intensive farming, and offers affordable water access.

What can be improved?

- **Recycling.** In 2020, the City of Cleveland paused its residential curbside recycling program due to high contamination rates. In Summer 2022, the City has now restarted the curbside recycling program on an opt-in voluntary basis.
- **Mixed waste.** The majority (56%) of waste produced in the region is minimally separated and is processed as mixed waste which is all landfilled. The City's policies focus mostly on end-of-life management rather than on reduction based approaches (output rather than input).
- **Organic waste.** Food is one of the largest material flows consumed by households across the City, with a yearly quantity of 413,600 tons of food consumed by households in Cleveland, from which 33,950 tons are collected in the mixed waste and only 3,900 tons are composted.
- **Electronic waste.** Electronics are a relatively small portion of the total waste produced, but show a high potential for value recovery and reuse to bridge the deep digital divide.



1,788 lbs/year

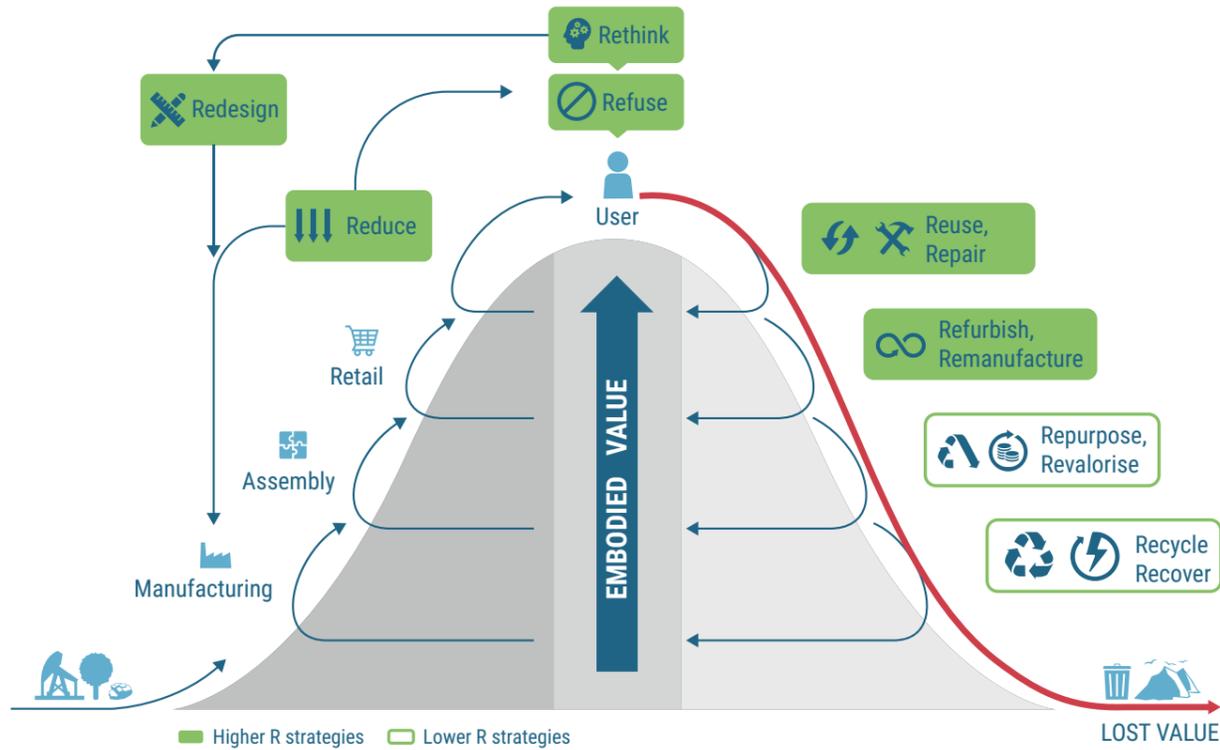
The USA produces close to the most municipal waste per resident in the world.

1,142 lbs/year

Residents of Cleveland sit far below this number.

578 lbs/year

Yet Cleveland's residents produce far more Municipal Waste per capita than the global average.



An adaptation of the Value Hill Model to include the 9R Framework. Buren, N., Demmers, M., Heijden, R., & Witlox, F. (2016). Towards a Circular Economy: The Role of Dutch Logistics Industries and Governments. | Circle Economy, Het Groene Brein, Nuovalente, Sustainable Finance Lab, TU Delft (2016). Master Circular Business With The Value Hill. | Kirchherr, J., Reike, D. & Hekkert, M. (2017). Conceptualizing the Circular Economy: An Analysis of 114 Definitions. | Potting, J., Hekkert, M., Worrell, E., & Hanemaaijer, A. (2017). Circular Economy: Measuring Innovation in the Product Chain.

Figure 5 Value hill infographic.

7.2. GETTING STARTED: AN ACTION TOOLKIT

The following three goals can serve as a guide to get more value out of resources in Cleveland. For each of the goals a set of actions and sub-actions is presented.

- Goal #1:** Reduce the consumption of resources and the generation of waste.
- Goal #2:** Extract value from waste materials (nutrient recovery, recycling)

7.3. A CIRCULAR ROADMAP

The roadmap below provides a visual summary of all the actions. It provides a blueprint for local policy makers, community organizations, residents and businesses to identify key actions that can start driving the circular transition.

GETTING MORE VALUE FROM RESOURCES					
OVERARCHING ACTIONS	ACTIONS IN TIME			GOALS	
	2022	SHORT TERM	LONG TERM		2030
D1. Promote and support the purchase of local, sustainable, secondary/circular and other environmentally preferable products.	D1.1 Create incentives to have local government, anchor institutions, and grocery stores adopt circular procurement strategies on soil, food, grocery supplies, facilities, and construction.	D1.2 Start an "eat and buy local and sustainable" campaign and educational program for public schools and public institutions.	D1.3 Develop a brand or certification for circular products and businesses.	D1.4 Introduce or reactivate an existing local currency and pay 3% to 5% of employee salaries in local currency.	GOAL 1: Reduce the consumption of resources and the generation of waste
	D2. Minimize the use of non-recyclable packaging materials.	D2.1 Work with retailers to promote zero packaging shopping.	D2.2 Provide funding for adopting (certified) compostable single-use containers across food establishments city-wide where reusable containers are not an option.	D2.3 Pilot reusable containers at local restaurants.	
D3. Decrease food waste from businesses.	D3.1 Promote the use of food rescue initiatives which connect surplus food to people facing food insecurity.	D3.2 Start collaborations with institutions to stimulate the purchase of excess food.	D3.3 Require food businesses to donate/share/sell or otherwise divert their excess edible food from landfill to local organizations.	D3.4 Re-evaluate municipal food safety regulation barriers that prevent businesses from sharing surplus food and/or byproducts.	
	D4. Leverage urban food production to transform city-owned vacant lands into valuable community assets.	D4.1 Revitalize vacant public lands into community assets such as urban gardens and sites of urban food production for Clevelanders with minimal to no access to fresh, nutritious food.	D4.2 Support industry to trial innovative urban farming techniques like aquaponics and vertical farming.		
D5. Promote reuse, repair, sharing, and recycling programs and businesses.	D5.1 Set up or support existing repair and learning exchange cafes, community centers and spaces that facilitate material exchange.	D5.2 Remove or reduce local taxes on second hand goods and circular activities like repair services to incentivize reuse.	D5.3 Incentivize or support companies to guarantee the right to repair.	D5.4 Implement a Pay-As-You-Throw scheme in the city for grocery stores and restaurants.	
	D6. Pilot and scale innovative circular technologies within the city to extract the most value from resources (e.g. high-quality organic waste processing, biomaterials manufacturing from feedstocks) and evaluate, replicate and scale-up existing initiatives.	D6.1 Introduce legislation to prioritize procurement and use of local and circular materials in the construction of public infrastructure projects.	D6.2 Improve infrastructure for collecting separate waste flows and processing them.	D6.3 Work in partnership with the Ohio Materials Marketplace to create a Circular Economy Resource Innovation Campus.	
D6.5 Allocate vacant lands to academic or community Living Labs (full scale experiments).		D6.6 Facilitate the collection of by-products from local businesses to use as a feedstock for local innovators and entrepreneurs.	D6.7 Provide tax incentives to local businesses aligned with climate goals to prioritize and monetize food waste diversion.	D6.8 Pilot high-quality organic waste processing with local food processing industry and knowledge institutions.	
D7. Develop a transparent participatory budgeting program and set up initiatives to inform residents about and engage them in the program.	D7.1 Co-develop a participatory budgeting scheme with the local community.	D7.2 Expand the participatory budgeting program.			

GOAL 3: Extract value from waste materials (nutrient recovery, recycling)

GOAL 1: REDUCE THE CONSUMPTION OF RESOURCES AND THE GENERATION OF WASTE



D1. Promote and support the purchase of local, sustainable, secondary/circular and other environmentally preferable products.

Local governments and institutions can use their purchasing power to stimulate local, sustainable entrepreneurship through the food and goods they buy and facilities they manage. Ideally, local institutions can receive incentives to cover any price premiums for local, and sustainable goods. In addition, a local brand or certification could spotlight local, sustainable businesses (e.g. the Great Lakes Friendly Restaurants program). A standardized local currency could even be introduced that can only be used to buy local goods (e.g. Ohio Direction Card, Women, Infants, and Children Program's Nutrition Card, Temporary Assistance to Needy Families Program, Lémans (Geneva)).

Key Partners:

CNP, Destination Cleveland, GCP, Central Kitchen, Food Access Raises Everyone (FARE), OSU Extension, Cleveland Metropolitan School Districts (CMSD), Cleveland Owns, Cleveland Independents.

Others to be involved: Community development corporations, grocery stores, local philanthropy, universities.

ACTIONS IN TIME



D1.1 Create incentives to have local government, anchor institutions, and grocery stores adopt circular procurement strategies on soil, food, grocery supplies, facilities, and construction.

Description:

Local governments and institutions can use their purchasing power to stimulate local, sustainable entrepreneurship through the food and goods they buy and facilities they manage. The City of Cleveland can partner with the City of Toronto's recently led [circular procurement exercise](#) to learn more about circular procurement policies that are consistent with trade rules. The City of Cleveland and Cuyahoga County can assist the Council of the Great Lakes Region, which also recognizes the power of circular procurement, and acts as part of the [Circular Great Lakes initiative](#). Through its own circular economy roadmap, the City of Cleveland can form a regional circular procurement working group, a public-private sector forum for sharing best practices and lessons learned in this emerging field in collaboration with other leading procurement and circular economy organizations.

Best practice:

Circular Procurement in Groningen: As a key priority area in the circular vision for the city of Groningen (Netherlands), circular procurement was identified. With circular procurement being a priority, the City Council means to influence the business community towards circular practices. An in practice example that is yet to be established is the Circular IQ, an online software application for collaboration, data monitoring and analysis that uses simple data to support circular decision-making.



D1.2 Start an "eat and buy local and sustainable" campaign and educational program for public schools and public institutions.

Description:

Creating awareness about sustainable food production is an important step in promoting environmentally preferable products. Starting a campaign on local, sustainable and packaging free food products as part of an education program for public schools and institutions can help inform citizens in making sustainable decisions. For lower resource school institutions and neighborhoods, such as for the CMSD school district, promote practices such as edible food waste diversion through partnerships between local businesses and institutions.

Best practice:

Sustainable Schools FAO program, El Salvador: Before in El Salvador, the school canteen only offered unhealthy food to children. Now, it serves all the students, aged 4 to 18, healthy, nutritious meals made with local produce, such as vegetables and fruits. Some of the ingredients even come from the school garden, which is tended to and harvested by school students. The biggest change of all is that students are aware of the difference between healthy and unhealthy foods.



D1.3 Develop a brand or certification for circular products and businesses.

Description:
A brand certification for circular products and businesses communicates to consumers that local goods and services are remanufactured or grown from the same residual streams. The development of a brand certification requires insights into product manufacturing. After its establishment, the effectiveness of the brand certification depends on the monitoring. Work with locally established organizations such as the Eat and Explore brand, the Cuyahoga Solid Waste District, and the Great Lakes Friendly Restaurant Program to launch the campaign with restaurants and food businesses.

Best practice:
Charlotte, North Carolina: Chamber of Commerce Entrepreneurship Support: Charlotte Chamber of Commerce launched support services for new entrepreneurs and local makers, giving advice and providing resources for people launching businesses. All local products made or refurbished according to circular principles can be labeled with the Circular Charlotte brand, which has been an important marketing platform for small enterprises in the city, particularly in their early stages.



D1.4 Introduce or reactivate an existing local currency and pay 3% to 5% of employee salaries in local currency.

Description:
To enhance circularity in Cleveland and strengthen the local market, a local currency should be adopted or reactivated to pay 3% to 5% of local employee salaries. This requires detailed monitoring to prevent local economic setbacks.

Best practice:
Hudson Valley Current: The Current is an alternative currency recognized by the IRS that can only be used within the Hudson Valley at member businesses. Pegged to the US dollar, this local current ensures money stays local and is used to strengthen businesses within the local economy. This results in the creation of a daisy chain of transactions that keeps all value within the local economy, creating a multiplier effect.



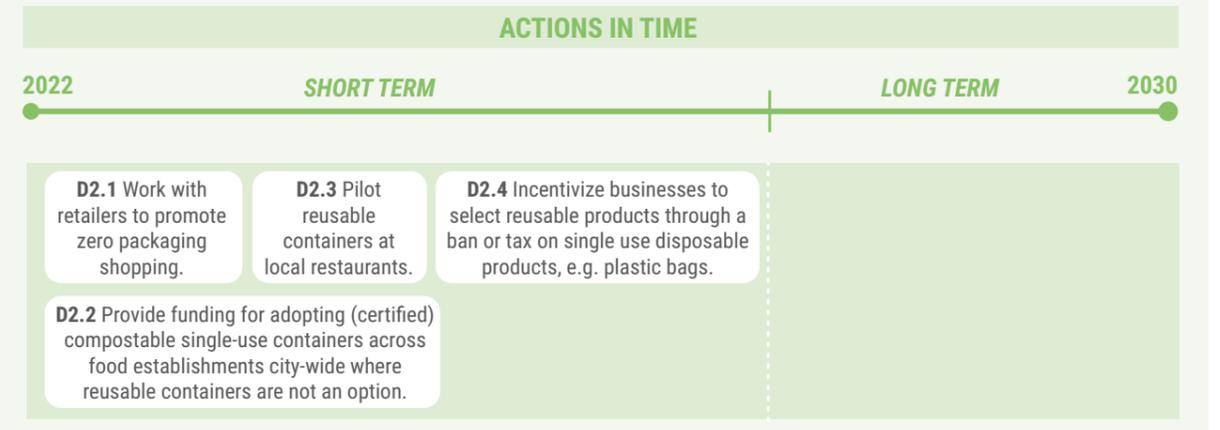
D2. Minimize the use of non-recyclable packaging materials.

Promote and support the use of reusable containers for local restaurants (e.g. New York City reusable tupperware) and small businesses through education campaigns, the implementation of incentives, and by working through trade associations. Establish grocery stores that provide products without packaging and/or in bulk, or permit them to do so. Work with the manufacturing industry to ensure that liability is balanced through all actors. In the long-term and with the support of the City (e.g. incentives), single use plastics could be avoided in the city entirely. The

objective of this action is to reduce the production of waste, and of the impact of the products that are consumed in Cleveland.

Key Partners:
Sustainable Cleveland ZeroWasteNEO Working Group (Zero-Waste NEO), Central Kitchen, Cleveland Independents, CSWD.

Others to be involved: Restaurant network, food manufacturers and packers, philanthropy, grocery network.



D2.1 Work with retailers to promote zero packaging shopping.

Description:
Grocery stores and retailers throughout Cleveland can be transformed into bulk and zero-packaging retailers or offer the latter to reduce packaging required. To promote the use of, and help grocery stores get started with, for example, reusable containers, the municipality should be working together with local businesses to provide resources. Additionally, Cleveland's city department should ensure this is permitted by local health codes and facilitate other policy and code changes to enable this. Potentially, the local polymer industry in Cleveland can be involved in these efforts.

Best practice:
Reusable containers in Philadelphia: After Philadelphia's Health Department collaborated with a local food business in 2021, it approved of using reusable containers. Since then, Philadelphia's Office of Sustainability has been working together closely with local businesses in raising awareness and creating this change.





GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D2.2 Provide funding for adopting (certified) compostable single-use containers across food establishments city-wide where reusable containers are not an option.

Description:

A successful way of minimizing packing materials is by funding (certified) compostable containers at local food businesses. Working together with local composting facilities is crucial to ensure compliance with local processing facilities (e.g. [Rust Belt Riders](#) and future facilities). To make this intervention successful, an accessible system of logistics must be created that assures the compostable containers end up at a composting facility.

D2.3 Pilot reusable containers at local restaurants.

Description:

Single-use cups and take-out packaging are a financial and ecological burden to municipal waste management. By setting up pilots at local restaurants across Cleveland, the municipality can start to build out a city-wide reuse system as an alternative to disposable to-go packaging.

Best practice:

Cafilia: The Cafilia Coffee Shop Network is a movement that successfully introduced reusable coffee mugs in the Cleveland/Akron area. By signing up, customers can order coffee from local shops and receive a sustainable mug that can be refilled. This way, customers support local and are sustainable with their coffee.



D2.4 Incentivize businesses to select reusable products through a ban or tax on single use disposable products, e.g. plastic bags.

Description:

To prevent plastics and other single use materials, from harming Cleveland's environment, a reduction in single-use products can be incentivized by starting with a single-use item fee, and move towards the implementation of a city-wide single-use ban over a longer period of time. It is important to work closely with local businesses to support them in the transition and create public support. Connect to [Skip the Stuff](#) policy campaign that enacts policies in local and state government to require restaurants to "ask first" before adding accessories. Connect to [Reusable LA](#) that empowers cities across the U.S. to champion a reusable culture and resolve plastic pollution.

Best practice:

Cuyahoga County's Plastic Bag Ban: Cuyahoga County will enforce a ban on single use disposable plastic bags in 2022. The ban prohibits retailers from providing disposable bags at the checkout while allowing them to provide 100% recyclable paper bags, and sell reusable bags. Among the retailers impacted are retail stores, convenience stores, grocery stores, service stations and drug stores. Cities that opted out of the plastic ban are encouraged to stop offering disposable bags at checkouts.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

GOAL 2: BUILDING A CIRCULAR LOCAL FOOD SYSTEM



D3. Decrease food waste from businesses.

Decrease the amount of food waste in Cleveland by connecting and supporting local organizations focused on redistributing food surplus and promoting the use of food redistribution applications (e.g. [Hunger Network](#), [Abound Food Care](#), [Spoiler Alert](#), or [TooGoodToGo](#)). Provide education and support to local organizations to facilitate the logistics of saving, storing, processing and sharing food surplus (e.g. health and safety regulations, best by/use date, development of a guidebook, real-time matchmaking, cold storage, commercial kitchens).

Key Partners:

ZeroWaste NEO, Hunger Network, Strengthening Our Students (SOS), Food Strong, Greater Cleveland Food Bank (GCFB), My Grow Connect, Rust Belt Riders.

Others to be involved: Grocery network, culinary institutes.

ACTIONS IN TIME

2022

SHORT TERM

LONG TERM

2030

D3.1 Promote the use of food rescue initiatives which connect surplus food to people facing food insecurity.

D3.3 Require food businesses to donate/share/sell or otherwise divert their excess edible food from landfill to local organizations.

D3.2 Start collaborations with institutions to stimulate the purchase of excess food.

D3.4 Re-evaluate municipal food safety regulation barriers that prevent businesses from sharing surplus food and/or byproducts.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D3.1 Promote the use of food rescue initiatives which connect surplus food to people facing food insecurity.

Description:

Expanding partnerships with local businesses that have excess food and local organizations such as senior centers, transitional houses and health clinics is critical in meeting those in need where they are. Initiatives like the [Hunger Network Food Rescue App](#) offer volunteers the opportunity to be responsible for the direct transport of surplus food from local businesses to organizations in the community supporting individuals and families facing food insecurity.

Best practice:

FoodCloud: This Irish organization is on a mission to rescue food from being wasted. By partnering with local supermarkets, retailers and manufacturers, FoodCloud gets notified of any surplus food and distributes it to local charities, ranging from homeless shelters to family support services.



D3.2 Start collaborations with institutions to stimulate the purchase of excess food.

Description:

Often excess food, which results in food waste, is perfectly edible and suitable to be purchased, but a lack of connections prevents it. Initiating collaborations with institutions will however stimulate food waste diversion. The City of Cleveland can potentially collaborate with [Our Food Future](#), a partnership between the City of Guelph and Wellington County (Canada), which developed an outline of the first circular food economy, aiming to eliminate food waste.

Best practice:

Milan's Circular Food Policy: This policy is designed as a tool to support the city's food industry players in reducing food waste. By working with local public and private organizations, and supporting innovation, Milan has seen important reductions in food waste. The city has developed a food waste hub where local food businesses can donate surplus food.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D3.3 Require food businesses to donate/share/sell or otherwise divert their excess edible food from landfill to local organizations.

Description:

Business participation in these types of programs could be elevated and more easily required by pitching programs that have guidelines for businesses to follow and allow for a smooth donation/sharing/selling process. Organizations such as [Food Rescue](#) could be leveraged to provide resources and education on these food waste reduction initiatives in place to better support business staff. Effort on behalf of the donors to build an internal infrastructure for participation in these initiatives, however, would have a dramatic impact on how smoothly these programs could run. Having a champion or community specific liaison at these businesses that are focused on this initiative would increase donation efficiency, and thus help keep excess food out of the landfill.

The collaboration between large scale recovery organizations (e.g. Food Bank) and smaller scale recovery organization (e.g. Hunger Network Food Rescue) is imperative in addressing the food waste issue as a whole.

Best practice:

San Diego Food & Yard Waste Recycling Rules: The City of San Diego recently enacted legislation that requires food recovery and composting of grocery stores, food distributors and other businesses as a solution for mitigating food waste. The EPA Food Recovery Hierarchy sets a precedent that excess food should first be donated for human consumption and additional leftovers can be used for animal feed and then composted. This type of legislation can be a critical component to support [Hunger Network Food Rescue](#), [Rust Belt Riders](#) and other organizations working on this topic in addressing food insecurity.



D3.4 Re-evaluate municipal food safety regulation barriers that prevent businesses from sharing surplus food and/or byproducts.

Description:

Businesses sharing surplus food and/or by-products may be further increased by re-evaluating Cleveland's and Cuyahoga County's current food safety regulations. The policy re-evaluation should focus on finding opportunities to overcome barriers that prevent businesses from donating excess food and set up new regulations if needed in accordance with the Good Samaritan Food Donation Act. To store these foods properly, increased investments in food storage options can be explored (e.g. explore opportunities with the new Opportunity Corridor and to co-locate infrastructure and logistics). Connect with the [Cuyahoga County Board of Health](#), the [Cleveland Department of Public Health](#) and [Hunger Network](#).

D4. Leverage urban food production to transform city-owned vacant lands into valuable community assets.

Support and expand existing community gardens with knowledge, funding, materials, and land sovereignty. Experiment with innovative and circular food production systems such as aquaponics (a closed loop food production system with fish and plants) in collaboration with local knowledge institutions and nonprofits. Set up a revolving fund to support urban

agriculture businesses, innovation and development. Revisit and stimulate the [Urban Agriculture Innovation Zone](#) through funding, resources and supporting policy changes.

Key partners

Rid-All, OSU Extension.

ACTIONS IN TIME



D4.1 Revitalize vacant public lands into community assets such as urban gardens and sites of urban food production for Clevelanders with minimal to no access to fresh, nutritious food.

Description:

Cleveland's public vacant lands can be identified and transformed into urban food production systems to increase their value as community assets. Urban farming can also facilitate closing the nutrient loop by reusing local compost as fertilizer. Sufficient funding must be identified to allow scaling.

D4.2 Support industry to trial innovative urban farming techniques like aquaponics and vertical farming.

Description:

Pilot innovation in Cleveland's urban food production systems with techniques such as aquaponics or vertical farming to create social cohesion on urban food production and strengthen community asset value. Partner with private organizations, such as large industrial players or local clean tech organizations, to secure sufficient financial resources. Offer this opportunity to innovators and R&D departments to pilot novel technologies.

Best practice:

Rid All Green Partnership: This partnership aims to grow food, create jobs, and build healthy, green neighborhoods. In Cleveland's Kinsman Neighborhood, the partnership has turned vacant land into an urban farm, consisting of greenhouses, hoop houses and aquaponics. The aim is to provide the local community with food products while training both adults and youth on cultivation techniques with educational programs.

GOAL 3: EXTRACT VALUE FROM WASTE MATERIALS (NUTRIENT RECOVERY, RECYCLING, RECOVERING)



D5. Promote reuse, repair, sharing, and recycling programs and businesses.

Promote reuse, repair, and recycling by improving current waste infrastructures, supporting the implementation of community initiatives (e.g. repair cafes, community centers, material exchange points), making circular/repared/secondhand products and services more financially accessible (e.g. reducing sales tax), and by working with businesses to guarantee durable products.

Key Partners:

Neighborhood Connections, TPL, OSU Extension, Rid-All, Evergreen Cooperatives (Evergreen Coop), Cleveland Owns, Cleveland Independents, CUDC, WRLC, FARE, ioby.

Others to be involved: Local land banks, large landowners.

ACTIONS IN TIME



D5.1 Set up or support existing repair and learning exchange cafes, community centers and spaces that facilitate material exchange.

Description:

Set up or support existing repair cafes, fixit clinics, community centers and spaces of material exchange with full-time staff for repair support and recyclable collection. Social centers of reuse, sharing and repair products can strengthen the sphere of public life, while delivering on the city's mission to foster ecological behavior amongst its citizens.

Best practice:

Repair Cafe: International non profit organization that stimulates the creation of repair cafes around the world, through offering interested people practical, legal, social and branding advice for starting a repair cafe. The organization also provides an overview of repair cafe locations.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D5.2 Remove or reduce local taxes on second hand goods and circular activities like repair services to incentivize reuse.

Description:

Work with the local governments, including at the State level, to incentivize the purchase of second hand and circular products or services through tax reduction.

D5.3 Incentivize or support companies to guarantee the right to repair.

Description:

Incentivize companies to guarantee the right to repair, take back products, or pay fees that fund repair, reuse, and recycling infrastructure.

Best practices:

Fairphone: At the core of its concept, Fairphone manufactures its products in such a way that all components are repairable. With that, the company aims to set the Right to Repair bar higher with the design of every new product.

The Model European Parliament "right-to-repair" law: MEPs want products to be designed to last longer, to be safely repaired and their parts easily removed. They believe that a proper "right to repair" should give repairers and consumers access to repair and maintenance information, free of charge.



D5.4 Implement a Pay-As-You-Throw scheme in the city for grocery stores and restaurants.

Description:

Systems "pay for as much as you throw" (i.e. Pay-as-you-throw (PAYT)) can effectively encourage waste reduction in the industry, enterprises, and residential level. Rather than indirectly charging fixed fees via property taxes, a PAYT-scheme ensures a variable fee based on use for residents and companies, allowing them the power to control their spendings on trash. On the short term, the City should start inform citizens about the current waste collection fees and educate on the PAYT-scheme, before implementing the program. Once implemented, it will be necessary to closely monitor these systems to prevent illegal dumping of waste. It will also require training for the private and public sector on how to reduce waste and adopt sustainable resource management. Special attention and flexibility in the program design should be given to low-income households, as well as the disabled and elderly, for example by reducing the per-household waste collection charges for eligible residents by a set amount, offer a percentage discount, or provide a credit on the overall bill.

Best practice:

Waterville's PAYT-system The city in the U.S. implemented a successful PAYT-system back in 2014. Since then, residential municipal solid waste collected curbside has decreased by 56%, saving an estimated \$1 million dollars in waste disposal fees in five years. Residents have expressed their appreciation for the enhanced recycling, referring to the financial savings for taxpayers that throwing away less trash every year creates.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

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ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D6. Pilot and scale innovative circular technologies within the city to extract the most value from resources (e.g. high-quality organic waste processing, biomaterials manufacturing from feedstocks) and evaluate, replicate and scale-up existing initiatives.

Pilot innovative circular technologies while building community wealth by repurposing vacant land in collaboration with the local community, local universities, and organizations. Develop full scale circular innovations (e.g. nutrient recovery from wastewater, modular buildings designed for disassembly, plastic upcycling, resource campus). Use local grants to execute and scale-up these circular economy pilots throughout the city.

Key Partners:

OMM, CASE, KSU, redhouse studio, AIA, Grind2Energy, Quasar energy group, Rust Belt Riders, Central Kitchen, Tri-C.

Others to be involved: Local Land Banks, universities, breweries.

ACTIONS IN TIME

2022

SHORT TERM

LONG TERM

2030

D6.1 Introduce legislation to prioritize procurement and use of local and circular materials in the construction of public infrastructure projects.

D6.3 Work in partnership with the Ohio Materials Marketplace to create a Circular Economy Resource Innovation Campus.

D6.5 Allocate vacant lands to academic or community Living Labs (full scale experiments).

D6.7 Provide tax incentives to local businesses aligned with climate goals to prioritize and monetize food waste diversion.

D6.2 Improve infrastructure for collecting separate waste flows and processing them.

D6.4 Incentivize residents and businesses to compost their organic waste.

D6.6 Facilitate the collection of by-products from local businesses to use as a feedstock for local innovators and entrepreneurs.

D6.8 Pilot high-quality organic waste processing with local food processing industry and knowledge institutions.

D6.1 Introduce legislation to prioritize procurement and use of local and circular materials in the construction of public infrastructure projects.

Description:

Circularity can be enhanced in local municipal infrastructure projects by prioritizing local procurement for construction. The adoption of legislation that mandates this integration in projects of the city is the first step.

D6.2 Improve infrastructure for collecting separate waste flows and processing them.

Description:

The City should ensure transparency to the local community about the waste collection and treatment currently being used (e.g. separated streams collected, local waste treatment infrastructure). Continue to improve the infrastructure for processing and collection of (separated) waste streams throughout the city and build on the recycling program.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D6.3 Work in partnership with the Ohio Materials Marketplace to create a Circular Economy Resource Innovation Campus.

Description:

Developing a Circular Economy Resource Innovation Campus (RIC) can stimulate the development of new material processing technologies while increasing community education. The RIC is a flagship project and will become a circular economy hub attracting entrepreneurs to create economic growth from materials recovered in the city's waste streams, creating local circular jobs. By partnering with Ohio Materials Marketplace, which has been successful in finding reuse and recycling solutions for waste and by-product materials, the campus can collaborate on creating a closed-loop network.

Best practice:

Phoenix's RIC: With the aim to reduce waste generation, the city developed a RIC at Arizona State University in 2015. This campus is part of The Resource Innovation and Solutions Network, which accelerates the global transition to a circular economy through a global network of public, private and NGO partners using collaboration, research, innovation, education and application of technologies to create economic value through sustainable resource management.



D6.4 Incentivize residents and businesses to compost their organic waste.

Description:

Support residents and businesses to compost their organic waste through the development of a city-wide composting program. Incentives can include composting rebate program, providing home composting bins and a composting ordinance.

Best practice:

Daly City's Composting Program: In Daly City, California, the city government has launched a citywide composting program. Residents are encouraged to separate organic waste in specific green compost carts, handed to them by the local authority. Once placed on the curb, the city ensures proper waste collection and processing, enabling valuable use of the compost.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D6.5 Allocate vacant lands to academic or community Living Labs (full scale experiments).

Description:

Public vacant lands can be successfully transformed to showcase innovative and full-scale circular experiments as part of academic or community Living Labs such as for nutrient recovery from wastewater, maker spaces, innovative recycling processes, production of biomaterials, modular buildings designed for disassembly, or plastic upcycling.

Best practice:

Living Lab De Ceuvel: In 2010, the idea for De Ceuvel was born following a municipal call for bids for the temporary use of a former shipyard in the district of Amsterdam North. The design proposals had to be sustainable and creative, and with that De Ceuvel became a clean-tech playground - a site to test and implement sustainable technologies aimed at achieving an area with 100% selfsufficiency and circular, closed loops - with the central café functioning as a hub for the community and sustainable activity of De Ceuvel.



D6.6 Facilitate the collection of by-products from local businesses to use as a feedstock for local innovators and entrepreneurs.

Description:

By-products from businesses are successfully used as feedstock for local innovators and entrepreneurs once the collection of these products is facilitated. Businesses across Cleveland can learn from existing initiatives where coffee grounds from local coffee shops are used to grow mushrooms (see Circular Manufacturing actions).



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D6.7 Provide tax incentives to local businesses aligned with climate goals to prioritize and monetize food waste diversion.

Description:

Work with local food businesses producing food waste or organic waste to incentivize them to divert it from the landfill. Tax incentives can be offered for donating their food to local organizations.

Best practice:

Arizona's food diversion incentives: The State offers two relevant tax incentives to divert food from landfill. First, a deduction for restaurants that donate food to non-profits that serve free meals to those in need, covering prepared food and drinks as well. Second, a tax deduction for farmers or agricultural processors who donate crops to non-profits in Arizona that use the crops for their charity work.



D6.8 Pilot high-quality organic waste processing with local food processing industry and knowledge institutions.

Description:

Off cuts and edible food waste can be turned into high-value added pharmaceutical or lifestyle products, otherwise turned into nutrition such as beers, jams or feedstock. Key players for edible food waste innovation are: Hunger Network, West Side Market, Central Food Kitchen and Hub, Tri-C Community College's Culinary Institute, Other Culinary Schools. Inedible organic waste from households, small businesses, and local industry can be processed into low-value products such as compost or generate energy through co-digestion (e.g. anaerobic digestion, biogas generation, etc.). Key partners in anaerobic digestion are Quasar Energy Group, and Grind to Energy. Key composting partners are City of Cleveland, Rust Belt Riders, Kurtz Broz. Organic waste processing can therefore result in promising products for the residents of Cleveland.

Best practice:

LOOP mission: LOOP Mission is a circular economy project that aims to reduce food waste by repurposing the outcasts of the food industry. They save fruits and veggies that are rejected because they lack proper shape, size or a shelf life that is not long enough to survive the cycle of distribution. They transform these foodstuffs into cold pressed juices, beers, gins, sodas, and soaps.



GOAL 1

ACTION D.1

ACTION D.2

ACTION D.3

ACTION D.4

ACTION D.5

GOAL 2

ACTION D.6

ACTION D.7

D7. Develop a transparent participatory budgeting program and set up initiatives to inform residents about and engage them in the program.

Begin using participatory budgeting (i.e. democratic process through which a part of the municipal budget is allocated directly by community members), starting with participatory budgets for green space management. Stimulate community projects by providing each neighborhood with a set budget to build natural infrastructure (e.g. phytoremediating plants, rain gardens, food production on vacant land, etc.) that will generate a healthy living environment and cleaner waterways. Host programming with local and national experts on pollution remediation to inform the participatory budgeting campaigns. Build upon existing efforts of

the *Cuyahoga Soil and Water Conservation District* rain garden assistance program, and extend it to broader green space planning, installing and governance. Work with academia to educate local community members on potential green space interventions.

Key Partners:

PB Cle, FARE, Neighborhood Connections, Northeast Ohio Coalition for the Homeless (NEOCH).

Others to be involved: Local land banks, community development corporations.

ACTIONS IN TIME

2022

SHORT TERM

LONG TERM

2030

D7.1 Co-develop a participatory budgeting scheme with the local community.

D7.2 Expand the participatory budgeting program.

D7.1 Co-develop a participatory budgeting scheme with the local community.

Description:

Develop a scheme of participatory budgeting across themes in which community members allocate money to projects and programs (e.g. green space implementation). Work with the community to answer local needs and stimulate participation in the program.

Best practice:

Ecologic and Solidary Participatory Budgeting in Paris Region: After the success of Paris Region's first participatory budget in 2020, that was to be used for green management amongst others, it was expanded for the second session. Apart from individuals, companies, associations and public or private agencies (such as universities) can also contribute to the process, thereby developing a community where learning opportunities are created.

D7.2 Expand the participatory budgeting program.

Description:

Gradually increase and expand the participatory budget available. Provide trainings to inform the community panel into the tasks, challenges and opportunities of budget allocation. Monitor the process and outcomes.

7.4. & INDICATORS

To evaluate whether or not progress is occurring across the desired pathways, we can use a set of indicators. The following indicators provide a starting point to give insight into the progress towards a more circular city in the years to come.

OBJECTIVES	INDICATORS
Cleveland reduces its municipal waste generation	Quantity (tons/year) of municipal waste generation per capita Share of people with access to collection of separate waste streams
Cleveland deploys its curbside recycling program on a city-wide scale	Share (%) of Cleveland residents participating in the curbside recycling program Share (%) of waste diverted from landfill
Nutrients are recovered from (organic) waste at maximum value (e.g. composted)	Average profit (\$) per ton of recovered waste Share (%) and tons of total organic waste from both households and industries used to recover nutrients
Collect organic waste separately from mixed waste	Share (%) and total tons of organic waste in the mixed waste stream
Residents in Cleveland use resources efficiently to meet their needs	Quantity (tons) of resource demand per capita
Local industries use resources efficiently	Quantity (tons) of virgin resources consumed by industry per \$ gross metropolitan product (GMP)
The municipality focuses its procurement on the purchase of recycled and biobased materials	Share (%) of public procurement of materials and products that consists of recycled or biobased materials
Local businesses and institutions adopt circular procurement strategies	Percentage of procurement committed to local businesses and circular products Share of local institutions participating in circular food campaigns Number of local businesses with a circular brand
Maintain complex and hard to recycle materials (e.g. textiles, e-waste) at their highest value	Share (%) of electronics and textiles actually reused, repaired, recycled (not just collected) in a given year; Accessibility of repair initiatives
Maintain material quality (complexity) of non-biotic resources	Share (%) of non-biotic resources processed per waste processing category (Reuse, Repurpose, Refurbish, Remanufacture, Recycle, Recover and Dispose)
Ensure that edible food waste is recovered locally for human use	Share (%) of edible food waste recovered through food donation Distance (miles) between pick up and drop off of donated products Number of (small) businesses with reusable containers
Increase the transformation of city-owned vacant lands into valuable community assets	Share (%) of urban farming initiatives on former city-owned vacant lands
Minimize water consumption in the city for both industries and residents	Water consumption per capita and per employee (gallons)

FROM STRATEGY TO ACTION

This Circular Cleveland Roadmap presents a set of specific actions that can guide local changemakers in Cleveland in their pursuit of a more inclusive and sustainable economy. It addresses the key actions that can help to build an empowering environment for systemic change towards a more inclusive environment, that requires a coordinated and collaborative effort of the governments, local industries, community organizations and Cleveland's residents. In addition, specific actions are presented in each of the focus areas that allow for a more guided approach with the champions that are already working towards positive change in these sectors.

The basis for this collaboration is already there – many individuals and organizations in Cleveland are actively working on elements laid out in this roadmap. However, the challenge of building an inclusive and circular society requires additional efforts and resources from all stakeholders. By allocating additional resources along the proposed actions of this roadmap, these initiatives can grow and replicate, step-by-step building a more circular economy in Cleveland. As a major city, Cleveland has the potential to contribute to a better world, for people and the environment, locally, regionally and globally. With this strategy, stakeholders have a path forward to make even more of a positive impact in the years to come.



APPENDIX I: MATERIAL FLOW ANALYSIS AND INSIGHTS

LEGEND
 ----- Under 50,000 tons, 500 TJ

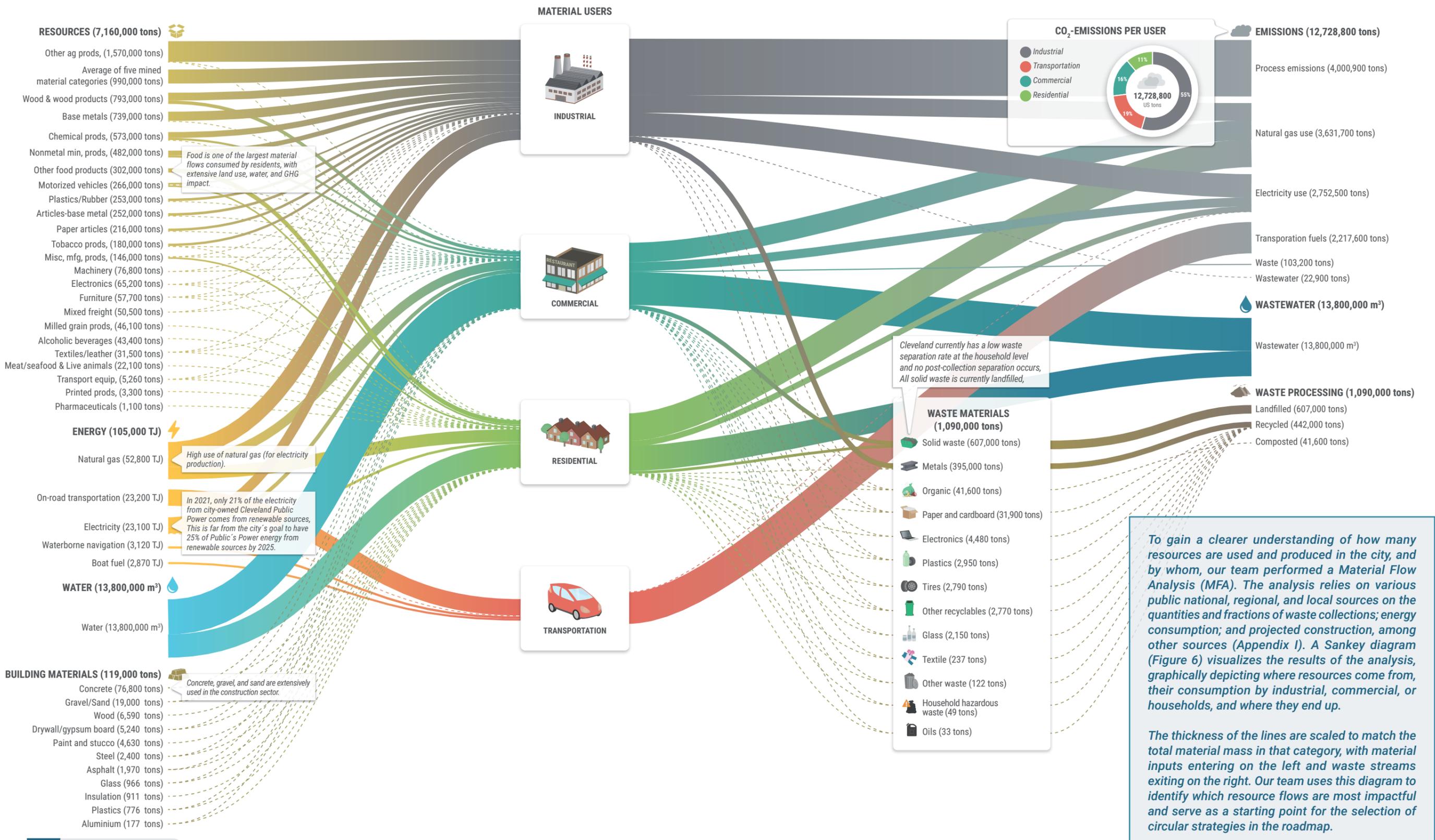


Figure 6 Material flow analysis.

DESCRIPTION OF THE MATERIAL FLOW ANALYSIS

Inputs

On the left side of the Sankey diagram we see the different resources that were consumed in the city of Cleveland for the year 2020, broken down into four categories. The following sections briefly describe the key insights and flows per category.

Resources

This material flow analysis provides insights into the material, energy and water flows that are consumed in the city of Cleveland. At the top left of the diagram we see an overview of general **material resources (7,160,000 tons)** that are consumed on an annual basis in the city. The largest resource flows for Cleveland are *Agricultural products (1,570,000 tons)*, *Mined materials (990,000 tons)*, *wood and wood products (793,000 tons)*, and *base metals (739,000 tons)*. The agricultural products are processed by the food processing industry into new food products for local, regional and global consumption. The metals and mined elements are an indication of Cleveland's extensive metal production and processing industry, which consume large amounts of primary (virgin) materials. In the pursuit of a circular economy, we are faced with the challenge to decrease the environmental impacts of the materials we consume by consuming more secondary materials or biobased materials.

Data source:

Based on the national sector use (\$) converted to mass (with a \$/tons factor calculated from imports in Ohio) and scaled down to the city with employee numbers per sector.

Built environment based on annual square footage per building type – calculated from the number of buildings and material intensity factors from a *MIT study*.

Residential consumption based on consumer expenditures in Ohio and scaled down to Cleveland's population – calculated from the \$/tons factor calculated before.

Energy

Cleveland's energy consumption (105,000 TJ) was mostly from natural gas (52,800 TJ), which was predominantly used by industrial actors. Industrial actors therefore play a large role in the city's transition towards less and cleaner energy consumption. Secondly, residences consume large amounts of natural gas. Insulation of houses can also strongly contribute to Cleveland's energy goals. On-road transport also consumes large amounts of energy (both trucks and cars). A clean transportation system is crucial to decrease Cleveland's CO₂-emissions as well as address local air quality issues.

Data source:

Based on the City of Cleveland's GHG Inventory Report (City wide energy consumption and emissions) and on the Cleveland Transportation GHG Emissions (municipal transport emissions).

Water

Commercial actors consume large amounts of water for utilities, washing, irrigation and consumption., as do households. Decreasing drinking water consumption can occur by collecting local rainwater and using it for non-consumption uses (e.g. irrigation).

Data source:

Based on the Department of Public Utilities - Water Sales and Service Report (net water consumption for the city of Cleveland).

Building materials

New buildings require extensive material use, which currently mostly consist of newly produced, primary materials, predominantly concrete (76.800 tons). More circular building materials include secondary (reused) materials, or renewable materials such as wood and other plant-derived materials.

Data source:

Based on Cleveland's construction and demolition permits and building profiles from: Ochsendorf et al. (2011), retrieved from: https://cf.specifyconcrete.org/doc/MIT_Buildings_LCA_Report.pdf

Building profiles that contain material usage per square footage of residential and commercial buildings were used in combination with the amount of square footage of newly constructed and demolished buildings to calculate material flows. All buildings fall into two rough categories; residential or commercial buildings.

Outputs

On the right side of the Sankey diagram we see the different flows that were produced in the city of Cleveland in the form CO₂-emissions and waste. The following sections briefly describe the key insights and flows per category.

Emissions

In the year 2020 Cleveland's residents and businesses emitted around 12,728,800 tons CO₂. Most of these emissions (4,000,900 tons) were process emissions, which are emissions that occur when raw materials (e.g. iron ore) are processed into industrial products (e.g. steel). In total, local industry accounted for around 55% of all Cleveland's emissions. Transitioning towards clean industries can strongly contribute to the city's climate ambitions. In addition, natural gas use accounts for a large amount of local emissions (3,631,700 tons). Less energy consumption and more renewable energy sources (e.g. wind and solar) can decrease local emissions.

Data source:

Based on the City of Cleveland's GHG Inventory Report (City wide energy consumption and emissions).

Wastewater

Wastewater from commercial actors and residents amounted to around 13,800,000 m³. Wastewater from residents often contains many valuable nutrients, such as nitrogen (N), phosphorus (P) and carbon (C). These and other nutrients can potentially be recovered and used for fertilization or the creation of circular products.

Data source:

Based on the Department of Public Utilities - Water Sales and Service Report (net water consumption for the city of Cleveland). Assuming that the wastewater is equal to the water consumption.

Waste processing

Currently, local industry, commercial actors and residents produce at least 1.090.000 of waste per year. The largest waste stream in the city is solid mixed waste, largely coming from households. This waste flow is currently landfilled, but contains many materials that could potentially be recycled. Increased separation at the household level could allow more materials to be reused. Additionally, waste separation technology can potentially separate out materials from a solid mixed waste flow, such as plastics, tins, drinking cartons. Metal waste from the metal industry is already recycled at a high rate, because it can be used as an input relatively easily when producing new steel products. Small fractions of organic waste are currently already composted. However, there are still large amounts of organic waste in the solid mixed waste flows that are now sent to landfill, which represents a large value loss.

Data source:

Based on the 2019 Cuyahoga County Solid Waste District recycling rates and scaled down for Cleveland.

Assuming the solid waste breakdown is the same as the Cincinnati solid waste breakdown for the same year.

KEY INSIGHTS FROM THE REGIONAL MATERIAL FLOW ANALYSIS

WASTE GENERATION* IN CLEVELAND: 1,090,000 ton waste/year

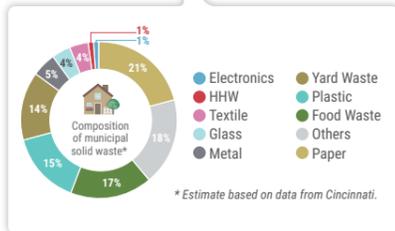
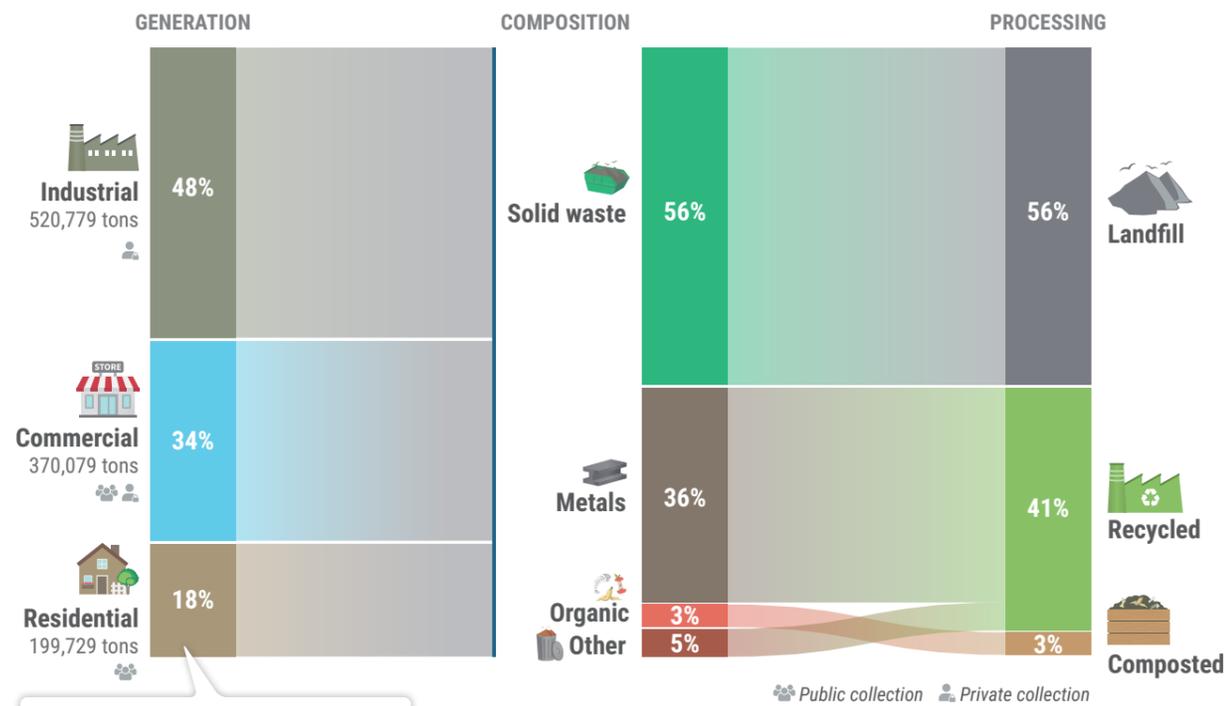


Figure 7 Waste generation in Cleveland.

*For the detailed waste generation in Cleveland per sector, see Appendix II.

DATA GAPS

Having access to more data from private industry increases the accuracy of the industrial flows in our analysis. Currently, this is collected through voluntary assessments.

Industries

Scaling down national data on resource consumption by industries indicates that Cleveland's industrial sector is likely the largest consumer of materials (e.g. fuel oils, agricultural products), and the largest waste generator in the city: 48% of all waste in Cleveland is produced by local industry. The majority of materials produced (steel and metals) are highly impactful materials for the environment (i.e. CO₂-emissions) and their production in the region accounts for 10% of overall U.S. output of steel.



End-of-life management

The majority (56%) of waste produced in the region is minimally separated and is processed as mixed waste which is all landfilled. The exact composition of Cleveland's Mixed Solid Waste (MSW) is unknown. Regional reports indicate MSW consists mostly of organic waste (31.1%),

paper (21%), and plastic (15%). The recycling processes of the various materials are also unknown and would need further characterization to avoid downcycling and minimize refusal.



1,788 lbs/year

The USA produces close to the most Municipal Waste per resident in the world.



1,142 lbs/year

Residents of Cleveland sit far below this number.



578 lbs/year

Yet Cleveland's residents produce far more Municipal Waste per capita than the global average.

Food

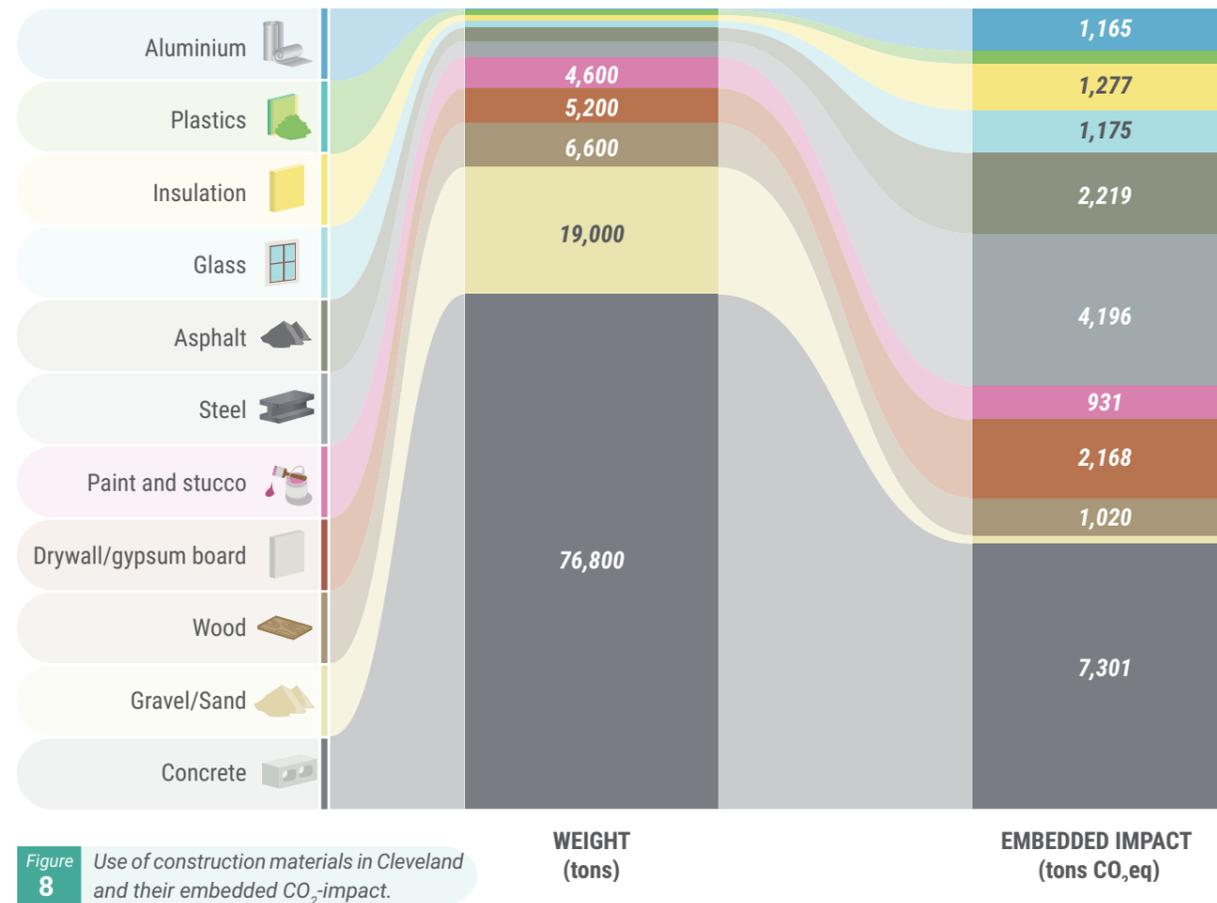
Food is one of the largest material flows consumed by households across the City, with a yearly quantity of 463,000 tons of food and other agricultural products consumed by households in Cleveland, from which 105,900 tons are collected in the mixed waste and only 3,900 tons (4%) are composted. As for the total organic waste produced by all actors in Cleveland, out of the estimated 230,000 tons, only 41,000 tons (18%) is composted.



Construction

The construction sector is mostly described by an extensive concrete (76,900 tons), gravel, and sand (19,000 tons) use by weight. When looking at the embedded CO₂-emissions of construction materials, which take into account the

emissions associated with production and transport up until retail (calculated based on *Dutch estimates*), concrete is responsible for 33% of total emissions from construction materials, followed by steel (19%).



Electronic waste

Electronics are a relatively small portion of the total waste produced. However, this waste has a high potential for value recovery due to the complexity of products and presence of rare metals. Cleveland has electronic recycling programs (e.g. *PCs for People*), however, it is currently difficult to know the exact scale at which those materials are recycled.



APPENDIX II: EQUITY TOOLKIT FRAMEWORK

The *Cleveland Climate Action Plan Racial Equity Tool* (2018) can be used prior to making decisions related to policy, planning, programming, and budgeting within city government and other institutions looking to advance racial equity and shared prosperity. Because racial inequities are compounded by institutional policies and decisions, the cumulative implementation of these tools by institutions can create transformational systemic change. Equity in climate planning, in particular, ensures the just distribution of the benefits of climate protection efforts and alleviates unequal burdens created by climate change. This requires intentional policies and projects that simultaneously address the on-the-ground effects and larger structural forces of the systems that perpetuate both climate change and inequity. The tool is

not intended to solve all problems related to inequities in climate planning and sustainability. Rather, it is intended to guide stakeholders through the process of recognizing inequities, the conditions under which they thrive, and the possible solutions and environments that would mitigate negative effects and enhance positive results.

The Cleveland CAP Racial Equity Tool consists of five question areas that help determine the extent to which proposed climate action objectives and corresponding actions prioritize equity. The following section shares an evaluation of how and to what extent the elements of the Racial Equity Tool have been incorporated in the creation of the Circular Cleveland Roadmap.

1. NEIGHBORHOOD ENGAGEMENT

How the community and stakeholder groups have informed or co-designed the goal and corresponding actions.

The year-long creation of the Circular Cleveland Roadmap included a number of stakeholder engagement sessions aimed to collect input from community members through a series of virtual engagements that followed an in person engagement, several focus group engagements, one-on-one conversations and a survey. Due to the COVID-19 pandemic, direct engagement with community stakeholders was replaced by mostly virtual strategies, being less present in neighborhoods. Only Circular Cleveland Ambassadors, Neighborhood Connection grantees, some local community development representatives, and community organizers could be involved in this process. During implementation, it is therefore recommended to design neighborhood specific action plans based on neighborhood resident input to ensure that outcomes of the proposed actions are responsive to the place.

2. DATA & ACCOUNTABILITY

Determining the available data concerning inequities, its ability to illuminate the extent to which a climate objective drives desired results, and who is accountable.

The Circular Cleveland Roadmap includes a section on monitoring resource flows, as well as monitoring pollution as part of the enabling principles (principle 6). To assure that the impacts of policy on different communities are visible, monitoring must include disaggregated data that illuminate disparity (e.g. by neighborhood, age, ethnicity, gender, sexual orientation, language, income, etc.). Efforts should be made to review data collectively and periodically by stakeholders and the City, - both qualitative and quantitative, to ensure process equity and distributional equity. In addition, data should also be made accessible to those without (reliable) digital access through public engagement, community posts, etc. Indicators to facilitate monitoring progress and outcomes have been developed and listed within each focus area chapter.

3. DISPROPORTIONATE IMPACTS

Who is benefitted or burdened by this impact?

Redlining and legacy industrial pollution have left several Cleveland communities bearing disproportionate health and economic impacts. The circular city strategy for Cleveland builds upon a legacy of systemic racial inequality that is currently still perpetuated in current policies and measures. To improve economic and environmental equity, the roadmap aims to prioritize policies, subsidies, and programs that focus on redlined and historically disinvested communities in Cleveland. This theme is recurrent throughout many of the proposed actions. This is specifically relevant in relation to providing healthy and pleasant living environments; proposed actions such as nature-based-solutions should be applied first to the most polluted neighborhoods, where most positive impact can be made and most inequalities can be addressed intentionally. Another key remark is that the development of vacant lands- a topic widely mentioned in the strategy- needs to come to the direct benefit of the surrounding residents and Cleveland's residents in general. We must ensure that the development of parks and green spaces does not lead to gentrification without benefit to those already there.

4. ECONOMIC OPPORTUNITIES

Do the proposed objectives and the actions provide equitable economic benefits via training, jobs, and contracts?

Some of the actions proposed in the Circular Cleveland strategy could lead to local jobs. An asset based local economy that focuses on creating a more local and resilient system, generates slower and better jobs. This combined with intentional practices of reducing pollution and keeping materials out of the waste stream longer keep the economic benefits local. The implementation of the roadmap offers an opportunity to prioritize historically marginalized people of race, color, gender and other intersectionalities by positively targeting economic incentives and hiring opportunities. This includes opportunities in the industrial and material service sector and products, for green space management or processing waste flows. For each of these actions, stakeholders from diverse backgrounds must be included, and disaggregated data tracked, to assure that benefits are distributed and contribute to a more equitable society.

5. LANGUAGE

Do the objectives and actions express racial and social equity? Is the language easily understood and will it resonate with the community?

With four focus areas, and two areas focusing on several actions that could be, community led or partnered initiatives, this roadmap would have to be accessible in language access and content. The roadmap and landscape analysis were reviewed at multiple stages by a few local grassroots grant recipients who have been constantly engaged, and ambassadors. Based on feedback, several parts were reworded, rewritten and rearranged to make it more approachable based on the feedback. Several images and icons were included to make it visually easier as well. We acknowledge that this document is dense, still not very simple and will need to be broken down, explained and localized as needed. This document is also currently only published in one language and has not been attempted to be translated at this stage. We recommend that portions of this document be translated as needed for the community.

APPENDIX III: PROGRAMS/ POLICIES

This table is a list of programs, policies, or initiatives available to Cleveland's residents and business owners, gathered through our team's desk research. This list is not exhaustive, and other programs or policies may complement it.

PROGRAMS/ POLICIES	DESCRIPTION OF THE PROGRAMS
<u>Active Transportation Plan</u>	The 2020 – 2050 Active Transportation Plan (ATP) advances the regional priorities of the Metropolitan Transportation Plan and helps communities within the Metropolitan Planning Organization area plan for and implement projects that include pedestrian, bicycle, and transit infrastructure in the region.
<u>Architecture 2030 Challenge for Planning</u>	This Challenge was adopted by local building industry leaders that unite around a shared vision for sustainability and economic growth, focusing on energy, water, and emission reductions.
<u>Bike Cleveland's 2019-2024 Strategic Plan</u>	Bike Cleveland's Strategic Plan is developed to build an inclusive, equitable movement for people biking and walking.
<u>Circular Cleveland Ambassador Program</u>	Circular Cleveland Ambassadors are working to connect circular economy efforts to their communities in Cleveland.
<u>City of Cleveland Complete and Green Streets Ordinance</u>	This ordinance incorporates design elements in roadway projects that expand opportunities for travel, including walking, biking, and transit and minimizing environmental harm.
<u>City of Cleveland Lead Hazard Control Grant Program</u>	The program is designed to strategically advance efforts to increase lead-safe affordable housing while eliminating the possibility of childhood lead poisoning in the City of Cleveland.
<u>City of Cleveland Planning Commission</u>	Links to the Citywide Plan, zoning information and planning initiatives for the City.
<u>City of Cleveland Residential Tax Abatement</u>	The Green Building Tax Abatement for residential projects must meet Cleveland Green Building Standards (founded in the Handbook).
<u>Cleveland 2030: A Housing Equity Plan</u>	This plan sets out actionable strategies to create equitable access to housing and housing resources, and ensure safe, healthy and affordable housing in a vibrant neighborhood.
<u>Cleveland Climate Action Plan (2018)</u>	To reaffirm commitment to climate action, the City of Cleveland, along with many others, formed a climate leadership network through meaningful actions.
<u>Cleveland District 2030 Program</u>	The Cleveland 2030 District is a public-private-nonprofit collaborative working to create a high performance building district in downtown Cleveland.
<u>Cleveland Environmental Resident Engagement Toolkit</u>	This program sets out to inform decision-makers on how environmental issues and injustices impact local communities in Cleveland.
<u>Cleveland Metroparks 2020: The Emerald Necklace Centennial Plan</u>	The strategic plan provides direction and guidance for Cleveland Metroparks using the following pillars: protection, relevancy, connections, come out and play, and organizational sustainability.
<u>Cleveland Neighborhood Platform</u>	The Cleveland Neighborhood Platform is developed to recommend specific policies for Cleveland's next Mayor and City Council. The policies focus on strengthening neighborhoods by improving the affordable housing stock and creating a healthy living environment.
<u>Cleveland Parks + Greenspace Coalition</u>	The Cleveland Parks and Greenspace Coalition represents residents and organizations who use, develop, maintain, and program parks and greenspaces for the purpose of providing equitable public spaces that reflect the communities where they are located.
<u>Cleveland Tree Coalition</u>	The Cleveland Tree Coalition is a community-wide collaboration to rebuild the urban forest through partnership.

PROGRAMS/ POLICIES	DESCRIPTION OF THE PROGRAMS
Cleveland: Urban Resilience and Urban Opportunity Plan (2015)	Cleveland Neighborhood Progress, the Cleveland Urban Design Collaborative, and the University at Buffalo worked with a broad range of community stakeholders to complete this plan. The proposed projects, programs, policies, engagement strategies, and research recommended in the plan will help to lessen overall demand for energy, anticipate and prepare for climate changes, and foster social cohesion.
Cleveland's Clean and Equitable Energy Future	The Cleveland's Clean and Equitable Energy Future report is an action-oriented roadmap, developed as a guideline for successful implementation of the 100% clean energy transition in the city of Cleveland by 2050.
Green Building Standards Handbook	With this handbook, the city of Cleveland seeks to provide affordable housing that reduces the environmental impact of communities and provides universal access to the elderly and disabled.
Neighborhood Connections Action Up Grants	Neighborhood Connections invests in resident-led projects in Cleveland with the aim to drive community change.
NOAA Great Lakes Marine Debris Action Plan	The Action Plan encompasses work that addresses marine debris through coordinated actions between 2020 and 2025.
Ohio EPA Grants	The Ohio Environment Protection Agency offers grants to expand community recycling and improve litter management infrastructure.
Recycle Cleveland	The opt-in recycling program is part of an effort to reduce contamination from curbside recycling, reduce program costs and improve efficiency of waste collection operations.
Reimagining Cleveland	Supported by a strong, citywide, public non-profit partnership, and a broad base of residents, Reimagining Cleveland is a vacant land reuse initiative that creates sustainable solutions to vacancy while building a movement of solidarity and stewardship.
Resource Efficiency and Climate Change	This U.N. report assesses the reduction potential of greenhouse gas emissions from material efficiency strategies applied in residential buildings and light duty vehicles.
RTA's Strategic Plan	Published in 2020, this plan sets out to shape the Greater Cleveland Regional Transit Authority to the year 2030, with improved customer experience and capital investments.
Surfrider Foundation's Great Lakes Friendly Restaurants Program	The program is building a community of like-minded restaurants that can be promoted, supported as examples of success to influence plastic reduction legislation.
Sustainable Cuyahoga Toolkit	Helpful data and extensive best practice information to help communities and businesses, no matter where they are in their sustainability journey.
The 2030 Agenda for Sustainable Development	The U.N. Sustainable Development Goals are established as part of the 2030 Agenda to stimulate action in areas of critical importance for humanity and the planet.
The Build Back Better Framework	President Biden's plan, this framework sets out to rebuild the middle class through numerous actions, ranging from climate to health care.
The Marshall Plan for Middle America	Strategy for tackling the concurrent challenges of climate change, social and environmental injustice, and economic crisis.
U.S. EPA Brownfields Cleanup Grants	Cleanup Grants provide funding for eligible entities to carry out cleanup activities at brownfield sites for a period of three years.
U.S. Temporary Assistance for Needy Families Program	States and territories are provided with flexibility in operating programs designed to help low-income families with children achieve economic self-sufficiency.

APPENDIX VI: PARTNER ACRONYMS

- **American Institute of Architects (AIA)** - <https://www.aia.org/>
- **Bike Cleveland** - <https://www.bikecleveland.org/>
- **Black Environmental Leaders (BEL)** - <https://www.blackenvironmentalleaders.org/>
- **Case Western Reserve University (CASE)** - <https://case.edu/>
- **Central Kitchen** - <https://www.clevelandindependents.com/home/>
- **CHN Housing Partners** - <https://chnhousingpartners.org/>
- **Cleveland 2030 District (CLE 2030)** - <https://www.2030districts.org/cleveland>
- **Cleveland Independents** - <https://www.clevelandindependents.com/home/>
- **Cleveland Industrial Retention Initiative (CIRI)** - <https://www.mfgworkscl.org/our-community/ciri>
- **Cleveland Metroparks** - <https://www.clevelandmetroparks.com/>
- **Cleveland Metropolitan School District** - <https://www.clevelandmetroschools.org/>
- **Cleveland Metropolitan School District (CMSD)** - <https://www.clevelandmetroschools.org/>
- **Cleveland Owns** - <https://www.clevelandowns.coop/>
- **Cleveland Parks + Greenspace Coalition (Parks Coalition)** - <https://www.parkscoalitioncle.org/>
- **Cleveland Seed Bank (CSB)** - <https://www.hummingbirdproject.org/cleveland-seed-bank-2>
- **Cleveland State University (CSU)** - <https://www.csuohio.edu/>
- **Cleveland Tree Coalition (CTC)** - <http://www.clevelandtrees.org/>
- **Cleveland Water Alliance (CWA)** - <https://clevelandwateralliance.org/>
- **Clevelanders for Public Transit (CLE for Transit)** - <https://clefortransit.org/>
- **CSU Urban Affairs and GIS** - <https://cepa.csuohio.edu/>
- **Cuyahoga County College (Tri-C)** - <https://www.tri-c.edu/>
- **Cuyahoga County Soil and Water Conservation District (Cuyahoga SWCD)** - <https://www.cuyahogawcd.org/>
- **Destination Cleveland** - <https://www.thisiscleveland.com/>
- **DigitalC** - <https://www.digitalc.org/>
- **Enterprise Community Partners (ECP)** - <https://www.enterprisecommunity.org/>
- **Environmental Health Watch (EHW)** - <https://www.ehw.org/>
- **Evergreen Cooperatives (Evergreen Coop)** - <http://www.evgo.com/>
- **EVNoire** - <https://www.evnoire.com/>
- **Food Access Raises Everyone (FARE)** - <https://thefareproject.org/>
- **Food Strong** - <https://www.foodstrong.org/>
- **GCP (Business Growth Collaborative)** - <https://greatercle.com/business-growth-collaborative/>
- **Great Cleveland RTA (RTA)** - <https://www.riderta.com/>
- **Greater Cleveland Food Bank (GCFB)** - <https://www.greaterclevelandfoodbank.org/>
- **Greater Cleveland Habitat for Humanity (Cleveland Habitat)** - <https://www.clevelandhabitat.org/>
- **Greater Cleveland Habitat for Humanity ReStore (Cleveland Habitat ReStore)** - <https://www.clevelandhabitat.org/restore/restore.html>
- **Greater Cleveland Partnership (GCP)** - <https://greatercle.com/>
- **Grind2Energy** - <http://quasareg.com/food-waste-g2e/>
- **Home Repair Resource Center (HRRC)** - <https://hrrc-ch.org/>
- **Hough Community Solar Garden** - <https://ioby.org/project/hough-community-solar-garden-cleveland>
- **Hunger Network** - <https://hungernetwork.org/>
- **ioby** - <https://ioby.org/campaign/cleveland>
- **IoT Collaborative (IoT)** - <https://iotcollaborative.org/>
- **Kent State Cleveland Urban Design Collaborative (CUDC)** - <https://www.cudc.kent.edu/>
- **Kent State University (KSU)** - <https://www.kent.edu/>
- **Lead Safe Cleveland Coalition (Lead Safe CLE)** - <https://leadsafecle.org/>
- **Local Initiatives Support Corporation (LISC)** - <https://www.lisc.org/>
- **MAGNET** - <https://www.manufacturingsuccess.org/>

- **Manufacturing Works** - <https://www.mfgworkscl.org/>
- **My Grow Connect** - <http://mygrowconnect.org/>
- **Near West Land Trust** - <https://experiencetremont.com/2021/03/near-west-land-trust-breaks-ground-on-first-new-construction-home/#:~:text=The%20Near%20West%20Land%20Trust%20is%20a%20shared%20organization%20whose,%2D%20and%20moderate%2Dincome%20families.>
- **Neighborhood Connections** - <https://neighborupcle.org/>
- **Northeast Ohio Areawide Coordinating Agency (NOACA)** - <https://www.noaca.org/>
- **Northeast Ohio Coalition for the Homeless (NEOCH)** - <https://www.neoch.org/>
- **Ohio Department of Transportation (ODOT)** - <https://ohgo.com/cleveland?lt=41.45&ln=-81.6956&z=11&ls=incident,construction>
- **Ohio Materials Marketplace (OMM)** - <https://ohio.materialsmarketplace.org/>
- **Ohio Restaurant Association (ORA)** - <https://www.ohiorestaurant.org/>
- **Ohio State Extension - Cuyahoga County (OSU Extension)** - <https://cuyahoga.osu.edu/>
- **Participatory Budgeting Cleveland (PB Cle)** - <https://www.pbcle.com/>
- **Power A Clean Future Ohio** - <https://www.poweracleanfuture.org/>
- **Rebuilders Xchange (RBX)** - <http://rbxhub.com/>
- **Redhouse studio** - <https://www.redhousestudio.net/>
- **Rid-All Green Partnership (Rid-All)** - <http://www.greennghetto.org/>
- **Rust Belt Riders** - <https://www.rustbeltriders.com/>
- **Sears think[box]** - <https://case.edu/thinkbox/>
- **Solar United Neighbors Ohio** - <https://www.solarunitedneighbors.org/ohio/>
- **Strengthening Our Students (SOS)** - <https://www.strengtheningourstudents.com/>
- **Sustainable Cleveland ZeroWasteNEO Working Group (Zero Waste NEO)** - <https://www.sustainablecleveland.org/zwno>
- **Sway Mobility** - <https://www.swaymobility.com/>
- **Team NEO** - <https://northeastohioregion.com/>
- **Trust for Public Land (TPL)** - <https://www.tpl.org/city/cleveland-ohio>
- **U.S. Green Building Council Ohio (USGBC-NEO)** - <https://www.usgbc.org/chapters/usgbc-ohio>
- **University of Akron Biomimicry Research and Innovation Center (UAKron BRIC)** - <https://www.uakron.edu/bric/>
- **Urban Land Institute (ULI)** - <https://uli.org/>
- **VCC** - <https://www.vccusa.com/>
- **Western Reserve Land Conservancy (WRLC)** - <https://www.wrlandconservancy.org/>



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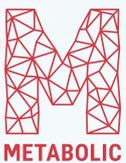
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