

Transitioning to the Circular Economy by 2050

Equitable, Low-Carbon, and Non-Extractive

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for the King County Solid Waste Division



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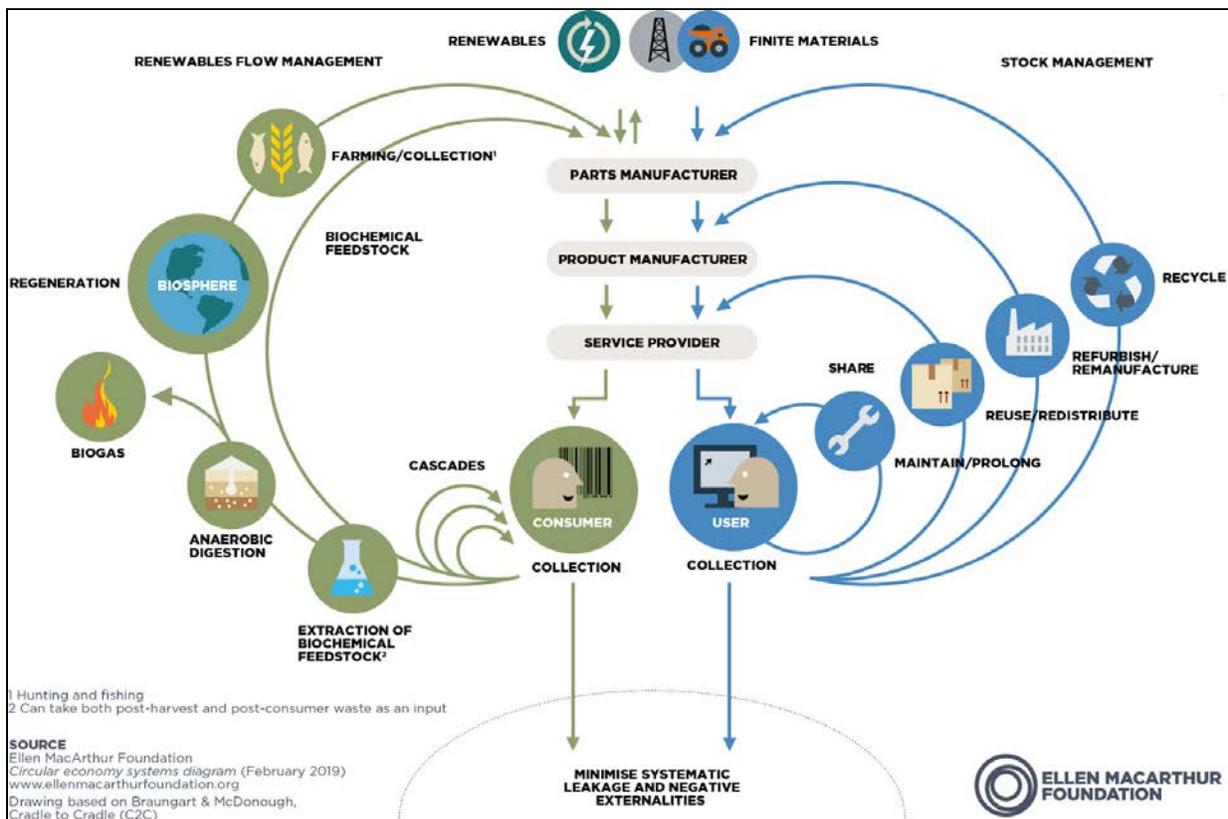
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Executive Summary

The Circular Economy is designed to limit the environmental impacts of the global economy by recapturing resources that would otherwise go to waste and reintegrating those resources back into the production and manufacturing process. This system-wide approach to resource management is designed to decouple the global economy from the inherent negative environmental externalities present in the current linear production stream. These externalities include land-use disturbance, trash pollution, and climate change resulting from greenhouse gas emissions.

Figure 1: The Circular Economy Butterfly Diagram (The Ellen MacArthur Foundation, 2019)



King County Solid Waste Division (KCSWD) has commissioned this report to assess how they might facilitate a transition to the Circular Economy within King County (KC) by 2050. This report begins with a literature review examining the nuances, challenges, and barriers associated with the Circular Economy. A primary aim of this review was to examine case studies of effective implementation from other localities and governments.

We supplement the literature review with semi-structured interviews of government, business, and community stakeholders with an interview protocol designed to represent



the interests of King County residents in our recommendations. These interviews encouraged us to tailor the best practices uncovered in our literature review to the unique needs and opportunities of King County.

After completing our research and data collection, we then identified seven guiding criteria to provide an analytical framework for our recommendations. These criteria align our policy recommendations with the best interests of the residents that KCSWD serves.

Our recommendations below propose a series of potential policy initiatives that KCSWD could pursue and support, as well as larger goals that these policy initiatives are designed to fulfill. Key attention is placed on collaborating with local and governmental stakeholders, and ensuring that circularity initiatives are embedded into the day-to-day lives of residents in King County.

- At the onset, KCSWD should prioritize establishing relationships with primary stakeholders and building trust and cooperation for the Just Transition to the Circular Economy. Since establishing the Circular Economy requires systematic changes in our society, a successful transition relies on established and cooperative relationships. In addition, enhancing public awareness of the Circular Economy will also be crucial in this early phase.
- By 2025, cooperative relationships with stakeholders should be well established, leading to early “wins” for the Just Transition to the Circular Economy. Stakeholder engagement should be fundamental in the decision-making process, aiming at both undoing the historical inequities of the linear economy and embedding equitable practices into policy frameworks.
- By 2030, the concept of “Just Transition to the Circular Economy” should be entrenched in public awareness and incorporated into legislative and policy agendas. Primary stakeholders, especially frontline communities, should feel embedded into the decision-making process and their input should be centered. With strong stakeholder engagement, King County should establish legislative and policy initiatives, including economic incentives, to promote the Circular Economy.
- By 2040, King County should further the initiatives established in the previous phase. Economic incentives should increase in scale, expanding the Circular Economy into more complicated supply chains.
- By 2050, all major industries in King County should be integrated into the Circular Economy, with production streams in King County being entirely circular. The concept of the Circular Economy should be commonplace across King County and legislation should focus on improving the robustness of the Circular Economy by protecting against the rollback of these policies.

Chapter 1: Introduction

King County Circular Economy by 2050

King County has set the goal of transitioning the region from a linear economy to an equitable, low-carbon, and non-extractive Circular Economy by 2050. Informed by leading research in Circular Economy policy, this report identifies important opportunities for KCSWD along with other agencies and stakeholders while constructing a roadmap for implementing the transformative policies needed to achieve this goal.

King County has already taken steps toward sustainability and zero waste targets throughout the region. The 2020 Strategic Climate Action Plan (SCAP) outlined steps to reduce carbon emissions and center frontline communities in both climate mitigation and adaptation efforts, and the ongoing Re+ initiative is working on producing a framework for minimizing waste entering landfills.

However, King County is seeking a more comprehensive roadmap that centers on the unique challenges and opportunities of the Circular Economy in the region. The Ellen MacArthur Foundation outlines three goals of the Circular Economy policy: (i) to design systems and products that eliminate waste and pollution, (ii) to keep materials valuable to the economy in use and in the production cycle, and (iii) to ensure that natural systems in and around cities regenerate. Circular Economy policies will be essential if King County wishes to accomplish the recommendations outlined in the 2020 SCAP.

Research Questions

To understand the current state of the Circular Economy practices, we asked:

- A. What are the challenges and best practices that governments around the world encounter when trying to implement the Circular Economy?
- B. Which circular economic policies have the most supported equitable outcomes for vulnerable populations in those communities?

To understand King County's capacity to transition to the Circular Economy, we asked:

- A. What are the specific opportunities and challenges King County faces in implementing equitable Circular Economy practices while upholding Just Transition principles?
- B. What are King County's immediate and long-term goals and what steps can be taken to ensure the transition to the Circular Economy by 2050?



Report Overview

This report presents a literature review focusing on the current state of Circular Economy research, where and how Circular Economy policies have been successful, the capacities and goals of King County, and the guiding principles of the Just Transition. We also performed stakeholder analysis and interviews to draw out the unique possibilities, concerns, or barriers for Circular Economy policies in King County. This information informed a set of recommendations that incorporates the geography, infrastructure, economy, and demographics of King County into a novel roadmap for policy implementation.



Chapter 2: Research Methods

Literature Review and Case Studies

We conducted a review of academic and nonprofit literature on the Circular Economy and Just Transition. We also examined best practices from other central and local governments to supplement our review with real-world case studies.

Interviews

To connect foundational literature with other regional considerations, we conducted semi-structured interviews with relevant stakeholders. These interviews were designed to solicit input that informs our roadmap while ensuring that the Circular Economy aligns with community needs and can be implemented without providing undue hardship or instituting inequities throughout King County.

Based on our client's guidance, we conducted interviews with several key stakeholder groups, including:

- Local business leaders, including both small business owners as well as sustainability experts from large corporations headquartered in King County
- Community leaders, particularly members of the BIPOC and frontline communities in King County
- Government leaders

Our interviews were conducted over Zoom, with an allotted time frame of 30 minutes each. All interviews were recorded, and a document with notes outlining the content of the interview was generated by the member of the research team leading the interview session. The names, companies, and titles of the interviewees were kept confidential. This confidentiality was crucial to ensure that our interviewees could respond to our questions with candor and trust. All interviews began with several shared questions that were asked of every interviewee. After these initial questions were answered, we then asked several more specific questions tailored to the interviewee's background and current role. Further information can be found in Appendix B.

Limitations

While this study aims to be as comprehensive as possible, there were several limitations.

Firstly, it should be noted that the Circular Economy is quite a broad concept. There is a myriad of factors that need to be addressed for complete coverage, such as the different levels of government, the perspectives of all sectors and stakeholders involved, or the upstream and downstream aspects of production and consumption. A perfect Circular



Economic model necessitates full commitment from every actor that is involved in every stage of the economy, including manufacturing, consumption, energy, transportation, and waste management, among other stakeholders. Given the limited time allotted for this report and the specific focus on King County, the work presented here is concentrated on the points that are relevant to King County and county-level governance, and may not present a comprehensive list of policy solutions.

Secondly, the complexity of the concept requires immense cooperation. Ideally, waste generated by one actor would become a resource for another, thus eliminating the need for raw materials. While this study includes input from a variety of businesses on how they might be affected by a circular transition, the sectors included here are not exhaustive, and will inevitably extend well beyond the boundaries of King County. Further research and analyses are required for a deeper understanding of the inner workings of industry symbiosis between different sectors and businesses of all sizes.

Thirdly, given that the Just Transition is a relatively nascent concept, there is a limitation in the academic literature on the Just Transition for the Circular Economy. Its context-specific nature led most of the academic literature to be rather abstract and procedural, i.e., mentioning that we need to consider the Just Transition in designing and implementing the Circular Economy policies or putting an emphasis on promoting the participation of local communities, as opposed to presenting practical steps and tangible tips for realizing it.

Finally, this report is neither designed to represent the entirety of the policies that might be leveraged in the Circular Economy, nor does it represent the sole pathway available to King County Solid Waste. Rather, this report presents one plausible policy pathway that could be utilized to catalyze a large-scale transition to a non-extractive economic model. We hope that this roadmap provides a starting point for more detailed discussions and collaboration regarding the Circular Economy in King County, and we encourage King County Solid Waste Division to continue exploring policies and initiatives that might not be included in this roadmap.

Chapter 3: Literature Review and Case Studies

I. Circular Economy: Theory and Practices

The Circular Economy is often described as an alternative to linear economies that extract raw resources for production, consume those products, and then dispose of those products as waste (The Ellen MacArthur Foundation). Underlying this linear production system is a tacit assumption that resources of the greatest value are derived through extraction from natural resources - an assumption that the Circular Economy rejects. Instead, the Circular Economy is focused on ensuring that manufacturing processes preserve the value of the resources they utilize, and implement the tools, processes, and knowledge necessary to extract materials needed for production not from natural sources, but from the waste stream itself (The Ellen MacArthur Foundation, 2021).

The Circular Economy has been proposed as a framework to address the root causes of numerous environmental issues simultaneously. The Ellen MacArthur Foundation explains the concept as “a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution” (The Ellen MacArthur Foundation, n.d.a). This solution framework is defined through three broader goals: (i) eliminate waste and pollution, (ii) circulate products and materials, and (iii) regenerate nature (The Ellen MacArthur Foundation, n.d.a).

Beaulieu et al. (2016) elaborate on this definition by identifying several key themes. They argue that circular economies are characterized by a systemic approach to create a closed-loop system for resource use, utilizing what is wasted through consumption as the raw material for products created. Beaulieu et al. characterize this framework as a socially constructed idea that can be intentionally pursued through effective policymaking and regulatory practices, with an emphasis on a life cycle approach to resource management.

This preservation of value for resources in the economy is achieved both by leveraging the initial use of materials created, and by also sourcing these materials from waste. The Circular Economy Butterfly Diagram (*Figure 1*) shows how this value is preserved: by first prioritizing repair, maintenance, and refurbishment of existing products, and then working to fill the gaps in the supply chain by collecting and repurposing resources that can be utilized in the production process (Beaulieu et al., 2016; The Ellen MacArthur Foundation, 2019, 2021).

While key tenants of the Circular Economy have been established for some time, translating theory into tangible policy outcomes at scale has been more challenging. To address that need, the Ellen MacArthur Foundation composed a list of five universal policy



goals that are necessary parts of the Circular Economy (The Ellen MacArthur Foundation, 2021). These goals are:

- 1) Stimulate Design for the Circular Economy.
- 2) Manage Resources to Preserve Value.
- 3) Make the Economics Work.
- 4) Invest in Innovation, Infrastructure, and Skills.
- 5) Collaborate for Systems Change.

Implicit in these goals is the recognition that implementing the Circular Economy will require interrelated policy structures that facilitate a cohesive policy shift (Beaulieu et al., 2016; The Ellen MacArthur Foundation, 2019, 2021). Making sure that these goals are realized in a just and equitable manner, however, is essential to ensuring that the Circular Economy serves all of society.

II. Just Transition: Framework and Principles

Since it originated in North American unions in the late twentieth century, the term “Just Transition” was initially understood as “a program of support for workers who lost their jobs due to environmental protection policies” (Just Transition Center, 2017). With the increased awareness of climate change, however, the scope of the Just Transition has expanded to climate change and low-carbon transitions.

In 2015, the Paris Agreement included the Just Transition in its preamble: “*Taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities.*” In the same year, the United Nations (UN) declared the 2030 Agenda for Sustainable Development straddling three pillars of sustainability: economic, environmental, and social wellbeing. The Agenda includes diverse goals: poverty eradication (Goal 1), decent work for all (Goal 8), reduced inequalities (Goal 10), sustainable consumption and production (Goal 12), and climate change (Goal 13) (Schröder, P., 2020).

The Just Transition for the Circular Economy can also be understood from a similar perspective: managing the transition from a linear economy to the Circular Economy can address not only environmental issues such as greenhouse gasses, waste, biodiversity loss, and pollution, but also economic and social issues such as poverty, inequality, and provision of decent work. When designing and implementing policies for the Just Transition, there are three types of justice (*Table 1*) to consider along with key contextual questions (*Table 2*) (Williams & Doyon, 2019; Schröder, P., 2020).

Table 1: Types of Justice (Williams & Doyon, 2019)

Types	Explanation
Distributive justice	<ul style="list-style-type: none"> Justice is conceived in terms of the distribution or sharing of good (resources) and bads (harms and risks). It should consider not only the direct impacts of policy interventions but also unintended consequences such as adverse impacts on informal workers.
Procedural justice	<ul style="list-style-type: none"> Justice is conceived in terms of the way decisions are made, who is involved and has influence, and access to the formal justice system. It is related to decision-making processes. Not only mere stakeholders' participation but also the provision of relevant information is the key element of procedural justice.
Justice as recognition	<ul style="list-style-type: none"> Justice is conceived in terms of who is given respect and who is and is not valued. It focuses on discrimination and prejudice of all forms against certain groups due to their race, ethnicity, gender, religion, disability, etc.

Table 2: Key Questions for Each Type of Justice (Williams & Doyon, 2019)

Types	Examples of key questions
Distributive justice	<ul style="list-style-type: none"> Where and how are the costs and benefits of the transition being distributed? What scales (e.g. jurisdictional, spatial, and temporal) are used to assess impacts and benefits? Are actions reactions to the mitigating impacts of events, or proactive planning for future benefits of the transition?
Procedural justice	<ul style="list-style-type: none"> Who is part of the decision-making process and in defining “just” and “transition”? Do all stakeholders have adequate capabilities to participate? If not, what tools or techniques are being implemented to engage a wider set of stakeholders? What power asymmetries exist within different processes (e.g. financial, political, structural, etc.) and how are they addressed?
Justice as recognition	<ul style="list-style-type: none"> How is recognition, misrecognition, or nonrecognition treated? What cultural institutional processes, legacies, or existing inequalities are present (e.g. the role of colonial legacy and relationships with Indigenous peoples)? How are minority or marginalized worldviews, knowledge, and values recognized and integrated?



In 2015, the International Labor Organization (ILO), the only tripartite (governments, employers, and workers) UN agency, suggested the following guiding principles for Just Transition in its “Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All” (International Labor Organization, 2015):

- Strong social consensus on the goals and pathways to sustainability is fundamental. Social dialogue must be an integral part of the institutional framework for policymaking and implementation at all levels. Adequate, informed and ongoing consultation should take place with all relevant stakeholders.
- Policies must respect, promote and realize fundamental principles and rights at work.
- Policies and programs need to take into account the strong gender dimension of many environmental challenges and opportunities. Specific gender policies should be considered in order to promote equitable outcomes.
- Coherent policies across the economic, environmental, social, education/training, and labor portfolios need to provide an enabling environment for enterprises, workers, investors, and consumers to embrace and drive the transition towards environmentally sustainable and inclusive economies and societies.
- These coherent policies also need to provide a Just Transition framework for all to promote the creation of more decent jobs, including as appropriate: anticipating impacts on employment, adequate and sustainable social protection for job losses and displacement, skills development and social dialogue, including the effective exercise of the right to organize and bargain collectively.
- There is no “one-size-fits-all” approach. Policies and programs need to be designed in line with the specific conditions of countries, including their stage of development, economic sectors, and types and sizes of enterprises.
- In implementing sustainable development strategies, it is important to foster international cooperation among countries.

Although these principles are not exclusively relevant for the Just Transition to the Circular Economy, the core concepts are equally applicable. All participants strive to identify which groups are impacted by Circular Economy policies, what kinds of benefits and burdens exist, how they are distributed among groups, and how those imbalances are mitigated through appropriate interventions (distributive justice); ensure active participation of stakeholders in decision-making processes (procedural justice); rectify inequalities among groups and recognize the due rights (justice as recognition).

In their guidelines, the ILO also presented key policy areas to address three barriers to sustainability simultaneously:

- 1) macroeconomic and growth, including industrial and entrepreneurial growth

- 
- 2) skills development, including occupational safety and health, social protection, and social services
 - 3) social dialogue and tripartism

Among these areas, social dialogue and tripartite policies are related to procedural justice and can serve as the basis for other policy ideas. ILO stressed active stakeholder engagements “at all stages from policy design to implementation and evaluation” (International Labor Organization, 2015) and “creation, development, and formalization of dialogues mechanisms and structures” (International Labor Organization, 2015) to discuss policy options to implement sustainability goals.

Since the issue of justice is highly contextual in terms of location, time, stage of development, and so on, deliberative consideration of all three dimensions of justice is required to address existing injustice effectively (Hurlbert & Rayner, 2018); accordingly, procedural justice and justice as recognition are especially important from a designing stage of the Just Transition (Williams & Doyon, 2019).

Although the Just Transition deals with the concept of justice, its implementation is essential not only for ethical reasons but also for practical reasons. Possible opposition from those who are adversely affected by the transition could delay or even hinder the transition process if their interests are not adequately and equitably addressed. However, there have been concerns about stakeholders who fear adverse consequences of misusing the concept of justice as a way to delay the transition process. To avoid this risk, “realistic transition plans and timelines are crucial” with inclusive participation (Schröder, 2020).

Due to its origin, discussions about the social impacts of the Just Transition have been under-considered since it has primarily centered on economic concerns, particularly employment practices and informal work (Vanhuysse et al., 2021). Furthermore, there have been few empirical and quantitative analyses on the impacts of the Just Transition since the concept is relatively novel, and even quantitative assessments are not easily applicable (Vanhuysse et al., 2021).

III. Successful Circular Economy Policies: What is Working and Where?

As the negative effects of linear “take-make-waste” economies become more evident, policymakers all around the world have worked to implement circular policies and strategies as part of their sustainability efforts. Thus, the Circular Economy model, as a broad concept and umbrella term that includes various types of sustainability strategies and initiatives, has been gaining more and more popularity.

The very nature of the Circular Economy requires collective action. For the past few decades, scholars and policymakers have been studying and examining similar practices



from various regions around the world to explore opportunities to mirror or modify policies that have worked elsewhere.

European Union

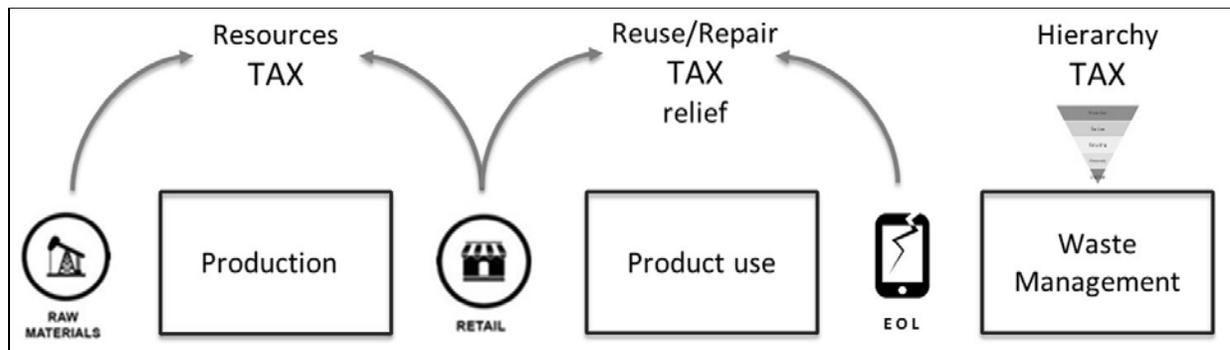
Over the last decade, there have been a number of developments around Europe that paved the way for governments to create roadmaps and start implementing Circular Economy strategies. Franz Timmermans, First Vice President of the European Commission, points to the need for the Circular Economy:

“Our planet and our economy cannot survive if we continue with the ‘take, make, use and throw away’ approach. We need to retain precious resources and fully exploit all the economic value within them. The Circular Economy is about reducing waste and protecting the environment, but it is also about a profound transformation of the way our entire economy works. By rethinking the way we produce, work and buy we can generate new opportunities and create new jobs.” (European Commission, 2015)

In 2015, the European Commission adopted its first Circular Economy Action Plan, which included measures to help stimulate Europe's transition toward the Circular Economy, boost global competitiveness, foster sustainable economic growth, and generate new jobs. The plan included 54 actions, with measures covering the whole life cycle: from production and consumption to waste management and the market for secondary raw materials, and a revised legislative proposal on waste (European Commission, n.d.a). When all 54 actions were successfully delivered in 2019, the European Commission prepared a new Circular Economy action plan, which was one of the building blocks of the European Green Deal (European Commission, n.d.b), Europe's new agenda for sustainable growth. Just like its predecessor, the new action plan covers a wide range of topics including designing sustainable products and packaging, sustainability of electronics, batteries, and construction materials, and empowering consumers or public buyers to support waste prevention and circularity (European Commission, 2020).

One section in this action plan discusses “getting the economics right” by encouraging economic instruments such as taxation. In this context, Milios (2021) introduced a comprehensive taxation framework (*Figure 2*), which compares and contrasts various tax strategies across different stages of a product's lifecycle, from resource extraction to waste disposal: 1) a raw material resource tax (production stage), 2) reuse/repair tax relief (use stage), and 3) a waste hierarchy tax (end of life stage).

Figure 2. Circular Economy Taxation Framework (Milios, 2021)



- **Production Stage:** A materials tax on newly extracted resources is recommended to internalize resource depletion and market failures into the price of goods, as well as to encourage the use of recycled materials (Söderholm, 2011, as cited Milios, 2021, p. 480). The effects of this type of tax may vary depending on the phase of the value chain where it is applied, due to shifting demand-price elasticity and market dynamics throughout a supply chain. It is worth noting that the tax might not have a direct effect on the consumption of the targeted materials due to imports from other regions leading to substitution effects. Thus, it is important to introduce appropriate additional measures to mitigate possible unintended side effects.
- **Use Stage:** Value added tax (VAT) relief is recommended to promote the reuse and repair of existing products. Sweden demonstrated this by introducing a 50% deduction on the labor costs for home repairs and maintenance in 2007 (updated in 2016) and a VAT reduction from 25 to 12% on the repair of products such as textile, shoes, and bicycles in 2017. According to Almén et al. (2020), from interviews with relevant stakeholders, there was no clear evidence that these tax reliefs directly contributed to increasing the reuse and repair of the corresponding products.
- **End of Life Stage:** A waste hierarchy tax is recommended, which is “a progressive tax which follows the “waste hierarchy” principle, with the tax rate decreasing progressively from landfilling (highest) to recycling (lowest), and is set to zero for any level above recycling” (Milios, 2021). EU member countries imposed a landfill tax, which effectively incentivized the diversion of considerable amounts of waste from landfills to other more environmentally sound options (European Environment Agency, 2013). While the impact may vary depending on the taxation design and the reactions from other sectors, this form of taxation led to responsible waste management.



Alongside the efforts of the EU and the European Commission, countries began creating their own roadmaps and action plans to reach their respective greenhouse gas (GHG) emission goals and have been adopting Circular Economy strategies as a way to reach these objectives.

The Head of Public Affairs at the Ellen MacArthur Foundation, Joss Blériot, explains the efforts (Isles, J., 2021):

“From a European perspective, it’s clear that the EU Commission has taken the lead on this, seeing as the principle of the Circular Economy package was adopted in June 2014, which is quite a long time ago already. At the time, no member state had come up with a national roadmap, and it was very much the hope of the Commission that they would pick this up and start implementing it. What we see now is that to a certain extent, that call has been heard. Finland presented its roadmap last year, France has just published one, Slovenia published its own strategy in May, Italy has revealed the building blocks of its roadmap (para. 3).”

It is important to note that, while governments take action and make progress in terms of the transition to the Circular Economy, the paths they follow are not always the same. This process is influenced by a variety of factors that are specific to each country, as Blériot explains with an example (Isles, J., 2021):

“But the main differences you can see between Netherlands and Germany is that Germany, being a very heavy industrial economy, has looked at this through material flows and material availability. They need a lot of stuff to build their cars, their heavy machinery — it’s really important for them to have a critical raw materials strategy. They have had since 2010 something called the German Mineral Resources Agency, which deals with those flows. More recently, we’ve been involved with the “Deutschland entkoppelt” initiative, with Acatech and SYSTEMIQ, which promotes industry leadership around the Circular Economy (para. 5).

In the Netherlands, it’s been more from an entrepreneurial angle, innovation in materials, business models, because that’s the type of economy they have. There’s a lot of service, they’re very nimble and agile, very open to new ideas. There was the Circular Economy initiative in 2008, which sat within the Ministry of the Economy and created a market, as there were some public procurement rules about circular products and services. And that really helped as well (para. 7).”

This means that there is no one-size-fits-all strategy, and policymakers must take into account the unique characteristics of their environment. Local governments have been

implementing solutions alongside national efforts to promote certain aspects of the Circular Economy model, such as waste reduction, reuse and recycling, and reducing greenhouse gas emissions. The following are several examples of these local policies.

Alelyckan Reuse Park in Gothenburg, Sweden (Bačová et al., 2016):

“Alelyckan Reuse Park, established in 2007, is a place where inhabitants can bring products to be recycled, donate reusable material or buy goods donated by others, which are often repaired or upcycled. The park is owned by the municipality but it houses also specialised thrift shops that pay rent for the use of municipal facilities. All visitors are encouraged to donate or sell items for reuse, and the rest is sorted into different waste fractions for materials recycling or energy recovery. The initiative resulted in the reuse of 5.5% of materials that otherwise would have been discarded (p.5).”

Sustainable public procurement for cradle-to-cradle design in Venlo City Hall, The Netherlands (Bačová et al., 2016):

“The Municipality of Venlo used C2C principles in the design and procurement of the new Venlo City Hall. The bidders were requested to take into account the use of appropriate, safe and healthy materials that can be recycled after their lifetime, the enhancement of air and climate quality, the production and use of only renewable energy and the enhancement of water quality. C2C design accounted for 30% of the overall scoring of the bids and a C2C specialist was involved in the assessment body. The ‘Total Cost of Ownership’ over 10 years accounted for a further 30% of the score, which estimated not only the direct costs of products but also indirect ecological and social costs. Bidders were required to offer a take-back system for their products after a period of ten years and to consider the financial residual value of these products, including maintenance. Over a time period of 40 years, the Municipality of Venlo will have realised a return on investment of around EUR 17 million (p. 8).”

Planning to launch a 100% circular textile factory in the City of Amsterdam, the Netherlands (Anonymous, 2022; Sommer, 2022):

“According to the Ellen MacArthur Foundation (2017), less than one percent of brand collections was recycled to make new clothing. Brightfiber Textiles, a Netherlands textile business, planned to establish a new raw material factory in 2023 to produce a “circular, sustainable and full-color fiber and yarn collection.” The factory can produce approximately 2.5 to 3 million kilos of raw textile materials from wasted textiles every year, which is almost the same amount of textiles collected in the City of Amsterdam

during the same period. For the production of these circular textiles, local old clothes will be fiberized by color and texture and, if necessary, dyed again in a sustainable way, ending up with high-quality fibers and yarns to produce new clothing. The company recently received a more than one million Euro grant from the Circular Economy department of the Ministry of Infrastructure and Water Management to achieve this goal.”

Establishing a monitoring framework for the Circular Economy in the City of Amsterdam, The Netherlands (City of Amsterdam, 2020):

Monitoring is necessary to identify whether the transition for the Circular Economy is on the right track and obtain useful insights toward a successful transition. The monitoring system for the Circular Economy in Amsterdam is based on the weighted impacts on greenhouse gas emissions and environmental costs. The City selected three value chains (food & organic waste streams, consumer goods, and built environment) and has estimated the annual consumption of raw and other materials in the value chains. Five sections of the monitor are: 1) input indicators; 2) throughput indicators; 3) indicators for waste collection by public authorities; 4) indicators for the waste treatment processes of regional industries; 5) indicators for the social foundation (*Figure 3*). The main indicator lists for each section are as follows:

- Input, Waste Collection, and Waste Processing (common for three sections): Total weight of materials in each value chain; Total CO₂ impact of each value chain; Total ECI impact of each value chain
- Throughput: Throughput indicators show the materials that continue to circulate in the economy. Ultimately, indicators must be developed that reflect the turnover rates of these materials in Amsterdam.
- Social Foundation: Work and income (average standardized income, long-term unemployment, employment opportunities, and so on); Environment and climate social domain (income inequality, wealth inequality, perceived health, loneliness, and so on); Living (satisfaction with home, commuting time, feelings of unsafety).

Figure 3. Five sections of the monitor in the City of Amsterdam (City of Amsterdam, 2020)



Mainstreaming the Circular Economy in the Basque Country, Spain (Bačová et al., 2016):

“The Basque Government has integrated the Circular Economy into its strategic documents, including the Basque Country Energy Strategy 2030, the Environmental Framework Programme 2020, the EcoEuskadi Strategy 2020, the Eco-efficiency Programme, as well as the Waste Prevention and Management Plan 2020. Most notably, the transition towards a resource-efficient economy, promotion of green growth, and eco-innovation have been listed as key priorities under Priority Axis 6 of the Basque Country Operational Programme, with the following measures planned:

- *Partnerships leading to the integration of more environmentally efficient processes in the strategies of companies.*
- *Support in the development of projects focusing on the development and demonstration of new, more efficient technologies, methods, and processes.*
- *Investment support to companies and industries for more efficient industrial approaches.*

The S3 strategy of the Basque Country which identifies three spearhead sectors (Advanced Manufacturing, Biosciences, and Energy) also shows close links to the Circular Economy (p. 9)."

Connecting stakeholders all along the food chain with "Good Food Brussels", Belgium (Bačová et al., 2016):

"Good Food Brussels' is a platform and a process launched by the Brussels-Capital Region, with the aim to increase local food production and reduce waste. It focuses on the entire food chain, from production to disposal, and is supported by multiple government institutions and social groups. One of 'Good Food Brussels' primary objectives is to increase awareness about what is already there and connect existing initiatives through an online platform, increasing their visibility and inspiring others to take part. Future activities will focus on encouraging local food production and minimising food waste by working with individual consumers but also restaurants, supermarkets, or food distributors. Brussels Environment, the region's environmental agency and project coordinator, has commissioned a study that identified some ways to reach a target of 30% of food consumed that is locally produced by 2035 (p. 10)."

Supporting the Circular Economy stakeholders in Aquitaine Limousin Poitou-Charentes region, France (Bačová et al., 2016):

"The French region Aquitaine Limousin Poitou-Charentes has committed to being a national 'pilot' in implementing the Circular Economy. Faced with the end of gas exploration, a system of industrial symbiosis has been established connecting new industrial facilities including fine chemicals, bioenergy, and carbon fibre industries. In December 2014, the region adopted a roadmap towards the Circular Economy which outlines twenty proposed actions to be taken. Among others, the proposals include mobilising stakeholders with a collaborative tool; observing, capitalising on, and sharing data on material flows and waste; promoting the use of recyclable materials and sorting within public procurement; and deploying operational tools aimed at businesses. One important role that the region has taken on is matchmaking and facilitation of cooperation between stakeholders. In April 2016, the region launched RECITA, a regional platform dedicated to the Circular Economy and its deployment in the territory (p. 11)."

Operating the public-private partnership, called BauKarussell, for the City of Vienna's construction sector, Austria (BauKarussell, n.d.; Lembachar, 2021):

“The City of Vienna and its industrial actors in the construction sector launched a consortium to establish circular loops in the sector especially focusing on large-scale demolition. Since the building sector accounts for more than 50% of material consumption¹ and 70% of waste production in the country, there is a strong need to reduce building-related consumption and waste for the Circular Economy. To address the issue, the concept of Social Urban Mining—“an extended value creation of the potentials of demolished buildings by optimizing the deconstruction phase through reuse and high-value recycling” (BauKarussell, n.d.)—was introduced. Before the demolition, reusable components are removed and recyclable materials are secured. The revenues from reuse and recycling finance the operational work carried out by local social businesses, and people disadvantaged in the labor market—for instance, long-term unemployed or persons over 50—are trained and employed in the deconstruction site. In this way, Social Urban Mining “extends the lifetime of components and materials, creates regional employment, and helps building a market for secondhand components” (BauKarussell, n.d.). By the end of 2020, the partnership has coped with more than 1,100 tons of materials, producing 21,000 social economy working hours and creating jobs for over 100 disadvantaged persons.”

Finland

Finland’s efforts to transition to the Circular Economy start with a focus on education, training young generations to think about the economy differently. “People think it’s just about recycling,” says Nani Pajunen, a sustainability expert at Sitra, the public innovation fund that has spearheaded Finland’s circular conversion. “But really, it’s about rethinking everything—products, material development, how we consume”. To make changes at every level of society, Pajunen argues, education is key—getting every Finn to understand the need for the Circular Economy, and how they can be part of it. A pilot program to help teachers incorporate the notion into curriculums in 2017 “just snowballed,” says Pajunen. “By the end of the two years, 2,500 teachers around the country had joined the network—far more than we had directly funded” (Abend, 2022).

The Finnish Government adopted the resolution on promoting the Circular Economy on April 8, 2021. However, long before that, Sitra (the Finnish Innovation Fund, an independent public foundation that operates directly under the supervision of the Finnish Parliament) collaborated with stakeholders and created a roadmap to make Finland a leader in the Circular Economy by 2025. In addition, they prepared a guide (Järvinen & Sinervo, 2020) for other nation-level governments on how to create a roadmap for the Circular Economy.

¹ “The non-metallic minerals represent the largest category, with 95 Mt/a, constituting 57% of total material consumption in 2018. [...] Non-metallic minerals include all construction raw materials and industrial minerals, including e. g. sand, salts, phosphates, etc.” (Eisenmenger et al., 2020)



Finland was the first country in the world to prepare a national roadmap for the Circular Economy in 2016 (SITRA, 2016). They started with a clearly defined goal: Making Finland a pioneer in the Circular Economy.

The roadmap focuses on five areas that are Finland's traditional strengths, including a sustainable food system, forest-based loops, technical loops, transport and logistics, and joint actions (SITRA, 2016):

- Sustainable food system:
 - Several strategies were proposed to more improve access to food that has been produced with responsible raw materials management. Emissions reductions efforts can be accomplished by wisely utilizing recycled fertilizers and natural resources as the focus of food growth. Additionally, the roadmap proposed transitioning to utilizing biofuels obtained from biowaste - instead of fossil fuels - during the production and distribution, as well as minimizing the use of packing materials wherever possible.
- Forest-based loops:
 - Finland is a circular bioeconomy leader due to its forestry and forest industry. Global competitiveness will increase with new commercial products, services, cooperation models, and digital technology.
- Technical loops:
 - By minimizing the use of virgin raw materials in production, Finland can create a competitive technical edge. At the same time, Finland should maximize the length of material and product life cycles and opportunities for reuse.
- Transport and logistics:
 - Transport should develop into a seamless, smart system that is free from fossil fuels. Mobility as a Service (MaaS), the sharing economy, and optimized and clean transport can encourage a more useful and sustainable transportation system.
- Joint actions:
 - Common action among legislators, companies, universities and research institutes, consumers and citizens, and vibrant regions are all needed to achieve systemic change. Communication and diverse interaction are particularly important when implementing joint action.

A striking feature of Finland's efforts for transitioning to the Circular Economy, and one that is shared among effective Circular Economy transitions thus far, is the recognition that the Circular Economy calls for a systemic, behavioral change. For the creation of the Circular Economy solutions, neutral encounters, dialogue, and cooperation between



different sectors and parties in society, mainly the businesses, politicians, scientists, and organizations, are required (Järvinen & Sinervo, 2020). This is why the actions in different focus areas of the roadmap are divided into three levels: policy actions, key projects, and pilots (Bilyalov, 2022). The roadmap includes measures in state administration, towns and cities, business life, and the daily lives of Finnish people.

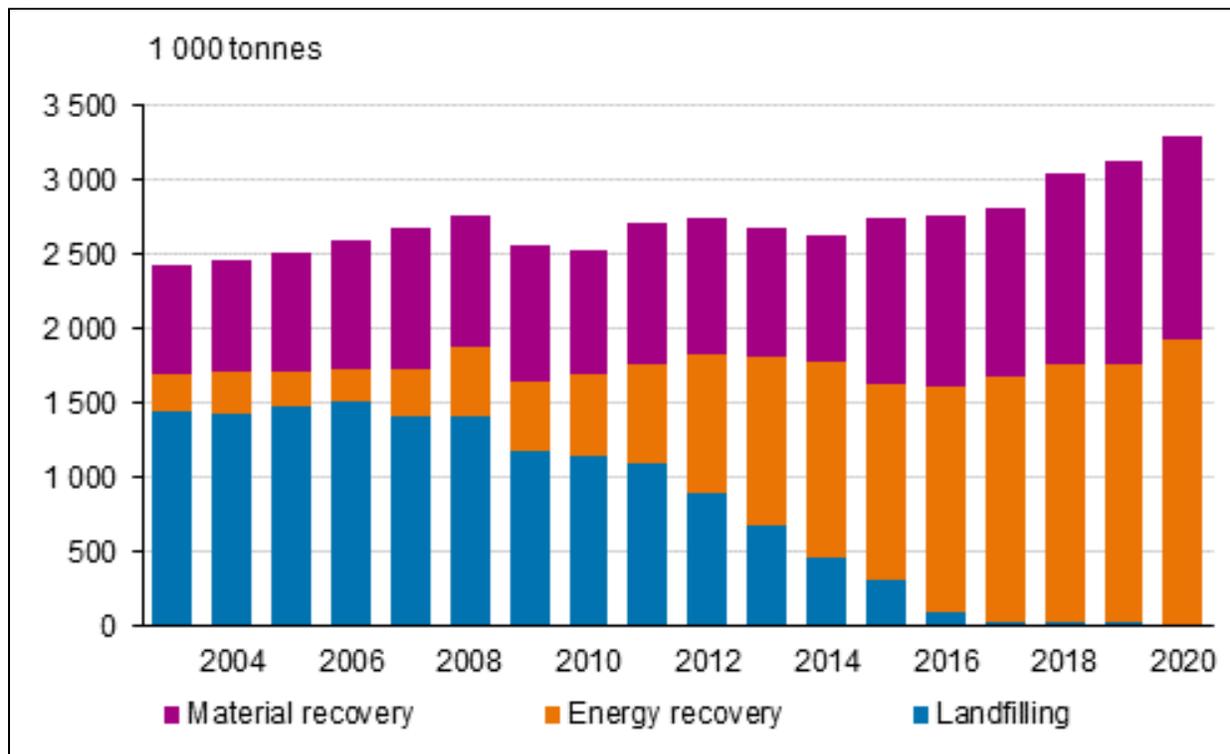
As defined in the roadmap, Finland's vision for the Circular Economy includes a broad range of areas and principles (SITRA, 2016):

- The products should be used for as long as possible, with service, repair, and changing of parts readily available whenever it is necessary. At the end of its life cycle, the parts or the material should be reused for the life cycle of another product.
- For the consumer aspect, the roadmap acknowledges that demand is the driver of sustainable products and commodities. Consumer choice is the factor that pulls closer or pushes away the Circular Economy.
- Companies should be directed to procure and require their subcontractors to provide parts and components that can easily be repaired, minimizing and eventually eliminating single-use parts.
- Retailers will have the opportunity to offer more “services” instead of “goods”, and will provide full information about maintenance and repair.
- For a sustainable distribution of products and materials, and the transport between different sectors, renewable fuels and jointly owned transportation equipment will be an essential part of a sustainable transition.
- On the manufacturing side, the industry will receive accurate information about the materials it uses, so that they can be identified and separated at the end of the product's life cycle.
- For material processing, careful planning will decrease the energy needed for processing big amounts of raw materials and the amount of surplus material.
- The roadmap also acknowledges the fact that raw materials are capital for the primary sector. Sustainable solutions are dependent on the protection of raw materials. The aim of the Circular Economy is to keep Finland vibrant for people and nature.

Between their education initiatives and roadmaps, these measures demonstrate that Finland has been making progress in several different areas: a recent poll showed that 82% of Finns believe the Circular Economy creates new jobs, and several Finnish cities have developed roadmaps of their own. Its forestry industry has taken steps to reinvent itself, a key move as a full 28% of domestic energy consumption now comes from wood-based fuels. Renewables surpassed fossil fuels for the first time in 2020 (Abend, 2022).

However, that does not mean Finland has completed its mission, especially in terms of waste reduction. Figure 4 below shows that, although the amount of waste going to landfill has decreased, Finland keeps producing more waste per capita each year compared to the previous years, but now it is turning waste that cannot be recycled into energy recovery instead of sending it to landfill. “In that sense, we are still living in the linear model,” says Sitra’s project director for the Circular Economy, Kari Herlevi. “We’re better at recycling, but we have not been able to turn the tide fully” (Abend, 2022).

Figure 4. Municipal waste by treatment method in 2004 to 2020 (Statistics Finland, 2021)



While their accomplishments thus far are worth celebrating, Finland still has room for further progress toward the Circular Economy. Barriers to full implementation are identified as a decline in research and innovation investment, a conservative nature or lack of risk-taking regarding eco-innovation, and conflicting views on waste incineration and bioeconomy sustainability (European Sustainable Business Federation, 2019).

Malmö, Sweden

Sweden operates numerous initiatives and ranks respectably in the Circular Economy indicators (Eurostat, n.d.). In fact, all indicators are in the top half of EU member states with the country’s top ranking coming in the percentage of small and medium-sized enterprises minimizing waste (4th) (European Sustainable Business Federation, 2019).



Malmö has more than a decade of progressive investment in environmental and climate issues under its belt (City of Malmö, 2009). And over the past few years, it has been drawing attention with its efforts for switching to the Circular Economy. The wide range of strategies the municipality of Malmö has been pursuing sets an example of how a local government can take action to start the transformation from a linear economy to a circular one.

“In the period 2017 – 2020 the Circular PP (public procurement) project has worked on promoting circular public procurement in the Baltic Sea area by doing pilots, research, and capacity building events” (Circular PP, n.d.). As a part of this effort, Malmö aims to catalyze the transition to the Circular Economy in the region using public procurement. The first step of this initiative started with a pilot framework for fulfilling the furniture needs of the municipality (The Ellen MacArthur Foundation, n.d.).

Public procurement can play a key role in transitioning to the Circular Economy. Including “circular principles” into procurement practices can help public sector buyers take a more holistic approach to sustainability—from the first stages of a procurement to the end of product life—while also achieving potential savings (European Commission, 2017).

The City of Malmö, with a procurement volume of around €0.9 billion per year, is a significant purchaser in the country. Malmö has been actively implementing sustainable procurement over many years, which it defines as procurement that helps to achieve the goals of the Environmental Program for Malmö City 2009-2020 principles (European Commission, 2019). However, specifically in 2018, Malmö decided to pilot a procurement approach that would increase the reuse of furniture, while drawing as much attention as possible to existing internal services (European Commission, 2019). The framework centered around the idea of reusing, refurbishing, and if all else fails, recycling the furniture used in governmental offices.

While doing this, Malmö focuses on behavioral change, as it understands that reducing waste and improving reuse practices need to become the norm. As an example, a priority list was created along with the framework contract to guide users’ actions when a need for furniture arises (European Commission, 2019).

The priorities are as follows:

- 1) As a first preference, furniture already owned by the City of Malmö should be used (i.e. furniture in storage or being advertised on Malvin²).

² An online marketplace for the municipal body of Malmö.

- 2) If furniture requires renovation or refurbishment, this can be done by the Labor Market and Social Administration (ASF -Arbetsmarknads- och socialförvaltningen).
- 3) If internal renovation is not possible, this work can be carried out by a supplier of the reused furniture framework.
- 4) If no existing furniture is found within the City, it can be purchased using the reused furniture framework.
- 5) If no reused furniture meets the needs of the user, it can be purchased from the new furniture framework.
- 6) If furniture owned by the City of Malmö is not considered to have any resale value, it can be sent to recycling. This is the last step of the furniture life cycle and should be avoided as far as possible.

With these priorities, Malmö is aiming to convince residents to embrace the repair-reuse-refurbishment approach before going for buying newly manufactured goods. The creation of the circular framework agreement is already an achievement in itself, however, the next frontier is to encourage buyers to use it as a preferred alternative to the established agreement for the procurement of new furniture (The Ellen MacArthur Foundation, n.d.).

Circular procurement is not the only area Malmö is active in. From food waste to renewable energy, from recycling to sustainable IT products, Malmö has been spearheading many other different initiatives that bring it a step closer to circularity.

In Malmö, it is mandatory to sort food waste for all households. Since 2014, all citizens in Malmö have been recycling their food waste through waste grinders, vacuum systems, or paper bags in garbage bins. The food waste is collected to produce biogas which is used to fuel the city buses, garbage trucks, taxis, and cars. Malmö's entire bus fleet is engineered to run on gaseous energy sources. Approximately 200 city buses run on a mix of biogas and compressed natural gas (CNG). As the production of biogas increases, an even larger percentage of Malmö city buses will run on biogas which reduces greenhouse gas emissions, NOx emissions, and particles.

Asia

China

China is an effective example of how to incorporate the Circular Economy into its strategic planning efforts. As part of their 11th 5-year plan, China introduced the Circular Economy principles in its policies in the early 2000s (Isles, J., 2021):

"To begin it was primarily an industrial ecology agenda, looking at how the waste of one company can become resources for another. It was very much end of pipe, the

three R's. Reduce, reuse, recycle. But the latest Circular Economy Policy Portfolio, which came out in 2017, looks at eco-design (both as a concept and as a policy) and extended producer responsibility and it's a massively important step. It shows the importance of upstream. A lot of cities are also looking at the Circular Economy so it seems that the Chinese perception of the concept has evolved massively. And coming from a pure 'how do we manage the flows' perspective, it's become an innovation agenda" (para. 22).

With their Development Plan for the Circular Economy in the 14th 5-year plan, released by the National Development and Reform Commission in 2021, China continued its efforts for the Circular Economy. The plan includes various initiatives to further develop the Circular Economy in the county, such as promoting recycling, remanufacturing, green product design, and renewable resources, and sets ambitious numerical targets for China such as increasing resource productivity by 20% compared to 2020 levels and utilizing 60 million tons of waste paper and 320 million tons of scrap steel by 2025 (Koty, 2021).

These efforts have brought a comprehensive set of policies that are classified into four general types: generation of more valuable resource flows, production efficiency and environmental performance, prevention of waste disposal and associated pollution, and sustainable consumption and life cycle considerations. Realizing that a market-based approach could provide a significant contribution to encouraging Chinese businesses to pursue a more sustainable path, China's efforts resulted in observable outcomes: in 2019, a Chinese enterprise, Tianjin Citymine Ltd., and a non-profit organization, Shandong Association for Circular Economy, have reached the final stages of the Circulars Awards, an initiative promoted by the World Economic Forum (WEF) and the Forum of Young Global Leaders (Pesce et al., 2020).

South Korea

South Korea has pursued a transition to the Circular Economy by enacting the *Framework Act on Resource Circulation* in 2016 (entry into force in 2018) and establishing the first master plan for the resource circulation for the period of 2018 to 2027. Listed below are some noteworthy policies that have helped drive the Circular Economy transition in South Korea.

Perhaps most notably, South Korea has pioneered how to separate colored and transparent plastic bottles, in order to maximize the value of the resources recaptured in a circular supply chain (Yoo, 2020):

"Since colored plastics are more difficult to be recycled than transparent ones, the latter has a higher market value (Tenenbaum, 2019). Therefore, South Korea started to collect transparent plastic bottles separately from colored ones in 2020. The

separation was first begun as a pilot project in several cities from February 2020; next expanded to large-scale apartment houses in December 2020, and then finally applied nationwide from December 2021. The Ministry of Environment of the Republic of Korea has also supported relevant businesses to further facilitate through the reduction in the EPR (Extended Producer Responsibility), public procurement of plastic-recycled items, and so on.”

South Korea also effectively leveraged community relationships built through effective engagement to help limit single-use plastic packaging in local restaurants (Park, 2018; Kang, 2019; Song, 2022):

“In May 2018, The Ministry of Environment concluded voluntary agreements with major cafes and fast food restaurants to reduce the use of single-use items and facilitate recycling. The participants agreed on: 1) unifying the materials used for single-use plastic cups since two types of the materials, PET and PS, are difficult to classify and, accordingly, recycled; 2) banning the use of single-use items in case of dine-in; and 3) promoting the use of personal containers, such as tumbler mugs, by providing a roughly 10% discount. In May 2019, the Ministry revealed that the materials were unified into PET which thus made recycling easier, and the use of single-use cups at cafes and restaurants reduced by 14.4% (from 701.3 million to 677.2 million) even with the increase in the numbers of cafes and restaurants by 1,222 (from 9,138 to 10,360). Although the banning was temporarily suspended after the outbreak of COVID-19 in early 2020, the Ministry gradually resumed the ban in April 2022.”

United States

Austin, Texas

One example of local governments in the U.S. supporting the Circular Economy practices comes from Austin, Texas. The City of Austin’s ambition to reach zero waste by 2040 has generated several initiatives, including the creation of the Austin Materials Marketplace, an online materials exchange platform. Aligning with the Circular Economy principles, the platform’s ambition is to keep materials and products out of the landfill and in use, not only reducing waste management expenditure for the city, but also providing the means for local businesses to advertise and bid for surpluses, thereby benefiting from cost savings or creating additional income (The Ellen MacArthur Foundation, 2019).

The Austin Materials Marketplace was developed by The United States Business Council for Sustainable Development (USBCSD), a non-profit organization that works with businesses to find solutions that address environmental and resource challenges, and it was supported by Austin Resource Recovery (ARR) Department (formerly known as the Solid Waste Services). Planning, budgeting, testing, and developing the Materials



Marketplace took approximately two years and policymakers were integral to the development.

ARR provides a wide range of services designed to transform waste into resources, with the goal of reaching zero waste by 2040, which means reducing the amount of trash sent to landfills by 90%. ARR funded the project for the first two years of its operation with \$175,000 each year, with the intention of decreasing it annually and eventually reaching \$0, when the project becomes self-sustainable. In 2018, the funding was approximately half of what it had been at the beginning of the initiative.

The Material Marketplace has been functioning both as a platform to connect all sizes of businesses and organizations, and a means to find new reuse opportunities for materials that are already in the loop, keeping them out of the landfill.

From its start in August 2014 to the end of 2018, the Materials Marketplace had engaged with over 530 participants on the platform. In the period October 2017 to September 2018, an average of 20 trades per month were processed. At the point at which 593 trades had been made, a net value of \$622,772 had been generated. The trades have resulted in over 400 tons of material diverted from landfill, and over 950 million tons of carbon dioxide equivalent emissions saved. (The Ellen MacArthur Foundation, 2019)

Washington State

Recently, Washington State initiated its own version of an online market called the Washington Materials Marketplace. Funded by the Washington Department of Ecology with the support of USBCSD, Washington Materials Marketplace has the same objectives as Austin Materials Marketplace: “creat[ing] a collaborative network of businesses, organizations and entrepreneurs where one organization’s hard-to-recycle waste and by-products becomes another organization’s raw material” (USBCSD, n.d.).

USBCSD (USBCSD, 2021) explained the role of the Materials Marketplace as follows:

“Through the Washington Materials Marketplace, traditional and non-traditional waste streams are matched with new reuse and recycling opportunities that result in landfill diversion, carbon reduction, cost savings, energy savings, and new job opportunities. This platform aims to aid both public and private sectors in reaching the region’s climate action and equity goals. This approach to enhancing recycling and reuse is quite different from previous approaches.”

Washington Materials Marketplace joins other regional Materials Marketplace initiatives, including programs both at the city and state levels such as Austin, Tennessee, Ohio, Ontario, and Michigan. This hybrid approach allows for deep engagement with



Washington-specific challenges and opportunities, and facilitates interaction at the national scale when appropriate (USBCSD, 2021).

Announced in August 2021, Washington Materials Marketplace is quite new, especially compared to Austin's example. Additionally, although it was developed by the City of Tacoma and Seattle Good Business Network, it is larger in scale as it aims to engage and serve the entire state, rather than specific cities.

IV. Stakeholder Engagement: Importance of Local Action and Support

As demonstrated above, while there have been numerous attempts to facilitate the implementation of the Circular Economy on a national scale, the most ambitious policy efforts to realize the Circular Economy have occurred at a local level. Local governments act closest to the waste management challenges ingrained in the Circular Economy while also having the policy tools available to directly engage with stakeholders and citizens in pursuit of the Circular Economy (Dagilienė et al., 2021).

As a result, cities and localities hold a unique opportunity to be the policy incubators for the Circular Economy. This is particularly realized when cities pursue the universal policy goals of the Circular Economy through a lens of collaborative governance and strategic planning (Bolger & Doyon, 2019; Dagilienė et al., 2021; The Ellen MacArthur Foundation, 2019). Effectively pursuing these goals, however, requires a multifaceted approach to policy implementation that takes into account both “hard” policies that build infrastructure and economic incentives for the Circular Economy, but also the “soft” policies that pursue civic engagement, public education, and strategic partnering within the community to be successful (Bolger & Doyon, 2019; The Ellen MacArthur Foundation, 2019).

Bolger and Doyon (2019) emphasize the importance of these relational and social drivers of change by comparing the circular policy efforts of the cities of Malmö and Melbourne. Bolger and Doyon identify that Malmö's success in implementing many of its circular goals was a high degree of social cohesion and an emphasis on social responsibility. Perhaps the most unique idea enacted in Malmö was the establishment of sharing stations, which allow people to share products and materials that they deemed as no longer useful with their neighbors; Bolger and Doyon emphasized that this expansion of the sharing economy throughout Malmö is rooted in a strong sense of social cohesion and care for neighbors. Similarly, the City of Melbourne recognizes and emphasizes the importance of education and behavior change to reduce waste in its strategic documents. Its waste strategy mentions consumer responsibility, and proposed actions included advocacy campaigns around single-use plastics or encouraging composting locally. The themes of co-locations and sharing economy were also common in Bolger and Doyon's study. One strategic planner observed that local governments “can lobby and advocate for good decisions but



for the Circular Economy to work it needs the whole city working together and for everything to be talking to each other”.

This reliance on social cohesion is echoed by the Ellen MacArthur Foundation in their report on how city governments can enable a circular transition. They explicitly reference that convening and partnering, as well as awareness building, are essential policy levers available to city governments as part of a larger engagement strategy for circular practices (The Ellen MacArthur Foundation, 2019). While they emphasize that no government has the capacity to act alone, “governments have an unparalleled ability to convene multiple stakeholders, and city governments are no exception” (The Ellen MacArthur Foundation, 2019).

Conversely, if a community lacks the social engagement necessary to build circular economic capacity, infrastructure and political gains can be blunted through noncompliance. Dagilienė et al. (2019) examine Lithuania as a case study, and highlight that the key challenge in implementing the Circular Economy practices into the waste management stream was the local “residents' reluctance to sort,” and a “lack of information about sorting” as well as “bulky waste or homeless waste.” They go on to emphasize that a common theme when the Circular Economy would fail to be effectively implemented was the failure of the local government to provide: 1) informal and formal education about effective waste management practices, 2) effective publicity of circular policy initiatives, and 3) buy-in from local businesses and farmers to support environmental efforts. As the case studies in Melbourne, Malmö, and Lithuania emphasize, the local government has both the responsibility and the opportunity to engage the various communities and stakeholders that will, in turn, embed the Circular Economy into a common vernacular and practice among local residents.

Stakeholder engagement is also essential to the Just Transition. During the process of Canada’s commitment to phase out coal-fired power, the government strived to “ensure workers affected by the accelerated phase-out of traditional coal power are involved in a successful transition to the low-carbon economy of the future” with provincial governments and organized labor (Just Transition Center, 2017). Although the case did not exactly fit into the Just Transition for the Circular Economy, core concepts are still applicable.

Engagement of local communities in the Just Transition is essential for two reasons: 1) the economic and social lives of workers and their families are closely tied to the region, and 2) a possible vicious circle of a reduction in tax and revenue leading to less public service, less population, and fewer employment opportunities, finally resulting in more reduction in tax and revenue again (Just Transition Center, 2017).



The participatory budgeting process, through which “citizens can freely and equally deliberate on the use of the city’s budget” (Friant, 2017), in Porto Alegre, Brazil, demonstrated how this participatory and deliberative decision-making process was able to contribute to urban sustainability and environmental justice; for example, the treatment of solid and liquid waste had significantly improved even with 7.69% of population growth between 1991 and 2000, and the majority of investment decisions prioritized the most disadvantaged communities (Avritzer, 2010; Marquetti, 2002; Marguetti et al., 2012, as cited Friant, 2017, p. 32).

Friant (2017) describes detailed procedures:

- The first phase of the process consists of two rounds of plenary assemblies and intermediary meetings from March to June mainly for monitoring and assessing the previous year’s budgeting plan; electing Delegates based on the number of attendees from its 16 districts; identifying and ranking the city’s priorities; and discussing concrete projects necessary to the City. During the process, the Delegates actively communicate and collaborate with diverse stakeholders such as NGOs and neighborhood associations.
- The second phase starting from June is mainly operated by the Delegates to evaluate the actual needs and demands of communities by visiting various sites. The Delegates continuously communicate with and inform citizens and communities. After finalizing the list of projects and priorities, the local government prepares a cost estimation for the submitted list. After the cost estimation, the previously recommended projects and priorities are reconciled with available resources by the distribution criteria to ensure the constrained resources are distributed fairly. By December, the budgeting plan is finished and submitted to the local government authorities for formal approval.
- The third and final phase is for the implementation and monitoring of the budgeting plan, and then improving, if necessary, the participatory budgeting procedures.

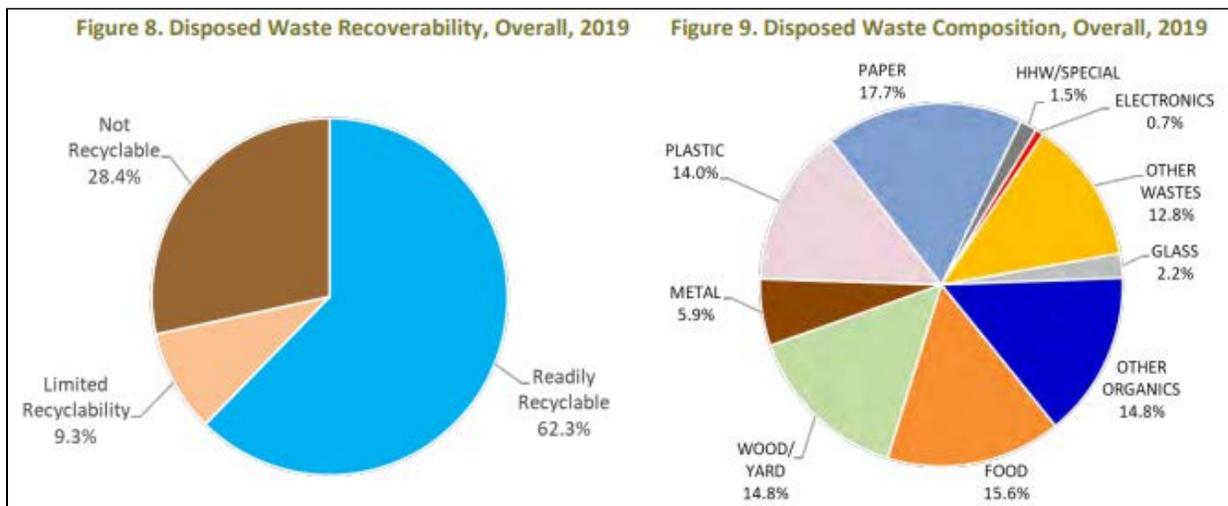
V. King County: Capacity and Goals

King County’s efforts for promoting and transitioning to the Circular Economy have included preparing the Implementation Plan for a Carbon-Neutral King County Government which is consistent with 2016 King County’s Comprehensive Plan Workplan Action 9 (King County, 2019). King County further expanded on these goals in the 2020 update to the Strategic Climate Action Plan (SCAP), which set aggressive goals to take steps towards a reduction in greenhouse gas emissions by 50% by 2025, and 80% by 2030 with the Circular Economy practices.

The King County Solid Waste Division provides garbage transfer, disposal, and recycling services for approximately 1.3 million residents in King County. Reliance on unsustainable linear economy practices makes research into and implementation of the Circular Economy policies essential for any government seeking to guard against the negative economic, social, and environmental effects of climate change, pollution, and resource scarcity.

King County alone generated approximately 868,532 tons of waste in 2019, with paper, food, wood/yard, other organics, and plastic waste representing the top five categories (Cascadia Consulting Group, 2020). As shown in Figure 5, these overall proportions differed across various waste substreams including residential, nonresidential, commercial, and self-haul. Of the estimated total, approximately 62.3% of waste was classified as “readily recyclable,” meaning that the facilities and technologies available to process those materials are well-developed and supported (Cascadia Consulting Group, 2020).

Figure 5. King County Waste Composition and Recoverability (Cascadia Consulting Group, 2020)



Of the top ten most frequently disposed materials in King County (Figure 6), seven were readily recyclable and three were not recyclable at all. Those three are disposable diapers (5.3%), construction and demolition wastes (4.0%), and animal feces (3.9%), which represent a collective 13.2% of the total waste stream. Without the presence of any materials with limited recyclability, any initiative seeking to improve the recoverability of the most commonly disposed materials would have to invest in new processes and technologies to do so.

Figure 6. King County Most Prevalently Disposed Materials (Cascadia Consulting Group, 2020)

Table 14. Ten Most Prevalent Disposed Materials, Overall, 2019

Material	Est. Percent	Est. Tons
Dimensional Lumber/Engr. Wood	7.0%	61,002
Low-Grade Recyclable Paper	5.9%	51,508
Disposable Diapers	5.3%	45,800
Other Compostable Paper	4.5%	39,483
Mixed/Other Food Waste, Non-edible	4.2%	36,094
Mixed/Other Food Waste, Edible	4.1%	35,190
C&D Wastes (except wood)	4.0%	35,118
Animal Feces	3.9%	33,997
Plain Corrugated Cardboard (OCC)	3.6%	31,430
Non-Industrial Packaging Film Plastic	3.4%	29,718
Total for Top Materials	46.0%	399,339

In terms of waste collection (Figure 7), the Bow Lake transfer station receives approximately 31% of the entire county’s waste (Cascadia Consulting Group, 2020). The Algona, Factoria, and Houghton stations receive between 16 to 18% while all others each receive less than eight percent.

Figure 7: King County Waste by Facilities (Cascadia Consulting Group, 2020)

Table 7. Annual Tons by Facility, 2019 ⁹			Table 8. Annual Transactions by Facility, 2019		
Site	Annual Tons	Percent of Total	Site	Annual Transactions	Percent of Total
Algona	154,195	18%	Algona	140,627	17%
Bow Lake	266,623	31%	Bow Lake	198,762	24%
Cedar Falls Drop Box	3,556	0%	Cedar Falls Drop Box	20,226	2%
Enumclaw	22,355	3%	Enumclaw	55,958	7%
Factoria	139,617	16%	Factoria	108,082	13%
Houghton	137,361	16%	Houghton	108,591	13%
Renton	59,156	7%	Renton	77,263	9%
Shoreline	48,549	6%	Shoreline	84,825	10%
Skykomish Drop Box	1,651	0%	Skykomish Drop Box	4,111	1%
Vashon	7,815	1%	Vashon	19,551	2%
Subtotal	840,878	99%	Subtotal	817,996	100%
Regional Direct Waste	7,542	1%	Regional Direct Waste	512	0%
Total	848,420	100%	Total	818,508	100%

King County’s Equity and Social Justice Strategic Plan (King County, 2016) also resulted in specific programs being offered by the KCSWD. For example, Cleanup LIFT offers a \$12



discount to customers who show Medicaid, EBT, or ORCA cards when dropping off garbage or recycling. With King County's broad commitment and adherence to equity and social justice, it positions itself as a potential pioneer of equitable Circular Economy policies in the United States. There is room for significant improvements to be made to these systems that maintain resource value, protect vulnerable communities, and empower related stakeholders to support a transition to the Circular Economy in King County by 2050.

In 2017, King County commissioned an inventory of the greenhouse gas emissions released within the county's boundaries. This revealed that emissions from solid waste disposal have been consistently—if modestly—declining over the past few years, despite the fact that the population of King County has gone up, with the sharpest declines coming from landfill emissions. This last point is a testament to the work already accomplished by King County to improve waste disposal practices and reduce both emissions generated by waste, as well as per capita waste itself. As the concept of the Circular Economy is designed to confront the underlying causes of environmental issues - including climate change - contextualizing our roadmap with the realities of greenhouse gas emissions will allow us to examine how to best reduce emissions quickly.

In 2020, King County disposed of 1.6 million tons of hazardous waste, recycled 200,000 tons of construction waste, increased recycling by 3.3%, and generated \$3.3 million by selling natural gas captured from the county's landfill (King County Solid Waste Division, n.d.). While this report outlines all of these statistics, it also contextualizes how these statistics align with the zero waste and circular ambitions of King County Solid Waste. Specifically, it highlights that much of the department's revenue comes from fees collected at transfer stations - fees that, if the Circular Economy is fully realized, will be dramatically reduced if not eliminated entirely. For a successful transition, new revenue streams will need to be identified to ensure the King County Solid Waste Division will be prepared to serve the county's residents in a circular future.

Recently, King County has released the early framework for the Solid Waste Division's Re+ plan. As a framework, Re+ aims to distribute \$1.8 million in grants for projects seeking to further circular practices in King County (King County 2022). Based on the analysis outlined in the 2020 Solid Waste Management Annual Report, King County identified that as much as 70% of waste sent to the local landfill could have been repurposed or reused in some way (King County Solid Waste Division, n.d.). As such, Re+ has outlined a vision with five key tenants: 1) Reduce single-use items, 2) Reuse "everything that can be", 3) Recycle what is left, 4) Renew communities, and 5) "Rethink what is possible" (King County, n.d.a). While the final plan will be released in 2022, the early vision released thus

far emphasizes the policy framework that King County Solid Waste is utilizing as it approaches the transition to the Circular Economy.

VI. King County: Current Initiatives

Re+ plan

The Re+(plus) plan is a roadmap for “healthy, safe, and thriving communities in a waste-free King County” (King County, n.d.a). To minimize waste, it urges communities to *reduce* single-use items, *reuse* as much as possible, *recycle* stuff, *renew* communities, and *rethink* what can be done. On the way towards zero waste King County, Re+ supports local actions through an array of initiatives focusing on minimizing KC’s environmental footprint, creating green jobs, and ensuring equal access to waste management services.

To facilitate local actions for the Circular Economy, KCSWD is currently preparing for an approximately two-year Re+ Circular Economy Grant Program of \$1.8 million, focusing on two areas - Prevention & Reuse and Recycling - and three materials - plastic, paper, and organics (King County Solid Waste Division, 2022). Like other KCSWD-funded programs, this Re+ Circular Economy Grant Program is also aligned with the concept of Equity and Social Justice by requiring the programs to understand and commit to the principles of Equity and Social Justice, such as understanding structural and institutional racism (King County Solid Waste Division, 2022).

2020 Strategic Climate Action Plan

The Strategic Climate Action Plan (SCAP) is a five-year plan for climate action mainstreaming climate change mitigation and adaptation into all areas across the County. The plan is based on the best available scientific evidence, local-specific expertise and experiences, best practices at diverse levels from global to local, and technological advances. Advanced from its previous 2015 version, the 2020 SCAP updates GHG reduction targets (50% reduction by 2030 and 80% reduction by 2050 compared to its 2007 GHG emissions), provides guiding principles, and strengthens stakeholder engagement, especially from frontline communities who disproportionately suffer from climate change. Although GHG emissions directly from solid waste were one percent in 2017, reducing single-use items, reusing, and recycling stuff altogether can largely contribute to GHG emissions reduction in King County (King County Climate Action Team, 2021).

NextCycle Washington

Launching in the summer of 2022, NextCycle Washington is a business accelerator for circular economic practices. Based on successful examples of similar projects created in Michigan and Colorado, NextCycle aims to start two programs—a Circular Accelerator and a Seed Fund Grant program—that operate in conjunction with one another to support



nascent businesses that operate in the Circular Economy (Hesterman et al., 2022; NextCycle Washington).

The Circular Accelerator program of NextCycle aims to provide the resources and technical expertise to develop nascent business ideas essential to the Circular Economy into actionable plans that can be executed to create and establish new industries. NextCycle aims to provide applicants with business training, networking opportunities, and advice on how to secure funding cycles, pitch to investors, and develop circular business ideas to a position of deliverable maturity (NextCycle Washington, n.d.).

Working in tandem with the Circular Accelerator program, the Renew Seed Grants can provide up to \$10,000 in early funding for selected business proposals, with an eye toward providing the financial footing to pursue larger funding opportunities. Together, NextCycle aims to enable people to both receive the business training, networking, and knowledge needed to deliver a product to market, as well as the basic funding that can launch a business idea into reality (Hesterman et al., 2022; NextCycle Washington, n.d.).

The NextCycle model has been demonstrated to be successful in Michigan and Colorado, where the mentoring and seed grant programs have helped establish businesses devoted to textile waste reuse, polymer recycling capacity, and expanded industrial composting systems (Hesterman et al., 2022). This program's initial stages launched on March 28th, with the first awardees being accepted into NextCycle in the summer of 2022.

VII. Climate Change: Implications for the Circular Economy

The Circular Economy is intrinsically linked to the climate crisis. The Ellen MacArthur Foundation estimates that only 55% of all greenhouse gas emissions are linked to the combustion of fossil fuels; eliminating the remaining 45% will require systemic changes to how to source, manufacture, consume, and dispose of our products and built environment (The Ellen MacArthur Foundation, 2021).

The built environment, in particular, represents a significant opportunity for decarbonization. Cantzler et al. (2020) conducted a systematic review of climate change and the Circular Economy, and identified that changing how we produce steel and concrete, in particular, had the greatest opportunity to reduce emissions. The manufacturing of steel and concrete is already carbon-intensive, and while decarbonizing the manufacture of those materials will be essential for the larger climate transition, the Circular Economy presents numerous opportunities to quickly reduce the carbon impacts of these materials.



Requiring buildings to be designed for reuse, for instance, can eliminate 15 to 21% of the building's lifetime carbon emissions, depending on how many times the structural steel and concrete can be repurposed, while optimizing the amount of material in construction can reduce emissions by 21% (Eberhardt et al., 2019; Gallego-Schmid et al., 2020). When those two techniques are combined—particularly around the concrete slab, core walls, and roof beams, total emissions can be abated by 25 to 60% (Gallego-Schmid et al., 2020).

Similarly, using Completely Recyclable Concrete—a material designed from manufacturing to be recycled into new concrete without any additional treatment after the end of the material's life—can reduce GHG emissions by 60 to 70% (de Schepper et al., 2014). Further emissions reductions in the built environment can also come from replacing steel and concrete with mass timber in a building's design, or by emphasizing the refurbishment of existing structures, rather than the demolition of old buildings and reconstruction of new buildings (Gallego-Schmid et al., 2020; King County Climate Action, 2020).

Waste management—particularly around plastics—also represents an area where the Circular Economy can dramatically reduce greenhouse gas emissions. By implementing both novel materials explicitly designed for reuse into the waste stream, as well as expanding waste management practices that allow for materials to be recaptured into the production stream, overall emissions associated with disposing of waste can be reduced. A key example comes from Portugal, in which improvements in the collection, sorting, and recovery of waste—both organic and otherwise—led to a 47% reduction in greenhouse gas emissions while simultaneously leading to a 61% improvement in the benefits from recovering mineral resources from landfills (Ferrão, 2016). Similarly, the implementation of a closed-loop supply chain for thermoplastic polymers used in auto production in Mexico resulted in a 73% decrease in greenhouse gas emissions corresponding to a 79% reduction in energy consumption (Chavez & Sharma, 2018). Put together, reducing waste and improving waste management can reduce emissions by 50 to 60%, with improved management of organics providing an additional eight percent of emissions reduction (Cantzler et al., 2020).

Within all these examples, the Circular Economy provides a framework that improves both systemic outcomes and emissions reductions. Closing production loops, designing end of life considerations into product manufacturing, and incentivizing reuse and repurposing provide numerous co-benefits to both the environment and to society, confronting numerous environmental challenges, including climate change.

King County has already internalized this rationale in the county's policy-making. In 2020, King County updated the SCAP, which outlined a policy roadmap to reduce carbon



emissions in the county by 50% by 2030 and 80% by 2050. The 2020 SCAP outlines three sections for emissions mitigation and adaptation: “Reducing Greenhouse Gas Emissions”, “Sustainable Frontline Communities”, and “Preparing for Climate Change.”

Numerous strategies already outlined in the King County SCAP intersect directly with the Circular Economy. Within the emissions reductions categories, the SCAP explicitly outlines strategies to improve green building development, improve waste management practices, and advance “a countywide Circular Economy framework, including achieving zero waste of resources and edible food waste by 2030.”

These policies and recommendations are built to expand on the existing successes that King County has already pioneered. A target of 85% waste diversion for construction materials by 2025, for instance, is built on the already commendable success 80% rate achieved in 2017. Other existing initiatives already align with the academic literature on the Circular Economy: creating a market for reusable wood in construction, or outlining a zero waste of resources plan, lays the foundation for rapid transitions to more sustainable and just resource management that can cross sectors.

It is upon this foundation that this roadmap explicitly analyzes the barriers and opportunities in a transition to the Circular Economy. The academic literature surrounding the Circular Economy has already established the numerous co-benefits that the Circular Economy transition can provide to the effort to confront the climate crisis. By exploring a roadmap to the Circular Economy in more detail, we aim to provide a complementary framework to King County’s SCAP—one that expands on the benefits of circularity more explicitly to frontline workers, strengthens climate resilience and mitigation efforts, and creates more policy tools to reduce greenhouse gas emissions county-wide.

VIII. Need for a Circular Economy Roadmap by 2050

King County’s existing ambition towards waste reduction and management, as well as the demonstrated effectiveness of the waste reduction and management programs implemented thus far to reduce per capita waste management, has created a foundation for the Circular Economy in King County. The Re+ Plan, in particular, is an opportunity for the King County Solid Waste Division to pursue circular waste management goals that will both improve the environmental challenges King County is facing, and strengthen local communities. However, in order to fulfill a just and equitable transition to a fully Circular Economy by 2050, the pace, scale, and scope of transition must accelerate—and must do so in collaboration with the communities, governments, and business partners that can facilitate and embed the Circular Economy into King County’s day-to-day operations.



In addition to the five Universal Policy Goals outlined above, the Ellen MacArthur Foundation has also identified three underlying cultural traits that can facilitate a collaborative transition in local governments seeking to pursue the Circular Economy (The Ellen MacArthur Foundation, 2019, 2021). Firstly, a collaborative transition must cultivate and nurture a culture of integration across topic silos, to ensure that knowledge and expertise from a variety of industries, perspectives, and stakeholders into the solutions proposed. Secondly, a culture of innovation, experimentation, and learning should be facilitated, in order to motivate the invention of new materials, new processes, and new solutions to waste management and reuse. Finally, a culture of inclusion and participation needs to be embedded into the decision-making that supports the locally created and locally supported solutions. Intrinsic to this roadmap is the recognition that King County is unique: both in the communities, experiences, histories, and geographies represented, but also in the opportunities and obstacles that must be overcome to implement the Circular Economy.

As such, this roadmap will build on the work already established in the Re+ Plan and the Strategic Climate Action Plan to identify the barriers and challenges facing the implementation of the Circular Economy, as well as outline the policies, relationships, and input needed to implement the Circular Economy throughout the next 28 years. If implemented successfully, we believe that a Circular Economy will provide King County's residents with a healthy, vibrant, equitable, inclusive, and sustainable economy.

Chapter 4: Results and Analysis

I. Key Themes and Findings from Literature Review and Case Studies

Our literature reviews revealed policy frameworks for the Circular Economy and Just Transition, which, when complemented with our case studies, revealed the best practices that King County can implement to pursue an equitable transition to the Circular Economy.

Circular Economy: Systematic and Behavioral Change

As the Circular Economy, as defined by the Ellen MacArthur Foundation, represents “a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution,” then implementing that systemic framework will require widespread behavioral change (The Ellen MacArthur Foundation, n.d.).

In this sense, it is essential to establish a long-term strategic plan that King County can utilize as a guiding document. For example, the EU has established two comprehensive action plans for the Circular Economy, and some individual member countries, such as Finland, have expanded on the EU’s policy goals by establishing their own national agendas. As shown in the case of the City of Amsterdam, these plans must include ways to measure progress and update strategic goals, if necessary.

As implementing these strategic goals will require the public to understand and support a circular agenda, public education is crucial to successful implementation. Finland has acknowledged the importance of the Circular Economy and outlined clear ways that the general public can participate in its adoption. Melbourne has also recognized and emphasized public education and behavioral change in its strategic documents for the Circular Economy.

Context-Specific Nature

One common feature that has been mentioned in the literature is the context-specific nature of the Circular Economy and the Just Transition. Each country and local society faces different opportunities and challenges; therefore, there is no one-size-fits-all strategy for the Just Transition to the Circular Economy.

Therefore, any jurisdiction pursuing the Circular Economy needs to identify and focus on engaging with key industries that present a unique opportunity for the region. For instance, Finland identified that their expansive historical forestry industry could stand to uniquely benefit from a circular transition, and as such, focused on policies that leveraged this opportunity when outlining their circular action plan. Basque Country, Spain also identified three spearhead sectors – advanced manufacturing, biosciences, and energy –



and concentrated on policies that would incentivize those industries to partner with government agencies to catalyze systemic change.

Just Transition: Essential for a Successful Transition

Throughout the academic literature, the Just Transition was shown vital not only due to ethical reasons but also due to practical reasons. Demographics that have been historically marginalized are unlikely to support any kind of systemic transition if the members of that group have reason to believe that existing injustices will be perpetuated under new policies. As such, it is crucial to ensure that members of frontline communities are recognized as key stakeholders and given clear opportunities to provide input and direction to policy objectives. In addition, the policy outcomes created through this engagement should be explicit about how they plan to repair historical injustices perpetuated by the status quo.

Since the word “just” is inherently context-specific, each society needs to identify the unique facets of the Just Transition that are relevant to their own regions through active and well-structured stakeholder engagement, especially for those who stand to be adversely impacted by the transition.

Stakeholder Engagement

There has been a variety of stakeholder engagement around the world, proving stakeholders can participate in major decision-making processes. Porto Alegre, Brazil, has implemented the participatory budgeting process, leading to improved solid and liquid waste management. The City of Vienna, Austria, has cooperated with industry actors through public-private partnerships in its construction sector to establish circular loops focusing on large-scale deconstruction. Platforms to enhance stakeholder engagement also play primary roles. In Brussels, Belgium, “Good Food Brussels” connects stakeholders along the food chain to increase local food production and reduce waste.

Prioritizing Reuse and Repair before Recycling

An effective Circular Economy focuses on keeping materials repaired and in use for as long as possible prior to any recycling efforts. Alelyckan Reuse Park in Gothenburg, Sweden, has encouraged visitors to sell or donate reusable goods, resulting in the reuse of 5.5% of goods that would have been discarded otherwise. Similarly, the City of Malmö has promoted the reuse and refurbishment of furniture before recycling since 2018. These efforts have not only extended the value that existing belongings can provide for residents, but also opened up a new economic opportunity for a workforce focused on responsible reuse. Policies that emphasize reuse and repair can have significant co-benefits that resonate throughout the economy.

Establishing Effective Economics

Policies utilizing economic instruments have also been recommended and implemented. Public procurement is an effective way for governmental authorities to exercise their purchasing power to promote the Circular Economy as demonstrated in the cases of Venlo City, the Netherlands, and Malmö, Sweden. Similarly, grants and fee reductions are the famous options for economic incentives: in Amsterdam, the 100% circular textile factory will be established with grants from the Ministry of Infrastructure and Water Management. Finally, economic incentives can be leveraged by government actors to incentivize purchasing decisions that align with the Circular Economy. By pricing environmental externalities into products with linear manufacturing chains, the EU's end-of-life stage tax program can help reduce the costs of circular goods to bring them into greater cost competitiveness.

II. Key Themes and Findings from Interviews

As part of our analysis, we conducted semi-structured interviews with stakeholders throughout King County. We focused our interviews on three broad categories: 1.) local government actors throughout King County, 2.) representatives of businesses located within King County, from small businesses to multinational corporations, and 3.) members of local communities, including BIPOC leaders and members of community development organizations.

These interviews were designed to supplement the findings of our literature reviews and case studies, and ensure that our recommendations aligned with the needs of King County's residents and economic progress. Out of these interviews, several significant themes emerged that provided input to our recommendations.

Clearly Defining the Circular Economy in Public Vernacular

When asked to define the term "Circular Economy" in their own words, most subjects were able to describe at the very least an understanding of the essential concepts of the Circular Economy: most often, that materials should be reused and repurposed back into the production stream. However, several subjects also articulated that the term "Circular Economy", in their mind, was simply one more way to describe the already existing efforts to waste less and do more to protect the environment. Several subjects even went so far as to describe the term "Circular Economy" as a buzzword that mostly serves to distract or confuse the general public, or even is a way for producers to greenwash their products with the most pioneering environmental language. One respondent stated: *"I don't think [the general public] knows what it means. I think that the Circular Economy is very jargony for a lot of people... It's kind of like a buzzword like sustainability, it's just another word people use. I'm not sure that people who are not in the industry really know what that looks like."* Most respondents either were ambivalent about using the term "Circular Economy"

in public marketing, or preferred to continue to use terms like “zero waste” or “waste reduction” to avoid confusion.

Additionally, the scope of the term “Circular Economy” can be challenging as well. One subject, a sustainability consultant, mentioned that they avoid using the term “Circular Economy” because clients often become intimidated by the use of the word “economy.” They explain that the academic and political connotations of the term can be confusing to those who are not familiar with the concept of circularity: *“I still stick with [the term] zero waste and even that has its challenges, just like reducing waste, lower waste, [etc.] I would use those terms to people who are just completely not in the sustainability spaces, I think that better communicates what we are trying to say ... I think even the word economy sounds like you need to be an economist to understand what it means, it takes people [in] different directions.”*

A key challenge here is that the definition of the term “Circular Economy” is not entirely synonymous with “waste reduction” or “zero waste.” While waste reduction is a key facet of the Circular Economy, and the well-established Circular Economy will greatly reduce, if not entirely eliminate, waste to landfills, the Circular Economy by definition involves changing and implementing how companies produce, consume, and source materials.

As such, if the Circular Economy is to be implemented in King County, one of the first decisions KCSWD will face will be to define how the county uses the term “Circular Economy” in public discourse. If KCSWD decides to continue using terms like “zero waste” in order to avoid introducing a new term that might confuse residents, then efforts will have to be made in order to ensure that concepts of circularity are incorporated into the definition of “zero waste.” However, if KCSWD decides to use the term “Circular Economy” or “Circularity” to describe the ambitions of the organization’s policy agenda, efforts will need to be taken to define what the concept means for the average person, why achieving this agenda is essential, and how it is different from other previous terms to describe waste reduction and management efforts in King County.

Publicizing the Circular Economy and Educating the General Public

More than any other theme, interview subjects focused on the concept of improving public knowledge and understanding of the Circular Economy. There was near unanimous agreement among our interview subjects that the residents of King County would like to see their communities operate in more environmentally sustainable ways, and would likely take reasonable steps to improve their impact on the environment if those steps were widely publicized and easily available to them.



Several subjects discussed the already significant efforts that King County has in place to support waste reduction and circularity efforts. Existing initiatives like the residential composting and recycling programs run by Seattle Public Utilities (SPU) and KCSWD were emphasized as success stories, for example, and the overall population which is environmentally inclined and open-minded towards improving environmental sustainability within King County was highlighted as a significant advantage. As expressed by a policy advisor: *“The great thing about this region is that we have kind of largely got recycling and composting down [...] There [are] more things that we could do, but compared to rates and other cities and things like that, we’re doing pretty well. We also have a populace and residents that are very engaged and willing and used to that sort of environmental approach to things which is very handy, and so I think a massive opportunity for Seattle and King County is using that to our advantage.”*

However, while these comments are encouraging, nearly every subject interviewed emphasized that the most significant and urgent barrier to expanding these waste reduction efforts was a lack of knowledge, clarity, and education on how to take advantage of these waste reduction efforts. Numerous business owners focused on sustainability emphasized that many of their customers were unaware of the various policies, tools, and opportunities available to them in King County, and that customers were often surprised by how easy it can be to switch to a more circular lifestyle.

Unique Opportunities in King County

While many of our interview subjects expressed the need for more publicity around the existing efforts for the Circular Economy, this information was often discussed in conjunction with excitement around how many opportunities to improve circularity are already present in King County.

Interview subjects frequently identified practices and policies that they had often utilized to reduce the waste of business operations and their own day-to-day lives, including SPU and KCSWD programs. Interview subjects pointed to the historical success pioneered by industrial composting and recycling programs as the present-day Re+ program and the SCAP, which has outlined a respectable environmental agenda confronting both climate change and waste management. Others recognized private companies and nonprofits focused on outdoor recreation, responsible construction, and waste management as organizations that aim to reduce waste and are working towards integrating sustainability into their business practices.

Additionally, the unrealized potential of King County was also often mentioned. As the home of several multinational corporations, and a political landscape largely friendly to pro-environmental policy, several interviewees felt like King County had a chance to be a



global leader in the Circular Economy innovation. One interview subject emphasized that one local firm had managed to implement a highly successful materials management program while operating entirely as a private company, and felt like KCSWD could utilize greater economies of scale available to a government utility to vastly improve on the concept. Another believed that relatively simple improvements to the existing waste management practices of King County—particularly around ensuring materials do not commingle and contaminate each other through the segregated curbside waste collection—could ensure that King County is prepared to preserve the value present in resources. Still, others pointed towards extremely large technology and textile companies as firms that, if they were to fully recognize their sustainability goals, would likely have a significant impact on the environmental footprint of the people who rely on their products. These firms also have the ability and power to inspire, influence, and set an example for people and other parts of the sectors and small businesses not only in King County, but due to their large network and both national and international relations, in other parts of the U.S. and the world. King County has the advantage of this proximity to these key actors and can use this opportunity to collaborate with them to trigger and initiate systemic change in its region.

As such, KCSWD has the opportunity to be a galvanizing force for the Circular Economy by taking advantage of these opportunities. Early collaboration efforts should focus on building the governmental and business coalitions necessary to pass policies that prioritize innovation in manufacturing and packaging production, build on what has already been demonstrated as effective in King County, and ensure that economic incentives are aligned with the circular business practices. If successful, the progress that King County pioneers can resonate well beyond the county's borders.

Technological Innovation for Day-to-Day Use

Nearly every subject that we interviewed believed that implementing the Circular Economy required some degree of behavioral change among residents in King County. *“I think the biggest barrier, the most obvious one to me,”* one professional mentioned, *“is that it's not switching from a linear economy to a circular [economy], it is not like a replacement; it's a complete transformation and that requires a lot of behavior change [...] You can't just introduce a circular product into the world that we have now and expect it to be able to flow or survive, you need to kind of train people on how to interact with this differently, because you're using different mechanisms.”* Most respondents, however, also believed that the opportunities that these behavior changes represented could be vast improvements over the status quo, and that most residents and business owners would prefer to be environmentally responsible if given the resources and opportunities to do so.



Several respondents mentioned that a key barrier to incentivizing this behavior change is the reputation that being “environmentally friendly” required some degree of sacrifice. One interview subject, a zero waste store owner, shared that there is a well-established conception that zero waste products are “inferior” in terms of comfort, and people usually “have to compromise” in order to contribute to the Circular Economy. In some ways, this concern is not without warrant, according to a second respondent who works as a consultant. They mentioned that the restaurants they work with are often hesitant to use compostable bags for their takeout order, as they have had episodes in which those bags break under the heat and pressure of a warm order of food.

However, while this reputation is not unearned, several respondents believe that the benefits of facilitating these behavior changes far outweigh the costs. In many cases, these benefits can literally be cost savings: the same zero waste store owner from the previous paragraph shared that many of their clients, when equipped to purchase some groceries in bulk, end up saving money by purchasing only the quantities necessary for their household, preventing money lost to food waste. Other benefits this respondent identified included healthier living environments and reduced long-term cost of living for local residents who took efforts to be more circular in their consumption habits.

Similar themes emerged among other small business owners we interviewed. While our interviews were limited to businesses that have already expressed an interest in sustainability, most respondents argued that most businesses in King County have an interest in presenting themselves as environmentally conscious to their customers. However, these business owners often felt constrained by the limited options available to them to reduce their waste from upstream suppliers, and a lack of coordination between retail, manufacturing, and governmental stakeholders.

Our interview subjects also provided numerous ideas on how to establish the coordination needed to improve circular business practices. Several business owners emphasized a need to standardize logistics and delivery systems across industries. By using standardized and reusable containers to deliver retail inventory, or identical beer bottles at breweries, businesses could take advantage of economies of scale to reduce their shipping and packaging costs while still delivering their goods reliably to their customers. Also this way, these goods are much easier to reuse, repurpose, find, and access for consumers and businesses.

Making Circularity Accessible and Affordable to Everyday People

Another crucial point raised in our interviews is the need for people to see parallels to their own lives in the Circular Economy. Numerous subjects expressed a belief that King County residents pride themselves on being sustainably minded, and would be willing to



be more sustainable if they had the knowledge and resources available to them to do so. As such, it is essential to show residents that circularity starts with reusing and repurposing as much as possible and limiting the acquisition of new materials in the first place.

On the business side, one interviewee highlighted that business owners are more responsive to implementing circularity in their companies when suggestions are related to their operations and unique problems; solutions that tend to both address existing issues as well as improve circular practices are much more likely to be implemented with fidelity.

This theme continued when subjects were asked about resident motivations. One respondent who owns a zero waste store articulated that many of their customers were unaware that making consumer choices that reduced single-use materials would often lead to cost savings. A similar sentiment was expressed by a manager at a private waste management and reduction company, who articulated that, when repurposed, reused, or recycled products were available to consumers on a regular basis, consumers would often like to choose these products over the status quo, which eventually would impact manufacturing process as well: *“The quickest thing to happen will be consumer change, how we consume, first and foremost. And when we stop buying things that are so disposable, it informs the manufacturer that they need to change.”*

However, these projects only became appealing when they were offered at an attractive cost. While wealthier consumers in King County often will pride themselves on purchasing circular products at a higher price, a large-scale transition to the Circular Economy will be stymied if they are not accessible to all consumers at all price points. This also represents both an equity and an implementation challenge. If the price of goods in a circular transition is going to be primarily accessible only to wealthy individuals, the benefits of the Circular Economy will miss those most vulnerable in King County and entrench injustice further into society. These higher prices will simultaneously slow the circular transition by limiting the impact of increasing economies of scale for circular goods. As consumers often “vote with their wallets” when choosing to purchase circular goods over linear goods, producers will be less incentivized to switch to circular production lines when the overall market share is small and limited to primarily luxury goods or wealthy target audiences. It is essential that the Circular Economy is accessible and affordable to everyone.

As such, it is crucial that King County emphasizes how the Circular Economy can both improve our environmental footprint while simultaneously solving problems for consumers and residents alike. Policy goals should focus on leveraging circular solutions that bring down prices for businesses and consumers alike, and economically incentivize

companies to incorporate circularity into their production streams while limiting overall cost.

III. Goals and Criteria

In order to provide a foundation for our analysis, we first begin by identifying some common goals that define the Circular Economy. Our literature review revealed several potential aspirational definitions, but the Circular Economy goals for Urban Environments, outlined by the Ellen MacArthur Foundation, aligned closest with our client's expressed goals and expectations. These can be identified as:

- 1) Designing waste and pollution out of products and urban systems.
- 2) Building systems that ensure materials can be kept in use as long as possible and maintain their value throughout the production, use, and recycling of a product.
- 3) Creating the capacities for natural systems in and around cities to regenerate, and support a healthy infrastructure.

With these goals in mind, we next wanted to create a set of criteria to which we can align policies to. To pursue this effort, we adapted the Universal Policy Goals created by the Ellen MacArthur Foundation into 7 criteria that our policies would use:

IV. King County Policy Criteria

Adapted from the Ellen MacArthur Foundation Universal Goals, prioritizing KCSWD's concerns:

1) Collaborate for Systems Change

- a) For the Circular Economy to succeed, the transition must occur simultaneously across, government, business, manufacturing, and throughout our social fabric. To facilitate that change, King County should work to collaborate with public and private stakeholders on both technical and legislative agendas that provide a foundation for tangible change.
- b) Policies fulfilling this criterion will include discussion forums, education initiatives, and intergovernmental partnerships on legislative agendas, among other policies.



2) Stimulate Design for the Circular Economy

- a) Crucial to this goal is the transition of the upstream production of resources to be designed to eliminate waste from their inception. Policies that support this criterion will



empower and motivate local businesses to both institute manufacturing processes that enable resource value preservation, and also shift the purchasing practices of local businesses towards products designed with circularity in mind.

- b) This design can include durability, repair, and waste-free disposal.

3) Manage Resources to Preserve Value

- a) In order to ensure the Circular Economy is sustainable, the resources invested in existing products need to be recaptured back into the production stream. To accomplish this, both upstream manufacturing and downstream waste management processes must adapt to prioritize the preservation of resource value.
- b) This preservation could involve ensuring goods can be built durably and repaired, creating waste management equipment and practices that salvage raw materials, or establishing and promoting secondary markets for resources, among other policies.
- c) Success in this criteria can involve tax and economic incentives, business innovation, consumer responsibility efforts, or waste management practices - any effort that aims to close a loop that currently leads resources into a landfill.



4) Facilitate the Just Transition

- a) If the Circular Economy is to be implemented in King County, it is imperative that the transition to this model undo historical injustices and inequities embedded in the existing linear economy in King County. This criterion specifically examines how policies can work both retroactively to address long-standing inequities, as well as prospectively to embed a just future into the Circular Economy.
- b) Policies fulfilling this criterion will inherently involve intentional and extensive input from the community, particularly members of Frontline communities and Indigenous communities. It will focus on addressing systemic racism and inequality, historical injustices throughout Seattle's history, and entrenched relics of policies that exacerbated economic disparity.



5) Make the Economics Work

- a) While innovation and resource management are crucial to providing practical solutions to linear problems, embedding



those solutions into our larger society will require economic incentives.

- b) Policies fulfilling this criterion will aim to align taxation and subsidization efforts with the larger Circular Economy goals, and incentivize businesses and firms to see circularity as a profitable and stable way to invest in our local economy.

6) Invest in Innovation, Systems, and Skills

- a) The Circular Economy presents barriers that will be difficult to overcome with our present technology. As such, the transition presents an opportunity to innovate new systems, technologies, and processes that will power a switch toward the Circular Economy.
- b) Policies that fulfill this criterion will focus on both the hard and soft innovations that can be used to develop a circular workforce. These policies can include, but will not be limited to, innovation grants, workforce training initiatives, and investment in the realized and digital infrastructure for both manufacturing and waste management.



7) Build Community Solidarity and Equity

- a) Economies, by their nature, are connective. By facilitating transactions, economies shape how individuals of our community relate to each other. In order to achieve a more equitable economy, the transition to the Circular Economy should also make our communities stronger, more connected, and more equitable. This criterion focuses on embedding community development and equity measures into the function of the Circular Economy.
- b) Policies that fulfill this criterion include those that prioritize the needs of frontline communities, make small businesses more resilient, and emphasize opportunities for frontline and BIPOC workers.



Five of the universal goals are taken directly from the Ellen MacArthur Foundation’s literature and are included here as guiding criteria to direct our roadmap and justify the policies included in our recommendations. The two other criteria not derived from the Ellen MacArthur Foundation —“Facilitate the Just Transition” and “Build Community Solidarity and Equity”—are included to reflect our client’s desire to center the needs and input of frontline communities in King County.



All of the policies that we are recommending in our roadmap are based on these seven criteria. The subsequent recommendations that we use are designed to align with these criteria and describe how they help King County pursue its Circular Economy Goals.

V. Barriers to Action

Beyond identifying policies that fulfill the criteria outlined above, we also want to identify policies that confront potential barriers to the Circular Economy's implementation. As such, we have identified several crucial barriers that our roadmap will be confronting:

- 1) Firstly, the embedded manufacturing infrastructure and the supply chains within King County are highly linear, with several notable businesses creating products that generate large amounts of waste.
- 2) Within King County, several large companies have built businesses using packaging and product chains that render large amounts of waste to landfills.
- 3) While total waste per capita sent to landfills in King County has declined over the past few years, the overall trend is not decreasing quickly enough for a transition to the Circular Economy by 2050. The present waste management infrastructure, despite its recent improvements, is still designed to facilitate a linear economy.
- 4) Additionally, the business models of solid waste utilities, including King County Solid Waste Division, are built around the safe transport and disposal of waste to landfills. Changing that business model while supporting a transition away from a linear model will be essential to providing equitable services within the Circular Economy.
- 5) Since it is connected with other municipalities in the US, King County should take into consideration the possible adverse impacts of its transition to the Circular Economy on other municipalities. The Just Transition should be pursued not only within the region but also outside of the region, guaranteeing the transition does not cause disadvantages and disproportionate negative externalities for other regions (Schröder, P., 2020). King County needs to address the issue by cooperating with other municipalities or aligning its roadmap with national or state roadmaps when they will be prepared in the future.
- 6) As mentioned multiple times, the Circular Economy is a model that builds on collaboration, and for a successful transition, all the actors in the economy should make an effort simultaneously. Enforcing Circular Economy practices only with government regulations will have adverse effects, especially since King County is home to many industry giants and business leaders, which all contribute to King County's economic growth and prosperity. Thus, the way to mobilize all stakeholders will be to find ways to show these actors the benefits of such transformation, and encourage circular practices. This might take different forms such as education campaigns or financial incentives, which might lead to increased financial costs for King County.

Chapter 5: Policy Recommendations

Roadmap

The policies described in the Roadmap below represent one potential policy framework that can be utilized to transition King County to a Circular Economy. This roadmap is not intended to be considered comprehensive, nor is it considered to be exclusive to any other policy framework. Implementing a Circular Economy in practice will almost certainly include policies not included in this roadmap.

However, this roadmap is designed to explore the magnitude, scope, and scale required to effectively transition to the Circular Economy. This roadmap examines policy implementations in 2022, 2025, 2030, 2040, and 2050; by exploring policies as they are implemented over time, this roadmap is designed to model the intended short and long-term changes when circularity initiatives are implemented, as well as how the larger policy ecosystem evolves and matures.

Accompanying each benchmark date is a description of how a transition to the Circular Economy should have evolved by that date. These descriptions analyze how policies previously implemented have evolved, as well as the barriers that each policy is intended to overcome, and what barriers still remain in the future. The individual policies recommended at each date are designed to accomplish the achievements and challenges described in each date's description.

Accompanying each policy is an icon that identifies which evaluative goal each policy is designed to support, as identified in the list below. By addressing both goals and barriers with each policy, this roadmap can provide a multi-faceted analysis of the scope and scale of the transition to a Circular Economy.

King County Policy Criteria: Goals and Symbols

- 1) Collaborate for Systems Change



- 2) Stimulate Design for the Circular Economy



3) Manage Resources to Preserve Value



4) Facilitate the Just Transition



5) Make the Economics Work



6) Invest in Innovation, Systems, and Skills



7) Build Community Solidarity and Equity



2022

As the Ellen MacArthur Foundation and other research have suggested, stakeholder engagement is key to a successful transition to the Circular Economy (Bolger & Doyon, 2019; Dagilienė et al., 2021; The Ellen MacArthur Foundation, 2019). *Therefore, the early stages of this roadmap are based on two main priorities: establishing business and intergovernmental relationships with major stakeholders around circular economies, and building trust and shared collaboration between KCSWD, King County, and frontline communities.* As establishing the Circular Economy requires changing behaviors, infrastructure, and practices across numerous sectors, industries, and governments, the success or failure of this roadmap hinges on the quality and quantity of relationships that can be formed. As KCSWD is intrinsically linked to the disposal of waste, it represents a well-positioned stakeholder that can begin these collaborative initiatives.

Secondary to this priority is the establishment of new initiatives that publicize the Circular Economy. Building awareness across the general public, as well as among small

businesses, universities, and cultural institutions, can provide both the popular and industrial foundations for the more comprehensive initiatives that this roadmap will articulate for later dates.

- **Begin communication and outreach efforts to mobilize citizens and businesses, as well as outreach to government, business, and community stakeholders.**



- The Circular Economy is a model that relies heavily on strong collaboration and cooperation. Engaging and mobilizing businesses within King County, other governments that King County has strong relationships with, and community stakeholders, will be the starting point that will help realize the further steps in this roadmap.

- **Initiate an upstream and downstream circularity audit, aiming to focus on what barriers exist within the KCSWD infrastructure to the Circular Economy.**



- This also includes identifying legislative barriers to such transition, and regulations that lift the barriers in front of the current extractive economy and thus supporting the linear model.

- **Raise awareness and improve education. Begin an education campaign on circularity, focusing on expanding common knowledge of the term. Engagement should focus on connecting with frontline community leaders and restaurants to start incorporating more reuse in practices and incorporating circularity in sourcing.**



- As learned from the Lithuania case study (Dagilienė et al., 2021), KCSWD should provide formal and informal education on waste management practices for local communities to embed the Circular Economy into their everyday lives.
- As suggested in the EU Circular Economy Action Plan, switching to circular business practices has the potential to create new jobs, and protect businesses from price fluctuations by creating a closed-loop model where materials are introduced back to the system at the end of their lifetime, and thus eliminating businesses' dependency on virgin materials.

- On the consumer side, the Circular Economy model will introduce designing processes for affordable products that last longer, with easy and high-quality reusability, repairability, and recyclability attributes.
- Conveying these types of facts about the Circular Economy to all stakeholders will not only enhance transparency and trust but will also educate the general public and pave the way for the establishment of legislative actions that will be required to further promote the Circular Economy.
- **Start a “Circular Economy Just Transition Forum” with businesses, employees, and frontline community groups.**
 - The Forum should be a formalized dialogue mechanism to engage stakeholders in the decision-making process (ILO, 2015); therefore, it should guarantee active and substantive engagement of all relevant stakeholders (procedural justice) and pay attention to the minorities and/or marginalized communities within the area (justice as recognition).
 - Members of the Forum should be compensated for their time, expertise, and participation.
 - By utilizing the key questions for three types of justice (Williams & Doyon, 2019), the Forum discusses what type of justice should be considered in the KC’s specific context. The Forum should identify what resultant benefits and burdens will exist, how they are distributed within KC, and, if any, how to alleviate the imbalances (distributive justice).
 - Based on the above analysis, the Forum discusses diverse policy options, such as macro- and micro-economic, skills development, occupational safety and health, and social protection (International Labor Organization, 2015) and recommends the options to the KC.
 - The Forum also monitors the progress and gaps on a regular basis based on the monitoring system mentioned in the next part, evaluates the results, and then incorporates the findings into the roadmap.
- **Develop a monitoring system including appropriate indicators.**
 - KC should identify key indicators to measure the progress and gaps of the Circular Economy. In addition to the existing resource-based indicators, new criteria that will assess the



indirect impacts and positive externalities of the Circular Economy should be included such as employment, public health, equality, and so on.

- KC updates the roadmap on a regular basis (i.e., every 10 years after 2030, or the initial updating year) based on the monitoring result.

- **Use public procurement as a lever for the deployment of the Circular Economy.**

- Public organizations constantly purchase a great number of goods and services due to their complex operations and responsibility to provide a wide range of public services. As demonstrated from a variety of cases, i.e., Malmö, the Netherlands, France, South Korea, and Sweden (Bačová et al., 2016; European Commission, 2017, 2019; Yoo, 2020), this purchasing power is a great leverage King County can use to establish and standardize the Circular Economy practices in product and service design, especially in terms of encouraging manufacturers and contractors to embrace innovation and sustainability. By incorporating Circular Economy principles as requirements into its procurement processes, King County has the power to increase demand for sustainable goods and services, and trigger a bigger change in product design. Additionally, pro-circularity public procurement can set an example for similar jurisdictions and other stakeholders in the private sector.
- King County's current sustainable purchasing initiative, Sustainable Purchasing Program, supports the purchase of sustainable products and services that provide environmental, social, and economic benefits (King County, n.d.b). By getting inspiration from other examples around the world (Bačová et al., 2016), widening its scope, and raising awareness of this effort, King County can build a solid foundation for its roadmap to the Circular Economy by 2050, using procurement as a tool.
 - The municipality of Venlo, The Netherlands, sets an example and creates a vision for sustainable procurement. It incorporated Cradle-To-Cradle principles into its requirements for the designing and construction of the Venlo City Hall, requiring the



bidders to use materials that can easily be reused and reintroduced into the material flow as resources for new products at the end of their lifetime (cradle-to-cradle). Today, Venlo City Hall remains to be a paramount case study on how to involve the building sector in the Circular Economy by using public contracting.

- The city of Malmö, Sweden, is another example that has been using public procurement as a tool for catalyzing a transition to the Circular Economy. Especially focusing on its furniture and IT purchases, Malmö has been incorporating repair, reuse, and refurbishment criteria into its procurement processes.

- **Strengthen the connection between different sectors for industrial symbiosis.**

- RECITA (France) is an example of this. It is an online network tool where industries, companies, and anyone else interested can easily connect, follow the latest news about the Circular Economy, and get information in general.
- RECITA “aims to disseminate the concept of the Circular Economy, news, and the know-how and potential of the region as a whole. It allows culture to be shared among stakeholders. This collaborative platform aims to identify people, resources, and initiatives, and to encourage them to network throughout the area so as to create a regional Circular Economy ecosystem” (“The RECITA project,” n.d.).



- **Begin a Frontline Community Stakeholder Engagement team, which identifies specific barriers that frontline communities currently face, and would continue to face in the Circular Economy.**

- Within this team, begin a participatory budgeting process to facilitate the allocation of resources towards circularity goals that will improve justice, equity, and community solidarity within the community.



- **Establish an intergovernmental circularity working group with the cities that rely on KCSWD’s waste disposal infrastructure.**



- This working group should establish long-term and short-term circularity goals, and will provide a communication portal for future circularity initiatives that KCSWD will undertake. This intergovernmental effort can also play a role to cope with possible adverse impacts of KC's transition to other municipalities.
- **Establish industry-specific forums to encourage collaboration and circularity efforts among retail-oriented businesses.**
 - Focus on formally connecting businesses that utilize similar products, in order to pioneer ways that packaging and materials can be shared and reused among businesses.
 - Particularly useful for industries that are located in close proximity to one another.
 - Increase King County's engagement in the Washington Materials Marketplace.
 - A marketplace for materials is a catalyst for industry symbiosis, which is one of the pillars of the Circular Economy. Making the waste of one business a resource for another is key, and King County should assess and increase its current involvement in the Washington Materials Marketplace project.
 - Opportunities for collaboration include:
 - Brewing industries: establish a process to design a single container widely used by breweries in King County that can be easily washed and reused - similar to existing glass "growlers," but designed to replace single-use aluminum cans in places like local grocery stores, markets, and taprooms. Solicit feedback on how to incentivize consumers to use reusable glass containers for purchase.
 - Grocery Stores: convene representatives from community markets and supermarket chains to explore ways to improve and expand bulk purchasing options.
 - Small retail businesses and farmers' markets: solicit input on how to incentivize consumers to avoid needing single-use packaging.



- **King County Council, the City of Seattle, and King County Solid Waste Division should begin studying taxation methods, with an eye toward understanding how to align taxation incentives with the Circular Economy while ensuring that the impact of additional taxes is not disproportionately instituted on low-income individuals.**



2025

By 2025, the collaborative relationship between public agencies, private businesses, and frontline communities should be well established; this relationship structure provides the foundation to begin aligning the interests of these three stakeholder groups to the Circular Economy.

The goals in this section are aimed at achieving some of the early “wins” of the Circular Economy, focusing especially on collaboration and community engagement. These tangible, clearly visible policies are designed to facilitate the Circular Economy transition within the common and policy vernacular, and begin taking advantage of the inherent opportunities in King County’s communities—specifically, its existing universities, socially engaged businesses, and community organizations.

In addition, early legislative priorities should focus on building support for consumer-oriented goods that can be produced in line with the Circular Economy. Emphasizing right-to-repair laws, limitations on single-use plastic, and other waste reduction laws will lay the groundwork for future legislative priorities.

This section is also designed to embed the Just Transition into the policy frameworks moving forward, so that equity, justice, and community engagement are intrinsic in the Circular Economy. By 2025, KCSWD’s policy agenda should have a mandatory emphasis on both undoing the inequities of the linear economy, and embedding more equitable practices into the policy frameworks moving forward.

- **Publish a Just Transition progress report, including recommendations and best practices.**
 - Update the Roadmap by incorporating the monitoring results.
- **Explore and coordinate public/private financing partnerships, in collaboration with local businesses, to explore improving local circularity practices and discovering potential business opportunities that will foster innovation. (1, 2, 5, 6)**



- This could be framed as an expansion of the Re+ Program, or through another separate grant focused more on changing consumer behavior.
- Another particular focus should be identifying funding efforts to innovate new materials that can more easily be recycled into the manufacturing chain at the end of a product's useful life.
 - Examples include: mixed-use plastic, textiles, electronics, and construction materials.
- This program should aim to support the existing efforts of large companies to innovate new materials and material usage.

- **Create a program to outline a transition from a waste management utility to a resource management utility.**



- As outlined in KCSWD's revenue statistics (King County Solid Waste Division, n.d.), KCSWD's current business model relies on revenue streams derived from the disposal of solid waste to landfills.
 - In the Circular Economy, these revenue streams would become obsolete.
- This program will identify the capacity improvements, technological improvements, and economic incentives needed to prioritize preserving the resource value of products disposed of in King County.
- By analyzing ways to improve the recapture of resources and the sale of raw materials back to local consumers, KCSWD can lay the foundation for a transition from a waste management agency to a resource management agency.

- **In order to shift revenue streams from waste management to resource management, KCSWD should expand efforts to separate materials at the curbside.**



- Create additional resource categories and pickups for materials that have the highest potential for effective recycling and reuse.
- Compliance with additional resource sorting could be established through discounts on larger recycling and compost pickup.

- Economic incentives could be leveraged by offering to lower curbside collection prices for residents and businesses that are willing to separate economically valuable materials from the larger waste stream.
 - One pricing model could rely on a per-container pricing model that would provide residents with a rebate on their utility bill in exchange for diverting a certain amount of electronic waste, plastic waste, or textile waste from the general waste stream.
 - A second model could simply provide more containers for residents to utilize to dispose of useful materials, in exchange for a lower overall price of collection.

- **Collaborate with local businesses and organizations, including universities, community organizations, libraries, and nonprofits, to establish circularity hubs across King County. Circularity hubs can act as tool libraries, meeting places for zero waste and buy-nothing groups, and exchanges for reusable materials.**
 - Circularity Hubs should be established in existing gathering points for residents, including in Libraries, Community Centers, and Parks.
 - Efforts should be made to ensure that every King County resident has a Circularity Hub within their community, with priority placed on establishing Hubs in locations that are within walking distance of most King County residents.
 - When established, KCSWD should reach out to existing community efforts to reduce waste - like local Buy Nothing groups - to offer these spaces as physical locations for their activities, as well as offer resources to support their missions.
 - Additionally, circularity hubs should be incorporated into the Washington Materials Marketplace system. The Marketplace could record what materials are in inventory at each circularity hub, and circularity hubs can act as physical drop-offs and repositories for useful materials - eliminating the need to transfer materials of value to transfer stations.



- **Based on the recommendations from the Frontline Community Stakeholder Engagement team, create a series of legislative**



priorities based on alleviating and eliminating barriers to circularity within frontline communities in King County. These recommendations should be presented to the King County Council.

- **Generate a participatory budgeting report from the Frontline Community Stakeholder Engagement team, which will outline priorities that have been invested in during the prior three years. This will be presented to the KC Council, Seattle City Council, and other legislative entities as both an agenda-setting tool and an impact statement for future circular initiatives.**



- **In order to fund higher-cost policies within King County, additional revenue streams should be established through levies or taxes, in collaboration with the King County Council and the City of Seattle.**



- King County should explore ways to expand its tax revenue while minimizing the impact on frontline communities.
 - One potential solution could be an end-of-life stage tax as demonstrated by the European Union, which instills a progressive taxation structure on the waste itself, with materials sent to landfills taxed at the highest level, and recyclable or repurposed materials taxed at the lowest. While this could still have disproportionate impacts on lower-income populations, it could also be an incentive structure that would offer more opportunities for individuals to avoid the additional cost while aligning behaviors with the Circular Economy.

- **Work with the King County Council, and if necessary, the State of Washington, to institute a Right-To-Repair law for specific consumer goods sold in the state.**



- This law could be designed to focus on a narrow band of industries and products initially, but could expand more fully.
- This law would require manufacturers to provide practical information on how to repair the products they create, as well as realistic resources to pursue repair.
- While this will likely create an opportunity for new jobs and businesses repairing products, the usefulness of this policy

could be increased by providing information on how to repair basic items through Circularity Hubs and their corresponding tool libraries.

- This could significantly accelerate the Just Transition if coordinated with investment programs like NextCycle, or with grant and training programs from the City of Seattle and King County.
- Early industries to focus on:
 - Electronics
 - Home appliances
 - Cycling and personal transportation
- **Collaborate with community members to understand barriers to using reusable containers in grocery and retail shopping, and how to ensure that reusable containers are made available to low-income individuals.**



2030

By 2030, the concept of the “Circular Economy” should be entrenched in public awareness, and emphasis on the Just Transition should also be articulated clearly in policy agendas and well understood. Frontline communities and leaders should feel embedded into the policy process, and their input should be central to the policy and legislative agendas.

For systematic change (Criteria 1) and making economics work (Criteria 5), near-term emphasis should be established on embedding the Circular Economy into economic and legislative policies. These policies should aim to start implementing the innovations and production processes established in prior years, build on the community engagement and infrastructure present, and establish economic incentives that motivate businesses to incorporate circularity into their production lines.

Emphasis should be placed on facilitating a transition for small businesses in particular and rewarding those businesses with responsible production and sourcing practices with economic incentives that strengthen their bottom lines. Restaurants, small manufacturers, and community organizations represent opportunities to align quickly with the Circular Economy.

Legislative priorities should focus on entrenching circularity into legal requirements. These policies can look like standards, targets, and mandates for waste reduction. In addition, infrastructure development should be prioritized to align with these proposed

pieces of legislation, particularly as it relates to the textile industry, packaging, and disposable products. These proposed pieces of legislation should aim to make disposable products that cannot be reintegrated into the Circular Economy obsolete in the next ten years.

Innovation initiatives should focus on the heavy industries heavily reliant on extractive resources, including cement, steel, construction materials, and rare earth metals. Preserving the value of expensive materials and heavy industries could make King County an exporter of circular technology, and influence supply chains well beyond the County's boundaries.

- **Publish a Just Transition progress report, including recommendations and best practices.**
 - Update the Roadmap by incorporating the monitoring results.
- **Diversify their business practices to include multiple streams of revenue generation, for both linear waste disposal models, as well as circularity efforts.**
 - By 2030, resource separation should be considered normal practice. E-Waste, plastics, construction waste, and compost should all be separated into different resource streams.
 - Transfer stations' capacity should be expanded, and processes improved, to ensure that separate resource streams are separated and supported across the entire repurposing process.
 - Transfer station staff should be trained to accommodate resource management practices, and compensated fairly for their training and work.
- **Collaborate with local government authorities to create a taxation structure that incentivizes consumers and producers alike to choose to source repurposed materials.**
 - Institute taxes on raw materials consumed in King County that are not from post-consumer sources.
 - These taxes can initially be small, but should be designed to increase in price as the supply of circular materials continues to increase.



- **Begin conversations with governments outside of King County, in order to build a collaborative relationship that can advocate for and expand circular products and supply chains outside King County.**

- Results from this relationship can include:
 - Sharing expertise and experience in implementing transfer station improvements with other jurisdictions.
 - Proposing and pursuing statewide taxation schemes that incentivize circular sourcing.
 - Expanding public research partnerships with private companies.



- **Collaborate with King County and Washington State on the scope of the Right-to-Repair laws implemented by 2025, both to larger jurisdictions and to cover more products.**

- Industries could include:
 - Automotive industries
 - Home improvement projects



- **Convene discussion and collaboration groups with construction and home improvement companies, to discuss how to incorporate deconstruction and circularity into new building construction.**



- **Convene discussions with Washington State on how to create legislation that would provide consumers with information on the circularity practices in their purchasing decisions.**

- Consumers already have access to information regarding energy efficiency through programs like EnergyStar, which focuses on appliances like dishwashers and water heaters.
- One potential program could provide information on post-consumer recycling, the circularity practices of the company that manufactured the product, and how it compares to other programs.
- A different policy lever could include the creation of a circularity certification program, which would allow consumers to know if a product or company obtained a high bar for circular resource use and manufacturing.



- **Expand collaborations with local businesses to include heavy manufacturing industries, to help understand how to capture and reuse those resources.**

- Industries include:
 - Aviation
 - Shipping and Maritime Industries
 - Construction, including local contractors and cement companies.



- **Establish a community outreach and education program to facilitate the widespread use of reusable materials, bulk inventorying, and minimal packaging in retail, farmers' markets, and grocery stores across King County.**



- **Continue to expand circularity hubs throughout King County.**

- Dedicated circularity hubs should be constructed in areas previously underserved by the existing network established in the 2020s.
- KCSWD should collaborate with waste transportation vendors, and with their own trucks, to facilitate useful transportation of materials between circularity hubs, so that materials and goods that are frequently reutilized are readily accessible for more people.
- Partnerships with other jurisdictions should promote the expansion of circularity hubs in other counties throughout Washington State.



2040

By 2040, King County should have established policies and legislative initiatives to make sure the products in the market meet certain criteria and requirements that are in line with the sustainable design aspect of the Circular Economy.

The regulations in effect should ensure that:

- premature obsolescence is discouraged by incentives for more durable goods;
- products in the market are safe and healthy, easily repaired, reused, and recycled; contain a predetermined minimum amount of recycled material, and are covered by take-back policies by the manufacturers;

- consumers are provided with accurate and relevant information about the products during the purchase, including the availability as well as the costs of repair services and spare parts.

Additionally, economic incentives should increase in scale, focusing on expanding circularity into more complicated supply chains. These incentives should support the transition of heavy industries, as well as the supply chains for multinational companies headquartered here in Seattle. The policy initiatives and infrastructure development pursued in this decade should build on the innovation established in 2030 to circularize the production of heavy equipment, construction goods, and industrial inputs like steel, aluminum, and cement.

Circularizing these industries will likely require industrial waste processing facilities capable of recapturing the value of resources in heavy equipment to be installed, creating a potentially inequitable environment if the facility is constructed in a frontline community. The Frontline Community Stakeholder Engagement team should be relied upon for input on how to equitably build these facilities.

- **Publish a Just Transition progress report, including recommendations and best practices.**
 - Update the Roadmap by incorporating the monitoring results.
- **Work with the King County Council to phase out single-use plastic items in King County entirely.**
 - Replacements could either include reusable items or items that can be composted industrially.
 - Legislative solutions should build on past design and innovation that can ease this transition.
- **Establish higher surcharges for accepting materials to KCSWD transfer facilities that are primarily sourced from a linear economy.**
 - Emphasis should be placed on plastic, hazardous, and electronic waste.
- **Work with King County Council to pass legislation requiring increasing circularity standards for building construction, as well as requiring deconstruction and materials capture when buildings are decommissioned.**



- Leverage KCSWD infrastructure to both capture materials as buildings are disposed of, and ensure that usable materials are resold back to other construction companies.
- Building projects should be required to analyze where materials can be reused or repurposed. Potential opportunities include steel beams, mass timber supports, concrete blocks, and exterior decorations.
- Legislation should also outline requirements on how building components created from newly-extracted raw materials should be designed with end-of-life repurposing in mind.

- **Collaborate with Washington State leadership to expand Right-to-Repair laws to nearly every realistic industry.**

- Exemptions for Right-to-Repair requirements could be limited only to products that are explicitly designed to be entirely recycled at the end of their useful life, providing manufacturers with an incentive to align with circularity goals either through resource preservation or through durable design.
- Other exceptions could include specific necessary materials needed for human wellbeing and safety, including single-use medical equipment, emergency equipment, and materials designed to ensure effective sanitation.



- **Continue to expand KCSWD’s resource management and resource sourcing efforts, in order to sell repurposed raw materials back to manufacturers.**

- Expansion should focus on widening the scope of materials that KCSWD can sell to manufacturers.



- **Aim to begin to incorporate the innovations and progress discovered through the collaborative grant program established in 2030.**

- Key areas to implement:
 - Novel plastic reuse.
 - Constructing new buildings with an eye towards deconstruction.
 - Incorporating previously used fibers into textiles.
 - Replace existing plastics with novel, easily recyclable materials.



- **Work with local businesses and retail representatives to standardize reusable bulk shipping containers that can deliver goods to stores in ways that minimize individual packaging.**



2050

By 2050, all major industries in King County should be embedded in the Circular Economy. Single-use plastics and disposable materials should either be completely eliminated, or processed in a way that immediately recaptures the material’s value into the supply chain.

Production streams in King County should be entirely circular, with a robust downstream material recapturing process well established and supplying production streams with raw materials. Within the community, circularity should be considered commonplace, with restaurants, grocery stores, and retail shops all utilizing circular products in their day-to-day operations. Large industries should have revamped their purchasing practices and production chains to emphasize circularity.

Legislation should be passed to improve the robustness of circularity within King County, focusing on making the Circular Economy hard to undo. In addition, King County should focus on being an exporter of circular technology, focusing on economic incentives to encourage new business that can make the Circular Economy profitable and attractive for companies around the world.

- **Collaborate with other regional solid waste partners to share knowledge, technology, and best practices with other solid waste utilities.**
 - These relationships could be utilized to help expand the resource management practices that create new revenue streams, through the selling of recovered materials to manufacturers.
- **Advocate for the passage of laws requiring minimum standards for goods manufactured and sold, specifically beyond King County’s level of jurisdiction.**





Conclusion

The concept of the Circular Economy is an alternative vision to the traditional, linear economic model that is centered around the “take-make-dispose” approach to manufacturing and consumption. As studies examined in this report suggest, the linear “extractive” model that relies on using raw materials, which are finite and face the risk of depletion, is neither environmentally nor economically sustainable.

The Circular Economy, alternatively, limits the environmental impacts of the global economy by recapturing resources that would otherwise go to waste and repurposing them back into the production and manufacturing processes. This shift in how resources are used and managed can decouple the negative externalities associated with our present model of disposable consumption while preserving economic growth and opportunity for consumers and businesses alike.

With the goal of establishing the Circular Economy model in the region by 2050, King County Solid Waste Division has commissioned this report to examine the ways to start and facilitate this transition. We began our process with a review of existing literature on the Circular Economy and related topics, and case studies from other countries and localities that have made progress in this same effort. We supplemented this literature review with semi-structured interviews with key individuals representing the government, business, and community sides of King County, to incorporate stakeholder input into our framework.

Finally, in light of our findings from our research and interviews, we prepared a roadmap that consists of policy recommendations and practices that can be implemented over the next three decades. We evaluated these recommendations through the lens of seven policy criteria from the Ellen MacArthur Foundation Universal Goals, which were adapted for the unique characteristics of King County, prioritizing KCSWD’s concerns.

Our roadmap paints a vision of one potential pathway to accomplishing a circular transition, and emphasizes the importance of public education, collaboration, and coalition building in order to facilitate a widespread change in consumer habits. These public engagement efforts will require corresponding investments in new innovations and technologies through public-private partnerships, as well as significant improvements in the capacity and functionality of the resource management infrastructure managed by King County Solid Waste Division.



Such a systemic change will require a high degree of trust and a shared vision between frontline communities, local businesses, and government actors. In order to build that trust, King County Solid Waste will need to identify historical injustices that are embedded in the present-day status quo, and explicitly identify this transition as an opportunity to pursue justice.

Pursuing a fully realized Circular Economy will require the engagement and support of numerous actors throughout King County and beyond. As such, this roadmap is designed to provide a starting point for future discussions and policy agendas, and serves to identify key obstacles and opportunities that King County Solid Waste can pursue both immediately and in the long term.

Beyond a framework established in this roadmap to the Circular Economy in King County, this report also suggests several other implications for future policy deliberations.

Firstly, King County has both the appetite and opportunity for the Circular Economy. While our interviews pointed to a sense of confusion as to the definition of the term “Circular Economy,” nearly every subject suggested that a desire to see King County operate in a way that averts waste, builds new opportunities, and ensures environmental sustainability is widespread among residents. This is mirrored by policy intent. King County’s history of leading in recycling initiatives, and its forward-thinking and comprehensive SCAP, provide a policy foundation that can facilitate the legislative and regulatory initiatives for the Just Transition.

Secondly, the solutions to transition to the Circular Economy are viable. While some solutions - particularly with regard to novel materials - are still nascent, the academic and nonprofit literature has described policies that are immediately available to stakeholders. These policies can incentivize reuse, align economic incentives with the needs of the Circular Economy, and match technological requirements with investment resources. Quickly implementing these solutions can kick-start a transition with the resources and knowledge already available to King County.

Thirdly, while this roadmap outlines a potential avenue to the Circular Economy, it cannot be implemented without the engagement and cooperation of stakeholders beyond King County’s borders. While King County’s resources to pursue the Circular Economy are substantial in their own right, the scope and scale of the change required will necessarily call for the county’s business and government actors to collaborate with interests beyond their borders. This roadmap explores some potential actions that King County could pursue with these external stakeholders, especially with Washington State. However, an extensive analysis of how to build and capitalize on the relationships with actors outside



of King County was considered to be largely beyond the scope of this roadmap; future explorations of the relationships and policies required without outside actors will be needed.

Finally, this roadmap highlights the urgency of action. Transitioning to the Circular Economy will require a coordinated, consistent, and systemic transformation; to do so justly will require ensuring that frontline communities and the input they provide are centered from the inception of this process. This is complicated by the reality that a transition to the Circular Economy will likely necessitate a sequential process: before any part of the economy can be incentivized to change, consumers will have to be educated, relationships will have to be established, and new technologies will have to be innovated and implemented. As such, time is of the essence. To ensure that every resident of King County can enjoy the environmental, economic, and social benefits of the Circular Economy by 2050, the County must take action to intentionally and urgently begin this transition today.

Appendices

Appendix A: Glossary

These definitions are inspired by current leaders in the Circular Economy research, but should not be construed as the sole descriptions of these concepts or systems.

Anaerobic Digestion - The microbial breakdown of organic matter in the absence of oxygen. Anaerobic digestion can be used to convert food by-products, sewage sludge, and other biodegradable materials into digestates (biosolids) that can be used as soil enhancers and biogas.

Biological Cycle - The processes (e.g. composting, anaerobic digestion, etc.) that help to regenerate natural capital. Only materials that can be safely returned to the biosphere are suitable for these processes.

Biowaste - Waste that is composed primarily of organic matter; such as biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants.

Circular Economy - A systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three design-driven principles: eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature. It is underpinned by a transition to renewable energy and materials. Transitioning to the Circular Economy entails decoupling economic activity from the consumption of finite resources. This represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits.

Composting - The microbial breakdown of organic matter in the presence of oxygen. Composting can be used to convert food by-products and other biodegradable materials into compost, which can be used as a soil enhancer.

Cradle-to-Cradle (C2C) - Cradle-to-cradle is a production approach in which materials, at the end of their life cycle, are seen as nutrients for future materials; therefore creating a waste-free circular system where everything is repurposed and kept in use.

Deconstruction - The process of carefully taking apart some portions or the entirety of a structure with the purpose of reusing the materials in the future.

Demolition - The process of knocking down a structure where the main purpose is removing it, instead of obtaining the materials for future use.

Disassembly - Similar to deconstruction, taking apart a machine or structure so that it is in separate pieces.

Durability - The ability of a product, component, or material to remain functional and relevant when used as intended. Durability often applies to the physical attributes of a product (its ability to resist damage and wear), though with some products durability can be technological (e.g. the ability of software to be upgraded many times), and it can be emotional (e.g. the ability of certain clothes to stay desirable over time).

Finite Materials - Materials that are non-renewable on timescales relevant to the economy (i.e. not geological timescales). Examples include: metals and minerals; fossil forms of carbon such as oil, coal, and natural gas; and sand, rocks, and stones.

Frontline Community - A community that will be disproportionately impacted by climate change; face historic and current inequalities, often experience the earliest and most acute impacts of climate change, and have limited resources and/or capacity to adapt. This includes Black, Indigenous, and People of Color (BIPOC) communities, immigrants and refugees, people living with low incomes, communities experiencing disproportionate pollution exposure, women and gender non-conforming, LGTBQIA+1 people, people who live and/or work outside, those with existing health issues (like asthma and heart disease), people with limited English skills, those experiencing pregnancy, and other climate-vulnerable groups.

Just Transition - A transition for greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.

King County Solid Waste Division - The primary clients for this report. Its solid waste system serves a large unincorporated area and 37 of the 39 cities in King County – the cities of Seattle and Milton are not part of the King County system.

Life Cycle Approach - A process that identifies both opportunities and risks of a product or technology, all the way from raw materials to disposal.

Lifespan - The period of time from when a product is released for use after manufacture to the moment it becomes obsolete beyond recovery at the product level.



Linear Economy - An economy in which finite resources are extracted to make products that are used - generally below their full potential - and then thrown away (“take-make-waste”). It is a wasteful and polluting system that degrades natural systems.

Maintain - To keep a product in its existing state of quality, functionally and/or cosmetically, and guard against failure or decline. It is a practice that retains the highest value of a product by extending its use period.

Non-Virgin Materials - Materials that have been previously used, also referred to as secondary materials. Examples include: materials in products that have been reused, refurbished, or repaired; components that have been remanufactured; materials that have been recycled.

Recoverability - The ease with which a material or product can be retrieved from the waste stream and reintegrated into production.

Recover - To sort through existing waste streams to retrieve a certain material or product for reintegration into the production process. Often strives to minimize or prevent the degradation of the material.

Recyclability - The ease with which a material can be recycled in practice and at scale.

Recycle - To transform a product or component into its basic materials or substances and reprocess them into new materials. Embedded energy and value are lost in the process. In the Circular Economy, recycling should be viewed as a last resort.

Redistribute - To divert a product from its intended market to another customer so it is used at high value instead of becoming waste. For example, a supermarket can redistribute surplus edible food to a food bank.

Refurbish - To return a product to good working order. This can include repairing or replacing components, updating specifications, and improving cosmetic appearance.

Regenerative Production - Regenerative production provides food and materials in ways that support positive outcomes for nature, which include but are not limited to: healthy and stable soils, improved local biodiversity, and improved air and water quality. In agriculture, regenerative production schools of thought include agroecology, agroforestry, and conservation agriculture.



Remanufacture - To re-engineer products and components into a condition with the same or improved level of performance as a newly manufactured one. Remanufactured products or components are typically provided with a warranty that is equivalent to or better than that of the newly manufactured product.

Renewable Energy - Energy derived from resources that are not depleted on timescales relevant to the economy (i.e. not geological timescales). Examples include: wind, solar, hydropower, hydrothermal, ocean (wave and tidal), geothermal, and biogas from anaerobic digestion.

Renewable Materials - Materials that are continually replenished at a rate equal to or greater than the rate of depletion. Examples include: cotton, hemp, maize, wood, wool, leather, agricultural by-products, nitrogen, carbon dioxide, and sea salt. In the Circular Economy, such materials (where relevant) must be produced using regenerative production practices.

Repair - The operation by which a faulty or broken product or component is returned to a usable state to fulfill its intended use.

Repairability - The ease with which a product or component can be repaired.

Reuse - The repeated use of a product or component for its intended purpose without significant modification. Small adjustments and cleaning of the component or product may be necessary to prepare for the next use.

Reusability - The ease with which a product or component can be reused in various stages of the production process.

Reverse Logistics - Supply chains dedicated to the reverse flow of products and materials for maintenance, repair, reuse, refurbishment, remanufacture, recycling, or regenerating natural systems.

Sharing - The use of a product by multiple users. It is a practice that retains the highest value of a product by extending its use period.

Technical Cycle - The processes that products and materials flow through in order to maintain their highest possible value at all times. Materials suitable for these processes are those that are not consumed during use - such as metals, plastics, and wood.



Virgin Materials - Materials that have not yet been used in the economy. These include both finite materials (e.g. iron ore mined from the ground) and renewable resources (e.g. newly produced cotton).

Appendix B: Interview Protocol

Our interview protocol is designed to be adaptable for numerous stakeholders with different perspectives, needs, and values. Potential stakeholders include: government agents, small business owners, community leaders, executives, and members of frontline communities. The foundational questions represent questions that will be asked of all stakeholders in every interview, in order to capture essential information relevant to the project. Depending on the circumstances of each interview, we will then have the opportunity to ask discretionary questions in order to capture the unique concerns and feedback of each person.

Scheduling

Interviews were scheduled in two ways:

1. Through the use of an intake form, shared at a presentation on circularity initiatives in King County.
2. By scheduling directly with contacts we reached out to, via email.

Process

Interviews were scheduled for 30 minutes. Upon the start of the interview, the interviewers are to ask if the conversation can be recorded; all interviews will be carried out virtually using Zoom, unless alternative media were requested by the interview subject and agreed upon by the interviewers.

Interviews were considered confidential. While King County Solid Waste Division helped us by making some initial introductions to contacts they already established, the specific names and roles of the interviewees, the companies or organizations they were associated with, and the content of the interviews - including recordings of the interviews - were kept confidential to anyone except the members of the capstone team.

Before any questions were asked, the interviewer asked if the subject would like more information about the content, scope, and purpose of our project. We also clarified the confidential nature of our interviews. Once the subject's questions were answered, the interview began with question 1 of the Foundational Questions.

Interviews started by asking Foundational Questions as listed below, and then progressed to the relevant discretionary questions. While these provided a semi-formal structure for the interviews, the lead interviewer ultimately had the freedom to ask whichever questions they felt were appropriate in the context of the interview.

After the conclusion of the interview, the interviewers sent follow-up emails thanking the subjects for their contributions, and asking them to share any further thoughts in the future.

Foundational Questions - for all interviewees

1. What do you believe the term “the Circular Economy” means?
2. How would you describe your role in your business/community/organization?
3. What environmental issues are you most concerned about?
4. When you think about the Circular Economy, what obstacles would you expect to encounter in your personal life?
5. When you think about the Circular Economy, what opportunities would you expect to encounter in your personal life?

Discretionary Questions

For Business Owners

1. If the Circular Economy were to be implemented, how would your business' operation change?
2. What, if any, would be a concern for your business in the Circular Economy?
3. What, if any, would be an opportunity for your business in the Circular Economy?
4. When you think about your industry, what would you expect to be the most significant obstacle to the Circular Economy?
5. If the Circular Economy was implemented, what would you likely change about your business? Would this change be considered a positive or negative impact on your business?
6. What could King County Solid Waste do to improve the outcomes of the Circular Economy on your business?
7. What could upstream producers - which is defined as the producers of raw materials that you would utilize in your business operations - do to improve the outcomes of the Circular Economy for your business?
8. Are there any concerns or opportunities that we have not discussed so far that we should know about?

For Community Members

1. How would you expect the Circular Economy to impact your family? Your neighbors? Would that impact be positive or negative?
2. What, if any, would be a concern for you or your community in the Circular Economy?
3. What, if any, would be an opportunity for you or your community in the Circular Economy?
4. What resources would you need available to you in your household in order to minimize your waste?
5. What resources would you need available to your community in order for your neighbors to minimize their waste?
6. Are there any concerns or opportunities that we have not discussed so far that we should know about?



Closing Questions - for all interviewees

1. Do you have any concerns that the Circular Economy would be unjust or inequitable?
 - a. If so, what do you think could be done to make the Circular Economy more equitable?
 - b. If so, who do you believe might be most vulnerable to injustice? Why?
2. Do you have any concerns that the Circular Economy would have any unintentionally harmful impacts on yourself, your business, or your community?
3. Is there anything else you would like us to know?

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