Roadmapping the GrIID™

Developing Tools and Resources for Green Industrial Innovation Districts (GrIID™)

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Disclaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organizations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of Recycling Alternative staff. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of Recycling Alternative or the University of British Columbia.

Acknowledgements

We acknowledge that the work for our project took place on the unceded ancestral lands of the xwməθkwəy̓əm (Musqueam), Skwxwú7mesh (Squamish), S'ólh Téméxw (Stó:lō), Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh) Nations, and Syilx tmixʷ (Syilx) (Okanagan) Nation. A primary goal of this project was to create roadmaps for green industrial innovation districts that promote social, environmental, and economic sustainability. This is often in conflict with prevailing Western, colonial approaches to societal, ecological, and economic organization. In problematizing that paradigm, the authors recognize the prudence and discernment of traditional, non-Western approaches preceding colonization to creating healthy communities sustainably and the continued resistance against colonialism's violent and disruptive consequences.

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Cover photo by KoikeYusuke on Pixabay.

Table of Contents

List of Figures

1. Executive Summary

The way that many cities operate around the globe is unsustainable. Several factors impact the livability of cities. In particular, the generation of large volumes of municipal waste, use of non-renewable energy sources, long-distance transportation and shipping requirements, lack of meaningful employment (including barriers to appropriate standards of living), and prevalence of local environmental issues impact the climate and local city inhabitants.

The circular economy is an alternative economic model that addresses these issues by prioritizing renewable energy, physical resource value retention via multiple use-cycles, and socio-economic equity to ensure all inhabitants have access to high standards of living. However, establishing a circular economy at the municipal level is challenging, and no single, established method exists to implement it.

In order to understand the characteristics of a successful circular economy implementation, and amalgamate resources for use by other jurisdictions in future circular transitions, this project reviewed 13 cases of cities installing a circular model. The cities were selected from an initial scan which generated nearly 100 potential cases. Those most pertinent to the Vancouver context were chosen for further analysis to understand who the key actors were, how the transitions were started, what the policy context was, what governance and funding models were utilized, and which resources/tools were involved. This yielded three key products: an *Annotated Bibliography* (see Appendix A), a *Case Studies Spreadsheet* (see Appendix B), and a *Tools and Resource Library* (see Appendix C).

The study found key distinctions between European and North American cases. The European cases were characterized by strong government support, with funding and circular strategy built into various municipal plans. The North American cases displayed a grassroots nature, with community organizers or individual companies initiating circular projects while seeking support and/or partnership from municipalities.

The policy context of a circular city refers to the local goals, priorities, and practices that form the backdrop of emerging circular projects. Ultimately, mapping, tracking, and intervening processes shape circular projects like GrIID™. Moreover, when intervening to support circular initiatives, municipalities used a combination of market interventions (e.g. tax incentives), and regulatory interventions (e.g. enforcing strict building codes). Differences in municipalities' policy choices around support for a circular transition informed differences in local contexts. National and international frameworks, such as the UN Sustainable Development Goals and the UN Paris Agreement on Climate Change, also influenced local policy decisions.

The governance of circular models varied with no singular model being preferred. Some cities displayed a strong top-down approach (e.g. led by the municipality), some displayed a bottom-up approach (e.g. led by community organizers or businesses), and some utilized a hybrid of these two approaches. In terms of funding, governments were the primary source of funding in nearly all analyzed cases. In some cases, municipal, regional, national, and international governments all provided funding, with municipal funding being the most common. In a few cases, funding was also acquired from private sources.

Overall, successful districts were typically characterized by municipal support, with clear commitments to policy and funding. The various resources, tools, and examples identified in this research may help support circular models in contexts with varying degrees of municipal support.

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2. Introducing GrIID™

The current climate crisis, coupled with COVID-19, have negatively impacted the global economy, supply chain resilience, and economic equity. In light of this, governments around the world are recognizing the urgent need for climate action and a global transition to economic development that is green, just, and inclusive.

Municipalities in European countries such as the Netherlands, Norway, and Belgium, have built resilient circular city models that situate infrastructure for production, manufacturing, distribution, and waste management close to the demand areas for goods, services, and urban infrastructure. This results in reduced ecological impact, economic resilience, and equitable, green cities that support communities. By addressing the twin crises of climate change and COVID-19 through circularity, these districts reveal the steps necessary for formulating and implementing circular city models at various scales.

A local iteration of such an alternative economy is the **Green Industrial Innovation District (GrIID™)** model. GrIID™ seeks to promote the sustainable use of resources, foster collaboration and community-building, and insulate communities from fluctuations associated with global supply chains. In Vancouver, GrIID™ aims to create a network of circular innovator businesses in the False Creek Flats to situate them in close proximity to each other and the downtown core. Resultantly, there is demand for understanding the conditions, development, and operation of circular district models in municipalities around the world. This knowledge gap forms the basis of this report.

The purpose of this project was to identify tools, resources, best practices, key actors, policy frameworks, governance structures, and sources of funding in other jurisdictions undertaking circular district innovation. To that extent, a key guiding question was identifying patterns in circular district creation and operation. Particularly, understanding the characteristics of successful circular district projects, and the barriers to such successful implementation.

This project sought to materialize research findings in the form of specific tools, resources, best practices, and lessons learned from these municipal-level circular transitions to help municipalities interested in initiating their circular transition. This resulted in three key products: an *Annotated Bibliography* (see Appendix A), a *Case Studies Spreadsheet* (see Appendix B), and a *Tools and Resource Library* (see Appendix C).

First, a broad scan of circular cities and related resources was conducted to situate the project within the circular district literature. This resulted in the creation of an *Annotated*

Bibliography of websites and documents related to the goals of GrIID™. A list of 33 circular districts emerged from this scan and was narrowed down to 13 municipalities for analysis in a *Case Studies Spreadsheet*. The spreadsheet identified key actors, policy frameworks, governance structures, funding models, and additional resources for each district surveyed. This allows future users of the spreadsheet to compare and refer to the practices of the surveyed cities with ease. Finally, a *Library of Tools and Resource* was created to outline and consolidate the most useful resource areas for GrIID™ partners. This library contains numerous one-pagers on different resource elements to guide current and future circular district partners.

The GrIID™project thus acts as a facilitator for municipalities worldwide, providing a comprehensive and accessible collection of tools and resources for those on the path to circularity. It is not an exhaustive, in-depth analysis, but a starting point for related future work that may be complemented via the addition of more municipalities to the Circular City Scan, a deeper dive into specific cases, or close collaboration with municipalities interested in building circular districts.

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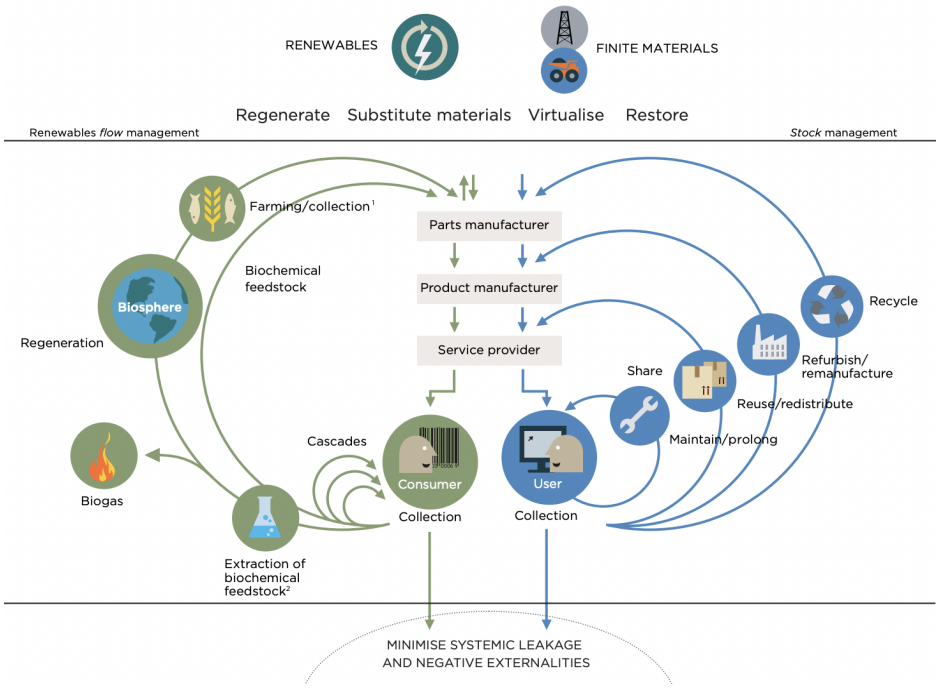
3. Theoretical Foundations of GrIID™

The GrIID™ model emerging in False Creek Flats, Vancouver, comprises 450 acres of industrial employment land, 600 diverse businesses, 8000 jobs, and industrial infrastructure 1.7 km from downtown (Bursey, 2021; Vancouver Economic Commission, 2017). It evolved organically from a highly collaborative and sharing-oriented industrial ecosystem propelled by Recycling Alternative and its many community partners. The Vancouver GrIID's success relies on the expansion and incorporation of innovators in its network. GrIID™ is the sum of a collection of innovators committed to using the best available tools and resources for implementing circular economy practices.

3.1. Circular Economy

In contrast to the prevailing take-make-waste model embodied in the linear model of economic production, the circular economy is a regenerative and restorative economic model that closes loops and reduces resource inputs and waste outputs (see Figure 1).

Figure 1. *Circular Economy: Restorative and Regenerative Industrial System by Design (Ellen MacArthur Foundation, 2015, p. 20).*[12]



[1] Hunting and fishing.
[2] Can take both post-harvest and post-consumer waste as a product.

While the linear model regards all production as a throughput of resource inputs and waste outputs, the circular economy bends the linear economy back on itself to convert these outputs into inputs while reducing the overall scale of inputs and outputs.

For example, de-construction processes, modular building design, regenerative power grids, urban bio-economies, and sharing economies provide valuable benefits under the circular economy. By enriching employment, contributing to economic growth, and enabling sustainable practices, these benefits accrue across society, economy, and environment (Ellen MacArthur Foundation, 2015; 2017; 2021).

Though the circular economy has been popularized by the European Union (EU) and the Ellen MacArthur Foundation, the concept was originally proposed in 1989 by Pearce and Turner, although the core ideas of a circular economy precede even Pearce and Turner. Now known across the world, the circular economy stands on the foundations of decades of conceptualization. This entailed unifying more than 70 concepts, including eco-industrial parks, and four perspectives ranging in radicality: from complete overhauls of the capitalist system (e.g. post-capitalism, de-growth, Doughnut economics) to minor tweaks and improvements of the prevailing political-economic system (Friant, et al., 2020).

By providing services essential to circularity and fostering principles of environmental sustainability, economic growth, and diverse and equitable employment, GrIID™ models the circular economy both in practice and principle.

3.2. Innovation Districts

A blend of innovatorship, business, and academic institutions, innovation districts encourage creative and collaborative opportunities for stakeholders in a close proximity (Katz & Wagner, 2014). Commonalities across the numerous variations of such districts are economic, physical, and networking assets (Clark, 2020; Yigitcanlar, 2020). **Economic assets** refer to firms, institutions, and organizations that drive, cultivate, or support innovation rich environments, including the provision of amenities. **Physical assets** refer to spaces (e.g. buildings, streets, parks, et cetera) that organize and stimulate new and higher levels of connectivity and collaboration. **Networking assets** refer to the relationships between actors (i.e. the social capital) that generate opportunities for innovation.

The foundation of innovation districts are **clusters**: geographic concentrations of interconnected businesses, suppliers, and associated institutions that converge on similar goals, and create spillover effects that make innovation districts desirable.

Presently, GrIID™ consists of eight clusters: arts and culture; de-construction; food; manufacturing and production; share, reuse, and repair; supply and distribution; sustainable waste management; and transportation (see Figure 2).

***Figure 2**. GrIID™ Clusters (Bursey, 2021; Gholami, Jalali, & Schwarz, 2022).*

ARTS & CULTURE
Cluster delivers arts and culture to create vibrant local communities.

FOOD
Cluster buys, processes, distributes, and recovers food sustainably to ensure local food access, supply, and security.

INDUSTRIAL INNOVATION R&D
Cluster provides research and development services related to product lifecycle, degradation, and materials recovery.

MANUFACTURING & PRODUCTION
Cluster sources materials locally to manufacture and produce goods for the local market.

SHARE, REUSE, REPAIR
Cluster develops and delivers share, repair, and reuse models via services, workshops, and industrial symbiosis opportunities.

SUPPLY, DISTRIBUTION, & TRANSPORTATION
Cluster provides product, transportation, and distribution services focused on GHG reductions and local distribution hubs.

SUSTAINABLE WASTE MANAGEMENT
Cluster provides services and facilities to pioneer and support local, regenerative recovery models.

URBAN AGRICULTURE
Cluster grows, processes, and distributes food sustainably to promote local food security and community resilience.

The businesses working within and across these clusters (e.g. The Arts Factory, SoleFood, Wood Shop Workers Cooperative) collaborate to counter inefficient production, manufacturing, and distribution while embracing sustainability, creating diverse and equal job opportunities, contributing to supply chain resilience, and stimulating growth. Additionally, innovation districts generate diverse and accessible employment, support innovatorship, raise revenues, and foster ecological benefits (Baily & Montalbano, 2018).

3.3. Eco-Districts

The eco-district is an iteration of the broader smart-city paradigm, closely related to sustainable neighborhoods, smart urbanism, and eco-city concepts. The principle style of smart cities combines new technology with public infrastructure and spatial planning such that the focus is on energy-related issues and data gathering (Bottero, et al., 2019). Often interwoven with the larger smart-city paradigm, eco-districts serve as test-beds or living-labs capable of demonstrating the feasibility and environmental, social, and

economic benefits of sustainable development[3] with city-wide implications (Bottero, et al., 2019; Fitzgerald & Lenhart, 2016; Flurin, 2017). As a result, many districts are backed by substantial public funding. GrIID™ Vancovuer reflects important aspects of the ecodistrict, namely the district's emphasis on sustainable and equitable innovation, though notably without public funding.

3.4. GrIID™ Today

GrIID™ hybridizes the circular economy, innovation district, and eco-district concepts into a single compact cell of bottom-up sustainable innovation. While some criticize eco-districts for focusing on energy efficiency and data gathering to the exclusion of social and governance aspects, GrIID™ focuses heavily on both the latter aspects (Bottero, et al., 2019). Where GrIID™ reflects aspects of innovation districts, the emphasis is on circular innovation. GrIID™ aspires to exemplify the best parts of these models on a scale that is feasible and immediately actionable.

This report builds on *Mapping the GrIID*™ (Bursey, 2021), a report which provided an overview of GrIID™ and identified an action plan for overcoming potential barriers. A rallying piece for local community leaders, the report reviewed academic and grey literature, analyzed policy alignment, and conducted interviews, case studies, and a roundtable discussion to arrive at three recommendations. First, adopt a **social benefits lens** to demonstrate GrIID's potential benefits to policymakers. Second, pursue a **densified industrial zone** with Vancouver's City Council to overcome land use pressure. Third, form a **steering committee**.

Since Bursey's report (2021), a GrIID™ Steering Committee has been established and will convene bi-monthly. The policy alignment analysis revealed strong potential for GrIID™ to support the City of Vancouver in its goals. The documents from Bursey's (2021) evaluation revealed three emergent directions for GrIID™: clustering and co-location, green economy, and alignment with Vancouver City goals, such as high energy and resource demands, and industrial affordability.

In addition to *Mapping the GrIID*™, a forthcoming report, *Prototyping the GrIID*™, and website are being developed in collaboration with the Emily Carr University of Art and Design. *Prototyping the GrIID*™ zooms in on four businesses (i.e. SoleFood, Arts Factory, Recycling Alternative, and Wood Shop Workers Cooperative) from different clusters to demonstrate the potential and ongoing capacities of GrIID™. Advantages foregrounded in

[3] Sustainable development is often defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987, p. 15).

this report included the businesses' nimbleness and adaptability, locality, on-site processing, cooperation, and innovation. The needs identified were access to affordable space, security of tenure, proximity to labor supply, partners and clients in the urban core, and lack of necessary infrastructure to support circularity. As for the website, a key feature includes a library of tools and resources to support future GrIID™ innovators. The contents of this library will be informed by the findings of this report.

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4. Research Approach

This project sought to materialize research findings in the form of specific tools, resources, best practices, and lessons learned from these municipal-level circular transitions to help municipalities interested in initiating their circular transition. This resulted in three key products: an *Annotated Bibliography* (see Appendix A), a *Case Studies Spreadsheet* (see Appendix B), and a *Tools and Resource Library* (see Appendix C).

Fulfilling these deliverables required using a qualitative methodological framework, specifically an interpretative phenomenological analysis approach. Two methods for data collection were used to improve the validity and reliability of findings. First, a **semi-structured interview** with the project mentor was conducted using a purposive non-probability sampling method to capture the local expertise and organizational knowledge around circularity in Vancouver. Second, a **document analysis** was conducted for more than 50 sources, including government white papers, grey literature from interest groups, newspaper articles, and academic journal articles. This range ensured a holistic representation of data.

4.1. Case Studies Spreadsheet

Initial web scans of circular cities yielded a sample size of nearly 100 possible case studies. Filters were then applied to select the most relevant cases.

First, the **C40 Cities Climate Leadership Group's** member database was filtered to include "Innovator Cities" and exclude "Observer Cities" and "Megacities" to reflect population sizes similar to Vancouver (C40 Cities, 2022). Next, a web search using terms such as "circular district", "green innovation district", and "circular city initiative" was conducted to identify cities from the *Circular City Funding Guide* and *Centrinno Cities* database with a strong circular program and/or green industrial innovation to mimic the traits of GrIID™ (Centrinno, 2022; Circular City Funding Guide, n.d.). Cities exhibiting geographical and political similarity to Vancouver were prioritized to maximize data utility. This entire process resulted in a list of 33 cities.

Thereafter, the 33 cities were divided amongst the three scholars, who then identified the 4-5 cities most similar to Vancouver which were then assessed for transferable lessons to inform the development of tools and resources to implement GrIID™ in Vancouver. Three primary parameters were used to arrive at a final list of 13 circular city case studies: recent **demographic context** (i.e. population size), **economic context** (i.e. Gross Domestic Product, or GDP in USD using present day conversion rates where needed), and

geographical context (i.e. continent). In cases of uncertainty, the presence of a circular style district was used to inform selection.

Figure 3. *Snapshot: Determining the Circular City Case Studies Shortlist.*

City/Region, Country	Population Size	GDP in USD	Continent
Barcelona, Spain	5.47 million*	177 billion	Europe
Eskilstuna, Sweden	0.07 million	N/A	Europe
Gothenburg, Sweden	1.06 million*	N/A	Europe
Madeira, Portugal	0.25 million	4.87 billion	Europe
Montreal, Canada	4.29 million*	200 billion	North America
Oslo, Norway	1.59 million*	68.6 billion	Europe
Portland, United States	2.51 million*	164 billion	North America
Tâmega e Sousa, Portugal	0.43 million	N/A	Europe
Treviso, Italy	0.09 million	0.03 billion	Europe
Valladolid, Spain	0.52 million	13.9 billion	Europe
Wallonia, Belgium	3.63 million	113 billion	Europe

*Note: *Statistic for metro population.*

For reference, the following data showcases how Vancouver, Canada fares along the three parameters (Statistics Canada, 2017; 2022):

- **Population Size**: 2.77 million*
- **GDP in USD**: 119 billion
- **Continent**: North America

As seen in Figure 3, the data for **Barcelona** (Spain), **Montreal** (Canada), **Oslo** (Norway), **Portland** (United States), and **Wallonia** (Belgium) are closest to Vancouver's population and economic size. Therefore, they were selected for further study. The remaining eight cities shortlisted include **Amsterdam** (Netherlands), **Austin** (United States), **Kalundborg** (Denmark), **Paris** (France), **Rotterdam** (Netherlands), **Seattle** (United States), **Stockholm** (Sweden), and **Tallinn** (Estonia). This emergent approach to case study selection prioritized data relevant to the implementation of GrIID™ in Vancouver.

Finally, a survey with thematic codes along four categories (i.e. **literature review**, **key activators**, **policy bucket**, and **governance and funding model**) was developed over five collaborative sessions to inform case study analysis (see Figure 4).

Figure 4. *Survey to Screen Circular City Case Studies.*

Q.1.	**Literature Review:**
Q.1.a.	How do circular initiatives get started?
Q.1.b.	What theoretical and disciplinary foundations inform the circular city project? / What is the theoretical background behind these circular city projects?
Q.2.	**Key Activators:**
Q.2.a.	Which sectors are involved?
Q.2.b.	Who are the key actors (on the ground)?
Q.2.c.	What were their roles?
Q.2.d.	Which industries/clusters do they represent?
Q.3.	**Policy Bucket:**
Q.3.a.	What is the policy framework for facilitating on-the-ground circular innovation and implementation?
Q.3.b.	What policies / committees / knowledge networks / partnerships exist around the SDG Agenda and ESG mandates?
Q.4.	**Governance & Funding Model:**
Q.4.a	What is the governance model of the circular city project?
Q.4.b	What is the funding model of the circular city project?
Q.4.c.	Who is financing / Where are the funds for circular projects coming from?

The data collected in response to these 11 survey questions was recorded in the *Case Studies Spreadsheet*.

4.2. Tools and Resource Library

The second set of deliverables for this project used the European Investment Advisory Hub's (2022) *Circular City Centre (C3) Circular Cities Resources Inventory* as a cornerstone for developing tools and resources necessary to implement GrIID™ in Vancouver and other jurisdictions. From the range of resource types listed in the C3 Circular Cities Resources Inventory, we identified the following list of resources and tools to develop in a GrIID™-specific context:

1. **Action Framework**: A non-linear action plan for the short-term implementation and/or long-term delivery of GrIID™-like models.

2. **Benefits Fact Sheet**: A snapshot of the social, environmental, and economic benefits of a GrIID™ model in a local context. Examples include metrics on greenhouse gas reductions, numbers of jobs created, materials exchanges, et cetera.
3. **Communication Templates**: Templates to support circular innovators in taking steps to set up their own GrIID™. Examples include email templates for contacting public officials and local circular innovators, and messaging on social media.
4. **Ecosystem Survey**: A scan of local innovators, businesses, and organizations in the city or region to identify partnerships, synergies, and potential clusters.
5. **Governance Models**: Descriptions of different types of governance models to best support GrIID™ localization. Examples include co-operative model, business association, social enterprise business, non-profit, shareholder model, et cetera.
6. **Guide to Funding Sources**: List of pools of funds available from the public, private, academic, and non-profit sector to support GrIID™ implementation and delivery.
7. **Industrial Symbiosis**: Guide to creating and embedding GrIID™ style models within the municipal or regional policy priorities through ties to circular, industrial symbiosis models.
8. **Policy Alignment**: An assessment of the local government's policy direction and priorities.
9. **Sustainable Development Goals (SDG) / Environmental, Social, and Corporate Governance (ESG) / Equity, Diversity, and Inclusion (EDI) Alignments**: An assessment of opportunities to align GrIID™ models with sustainable development, ESG, and EDI frameworks.
10. **Web Resources**: Links to GrIID™-related seminars, webinars, workshops, and videos. Example includes the Circular Cities and Regions Initiative's series of webinars on circularity in Canadian cities (Metro Vancouver, 2022).

The scholars developed six of the ten resources listed above (see Appendix C). These resources were identified while conducting research related to the *Case Studies Spreadsheet*. One-pagers have been created for the Action Framework, Benefits Fact Sheet, Ecosystem Survey, Industrial Symbiosis, Policy Alignment, and SDG/ESG/EDI Alignment to provide a brief description of the resources, how to use them, and links to samples. These one-pagers are available in Appendix C.

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5. Findings: How Circular Initiatives Get Started

The scan of municipalities and districts undertaking transitions to circular models included regions in Europe and North America.[4] The initiation of circular district projects in Europe and North America exhibited markedly different characteristics.

European cities, especially Oslo, Rotterdam, Stockholm, Tallinn, and Wallonia, were characterized by strong government initiative to undertake circular district creation. Projects in these cities typically began with an explicit **government initiative**, such as through the creation of the **Rotterdam Circularity Programme** or the **Norwegian Centre of Circular Economy**, to transition parts of the city's regular functions to a more circular model, to support circular innovation, or to create a circular district.

Broadly speaking, European circular districts, which are also the most established districts, are characterized by strong government support, both in the initial development and subsequent operating. North American cases, specifically those in Austin and Seattle, are characterized by **private companies**, including not-for-profits, driving the development of the district.[5] These projects are often supported in some way by the municipal government, but the degree of the support is typically less than in European cases; support more often takes the shape of a one-off grant rather than a full municipal plan (with funding) to transition to a circular model.

The European cases of Amsterdam, Paris, and Kolundberg differ slightly from the other European cases. They now display a strong government commitment, but began with either an initial undertaking by a private company (e.g. RATP in Paris) or through a public-private partnership (e.g. Kalundborg Symbiosis). In these cases, initial action by a private company was supported by the municipality, which then became a driving force for the project. In most cases, the municipality became the key actor facilitating circular innovation and transition. In Paris, for example, the City of Paris and the Metropolis of Greater Paris are two of the four founding members of **Les Deux Rives Association**, which is the governance structure for the circular district in Paris.[6] Some North American cases have displayed a similar initial action from a private entity, but the long-term municipal support has not been witnessed.

[4] Cities on other continents were initially considered, but were not chosen due to a lack of available data and/or they were less comparable to the Vancouver case.
[5] In some cases this takes the form of individual circular projects more-so than a coherent "district".
[6] The other two founding members are also public entities: RATP, which is a state-owned transportation company, and Eau de Paris, which provides water to over 3 million people.

In sum, the majority of the cases analyzed were initiated and sustained by municipal support. There appears to be a clear divide in municipal support between European and North American cities, with European characterized by systematic municipal support and North American characterized by private initiative.

5.1. Characteristics of Circular Cities

5.1.1. Key Activators

5.1.1.1. Sectors

In all circular districts analyzed, there appears to be a combination of various sectors present. The most consistent sectors represented are the public (municipal government) and private (typically local SMEs and/or startups), but a number of cities, such as Amsterdam, Barcelona, Montreal, Oslo, Portland, and Seattle, were also characterized by the presence of non-profit entities facilitating the undertaking of circular initiatives. Other sectors, such as the knowledge sector[7], were somewhat common, although less so than the others mentioned. In the European context, the public sector was present in a leading role in all cases. They typically facilitated, coordinated, planned, and funded circular initiatives (see section 5.1.1.2.).

In the North American context, the public sector still played an important role, especially in funding projects, but initiatives were more often started and managed by private entities. For example, in Seattle, the **Capitol Hill EcoDistrict** is a project that was founded by Community Roots Housing, an independent non-profit, with the goal of promoting "…an environmentally resilient, socially equitable, and culturally vibrant neighborhood in Seattle's center city" (Capitol Hill EcoDistrict, n.d.). This organization is coordinating with government agencies on the project, but appears to largely be responsible for the day-to-day operations and overall direction of the project.

A contrasting European example is the city of Tallinn. Tallinn is working to revitalize a section of housing that dates back to the USSR. The city is leading the project, offering funding for circular initiatives, publishing its support in policy and publications, and has even hosted an architecture competition to support refurbishment of the buildings (Seward, 2021). There are other housing developments based on circular principles being developed in Tallinn which are receiving support from private companies as well as the European Union (Hundipea OÜ, 2022).

[7] This term includes the academic sector as well as research and development conducted outside of academia.

Across all cities analyzed, with few exceptions, the government appears to have a strong coordination role. In the European context, the influence of government is more pronounced, and there tends to be policy and funding to support the initiatives (see sections 5.1.2. and 5.1.3.). North American governments are also involved in coordinating and planning, although in general to a lesser extent. Below (see Figure 5) are selected examples of work undertaken by municipal governments.

Figure 5. *Municipal Government Actions.*

City	Government Actions
Barcelona	Identify key levers, regulatory needs, stakeholders, obstacles, and opportunities in the circular economy to drive transition.
Montreal	Understand resource flows, convene complementary organizations, and adapt regulations to new strategies, such as a sharing economy.
Portland	Develop a better understanding of share-reuse-repair (SRR) services, strengthen existing relationships, and build new relationships within SRR.
Rotterdam	Create policies and strategic plans, collaborate, innovate, engage in outreach, and build public awareness.
Stockholm	Conduct research, provide funding, conduct scoping, create policy and regulations.
Tallinn	Coordinate with private companies and academia, and provide funding initiatives.

Role of Government. It appears that the municipal government typically undertakes a number of activities: to identify key stakeholders/actors, and to facilitate collaboration between them; to create policies and regulations that support the creation of circular districts, such as through commitments to waste reduction; to provide funding and other incentives to support circular initiatives; and to be an example for other entities (e.g. by developing a circular procurement strategy).

Role of Private Industry. The role of private industry showed more variance from city to city. In some places, such as Amsterdam, and Kolunberg, private companies played a large role in establishing circular districts, either initiating the transition themselves or partnering with the government to form an association (Dembski, 2013). In other locations, such as Tallinn, Austin, and Rotterdam, supporting innovation through start-up companies was highlighted as an important action for future success. What was consistent across all cases analyzed was the importance of working with the private sector to facilitate the transition to circular models. While in the European cases the government was the main driver of the transition, there was a clear focus to incentivize industry to participate in the transition in order to increase effectiveness, as well as to allow for the creation of new jobs

and to bolster local economies (C40 Cities, 2016b; European Union, 2019b; Government of Tallinn, 2022).

5.1.1.2. Clusters

A number of clusters were identified across the various sectors, which signify the focus of circular district transitions in the examined cases. The most common clusters were waste management, (de-)construction, food (agri-food system and food waste), energy, and water management. Across these clusters, a focus on creating job opportunities was present. The actual initiatives within each sector varied drastically, such as sustainable considerations in the construction of new buildings in Rotterdam (e.g. waste sorting facilities), versus sustainable refurbishment of buildings in Tallinn, and circular de-construction of buildings in Montreal (Center for Intersectoral Studies and Research on the Circular Economy, 2019a; 2019b; City of Rotterdam, n.d.; Hundipea OÜ, 2022; Seward, 2021). These cluster areas represent the types of initiatives that are typically undertaken as part of the transition to a circular model, but the specifics of each action will differ depending on the local context.

5.1.2. Policy Bucket

5.1.2.1. Context

The policy context of a circular city refers to the local goals, priorities, and practices that form the backdrop of emerging circular projects. Ultimately, **mapping**, **tracking**, and **intervening** processes shape circular projects like GrIID™.

Mapping. Mapping is a spatial and directional process that identifies relevant actors and sites for mobilization. For example, Barcelona illustrates the mapping process for sustainability goals, priorities, and strategies through its *Climate Emergency Declaration* (2020), *Barcelona Green Deal* (2021), and *Barcelona Circular City* policy (2021). Another instance of the complementary nature between goals and policies is noted in Seattle. Its *Drive Clean Seattle Implementation Strategy* (2017) accompanies its climate strategy. Cities also present more unified visions of goals and policies in the form of roadmaps and action plans consistent with their declarations. For example, Amsterdam's commitment to achieving a circular economy by 2050 (City of Amsterdam, 2020). To support this goal, Amsterdam produced the study, *Amsterdam Circular: Vision and Roadmap* (2015), which in turn yielded programmes like, *Amsterdam Circular: Learning by Doing*, and *Circular Innovation Programme 2016-2018*. This was closely followed by the passage of policies like the *Amsterdam City Doughnut*, the *Amsterdam Circular Monitor*, and the *Amsterdam Circular 2020-2025 Strategy* in 2020. Combined, such policy instruments provide a framework (with attention to vision, roadmap, monitor, best practices) for activating and growing circular

initiatives across the city. Wallonia's *Economie Circulaire* (2020), and Montreal's *Circular Economy: an Economic Model for the Future* (2022) are other excellent mapping examples.

Tracking. Though presented as separate processes, mapping and tracking (or monitoring) contain inter-linkages that could categorize them as part of a single process. Two key features characterize monitoring. First, knowing the actors involved in specific clusters. Second, understanding goods and material flows, resource inputs and outputs, and energy demands. Material flow analyses, business analyses, and benchmarking tools examine how specific resources interact at various stages of a supply chain in the economy. As mentioned earlier, this forms an important part of mapping processes since it identifies key metrics that facilitate additional critical steps for a program. This includes goal-setting, tracking, and program evaluation to analyze the efficacy of a particular intervention. Stockholm's **Municipal Building Efficiency Network's** focus on data collection exemplifies the role of data collection in informing policy decisions.

Intervening. In a way, mapping and tracking are intervening processes given the opportunities they create for socio-political interventions. An action plan typically identifies a cluster, and proposes strategies for transforming the cluster's unsustainable components. For example, in the food and waste cluster, strategies for sustainability involve organizing local markets, leading information campaigns about waste and recycling, and introducing product labels, such as Fair Trade, non-GMO, Organic, et cetera. Two groups of interventions emerged from the *Case Studies Spreadsheet*: **market** and **regulatory** interventions.

Market Interventions. Market-based interventions redirect the flow of market exchanges toward more circular and sustainable directions. The municipal governments in the case studies use fiscal frameworks and direct policy to achieve this redirecting. To encourage or discourage specific material use, a government may use positive or negative tax incentives, policy mechanisms (e.g. tradable emissions permits), and penalties (e.g. polluter pays principle). The city may also introduce sustainable standards of production to prolong product lifespan and require full transparency on the materials used throughout production. Other interventions include public procurements that encourage renewable energy and resources, and funding through direct investments and subsidies.

Regulatory Interventions. Regulatory interventions refer to deliberate and direct policy strategies, such as rezoning areas for greater efficiency standards, enforcing strict building codes and construction standards, administering environmental permits, conducting environmental and sustainability assessments, spatial planning, activating circular communities and networks (i.e. sharing platforms), legislating frameworks, providing

labels, and conducting information campaigns. Some of the case studies observed required exemptions from certain zoning regulations (e.g. all new buildings must be connected to a centralized utility grid). When total rezoning was too cumbersome for involved parties, defining the circular city initiative as a **living lab** enabled the suspension of certain regulations. This approach proved effective for overcoming regulatory obstacles. Other regulatory interventions include governance structures and commitments.

Across the case studies observed for this project, GrIID™-like initiatives evolved in policy contexts in which mapping, monitoring, and intervening processes unfolded. In some cases, the initiatives evolved 'from scratch,' catalyzed by the policy context, while in others, pre-existing initiatives, like Amsterdam's **Buiksloterham**, were stimulated by their policy environment. Mapping, monitoring, and intervening processes overlap to create a dynamic policy space that allows districts like Buiksloterham or the **Stockholm Royal Seaport** to evolve with assistance from the public sphere. The case studies highlight the importance of context to the success of circular city initiatives. Ranging from favorable regulations to multiple funding sources, many of the case studies observed succeeded because of the rich policy context they were situated in.

5.1.2.2. Alignment with Sustainability Frameworks

Cities can demonstrate the compatibility of their circular initiatives with overarching sustainability frameworks through alignment with the **United Nations (UN) 2030 Sustainable Development Agenda** (Rodriguez-Anton, et al., 2019; Schroeder, et al., 2019). Although the degree of such compatibility varies from city to city, GrIID™-like models align with the 17 Sustainable Development Goals (SDG), particularly **Goal 8** (i.e. decent work and economic growth) and **Goal 12** (sustainable consumption and production). This SDG alignment is evident in the circular policies of cities like Stockholm (Ministry of the Environment, 2020), Rotterdam (Port of Rotterdam, 2022), Oslo (Department of Economic and Social Affairs, 2022), Wallonia (Economie Circulaire, 2020), and Tallinn (Tallinn City Council, 2022). In addition to Goals 8 and 12, the case studies frequently refer to **Goal 9** (industry, innovation, and infrastructure), **Goal 11** (sustainable cities and communities), and **Goal 3** (good health and wellbeing) as well.

In addition to the SDG framework, circular city initiatives align with other international and regional commitments to sustainability, chiefly the **European Green New Deal** (2021), the **UN Convention on Biodiversity**, the **UN Paris Agreement on Climate Change**, the **Western Climate Initiative**, and broader state/provincial policy goals (e.g. the Netherlands, Quebec, and Sweden). A majority of the cases studied for this project made C40 declarations, commitments, and pledges, including the *Cities and Unions Call to Action on Jobs*, the *Advancing Towards Zero Waste* declaration, *Clean Air Cities* declaration, *Clean*

Construction declaration, *Climate Emergency* declaration, *Divesting from Fossil Fuels and Investing in a Sustainable Future* declaration, *Equity* pledge, *Good Food Cities* declaration, *Green and Healthy Streets* declaration, *Investing in a Sustainable Future* declaration, *Urban Nature* declaration, and *Net Zero Carbon Buildings* declaration. In these cases, the circular initiatives helped cities meet these goals and the cities also participated in various knowledge networks to contribute their circular initiatives as case studies to the C40 database.

5.1.3. Governance & Funding Model

5.1.3.1. Governance Model

First, there is no one governance model for running a circular city initiative. The governance models reflect **a variety of approaches across a spectrum of leadership and authority**. At one end of the spectrum, the governance model for circular city initiatives in cities like Amsterdam and Barcelona takes a **bottom-up approach**. In such cases, the government offers robust financial support, but emphasis is placed on grassroots and volunteer-based structures of leadership (Barcelona Circular City, 2021a; C40 Cities, 2018).

At the other end of the spectrum, cities like Rotterdam, Stockholm, and Tallinn maintain a **top-down approach** to governing their circular city initiatives. This usually involves clear direction and high-level leadership from the government related to project oversight and guidance (C40 Cities, 2016c; Hundipea OÜ, 2022; Rotterdam Circulair, 2019).

Lastly, at the centre of the spectrum, lies a blend of both governing approaches, giving rise to a **hybrid leadership model**. This appears to be the most common form of governance in our case studies, and may likely be attributed to the intersectoral nature of circular innovation. This governance model is observed in Kalundborg, Oslo, and Wallonia. A key feature of such governance structures is the presence of several tiers of leadership, namely (Economie Circulaire, 2020):

- **Project**: A governance body oriented toward project strategy, decision-making, and monitoring. E.g. Steering Committee, Stakeholder Coalition, Board of Directors; and
- **Administration**: A governance body oriented toward accountability and transparency (e.g. Circular Economy Council, Secretariat); and
- **Network**: A governance body oriented toward ongoing member/stakeholder engagement and collaboration. E.g. Circular Economy Platform, General Assembly.

5.1.3.2. Funding Model

Second, **governments were the primary source of funding** for nearly all of the 13 case studies reviewed for this project. In particular, local municipalities, followed by regional,

national, and state-level bodies of governance, provided significant financial support for their circular city projects. Following that, considerable financial support came from external and private sources.

For example, Amsterdam has invested in 50+projects in climate, sustainability and air quality using two funds: the **Amsterdam Climate and Energy Fund** and **Sustainability Fund** (AKEF, 2022). It also received additional funding support from the Dutch state and the European Union. Meanwhile, the circular initiative **Les Deux Rives Circular Quarter**, was founded by a private actor in the city of Paris and then partnered with the Parisian city government to receive public funding. The initiative also benefited from the French government 's **Future Investment Program**, a €370 million fund to support circular innovation between 2021 and 2027 (Choose Paris Region, 2022).

Overall, the case studies revealed a diverse pool of financiers for their circular city innovations. Typically, a combination of government budgets, membership fees, tariffs and tax schemes, grants, venture capital and private investments, and banking institutions constituted the pools of funds.

5.2. Tools and Resource Library

Though there is a vast literature on tools, policies, and resources useful for implementing a circular economy, it predominantly targets policymakers and private business innovators. This is outside the scope of relevance for GrIID™-specific strategies. Tools and resources for GrIID™ are thus materials that future GrIID™ innovators can use to contribute to GrIID™ Vancouver or initiate a GrIID™-like model in their local contexts. Tools essential to GrIID™ implementation include action framework, alignment assessments, communication and engagement templates, ecosystem surveys, and roadmaps. Additionally, cross-sectoral partnerships, coalescing, and networking are necessary techniques to use in conjunction with these tools for GrIIDs to succeed.

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6. Conclusion

The aim of this report was to understand the context in which circular projects similar to GrIID™ evolve across the world and to develop a collection of tools and resources for use by future GrIID™ innovators. 13 cities were selected and studied with the findings organized into three streams: key activators, policy context, and funding and governance.

The cities spanned North America and Europe. In the North American context, circular projects were primarily driven by private companies, including non-for-profits, whereas the government led most circular initiatives in the European context. The government's role was to identify key stakeholders, facilitate collaboration, create policies and regulations, provide funding and incentives, and set an example through planning and procurements.

With regards to policy, a context of favorable regulations and opportunities for funding has been essential for the successful proliferation of GrIID™-like districts even outside of Europe. The increasing popularity of eco/circular districts around the world arises from their alignment with broader policy targets. Though the form of governance varied across a spectrum from top-down to bottom-up styles, the prevailing form governance took in circular initiatives was a hybrid between the two involving multiple tiers of leadership. Funding sources, however, were less varied across the scanned cities, wherein most projects were primarily funded by governments.

Ultimately, GrIID™ occupies a unique space in the circular district landscape. In most cases, successful districts are sustained by municipal, if not national, commitments to funding and policy. It is difficult to describe many of the districts analyzed as independent entities separate from their larger policy context of mapping, tracking, and intervening processes, many of which are outside of GrIID™ capacities. Nonetheless, tools were developed with GrIID™-specific capacities in mind to mimic the overall effect of these larger policy contexts. Despite its unique status, GrIID™ can continue to draw insight from similar cases around the world, mimicking the ideas and logics of the best practices, if not always the scale. Further, the tools and templates will help GrIID™ continue to evolve, expanding its influence in the False Creek Flats, Vancouver neighborhood and inspiring future-GrIID™ innovators around the globe intent on sustainable innovation without waiting for government initiation.

6.1. Next Steps

Building on previous GrIID™ projects, this report provides a suite of tools and resources that identify steps for creating local and global GrIIDs. Moving forward, GrIID™ implementation will need local context-specific iterations of these resources. This ensures

that the tools and resources have optimal utility and efficiency. A key recommendation for future Sustainability Scholars is to collaborate with local experts to detail these resources.

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8. Appendices

8.1. Appendix A: Annotated Bibliography

This offers readers a brief description of 23 sources related to circular cities.

Each resource includes one or more of the following tags to indicate its key themes:

- 🔢 **Benefits Quantification**: Source offers metrics to quantify circularity benefits.
- 📍 **Case Studies**: Source reviews case studies of circular cities/initiatives.
- 📃 **Policy Framework**: Source contains information on policy-related contexts.
- 🧰 **Resources**: Source contains action-oriented tools and more information.
- 🗺️ **Roadmap**: Source contains step-by-step instructions for achieving circularity.

	🔢Benefits Quantification; 📍Case Studies; 📃Policy Framework; 🧰Resources; 🗺️Roadmap
1	📍 **Case Studies** https://www.circularcityfundingguide.eu/case-studies/ An archive of case studies demonstrating tangible benefits of circular economy practices. The case studies cover different parts of Europe, and review funders and seekers. Cases can be filtered by strategy (e.g. support, value recovery, use and life extension), and sector (e.g. built environment, consumer goods, clothing and textiles, biomass, mobility, waste management and recycling).
2	🔢 **Circular Benchmark Tool: How to Use It** https://circularbenchmarktool.eu/how-to-use-it A measurement tool for comparing regions and provinces in efforts to introduce circular principles. Aims to include 50 regions in 2021. The measure uses 6 indicators: circular procurement, access to funding, circular society, value chain activation, good governance, and integrated policy framework. These 6 indicators are measured according to maturity benchmarks: mapping, planning, doing, checking and acting, and leading by example. These indicators and benchmarks offer a way for measuring GrIID's circularity.
3	🧰 **Circular City** https://circulairestad.nl/en/ A website listing 18 trial projects that are underway in the Netherlands. Each of the cities in the City Deal has contributed two projects. Contains a list of projects organized by type: circular building, circular area development, restructuring residential districts, combining parties and tasks. All projects aim to reduce consumption of power, water, and materials and many of them are experimenting with ownership. Emphasis is placed on the social improvements of the projects. Includes a circle region toolbox to assist government authorities and businesses in discovering networks, flows, methods, and best practices and models to develop. This tool bridges supply and demand because it brings mutual parties together. Resources on the site include a visually appealing and interactive map that could serve as a model for GrIID, projects, indicators, barriers, supply and demand, and international.

	🔢Benefits Quantification; 📍Case Studies; 📃Policy Framework; 🧰Resources; 🗺️Roadmap
4	🔢🧰 **Circular City Initiatives and Resources** https://www.circularcityfundingguide.eu/circular-city-initiatives-and-resources/ A rich list of resources including tools, policy frameworks, models, theories, indicators, measurements, and networks.
5	🧰🗺️ **Circular Cities & Regions Initiative** https://ec.europa.eu/info/research-and-innovation/research-area/environment/circular-economy/circular-cities-and-regions-initiative_en A website showcasing EU members' action plans to transition to a circular economy by 2050. Focuses on circular economy implementation, identifies synergies between projects and initiatives, disseminates relevant knowledge, and gives greater visibility to best practices, combining technical and financial support.
6	🗺️ **Circular Cities & Regions Initiative (#EU Regions Week)** https://ec.europa.eu/regional_policy/rest/cms/upload/29102021_034834_1_ccri_rtd_p_goyens__13info21451.pdf A Presentation on the concept of Circular Cities and Regions Initiative (CCRI). Examines the local and regional implementation of circular economy solutions.
7	📃 **Circular Public Procurement: A Framework for Cities** https://emf.gitbook.io/circular-procurement-for-cities/framework-overview A four-step framework to help cities embrace circularity and procure resources and assets consistent with those ends. First, set yourself for success: develop common understanding among city officials, stakeholders and practitioners, build internal capacity, conduct market research, identify low-risk pilot projects. Second, adapt criteria and requirements: set up circular criteria and requirements, an ongoing process with increasing scale of ambition. Third, run circular tender process: begin piloting and procuring circular projects, goods, and services. Fourth, mainstream circular public procurement: share lessons learned and best practices to replicate success across city departments and use pilots to inform future staff and innovators.
8	🔢 **Cities in the Circular Economy: An Initial Exploration** https://ellenmacarthurfoundation.org/cities-in-the-circular-economy-an-initial-exploration A paper outlining the challenges of the linear economy, exploring the circular city alternative, and collating the benefits so far. Critiques the linear economy for its high amounts of waste generation. Discusses the main tenets of the circular economy as keeping products, components, and materials at their highest value and in use, regenerating natural systems, and designing out waste and pollution. A circular city is likely to have a built environment that takes advantage of modular building, deconstruction and reconstruction methods, flexible offices, generative power grids, renewable resource use; energy systems that are resilient, renewable, localised, and distributed equally; an urban mobility system that minimizes pollution; an urban bioeconomy that returns nutrients to the soil; and a production system that encourages local shopping. Its benefits include relieving pressures on municipal services and budgets, increasing disposable incomes, encouraging an innovation-rich urban economy,

🔢Benefits Quantification; 📍Case Studies; 📃Policy Framework; 🧰Resources; 🗺️Roadmap

and reducing carbon emissions, increasing reliability, and positively impacting employment opportunities.

9 📍📃🗺️ **City Governments and their Role in Enabling a Circular Economy Transition: An Overview of Urban Policy Levers**

https://emf.thirdlight.com/link/lg3ap956qxbi-66omej/@/download/1

A report about the city as the principle scale of government in circular transitioning. Focuses on multiple policy zones: vision, engagement, urban management, economic incentives, regulation, roadmaps and strategies, convening and partnering, urban planning, financial support, legislation and regulation, awareness raising, asset management, fiscal measures, capacity building, and public procurement.

10 📍📃 **Delivering the Circular Economy: A Toolkit for Policymakers**

https://ellenmacarthurfoundation.org/a-toolkit-for-policymakers

A report providing an actionable toolkit for policymakers. Identifies eight key insights, policy options, opportunities/barriers, and instructions for applying tools. First, a circular economy can bring about lasting benefits and develop a more innovative, resilient, and productive economy. Second, policymakers need to help businesses overcome market hurdles to circular principles. Third, there is no silver-bullet/blanket solution, approaching circularity sector by sector allows for refined approaches and solutions. Fourth, broad changes to the fiscal system and measurement of economic performance is necessary. Fifth, partnerships between city government and industry are essential for identifying barriers, creating early alignment with goals, and identifying and demonstrating benefits. Sixth, even in Denmark, which enjoys a considerable advantage in green economic design, there are considerable barriers. Seventh, the EU must intervene and complement the work of member countries with its own policy. Eighth, results of applying the toolkit will vary by country and region. The report introduces the core concepts of circular economy, presents a how-to-guide for policymakers (part 2), and covers the core findings of the pilot study in Denmark (part 3).

11 🧰 **European Regions and Cities Week 2021**

https://europa.eu/regions-and-cities/programme/2021/sessions/2038

A seminar/session on Circular City and Regions Initiative (CCRI), which is part of the circular economy action plan. It offers cities and regions a range of opportunities from knowledge sharing and technical expertise to financial support for programming and services. First, Goyens presents the initiative. Second, Philipp Horn presents the European Investment Bank's Circular City Centre as the EU's new circular economy banking system. Third, the Deputy Mayor of Helsinki presents their city's roadmap to a circular sharing economy. Take away message: CCRI provides "a scheme of coordinated instruments tailored to meet local and regional players' needs, depending on the stage their circular economy project/initiative is at. Financial support and technical assistance exist to help these players overcome the challenges in moving the circular economy forward. The financial assistance focuses on demonstration projects and the development of investment proposals."

12 📍 **Examples of Horizon 2020 and Bio-based Industries Joint Undertaking's Projects on Circular Economy and Circular Bio-based Economy with Local and Regional Components**

🔢Benefits Quantification; 📍Case Studies; 📃Policy Framework; 🧰Resources; 🗺️Roadmap

https://ec.europa.eu/info/sites/default/files/research_and_innovation/research_by_area/documents/ec_rtd_h2020-biobased-projects.pdf

A list of projects embracing circular innovation that are classified into five groups: buildings, plastics, waste, water, and urban planning.

13 🧰 **Knowledge Map: Circular Economy**

https://kenniskaarten.hetgroenebrein.nl/en/kenniskaart/circular-economy/

An overview of present-day knowledge on circular economy issues. Summarizes publications up to January 2020 in notational form. Lists seven questions: What is the circular economy? What are the benefits? What are the examples? What are businesses doing? What is the government doing? How does finance work? What does education do? How do we make the economic sectors circular?

14 🔢🧰 **Measuring the Circular Economy**

https://circulareconomy.europa.eu/platform/en/measuring-circular-economy

Library of resources that can be used for quantification of circular economy benefits.

15 📍 **Strategies**

https://circulareconomy.europa.eu/platform/en/strategies

An archive of 60 reports on strategies for transitioning to a circular economy that can be adopted by national, regional, and local-level authorities.

16 📍 **Survey Report on Regulatory Obstacles and Drivers for Boosting a Sustainable and Circular Urban Biobased Economy**

https://ec.europa.eu/futurium/en/system/files/ged/analysis_of_regulatory_obstacles_and_drivers_urban_circular_bioeconomy_report_final_version_29.10.19_rv_27.04.2020.pdf

This report presents analysis of EU regulatory obstacles and drivers in the production of biobased products. The goal is to present feedback from producers to EU officials on the effects of EU legislation. There is no broad conclusion but a conclusion at the end of each independent policy analysis.

17 🗺️ **The 15 Circular Steps for Cities – Second Edition**

https://www.eib.org/en/publications/circular-economy-15-steps-for-cities-second-edition

A report published by the European Investment Bank's Circular City Centre. Explains the benefits of a circular economy; how it helps cities overcome the challenges of the 21st century; why cities are the focus area; and what a circular city might look like in the future. Provides a 15 step plan categorized into three sections: planning, acting, and mobilizing.

18 🧰 **The C3 Circular Cities Resources Inventory**

https://eiah.eib.org/_tools/resources/documents/the-c3-circular-cities-resources-inventory.pdf

A highly comprehensive, rich, and large archive of resources for cities and innovators to draw on for their own circular initiatives. Include case studies, partners, networks, knowledge hubs, et cetera.

🔢Benefits Quantification; 📍Case Studies; 📃Policy Framework; 🧰Resources; 🗺️Roadmap

19 🔢📍📃🧰 **The Circular Economy in Cities: Resources Suite**
https://ellenmacarthurfoundation.org/circular-economy-in-cities

A suite of resources for urban policymakers and change makers focusing on three key urban systems: buildings, mobility, and products. It addresses questions like vision (e.g. what does planning, designing, making, and accessing circular cities look like?), factsheets, policy levers, and case studies (e.g. Brussels, Peterborough, Cape Town, New York City, Glasgow, Amsterdam, London, Austin, Toronto, Venlo, Shenzhen, San Francisco, Belo Horizonte, Milan, Guelph, Portugal, Brazil, Brussels).

20 🔢📍🗺️ **The Circular Economy in Cities and Regions: Synthesis Report**
https://doi.org/10.1787/10ac6ae4-en

A report summarizing the necessity of circular economies and importance of city-level implementation. Discusses five gaps preventing cities from achieving circularity: financial, regulatory, policy, awareness, and capacity gaps. Recommends cities and regions act as promoters, facilitators, and enablers of circular practices. Includes a checklist for action, with specific guidance and milestones, as well as a scoreboard on governance of circular economies for governments to use as self-assessment.

21 🗺️ **The City of Helsinki's Roadmap for Circular and Sharing Economy**
https://www.hel.fi/static/kanslia/Julkaisut/the-city-of-helsinkis-roadmap-for-circular-and-sharing-economy.pdf

A report discussing Helsinki's transition from a linear to a circular economy as a solution to the 21st century's intractable problems. Includes a thorough roadmap prepared by the city to bring Helsinki to a circular economy by 2035.

22 🧰 **Toolkits and Guidelines**
https://circulareconomy.europa.eu/platform/en/toolkits-guidelines

An archive of toolkits for governments. Toolkit includes a circularity data sheet; a framework for cities; action, tools, and guides for public authorities, policymakers, and operators to boost circularity; guides and workbooks for developing a circular business model; sector-specific guidelines for implementing circular economy principles in product life-cycles; circular economy financing and strategies.

23 📃 **Universal Circular Economy Policy Goals**
https://ellenmacarthurfoundation.org/universal-policy-goals/overview

A review of circular economy benefits, such as improving resilience, health and wellbeing; offsetting climate change, pollution, biodiversity loss; improving resource management; improving public well-being via environmental care; improving food safety and security; improving employment; and meeting the SDGs. Offers five goals as a blueprint for universal collaboration: stimulate design for the circular economy, manage resources to preserve value, make the economics work, invest in innovation, infrastructure, and skills, collaborate for system change.

8.2. Appendix B: Case Studies Spreadsheet

This provides data on the 13 case studies researched for this project.

Collected data responds to 11 survey questions, each of which is organized into one of four categories: literature review (Q.1), key activators (Q.2), policy bucket (Q.3), and governance and funding model (Q.4). In the spreadsheet, each question is coded for brevity such that it begins with the category it corresponds to (e.g. Q.1), followed by an alphabet to indicate its order (e.g. Q.1.a), and a brief description of the question (e.g. Q.1.a_Started).

See below for the full list of the question codes and associated survey questions:

Q.1.a_Started → How do circular initiatives get started?

Q.1.b._Theory → What is the theoretical background behind these circular city projects?

Q.2.a_Sector → Which sectors are involved?

Q.2.b._Actors → Who are the key actors (on the ground)?

Q.2.c._Roles → What were their roles?

Q.2.d._Cluster → Which industries/clusters do they represent?

Q.3.a.PolicyFrame → What is the policy framework for facilitating on-the-ground circular innovation and implementation?

Q.3.b.SDG/ESG → What policies/committees/knowledge networks/partnerships exist around the SDG Agenda and ESG mandates?

Q.4.a.Governance → What is the governance model of the circular city project?

Q.4.b.Funding → What is the funding model of the circular city project?

Q.4.c.Finaciers → Who is financing / Where are the funds for circular projects coming from?

Note, the spreadsheet below is organized to improve accessibility such that each row displays survey data for two case studies at a time.

	Amsterdam, *Netherlands*	**Austin, *United States***
Q.1.a_Started	Municipal Government Initiates	Private Stakeholder Coalition Initiates
Q.1.b._Theory	Doughnut Economics, Circular Economy, Living Lab	Innovation District
Q.2.a_Sector	Knowledge, Private, Public, Third	Knowledge, Private, Public
Q.2.b._Actors	Academic, Business (e.g. DELVA Landscape Architecture, Noordwaarts, Shell), Government, Individual (e.g. residents)	Academic (e.g. Huston-Tillotson University, McCombs School of Business, University of Texas Austin Dell Medical School), Business (e.g. Capital City Innovation, Gensler, HR&A Advisors and Perkins + Will)

Q.2.c._Roles	Design, Community Leadership, Finance, Governance, Technological Innovation	Invest, Plan, Policy, Procurement, Research
Q.2.d._Cluster	Supply, Distribution, and Transportation	Industrial Innovation R&D
Q.3.a.PolicyFrame	Amsterdam Circular, Amsterdam Circular Strategy 2020-2050, C40 Declarations and Networks, Circular Innovation Program	C40 Declarations and Networks, Innovation District Charter
Q.3.b.SDG/ESG	N/A	N/A
Q.4.a.Governance	Bottom-Up	Hybrid
Q.4.b.Funding	Budget, Loan	Budget, Tariff, Venture Capital
Q.4.c.Finaciers	Public Funding	Private Funding, Public Funding
Sources	• Amsterdam's Circular Economy Roadmap: Lessons Learned and Tools for Upscaling • Amsterdam Circular 2020-2025 Strategy • Amsterdam - C40 Cities • Circular Amsterdam. A Vision and Action Agenda for the City and Metropolitan Area • Circular Buiksloterham • Circular District Buiksloterham • Circular Innovation Program - City of Amsterdam (Dutch) • Living Lab en Manifest, Rapport, Report • The Amsterdam City Doughnut: A Tool for Transformative Action	• Austin's Innovation District • Austin's Innovation District Market Analysis • Austin - C40 Cities • Designing an Innovation District for the City of Austin • Integrated Intelligent Infrastructure • Reimagining the Palm District

	Barcelona, *Spain*	**Kalundborg, *Denmark***
Q.1.a_Started	International Challenge	N/A
Q.1.b._Theory	Circular Economy	Industrial Symbiosis, Circular Economy
Q.2.a_Sector	Knowledge, Private, Public, Third	Private, Public
Q.2.b._Actors	Academic (e.g. research and technology institutes), Business, Government	Business, Government
Q.2.c._Roles	Act, Implement, Plan, Represent, Troubleshoot	Lead, Sustainable Living
Q.2.d._Cluster	Food; Manufacturing and Production; Supply Distribution and	Supply, Distribution, and Transportation; Sustainable Waste

	Transportation	Management; Urban Agriculture
Q.3.a.PolicyFrame	Action Plan for Climate Emergency, Barcelona Green Deal, C40 Declarations and Networks, Carbon Neutral 2050, Climate Emergency Declaration	N/A
Q.3.b.SDG/ESG	SDG 2, 3, 11, 13, 15	SDG 8, 12
Q.4.a.Governance	Bottom-Up	Hybrid
Q.4.b.Funding	Budget	Budget, Grants, Membership Fees
Q.4.c.Finaciers	Private Funding, Public Funding	Public Funding, Self Funding
Sources	• Barcelona Circular City 2021 Report. Circular Economy Club Barcelona • Barcelona - C40 Cities • Join Us • The Circular Economy in Barcelona's Road Map Towards Sustainability	• Baltic Industrial Symbiosis BIS • Guide for Industrial Symbiosis Facilitators • Study and Portfolio Review of the Projects on Industrial Symbiosis in DG Research and Innovation • Surplus from Circular Production

	Montreal, *Canada*	**Oslo, *Norway***
Q.1.a_Started	Provincial Government Initiates	Municipal Government Initiates
Q.1.b._Theory	Circular Economy, Industrial Ecology	Circular Economy
Q.2.a_Sector	Knowledge, Private, Public, Third	Knowledge, Private, Public, Third
Q.2.b._Actors	Business, Government (e.g. development agencies, municipalities), Individual (e.g. experts, citizens, consumers), Financial Institutions, Non Profits	Business, Individual
Q.2.c._Roles	Advocate, Convene, Educate, Procurement, Troubleshoot, Understand, Unite	Collaborate, Resource Efficiency, Scale, Support, Sustainable Living
Q.2.d._Cluster	Food; Manufacturing and Production; Supply Distribution and Transportation; Sustainable Waste Management; Urban Agriculture	Arts and Culture; Food; Industrial Innovation R&D; Manufacturing and Production; Share, Reuse, Repair; Supply Distribution and Transportation; Sustainable Waste Management; Urban Agriculture
Q.3.a.PolicyFrame	C40 Declarations and Networks, Carbon Neutral 2050, Zero Waste 2030	C40 Declarations and Networks
Q.3.b.SDG/ESG	SDG 2, 7, 9, 11	SDG 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 17
Q.4.a.Governance	N/A	Hybrid

Q.4.b.Funding	Budget	Budget
Q.4.c.Finaciers	Public Funding	Public Funding, Self Funding
Sources	• Circular Economy: An Economic Model for the Future • Montréal - C40 Cities • Montréal Circulaire • Québec Circulaire	• Circular Norway • Circular Oslo • Circular Regions • Network Governance • Oslo - C40 Cities • Stakeholder involvement

	Paris, *France*	**Portland, *United States***
Q.1.a_Started	Private Company Initiates, Municipal Government Partners	Municipal Government Initiates
Q.1.b._Theory	Circular Economy, Industrial and Territorial Ecology, Collaborative Economy	Doughnut Economics, Circular Economy
Q.2.a_Sector	Private, Public	Private, Public, Third
Q.2.b._Actors	Business (e.g. private companies), Government	Business, Government, Non Profits
Q.2.c._Roles	Resource Efficiency, Synergy	Finance, Connect, Network, Storytell, Support, Troubleshoot, Understand
Q.2.d._Cluster	Food; Supply, Distribution, and Transportation; Sustainable Waste Management	Share, Reuse, Repair
Q.3.a.PolicyFrame	C40 Declarations and Networks, Emission Reductions	C40 Declarations and Networks
Q.3.b.SDG/ESG	SDG 8	SDG 3, 7, 9, 11, 13, 15
Q.4.a.Governance	Hybrid	N/A
Q.4.b.Funding	Budget	Grants
Q.4.c.Finaciers	Public Funding	External Funding
Sources	• 5 things we can learn from the world's greenest business district • Circular Economy • Paris - C40 Cities • Station F • Transitioning to a Circular Economy • Circular	• Portland - C40 Cities • Reuse, Repair, and Share: Needs Assessment Overview

	Rotterdam, *Netherlands*	**Seattle, *United States***
Q.1.a_Started	Government Initiates	Municipal Government Initiates, Non-Profit Partners
Q.1.b._Theory	Circular Economy, Repair-Reuse-Upcycle, Zero Waste	Ecodistrict

Q.2.a_Sector	Private, Public	Knowledge, Private, Public, Third
Q.2.b._Actors	Business (e.g. start-ups), Government (e.g. port authority, municipality, regional)	Academic (e.g. Lowell School), Business (e.g. Broadway Business Improvement Area, Seattle Good Business Network), Government (e.g. Department of Transportation; Office of Economic Development, Public Utilities), Non Profit (e.g. Audubon, Circular Economy Club, Community Roots Housing)
Q.2.c._Roles	Collaborate, Educate, Innovate, Plan, Policy	Conservation, Finance, Programming, Regulate
Q.2.d._Cluster	Food; Manufacturing and Production; Supply, Distribution, and Transportation; Sustainable Waste Management; Urban Agriculture	Arts and Culture; Manufacturing and Production
Q.3.a.PolicyFrame	C40 Declarations and Networks, EU Environment Programme, Trash to Treasure Program	C40 Declarations and Networks, Clean Energy Waste Fleet, Mass Electrification of Public Transport, NexGen Energy Efficient Buildings, Public Disclosure of Energy Performance, Public Transportation
Q.3.b.SDG/ESG	SDG 3, 7, 8, 9, 13	N/A
Q.4.a.Governance	Top-Down	Hybrid
Q.4.b.Funding	Budget, Grants, Subsidy	Budget, Investment
Q.4.c.Finaciers	Public Funding	Private Funding, Public Funding
Sources	• BlueCity: Surfing the New Economy • Circular Rotterdam • From Trash to Treasure: Rotterdam Circularity Programme 2019-2023 • Raw Materials Bill 2019-2022 • Rotterdam - C40 Cities • Rotterdamse Stijl	• Capitol Hill EcoDistrict • Let's Build a Dense, Climate-Resilient EcoDistrict in Seattle's Interbay • More 'urban villages' and more 'complete neighborhoods' • Seattle's Emerging EcoDistrict • Seattle - C40 Cities

	Stockholm, *Sweden*	**Tallinn, *Estonia***
Q.1.a_Started	Municipal, Federal Government Initiates	Government Initiates
Q.1.b._Theory	Circular Economy	Circular Economy, Smart City
Q.2.a_Sector	Knowledge, Private, Public	Knowledge, Private, Public
Q.2.b._Actors	Business (e.g. Atrium Ljungberg, Envac, Skanska), Government (e.g. City of Stockholm, Nacka Municipality, Stockholm Region EU Office)	Government (e.g. municipality)

Q.2.c._Roles	Finance, Policy, Regulate, Research, Scope	Collaborate, Connect, Convene, Coordinate, Finance, Innovate
Q.2.d._Cluster	Industrial Innovation R&D; Manufacturing and Production; Supply, Distribution, and Transportation	Sustainable Waste Management
Q.3.a.PolicyFrame	C40 Declarations and Networks, Climate Budget, Environment Programme	EU Network, Tallinn Waste Management Plan
Q.3.b.SDG/ESG	SDG 3, 8, 9, 11, 12, 14	SDG 6, 11, 12, 13, 14, 15
Q.4.a.Governance	Top-Down	Top-Down
Q.4.b.Funding	Budget, Tax Schemes	Budget, Venture Capital
Q.4.c.Finaciers	Private Funding, Public Funding	Private Funding, Public Funding
Sources	• Assessment of the Urban Circular Economy in Sweden • Circular Economy and the Stockholm Convention Division • Circular Economy – Strategy for the Transition in Sweden • North Sweden CleanTech Circular Economy • Opinion: Globalizing the circular economy at Stockholm+50 • Stockholm+50 • Stockholm - C40 Cities	• OECD experts assess Tallinn's transition to circular economy • Tallinn named European Green Capital 2023 • Tallinn's new waste plan foresees changes as early as next year • Tallinn Waste Management Plan 2022-2026

	Wallonia, *Belgium*
Q.1.a_Started	Federal Government Initiates, Private Company Partners
Q.1.b._Theory	Circular Economy, Zero Waste
Q.2.a_Sector	Private, Public
Q.2.b._Actors	Business (e.g. large companies, SMEs), Government (e.g. municipalities, cities) Individual (e.g. citizens)
Q.2.c._Roles	Catalyse, Improve, Renew, Stimulate, Troubleshoot
Q.2.d._Cluster	Food; Industrial Innovation R&D; Manufacturing and Production; Supply, Distribution, and Transportation; Sustainable Waste Management
Q.3.a.PolicyFrame	Air Climate Energy Plan, Digitization, Employment-Environment Alliances, European Green Deal, Recovery and Resilience Facility (RRF), Regional Mobility Strategy, Strategy for the Energy Renovation of Buildings, Strategy of Wallonia to Support Social Economy Development, Sustainable Development Strategy, UN Convention on Biodiversity, UN 2015 Paris Agreement on Climate Change, Walloon Waste-Resources Plan (PWD-R)
Q.3.b.SDG/ESG	SDG 8, 12

Q.4.a.Governance	Hybrid
Q.4.b.Funding	Budget
Q.4.c.Finaciers	Public Funding
Sources	• Belgium, on its way towards a circular economy • Circular Wallonia • Circular Wallonia: Deployment Strategy of the Circular Economy in Wallonia • Circular Wallonia Stratégie de déploiement de l'économie circulaire • Stakeholders and Institutions

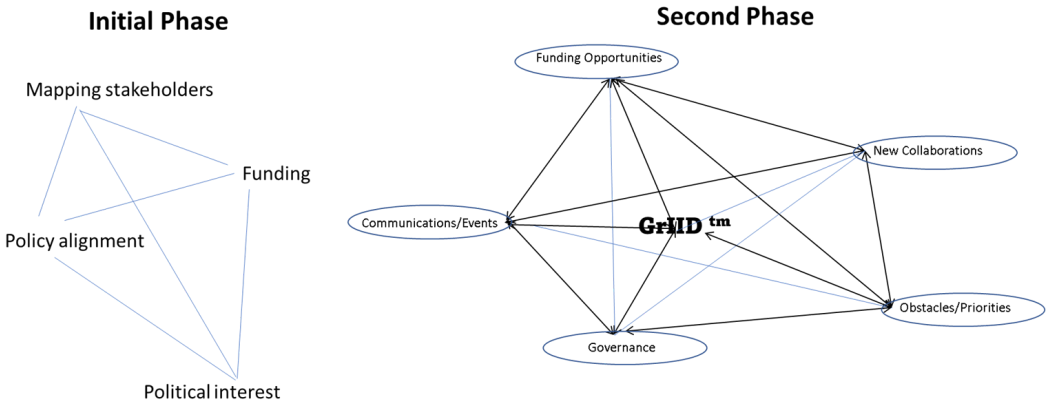
8.3. Appendix C: Tools and Resource Library

This section explores the following six out of ten tools and resources ideated for this project in more detail:

1. Action Framework
2. Benefits Fact Sheet
3. Ecosystem Survey
4. Industrial Symbiosis
5. Policy Alignment
6. SDG/ESG/EDI Alignment

Figure 6. *Action Framework.*

Name	**Action Framework**
Purpose	To provide a flexible set of guidelines that GrIID™initiators may reference, and a general direction in which they can steer. To add some predictability and structure without sacrificing the nimbleness and flexibility that allow GrIIDs to innovate and evolve spontaneously in beneficial ways. To help maintain momentum, identify obstacles and capacities, orientate policy levers, raise ambitions, engage stakeholders, identify opportunities for collaboration, and set realistic/actionable goals and strategize to their fulfilment.
Context & Description	GrIIDs are bottom-up, peer-to-peer, and self-guided. The process through which GrIIDs begin and evolve is non-linear and continuous. This tool, nevertheless, presents important milestones that most GrIIDs will pass through. Some of the other tools will be referred to in this roadmap including the 'mapping circular innovators' tool and the 'policy alignment' tool. The process of establishing a GrIID™is divided into two phases. The first phase is the initial gathering of innovators and local champions (ecosystem analysis, policy alignment, funding opportunities), identifying potential research and political partners at this stage is significant. Other important aspects of the first phase is grouping the potential innovators into clusters and sectors and determining scope. Once a steering committee, or similar meeting format, is established then the GrIID™enters the second phase wherein the pool of stakeholders and capacities are gradually expanded following the interaction of suggested actions: resourcing, recruitment, recognition, monitoring, and planning. Alternatively, the transition from phase one to phase two could be when the GrIID™joins the online portal.
How to Use	Use of this tool is intended to be dynamic and continuous. The tool provides a general framework for action that will help GrIID™innovators initiate and expand their GrIID's capacities. At the start, GrIID™innovators pursue funding, talk to innovators and stakeholders, and identify opportunities for policy alignment. In the second phase, the GrIID™steering committee continuously balances between planning, resourcing, recruiting, communication, and monitoring. Separate tools are available for many of these resources.



Initial Phase

- Mapping the policy ecosystem – what is my policy context?
- Mapping funding opportunities – what funding is available?
- Gauging political interest – who are my government advocates?
- Mapping and gauging stakeholder interest – who are the local champions?

Second Phase

- Finding and renewing funding opportunities.
- Finding new public-private partners/stakeholders.
- Identifying and overcoming obstacles.
- Meeting with GrIID™innovators and collaborators – commitment to ongoing governance.
- Outreach through public events, showcases, online features, social media.

Sample

- Getting the Governance of the Circular Economy Right: Checklist for Action and Scoreboard
- Strategies
- The URBACT II Local Support Group Toolkit

Figure 7. *Benefits Fact Sheet.*

Name	**Social, Environmental, Economic Benefits of GrIID™-like Models**
Purpose	To provide examples of benefits and inspiration for those considering a transition to a circular economy model.
Context & Description	There are various social, environmental, and economic benefits to adapting GrIID™-like models. These models tend to reduce environmental impact, such as through reductions in waste creation or energy requirements, as well as provide meaningful social goods related to inclusive operating practices and meaningful employment. Circular city models, such as the GrIID™, create social, environmental, and economic goods. These include reductions in waste (both household and industrial), energy savings, inclusive job creation, community cohesion, and collaboration amongst businesses, among others. This one-pager provides some examples of different resources that are available to quantify the benefits of a transition to a more circular economy, including links to case studies which display the on-the-ground impact. Understanding the various benefits of a circular economy can help interested companies and/or municipalities to gain support from various key actors and the general public.
How to Use	N/A
Sample	• **Material Flow Analysis**: Especially useful for determining the potential environmental benefit of a GrIID™-like model. Collaborating with an academic institution or consultant, or carrying out an internal analysis, can provide insight into the volume of different material inputs and outputs for a business/cluster/municipality. This informs potential target areas for waste reduction, and provides a means for measuring improvements in environmental performance. See pages 117-118 of Kalundborg Industrial Symbiosis Guide For Facilitators. • **Doughnut Economics**: This economic structure ensures that human activity remains within the Earth's carrying capacity, while also ensuring that all people can meet the threshold of their basic needs. Such a system ensures social and environmental needs are met by the economic system. For an example of social goods in a circular district, see "Lesson #3" from Les Deux Rives. • **Kalundborg Industrial Symbiosis Two-Pager**: Every year this network saves 4 million m3 of groundwater, 586,000 tonnes of CO2, and recycles 62,000 tonnes of residual materials. 80% of CO2 emissions in the symbiosis have been reduced since 2015, and the local energy supply is CO2 neutral.

Figure 8. *Ecosystem Survey.*

Name	**Mapping the Circular Landscape**
Purpose	To help GrIID™ implementers scan and survey local innovators, businesses and organizations in the immediate city/region. To identify opportunities for partnerships, synergies, as well as potential clusters.
Context & Description	At their core, GrIIDs are the sum of its members and the clusters they form that build and drive the GrIID™model. It is therefore important to have an understanding of the number and types of local circular innovators, businesses, implementers, and organizations already operating in the region. The tool helps categorize GrIID™ collaborators procedurally, identifying potential early primary collaborators and subsequent secondary collaborators. The tool also includes categories that identify the capacities potential collaborators have to offer, their level of interest, and contact information.
How to Use	The tool is a spreadsheet (see below) where each row is a spot for a potential collaborator and the columns are categories. The method of collection is up to the user – email, direct contact, phone, etc.

GrIID™ Partners and Stakeholders
GrIID™ Location: E.g. Penticton

Early Potential Partners and Stakeholders

Name	**Company Description**	**Cluster Category**	**Level of Interest**	**Capacity**	**Contact**
E.g. John Smith, *Company*	Refurbishing construction equipment	De-construction	Very High	Wants to help recruit innovators	j.sm@rce.ca (###)-###-####

Secondary Partners and Stakeholders

Name	**Company Description**	**Level of Interest**	**Incentives**	**Contact**
E.g. Jane Doe, *Company*	Reusable containers for food and beverage	High	Ex. Waiting for higher public involvement	(###)-###-####

	In addition to the survey tool, users could: • Use different mind-mapping or networking tools (mindmup, mindly, etc.) • Use a map of the target area with members highlighted/circled. • Reformat the chart into a survey for distribution. The chart could also be substituted or supplemented with a group meeting of interested stakeholders. Once the GrIID™ website is operational users could send a link to potential collaborators, or use the website in some other capacity.
Sample	• Scoping a Circular Ecosystem (The Hague) • URBACT II Local Action Plan (p. 65) • Austin's Circular Economy Map • Circular City

Figure 9. *Industrial Symbiosis.*

Name	**Industrial Symbiosis Guide for Facilitating Organization**
Purpose	To identify potential partners available in your area.
Context & Description	Kalundborg has been operating an Industrial Symbiosis (IS) network since 1972 involving private and public companies. This resource is most suited for an organization trying to establish an IS network, an anchor company attempting to develop a symbiosis partnership or network, or for an organization or government attempting to facilitate symbiotic partnerships. It identifies four key parts of developing IS networks, including key questions and actions associated with each. An Industrial Symbiosis occurs when a company shares its "waste" product with another company to assist in its operations and reduce waste. An example from the document is a mining company sharing excess heat created in the refining process with a shrimp production company, who used the heat to process shrimp. This reduced waste and the need for further heat production. The guide provides support on four key parts of creating/operating an IS network: pre-emergence, the facilitating organisation, symbiotic exchanges, ensuring the drive. It covers topics like building internal support for IS (within a company or organization), finding potential IS partners, tips to secure funding (and different funding needs), the need to setup a facilitating organization (and how to do so), the facilitator's role in the innovation process, creating awareness of IS amongst potential partners, how to communicate about IS, the importance of a common story, how to measure performance, and how to develop a shared strategy, among other things. This is a detailed document that provides guidance on the step-by-step process of setting up an Industrial Symbiosis. Specific suggested actions are presented, and several case studies are provided. The document is long (~80 pages) but is easy to read and understand.
How to Use	This guide pairs well with the Ecosystem Survey tool to determine what potential partners are available in your area. This is a document that is worth reading in its entirety. Consideration of how the suggested steps apply to the local context that a facilitator is working in will provide the most benefit while reading.
Sample	• Kalundborg Industrial Symbiosis Guide For Facilitators

Figure 10. *Policy Alignment.*

Name	Local Policy Context Assessment
Purpose	To demonstrate the alignment of GrIID™ with numerous existing municipal/regional targets, policies, and strategies to highlight the resultant benefits generated in one's city/region.
Context & Description	In the absence of a government-driven circular city model, GrIID™ activators will need the support of local authorities to get GrIID™ off the ground. To get this support, champions of GrIID™ will need to explicitly articulate how the model aligns with local authorities' (e.g. City Council, Regional Board, Provincial Government) policy goals and strategic direction, as expressed in the Motions and/or Bylaws introduced and passed by them.
How to Use	Review official municipal/regional websites and plans to better understand the local authority's political mandate and strategic priorities. Key policy areas to investigate include land use, climate, economic development and recovery, and equity, diversity, and inclusion (EDI). Examples of frameworks that align with GrIID's values are as follows: • Climate Action • Circular City • Green Economic Development • Local Supply Chain Resilience • Land Use for Light Industrial, Green Infrastructure • Equitable and inclusive Employment Depending on the level of detail desired, track the local position on these policy areas in a document, spreadsheet, or database. This involves making a list of the relevant policy frameworks, identifying related goals and targets that GrIID™ can contribute to, and quantifying GrIID's social, environmental, and economic benefits. Sample metrics may include number of jobs created, quantities of greenhouse gas emissions reduced, etc. This enables the evaluation of potential opportunities for aligning GrIID™ benefits with local political goals and targets, thereby leveraging the symbiotic relationship between local authorities and GrIID™ activators to build political support for GrIID™ implementation and delivery. This resource may be formatted as a scorecard, checklist, or a spreadsheet. Note, the scorecard offers a grading or rating system to reflect low, medium or high policy alignment. The simple scorecard enables circular innovators to identify, focus, and leverage policies with the greatest alignment. Not only does this inform their advocacy and communication styles, but it also highlights windows of opportunity in policy areas that they could develop in cases of a low alignment score.
Sample	• Circular Wallonia • Montreal - C40 Cities • Oslo - C40 Cities

Figure 11. *SDG/ESG/EDI Alignment.*

Name	SDG and ESG Alignment
Purpose	To assess the alignment of GrIID™ with the United Nations 2030 Sustainable Development Agenda and environmental, social, and corporate governance framework.
Context & Description	To gain support among public and private spheres for implementing a GrIID™ model, finding GrIID's alignment with the SDG and ESG frameworks will be a valuable leveraging point.
How to Use	Use a document to identify and quantify how GrIID™ relates to the 17 Sustainable Development Goals, including subsequent targets and indicators, and corporate pledges to environmental and social wellbeing. For example, GrIID's ability to reduce greenhouse gas emissions aligns with Goal 13: Climate Action and the environmental aspect of corporate governance. Such alignments allow GrIID™to leverage its benefits among local authorities in public and private sectors to build support for GrIID™ implementation and delivery. Key SDGs to seek alignment with are as follows: ☐ **Goal 8: Decent Work and Economic Growth**. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. ☐ **Goal 9: Industry, Innovation, and Infrastructure**. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. ☐ **Goal 11: Sustainable Cities and Communities**. Make cities and human settlements inclusive, safe, resilient and sustainable. ☐ **Goal 12: Responsible Consumption and Production**. Ensure sustainable consumption and production patterns. ☐ **Goal 13: Climate Action**. Take urgent action to combat climate change and its impacts. ☐ **Goal 14: Life Below Water**. Conserve and sustainably use the oceans, seas and marine resources for sustainable development. ☐ **Goal 15: Life on Land**. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. ☐ **Goal 17: Partnership for the Goals**. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development. This resource may be formatted as a checklist, a mind-map, or a spreadsheet.
Sample	• Circular Regions • Sustainable Development in the Port of Rotterdam