Reflow | Co-Creating Circular Resource Flows in Cities

constRuctive mEtabolic processes For materiaL flOWs in urban and peri-urban environments across Europe

Deliverable 4.4

REFLOW COLLABORATIVE GOVERNANCE TOOLKIT v1.1

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DELIVERABLE 4.4

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Abstract	This report presents the REFLOW Collaborative Governance Toolkit v.1.1. In its final iteration, the Toolkit is designed as a website, hosted as a sub-page within the REFLOW web domain (https://governance.reflowproject.eu/). Its architecture builds on the 'collaborative governance' framework captured in the previous versions of the Toolkit. This framework has been enriched and adapted over time, along with progress in the broader REFLOW project and the activities within the REFLOW Pilot cities. This final iteration includes the final list of tools, as well as a series of proofs of concept of its use by the Pilot cities, documenting the REFLOW governance process.
Keywords	Toolkit; Collaborative Governance; Circular Economy; Circular City Transition; Infrastructuring; Portfolio; Experiments.
Statement of Originality	This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Revision History

Revision	Date	Authors	Organization	Description
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D4.4, v.0.2	15/03/2022	Pilot Cities (Validation Round)	IAAC, All Pilot Cities	Validation of 'Toolkit in Practice' section by Pilot cities
D4.4, v.0.3	28/04/2022	Panos Petridis, Valentina Frosini	P2P Lab	Second draft ready for internal peer review
D4.4, v.0.4	14/05/2022	Massimo Bianchini, Stefano Maffei, Leonardo Saletta, Erika Hayashi, Dina Bekkevold Lingås	POLIMI, CBS	Revision by internal reviewers
D4.4, v.0.5	21/05/2022	Panos Petridis	P2P Lab	Final draft integrating reviewers' suggestions and feedback
D4.4, v.1.0	31/05/2022	Panos Petridis, Valentina Frosini, Alex Pazaitis, Nikiforos Tsiouris	P2P Lab	Final version to be submitted to the EC

ACRONYMS	
EU	European Union
ODD	Open Data Dashboard
RCGT	REFLOW Collaborative Governance Toolkit
REFLOW OS	REFLOW Operating System
WPs	Work Packages

D.4.4 REFLOW Collaborative Governance Toolkit

Glossary

Circular city: A circular city is a city where the circular economy principles are implemented and result in a resilient system that facilitates new kinds of social, environmental, technological, and economic activities. Examples of which can be the strengthening of competitiveness and the generation of employment.

Circular Economy (CE): A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and reusing products and materials. Within REFLOW the focus of the circular economy gradually extends beyond issues related to material management and covers other aspects, such as social impact, technological aspects and the evolution of urban governance structures.

Capacity building: The process by which individuals and organisations obtain, improve, and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently or to a greater capacity

Co-creation: is a bottom-up and design driven approach that's fundamental to build a common and supported understanding of new routes and futures through all layers of society.

Distributed design: is an approach to design matching networks with distributed elements. Under this approach, creative individuals have access to digital tools that allow them to design, produce and fabricate products themselves and connect to a global network of collaborators.

Iterative design: Iterative design is a design methodology based on continual improvement of a concept, prototype, design or product. In REFLOW, iterative design will be conceived with an agile structure enabling continuous improvements and adjustments of the local pilot projects in a collaborative manner.

Levers: Actions and interventions promoting transformative change.

Regenerative city: A regenerative city moves beyond sustainability, and develops a restorative, mutually beneficial relationship with the natural and social systems that sustain it. In REFLOW, the road to generative urban development will be achieved through the attention to the social, environmental, technological and economic dimensions.

REFLOW OS: Operating System based on GNU/Linux distribution technologies helping to incentivise circular practices in local ecosystems by monitoring and optimising urban metabolic processes. It is a peer-to-peer network that conducts economic activities such as monitoring, track and trace, and coordination among participants.

PART 1 | Introduction

1.1 About REFLOW

REFLOW is an EU Horizon 2020 research project running from 2019-2022, which aims to enable the transition of European cities towards circular and regenerative practices. More specifically, REFLOW uses Fab Labs and makerspaces as catalysers of a systemic change in urban and peri-urban environments, which enable, visualize and regulate “four freedoms”: free movement of materials, people, (technological) knowledge and commons, in order to reduce materials consumption, maximize multifunctional use of (public) spaces and envisage regenerative practices. The project provides best practices aligning market and government needs in order to create favourable conditions for the public and private sector to adopt circular economy (CE) practices. REFLOW is creating new CE business models within six Pilot cities: Amsterdam, Berlin, Cluj-Napoca, Milan, Paris and Vejle and assess their social, environmental and economic impact, by enabling active citizen involvement and systemic change to re-think the current approach to material flows in cities.

1.2 REFLOW Vision

A circular and regenerative city in REFLOW represents an urban system with social and business practices which place equal attention to **social, environmental and economic impact**; where **technology** is open and represents a central enabler of positive social and environmental change; where the urban system ensures and support resilience of social and ecological systems; where **governance** is collaborative and inclusive; where **knowledge** is shared, and **stakeholders** are active and involved.

1.3 About this deliverable

The REFLOW Collaborative Governance Toolkit (RCGT) is a ‘how to’ resource conceived to support the design and development of collaborative governance arrangements for the transition to circular and regenerative cities. The RCGT is designed as a website, featuring as a sub-page within the REFLOW website (https://governance.reflowproject.eu/). Its architecture builds on the ‘REFLOW collaborative governance’ framework developed in the earlier stages of the project.

The objectives of the RCGT are twofold:

- Showcase the tools used by Pilot cities within REFLOW, but also potential tools that other cities can use in order to support circular action plans and specific collaborative governance activities.
- Capture some of the learnings gained so far from the Pilot city journeys as well as their use of the Toolkit, (i) in the form of stories describing different aspects of the Pilot ecosystems, and (ii) proofs of concept that offer insights about the governance process of

urban transition. In the latter case, learnings from other deliverables were thoroughly scrutinized and presented under the different 'infrastructuring' dimensions (see section 2.2.1), to provide a series of governance models that indicate potential collaborative pathways towards circular and regenerative cities.

The aim has been to create an openly accessible resource that hosts a rich set of tools and at the same time provides inspiration of how such an iterative journey could look like, by exploring synergies and partnerships, and identifying possibilities that unleash distributed agency for social innovation.

1.4 Connection to the REFLOW Framework other deliverables

The RCGT is a cross-cutting living resource and repository of collaborative governance tools. As such, it encompasses and touches upon the entire REFLOW framework (figure 1): It focuses on individual Pilot city solutions (micro level), positions them within the city-wide ecosystem and relates them to urban policies (meso level), while hinting to pathways for broader societal innovation (macro level). Given it followed closely the REFLOW Pilot city developments, it is predominantly positioned between the micro and meso sections of the framework.

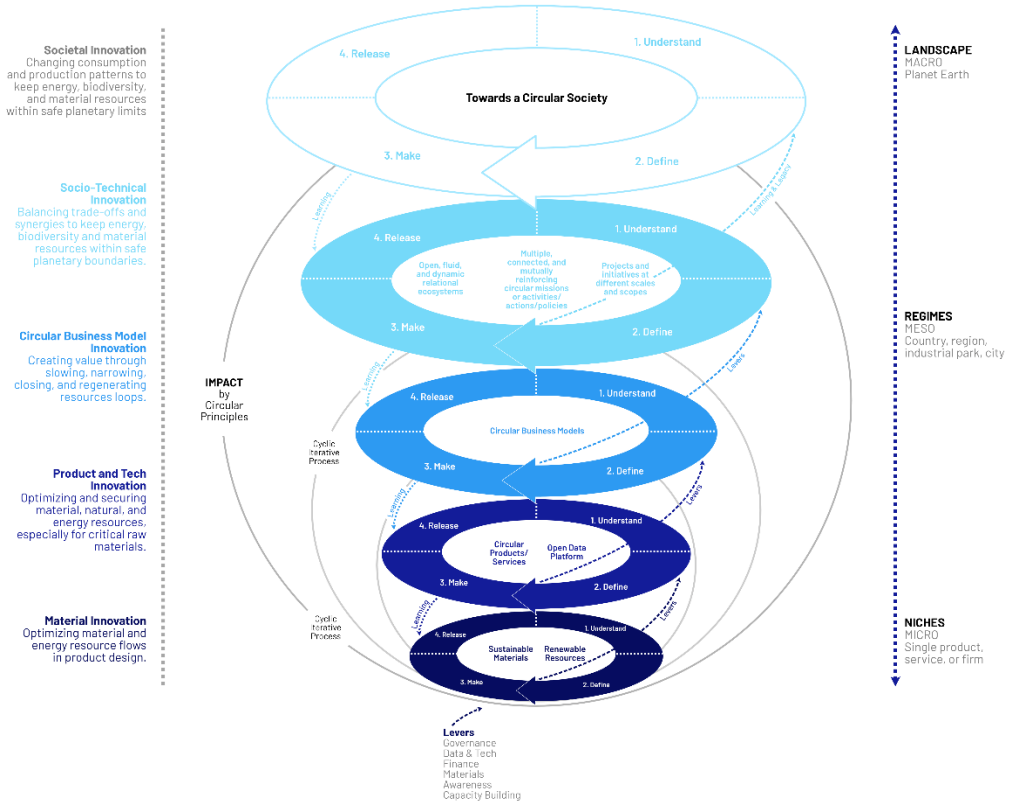


Figure 1. The REFLOW Framework

For the development of D4.4, strong collaboration took place between other ongoing processes within REFLOW, in particular T1.4 (Validation and Performance Analysis), T5.3 (City Ecosystem Analysis), T5.4 (REFLOW OS Pilot Applications) and T7.6 (Sustainability and Business Planning), in order to align efforts and strengthen synergies between the respective deliverables. The final list of tools appearing in D4.4 presents the outcome of tool development in the above-mentioned tasks.

Moreover, for the section 'Toolkit in Practice', we utilized inputs from the following deliverables:

- D1.4 (Validation and Performance Evaluation): Pilot theory of change and PESTEL analysis
- D5.3 (City Ecosystem Design): Ecosystem analysis, challenges and key actions
- D5.4 (REFLOW Pilot Applications): Technological solutions developed
- D7.5 (Sustainability and Business Plans): Business models developed

Based on those deliverables, we outlined 6 governance models, one per Pilot city, as 'snapshots' of the governance process of utilizing the Toolkit towards urban collaborative governance. In essence, we presented key activities as well as future plans of the REFLOW Pilots, re-interpreted as interventions in one of the three main 'infrastructuring' dimensions of collaborative governance, that can unlock collaborative capacities between different stakeholders (see Annex 1).

This deliverable directly feeds into D4.5 (Policy Proposals for Flexible Urbanism). Through a survey between REFLOW partners and external contributors, we assessed the implementation of the Toolkit, and made explicit connections with three main areas of intervention for flexible urbanism, i.e. Policy Briefs 'Iterative', 'Open-access', and 'Commons-based and polycentric' cities. At the same time, this helped us finalise the 'filtering system on needs basis' (see section 3.1.2), thus contributing to the 'user-friendliness' of the resource.

Finally, D1.5 (Project Impact Assessment) refers to D4.4 and the RCGT for the governance model KPIs.

All deliverables can be found at the REFLOW "Knowledge Hub", at the following address: https://reflowproject.eu/knowledge-hub/

1.5 Structure of this document

The current document serves as an accompanying resource to the main deliverable (appearing under: https://governance.reflowproject.eu/), and outlines the main additions and developments from the previous RCGT iteration (D4.3).

Part 2 describes the theoretical background used in the development of the RCGT. It shortly introduces a vision of balanced governance and places it within the context of REFLOW. Moreover, it reinforces the conceptualization of collaborative governance as a process of

infrastructuring, as developed in the 'REFLOW Collaborative Governance Framework'. Finally, it outlines the Portfolio Approach that was followed throughout the development and eventual testing of the Toolkit.

Part 3 then goes on to outline the updated sections of the RCGT, compared to the previous version. Section 3.1 focuses on the Toolbox page, outlining the final tools collection according to their infrastructuring category, and introducing the 'Filtering system on needs basis', and the 'Miro boards'. Section 3.2 outlines some of the Pilot cities' lessons in the form of structured stories that describe each Pilot framework, learnings gained and main insights from the project, as well as some examples of collaborative governance models. There, we structure a selection of the outcomes and learnings from the Pilot cities following the infrastructuring logic described above, essentially providing a 'snapshot' of a governance structure. Using the Circular Portfolio Canvas, we showcase priorities of action and thus, visually demonstrate a set of necessary elements for collaborative governance to function at a city level. These governance models are also provided at the end of this document, as Annex 1.

PART 2 | Theoretical foundations

2.1 Guiding concepts

2.1.1 Balanced governance within an economic network

An **economic network** is a set of independent agents, which could be individual persons or organisations, who regularly collaborate to create and exchange goods and services. Examples of economic networks include supply chains, joint ventures, municipalities, and bio-regions, but also economic ecosystems surrounding a resource like the Android OS. Each economic network has its own rules for accessing and participating in economic activities. These rules, and how they are practiced, constitute the **governance of the network**.[1] In essence, governance describes how a certain social system (such as an economic network) is reproduced. An organization's governance for example determines who can participate in the decision-making, sets out the different roles, and provides guidance or protocols on how interactions take place and how disputes are resolved.

Urban governance offers a new perspective and expands the traditional notion of government, where solving societal problems is seen not merely as a matter of 'good policy-making', but it rather becomes a fundamental question of **organizing and supporting strong collaboration between a series of stakeholders**. The attention given to new forms of participation and collaboration is not only a means of consensus-building and better decision-making, but rather

[1] https://reflowos.dyne.org/docs/what_is_reflowOS

acts a catalyst for practices of co-creation, co-generation and co-production of the strategies themselves.

A series of factors, and how they interrelate can deeply affect the governance of the network. Broadly speaking, the **balance** of power, autonomy, responsibility, risk-holding and accountability in each and every actor is considered vital - an imbalance between actors in a system makes the ecosystem more conducive to corruption, inefficacy and/or injustice. The understandings we apply when we use those terms come from the work of Dark Matter Labs[2] and are the following:

- **Power** – the ability to shape conditions
- **Autonomy** – the freedom to do things in a way that you deem fit
- **Responsibility** – the burden/ability to take action
- **Accountability** – the burden to justify your approach
- **Risk-holding** – bearing consequences of the results

2.1.2 Collaborative governance within REFLOW

In REFLOW, we understand **collaborative governance** as '*a long term, systemic process of steering and coordination of all the different levers in cities - policy, regulation, funding, knowledge, collective intelligence, and many others - in a way that allows distributed capacity, legitimacy and agency for (circular) change across public and private sectors*'.

Within the REFLOW context[3], the goal is to create an economic network that encourages the development of a municipal circular economy in order to:

- Promote the inclusion of people and/or organisations that inhabit the urban area in the production processes, as well as in the creation and distribution of the generated value (thus addressing the issue of *power*)
- Trace the flow of resources in the urban and peri-urban area in order to reduce waste and increase reuse and recycling practices (relating to *risk-holding*)
- Plan production processes based on availability of resources, vehicles and people within the network, to encourage the growth of the local economy and its participants (promoting *autonomy*)
- Certify the supply chain of resources produced locally, to create incentives and narratives between producers and consumers (addressing *responsibility*)
- Collect data from the territory to promote the creation of new policies, which can be scaled from a municipal to a national level (relating to *accountability*)

[2] https://provocations.darkmatterlabs.org/beyondtherules-balanced-governance-and-behaving-well-everywhere-every-day-5aa852b4843e
[3] https://reflowos.dyne.org/docs/what_is_reflowOS

Our work is to build and test a set of possible answers to the question posed by Kate Raworth in her book Doughnut Economics: 'Can we produce for human needs, without exceeding planetary boundaries?'[4]. Aware of the fact that technology influences economy and politics, we believe that this kind of infrastructure can help those communities and municipalities that want to experiment with economic networks to plan economies that can become a real alternative to the prevailing ideology of the free market, which is no longer sustainable.

REFLOW envisions a transition to collaborative and circular urban ecosystems, characterized by distributed forms of governance. In essence, we propose collaborative governance structures that are informed by 'commons-based' principles, which utilise the enabling capacities akin to those of **REFLOW OS**. By doing so, opportunities for more generative (as opposed to extractive) and inclusive forms of governance that create added value (social, environmental or other) around the communities that use them are formed.[5]

The main idea is that **innovative partnerships**, including collaborations between public, private and civic groups, can lead to more circularity, through creating more agency, legitimacy and capacity building for citizens to change consumption patterns. Moreover, cities can also try to organize around becoming **enabling platforms**, by creating different types of governance arrangements that allows actors (citizens, social organizations, enterprises, etc) to convene together and start to collaborate.

A **platform strategy** aims at mobilizing an ecosystem in creating value (with the aim of capturing part of that value). Platforms often utilize digital ecosystems in order to make resources and participants more accessible to each other on an as-needed basis (i.e. they facilitate match-making). With minimal marginal cost, platforms benefit from network effects. A well-functioning platform requires a governance structure that includes a set of protocols that determines who can participate, what roles they might play, how they might interact, and how disputes get resolved; and an additional set of protocols or standards to facilitate connection, coordination, and collaboration.[6] Like all techno-social systems, the way platforms are designed can affect their outcomes. Collaborative and sharing economy platforms enabled by distributed forms of governance, can potentially allow power to be distributed across the ecosystem, so that actors are more legitimated and enabled to have an active say in the innovation path towards circular cities.

[4] https://www.kateraworth.com/doughnut/
[5] https://commonstransition.org/peer-to-peer-a-commons-manifesto/
[6] https://www2.deloitte.com/us/en/insights/focus/business-trends/2015/platform-strategy-new-level-business-trends.html

2.2 Foundational frameworks

The REFLOW Collaborative Governance Toolkit (RCGT) is a resource rooted in the concept of collaborative governance as a key lever for the transition to circular and regenerative cities, and as such carries in its backbone the aforementioned principles. In particular, in the conceptualization and development of the present Toolkit we have been relying on and utilizing the **REFLOW Collaborative Governance framework** (figure 2), essentially an adapted version of the **REFLOW framework** introduced earlier (figure 1), which provides the overall framing, by understanding governance as a process of infrastructuring.

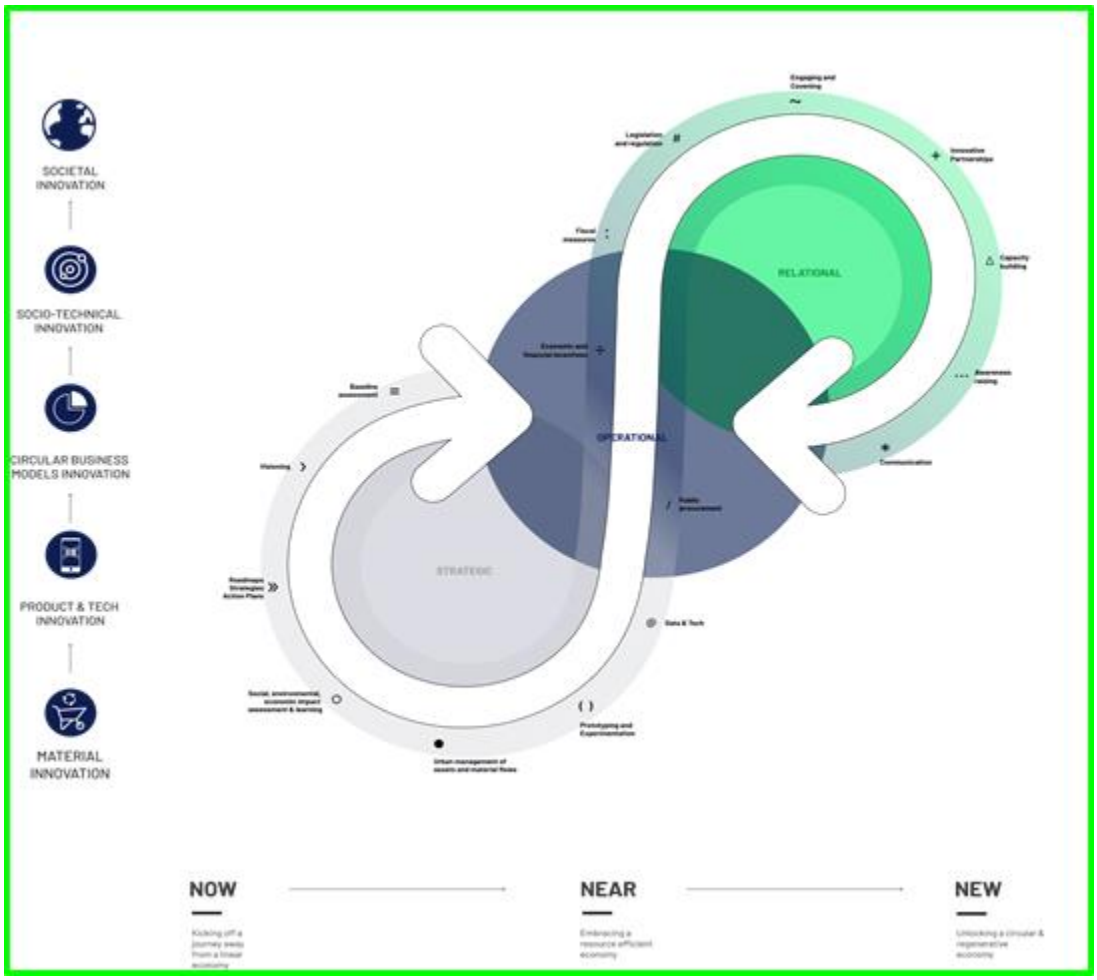


Figure 2: The REFLOW Collaborative Governance Framework

2.2.1 Collaborative Governance as “Infrastructuring”

Drawing from Thorpe & Manzini (2018), Collaborative Governance is conceptualised as an **open-ended infrastructuring process**: a continuous work of providing the means for action,

discovering and learning within a loose steering and coordination framework that supports both present and future collaborations. This infrastructuring can be understood to operate at different scales and scopes and with different dimensions that include:

- **Strategic infrastructuring**: articulating a long-term strategic vision, focused on creating synergies and alignment across different actors and agendas so that their resources can be made widely accessible and pooled towards collective impact;
- **Operational infrastructuring**: focused on building operational capacities and tools in a way that allows different circular experiments and activities to exist as a highly connected, systemic process;
- **Relational infrastructuring**: defining the relational ecosystem, focused on building trust, distributed agency and legitimacy, developing shared value.

Each dimension can be fostered by combining and activating different levers in a process that is iterative - thus facilitating the emergence of innovations at micro, meso and macro levels (from material to societal innovation) and over time. The three dimensions of infrastructuring continuously interact with each other, thus contributing to forming the actual shape of the social, cultural and economic fabric of the city.

In the REFLOW Handbook (D4.1) we have further elaborated the three infrastructuring logics, outlining a set of ‘essentials’ to be taken into consideration during a circular transition journey. These include:

Strategic infrastructuring

- Build a shared vision and narrative
- Design holistic and integrated strategies
- Articulate strategies with a circular hotspot approach (wide-scaling)
- Set clear yet flexible roadmaps

Operational infrastructuring

- Understand your local system - Mapping urban flows
- Understand technological assets and capabilities
- Develop multi-level impact frameworks
- Establish strategic partnerships
- Develop business case scenarios

Relational infrastructuring

- Promote communication and awareness
- Develop wide capacity building
- Unleash collective action
- Multi-stakeholder collaboration

2.2.2 A Portfolio Approach

Throughout the process of the production of this Toolkit, we have adopted a portfolio logic in order to trigger experimentation and learning across a full-stack designed transition. The intention was to showcase circular action plans for the Pilot cities within a more systemic perspective, defining a set of mutually reinforcing activities and experiments that, taken together, create new value, guide strategic investments, and offer potential for learning.

The REFLOW Pilot cities have developed a series of business models and technological solutions/prototypes that, together with a set of regulations, financing instruments and other capacities of the municipality, can enable a circular transition. From a governance perspective, we are interested in how all these elements connect and how they interrelate, by putting the spotlight on the **enabling capacities they activate**. Which set of capabilities are needed for a circular transition? How can they all work together towards circularity? What are their interrelations? What possibilities do they open?

Reflecting on this approach, the RCGT is not only a set of tools, but most importantly, it is a resource documenting the transition process itself. Our intention therefore has been to facilitate a journey for cities to clarify **collaborative governance capacities for circular transition**.

PART 3 | RCGT updated sections

3.1 Toolbox page

The overall architecture of the Toolkit has been designed to be user friendly and easy to navigate, making the user experience as intuitive as possible. The design has gone through internal co-design sessions with WP4 members, incorporating the feedback of Pilot cities and other stakeholders along the way. We have adopted Figma as a design platform to allow for better collaborative design of the Toolkit architecture, user journey and interface design. The main backbone of the toolbox has been described in D4.3. The following sections will present the main additions and developments in this final iteration.

3.1.1 The final tools collection

The Toolbox page provides final users with the final tools collection, tagged/grouped according to the three infrastructuring dimensions.

New tools were added in this final RCGT iteration (figures 3, 4, 5) in order to better reflect the REFLOW process towards circular and regenerative cities. The final tools selection is the result of an alignment processes we have run with the respective task leaders (in particular for T1.4, T5.3, T5.4 and T7.6) and includes the following new tools:

1. **Circular Loops diagram** and **Backcasting diagram**

These tools reflect the undertaking of Pilots cities in **redesigning their local ecosystem**, with respect to their chosen topic and focus. The process was based on co-design, co-creation and reflective practice to redesign their future proof models, in order to promote the concept of regenerative cities.

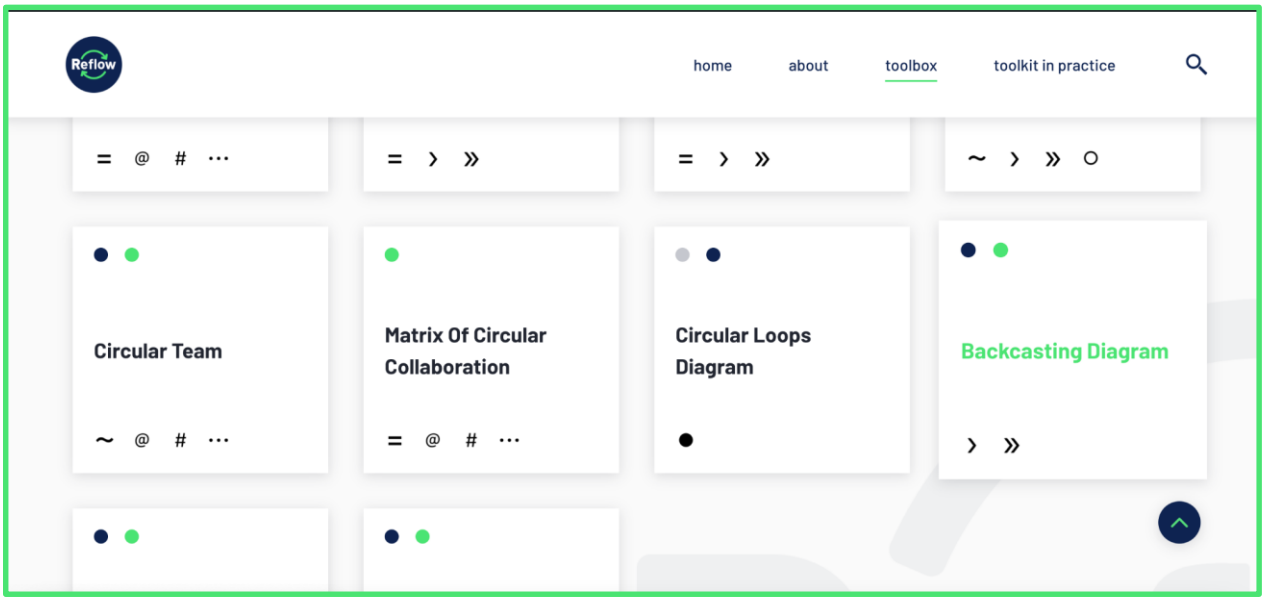


Figure 3: The Circular Loops Diagram and Backcasting Diagram tools

2. **Circular Business Model canvas** and **Value Proposition canvas**

This next group of tools reflects the business model process of the Pilots cities' solutions, which aimed at understanding **how value is created, delivered and captured** in a circular and regenerative context.

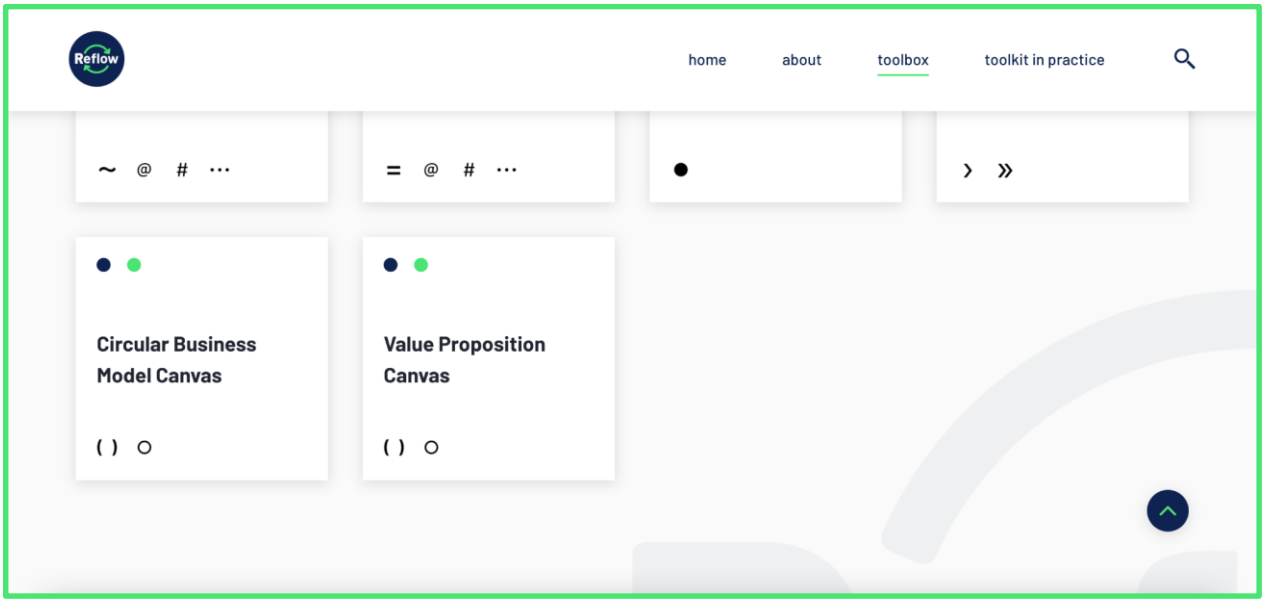


Figure 4: The Circular Business Model Canvas and Value Proposition Canvas

3. **Circular Theory of Change**

This tool helped Pilots cities define the **connections and logical associations** between long-term goals and impacts, outcomes, outputs and activities.

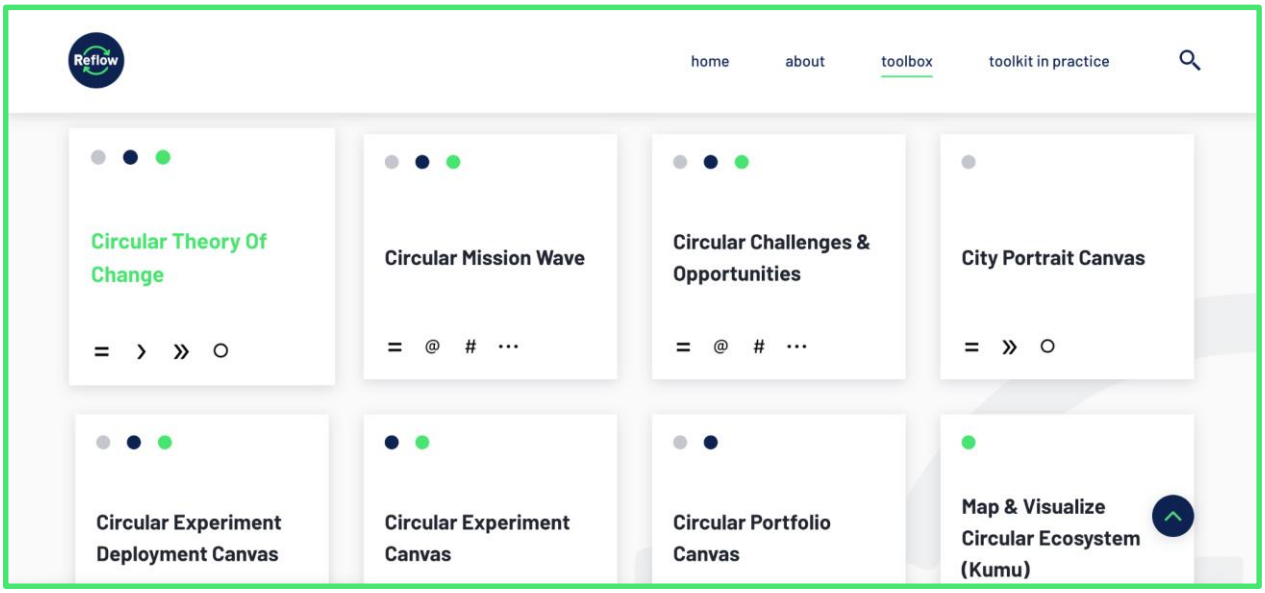


Figure 5: The Circular Theory of Change

3.1.2 Filtering system on needs basis

A new feature of the final RCGT iteration is the “needs based” filtering of tools (figure 6). The needs were defined and further refined in direct contact with the Pilot cities, and were further validated by both REFLOW and external partners as described below:

A survey was conducted in M32, led by IAAC, that aimed to assess insights for the implementation of the RCGT, and to propose a connection between the tools of the Toolkit and three main areas of intervention for flexible urbanism, i.e. ‘Iterative’, ‘Open-access’, and ‘Commons-based and polycentric’ cities (for more details, refer to D4.5). In the survey, REFLOW partners and external contributors filled an online questionnaire that consisted of the following process:

- Three scenarios inspired by REFLOW Pilot cities were connected to the areas of intervention. For each scenario, contextual barriers to support and sustain the transition towards circularity and flexible urbanism were presented.
- Participants were invited to reflect, assess and draw connections between the contextual barriers and possible solutions for overcoming them. Participant responses were gathered through multiple choice options and followed by additional explanations for elaboration.
- The solutions selected were finally connected to specific tools from the RCGT.

This, in turn, helped us fine-tune and finalise the filtering system on a needs basis. Given that this system provides an entry point to the Toolkit, it was considered important to facilitate the attractiveness and usability of the resource. Since our collection of tools is not prescriptive of a specific journey, but rather, generative of multiple possibilities, we formulated the needs in a generic way, in order to include a full spectrum of diverse journeys. The filtering system on a needs basis hence helps final users browse the collection to find the most suitable tools, according to their own journey in an intuitive way.

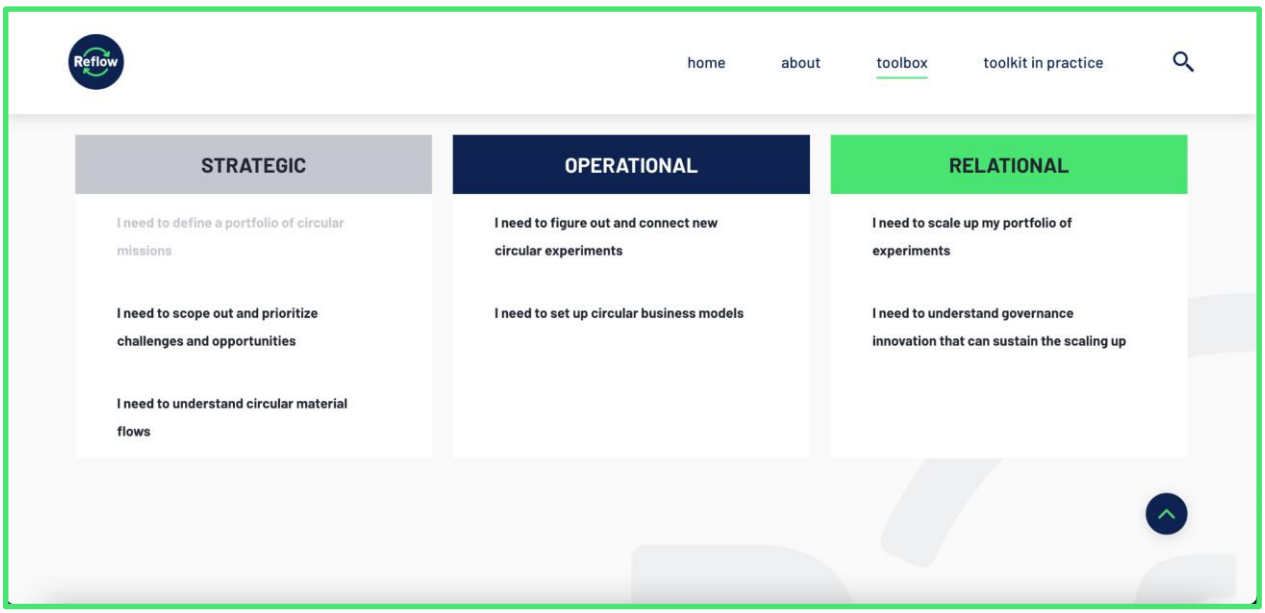


Figure 6: The Filtering System on needs basis

Needs have been aligned according to the infrastructure dimensions: strategic, operational and relational. For every need, one or more tools are associated. The final list is as follows:

STRATEGIC

1. *I need to scope out and prioritize challenges and opportunities to address*

   RELATED TOOL/S:
   City Portrait Canvas
   Circular Challenges & Opportunities

2. *I need to define a portfolio of circular missions*

   RELATED TOOL/S:
   Circular Mission Wave
   Circular Theory of Change
   Circular Portfolio Canvas

3. *I need to understand circular material flows*

   RELATED TOOL/S:
   Circular Loops Diagram

OPERATIONAL

4. *I need to figure out and connect new circular experiments*

   RELATED TOOL/S:
   Circular Team
   Circular Experiment Canvas
   Circular Experiment Deployment Canvas

5. *I need to set up circular business models*

   RELATED TOOL/S:
   Circular Business Model Canvas
   Value Proposition Canvas

RELATIONAL

6. *I need to scale up my portfolio of experiments*

   RELATED TOOL/S:
   Backcasting Diagram

7. *I need to understand governance innovation for scaling up local solutions*

   RELATED TOOL/S:
   Mapping & Visualizing Circular Ecosystem (Kumu)
   Matrix of Circular Collaboration

3.1.3 Redesign of tools as Miro boards

Due to the ongoing pandemic, we have made extensive use of the collaboration platform “Miro” as a visual and virtual workspace during the project. Building on this new generated capacity, we decided to include a second entry point to our Toolkit: a Miro board hosting all the tools of the Toolkit, where final users can copy and paste every tool according to their specific needs. The reason for this was threefold:

1. Many of our tools are meant to be iterated, in order to help cities continuously verify the consistency of activities in addressing objectives and desired impacts. Hosting the tools on Miro facilitates this iterative and participatory process, unleashing collective action;
2. Multi-stakeholder collaboration requires (real or virtual) space for collaboration. Promoting a virtual workspace where all knowledge is converged can help cities to come up with meaningful insights and to spread capacities across all stakeholders;
3. Tools are open-ended because they build on Miro elements. This helps interactions with the tools as they can be changed and improved based on specific needs.

3.2 Toolkit in practice

The REFLOW Collaborative Governance Toolkit is a resource that intends to support the design and development of **collaborative governance arrangements** that would facilitate the transition towards more circular and regenerative cities. As already mentioned, more than just a collection of tools, the aim is also to support and document the **process of transition** itself, and therefore to provide inspiration of how such an iterative journey could look like, by exploring new synergies and partnerships and identifying possibilities that unleash distributed agency for social innovation.

The section "Toolkit in practice" departs from focusing on individual tools, and rather highlights the resource as a repository of the transition process itself. In an effort to facilitate a collaborative governance journey for cities towards circular transition, here we present a series of insights and learnings of collaborative governance arrangements fit for circularity.

3.2.1 Finalization of the Pilots' stories

The sub-section 'Stories' provides short learnings and experiences from the Pilot cities, highlighting various aspects of their different initiatives and governance ecosystems. They are the result of short interviews with representatives from the Pilot cities, and provide useful insights from the project, of interest to both consortium partners, as well as cities in the process of urban circular transition. The edited interviews were sent for a second round of validation to the Pilot cities, before finally being uploaded to the website.

In the case of Cluj-Napoca, we have also produced a report on Circular-led energy transition, that provides a holistic and integrated set of arguments for a circular-led energy transition in Cluj-Napoca and could be highly relevant for cities along a similar path.

3.2.2 REFLOW Governance process section

Based on activities within REFLOW for the 6 Pilot cities, the sub-section 'REFLOW Governance process' aspires to identify and evaluate existing capacities that foster city-wide collaboration and co-creation. It does so by providing concrete examples of the different possibilities this journey can have and showcases what it takes for a city to move towards an urban circular transition. The

section provides 6 snapshots of the process of utilizing the Toolkit towards collaborative governance, by presenting some of the key activities of the REFLOW Pilots (as described – among others – in deliverables D1.4, and D5.3), codified as interventions in one of the three main infrastructuring dimensions described above - *strategic, operational and relational* -, that can unlock collaborative capacities between different stakeholders. These snapshots of the REFLOW Governance process constitute the Pilot cities' governance models. In other words, in these governance models we present some of the key Pilot activities through the interpretative lens of the three main layers of infrastructuring that continuously interact with each other and form the actual shape of the social, cultural and economic fabric of the city.

It should be highlighted that different actions may primarily utilize one "lever" or fall into one of the infrastructuring dimensions. Yet, we are dealing with an open-ended, iterative and highly dynamic process with no strict boundaries, where activities are enriched with each iteration over time to encompass the scope of collaboration and which capitalize on new synergies that reinforce the envisioned transition.

In addition, each governance model is complemented with a visualization of the activities in one of the main strategic tools of the Toolkit, the **circular portfolio canvas**: The canvas shows some of the key actions that helped "unlock" collaboration dynamics, for example by forming a joint vision, developing a new business model, or unleashing new socio-technical possibilities. Activities are conceived and visualized as small-scale "portfolio" experiments that leverage circular possibilities in one or more sectors and can be further scaled up at subsequent iterations of the process.

The final outcome is the result of both synthesizing work of past deliverables, and ongoing discussions with the Pilot cities. The final drafts were once again sent for a last round of validation by the Pilot cities, before finalising and uploading them (see annex 1).

Concluding remarks

The final iteration of the RCGT intends to serve as an online living resource providing a comprehensive repository of tools and resources for the REFLOW Pilot cities, but also for other cities interested in engaging in a transition journey towards circularity, that would entail a series of collaborative governance arrangements fit for an urban context.

The 'Toolbox' section provides an updated list of strategic, operational and relational tools that can assist urban policy makers in understanding their city flows, challenges and opportunities, set up circular innovations and business models, and scale up their portfolio of experiments. The 'Toolkit in Practice' section documents some of the pathways this portfolio can take and indicates a number of possible governance arrangements from the plethora of potential options. Together, they intend to support collaborative journeys towards circular and regenerative cities.

The RCGT, together with D4.5 Policy Proposals for Flexible Urbanism, are the main outcomes of the REFLOW project within the Work Package 4 on Governance and Urban Strategies on Circular Economy. As such, after the end of the project, the website will remain accessible as an online resource, in order to be implemented across European cities and beyond that want to explore collaborative governance frameworks for a circular transition process.

For these reasons, the online version of the Toolkit will remain:

- **Openly accessible online**: In this way it can be used by different cities and users from REFLOW and beyond.

- **Replicable and easily scalable**: As a living resource, it provides a journey that can be adopted by different cities in the future and adapted to different contexts.

- **Inter-relatable**: It forges connections between other relevant resources, in order to make the user journey as enriching and intuitive as possible.

Annex 1: Individual governance models

Amsterdam: Fostering circularity on textile materials

Summary

The Amsterdam Pilot focuses on textiles, aiming at transforming the city's substantial and largely linear textile stream to ever increasing circularity, by reusing a larger percentage of currently discarded materials. Amsterdam's strategy consists of two complementary scenarios. A short-term 'citizen' scenario targets citizens and aims at achieving impact through behavioural change by promoting the reuse, repair and revaluing of textiles, essentially extending the life-cycle of materials, and – as a last resort – the proper discarding of unusable materials. A long-term 'industrial' scenario complements and builds upon this approach with citizens, by facilitating the processes of collection and provision of recyclable material to the industry, thus creating new products (therefore new value) out of the recycled material. Utilizing track-and-trace technology it aims to create an exchange system platform that would better valorize reused textiles and in turn facilitate and incentivize new circular business opportunities.

Stakeholders

The Amsterdam Pilot has formed a strong alliance between actors from the public sector, industry as well as civil society. Activities are coordinated by the Municipality of Amsterdam, in cooperation with the Amsterdam Metropolitan Area Bureau, the platform for social innovation & creation 'Pakhuis de Zwijger', the Future Lab 'Waag' and BMA Techne. Moreover, there are multiple and ongoing cooperation partnerships with a series of organisations like Dress for Success, social enterprises such as I-did, companies (e.g. Clean Lease) as well as the makers community (non-profit Makers Unite). A long list of stakeholders from industry are also included and appear as signatories of the 'Green Deals Circular Textile' agreement.

Key infrastructuring actions

Strategic: The forthcoming 'EU strategy for sustainable textiles' to guide the sector's competitiveness, sustainability, and resilience – based on the 'Circular Economy Action Plan' of the European Green deal sets the scene and scope for action. At a regional level, the Amsterdam Economic Board, in collaboration with the Municipality of Amsterdam and the Amsterdam Metropolitan Area (MRA) Bureau, in line with their sustainability goals for 2020, 2030 and 2050, have developed the 'Green Deals Circular Textiles' agreement. Specific initiatives include (i) a repair shared service center, (ii) a circular fashion innovation lab, (iii) integrating circular principles in textile research and education, (iv) circular procurement of work clothing, including protective clothing for healthcare, and (v) awareness campaign for end users. Within the project's lifetime this has led to a Strategic Framework 'Roadmap on Circular Textiles' to serve as a governance

guideline and as such to have a lasting effect on the long-term strategic course on circular textiles within the MRA.

Operational: Initial steps for baseline assessment included a material flow analysis of textile streams and wide stakeholder analysis, resulting in a 'Circular Textile Wheel' that provides a full vision on circular textiles in the city. A thorough mapping of the system and flows was instrumental for the development of a series of solutions that aim at closing the loops, and providing attractive opportunities for textile reuse. These included: the 'Swapshop' aiming at sorting and reselling used clothes, the development of 'Reusable circular isolation gowns' in the healthcare sector, and the 'United Repair Centre' that connects brands needing repair services with 'Makers Unite' tailors. These solutions were partly facilitated by the development of track-and-trace technologies using REFLOW OS. Tracking of textiles made it also easier to forge links with organisations such as 'Dress for Success', or to support the 'Denim Deal' (see below). In addition, and in line with the MRA's Circular Textiles sub-deal 'Circular Procurement of work clothing', 'Circular linen' tackles circular procurement in the hotel industry, while the municipally funded 'On demand Collection (Ragman)' aims at collecting unused textiles directly from the source.

Relational: Citizen awareness has been a top priority in the project's first phase, as reflected also by the MRA's Circular Textiles sub-deal 'Awareness Campaign for End Users'. Initially, an explanatory booklet was produced based on the Circular Textile Wheel that provides a full vision on circular textiles in the city. The organization of 'Maandag Wasdag' roundtable discussions targeted industry stakeholders and these were followed by a wide scale awareness campaign. Further actions included the 'Textilerace', a race among primary schools to collect discarded textiles, the development of educational information material for workers and guests of the hotel industry for increasing the lifespan of textiles, and the 'Stadpas Card' to encourage textile recycling by subsidizing the cost of repairing. Regarding isolation gowns, efforts were made to facilitate exchange between entrepreneurs & sorting companies. As regards capacity building, the setting up of the 'Markthal Innovation Lab' stands out as a long-term project focusing on the support of future start-ups. Perhaps the most important achievement of collective action and multi-stakeholder collaboration regarding policy was the establishment of the 'Green Deal on Circular Denim', or simply 'Denim Deal', an alliance with leading actors in order to close the material loops and significantly increase reused denim in the value chain, that aims at becoming a blueprint for sustainable textile industry in the future, where the use of recycled fibres in denim becomes the new industry standard.

Outlook

In its effort to establish itself as a thriving, regenerative, and inclusive city for all citizens, while at the same time respecting planetary boundaries, the region of Amsterdam seeks to develop into a circular textile hub in line with its national and EU textile agreements and frameworks. This ambition has placed textiles as a priority area in the City of Amsterdam's circular strategy. The process that led to the development of 'Roadmap for Circular Textiles' is a good example of concerted policy action that builds upon past achievements.

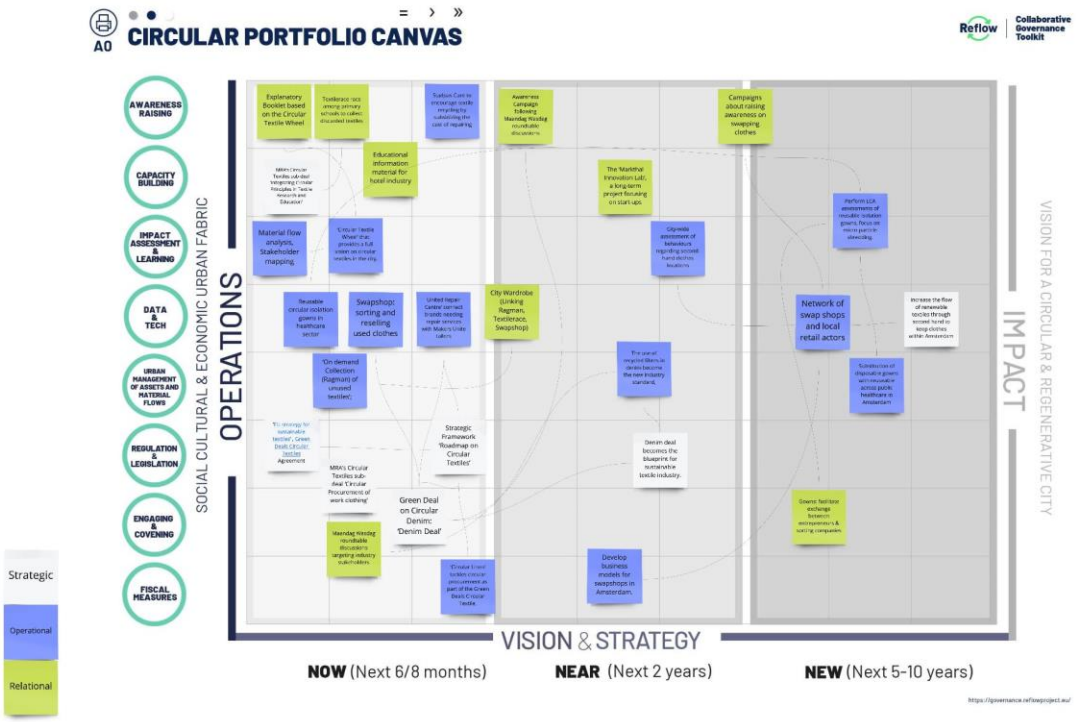
The commitment of the Amsterdam Metropolitan Area (MRA) Bureau towards circular textile flows, as documented in its sustainability goals for 2020, 2030 and 2050, gave rise to the 'Green Deals Circular Textile' agreement. The Amsterdam REFLOW Pilot utilized this momentum and with baseline assessment work on material flows and stakeholder analysis, highlighted the importance of improved collection, citizen awareness, as well as the need for a cooperative aligned textile-ecosystem and managed to bring this one step further with the development of a strategic framework. The 'Roadmap on Circular Textiles' is intended to serve as a key governance guideline that includes concrete future goals. It is used to both facilitate and connect several of the activities performed, such as the Swapshop, Circular Isolation Gowns, and the United Repair Centre; these activities in turn directly tackle the MRA's Circular Textiles Green sub-deals.

The Amsterdam REFLOW Pilot focuses on a dual strategy that targeted citizens in the short term and industry in the longer term. A core focal point has been behavioural change, a fact that was evident in the development of most solutions, especially during the first stages of the project. The project aims at supporting the currently shifting consumer awareness towards sustainable clothing, apparent in the increase in swap shops, and online markets for used clothing. The intention has been to re-evaluate used textiles by an increasing number of consumers, and therefore assist in the viability of used textile businesses.

Next proposed steps include a city-wide study to assess behaviours regarding second-hand clothes and therefore identify the best suited locations for the implementation of more pick-up points and swap shops. A further elaboration of a viable business model for swap shops in Amsterdam, together with a logistical capacity building program and awareness campaigns on swapping clothes can lead to the emergence of more points of exchange, that may result in a more formalized network of swap shops and local retail actors. Novel ways to reward participation can lead to a fairer redistribution of this new value created. Regarding isolation gowns, future LCA assessments on disposable gowns focusing on micro-particle shredding (thus highlighting the environmental co-benefits of reusable gowns), together with the development of procurement guidelines across public healthcare and other incentives will further ensure multi-use and adoption of a new industry standard.

Circular Portfolio Canvas 'snapshot'

AMSTERDAM: Fostering circularity on textile materials



Berlin: Wastewater heat as a new energy resource

Summary

Berlin turns its focus on an underutilized and largely wasted resource, namely wastewater heat, a by-product of water use in domestic and industrial settings, and aims at utilizing its potential in order to contribute towards climate-neutral heating. In order to do so, the Pilot focuses on a dual strategy of (i) developing a technology for mapping the wastewater heat potential in substantial areas of Berlin, and (ii) promoting citizen awareness in order to significantly increase visibility of this promising technology. Therefore, the power of the Berlin Pilot application is in creating awareness for the technology itself, but also in creating a streamlined process of finding useful locations for installations, by analysing and matching data sources from both the supply side (where is the wastewater that contains the heat energy) and the demand side (where can the heat energy be used). Its long term vision is that wastewater heat is considered a valid option of circular heating systems by decision makers across European cities.

Stakeholders

The Berlin Pilot consists of a solid partnership between three main actors: (i) the Municipal Water Management Agency (BWB), the municipal water supply company in Berlin with access to the city's major water pipelines and associated data, (ii) the make and think tank "Prototypes for Europe", with project management and technology transfer experience, and (ii) two technology providers (Frauenhofer Fokus, MCS Data Labs), who specialize in applied research and ICT development. Once developed, the solution would directly involve, and depend upon, the active involvement of building owners and users, as future wastewater heat energy buyers.

Key infrastructuring actions

Strategic: At national level, Germany implements its Climate Action Plan 2020, that defines strategies for achieving the Paris Agreement objectives. Based on its Climate Action Law, Germany plans for Climate neutral Germany by 2045 onwards. Part of this plan is Berlin's Energy and Climate Protection Programme 2030 (BEK 2030) and its digital monitoring and information system (diBEK), a framework that reviews and monitors the effectiveness of measures of climate change adaptation. Based on these frameworks, the Berlin Pilot has developed a clear roadmap, that defined a strategic foundation around the technology development, and highlighted awareness raising, in an effort to wide-scale the approach.

Operational: The first and foremost key operational action has been to map wastewater potential. This is an ongoing process, as larger parts of the city are incorporated, and is intended to be replicated to other cities in the future, therefore enlarging the database. The main technological prototype developed (the Wastewater heat radar, and its Open Data Dashboard), is a mapping and match-making platform between suppliers and users. Throughout the process, efforts have been made to identify potential partners and stakeholders, as well as utility companies in other cities, therefore establish strategic partnerships that also enhance capacity building. Finally, a business model has been developed that would dig into new value creation, essentially turning

wastewater from a by-product into a useful resource. This involves the evaluation of financial incentives and the identification of monetary flows from considering wastewater heat infrastructure as a service.

Relational: A communication and awareness campaign was at the backbone of the project, as the success and future adoption of the technology largely depends on reverting the current lack of familiarity and scepticism about this new energy source. Therefore, an outreach campaign about wastewater heat has been developed that included a series of explanatory videos. The goal was to spread awareness and satisfy curiosity about this new technology, regarding its environmentally friendly status, but also as regards its potential to reduce energy costs for end users. A further 'relational' action was the fostering of links with other municipalities, and developing joint capacity building arrangements, so that in the future the technology is largely applied by the municipal water agency in Berlin, and similar agencies in other cities, thus scaling it up significantly. Future plans include the organization of focus groups with industry, and other municipalities, therefore elaborating a network for better outreach of the technology.

Outlook

The Berlin Pilot' approach focuses on wastewater heat - a topic that intersects society, economy, environment and data science. The main technological application is a dashboard that maps the potential supply and demand of wastewater heat, creating matches between suppliers and users. This web-based app is a major asset of the Berlin Pilot, as it goes beyond similar existing tools, by including the geographical dimension, thus not only assessing potential, but facilitating match-making.

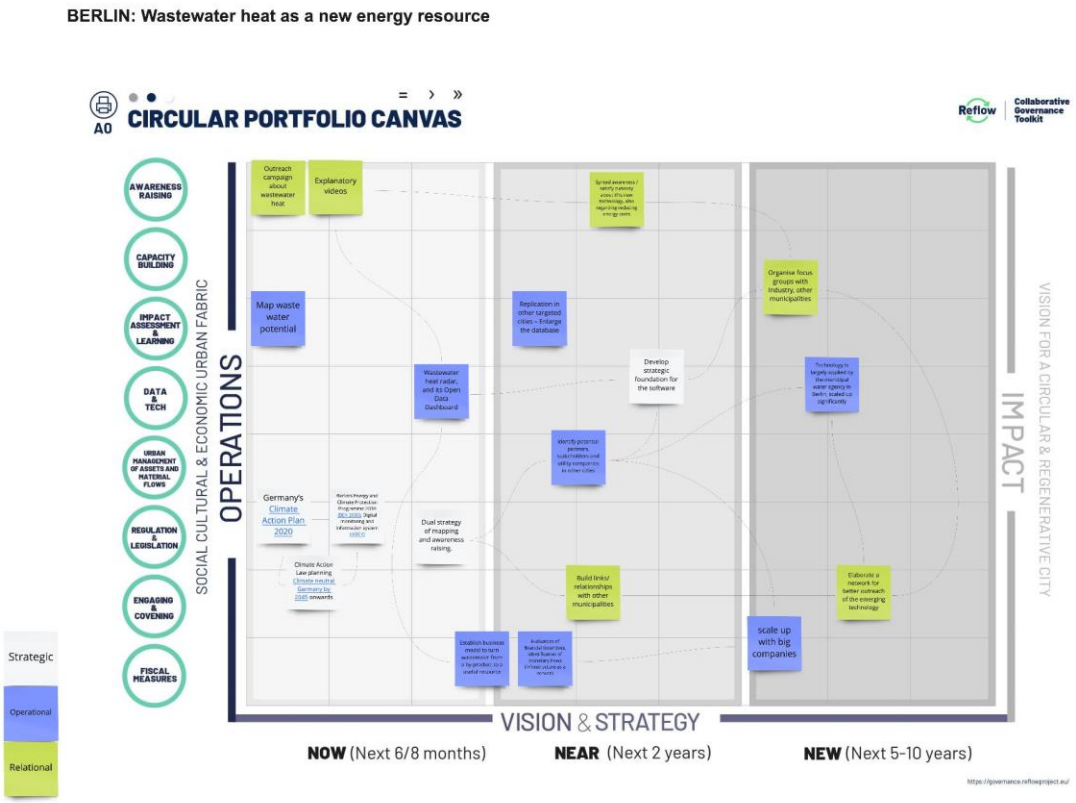
Since we are dealing with an emergent technology, its success implementation also depends on the willingness of end users and urban developers to consider it, not only as a viable heating alternative, but also as a strategy for reducing their heat costs, while simultaneously contributing to climate policies. Given that renewable energy is high on both the city and federal agenda, and citizens are largely favourably inclined to more environmentally friendly policies, wastewater heat has a great potential to scale up, especially if it brings about concurrent cost reductions, and this is communicated properly.

As a result, the development of the technology was complemented from the very beginning with a focus on awareness raising. Ultimate goal is to achieve a significantly higher recovery rate of wastewater heat (and concomitant reduction in CO_2 emissions) through communication campaigns, municipal procurement, and developing of a business case that would mainstream this unacknowledged energy resource. In addition, the Pilot has already been approached by large international energy companies interested in adopting the solution. This would not only magnify the Pilot's scope, but would also increase credibility for wastewater as a viable energy source.

Finally, an exciting dimension in the case of the Berlin Pilot and one of the main challenges for scaling up the proposed solution has to do with access, and therefore governance, of data. Access to a large database is needed in order to close the loop between energy availability and energy

demand. Yet, water supply in cities is usually a highly regulated or monopolized market, and this poses challenges as regards accessing the data. This requires working and cooperating closely with the industry (in particular water utility companies), but also property owners and urban developers. It also highlights the necessity to place data privacy and safety as a top priority, as transparency and protection of data is crucial for wide-scaling the solution. Following this line, the technologies developed in the project, based on REFLOW OS, enable the sharing of open data through a secure operating system that uses a selective sharing system partly utilising blockchain technology. This helps overcome accessibility barriers and enables the sharing of data, while respecting privacy.

Circular Portfolio Canvas 'snapshot'



Cluj-Napoca: Energy efficiency of buildings to support wider energy transition

Summary

The focus of the Cluj-Napoca Pilot is on energy use, and in particular on improving the energy efficiency of public buildings and residential homes. Throughout the project the Pilot combined an assessment of measures taken by the city towards energy efficiency of selected buildings, while mobilizing local actors to further advance and complement them with new ideas, in particular regarding the integration of renewable energy sources. A large part of the activities were targeting citizen awareness and education towards circular energy transition. Its long term vision is to significantly reduce energy consumption and increase energy efficiency, becoming energy neutral by 2050, and become a lighthouse city for sustainability transition at national and European level.

Stakeholders

Cluj-Napoca Pilot is comprised of a consortium of three main local actors from the public, business and research sector, namely the Municipality of Cluj-Napoca, ARIES Transilvania and INCDTIM, all of which are deeply committed in processes of innovative and sustainable development of the city. While this already covers a wide range of stakeholders in the energy efficiency ecosystem, the Pilot is constantly reaching out to connect with citizens, as well as academic and education institutions, in order to embed awareness and circular economy practices at all levels of society.

Key infrastructuring actions

Strategic: Energy transition stands as a core pillar of the strategic plan for Cluj-Napoca, with the overall goal of developing a secure, affordable and climate friendly energy system. The plan builds upon a series of national policy documents. The 'Energy Strategy of Romania 2019-2030' guides local and regional strategies with reference to energy consumption, focusing on energy security, sustainable development, and competitiveness. Moreover, the Integrated National Energy and Climate Change Plan (INECCP) 2021-2030 in Romania sets out operational policy objectives at the level of the EU, while the 'Energy Efficiency Directive (EED)' mandates a 30% improvement in energy efficiency by 2030. National legislation regarding the 'Energy Performance of Buildings' in particular regulate the framework for calculating energy performance and set requirements for energy certifications. Based on the above, the new 'Cluj-Napoca Energy Plan' targets energy neutrality by 2050, including reducing energy consumption and increasing efficiency through the development of circular solutions. Cluj-Napoca's Urban Innovation Unit (UIU) 'Mobility Pact' aims at improving the decision-making processes on urban mobility. Finally, as part of REFLOW, a 'Policy Proposals Package' has been developed, a series of recommendations aimed towards local authorities for strategies that integrate circularity and sustainability principles.

Operational: Initial activities included an impact analysis of energy use and energy production, as well as a city wide Energy Flow Analysis, complemented by a quantification of the renewable energy potential (including using noise and vibrations for energy regeneration). A study report on

energy consumption has been produced and an open database created. This will feed into the production of an 'Energy Map' showcasing promising areas within the city for the development of renewable energy production. The main technological asset within REFLOW has been the development of a 'Retrofit Kit' aiming at reducing energy consumption, that is combined out of five components (smart sockets, electric panels, motion sensors, lighting fixtures and a smart metering system). The Retrofit Kit has been procured and piloted in a school dormitory, while methods to finance its installation in more public buildings are currently assessed. In addition, the concept of an 'Green Energy Tree' has been developed, a mechanical model of a tree that can produce energy from renewable sources and provide energy for different usages, in order to raise awareness, while providing key services.

Relational: The city of Cluj-Napoca has been open to the development of partnerships with both industry and civil society. The Center for Imagination and Civic Innovation (CIIC), stands out as a public-private collaboration that combines citizen engagement to advance a shared vision for sustainable urban development. In the context of REFLOW, surveys are planned to assess the qualitative and quantitative performance of retrofitting (by the users of the buildings); the results, together with a promotional package for the Retrofit Kit, will be used to raise awareness among citizens of Cluj-Napoca about circular economy. Moreover, technical training will be provided to users of retrofitted buildings, with the use of a monitoring app. Specific actions have been proposed regarding capacity building: A Master of Arts (M.A.) Course on Circular Economy has been developed, directly utilizing information from the REFLOW knowledge hub. Moreover, an 'Educational Kit' for schools has been prepared incorporating circular economy principles into the curriculum, as well as a 'Circularity Kit for the classroom'.

Outlook

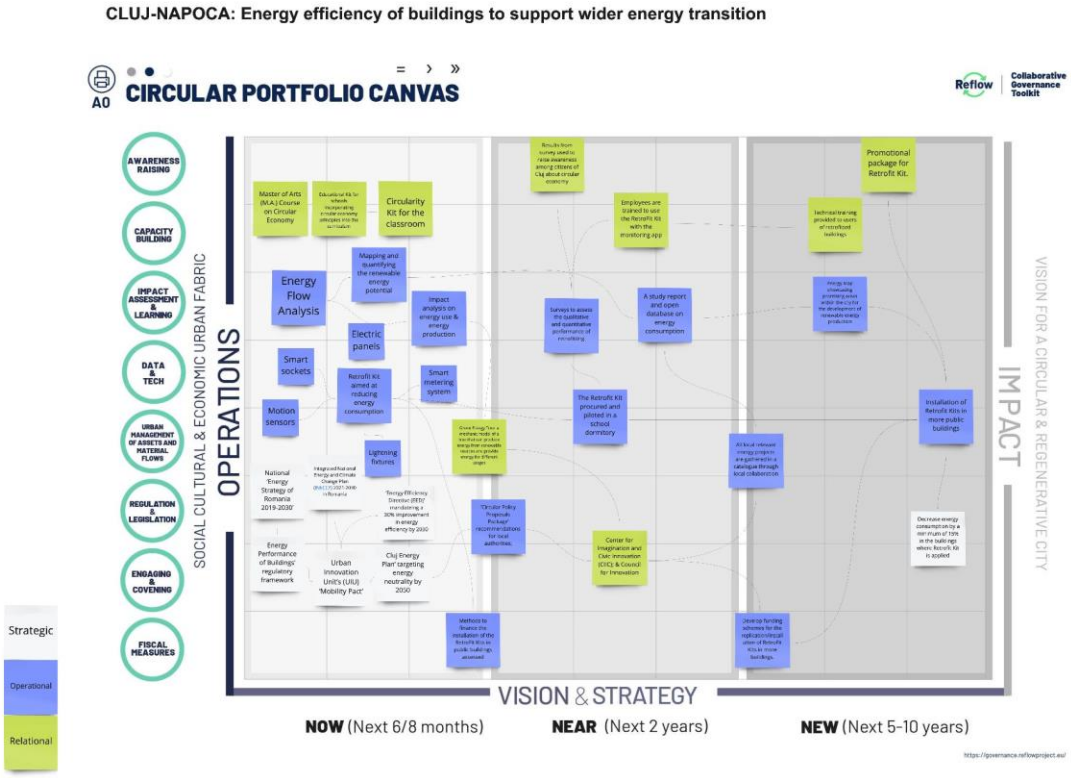
Cluj-Napoca is amongst the most dynamic cities in Romania, with a vibrant ecosystem of innovative institutions, businesses, universities and start-ups. The city is on its way to becoming a cultural and creative hub of Europe, attracting industries, creative communities and grassroots initiatives in the field of sustainability. All these aspects have the potential to assist Cluj-Napoca to effectively steer its transition towards energy efficiency, using circular principles and approaches, thus magnifying opportunities for long term and systemic impact. Embracing a circular-led energy transition through creative and collaborative ecosystems of innovation can unlock employment opportunities, while multi-stakeholder engagement can generate new forms of collaborative governance rooted in public-private-people alliances that can in turn help better utilize the potential of social capital, and reinforce democratic institutions.

Cluj-Napoca's Pilot within REFLOW could capitalize on the city's innovative approach to energy transition, centred around multi-stakeholder partnerships, and aimed at further unlocking potentials to a local green and resilient economy, through triggering integrated policy-making in relation to its energy system. Throughout the project, strategies and tools have been proposed that support the goal of circular energy transition. Beyond REFLOW, a circular approach to the city's energy transition can drive synergies across multiple levels in the urban environment, which in turn can unleash a series of environmental, social and economic co-benefits contributing to an improved quality of life for its citizens (see the report on energy transition).

More particular, regarding the Retrofit Kit replication, the intention is to install more units in multiple public buildings in Cluj-Napoca. A planned series of discussions between the users of the buildings and the municipality aims to raise awareness about monitoring energy savings. This will lead to the creation of a visualization app to give an overview of energy consumption across the buildings, hence communicating the impacts achieved, while enabling more focused interventions for extending energy savings. The tangible goal is to decrease energy consumption by a minimum of 15% in the buildings where the kit is applied within the first year of installation. The development of funding schemes for the replication/installation of Retrofit Kits in more public buildings, based on demand from the municipality, will further improve energy efficiency goals.

The municipality of Cluj-Napoca has secured funding for projects targeting increased energy efficiency, promoting low carbon public transport, and citizen awareness activities. Moreover, an increasing number of organisations active in the field provide for a progressive social environment in support of sustainability, eco-friendliness, and responsible development that can further advance the developed technological and social capabilities, and provide a multiplier effect within Romania and beyond.

Circular Portfolio Canvas 'snapshot'



Milan: towards Circular Municipal Markets

Summary

The Milan Pilot focuses on transitioning its urban food system towards greater circularity, by tracking food flows across the city, in particular looking at the flows going through Milan's main food wholesale Market, SoGeMi, and the city's 23 covered municipal markets. It focuses on circular food innovations, supports projects that would utilize food waste turning it into new products, and enables initiatives that focus on reducing food waste at the wholesale and market stage. Its long-term vision is to eliminate food waste and deploy "Farm-to-Fork" food traceability in Milan, from local producers, via SoGeMi and the municipal covered markets, all the way to the consumers.

Stakeholders

The Municipality of Milan has been a key driving force behind the envisioned transition. Moreover, the involvement of market actors both large (the main food wholesaler SoGeMi), and small (municipal covered markets, and market vendors) was crucial for wide-scaling the proposed experiments. Other key stakeholders prominently include a network of fab labs, that include Polifactory, WeMake, Open Dot, Ibrida beer as well as s series of NGOs, like Recup, as well as the Italian Red Cross.

Key infrastructuring actions

Strategic: A key action here has been the incorporation of a solid policy framework, as exemplified by Food Policy Milano, one of the leading policies in Europe, that the Municipality of Milan has been actively supporting. At a local level an important element was the commitment to a shared narrative, facilitated by a series of visioning workshops within markets. Further steps included a wide-scaling approach of networking and pooling expert designers and makers (Polifactory-Politecnico di Milano, OpenDot and WeMake in Manifattura Milano), local associations, and start-ups (Ibrida and Recup).

Operational: When it comes to the operational framework, a first necessary step was the exhaustive assessment and mapping of food flows. An important contribution of the Milan Pilot involved the testing of new tech prototypes that would promote the better tracking of food flows (namely, the *Foody zero waste* automated communication system, the *Food Market 4.0* tracking dashboard, and the *Prima Seconda* matchmaking platform). All of them utilized the enabling technology of REFLOW OS that allows actors in the system of municipal markets to have access to data and information on food flows, and thus facilitate product traceability and reduce waste by increasing the potential to recover and/or recycle unsold food. As regards regulatory actions, we must refer to the Municipality's intention to establish requirements for managing the markets (such as circular tenders for markets). This goes hand in hand with developing an economic plan for each market and leverage financial incentives, such as a tax reduction for wholesalers that donate food surplus.

Relational: First, we must refer to a series of capacity building actions, such as co-creation workshops with municipal markets, as well as digital training for distributors, in order to achieve a better incorporation and utilization of the tech prototypes developed. Moreover, regarding increased engagement with the public, important was the sharing and open discussion of the outcomes of small scale experiments. Finally, piloting with a small group of dedicated operators also highlighted the links and challenges that would be needed regarding training and financing.

Outlook

The Milan Pilot has been strong in strategic planning and visioning and, through a committed involvement of a network of research partners and fab labs has achieved a significant advancement of technological capabilities. In this, the municipality acts as facilitator and enabler of several initiatives. At the moment there is a strong basis of a governance model that combines a clear vision with the development of innovative technologies. The Milan Food Policy provides a clear roadmap that can form the basis of a municipal circular food strategy. Moreover, with the involvement of "SoGeMi" there is potential to build a strong business case. In the future, a stronger focus on relational elements, such as capacity building, as well as developing a clear multi-stakeholder partnership between wholesalers, markets and NGOs, can help scaling up the individual solutions.

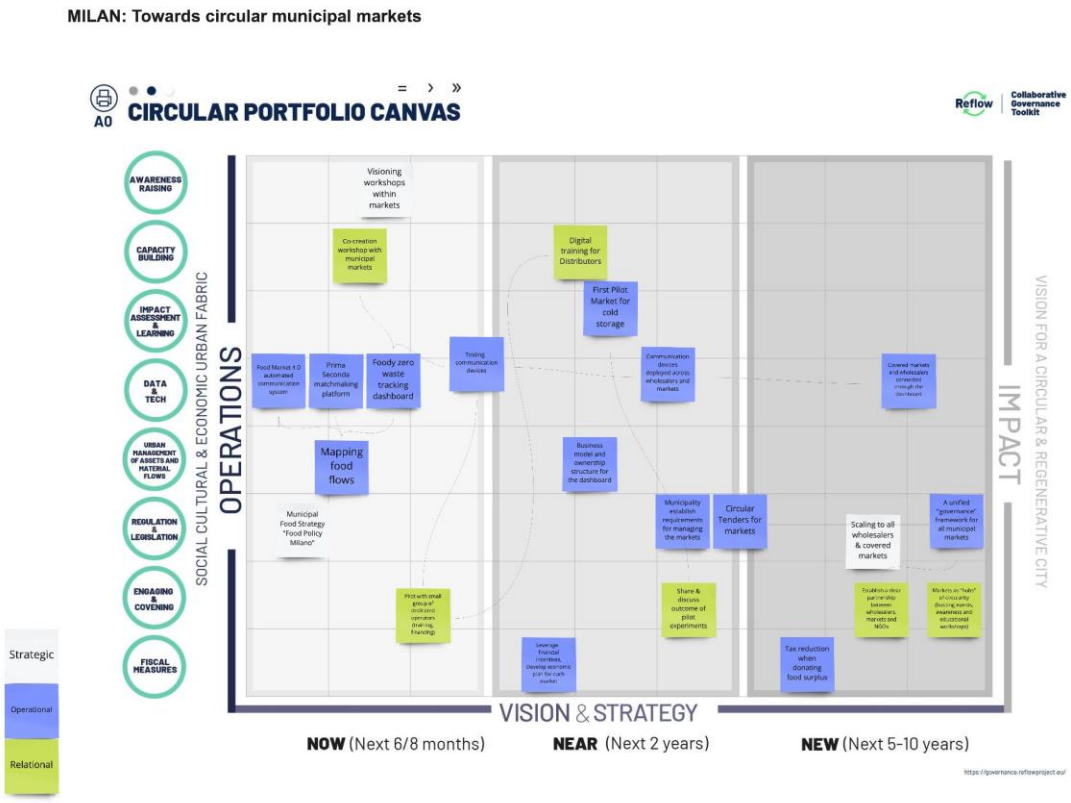
On the technological side, the next steps would be the gradual deployment of prototypes (such as the tracking of communication devices) across wholesalers and markets, with the final goal being the connection of covered markets and wholesalers through the dashboard. Linking individual solutions with the city level can increase their replicability and upscaling. For example, the Foody Zero Waste automated communication system (BOTTO), developed within the SoGeMi market, for some wholesalers, RECUP and the Italian Red Cross, could be tested in the future also within the covered municipal markets. This can be done by proposing a tender to the future manager of the market to test a potential solution that can track-and-trace food leftovers.

A complementary suggestion, that also portrays collaborative governance, could be opening up the prototyping process to include civic actors, leveraging the city's vibrant maker culture. For instance, the designs of the devices could be shared (e.g. under commons-based licences) and smaller actors could experiment with customised solutions, with the support of experts in makerspaces. Defining shared open standards for the devices to operate would improve interoperability and the viability of the system as a whole, avoiding single-points of failure. From a governance perspective, this will create opportunities for broader and more inclusive city level collaborations and increase resilience in a vital system, such as food distribution.

Finally, further development of a business model and ownership structure for the 'Food Market 4.0' dashboard, would lead to a unified governance framework for all municipal markets. This can potentially gradually turn markets into hubs of circularity, where a series of activities, such as hosting events, awareness and educational workshops, can take place. This invites us, more broadly, to look beyond traditional stakeholder identities (such as that of producers and consumers) and imagine new roles, such as the prosumer, the enabler, or the matchmaker. Under this lens, the Municipality, rather than a pure regulator, can be seen as a 'facilitator' responsible

for maintaining a healthy and vibrant ‘platform’ of food flows in the city. In such a system, resources such as physical spaces, equipment and facilities, but also intangible assets such as information flows and knowledge, are more efficiently shared, reducing overall cost, and promoting circularity.

Circular Portfolio Canvas ‘snapshot’



Paris: Towards an improved, circular regulatory framework for wood and timber in the temporary construction sector

Summary

The Paris Pilot in REFLOW focuses on improving the event and temporary construction sector, by increasing circularity of timber and wood flows. Utilising its own start-up studio and incubator the Pilot consortium develops a series of digital tracking and scanning tools that intend to identify and quantify material flows of timber, so that those can be then monitored and integrated back into the manufacturing processes. This facilitates reuse, and extends the life cycle of the materials, therefore accelerating the transition to circularity. The development of robust business models around the digital tracking tools further supports the adoption of circular protocols within the event industry. At the heart of the Pilot's activities is an alignment between the development of technological innovations and the articulation of strategic planning targeted at higher institutional levels, in order to contribute to a new and improved waste regulatory framework. The Pilot's vision is a city with a culture of truly circular events and circular temporary constructions.

Stakeholders

The Paris Pilot comprises a multidisciplinary team, orchestrated by urban innovators and makers under the association Fab City Grand Paris, the creative hub Volumes, and the associative design agency Ars Longa. Political actors include the City of Paris, thus adding up to the potential of effectively implementing and scaling up the prototypes developed. Other actors that have been involved in the process include temporary structures actors and innovative project developers (as future 'waste generators' and 'waste users' respectively), as well as logistical actors, wood designers and reuse resource centres.

Key infrastructuring actions

Strategic: Following the French Energy and Climate Law, the new French Environmental Regulation 'RE2020' aims for carbon neutrality by 2050, and –among others– regulates the carbon impact of the construction sector. Moreover, both the 'Charter of 15 environmentally responsible commitments', and the 'Grenelle Environnement' an action plan to tackle environmental challenges and to pursue sustainable development in France, specifically cover the use of timber in construction. Adding to those, the city of Paris in particular has developed the Strategy 'Paris: Smart and Sustainable', as well as a 'Circular Economy Plan' that promotes open partnership-based forms of governance, that includes a practical guide to foster circularity within cultural spaces and institutions. Meanwhile, the 'Charter of eco-responsible events', also established by the City of Paris, aims to guide event organisers in managing and dismantling events in an eco-responsible manner.

Operational: Initial activities involved an inventory of wood workshops and wood waste in Paris, as well as the mapping of wood material flows at a city level. This initial baseline analysis paved the way for the development of a series of digital tools that included: the 'Dimension-use', a semi-

automated scanner and online database/digital inventory for timber and wood that feeds an online database using the REFLOW OS technology, and ‘Re-Stock’ a toolkit that intends to support and organize resource centers' actions. These tracking systems aim at creating new standards and help enrich existing databases, and in the future will be implemented at event scale. A further development is the ‘Re-label’ certification, a platform that offers tools and services to local makers to better valorize their work. Finally, “REFLOW Paris SAS” provides a holistic product-service system that allows event organisers to reuse and recycle their waste wood.

Relational: An initial focus group has been facilitated by the municipality of Paris, in order to identify key challenges and potential solutions to implement circular actions in the cultural sector. At the same time this was a way to start raising awareness in the marketplace. In the future, targeted workshops with actors from the cultural sector will present and discuss circular economy principles and ways to materialize them. Moreover, ‘Re-label’ will be promoted through events and tenders, with the intention to further increase the awareness and motivation for customers to buy Re-label products. A main vehicle to promote capacity building actions has been the ‘Driven’ incubator start-up studio which ideates, validates, and develops technological innovations for the construction sector.

Outlook

The vision and scope of the Paris Pilot is that the tracking systems prototyped within REFLOW, as well as the associated material passports, will be gradually implemented across different events. The building of large databases of open source but securely stored data enables the sharing of assets and facilitates visibility and repurposing of otherwise unutilized products. Similarly, using the gradual adoption or Re-label certification, the waste produced will be reduced and better valorized, as new products will be created, reused, and repurposed along the way.

The Paris Pilot focuses on the development of technological solutions that would improve logistics, but at the same time recognizes that these need to be complemented with circular business models, and reinforced by a common narrative, formalized in a clear roadmap, that provides appropriate regulations towards a circular transition. A further step is the creation of a mandate for event organisers and exhibitors to share information on materials used. As more major events in Paris adopt the protocols developed, and more communities in France utilize Re-label, partnerships can then be developed with waste collectors for better sorting and collection at events.

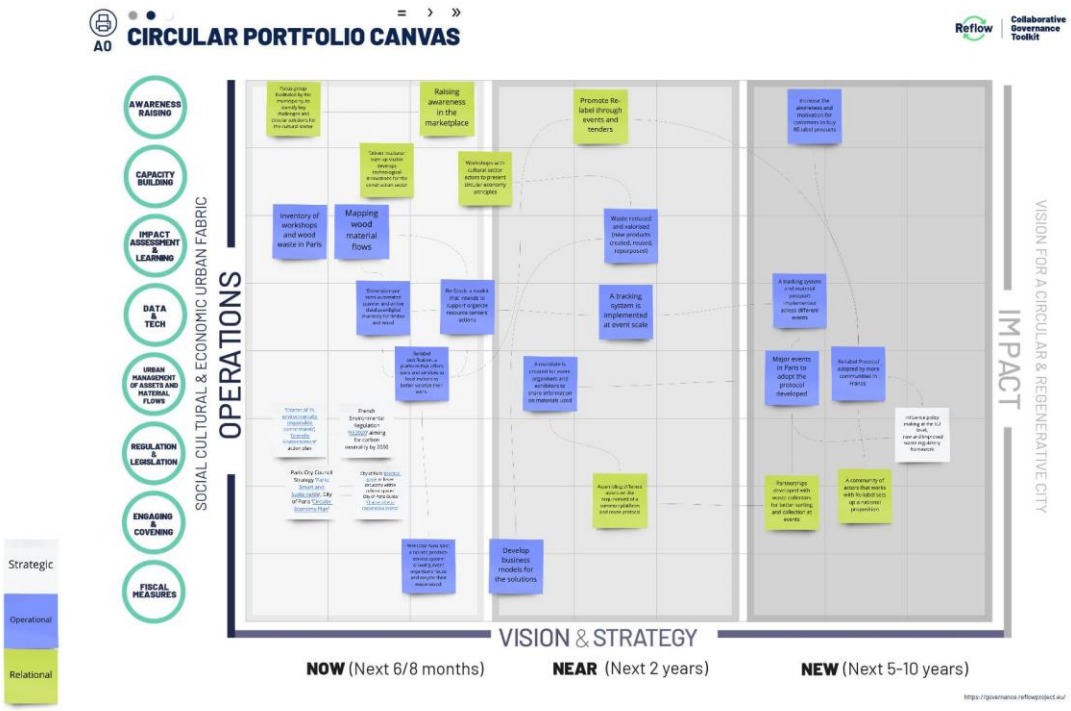
There is high potential to unleash collective action through multi-stakeholder collaboration in the future. Assembling different actors on the requirement of a common platform and reuse protocol can lead to the establishment of a community of actors working with Re-label, thus setting up a national proposition. Ultimate long-term goal of the Pilot is to help in influencing policy making at the EU level and contribute to the development of a new and improved regulatory framework for waste.

The Paris Pilot activities also hinted into different directions of generative collaborative governance. When more actors, makers and designers, are part of the process, a more inclusive

decision making is achieved. Moreover, as experience from the ‘Driven’ studio showcases, participation can be rewarded in different ways, and include extra benefits such as knowledge exchange.

Circular Portfolio Canvas ‘snapshot’

PARIS: Proposing a circular regulatory framework for wood and timber in the temporary construction sector



Vejle: Enabling Circular Plastic Flows

Summary

The Vejle Pilot focuses on plastics and aims to substantially increase the circularity of the city's plastic value chains. It mainly works in three micro-scale test sites in the Western neighborhood of the city (Vestbyen), that include: A retail store in the supermarket chain REMA 1000, the public housing block Den Gamle Gård, and the public elderly home Sofiegården. Some of the main targets in these areas are a reduction of plastic packaging, and a renewed sorting system, as well as a better sorting of waste. Strong emphasis is given to public policies and the active engagement of citizens in being part of change locally. Through targeted experimentation, workshops, and public engagement activities the aim was to showcase solutions for increased plastic reuse and recycling. The Pilot's ultimate vision is to create new circular plastic streams of specific plastic packaging, and eventually to eliminate single use packaging in all major food retailers in Denmark. Moreover, to easily identify and separate for recycling all plastic products that are deemed necessary in healthcare facilities in Vejle, via circular procurement policies and practices that gradually phase out PVC-containing products.

Stakeholders

Public stakeholders include the Danish Environmental Protection Agency, the Innovation and Entrepreneurship and Waste and Environmental departments of the Municipality of Vejle, as well as Sofiegården - an elderly care center. Moreover, the local politicians have been involved in the project - both in a local steering group committee as well as the supportive political committee KNMU (Climate, Nature and Environment Committee). The supermarket chain REMA1000 is the main actor on behalf of the industry, also represented by 'Aage Vestergaard Larsen' recycling company and 'AAB' housing association. Moreover, there is strong involvement by community actors, such as residents of the public housing block Den Gamle Gård, and the local citizen committee of West of Vejle, and civil society more generally, through the "Danish Design Centre", and the fablab in the innovation house: Spinderihallerne. Research institutions, such as Materiom, complete this diverse constellation of actors.

Key infrastructuring actions

Strategic: Vejle has built its activities around a narrative of "Circular Plastic City", with focus on supermarkets and healthcare, and a strategy aiming at testing in multiple micro-sites. This is squarely based within the Danish Government's "Strategy for Circular Economy", as articulated in the (clear, yet flexible) "Action Plan for Circular Economy", and more particularly the National Plastics Action Plan "Plastics without waste". Focusing on a single supermarket chain (REMA 1000) has a clear potential of scaling up the envisioned plastic sorting system to all affiliated stores in Denmark, then across other food retailers in the country. These activities are also connected to the development of the Municipality of Vejle's Local Climate Plan for 2020 to 2050 - Vejle Klimaplan, that highlights circular/green procurement policies.

Operational: An initial baseline assessment was necessary in order to assess plastic streams. Moreover, an analysis of REMA 1000 plastic waste allowed the Pilot to identify "critical products" and causes of lack of recycling, while research on bio-materials identified potentially suitable alternatives. Actions related to a better understanding of technological capabilities included the development of recycling bin packages, an experiment with a better sorting system for small apartments, and the testing of an optimized sorting system for food retailers that reduces plastic use. In addition, a series of workshops focused on the development of biomaterial (bio-plastic), while a new business case was developed for food packaging at REMA1000 stores. In cooperation with the Purchasing Department in Vejle Municipality, the Pilot is currently working on developing circular tenders, as well as integrating new methods and tools to ensure more circular purchases.

Relational: Communication and awareness activities have been a cornerstone of Vejle's approach. Especially, the two exhibitions in Spinderihallerne as well as several workshops organized there have contributed to the involvement of local stakeholders and citizens as well as to an increased awareness for the participants of the exhibitions and workshops. Furthermore, the Wild Studio was devoted to making decorative consumer goods out of recycled plastic, while the development of a "Value Chain Mapping Game", a physical tool linked with REFLOW OS, showcases value chain plastic flows in retail. Further capacity building actions included the development of education materials for primary schools (see: http://mindthefuture.dk/). Moreover, there were efforts to unleash collective action through the Mobile Sorting Unit at the public elderly home Sofiegården, an action with clear links to business cases.

Outlook

The Vejle Pilot has based their work on a series of well-grounded long-term targets for circular plastics. It is fortunate to be guided by an engaged municipality that focuses on advancing regulatory measures towards circularity, as well as on promoting and strengthening citizen awareness. There is potential to further advance an effective utilization of technological capabilities, and can further capitalize from the formation of multi-level partnerships. An example of such a strategic partnership is the eventual sharing of a protocol between REMA 1000 stores in collaboration with Municipalities for plastic waste management that, once successful, has the potential to be scaled up to all food retailers in Denmark.

Vejle can use the current momentum that has been created by a series of regulations at the EU level, in combination with a favorable local administration and increasing public awareness, to further advance circular procurement policies for the city. One way to achieve this is through a collaborative effort between procurement departments for an open innovation challenge to replace products that will run out in a few years and should be replaced.

In circular procurement, procurement staff will look for ways to manage the lifetime extension and reuse of the product, and to manage closing the cycle when the product has reached the end-of-life stage, by applying 'product-as-a-service', leasing, or buy-back agreements. Essentially all these models encourage alternative revenue/business models for suppliers, by basing the call for tenders on functionality, and re-inventing the concept of 'ownership' towards more distributed

forms where assets are shared rather than owned. In such a model, products after use are not considered waste but instead represent a certain (residual) value either through reuse or recycling. This value should be reflected as an explicit part of the revenue model and the quoted price.

Finally, stronger links can be made for utilising tech solutions, such as prototypes for sorting of waste and producing bio-plastic materials, as well as a procurement software with integrated scoring system that can enable municipal and regional departments to select best packaging options. All in all, many small scale experiments have been performed, shifting the future challenge in finding creative ways of systematizing generated knowledge for scaling up the performed experiments, in direct collaboration with the municipality.

Circular Portfolio Canvas 'snapshot'