



Co-Creating Circular
Resource Flows in Cities

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

Deliverable 1.5

PROJECT IMPACT ASSESSMENT

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D1.5 Project Impact Assessment

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Author(s)	Erika Hayashi, Cristiana Parisi
Point of Contact	Cristiana Parisi (cp.om@cbs.dk)
Reviewers	Ann Louise Slot (VEJLE), Signe Jul Kirkegaard-Larsen (VEJLE), Constantino Bongiorno (WEMAKE)
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Abstract (for public dissemination only)	Deliverable 1.5 – Project Impact Assessment presents the quantitative and qualitative assessment of the social and economic impact of the Circular Economy practices implemented within the REFLOW project’s pilot cities. The deliverable reports on impact across three phases: (i) exploring and describing



	<p>change, (ii) evidencing and measuring change, and (iii) valuing and monetizing change which are presented in the deliverable's three respective chapters: (i) Theory of Change, (ii) Key Performance Indicators, and (iii) Social Return on Investment. Firstly, this deliverable provides the final iteration of the pilot cities' Theory of Change, including their accompanying narratives. Secondly, the achieved results of the pilot cities' socio-economic and environmental Key Performance Indicators are reported. The deliverable closes off with presenting the Social Return on Investments for the pilot cities at the level of a pilot solution. The results and outcomes from this deliverable provide the pathways to change, the social, economic, and environmental indicators to measure and evidence change, and the social value creation of circular economy practices implemented within the REFLOW pilot cities which support the business case for adoption of circular economy strategies by other European cities.</p>
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Abbreviations

API	Application Programming Interface
ApS	Anpartsselskab (DK)
B2B	Business to Business
CE	Circular Economy
CO₂-eq	Carbon dioxide equivalent
FoW	Future of Work
GUI	Graphical User Interface
KPI	Key Performance Indicator
kW	Kilowatts
kWh	Kilowatt hour
LED	Light-emitting diode
MA	Master of Arts
MFA	Material Flow Analysis
MFP	Milan Food Policy
MRA	Metropolitan Region Amsterdam
MW	Megawatt
MWh	Megawatt hour
NGO	Non-governmental organisation
ODD	Open Data Dashboard
PE	Polyethylene
PET	Polyethylene terephthalate
PFAS	Per- and polyfluoroalkyl substances
PP	Polypropylene
PR	Public Relations



RFID	Radio Frequency Identification
ROI	Return on Investment
SaS	Société par actions Simplifiée (FR)
SDG	Sustainable Development Goal
SME	Small Medium Enterprise
SoMe	Social Media
SROI	Social Return on Investment
TCIC	Transylvania Clusters International Conference
Toc	Theory of Change
UHMWPE	Ultra-high-molecular-weight polyethylene



Glossary

Attribution

Attribution gauges how much of the outcome that was experienced by the stakeholders was caused by the contributions from other organisations or people (Nicholls et al., 2012). Through assessing the attribution, the shared value that has been created and shared across other organisations will be accounted for. This allows for the pinpointing of only the returns that were generated by the organisation carrying out the intervention itself to be included in the SROI calculation (Nicholls et al., 2012).

Circular Economy

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.

Deadweight

Deadweight involves the amount of outcome that would have already taken place had the activity being analysed not been carried out (Nicholls et al., 2012). In this way, deadweight can account for the social impact that would have been otherwise created, without the effects of the intervention. Deadweight is calculated through analysing available baseline data which gives a picture of this social benefit that would have anyways occurred and deducting this from the outcomes linked to the actual intervention (Nicholls et al., 2012).

Displacement

Displacement assesses the outcomes from the intervention being analysed and how much they have displaced other outcomes (Nicholls et al., 2012). In practice, this involves understanding how positive outcomes that are experienced by certain stakeholders can be offset by negative outcomes for others (Nicholls et al., 2012).

Drop-Off

Drop-off looks at the deterioration of an outcome over time (Nicholls et al., 2012). In other words, it looks at the outcome's lifespan if it is not



continued. Drop-off is assessed through the use of benchmarking information or evidence from research (Nicholls et al., 2012).

Impact

Within SROI, impact refers to the outcomes that were achieved through the activity (Nicholls et al., 2012). Impact considers what would have happened regardless of the organisation's intervention, the contribution of others outside the organisation, and how long the outcomes last (Nicholls et al., 2012). Thus, deadweight, drop-off, attribution or displacement are considered.

Key Performance Indicators

Key performance indicators (KPIs) refer to a set of quantifiable measurements used to gauge overall long-term performance. KPIs are used not only to measure economic benefits (e.g., value creation and savings by reducing the purchase of primary raw materials), but also environmental benefits (e.g., impact reduction), and social benefits (e.g., job creation).

Open Data Dashboard

An online platform that will enable pilots to publish, visualize and enrich their data as open data. It provides a possibility to find published datasets, publish own data, register important datasets already published by third parties, download data or visualize data. These published visualisations can be combined in a dashboard view. It provides access to open data circulated/generated in REFLOW that can be used both by humans (GUI) and machines (API).

Outcome

Within SROI, outcomes refer to the changes that occur as a result of an activity (Nicholls et al., 2012). Outcomes can be both positive and negative, and both intended and unintended.

Proxy

A proxy seeks to attach an approximate value where an exact measure cannot be obtained (Nicholls et al., 2012). In practice, a proxy financialises an outcome within the SROI which does not traditionally have a financial value associated with it (Nicholls et al., 2012).

REFLOW Framework

The result of the processes and activities implemented throughout the second year of the REFLOW project. In this sense, it continues and further develops the work dedicated to the definition of the REFLOW Methodology, in the form of the REFLOW Vision, REFLOW Process and



REFLOW Resources, to enable the pilot cities' transitions towards a circular economy.

Social Return on Investment

Social Return on Investment (SROI) is a framework for measuring and account for a broader concept of value; it seeks to reduce inequality and environmental degradation and improve wellbeing by incorporating social, environmental, and economic costs and benefits. SROI measures change in ways that are relevant to the people or organisations that experience or contribute to it. It tells the story of how change is being created by measuring social, environmental and economic outcomes and uses monetary values to represent them. This enables a ratio of benefits to costs to be calculated. SROI is about value, rather than money. (Nicholls et al., 2012, p. 8).

Stakeholder

A group, organization, member, individual or system that affects or can be affected by an organization's actions

Theory of Change

Theory of Change is used in REFLOW as a baseline for common understanding in the project. The methodology links activities, outputs, and outcomes by describing the pathway of change through which the REFLOW pilot cities and the project itself expect to generate desired impact.

Consortium Members

No	Name	Short name	Country
1	COPENHAGEN BUSINESS SCHOOL	CBS	Denmark
2	INSTITUT D'ARQUITECTURA AVANÇADA DE CATALUNYA	IAAC	Spain
3	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	FRAUNHOFER	Germany
4	POLITECNICO DI MILANO	POLIMI	Italy
5	STICHTING DYNE. ORG	DYNE	Netherlands
6	STICHTING METABOLIC INSTITUTE	METABOLIC	Netherlands
7	MATERIOM LIMITED	MATERIOM	United Kingdom
8	MOUZAN ERWAN	ECOVALA	Finland
9	ORGANODI GIA TIN ERVNA TIN TEKMIRIOSI KAI TIN PROOTHISI TON OMOTIMON PRAKTIKON	P2P	Greece
10	STICHTING WAAG SOCIETY	WAAG	Netherlands
11	GEMEENTE AMSTERDAM	AMS	Netherlands
12	STICHTING PAKHUIS DE ZWIJGER	PDZ	Netherlands
13	BRINKS MANAGEMENT ADVICE/ TECHNE B.V	BMA	Netherlands
14	AGILE HEAP EV (PROTOTYPES FOR EUROPE)	AH (PROT)	Germany
15	MCS DATALABS	MCS	Germany
16	COMUNE DI MILANO	MILAN	Italy
17	WEMAKE S.R.L.	WMK	Italy
18	OPENDOT SRL	OD	Italy
19	FAB CITY GRAND PARIS	FCGP	France
20	COMMUNE DE PARIS	PARIS	France
21	ARS LONGA	ARSL	France
22	VOLUMES	VOL	France
23	VEJLE KOMMUNE	VEJLE	Denmark



24	DANSK DESIGN CENTER APS	DDC	Denmark
25	MUNICIPUL CLUJ-NAPOCA	CLUJ	Romania
26	FILIALA TRANSILVANIA A ASOCIATIEI ROMANE PENTRU INDUSTRIA ELECTRONICA SI DE SOFTWARE	ARIES	Romania
27	INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE PENTRU TEHNOLOGII IZOTOPICE SI MOLECULARE-INC DTIM CLUJ-NAPOCA	ITIM	Romania
28	BERLIN WASSERBETRIEBE	BWB	Germany



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 used Fab Labs and makerspaces as catalysers of a systemic change in urban and peri-urban environments, which enable, visualise and regulate “four freedoms”: free movement of materials, people, (technological) knowledge and commons, in order to reduce materials consumption, maximise 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 created new CE business models within six pilot cities: Amsterdam, Berlin, Cluj-Napoca, Milan, Paris and Vejle and assessed 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 the Deliverable

Deliverable 1.5 Project Impact Assessment presents the social and economic impact of the circular economy practices implemented within the pilot cities to support the business case for adoption of circular economy strategies by other European cities. The deliverable presents the work carried out as part of Task 1.6 Project Impact Assessment which has entailed the following processes of (1) exploring and describing change; (2) evidencing and measuring change; (3) and valuing and monetising change. These three components are presented in the deliverable across three respective chapters: The Theory of Change, Key Performance Indicators, and the Social Return on Investment.



1.4 Connection to the REFLOW Framework

With respect to the REFLOW Framework which has been described in D1.3 The REFLOW Framework, the task of project impact assessment touches upon all levels of the REFLOW Framework, moving from the micro to the macro levels. D1.5 Project Impact Assessment structures the work of this task in a way which starts at the macro-level where the desired impact that each of the pilot cities' have strived for during REFLOW is presented. From there, the pilot cities' performance towards reaching impact towards a circular and regenerative society is reported across their achieved results. Finally, the deliverable presents an analysis of the return on societal investments in circular economy practices at the level of the product and tech innovations (connected to D5.4).

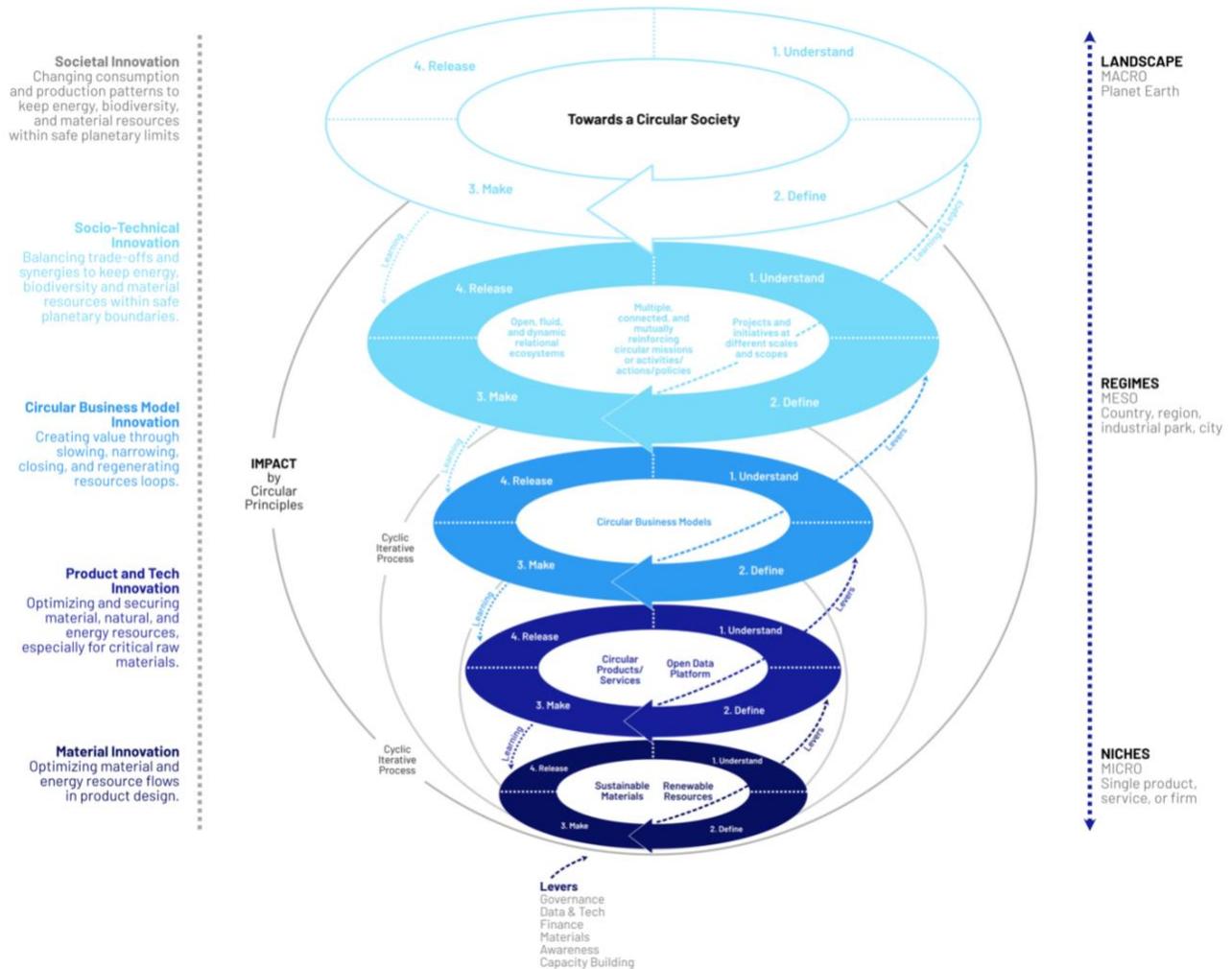


Figure 1: The REFLOW Framework



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

With consideration for the circular economy levers which are activated by the project impact assessment task, *Strategic* levers have been quintessential. This has included the visioning and roadmaps, strategies, and action plans levers, where, throughout the lifetime of REFLOW, the pilot cities have worked to draw out their Theory of Change across several iterations. Baseline assessment has also been activated across the tasks within WP1 leading up to the final project impact assessment. Understanding the current state of the pilot cities’ systems has been an important step in developing their action plans where pilot cities had set out to identify the challenges within their contexts as a starting point, and the desired impact they wanted to create. The social, environmental, and economic impact assessment and learning lever has also been a crucial circular economy lever activated during the process of KPI calibration and monitoring progress towards impact.

1.5 Connections to Other REFLOW Deliverables

Deliverable 1.5 Project Impact Assessments is vastly connected across the other REFLOW deliverables, both by building upon the work that has been undertaken throughout the life of the project, but also linked to final deliverables that have been presented at the end of the project. Above all, this deliverable has strong ties to D3.3 Urban Metabolism Strategy Final Report where the environmental impact assessment is presented, while D1.5 Project Impact Assessment focuses on the social and economic impact.

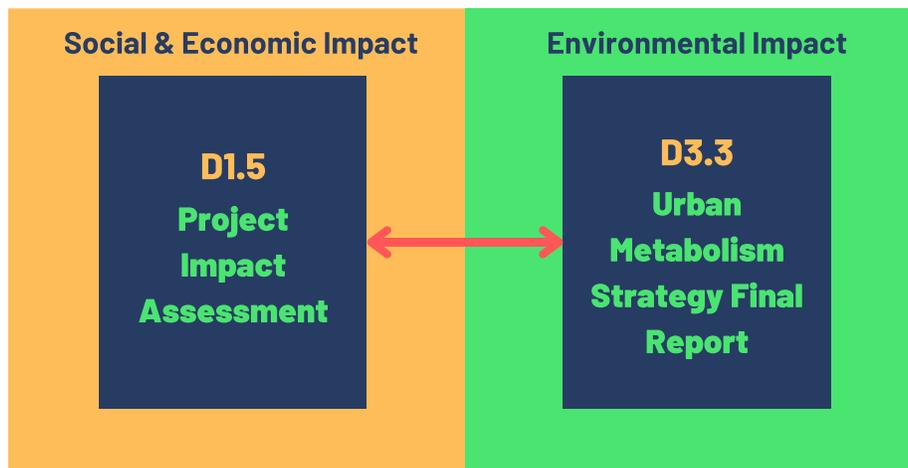


Figure 2: Connections to other REFLOW Deliverables (D1.5 and D3.3).

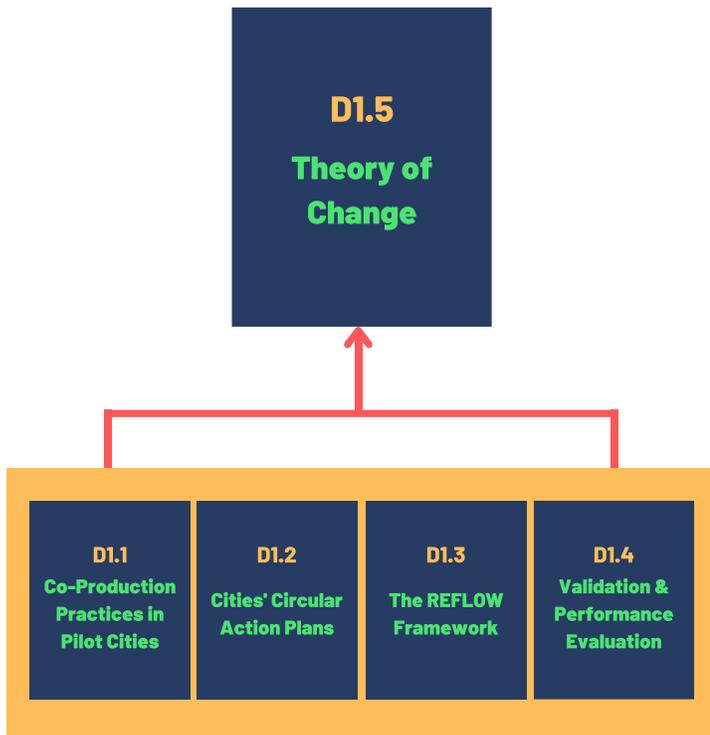


Figure 3: Theory of Change chapter connections to other REFLOW deliverables.

The **Theory of Change**, which is presented in its final iteration within this deliverable, builds upon the work and outputs within the previous WP1 deliverables including D1.1, D1.2, D1.3, and D1.4. Moreover, the Theory of Change has been a central element across many other Work Package activities within the REFLOW project.

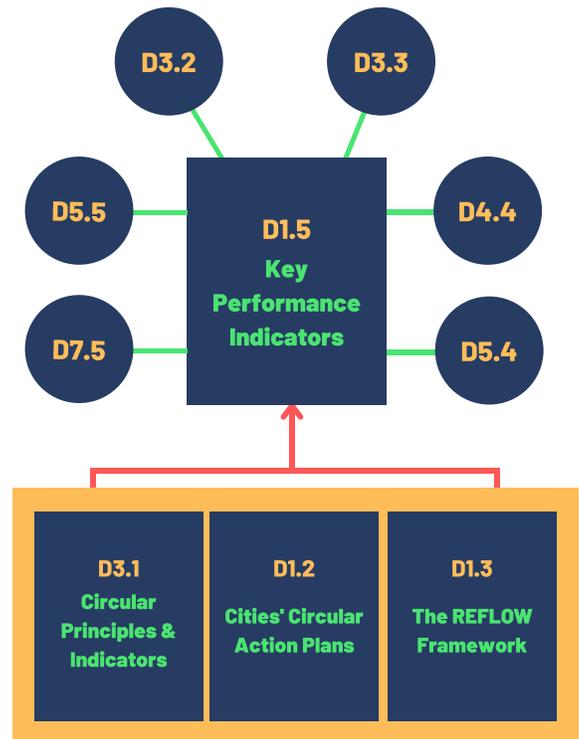


Figure 4: Key Performance Indicators chapter connections to other REFLOW deliverables

The establishment of the pilot cities' **Key Performance Indicators** have undergone a co-creative process in collaboration with WP1, WP3, and the pilot cities which has been presented in D3.1, D1.2, and D1.3 where the final list of KPIs was given. Based on this work, this deliverable reports the achieved results of the pilot cities' performance over the three-year timespan of the REFLOW project across all socio-economic and environmental KPIs. Further details on the achieved results of the KPIs are linked to other REFLOW deliverables including D3.2, D3.3, D4.4, D5.4, D5.5, and D7.5.



As mentioned in D5.3, this deliverable sets out to present the **Social Return on Investment** (SROI) for the pilot cities at the solution-level. Importantly, the scope of the SROIs has been based upon the outputs of D5.4 REFLOW Pilot Applications, whereby the pilot cities' prototypes (with the exception of Vejle) presented in that deliverable have been used as the scale of analysis for monetising and valuing change. The SROI also builds upon the work undertaken in Task 5.3, where the identification of relevant stakeholders was extracted during the initial stages of the SROI for stakeholder involvement.

Figure 5: Social Return on Investment chapter connections to other REFLOW deliverables

1.6 Reading Guide

The structure of the deliverable is divided into three main sections. The deliverable starts with a larger overall picture of the pilot cities and their Theories of Change. Within this chapter, the exploration and description of change at the pilot city level is presented in visual form (Theory of Change Miro Boards) and written form (narratives of change). To evidence and measure change, the second chapter presents the achieved results of the pilot specific Key Performance Indicators, highlighting what the pilot cities have achieved within REFLOW over the last three years. The pilot cities' environmental Key Performance Indicators are also presented within this deliverable; however, further analysis linked to their environmental impact assessment can be found in detail in D3.3 Urban Metabolism Strategy Final Report. The last chapter of D1.5 presents the Social Return on Investment as a way to value and monetise change. The scale of analysis has been conducted at the level of one solution per pilot that has been developed within REFLOW.



Figure 6: Visual Reading Guide of Deliverable 1.5 Project Impact Assessment

Over the REFLOW project, the strength of diversity across the six pilots has allowed for each pilot city to create their own unique focus areas and pathways towards becoming circular and regenerative. As such, when reading this deliverable, it is important to keep this aspect in mind – as each pilot has forged their own path, resulting in a diverse collection of activities, solutions, and achievements.



Chapter 2

Theory of Change

Exploring and Describing Change



2 Theory of Change: Exploring and Describing Change

This chapter presents the final iteration of the pilot cities' Theory of Change. The visual map of the Theory of Change is presented for each of the pilot cities followed by a written narrative of change. This work builds upon the previous deliverables – D1.2 Cities' Circular Action Plans, D1.3 The REFLOW Framework, and D1.4 Validation and Performance Evaluation. The inputs are extracted from these previous deliverables with updates and changes to the pilot cities' Theory of Change based on the final iteration carried out in M33 of the project.

2.1 Methodological Approach for Exploring and Describing Change

This section outlines the processes that were carried out as part of the pilot cities' journey in exploring and describing change. To start, the final iteration of the Theory of Change is described and situated within the context of the Project Impact Assessment. Next, the narrative of change is introduced and defined as a core component of describing change.

2.1.1 Theory of Change

The pilot cities' Theory of Change (ToC) links the activities, outputs, and outcomes envisioned as a pathway to change which is expected to generate desired impact. A full overview of the Theory of Change methodology is described in detail across previous deliverables including D1.1 Co-Production Practices in Pilot Cities, D1.2 Cities' Circular Action Plans, and D1.3 The REFLOW Framework. The pilot cities, in close collaboration with WP1, have explored change through several iterations of their Theory of Change throughout the lifetime of the REFLOW project. These iterations have included reflective considerations and critical thinking to explore the ways in which change could occur through the pilot cities' activities.

The first Theory of Change was developed in February 2020 following a series of meetings with the pilot cities and WP1 where the pilot cities explored their pathways to change according to their desired impacts and areas of intervention. Following this, the first iteration of the Theory of Change took place in March 2020. This iteration entailed further definition of their pathways to change with focus on underlying assumptions to describe the necessary preconditions that were needed for change to occur. This iteration was used within D1.2 Circular Cities' Action Plans to inform the pilot case studies presented in the deliverable. In September and October 2020, the second iteration of the Theory of Change took place. This iteration focused on refining the causal pathways to change for the pilot cities



and incorporated the distinguishment between mid-term and long-term outcomes to further clarify causality within the pilots' Theory of Change. Connecting lines were also added to the Theory of Change boards for the pilot cities to further refine their pathways to change. The third iteration of the Theory of Change took place from February 2021 to March 2021 where pilot cities set out to validate and connect their Key Performance Indicators to their activities and outputs. This iteration provided the pilot cities with the opportunity to identify any gaps within their KPIs targets and monitoring. From September 2021 to November 2021, the fourth iteration was carried out and presented in the D1.4 Validation and Performance Evaluation. During this iteration, the refinement of the outputs presented in the pilot cities' Theory of Change was undertaken as the pilots had further progressed within their action plans towards the development of their pilot solutions within REFLOW. The final iteration took place in February 2022. At this stage, the pilot cities were well acquainted with the Theory of Change concepts and undertook this iteration independently – predominantly validating and reflecting on their pathways to change.

The Theory of Change has been used by the pilot cities to understand, explore, and to carve out their pathways towards producing societal impact within REFLOW and beyond. As such, the Theory of Change positions itself within the Project Impact Assessment as a key element which showcases the exploration of how change occurs. Through this exploration, the pilot cities' logic and key assumptions behind their activities, the outputs produced, and the outcomes generated as the chain of events have guided each of the pilots' work in REFLOW towards reaching their desired long-lasting impact. The Theory of Change thus paints a complete picture of impact at the level of the pilot cities' overall action plans towards becoming circular and regenerative.

Within this chapter, the final iteration of the pilot cities' Theory of Change is presented. This final iteration was undertaken, as mentioned above, independently by the pilot cities in M33 of the project where they updated their Theory of Change boards on the collaborative whiteboard app, Miro.

2.1.2 Narrative of Change

A complementary component to the Theory of Change is the narrative of change. The narrative of change seeks to describe change in written form, based on the visualisation of the Theory of Change. The narratives of change presented in this chapter elaborate further into the logic of how each of the pilot cities believed that their activities and outputs would lead to the outcomes that produce meaningful impact and change. The narratives of change were co-developed by the CBS team in WP1, and the pilot cities based on the final iteration of the Theory of Change as well as additional information gathered from the pilot cities' action plans across other deliverables in REFLOW. This has included



building off of the structure presented in D1.3 The REFLOW Framework where the pilot city action plan narratives were presented and D1.4 Validation and Performance Evaluation where the list of pilot city solutions alongside their descriptions were provided. Through these three components, the narrative of change for each pilot city was developed.

The process of writing the narrative of change for each of the pilot cities followed the same structure across pilot cities. Based on the initial work in D1.3 The REFLOW Framework and the PESTEL analysis in D1.4 Validation and Performance Evaluation, the development process of the narratives presented in this deliverable started from understanding the challenge and context of the pilot city. In this way, the political and economic setting which the pilot city operated within could first be understood and the challenge which they have addressed in REFLOW could be placed within this context. Following this section, the envisioned impact was written to present the long-term change in which the pilot city had aimed to contribute to through their activities. This section built further upon the work in previous deliverables as well as the final iteration of the Theory of Change. Next, the pathways to change were described to present the overarching view of how activities have led to the outputs and outcomes. This also built upon the work across the aforementioned deliverables and the final iteration. To conclude the narrative of change, the final list of pilot solutions was updated, based on the work presented in D1.4. These pilot solutions represent the outputs within the Theory of Change, where their relevance and connections to generating outcomes and eventual impact was included into the development process of the pilot city narratives. The final output of this development process has resulted in the narrative of change for the pilot cities which have all been structured in the following manner:

1. The Theory of Change statement (if...then)
2. The Challenge
3. The Context
4. The Envisioned Impact
5. Pathways to Change (the overarching view of how the activities lead to the outputs and outcomes)
6. The Pilot Solutions
 - a. Description (the output)
 - b. How the solution leads to outcomes
 - c. Process of getting to the solution – how they were developed (the activities)



While each pilot city narrative has followed the same structure, their paths towards change are diverse. In this way, the narratives of change further point towards the diversity of contexts in which the pilot cities have started out on and the multiplicity of pathways in which they have taken towards generating impact.



Amsterdam

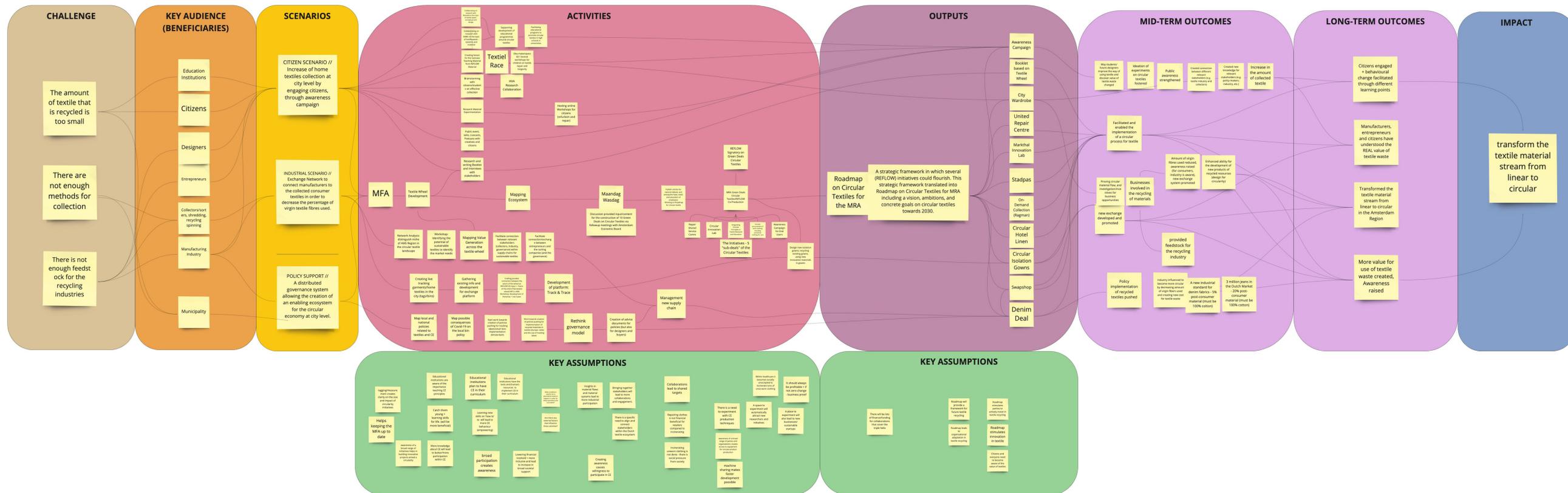
Exploring and Describing Change



2.2 Amsterdam

The Amsterdam pilot in REFLOW focused on textiles through rethinking their lifecycle with citizens and stakeholders. This entailed a focus on how textiles were used by its citizens, the way these textiles were discarded and reused, and how textiles as resources could be brought back into the city's material flow.

2.2.1 Theory of Change



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

2.2.2 Narrative of Change

The Theory of Change in the Amsterdam Pilot is based on the premise that the **transition of the textile stream from linear to circular** can occur:

- If there is an increase in the collection of discarded textiles at the city level by engaging citizens through raising awareness
- And if there is an exchange network to connect manufacturers to the collected consumer textiles to decrease the percentage of virgin textile fibres used
- And if there is a distributed governance system allowing for the creation of an enabling ecosystem for the circular economy at city level
- Then there will be a change in behaviour of citizens; manufacturers, entrepreneurs and citizens will understand the *real* value of textiles; there will be a circular textile material stream in the Amsterdam Region; and there will be more value and awareness for the use of textile waste

2.2.2.1 The Challenge

The challenge underlying the Amsterdam pilot's journey in REFLOW was premised on the evidence that the city has experienced negative effects from a long tradition of linearity within their textile streams. This linear model as a driving force, has resulted in unsustainable levels of textile practices across citizens and industry resulting in the challenges of low amounts of textiles being recycled, suboptimal ways of collecting textiles, and insufficient supply of feedstock for the recycling industries in the city. This is evidenced in the city's collection of 12.9 million kilos of textiles annually¹, with 69% of these textiles ending their lifespan in the incinerator rather than being recirculated as clothing or recycled feedstock material for the textile industry². Incorrect sorting and disposal of textiles among households – due to the lack of both awareness and methods of collecting textiles – has contributed largely to the problem.

2.2.2.2 The Context

At the municipal level, Amsterdam is no stranger to the concept of circularity. The city became the first in the world to develop a circular vision and roadmap in 2015 and is also a leader in circular economy transitions, setting out the goal to become a fully circular city by 2050. At the beginning of Amsterdam's

¹ Based on 2018 (D3.2 Urban Metabolism Scans Initial Assessment)

² See D3.2 for more information



involvement with the REFLOW in June 2019, the city already had a little over 70 circular projects completed. While there were many circular initiatives taking place in the city, these were mostly focused on the construction, biomass, and food value chains, with only 7 of these projects exploring consumer goods – of which included a focus on textiles. To achieve a fully circular city by 2050, increasing the circularity of the textile industry in Amsterdam has become an important agenda item and step to reaching this municipal goal. While progress is being made in the right direction, including an increase in industry demand for recycled textile materials and more consciousness towards sustainable textile behaviours, these efforts are slow and lack the proper support to realize a real and lasting change. Within the context of REFLOW, the project as a whole set out to show how a rethinking of our current economy and a reconfiguration of the urban metabolism could enable the transition to circular and regenerative cities. As a pilot city, the Amsterdam pilot is afforded an enabling context made up by a constellation of expert organizations branching across disciplines in the REFLOW consortium alongside their local networks of makers, manufacturers, social enterprises and more, to focus in on addressing the problems linked to the linearity of their textile streams.

2.2.2.3 *The Envisioned Impact*

The Amsterdam pilot focused on the way textiles were valued, discarded, reused, and how they could be brought back into the material flow across the citizen, industry, and policy support levels. Their involvement as a REFLOW pilot city presented a significant opportunity for them to transform the textile material stream from linear to circular and to accelerate the city's transition towards becoming a fully circular, inclusive, and thriving city.

2.2.2.4 *Pathways to Change*

To realize this change, the Amsterdam pilot focused on generating long-term outcomes centring on: (1) citizen engagement and behavioural change, (2) the understanding of the *real* value of textiles across manufacturers, entrepreneurs, and citizens, (3) transforming the textile stream from linear to circular in the Amsterdam Region, and (4) increasing the awareness and value of textiles. Within this frame of focus, the Amsterdam pilot adopted an approach which focused on citizens and industry across two interconnected scenarios of activities – one in the short-term (Citizen Scenario) and one in the long-term (Industrial Scenario) – both of which collectively aimed to spearhead closing the loop in textile streams.

By addressing citizens and industry in sync, the Amsterdam pilot saw this as a way to ensure that the amount of virgin textile fibres was decreased at the industry level through promoting circular behaviours



in the way citizens consumed, discarded, used, and valued textiles. These aims were driven by promoting proper discarding practices and providing enhanced collection methods at the citizen-level to increase the quantity of textiles collected and recovered for the industry. Engagement with citizens and industry was also key to increase their awareness on the value of textiles and textile waste and to enhance the capacity of these actors to practice circular textile behaviours facilitated through network creation, workshops, events, and other public activities. Together, these two scenarios fed into a third scenario focusing on policy support. The Policy Scenario was fed by and underpins the Amsterdam pilot's activities through the creation of an enabling ecosystem for circular economy at the city level facilitated by a distributed governance system.

The materialization of these outcomes was generated through a series of meaningful activities and actions resulting in the creation of the Amsterdam pilot solutions within REFLOW as tangible outputs leading the pilot towards change. The development of each solution ventures along different pathways to change through the interconnected scenarios and activities carried out, but with each and every output having a role towards leading the Amsterdam pilot to circular textile streams.

2.2.2.5 Amsterdam Pilot Solutions

2.2.2.5.1 Roadmap on Circular Textiles

The Roadmap on Circular Textiles is a document outlining a strategic framework which guides the Metropolitan Region Amsterdam (MRA) towards its sustainability goals and reaching circular textiles by 2050 directed by the creation of a vision, ambitions, and concrete goals.

The Roadmap on Circular Textiles sets out the preconditions for change by providing a framework for future textile recycling. The Roadmap on Circular Textiles leads to organisational adaptation in textile recycling, stimulating parties to actively invest in textile recycling and innovation in the textile industry. As a key output of the Amsterdam pilot, the Roadmap on Circular Textiles has led to several circular textile initiatives flourishing within REFLOW and in the region. Additionally, the Roadmap on Circular Textile serves as a governance guideline and will have a lasting effect on the long-term strategic course on circular textiles within the MRA exemplified through its initiatives. These initiatives touch upon a diversity of textile streams, target groups, and methods of intervention all while collectively driving towards the long-term outcome of transforming the region's textile material stream. Importantly, the Roadmap on Circular Textiles has helped to highlight the importance of improved collection of discarded textiles, citizen awareness and the need for a cooperative aligned textile-ecosystem. The



initiatives in REFLOW that continue to flourish from the Roadmap for Circular Textiles include the Swapshop, Circular Isolation Gowns, and the United Repair Centre solutions (described in the following sections) – upon which business models were developed in REFLOW³. These solutions alongside other initiatives⁴ all tackle the MRA's Green Deals Circular Textiles 5 initiatives or “sub-deals” for circular textiles which include: (1) Repair Shared Service Centre, (2) Circular Innovation Lab, (3) Integrating Circular Principles in Textile Research and Education, (4) Circular Procurement of work clothing, including protective clothing for care, and (5) Awareness Campaign for End Users.

The Roadmap on Circular Textiles came to fruition through the Amsterdam activities in the REFLOW project. This included the material flow analysis (MFA⁵), stakeholder mapping, construction of the circular textile wheel⁶, and bringing together industry stakeholders into discussion through “Maandag Wasdagen” roundtables which shaped the basis on which this Roadmap solution was constructed. Moreover, these activities led to the co-production of the MRA's Green Deals Circular Textile, with REFLOW leaving its long-lasting impact towards circular textiles in the region as a signatory. By combining these major drivers for change, the momentum was generated, and the Roadmap on Circular Textiles was born. The following solutions below showcase further the outputs of these activities and the diversity of solutions which have worked towards the Amsterdam pilot's desired outcomes.

2.2.2.5.2 Swapshop

The Swapshop offers citizens a place to bring in their clothing while also providing them with the opportunity to swap these with the Swapshop's clothing stock. When clothing is brought into the Swapshop, it is sorted, cleaned and repaired if needed. The un-swappable items, meaning those that are too worn out to be used again, are sorted out manually by the staff. The items made of high percentages of cotton are channelled through the Denim Deal (see section 2.2.2.5.5). Other items go to other organisations such as Dress for Success² or external enterprises like “I-did”³ which produces new items out of the collected textiles to sell on the B2B market. The Swapshop also serves a social function through the inclusion of people who are at distance from the job market. Through REFLOW, the Amsterdam pilot has integrated the REFLOW OS track and trace technology to follow the journey of the clothes going through the Swapshop. This generates a REFLOW ID which tells the story of the life of the clothing items from its sequence of users including how it has been used and by whom. At the same time, this gathering of information provides insights on the behavioural motivations related to swapping, using, and/or taking care of second-hand clothing.



By attaching a more humanized story to each clothing item brought in and swapped in the Swapshop, the Amsterdam pilot taps into generating the awareness and behavioural change in the way citizens consume, dispose of, and value textiles, which is needed for their circular transition. Moreover, the enhanced connections with the Swapshop which provide the textile feedstock of un-swappable items to the Denim Deal, textile collectors, recyclers, designers, and social enterprises allows for a revaluation of textile waste, the reduction of virgin resources used, and enhanced ability for the development of new, circular products from these reclaimed resources.

2.2.2.5.3 Circular Isolation Gowns

The Circular Isolation Gown is a reusable isolation gown for the healthcare industry which incorporates circular product design and track and trace technology. They are designed to compete with disposable isolation gowns on both functionality and comfort and can be washed up to 200 times. The Circular Isolation Gowns also addresses critical environment concerns including trying to minimise the shredding of microparticles and the replacement of fluor containing finishes (PFAS). PFAS replacement has been achieved through applying an acryl polymer-based water repellent. Microparticle shredding is subject to ongoing research which includes assessing the analytical methods and how to capture these particles at the source, which will be further continued in a subsequent project. In addition, the attachment of a material passport allowing for track and trace gives insights into the material flow of the Circular Isolation Gowns and transparency for its user.

The development of this solution has introduced reusable isolation gowns to a market which, as of today, uses solely disposable gowns. The Circular Isolation Gowns can be used, sent back for cleaning, and then reused again. This process increases product lifespan and ensures the recycling of the materials at the end of their life. The circular principle of “design to reuse” is embedded in this solution, thereby decreasing the consumption of virgin resources and the production of waste.

The solution was realised through collaboration with Clean Lease, a textile service company. They are the leasing company which provides textile products for the healthcare and hospitality industry, and which undertake the processes of cleaning the gowns and recirculating them. In the process of its creation, the Circular Isolation Gown prototype underwent in-use trials to gather feedback on ease of use, comfort, care, maintenance, the implication for use, and laundry logistics. The gowns are being locally produced by Makers Unite who are manufacturing the first 3000 gowns.



2.2.2.5.4 United Repair Centre

The United Repair Centre is a solution which connects brands needing repair services with tailors at Makers Unite. Makers Unite is a non-profit organisation who engage with refugees and other volunteers to integrate them into the labour market and society by providing them with tailoring work opportunities. The United Repair Centre addresses the gap experienced in shops or brands who do not normally have the competencies or partners to repair clothing items that are returned by customers to their shops because of flaws or damages. To bridge this connection, the journey of the clothing needing repair starts at the shop where the item is received. From there, the clothing is transported via eco-transportation methods to Makers Unite to be repaired and eventually returned to the retailer within two weeks. The solution utilizes the REFLOW OS track and trace system to track the garments and ensure an effective process for retailers who use or offer this solution.

The United Repair Centre presents a method to extend the product life of textiles and clothing through its offering of repair services for shops when they receive clothing from their customers. Through this way, the revaluation of textiles can be formulated not only at the citizen-level, but also through the businesses using the solution. As such, this extension and prolonged value of textiles and clothing contributes to the reduction of production using virgin resources.

2.2.2.5.5 Denim Deal

The Denim Deal also called the Green Deal on Circular Denim¹⁰, is an alliance across the value chain of denim which gives all parties certainty. The alliance represents every part of the value chain allowing for the true monitoring of the process. Currently, more than 40 partners from the industry including governmental actors are involved with the Denim Deal.

The strength of this alliance lies in the fact that all parties involved in the making and processing of a denim garment will participate. This includes those ranging from production companies, brands and retailers, to collectors, sorters, cutters and weavers. Thus, all the signatories of the Denim Deal will be initiating a change in the entire chain. Once this step is taken, scaling up will be easier afterwards, making the Denim Deal a blueprint for a more sustainable textile industry.

By the end of 2023, 3 million denim clothing items will have been produced containing 20% post-consumer textiles and together they will work towards a new industry standard in the denim industry for 100% of post-consumer cotton textiles. The REFLOW partner – the Municipality of Amsterdam supports the Denim Deal across the other Amsterdam pilot solutions and activities through increasing the



collection of old textiles from citizens and ensuring that recycled denim is being discarded correctly. Moreover, the Amsterdam pilot coordinator coordinates the Denim Deal Coalition.

2.2.2.5.6 Booklet

The Booklet is an online resource based on the Textile Wheel developed in the Amsterdam pilot. The Booklet is a series of 16 chapters which have been developed to describe each step within the Textile Wheel to inform citizens, stakeholders and others interested in the true circular textile process.

The Booklet targets a broad audience of both citizens and the industry as a way to increase their knowledge of the environmental impact of the textile industry and on circularity. Through engaging with this material, the reader is informed and given the foundational knowledge to understand the real value of textile waste and how they can change their behaviours.

2.2.2.5.7 The Stadpas

The Stadpas Card is offered by the city of Amsterdam for specific services (such as the repair of clothing) to lower-income citizens as part of the Green Deals Circular Textile.

The Stadpas Card focuses on encouraging different textile behaviours of citizens, particularly lower-income citizens who may not have access to certain repair services. The city of Amsterdam will cover the majority of the cost of tailors while the Stadpas Card holder will pay 10% of associated costs for two months. The following two months after that, the Stadpas Card holder will give a 75% contribution. The key purpose behind the Stadpas Card aims to include lower-income citizens to be involved in circular economy.

2.2.2.5.8 On-Demand Collection – Ragman

On-Demand Collection is a solution that collects old clothing/textiles from citizens. The solution uses the IT from an existing platform to facilitate on-demand collection. Users can connect with textile collectors online to coordinate when and where to pick up their textile and clothing waste.

The On-Demand Collection tackles the challenge of contaminated and unusable discarded clothing and textiles because in order to use textiles further, they must be clear and dry. However, textile collection bins are often used for waste or become contaminated by rain or groundwater, leading to contaminated and unusable clothing. The solution aims to collect higher quality material (clean and dry) to ensure that these resources can be used to make new textiles.



2.2.2.5.9 City Wardrobe

The City Wardrobe is an overarching solution that has been realised out of three pilot activities/solutions that increase the uptake of discarded textiles from citizens. Part of this is the On-Demand collecting solution (Ragman), the Textilerace which is a race among 15 primary schools to collect the most discarded textiles, the Swapshop solution, and the redesign of the textile collection containers on the streets. Underground textile collection containers will be replaced by containers above ground due to the high risk of textile contamination through underground textile containers. Inhouse collecting is also part of this initiative where citizens will be given the opportunity to bring their discarded textiles to indoor collection places such as retailers and public spaces. Some of these public spaces also contain rooms where workshops can be provided.

2.2.2.5.10 Markthal Innovation Lab

The REFLOW partner – the Municipality of Amsterdam has given written advice to Markthal Innovation Lab on how to set up an innovation lab (through the knowledge of stakeholder mapping in the REFLOW process carried out by the pilot). The Markthal Innovation Lab is a long-term project focusing on start-ups. The launch is foreseen in 2025 where REFLOW integrates knowledge on how to set up and what is needed in the lab.



Berlin

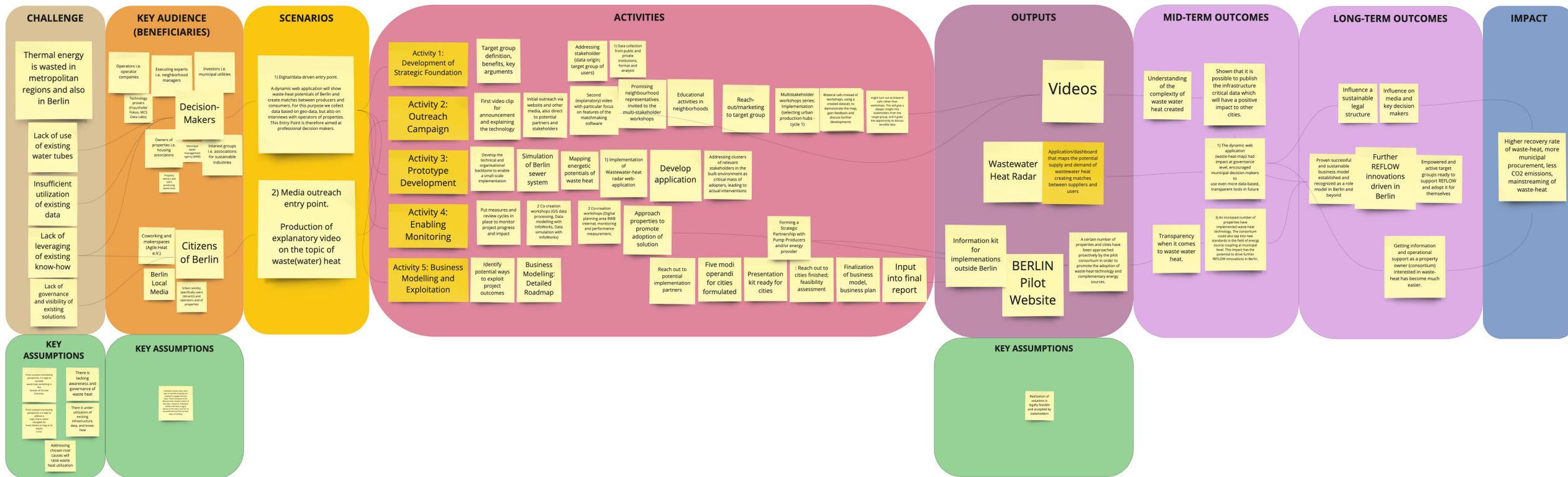
Exploring and Describing Change



2.3 Berlin

The Berlin pilot within REFLOW focused on wastewater heat recovery through increasing its visibility as a potential renewable and climate-neutral energy source.

2.3.1 Theory of Change



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

2.3.2 Narrative of Change

The Theory of Change in the Berlin Pilot is based on the premise that enabling the **transition towards climate-neutral heating through the recovery and mainstreaming of wastewater heat** can occur:

- If there is a dynamic web application showing waste heat potentials and to create matches between producers and consumers
- And if there are explanatory efforts to communicate the topic of waste(water) heat
- Then getting information and operational support as property owner interested in waste heat will be easier; the recovery and potential of waste heat will influence a sustainable legal structure and media and key decision makers; and target groups will be empowered and active to support REFLOW and adopt it for themselves

2.3.2.1 The Challenge

The challenge underlying the Berlin pilot in REFLOW was founded on the evidence that a reduction of CO₂ emissions and the acceleration towards climate-neutrality is crucial to reverse the detrimental effects that an unsustainable energy system has had on the climate, environment and society. Heavy reliance on conventional fossil-based resources to fuel energy systems not only drives the climate crisis but also leads to the underutilisation of existing infrastructure, data and know-how as well as an overall lack of knowledge, awareness, visibility, and governance for other sources of energy, specifically thermal energy generated by wastewater. This is evidenced in the use of less than 3% of the potential wastewater heat in the city of Berlin. In the city of 3.6 million citizens, Berlin produces an abundance of wastewater from private households, public buildings, industry, and others while also continuing to demand energy for heating and cooling systems. Much of this wastewater supply is often still warm or even hot when it enters the drainage system, but under the current status quo in the city, wastewater is not being captured for heat recovery, and thus, wasted. The gap in the uptake of wastewater heat is embedded largely in the lack of available data showcasing the quality and quantity of its potential recovery, deficient awareness among potential users, and the disconnection between these potential users and the supply of potential wastewater heat.

2.3.2.2 The Context

As the capital and largest city in Germany, Berlin is committed towards advancing the push for a sustainable energy transition and enhanced climate protection. The Berlin Energy and Climate Protection Programme 2030 sets concrete targets for the reduction of CO₂ emissions and climate adaptation for the city over the next decade. Berlin is also at the forefront of Germany's circular



economy, zero-waste, and other sustainable and resilient initiatives, with both small and large projects being carried out to create and improve the city landscape for further vibrant and innovative interventions. With the agenda established for transitioning the city's energy profile, wastewater heat potential has been highlighted as a key resource to tackle this aim. While these initiatives set the ground for change, accelerated support and action to leverage the potential of wastewater heat is still needed. Within the context of REFLOW, the project as a whole set out to show how rethinking of our current economy and a reconfiguration of the urban metabolism could enable the transition to circular and regenerative cities. As a pilot city, the Berlin pilot focused in on this need for support and action in relation to wastewater heat with their key partner, Berliner Wasserbetriebe.

2.3.2.3 *The Envisioned Impact*

The opportunity as a REFLOW pilot city presented the Berlin pilot with the occasion to enhance the visibility of wastewater heat and to build an accessible understanding of this complex and technical topic. Through this, the Berlin pilot would aid to increase both the utilisation of wastewater heat as a heat resource as well as enhance its role in climate-neutral heating transitions. The Berlin pilot's envisioned impact is set forth to have a higher recovery rate of waste heat, more municipal procurement, less CO₂ emissions, and the mainstreaming of waste heat.

2.3.2.4 *Pathways to Change*

The realisation of these changes placed the importance on generating long-term outcomes which would (1) influence a sustainable legal structure, media, and key decision makers, (2) establish a role model in Berlin and beyond based on a proven sustainable business model, (3) drive further innovations in the city, (4) empower an active target group to adopt REFLOW, and (4) make the information and operational support on waste heat easier. To strategically frame these outcomes that shape the pilot's success and its long-term impact, the Berlin pilot embedded five components of their pathway to change (technology development, awareness raising, generating interest, implementation, and exploitation or replicability) into five major activity strings: (1) Development of a Strategic Foundation, (2) Outreach Campaign, (3) Prototype Development, (4) Enabling Monitoring, and (5) Business Modelling and Exploitation. The first activity, Development of a Strategic Foundation, provided an important foundation to move the Berlin pilot forward in its subsequent activities. From this work, the Berlin pilot was able to define their target groups and to formulate the benefits and key arguments to use to meet the defined target groups' interests and motivations when addressing them. The pilot also dedicated time for the collection of data – deemed as a crucial component to tackle the lack of knowledge in the opportunity of wastewater heat and to generate a much-needed fact-based feasibility assessment. With this first activity laying the



Strategic Foundation, the Berlin pilot built upon this basis, for the next activities including its Outreach Campaign, Prototype Development, Enabling Monitoring, and Business Modelling and Exploitation. Subsequently, these paths led to the development of the Berlin pilot solutions within REFLOW. The solutions developed represent the tangible outputs of the Berlin pilot, and which necessitated the pilot's momentum and preconditions towards generating the results which will lead to the future impact of the Berlin pilot's intervention.

2.3.2.5 Berlin Pilot Solutions

2.3.2.5.1 Wastewater Heat Radar: Matchmaking

The Wastewater Heat Radar (WWHR) is a dynamic web application platform. Based on simulations and GIS-based operational data of the Berlin water utility, parts of the infrastructure are analysed that are feasible for wastewater heat recovery. The WWHR uses the Open Data Dashboard technology to visualise and map the potential wastewater heat supply and demand and creates matches between suppliers and users.

Through this mapping, the WWHR bridges the gap between wastewater heat supply and demand by way of matchmaking. Through this matchmaking, the WWHR addresses the lack of overview of supply and demand of wastewater heat at a municipal/city level, increasing not only the awareness of wastewater heat potential but also its recovery. In turn, buildings where wastewater heat can be recovered can reduce their energy costs and improve their sustainability. Because the availability of data is the main barrier to the utilisation of waste heat in general and specifically wastewater heat, the WWHR overcomes this hurdle and makes the process of wastewater heat recovery more common. The WWHR in combination with the videos allows the Berlin pilot to foster positive impact and influence on other cities in two ways. Firstly, the Berlin pilot will impact at the governance level facilitated by encouraging municipal decision-makers to incorporate even more transparent data-based tools in the future. Secondly, through the videos and WWHR, the Berlin pilot will enhance the potential to drive further REFLOW innovations in the city and beyond.

The activities to produce this powerful solution was data-driven, therefore, the development of the prototype involved the collection of key data flows needed to produce the final output. This process involved gathering three key datasets: geospatial data on all buildings and building type classifications in the city, consumption of buildings on different energy-saving conditions, and wastewater heat potentials derived from BWB. The exercise of retrieving these datasets were not always easy since much of this data was not open-source or publicly accessible due to lack of incentives or security and



privacy issues associated with data sharing. Despite these data hinderances experienced in the Berlin pilot, they overcame these challenges by modifying and adjusting their activities and subsequently their WWHR output's final functionalities. These modifications included the creation of an anonymised data set to ensure legal compliance within the topic of critical data.

2.3.2.5.2 Videos

The videos are illustrative clips created by the Berlin pilot through which they disseminate the topic of wastewater heat and the concept and features of the Wastewater Heat Radar (WWHR) that they have developed. There are two videos that the Berlin pilot has produced. The first video is developed in the form of an announcement video. The video includes a short explanation of wastewater heat in general and an introduction to the Wastewater Heat Radar. The second video is developed in a more explanatory format. In this video, a particular focus on the features of the Wastewater Heat Radar is zoomed into. Through the release of these videos, the Berlin pilot untangles the complexities behind the topic of wastewater heat and technological functionalities of the Wastewater Heat Radar to generate an accessible understanding across their defined target group, as well as a broad audience including urban planners, property owners, and citizens. This comprehension not only makes wastewater heat and its potentials an easier subject to navigate, but also acts an important output to prove and empower future adoptions of the WWHR and wastewater heat recovery in Berlin and beyond.

The production of the videos came to materialisation within the focus of the Berlin pilot's outreach campaign activities emphasising awareness raising and generating interest. The initial video developed started its outreach across both a broad audience via dissemination on the REFLOW project's website, YouTube, and other media platforms as well as directed to potential partners and stakeholders. Following further developments with the Wastewater Heat Radar, the second video was developed and is set to reach the defined target groups of the pilot as both a source of information and a launching pad for educational activities and bilateral calls on the data integration and implementation of the Wastewater Heat Radar.

2.3.2.5.3 Information Kit

The information kit is a set of links found on an information sheet. The information sheet is set-up as a short how-to guide for decision makers. It provides necessary facts and links to relevant information, including links to one of the explanatory videos which the Berlin pilot has produced during REFLOW. Moreover, a link to ICLEI's climate finance decision making tree is also included on the information sheet.



Embedded in this information will present some use cases, descriptions about the REFLOW project, minimum data requirements for other cities to implement the solution and match supply and demand, and general information about using wastewater heat. The Information Kit can be accessed at [Reflow Berlin](#).

Through the Information Kit, the Berlin Pilot addresses cities' awareness of solutions to address the recovery of wastewater heat. In initial talks, it was shown that while curiosity in wastewater heat recovery is high, the actual awareness of solutions is much lower. Same is true for the overall awareness of the potential wastewater heat possesses. With the Information Kit, the future cities interested in the adoption of the Wastewater Heat Radar can get up to speed on the topic of wastewater heat recovery, the WWHR itself, and what data requirements they may need.



Cluj-Napoca

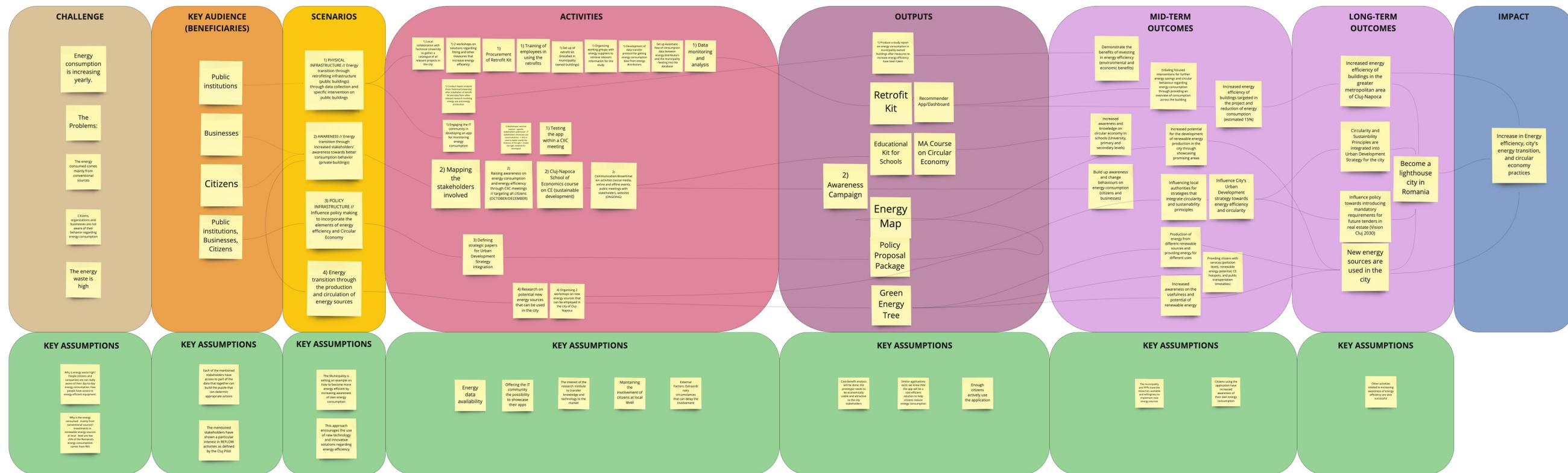
Exploring and Describing Change



2.4 Cluj-Napoca

The Cluj-Napoca pilot in REFLOW has focused on energy through addressing the challenges of reversing the city's increasing energy consumption and waste by introducing more efficient and circular solutions that concentrate on district heating and electricity usage.

2.4.1 Theory of Change



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

2.4.2 Narrative of Change

The Theory of Change in the Cluj-Napoca Pilot is based on the premise that **an increase in energy efficiency, the city's energy transition, and circular economy practices** can occur:

- If tech/business solutions are developed
- And physical infrastructure is retrofitted based on data collection and specific interventions on buildings
- And if stakeholders' awareness is increased towards better consumption behaviour in buildings
- And if policymaking is influenced to incorporate elements of energy efficiency and Circular Economy
- Then there will be increased energy efficiency of buildings in the greater metropolitan area of Cluj-Napoca; circularity and sustainability principles will be integrated into the Urban Development Strategy for the city; there will be influence towards introducing mandatory requirements for future tenders in real estate (Vision Cluj 2030); and there will be new energy sources used in the city
- And then Cluj-Napoca will become a lighthouse city in Romania for circularity and energy efficiency

2.4.2.1 The Challenge

The challenge underlying the journey of the Cluj-Napoca pilot in REFLOW was driven by the negative climatic, economic, and social effects experienced in the city driven by an energy sector powered mainly on conventional fossil-fuel sources. Further, this was coupled with increasing rates of energy consumption and waste in the city of Cluj-Napoca. Low investments at the local level in renewable energy, lack of awareness amongst citizens and companies in the city on energy consumption, and poor access to energy efficient equipment have magnified the problem over recent years as Cluj-Napoca has begun to grow both economically and demographically.

2.4.2.2 The Context

The Municipality of Cluj-Napoca is one of Romania's most performant cities in terms of economic growth, innovation and civic engagement. Cluj-Napoca is one of the few mid- sized European cities that grows both economically and socially, standing out as a lighthouse of social, economic, policy and technology innovation in Romania. The city's recent developments have led to significant changes in the social and economic life of the city. Notably, Cluj-Napoca has become an important economic and IT



sector hub for Romania and experiences a constant inflow of population. Further upcoming changes to the social, economic and political environment are planned to take place as the municipality works through its forthcoming Integrated Urban Development Strategy 2030. The strategy represents a set of policies that mark the combined efforts of actors in the city's ecosystem to ensure inclusive development, aligning the needs of the citizens and local actors as well as with European and global priorities. The strategy will also set out Circular Economy and Energy Efficiency priorities and will align with the promise of adopting a Circular Economy Action Plan for the city by 2030.

While the city works diligently towards framing a more circular future, the fast-paced growth experienced in the city have given rise to challenges that need to be addressed, namely, increasing energy consumption. The Municipality's Action Plan aims to reverse the city's increasing energy consumption by introducing more efficient and circular solutions in district heating and electricity usage. A key direction for interventions being undertaken has focused on the implementation of investment projects aimed at increasing energy efficiency and mitigating climate change with the help of EU funding. To date, the Municipality has successfully accessed some funding for increasing energy efficiency, promoting low carbon public transportation, and disseminating the need to be energy efficient to the local community. With a vast repertoire of efforts addressing both energy and climate change in Cluj-Napoca, there was still a need to further advance and foster change in the city. Within the context of REFLOW, the project as a whole sets out to show how a rethinking of our current economy and a reconfiguration of the urban metabolism can enable the transition to circular and regenerative cities. As a pilot city, the Cluj-Napoca pilot is engaged in this REFLOW context to enable a rethinking of urban energy consumption and the current energy system.

2.4.2.3 *The Envisioned Impact*

Cluj-Napoca's involvement as a pilot city in the REFLOW project presented the city with an opportunity to further build upon their previous and ongoing efforts. It also allowed them to tackle energy which is an impactful resource due to its high consumption levels and its fundamental role in other material cycles. The envisioned impact guiding the pilot throughout their energy transition and efficiency journey was aimed at reversing the city's trend of increasing energy consumption and waste and to decrease the amount of carbon emissions.

2.4.2.4 *Pathways to Change*

The Cluj-Napoca pilot set their focus on generating long-term outcomes which would lead to not only their envisioned impact, but which would centre Cluj-Napoca as a lighthouse city in Romania. For this to



be achieved, the Cluj-Napoca pilot concentrated on results to: (1) increase energy efficiency of buildings in the greater Metropolitan Area of Cluj-Napoca, (2) integrate circularity and sustainability principles into the city's Urban Development Strategy, (3) influence policy to incorporate mandatory requirements for future tenders in real estate, and (4) use new energy sources in the city. Within this framework, the Cluj-Napoca pilot structured their pathway to change across 3 interconnected scenarios: awareness raising and ecosystem support, physical infrastructure and technology innovation, and policy infrastructure and political will. These scenarios were seen as fundamental pillars and engaged a wide audience including public institutions, businesses and citizens, who all played an imperative role in making a city-wide energy transition. Concretely, the pilot implemented these scenarios across 5 activity pillars³ where key activities were undertaken towards reducing carbon emissions by introducing more efficient and circular energy solutions from the Cluj-Napoca pilot.

2.4.2.5 Cluj-Napoca Pilot Solutions

2.4.2.5.1 Retrofit Kit

The Retrofit Kit is a combination of five components (smart sockets, electric panels, motion sensors, lighting fixtures, and a smart metering system). While the components are not new, the innovativeness is that they are combined in a turn-key package that is cheaper than undertaking renovation. Included in the Retrofit Kit is a recommender app/dashboard which gives an overview of the consumption across the building where the Retrofit Kit has been installed to enable focused interventions for further energy savings and circular behaviour regarding energy consumption.

The solution has set the grounds for reducing energy consumption in existing buildings across the Municipality and metropolitan areas. With the Retrofit Kit, an estimated 15% reduction of energy consumption can be reached and allows existing buildings the access to bypass costly renovations to increase their energy efficiency.

The process towards realising the development of the Retrofit Kit was carried out through a series of activities in collaboration with the Technical University, the Cluj-Napoca IT community, private businesses, energy suppliers and distributors, and the Cluj-Napoca pilot.

³(1) pilot management and coordination activities, (2) education, citizen engagement and awareness raising activities, (3) governance-focused activities, (4) stakeholder and ecosystem development activities, and (5) solution-oriented activities



2.4.2.5.2 Green Energy Tree

The Green Energy Tree is a concept that describes a mechanic model of a tree that can produce energy from different renewable sources and provide energy for different uses. At the conceptual level, the Green Energy Tree generates energy from sun and wind, and can for instance be used to charge phones, provide Wi-Fi, charge electric bikes, and run displays (screens) that provide relevant information, such as pollution levels, renewable energy potential, circular economy hotspots, and public transport timetables. The specific functions of the Green Energy Tree are modular and can be combined according to the needs of the city and can also be installed in different areas of the city and integrated into urban architecture.

Resulting from the Green Energy Tree leads to the provision of key services to the inhabitants of the city, and at the same time raised awareness of the usefulness and potential of renewable energy. Moreover, it leads to the production of energy from different renewable sources and provides energy across a portfolio of uses and thus, the integration of new energy sources to be used in the city.

Research activities on the potentials of new energy sources that had the possibility to be used in the city was undertaken to reach the development of this concept. Additionally, two workshops on these new energy sources were held to disseminate the information gathered as well as to receive inputs and feedback for the Green Energy Tree development.

2.4.2.5.3 Policy Proposal Package

The Policy Proposal Package is a series of recommendations aimed at local authorities for the integration of circularity and sustainability principles into their strategies.

The Policy Proposal Package is a key output which leads to the circular and sustainable influence embedded in local authorities' strategies and Cluj-Napoca's Urban Development strategy towards energy efficiency and circularity. Through necessitating influence on policy, mandatory requirements for future tenders in real estate can be born to accelerate and foster the increase of energy efficiency and energy transitions.

The development behind the Policy Proposal Package encompassed the key activity of defining strategic papers which could be fed into the final output.



2.4.2.5.4 Energy Map

The Energy Map is a concept that showcases promising areas within the city for the development of renewable energy production, including using noise and vibrations for energy regeneration. The Energy Map is conceptualised as a visual platform which can be integrated into the Open Data Dashboard.

The concept of the Energy Map, which outlines encouraging areas, can generate increased potential for the development of renewable energy production in the city and as such, the incorporation of new energy sources being used in Cluj-Napoca. By integrating the Energy Map concept into the ODD, the difference between potential and actual use of energy consumption can be captured.

2.4.2.5.5 Master of Arts (M.A.) Course Module on Circular Economy

The M.A. Course on Circular Economy is a set of modules on the topic of CE. A portion of these modules have been incorporated into teaching at the Cluj-Napoca School of Economics during the 2020 to 2021 period.

The facilitation of increased awareness and knowledge on CE at the university level was made possible through the Course and therefore leading to more changes to behaviour on energy consumption as well as deeper understanding of importance of CE.

The development of this course utilised the REFLOW Knowledge Hub as a source of information.

2.4.2.5.6 Educational Kit for Schools

The Educational Kit for Schools includes a Circularity Kit for classrooms and a series of modules for primary and secondary school levels which embeds circular economy principles and information from the REFLOW Knowledge Hub into the curriculum and extra-curricular activities.

Intercepting the future generation by way of the Educational Kit for Schools not only increases awareness and knowledge on CE, but also makes this information more accessible for youngsters. Further, the Educational Kit fertilises the grounds for better consumption behaviours, the use of renewable energy sources, and the potentials for increased energy efficiency well into the future generations of Cluj-Napoca's citizens.

The Educational Kit for Schools used key information from the REFLOW Knowledge Hub and adapting this to the audience.



2.4.2.5.7 Awareness Campaign

The Awareness Campaign is a general outreach campaign spreading across citizens, organisations, and businesses in Cluj-Napoca.

The engagement with a diversity of actors in the city through the Awareness Campaign leads to awareness building and changes in energy consumption behaviours – which are fundamental steps to instigating change in Cluj-Napoca and reversing the trend of increasing energy consumption. By cultivating increased awareness in the city, the stage is set for Cluj-Napoca to reach the status as a lighthouse city in Romania and to increase the city's energy efficiency.

Activities involved in the development of the Awareness Campaign included hosting CIIC meetings on energy consumption and energy efficiency to raise awareness. Additionally, communication and dissemination activities across social media, online and offline events, public meetings with stakeholders and through the project's website fuelled the development of this output.



Milan

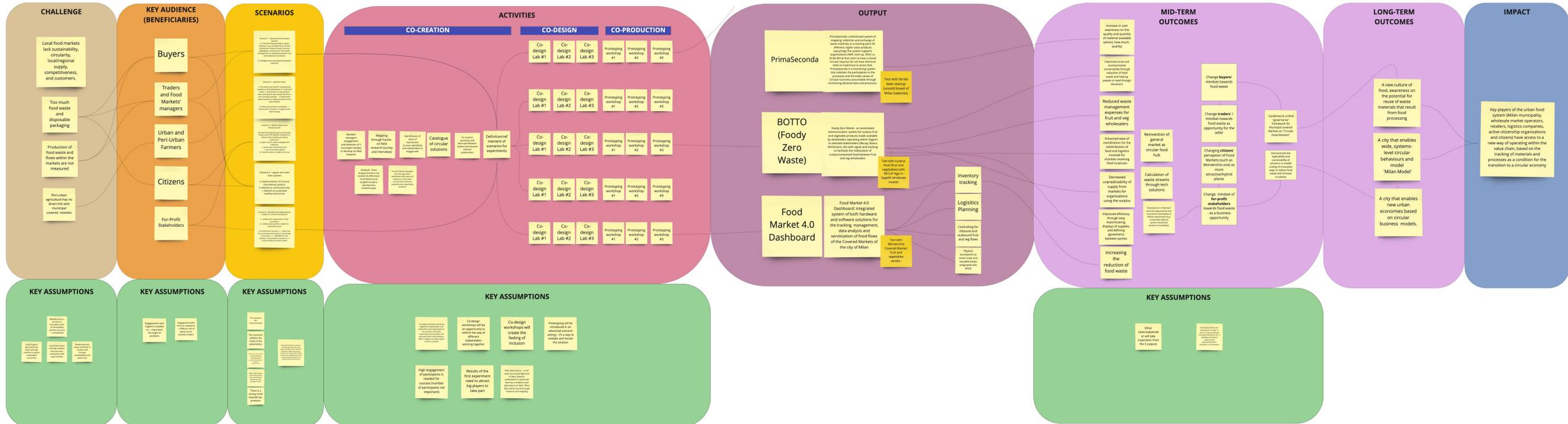
Exploring and Describing Change



2.5 Milan

The Milan pilot within REFLOW focused on food within their urban system through the involvement of key players and with the support of technological solutions to transition to a circular urban food system.

2.5.1 Theory of Change



2.5.2 Narrative of Change

The Theory of Change in the Milan pilot is based on the premise that *the transition to a circular economy for key players of the urban food system can occur:*

- If key players in the urban food system have access to a new way of operating within the value chain based on tracking of materials and processes;
- Then there will be a new culture of food and awareness on the potential for reuse of waste materials that result from food processing; Milan will be a city that enables wide, system-level circular behaviours and models – the ‘Milan Model’; and Milan will be a city that enables new urban economies based on circular business models.

2.5.2.1 The Challenge

The environmental, social, and economic effects associated with unsustainable modes of food production, consumption, and increasing amounts of food waste in Milan’s urban food system underlined the challenge of the Milan pilot in REFLOW. These challenges are exacerbated by the pressing challenges of climate change and the growing inaccessibility to healthy, safe, fair, and nutrient-rich food for Milan’s citizens from all walks of life. Food consumption has been identified as a major driver accelerating climate change. Additionally, the reliance of global food systems has resulted in decreased food security further influenced by a changing climate. Rooted in this problem of an unsustainable urban food system is recognised in the local traditional food marketplaces where a lack of sustainability, circularity, local/regional supply, competitiveness, and customers is being experienced. This is evidenced in the production of high amounts of food waste and disposable packaging, the fact that food waste and flows are not being measured, the degradation of municipal markets in the city, and that there is no direct link connecting peri-urban actors to urban actors.

2.5.2.2 The Context

The Municipality of Milan is well acquainted with the work needed to advance their urban food system towards circularity. For them, food plays a central role in their strategy towards circular economy being actioned mainly through the Milan Food Policy (MFP). The MFP designs and develops a framework for joint and coordinated actions on a food system based on circular economy. The Municipality of Milan assumes the role of support, stimulus, and facilitation of innovation to meet the principles and implementation of the MFP across 5 priorities: ensure healthy food and water for all citizens; promote the sustainability of the food system; promote food education; fight against food waste; and support



scientific research in the agri-food sector. Existing initiatives such as a local food waste hub, mid-morning fruit, tax reduction for companies donating surplus food, short chain, and healthy meal have already prepared the grounds in the city for changes. Despite overwhelming progress, there is a crucial need for intervening across the key players in the urban food system and for integrating innovative technology into the system. Within the context of REFLOW, the project as a whole sets out to show how a rethinking of our current economy and a reconfiguration of the urban metabolism can enable the transition to circular and regenerative cities. As a pilot city, the Milan pilot applies this rethinking to their urban food system in collaboration with an assemblage of influential actors in the city.

2.5.2.3 The Envisioned Impact

Becoming a pilot city in the REFLOW project allowed for Milan to act on their urban food system by focusing on its key players. These include the Municipality of Milan, wholesale market operators, retailers, logistics companies, active citizenship organisations, and citizens. Through this focus, the Milan pilot set out to reach their envisioned impact of a circular economy transition in their urban food system – a cornerstone in the city-wide transition.

2.5.2.4 Pathways to Change

Realising this change is made possible by the Milan pilot through enabling access to a new of operating within the value chain based on the tracking of materials and processes to the key players of the urban food system. To set the stage for this change, the Milan pilot's pathway to change was founded on the framework of connecting a multitude of different actors in the urban food system, including large municipal enterprises, wholesalers, universities, FabLabs, and makerspaces, and allowing for possible paths of circular and social innovations to emerge from these collaborations. Principles of co-creation, co-design, and co-production to test and prototype with this diversity of actors provided the basis for the development of the pilot solutions that preconditions the grounds towards their circular food transition. In the co-creation phase, workshops with some of the key actors in the urban food system were undertaken. Through the workshops, the co-creation of scenarios was produced and provided the foundation which framed the setting for the activities undertaken, the outputs produced, and the subsequent results achieved. Following the definition of the co-created scenarios, the co-design phase worked together with the set of key stakeholders to further define the scenarios. Facilitation of key outputs and activities in line with the co-created scenarios emerged through a series of co-design workshops and activities between the Milan pilot and key stakeholders. Building off from the further defined outputs and activities realised through co-creation and co-design, the co-production phase tested and developed the prototypes for circular solutions based on the assessment and definition of



the key stakeholders needs and feedback as a starting point. Transpiring out of these core actions came the co-development of the tangible outputs of the Milan pilot, through which the pilot manoeuvred its way towards generating results leading to impactful and lasting change.

2.5.2.5 The Pilot Solutions

2.5.2.5.1 Milano Prima Seconda

Milano Prima Seconda is a distributed system of mapping, collection and exchange of waste materials as a starting point for different, higher value products produced through upcycling. The system supports organisations (SMEs, start-ups, NGOs such as Ibrida Birra) that claim to have a closed circular loop, but do not have the technical tools to track and trace which can prove this circularity. Milano Prima Seconda functions as a monitoring system that validates the participation in these processes and makes the values of the Circular Economy accountable through monitoring declared data and processes. The solution is founded upon REFLOW OS to track and trace supply, demand, and usage of surplus food/by-products. It collects data from surplus food producers (such as bakeries who produce bread) and food/beverage processing businesses (such as breweries who upcycle this food waste or by-products). Through the implementation of Milano Prima Seconda, the Milan pilot produces key outcomes for actors working towards circular change in the urban food system. These outcomes include:

- **Process visibility:** The track and trace system make users aware of the quality and quantity of material available (quantity, quality, localization). Further development of the platform could provide sustainable accountability of the processes implemented into the system.
- **Process accountability:** the system displays the pilot's stakeholder results, making data and processes visible and readable. Some basic features of the system Milano Prima Seconda are tested in collaboration with the Ibrida Beer project, a quality craft beer made with everyday surpluses from local bakeries. Unwanted bread becomes an ingredient to produce quality beer, replacing about one-third of the raw material "malt" needed for production.

In line with the bottom-up principles of co-creation and co-design, the development of Milano Prima Seconda was born out of collaboration with the key stakeholders – AMSA and Ibrida. With the Milan pilot acting as facilitators, they took the stakeholders through co-design workshops starting from the proposal of the design scenario to identify the areas of opportunities and critical issues related to the development and implementation of Milano Prima Seconda. From there, this feedback and insights were translated into emerging considerations for the strategic choices in the generation of the Milano Prima Seconda concept and the co-designing of its elements (hardware and/or software) and its eventual co-production of the prototype and testing.



2.5.2.5.2 BOTTO (Foody Zero Waste)

BOTTO is an automated communication system for surplus fruit and vegetable products made available by wholesalers operating within SogeMi to selected stakeholders (such as Recup). BOTTO incorporates signal and tracking to facilitate the reallocation of surplus/unwanted food between fruit and vegetable wholesalers.

Targeting both suppliers of surplus/unwanted food and those demanding the reallocation of food, the implementation of BOTTO introduces and gives access to these actors, new ways of operating their food flows. On the demand side, BOTTO makes it possible for actors to have a quick and real-time snapshot of the available food. Thus, charities on the demand side, spend less time coordinating the redistribution of food and the logistics involved with these activities. As a result, they are able to plan and organise their work better as they know in advance what and how much food is available. With the BOTTO solution, the unpredictable supply from markets (i.e. the type and the amount of food which varies greatly and challenges the organisations who aim at utilising the food) is addressed. Moreover, wholesalers do not need to struggle with coordinating their own supplies of food supply, where BOTTO allows for these actors to easily display their supply to a range of charity organisations while also easily defining an agreement with them. Together, this makes the exchange through the solution more efficient and less time consuming from both ends. It is also an opportunity to digitise flows, monitor the movement of goods, generate timely data and rework them for both internal and external purposes which is highly useful for all the stakeholders involved.

The realisation of BOTTO came to fruition through the involvement of the intermediary association, RECUP, who processes and redistributes food to organisations catering to people in need, and SogeMi, which is the general market that hosts wholesalers. Their contributions to co-creating, co-designing and co-producing the prototype were critical activities in BOTTO's materialisation. Inputs from these stakeholders also ensured that the output of these interactions were incorporated into the final solution and worked towards the Milan pilot's outcomes alongside the individual aims of the stakeholders using BOTTO. The testing phase of BOTTO has involved the fruit and vegetable wholesalers in the SogeMi general market, RECUP, and the Italian Red Cross.

2.5.2.5.3 Food Market 4.0 Dashboard

The Food Market 4.0 Dashboard is an integrated system of both hardware and software solutions aiming to prevent food waste. The system allows for the tracking, management, data analysis and servitisation of food flows in the covered markets in Milan. Food Market 4.0 Dashboard includes inventory tracking,



logistics planning, and controlling for the inbound and outbound fruit and vegetables flowing through the municipal markets. Additionally, Food Market 4.0 Dashboard also provides physical touchpoints such as a smart scale and reusable boxes with integrated RFID.

Food Market 4.0 Dashboard comprehends markets as neighbourhood (logistics) hubs. It sees these places as actors stimulating the transition towards circular business models based on sustainable processes of access, consumption and use of products and services linked to the agri-food system. The covered markets are thus a distributed system of “hyperlocal” logistics platforms that integrate or support the development of services on an urban scale. With Food Market 4.0 Dashboard, municipal markets have access to: intelligent systems for the tracking and storage of goods to facilitate the supply and sale of agri-food products (internal and external smart tracking and storage system), sustainable systems for the management of order and delivery of agri-food products (inbound and outbound smart delivery system), and infrastructure for spaces inside and outside the market equipped to attract and promote the local movement of goods and people or the development of new services (such as smart mobility, smart picking, etc.).

The involvement of key stakeholders along the process of food flows in co-design workshops was a key activity towards the creation of Food Market 4.0 Dashboard. By integrating all actors across the flows of food, they have given inputs of their realities and ensured that the co-production Food Market 4.0 Dashboard could be used to optimise their actions, resulting in an overall waste reduction of food and packaging. The testing phase of Food Market 4.0 Dashboard has centred its operations at the Morsenchio Covered Market with a fruit and vegetable vendor.



Paris

Exploring and Describing Change



2.6.2 Narrative of Change

The Theory of Change in the Paris pilot is based on the premise that *a city with a culture of circular events and circular temporary constructions* can occur:

- If reused wood materials are available in an easy and efficient way for reuse actors and specialised and non-specialised actors have access to a fully developed and integrated pool of resources and digital tools
- And if wood material is reused between different events or temporary architecture and its use in the event industry is facilitated
- And if awareness around circular practices and technological solutions for CE is raised amongst professionals of the event and temporary industry
- Then there will be a shift in the mindset of construction stakeholders; and available materials will become a mandatory input/constraint/entry point for any design choice; and there will be proposes for changes in waste regulation and temporary events regulation developed in line with circular principles
- And then there will be an increase in the reuse of wood and timber in Paris

2.6.2.1 The Challenge

The environmental costs of resource extraction, waste generation, and the management of waste in cities has become a major area of concern over recent years. With 70% of the world's population expected to live in urban areas by 2050, these problems will only be exacerbated under the current status quo. The growing amount of urban solid waste has negatively impacted the earth, water, and air across cities and consequently the public health of citizens. This problem has underpinned the Paris pilot's journey in REFLOW. As both a global destination for international events and fairs and as one of Europe's largest global cities, Paris generates huge amounts of wood and timber waste within its events and temporary construction industries. Simultaneously, Paris is dealing with logistical challenges in relation to its resource management and its recirculation of materials back into the city's ecosystem of reuse actors. Additionally, the forthcoming Summer Olympic Games in 2024 will be hosted in Paris and is expected to further aggravate the amount and impacts of wood and timber waste in the city.

2.6.2.2 The Context

Paris is dedicated to making the transition towards circular economy and addressing the challenges of climate change. Focus on climate and energy, local urban planning, urban agriculture development, local waste prevention, sustainable food, and various circular economy practices are already undertaken in



Paris. The transition towards circular economy in the city is guided by the development of its Circular Economy Plan produced by the City of Paris and local authorities of the Paris Region. The Plan focuses in on cultivating a logic of reuse over replacement in five areas of activity including: (1) planning and construction, (2) reduction, reuse, and repair, (3) support for actors, (4) public procurement, and (5) responsible consumption. On top of this, important legislative changes have taken place. Implemented at the start of 2021, the AGECE (against waste for a circular economy) law came into force and set out to encourage the use of spare parts through industry obligations to offer spare parts for any product. Further, a plan to widen the Extended Producer Responsibility within the construction sector, which are the biggest wood waste producers in France has also been provided⁴ (ADEME, 2017). Despite having nation- and city-wide initiatives, legislation, and strategies to frame the grounds under which circular transitions can be made, further timely efforts are needed to connect actors and materials in the city, shift mindsets associated with waste, and to develop circular business models in the management of wood and timber waste produced from events and temporary construction taking place in the city.

Within the context of REFLOW, the project as a whole sets out to show how a rethinking of our current economy and a reconfiguration of the urban metabolism can enable the transition to circular and regenerative cities. As a pilot city, the Paris pilot leverages their global position of influence and involvement in the REFLOW project to tackle the inefficient management of wood and timber wastes in the event and temporary construction industries that have been fuelled by a lack of a common narrative, technological solutions, and circular business models.

2.6.2.3 *The Envisioned Impact*

The REFLOW Paris pilot set out to steer the event and temporary construction industry towards circularity with the envisioned impact of Paris becoming a city with a culture of circular events and circular temporary constructions. Ultimately, the Paris pilot sees their impact through the achievement of continuous support for the event and temporary construction industries economic development through sustainable and circular business models. Setting a good example, paired with uncovering the inefficiencies in existing regulation, could unleash long-lasting impact through national and global political reforms regarding waste management, especially in the event industry.

⁴ See more information on this in D1.3.



2.6.2.4 Pathways to Change

The Paris pilot direction towards making this change a reality focused on creating long-term outcomes to (1) produce a shift in the mindset of construction and design stakeholders whereby available reuse materials become a mandatory input/constraint/entry point for any design choice and (2) influence waste and temporary events regulation developed in line with circular principles, and thus increase the reuse of timber and wood in Paris. The strategic framework surrounding the realisation of these long-term outcomes and eventual impact was administered through the Paris pilot's adopted approach across three core scenarios including: (1) Equip: giving access to a fully developed and integrated pool of resources and digital tools to city actors, (2) Design: advancing the facilitation of reuse wood across the event and temporary construction industries, and (3) Raise awareness and evaluate: raising awareness on practices and technological solutions for CE within the event and temporary construction industries. These interconnected and strategic scenarios laid the foundation for the Paris pilot to develop the tangible outputs – the pilot solutions – which sow the seeds for Paris to reach their desired change.

2.6.2.5 The Pilot Solutions

2.6.2.5.1 The Online Catalogue and the Dimension-use

Dimension-use is a low-cost semi-automated scanning device under creative commons license, coupled with a database, which allows the scanning of reused materials from the construction industry for example. It can be used for different materials (focusing on timber/wood in Paris) through which a network of users is created, developed in partnership with WAO Architecture incubated at Driven. The collected data (through the scanning device) is visible in an online database which facilitates further use of the materials (REFLOW OS), by constituting a large inventory of all the reused materials available in a defined geographical area.

The scanner creates a digital inventory but does not manage it. Therefore, it must be connected to another system (inventory management system or another reuse marketplace). The customer can scan their wood (which they do not have further use for) and the database shows and provides it to potential next users. Reuse is thus facilitated for architects, builders, designers and makers, having access at a glance to all materials available around them. The flow of material exchange (recovery, transfer, resale) is also amplified for storage and resale locations of reused materials, thanks to a visibility increased by digitization, facilitated by the scanner. In doing so, Dimension-use facilitates the flow of reusable materials from the source of production to its reuse, while massifying the amount of reusable materials in that flow.



The online catalogue is an important solution produced by the Paris pilot which increases the visibility and availability of materials for reuse through its connection into existing databases and thus provisioning a distributed network of reuse actors with better access to these materials for their projects and/or businesses. The industrialisation and digitalisation of reusable materials through Dimension-use enables the creation of new standards around managing wood waste, making it easier for existing databases to get more reuse material into it, and ultimately shifting linear mindsets and enhancing access to these reuse materials for specialised and non-specialised actors.

The development of Dimension-use was born out of the beta version of Driven's incubator with WAO, a Paris-based architecture agency. The first prototype was able to scan small objects, the last one is able to digitize object of various size to an online database. This inventory is then accessible via WeLoop.

2.6.2.5.2 Re-Loop Consulting SaS

Re-Loop Consulting SaS⁵ is an umbrella company offering a holistic product-service system that allows for events to increase the reuse and recycling of their waste wood. The solution is delivered through management consulting on how events and temporary construction can enable wood circularity, and through providing tools and solutions like the leasing of Dimension-use (the industrial scanning tool) and the organisation of a distributed storage system through resource centres (Re-Stock).

The outcomes realised through Re-Loop Consulting SaS build upon the integration of resources and digital tools extended to specialised and non-specialised actors while also tapping into the actual facilitation of the wood material reuse in different events or sites of temporary construction. Additionally, Re-Loop Consulting SaS enhances the efficiency of existing resource centres while also increasing the knowledge deposits on how to source, use, disassemble and discard wood construction.

The development of this umbrella company took place across a series of activities related to the development of the suite of solutions developed in the Paris pilot including Dimension-use, Re-Label, and the smart storage process design – ReStock.

2.6.2.5.3 Re-Label

[Re-label.eu](https://re-label.eu) is a labelling tool to quantify and qualify the circular practices of workshops working with wood and other materials. It is designed for designers, makers and manufacturers. The aim of Re-label is

⁵ Formerly referred to as Paris SaS



to facilitate the creation of communities, bringing together all reuse facilitators, to create an exchange of good practices between them, in order to improve the performance of the labelled workshops and designers. Any improvement in circular practices is reflected in the label scores of the productions.

The Re-Label responds to a need for new standards on reuse in product design, furniture, interior design and micro-architecture, to give better awareness to ecological and circular approaches implemented by small associative workshops or by independent designers and manufacturers. It is also a communication tool and a way to promote the manufacturing potential of a territory.

Re-Label equips local makers with the preconditions which enable these actors to attach a value to the hidden circular processes embedded in their work and final product as well as provisioning resources that allow them to build communities and to integrate more circular practices into their work. Through this generation of visibility, the real value of local makers' work is increased alongside increased understandings of value across consumers. Moreover, having variables associated with circular practices valued through Re-Label helps to increase the use of reuse materials amongst these communities and also provides the space for improving collaboration and the exchange of ideas and best practices amongst these communities to ultimately reduce the amount of wood scraps and to facilitate more circular principles into processes.

Close collaboration between the Paris pilot and the actors in the territory to propose a method and simple, accessible tools were fundamental activities leading to the development of Re-Label. This has included the activity of investigating designers, craftspeople, workshops, storage places, temporary places, resources and communities to determine relevant work protocols within Re-Label that could be adapted to the reality of a workshop. Through these foundational activities, the strengths and weaknesses of the territory on subjects of reuse and the real needs of the community of committed actors emerged. Through these underpinnings, the protocols facilitating reuse and circularity were refined and implemented into Re-Label.

2.6.2.5.4 Driven Studio

Driven is a start-up studio for the construction sector that ideates and develops, in parallel, several early-stage applications of computational design and advanced technologies in relation to challenges being tackled in REFLOW through a new approach to start-up creation, incubation and acceleration. Instead of offering support and mentoring of already established start-ups, Driven ideates the solution based on their inhouse experience with the knowledge of the challenges and areas of opportunities of



the sector. The Studio then sources and hires young talents and researchers to further develop these solutions based on a co-founding model. The start-ups coming out of this process are invested in both by the Studio and external investors, in exchange for shares. By using a tested and proven methodology for turning innovative ideas into successful companies, the Studio ensures the investors ROI and the financial sustainability of the Studio without the need for public funding.

Driven Studio produces important outcomes that set out to reach circularity in the construction sector. Through the involvement with the Studio, the production of innovative services and new business models foster new connections between resources, reuse professionals and reuse customers equipping them with the know-how of circular solutions and tools into their practices. Further, the generation of best practices from the incubated projects emerging from the Studio prepares the grounds to inform future businesses in the pipeline and to prepare the grounds with the support for the development of new companies working with CE solutions.

The development of the Driven Studio started with addressing the need for a space to explore the connections between advanced computational design strategies in early stage entrepreneurship for circular economy. The challenges that creative professionals were experiencing in building strong business models to take their impactful projects and ideas forward provided an important basis for developing Driven Studio. Moreover, the observation of a lack of connection between creative communities, academic research institutions and big corporations within the construction sector carved out the path for the emergence of a solution that could bridge these gaps in the support and to support the creation of new radical solutions of business. Important activities including running of rounds of the incubation program with 3 to 5 projects in REFLOW and offering supporting activities to these projects in the shape of concept definition, business model definition and the establishment of the company through access to knowledge, mentoring, a connected ecosystem, facilities, and the REFLOW network, the solution was prototyped and born.



Vejle

Exploring and Describing Change



2.7.2 Narrative of Change

The Theory of Change in the Vejle pilot is based on the premise that to *reduce plastic waste and increase plastic recycling* can occur:

- If there are new solutions that decrease the use of plastic in the healthcare sector
- And if there are new circular loops created for specific plastic types
- And if there are better and more intuitive sorting systems and information in apartment buildings
- And if the local community is empowered and has the knowledge capacity
- And if plastic packaging loops in retail can be tracked and traced
- Then there will be an empowered local community of active and informed citizens; and these solutions, models, and methods can be scaled across other contexts and scales

2.7.2.1 The Challenge

The problematic effects of a linear plastic model underpinned the logic of the Vejle pilot in REFLOW. These are evidenced in the environmental degradation of the planet through unsustainable levels of fossil fuel extraction, toxic production processes, single-use plastics, non-recyclable plastics, and polluting disposal methods. After several decades under this linear regime, the plastic problem in Vejle has resulted in the annual generation of 8,600 tons of plastic waste with over two-thirds of this waste ending its life in the incinerator¹. Not only does the burning of plastic release toxins that are harmful to human health into the air, but it also shortens the lifespan of plastic waste as a valuable resource. High rates of plastic use and low rates of plastic recycling and reuse across citizens, businesses, and public institutions in Vejle was the status quo. These linear and unsustainable plastic behaviours stemmed from a lack of methods and tools to realise plastic recycling and replacement, a lack of infrastructure and collaboration across stakeholders, as well as a lack of buy-in towards innovative solutions tackling the linearity of plastics contributed greatly to the plastic problem in the city.

2.7.2.2 The Context

Vejle's dedication to resilience and sustainability has played out in its frontrunning position as Denmark's resilience capital and its work towards co-creating a smart city focused on social cohesion and climate resilience. The Municipality has also made concrete steps in recent years to maintain this title while also tackling the topic of plastics and circular economy. In 2020, the Municipality of Vejle released their new waste plan, and in collaboration with the aptly named RessourceCenter Vejle, important contributions to guidance and knowledge on CE and plastics are being made. These local initiatives go hand-in-hand



with Denmark's National Plastic Plan bringing the attention to plastic recycling and circular economy. The National Waste Plan further reinforces circular transitions in Denmark by setting the goal to advance the circular economy and to reduce 70% of greenhouse gas emissions associated with waste by 2030. Further, the recent action at the national level to improve the sorting behaviours of citizens has resulted in the introduction of the 10 waste fractions – an important step towards closing the loop on plastics and other materials. The cross-pollination of this local drive and ongoing momentum for circular economy and plastics at the national level has centred Vejle in an optimal position to enact impactful change within its plastic material streams. While progress has been in Vejle to address problematic plastics and its linear mode of production, consumption, and disposal, bottom-up approaches which focus on the reality of citizens needs were lacking. Within the context of REFLOW, the project as a whole sets out to show how a rethinking of our current economy and a reconfiguration of the urban metabolism can enable the transition to circular and regenerative cities. As a pilot city in REFLOW, the Vejle pilot capitalises on the project's citizen-centred focus and uses this context to draw in a constellation of citizens across the city's Vestbyen neighbourhood to collaboratively tackle the problem of linear plastics.

2.7.2.3 *The Envisioned Impact*

The envisioned impact of Vejle is the reduction of plastic waste and the increase in plastic recycling. Becoming a pilot city in REFLOW afforded Vejle the perfect opportunity to create long-lasting impact from the bottom-up by transitioning their plastic value chains from linear to circular. The Vejle pilot's focus on plastic and plastic waste allowed them to tackle not only the challenges of the material, but also to uncover the opportunities that could be created from its recirculation and the co-creation of citizen-focused interventions.

2.7.2.4 *Pathways to Change*

The achievement of this envisioned impact towards change placed a large emphasis on the citizens of Vejle as empowered, active, and informed changemakers. By activating a citizen movement supplemented by the future scaling of the Vejle pilot's solutions, models, and methods across other contexts and scales, circular plastics will be a reality. The Vejle pilot strategically approached this framing for change by laying out the foundation for their journey based on: (1) working from the bottom-up, based on the real needs and reality of human beings, (2) co-creating solutions across segments and social boundaries, (3) working with change from the perspective that it is people who must drive it, (4) anchoring from day 1 of the project (governance).



Alongside this strong bottom-up, citizen-driven approach, the Vejle pilot diversified their pathways to change across the selection of three micro-scale test sites in the Western neighbourhood of the city – Vestbyen. These test sites were selected based on the plastic analysis conducted by the Vejle pilot at the beginning of the project and which were decided upon by the pilot's local steering group committee made up of politicians, community members, and experts. These test sites included a retail store in the supermarket chain REMA_1000, the public housing block Den Gamle Gård, and the public elderly home Sofiegården.

In REMA 1000, the test site focused on the recycling of the large amount of plastic used in packaging of food. At the test site, they focused on how they could, together with relevant members of their value chain, create new circular loops for specific plastic containers and products. They also worked towards making citizens aware of the high consumption of plastic used for food and involved them in the problems associated with the large plastic consumption of grocery stores. At Den Gamle Gård test site, making residents of the public housing block better at sorting waste and making sorting easier for them was a key focus. Lastly, at the Sofiegården test site, the public elderly home in Vestbyen focused on reducing their consumption of plastic and increasing the degree of sorting. By doing so, they could increase the recycling of plastic in the health sector while also providing this test site as a source of inspiration for the entire health area. Across the three micro-scale test sites, the pilot ran targeted experiments, design workshops, and engagement sessions to identify and showcase solutions for increased plastic reuse, recovery, and reduction.

The focus on gaining insights on urban plastic consumption from citizen-level perspectives and activities to realise the circularity in the city's plastic value chains has led to the tangible outputs of the Vejle pilot. The co-creation of the circular plastic solutions represents the crucial outputs of the Vejle pilot fertilising and preconditioning the grounds for change.

2.7.2.5 *The Pilot Solutions*

2.7.2.5.1 Renewed Sorting System for Food Retailers

The Renewed Sorting System is an easy, intuitive sorting method that fits into food retailer's store workflows – tested in one store and on its way of scaling to all REMA 1000 stores in Denmark. Through this solution, the optimisation of sorting possibilities is made possible while also integrating the legislative obligations in Denmark which stipulates the sorting of waste into 10 fractions.



A crucial step towards increasing the recycling of plastic involved providing the right conditions for sorting correctly. The Renewed Sorting System for Food Retailers puts forward these conditions by provisioning actors at the REMA 1000 test site to good sorting solutions which function well within their daily operations. With the solution scaled to all REMA 1000 stores in Denmark (approximately 360) and over time, scaled across the entire Reitan Group in Northern Europe (approximately 1,900 stores), the seeds are sown for not only better sorting practices at the REMA 1000 test site, but also Vejle, Denmark, and beyond. This scaling process in REMA 1000 Denmark stores is already being implemented and is expected to finish at the beginning of 2023.

2.7.2.5.2 Value Chain Game

The Value Chain Game is a physical game that helps construct an outline of the value chain in companies and organisations through gamification. The game is connected to REFLOW OS and builds upon the ontology from the OS. The user of the game (retailers such as REMA 1000) maps out the value chain flow of a specific plastic container or product at a time and answers questions such as: Who are your suppliers? Who do you need to get in contact with? What happens to the material when it is used or thrown away? What kind of new loops are possible for the material?

The gamified understanding of the value chain bridges the knowledge gap of the users about the value chain of plastics and enables them with new founded abilities to increase the circularity of their plastic streams through playful tactics. Consequently, this leads to a mapping of the value chain as well as an overview over possible loops – the game thus helps the reduction of plastic use and increasing the rate of reusing or recycling plastics. Important outcomes towards long-lasting impact are already achieved in the REMA 1000 test site through the Value Chain Game. This solution has laid the foundation for REMA 1000 to identify potentials within recycling certain plastic containers such as candy boxes and flower buckets. This has kickstarted the investigation and testing into possible futures of recycling these plastics into new REMA 1000 products.

Fundamental co-creation activities underpinned the process towards the development of Renewed Sorting Systems for Food Retailers and the Value Chain Game. These activities consisted of collaborative efforts including:

1. Clarification of needs and possible collaboration opportunities (synergies between REFLOW and REMA 1000's ambitions on circular plastic)
2. Interviews with local store and REMA 1000 group level
3. Identification of collaborations / efforts with management and local store



4. Formulation of a common vision with the management - what will we achieve and how?
5. Selection and prioritization of ideas
6. Workshops with the relevant stakeholders for each prototype
7. Development of prototypes
8. Testing the prototype through ongoing dialogue with REMA 1000
9. Collecting endline data through waste analysis and interviews

2.7.2.5.3 Better Sorting Systems in Small Apartments

Better Sorting Systems in Small Apartments is a set of “recycling bin packages”, made up of different types of bins and combinations, adapted to a diversity of household characteristics including number of family members, size of the kitchen, habits, and other aspects. The Better Sorting System’s bin packages are also supplemented by efforts to make sorting and recycling of plastic and other waste more tangible and visible for residents at Den Gamle Gård test site. This incorporated the showcasing of a flowerpot prototype made from household plastic waste.

To accelerate the movement towards circular plastic streams, the bin packages grants residents at Den Gamle Gård test site with necessary conditions to move past the very practical barrier for correct waste sorting – namely, fitting bins for all 10 waste fractions into the comforts of their small kitchens and apartments. The bins intervene in waste sorting practices of residents, making it easier for them to sort their waste at home before placing it into the waste containers in the yard. Accordingly, through easier and more intuitive sorting practices conditioned by the bins, the issues of plastic in residual waste are solved, while subsequently increasing the amount of waste that is being correctly sorted for recycling. Concurrently, awareness creation is also facilitated through turning the notions of household plastic waste into a real, tangible, and visible output as a communication method for showing the value and results from improved sorting. By making new products born out of household plastic waste visible and sensuous, increased community commitment to waste sorting and relationships to everyday resources becomes more meaningful for citizens.

The following collaborative activities with the citizens of Den Gamle Gård, Wild Studio (a small circular business), Ressourcer & Genbrug and the housing association AAB were central to developing Better Sorting Systems in Small Apartments.

1. Clarification of needs - how can the residents of DGG become better at sorting their waste?
2. Identify barriers and potentials in dialogue with residents' groups and housing associations
3. Formulation of a common vision - what will we achieve?



4. Joint idea development with resident group and selected actors (including companies, designers)
5. Selection and prioritization of ideas with resident group
6. Development of prototype
7. Testing the prototype through ongoing dialogue with resident group and AAB Vejle
8. Collecting endline data through waste analysis and interviews

2.7.2.5.4 Mobile Sorting Unit

The Mobile Sorting Unit is a mobile and compact device that allows the staff at the elderly home test site, Sofiegården, to sort more efficiently and seamlessly while doing their other tasks. Additionally, special sorting instructions are provided to give an overview of the correct sorting of plastic types as well as hazardous waste. Due to the circumstances of an elderly home, with residents in these institutions often not capable of sorting themselves, and staff being required to keep a high tempo work pace, sorting solutions cannot be complicated. Thus, sorting waste should not result in increased work, but instead, should be an easy and intuitive practice.

The Mobile Sorting Unit primes the healthcare sector with the capacity and inspiration to increase correct sorting and thereby, reduce the amount of plastic waste that ends up in residual waste which is subsequently being incinerated. This inspiration is founded in the positive outcome of better sorting at Sofiegården activated through the Unit – leading to a greater change in plastic streams in healthcare and further extending this reach to other institutions such as schools and day-care centres.

Together with employees at the Sofiegården test site and a product designer, the development of the Mobile Sorting Unit came to materialisation.

2.7.2.5.5 Circular Procurement Policy

The Circular Procurement Policy is built from a case from the Sofiegården test site and translated into new methods and tools to integrate more circular and greener purchases in the Purchasing Department of Vejle Municipality. The case is based on the fact that a number of nursing products, such as diapers, are currently ordered under the resident's social security number. Unfortunately, if there is a case where the resident receiving the diapers passes away, the unused products are not allowed to be used by others leading to their eventual disposal as residual waste – making up a large number of usable resources being waste. The tools and insights making up the cases as part of the Circular Procurement Policy are also based on recommendations and research on existing tools carried out with WP4, DDC, and the Vejle pilot as well as a test process with diapers at Sofiegården.



Having a Circular Procurement Policy generated from the real insights from Sofiegården points to the potentials of what a changed procurement policy in the Municipality can look like. The change towards circular plastics in Vejle is a reality for the Municipality, who now has the tools and insights it needs to decrease the amount of plastic used in products and packaging coming to the Municipality through both tenders and contracts.

The process of getting to these two solutions at the Sofiegården test site took place over a series of activities between the Vejle pilot and actors at the test site including:

1. Clarification of needs - how can reduce the consumption of plastic and generally become more circular?
2. Identification of barriers and potentials in dialogue with the staff group
3. Formulation of a common vision - what do we want to achieve through our solutions?
4. Joint idea development with staff group and selected actors (including companies, designers)
5. Selection and prioritization of ideas with employee group
6. Development of prototype
7. Testing the prototype through ongoing dialogue with employee group
8. Collecting endline data through waste analysis and interviews

2.7.2.5.6 Biomaterial Experiments and Development

Biomaterial Experiments and Development are workshops (organised in collaboration with Materiom) carried out with makers and start-ups to inform and inspire these actors on the potentials of bio-plastic materials. During the workshops, a dedicated session to business model recalibration was incorporated challenging and helping participants to imagine how biomaterials could be integrated into their current business models.

Through the experimentation and development workshops on biomaterials, these moments of interaction with makers and start-ups gives way to increased awareness and knowledge of plastic alternatives and activates the exploration into experimenting on plastic alternatives which lead the way towards new methods and tools to reuse/replace plastic in products.

Leveraging off of the innovative home and meeting place in Vejle, Spinderihallerne, the Biomaterial Experiments and Development were held here in their local FabLab.



2.7.2.5.7 Exhibitions

The Exhibitions were held in Vejle's innovation hub, Spinderihallerne. The Exhibitions consisted of two occasions where the Vejle pilot set up engaging and informative materials at Spinderihallerne. The first exhibition (opened in November 2020) entitled "Rethinking Plastic" centred around the potentials related to waste sorting and the reuse of plastic, alongside a showcase of the Vejle pilot's focus, processes, and work in REFLOW. Art, design, and product elements were used to increase awareness and tap into the curiosity of visitors and participants. The second exhibition (opened end of April 2022) built upon the first with supplemental presentations from each of the local test sites including the co-created solutions that emerged from them. Moreover, the second exhibition became a more interactive experience through the inclusion of workshops and events, as well as interactive elements integrated into the exhibition. Materials developed in the previously mentioned Biomaterial Experimentation and Development were presented alongside educational material created by Mind the Future. This educational material is developed for primary and lower secondary schools to be used during class visits to Spinderihallerne.

Through implementing Exhibitions, the Vejle pilot fed directly into the overall vision of REFLOW to develop circular cities in co-creation with local actors, citizens, organisations, and public institutions. Further, raised awareness and intrigue into the possibilities of waste sorting and reusing plastic were sparked through the versatile forms of dissemination including turning the complexity of the theme into a more accessible, concrete, and relatable topic, suitable for a wide range of audiences from many different backgrounds.

The initiative has been created by a wide range of stakeholders – Artist Maria Viftrup, Innovation team Vejle Municipality, SDE, FabLab, designers, Waste Management Vejle, entrepreneurs and SME's, Aage Vestergaard Larsen, Danish Design Center and many more.



2.8 Theory of Change Conclusions

This chapter has described the pathways of change that the six pilot cities have explored and undertaken during the REFLOW project. The chapter has also presented the final iteration to the Theory of Change for the pilot cities. The exploration of change has been carried out across several iterations to the pilot cities' Theory of Change as a way to understand and visualise the changes that the pilot cities have envisioned and how they believed these would occur.

Within the context of the project impact assessment task, the Theory of Change has revealed that pathways to circular and regenerative cities can take different forms and routes based on the specific challenges, context, and starting points of the REFLOW pilot cities. Moreover, the outcomes and chain of events which produce the pilot cities' societal impact varies across the specific contexts in which the cities create and implement interventions and the focus which they have defined.

The Theory of Change as a methodology has proven to be an important foundational resource for the pilot cities within REFLOW to support them in the planning and definition of their envisioned impact and to build a blueprint of meaningful activities that allow them to reach their desired change. The iteration process implemented in the REFLOW project has also allowed the pilot cities to question their assumptions across the chain of events thought to produce societal impact. In this way, the pilot cities have been able to evaluate their pathways of change throughout the timespan of the REFLOW project and to better define strong connections that work towards long-lasting impact.

To monitor and track progress towards impact, the pilot cities have furthermore linked their pilot-specific Key Performance Indicators to the corresponding activities and outputs mapped out in their Theory of Change. Along these lines, the pilot cities have been able to evidence and measure the change within their distinct, yet related journeys. The next chapter, Key Performance Indicators, presents these results across the six pilot cities revealing their quantified performance as they worked towards their objectives during the REFLOW project.





Chapter 3

Key Performance Indicators

Measuring and Evidencing Change



3 Key Performance Indicators: Evidencing and Measuring Change

This chapter presents the achieved Key Performance Indicator (KPI) results for each of the pilot cities over the duration of the REFLOW project. It further extends upon the work presented in D1.3 The REFLOW Framework where the final list of KPIs for each of the REFLOW pilot cities were originally presented including their target and monitoring approach. The Key Performance Indicators are pilot specific and were based on the proposal KPIs from the Grant Agreement and the co-creation processes undertaken with the pilot cities and WP1 and WP3. The KPI co-creation process is detailed in D1.3 The REFLOW Framework.

The chapter is subdivided into individual pilot city sections where their achieved results are presented across both socio-economic and environmental KPIs. Moreover, this chapter reaches across the other deliverables and work carried out in the REFLOW project. As a result, references to other deliverables are made within this chapter.

3.1 Methodological Approach to Evidencing and Measuring Change

To evidence and measure change, the pilot cities and WP1 and WP3, worked to identify monitoring approaches for their individual KPIs prior to the submission of their finalised KPI lists in D1.3 in M24 of the project. The monitoring approach outlined how the progress of a given KPI would be monitored, which includes the following:

- Scale: whether the KPI would be monitored on a neighbourhood, city, test site, or national scale
- Regularity: how often the data would be analysed and reported
- Stakeholders: who the key groups were that the KPI observes
- Lead organisation: which partner organisation from the pilot city team would be responsible for the data collection and monitoring of progress

Following the finalisation of the KPIs in M24 presented in D1.3, the pilot cities in close collaboration with WP1 worked together to connect the KPIs with the activities, outputs, and outcomes within the pilot city action plans – mapping them out onto the Theory of Change visualisations. This was undertaken to ensure that the KPIs were being used to drive the performance of the pilot cities' activities and the goals they were working towards. Over the course of the project, the KPIs across the pilot cities were tracked through important milestones such as the Material Flow Analysis in D3.2 and the Action & Event Tracker on the Pilot City Framework. Moreover, the lead organisations responsible for the monitoring of



progress for specific pilot city KPIs undertook these activities through both quantitative and qualitative methods of data collection such as interviews, surveys, and questionnaires distributed to stakeholders. The data collection and reporting of the KPIs was carried out by the pilot cities with the support from WP1 and WP3. Pilot cities reported their KPI results within a centralised reporting system set up by WP1.



Amsterdam

Key Performance Indicators



3.2 Amsterdam

3.2.1 Achieved Results

The final list of KPIs for Amsterdam, including the monitoring approach, can be found in Annex 7.1. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information. Furthermore, the sections are divided into socio-economic KPIs followed by environmental KPIs.

KPI	Achieved Results	Projected Target
Number of business models developed	3	5
Overall stakeholder satisfaction with new models	88%	80%
Number of new initiated developments for textile waste developed	14	10
Number of local makers and business reached through showcases	2,653	2,000
Number of citizens engaged through educational programmes	1,503	500
% of textile regenerated (current 20% of complete stream)	26%	25%
% of textiles diverted from incineration	26%	20%
Amount of AMS textiles with a second life through REFLOW OS	0 kg	3 Swapshops x 15k kg = 45k kg
% of reduction in textile waste found in mixed waste	0%	20%
CO ₂ reduction through REFLOW activities	604 tonnes	Reduction of 2.6 kton
Number of textile specific city resources identified (materials, infrastructures, etc.)	200	100
Number of specific textile streams identified	11	10

Table 1: Amsterdam KPI Achieved Results Overview



3.2.2 Socio-Economic Impact

The following sections present short descriptions of each socio-economic KPI's results and where further analysis can be found across other REFLOW deliverables and resources.

3.2.2.1 Number of business models developed

The development of business models within the Amsterdam pilot involved close collaboration with WP7. Over the course of the business model development, there were initially 5 business models that were considered. These included the Circular Hotel Linen, the Denim Deal, Circular Isolation Gowns, the Swapshop, and the United Repair Centre. With the 5 business models as the initial starting point for discussion and development, these were eventually narrowed down to 3 following their evaluation and potentials. Ultimately, the final 3 business models include the Swapshop, Circular Isolation Gowns, and the United Repair Centre, which can be found in detail in D7.5 Sustainability and Business Plans. The reasoning for this narrowed down focus on the development of business models was based on the connection to the REFLOW project itself. Moreover, it was important that the development of the business models based on the pilot solutions were feasible and constituted concrete business models. For these reasons, the Circular Hotel Linen and Denim Deal were not developed into business models, however, they were still evaluated and considered.

3.2.2.2 Overall stakeholder satisfaction with new models

Overall stakeholder satisfaction with new models was analysed based on the REFLOW Live Events at Pakhuis de Zwijger. The Live Events came to being through REFLOW, centring their themes on circularity and circular textiles. These Live Events were important in disseminating information on the topic of circular economy and textiles. They were also crucial platforms to start and build up conversations and dialogues between a mixture of different actors including textile industry experts, entrepreneurs, researchers, activists, citizens, and more. The Live Events were free and held in the PdZ studios or broadcasted live online. They were also uploaded onto YouTube and can be viewed on the PdZ webpage⁶. The data for this KPI was collected through a survey which was sent out to the speakers at the Live Events to understand and gauge their satisfaction with this new model, the REFLOW Live Events.

There were 22 respondents to the survey. Respondents of the surveys were presented with statements regarding their satisfaction and feelings towards the REFLOW Live Events where they indicated their

⁶ <https://dezwijger.nl/programmareeks/reflow>



scale of agreeance to each. The results were analysed with the Likert-scale. The following table displays the overall results from the respondents.

Statement	Stakeholder Satisfaction Level	Percentage of Satisfied Stakeholders
<i>I feel satisfied with the overall organisation of the Live Events at Pakhuis de Zwijger</i>	88%	91%
<i>I feel satisfied with the format of how the Live Events at PdZ were carried out</i>	92%	95%
<i>I feel satisfied with the quality of conversation during the Live Events</i>	89%	95%
<i>I feel satisfied with the other speakers who were invited to the Live Events</i>	86%	95%
<i>I feel satisfied that many groups were represented at the Live Events such as governance, industry, research and education, and citizens</i>	83%	84%
<i>I feel satisfied that I was heard during the Live Events</i>	87%	94%
<i>I feel satisfied with my involvement in the Live Events</i>	89%	100%
<i>I feel satisfied that my inputs during the Live Events were taken into consideration</i>	87%	94%
Overall Stakeholder Satisfaction with New Models	88%	93.5%

Table 2: Amsterdam Stakeholder Satisfaction Questionnaire Statements and Responses

The stakeholder satisfaction level was calculated based on the average across all the satisfaction statements presented to the respondents. For this, there is an overall 88% stakeholder satisfaction level. Among the respondents, there was also a high overall satisfaction with 93.5% of stakeholders on average feeling satisfied with the REFLOW Live Events model (Table 2).

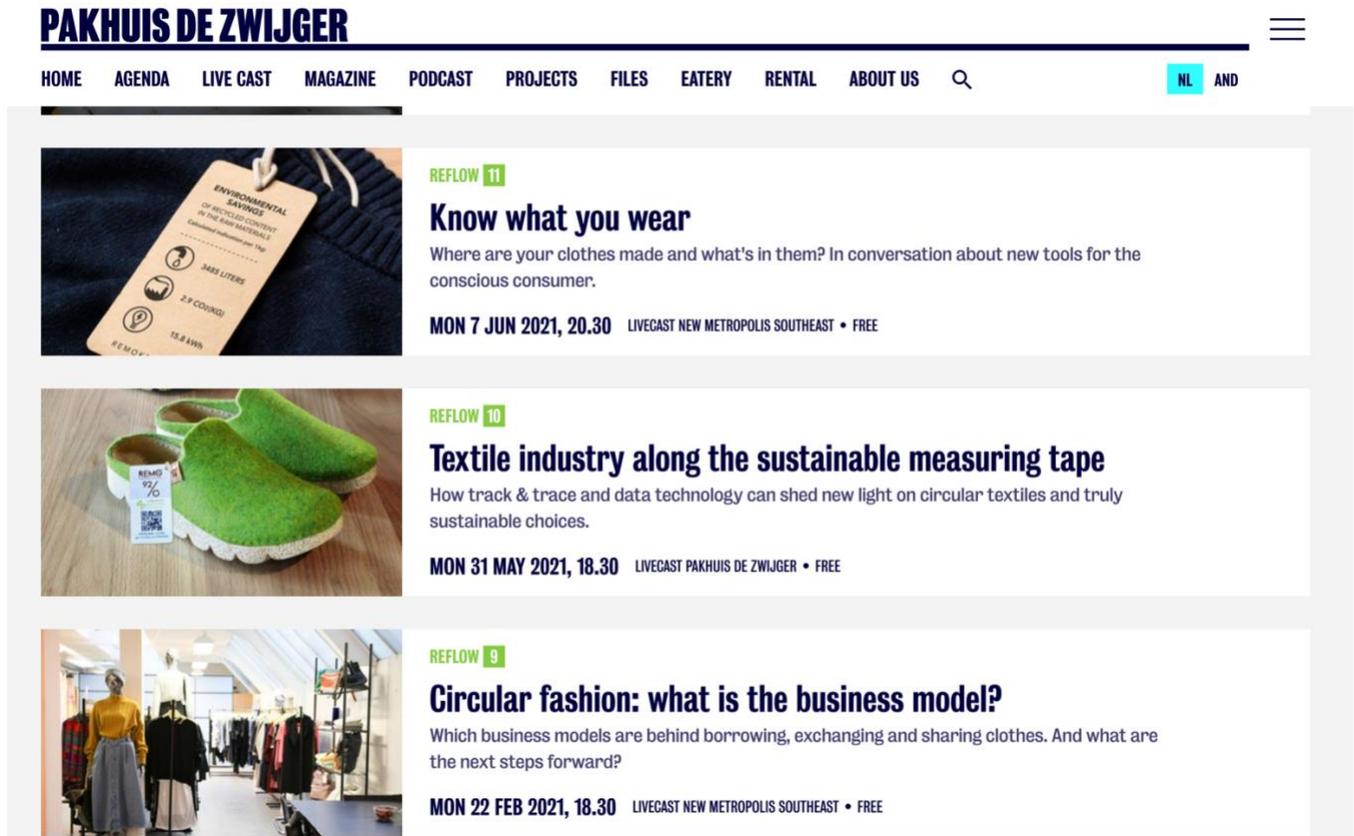


Figure 7: Screenshot of the REFLOW Live Events series hosted at Pakhuis de Zwijger (Source: PdZ webpage)

3.2.2.3 Number of new initiated developments for textile waste developed

14 new initiatives were developed in relation to textile waste through the work of REFLOW in the Amsterdam pilot. The development and full description of these initiatives have been previously reported in D1.4 Validation and Performance Evaluation and can be found in section 2.2.2.5 of this deliverable. These initiatives are as follows:

1. Stadpas
2. Swapshop
3. United Repair Centre
4. Roadmap on Circular Textiles in the MRA
5. Ragman (On-Demand)
6. Denim Deal
7. Circular Isolation Gowns
8. Textielrace



9. OBA Maaktplaat 021
10. Awareness Campaign 2022
11. Markthal Innovation Lab
12. Booklet
13. Livecasts at PdZ
14. Workshops and Maandag Wasdagen

3.2.2.4 *Number of local makers and business reached through showcases*

The showcases described in this KPI entailed the Live Events at PdZ, the dissemination of the Booklet developed by the pilot, the Maandag Wasdag events, and other pilot events. The Amsterdam pilot also held their final event – REFLOW Circular Textile Festival – on 19 April 2022. At this event held at Pakhuis de Zwijger, the Amsterdam pilot was joined by 433 participants across a diversity of stakeholder groups where they disseminated the work done in the Amsterdam pilot, held workshops and talks for professionals and the general public, as well as having a pop-up Swapshop, a mending workshop, and a fashion confession booth. The data was collected by the Amsterdam pilot and updated in the REFLOW project's Action & Event tracker on the Pilot City Framework. The importance of reaching these local makers and businesses has been a key activity for the Amsterdam pilot to gain feedback, communicate with their target stakeholders and audiences, and to disseminate their work within REFLOW.

3.2.2.5 *Number of citizens engaged through educational programmes*

The Amsterdam pilot has focused on engaging with citizens across ages through varying educational programmes. This has included reaching children in 15 primary schools through the Textiel Race⁷ in the city. As part of this fun and engaging programme for children, the Amsterdam pilot involved 45 classes of around 25 students to tackle the challenge of textile waste in the city of Amsterdam. During the Textiel Race, children collected textiles across the city and learned more about textiles including the impacts of textiles on the environment, how they can repair old textiles, and what can be done with discarded textiles. The Amsterdam pilot also engaged children through workshops at OBA (The Amsterdam Public Library Foundation) where children were involved through workshops on "The world of clothing"⁸. The workshops were free and were catered to children between 8 and 12 years old to come

⁷ Textiel Race in Amsterdam: <https://www.nieuwamsterdamsklimaat.nl/actueel/laat-jouw-oude-textiel-ophalen-tijdens-de-textiel-race-1>

⁸ <https://www.oba.nl/nieuws/maak-iets-nieuws-van-je-oude-kleding-in-maakplaats-021.html>



and learn about clothing and the many stories behind these materials. The Amsterdam pilot also adapted the Circular Textile Wheel⁹ as learning materials for the children.

At KABK (the Royal Academy of Art), university students in the Master of Industrial Design programme participated in design projects¹⁰ focusing on ethical and environmental factors involved in the current state of the textile and clothing industry. The students were engaged and able to get hands on with the design research process to explore and map the systems and chains within the industry. The Amsterdam pilot also engaged with students at the Gerrit Rietveld Academie, a university for fine arts and design in Amsterdam.

Hosted by Waag, the Amsterdam pilot carried out an online workshop series called “Don’t let your textiles go to waste”¹¹ where they engaged with citizens who were given the tools and knowledge on how to reuse, repair, reduce, rethink, recycle, and revalue their wardrobes. This series was an important educational programme to provide citizens with the skills and knowledge on extending the lifespan of their textiles and to further raise awareness on closing the loop on textiles in Amsterdam.

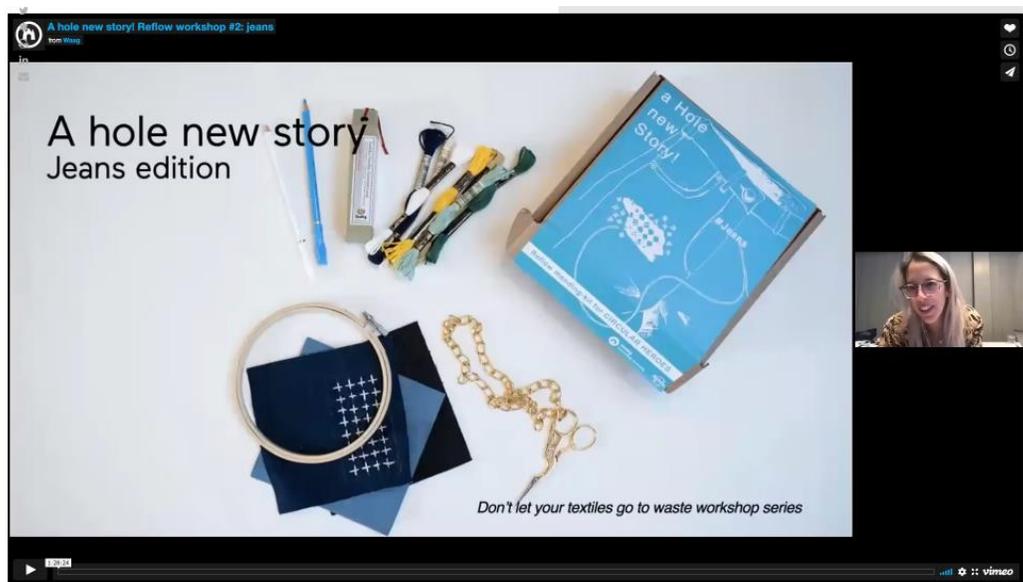


Figure 8: Workshop Series held online by the Amsterdam pilot (Source: Waag)

⁹ See the Circular Textile Wheel here: <https://waag.org/en/article/amsterdam-reflow-booklet>.

¹⁰ <https://www.kabk.nl/projecten/mid-waag-reflow-pilot-textile-lifecycling>

¹¹ <https://waag.org/en/article/dont-let-your-textiles-go-waste>



3.2.3 Environmental Impact

The following sections present the results of the Amsterdam pilot’s environmental KPIs. The results were collected based on the tasks undertaken by WP3 and through pilot data collection. Further assessment of the environmental impact can be found in D3.3 Urban Metabolism Strategy Final Report.

3.2.3.1 % of textile regenerated (current 20% of complete stream)

Regenerated textiles refer to textile materials that go through recycling and reuse processes after they have been discarded and sorted, implying a prolonged lifecycle of these textile materials. Based on the initial urban metabolism scan completed during the beginning of the project, the baseline of textile regenerated stood at 20% of the complete stream.

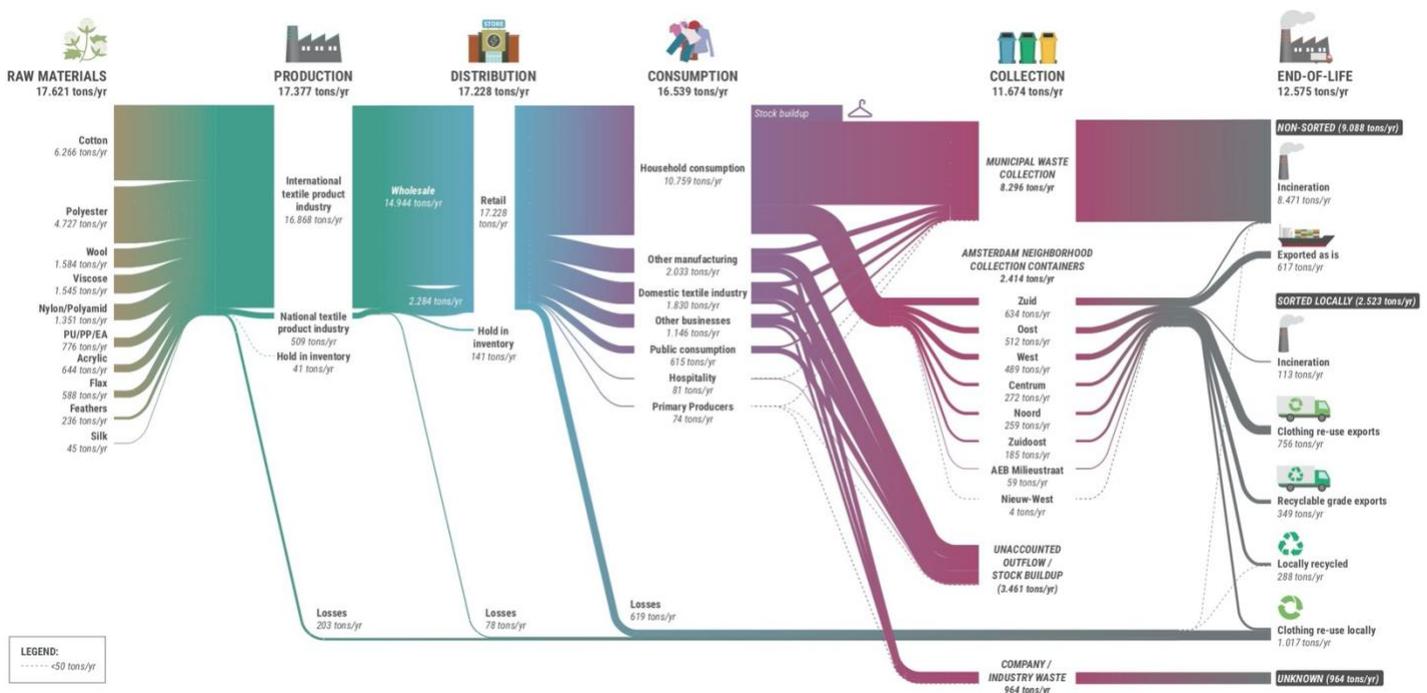


Figure 9: Amsterdam's Baseline Urban Metabolism Scan (Source: D3.1 Circular Principles & Indicators)

The Material Flow Analysis presented in D3.2 Urban Metabolism – Initial Assessments submitted in M24 of the project showed an increase in textiles regenerated – increasing to 26% of the complete stream. Further details on these results can be found in D3.1 and D3.2.



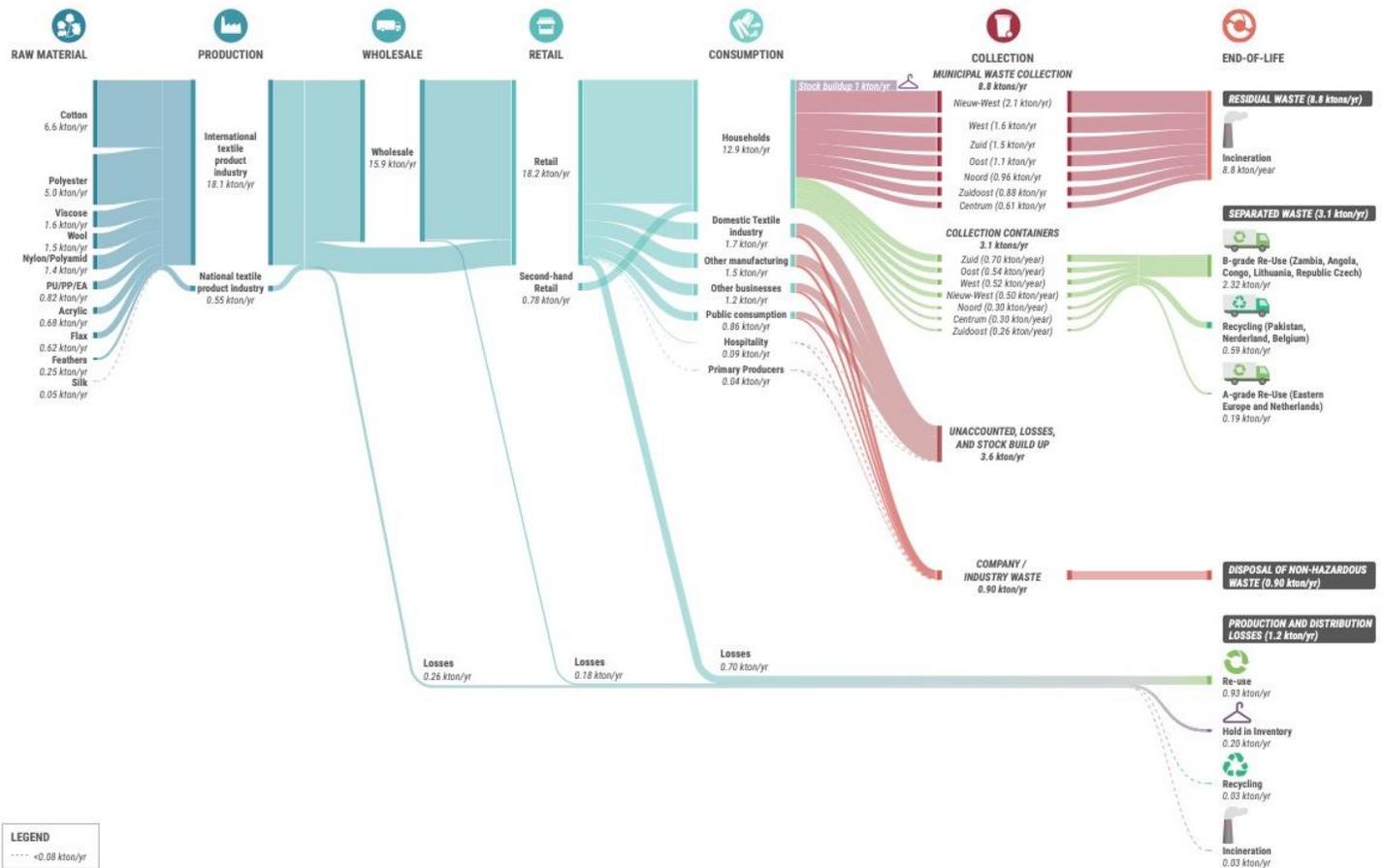


Figure 10: Amsterdam's Urban Metabolism Scan from D3.2 Urban Metabolism - Initial Assessment

3.2.3.2 % of textiles diverted from incineration

Derived from the urban metabolism scan for Amsterdam's textile streams completed during the beginning of the project, a total of 19,7% of textiles had been diverted from incineration based on the proper sorting at the neighbourhood-level within textile containers. This baseline situation showcased an annual total collection of 11.647 tonnes of textiles with 8.296 tonnes collected through municipal waste – thereby, going straight to incineration – and 2.414 tonnes collected through neighbourhood textile containers. The textiles discarded in textile collection containers in the city were then sorted, across both high-value and low-value reuse through clothing re-use exports, recyclable grade exports, local recycling, local clothing re-use, and the export of these textiles as is. In this way, the proper sorting allowed the textiles to be diverted from incineration.



When analysing the MFA undertaken by Metabolic and presented in D3.2, the results showcase an increase in textiles diverted from incineration based on sorting practices at the neighbourhood levels in Amsterdam. This accumulated to 3.100 tonnes of textiles collected in the neighbourhood containers in the city, with a total collection of 11.900 tonnes. As a result, the textiles diverted from incineration reached 26%. This KPI is also closely related to the KPI, *% of reduction in textile waste found in mixed waste*.

3.2.3.3 *Amount of AMS textiles with a second life through REFLOW OS*

The monitoring for this KPI was based on the Amsterdam pilot solution – The Swapshop – where REFLOW OS was deployed as a pilot project to track and trace clothing items. The achieved results of this KPI do not meet the initial target proposed. This is a result of the late implementation of REFLOW OS within the Swapshop pilot site and difficulties with engaging potential swappers. Additionally, there has yet to be an additional iteration in the design and functioning of the application in the Swapshop. Because of this timeline, the pilot testing of REFLOW OS in the Swapshop has only recently begun, and thus, there have not been a high amount of users involved within the duration of the REFLOW project.

Despite these results, the purview of reaching this KPI target with the full implementation of REFLOW OS across the Swapshops (including their 5-year goals for expanding their shops across the Netherlands – see D3.3 for details) is bound to occur in the near future. Currently, the Swapshop reports 7.500 kilograms of clothing which have been donated, 7.500 kilograms of clothing which have been recycled, 60.000 items submitted, and 33.000 items swapped¹².

3.2.3.4 *% of reduction in textile waste found in mixed waste*

The percentage of textile waste found in mixed waste in the city has remained the same since the start of the project. However, this is not a reflection of the efforts that the Amsterdam pilot has made within REFLOW. Under the pandemic, the Amsterdam pilot experienced citizens discarding more textiles. Despite this, the Amsterdam pilot feels positive as these numbers are expected to decrease in the upcoming year. While the KPI has not been reached within the project period of REFLOW, it is important to note that an indicator such as this should be considered as a long-term outcome rather than a short-term scenario.

¹² <https://www.the-swapshop.com/pages/onze-missie>



3.2.3.5 CO₂ reduction through REFLOW activities

The two key REFLOW activities from the Amsterdam pilot used to calculate the CO₂ reduction was based on the Circular Isolation Gowns and the Swapshop interventions. Based on the calculations presented in D3.3, these two interventions resulted in 604 tonnes of CO₂ reduction during the reporting period. However, when factoring in the scaling of these interventions, there is a potential impact of 6,161 tonnes of CO₂ reduction based on these two instances of REFLOW activities within the pilot city. D3.3 provides further details and analysis regarding the calculations, assumptions, and the environmental impact.

3.2.3.6 Number of textile specific city resources identified (materials, infrastructures, etc.)

For this KPI, sorting for recycling including sorting on colour has resulted in the identification of over 200 variants of textiles. From the MFA analysis conducted by Metabolic, there were 9 varieties of textile materials identified that must be sorted out for recycling. For recycling and thus for sorting, it is important to note that Polyester and cotton are commonly used as blends. Most common are 20/80, 30/70, 35/65, 40/60, and 50/50 Polyester/cotton, but also in reverse order Cotton/Polyester. This adds 10 varieties to the expanding list of materials that must be sorted, although in reality only 100% cotton, 100% polyester, and a sort of average blends mixture is sorted. For mechanical recycling, this is doable, however, for chemical recycling this does not work. In addition, wool/Nylon and wool/acrylic blends are also quite common. And of course, we see the blending of cotton and elastane like e.g., in jeans. Again, a variety of textile types.

This means, only based on raw material composition can we easily identify 25 variants. To give an example, Fibersort sorts about 40 types of materials and varieties.

Textiles are used as final products in an endless number of constructions and varieties. However, there are a few basic cloth constructions that can be distinguished: Woven, Knitted, braided and the big group of Nonwovens. For specific technical applications there are more cloth constructions possible like cables of nets. So, at least 60 variants emerge.

However, after cloth production the materials are finished, like dyeing, coating, application of flame retardants etc., each time for a specific use. And now it becomes interesting, and the number of variants explodes!

- Roughly 60% of textiles are used in apparel (fashion, clothing)
- About 15 % is used in interior of home textiles
- 25 % is applied in technical or industrial use.



Textile markets of application areas and in each application textile construction varieties are applied:

Apparel (clothing, fashion)	Cotton, Polyester, various blends of polyester/cotton, viscose, nylon, elastane, wool	apparel, underwear, stocking, shoes, coats etc.
Interior/home textiles: Domestic Hospitality Parts of healthcare Office buildings	Polyester, cotton, polyester/cotton blends, nylon, polyolefins, wool	Bedlinen, towels, blankets, carpets (wool, nylon, polyolefins like PP, polyester), curtains, upholstery, mattresses, etc.
Technical or industrial textiles	All materials depending on application.	<ol style="list-style-type: none"> 1. Textiles for Agriculture: Textiles used in agriculture, horticulture, forestry, farming and fishing 2. Construction Textiles 3. Clothtech Functional (and largely hidden) components of clothing and footwear such as interlinings, sewing thread, zippers, shoelaces, labels, 4. Geo textiles Construction of bridges, dams, roads, railways and paths as well as embankments and sub-sea coastal engineering projects. 5. Industrial Textiles 6. Medical tech 7. Textiles used in transport like Seat covers, seat belts, drive belt, car carpets, air bags, tire cord, 8. Packaging textiles 9. Protective Textiles and professional workwear, uniforms firefighters etc. 10. Sports Textiles

In hospitality and healthcare, the textile service suppliers (laundries) are an easy to define group. Within hospitality and health care (bedlinen, towels, and the like), this material, cotton, polyester and PET/Cotton blends are easy to recover and due to their composition relatively easy to recycle. This is also true for home textiles and bed and bath linen of consumers.

Important for now, is that in technical applications, the manmade fibres, polyester and nylon are dominating, and there is an annual growth viscose or regenerated cellulose use of 5% per year.

The urban region of Amsterdam has about 130 producers, manufacturers, and wholesalers of textiles active. In addition, there are numerous small workshop-like tailors present. Considering the industrial mix in the urban region of Amsterdam, it seems defendable that textile waste includes waste from various sources. The table below gives an estimate based on the assumption that pro rate the urban region of Amsterdam is producing textile waste in line with the global use data.

Source of waste	Material	Relative amounts %	Recycling
Mobility: used cars, trams, tires	Polyester, nylon, viscose,	25	Possible but complex, a lot of coated textiles (car interiors) or mixed with e.g., rubber, polluted material, safety belts, airbags and the like
Industrial: textile products used in the manufacturing sector, purification, mechanical engineering, chemical industry, filters, wipes, felts, ropes, conveyor belt, coated abrasives, cordages Composites Printed circuit boards	All materials are being used here, a lot of Nylon and polyester (filament)	18	Very diverse and complex, a lot of unsolved recycling issues like composites. A lot of polluted material
Sport: artificial turf, sport shoes, tents, gym facilities	PE, PP, nylon, polyester, cotton/viscose	18	Possibly a large deal like apparel

Building and construction: façade membranes, safety nets, awnings, tarpaulins	Polyester, nylon	8	Possible, mainly mono material, often polluted and degraded by prolonged weathering.
Homes: interior textiles, a separate application not in this analysis			
Clothing, not apparel: interlinings, sewing thread, zippers, shoelaces, labels	Polyester, cotton, jute, nylon	5	Possible but mainly products that make recycling more difficult since lower amounts are being used in apparel manufacturing.
Medical: medical and hygiene products, bandages, hospital apparel. implantable products, non-implantable products, and extracorporeal devices, aprons, face masks, and shoe covers. surgical gown, knee and ankle supports	Many nonwovens, polyester, viscose, cotton, nylon	8	Possible but polluted with biological material.
Agro: agriculture, horticulture (incl. floriculture), fisheries and forestry. Shade-nets, Mulch-mats, Crop-covers Anti-hail nets and bird protection nets, Fishing nets	PE, PP, polyester, nylon	6	Possible. A lot of mono materials.
Protective: Ballistic protective clothing – Bullet-proof jackets Fire retardant apparel Fire retardant, Radiation protection textile/NBC suits, High visibility clothing/Foul weather clothing, Chemical protection clothing Industrial gloves/Cut. Slash protection	Polyester, cotton, nylon, UHMWPE (Dyneema). aramids	6	Complex products finished with toxic chemicals or composed of multi materials.
Packaging: heavyweight woven fabrics or bags, sacks, Intermediate Bulk Containers,	Polyester, jute, nylon	5	A lot can be recycled after cleaning, mainly mono material



wrappings for textile bales and carpets. durable papers, tea bags, and other food and industrial product wrappings with modern material used in the food industry, medicine packaging, and electronic parts.			
Geo: reinforcement of embankments or in construction work, civil engineering, earth and road construction, dam engineering, soil sealing and in drainage systems.	Polyester, glass, polypropylene and acrylic fibres	3	Difficult to recycle heavily polluted.

3.2.3.7 Number of specific textile streams identified

Alongside Metabolic, the Amsterdam pilot identified 11 textile streams in the city:

1. Denim
2. Hotel linen
3. Bath linen
4. Clothing
5. Workwear
6. Isolation gowns
7. Upholstery
8. Representative work clothing
9. Blinds
10. Isolation material
11. Sound isolation

The identification of these textile streams helped the Amsterdam pilot to focus in on specific streams for their pilot solutions. See section 2.2.2.5 for more detail on the pilot solutions which have tackled some of the streams identified.



3.2.4 Amsterdam Key Performance Indicators Conclusion

This section has presented the achieved results of the Amsterdam pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

Pertaining to Amsterdam's socio-economic KPIs, the pilot city has reached their projected target for four of their five KPIs. Within the Amsterdam pilot's two core scenarios – Citizen and Industry scenarios – much of the pilot's activities have focused on citizen and industry engagement, education, and awareness which have contributed to this success and the overachievement of the initial projected targets. Moreover, the Amsterdam pilot's key activities in bringing together industry actors have played a significant role in the accomplishments of the pilot's textile initiatives developed through REFLOW – namely the creation of the Roadmap for Circular Textiles for the Metropolitan Region of Amsterdam and the Green Deals Circular Textiles. Reaching these KPI targets sets the ground for long-lasting impact through the creation of strengthening public awareness and connections across different textile stakeholders.

While the number of business models developed within the timeframe of the REFLOW project did not reach its projected target, focus on the quality of the business model development over the quantity became a key emphasis in this KPI's achieved results. The outcomes of this performance have generated viable business models for those supporting circular material flows in the city, strengthening the development of exchange across textile streams and urban actors, and designing for circularity through building sustainable business models which tackle the reduction of virgin fibres used within products and generating services which allow for the promotion of new exchange systems – aiding in the transformation towards circular textile material streams in Amsterdam.

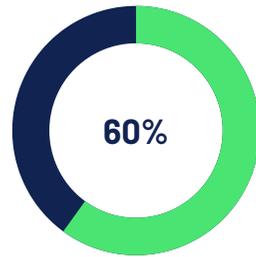
In relation to the environmental KPIs for Amsterdam, the overall achieved results have demonstrated that reaching the target of certain performance indicators is a long-term outcome reflected in the KPI on textiles found in mixed waste. Moreover, that achieving results depend on the time to develop and implement solutions. This is demonstrated in the KPI on REFLOW OS and the amount of textiles which receive a second life through the app. However, the overall achieved results still paint a positive picture of having KPIs in relation to activities which establish the grounds for these long-term outcomes such as identifying textile streams and city resources. While this deliverable has reported on the achieved results of the environmental KPIs for the Amsterdam pilot, a full assessment of the environmental impact is elaborated within D3.3.



Amsterdam Socio-Economic KPIs

Number of Business Models Developed

Projected Target: 5
Achieved Result: 3
-2



Overall Stakeholder Satisfaction with New Models

Projected Target: 80%
Achieved Result: 88%
+8%



Number of new initiated developments for textile waste developed

Projected Target: 10
Achieved Result: 14
+4



Number of Local Makers and Businesses Reached through Showcases

Projected Target: 2,000
Achieved Result: 2,653
+653



Number of citizens engaged through educational programmes

Projected Target: 500
Achieved Result: 1,503
+1,003

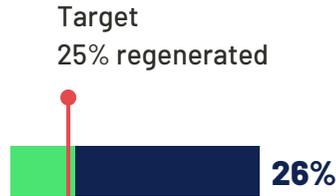




Amsterdam Environmental KPIs

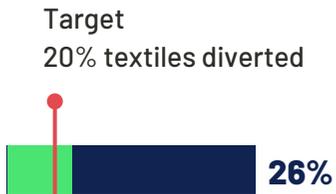
% of textile regenerated

Projected Target: 25%
Achieved Result: 26%
+1%



% of textiles diverted from incineration

Projected Target: 20%
Achieved Result: 26%
+6%



Amount of AMS textiles with a second life through REFLOW OS

Projected Target: 45,000 kg
Achieved Result: 0 kg
-45,000 kg



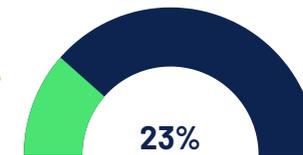
% of reduction in textile waste found in mixed waste

Projected Target: 20%
Achieved Result: 0%
-20%



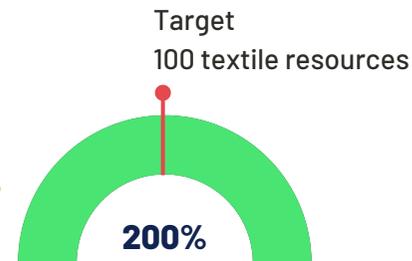
CO2 reduction through REFLOW activities

Projected Target: 2.6 kton
Achieved Result: 604 tonnes
-1,996 tonnes



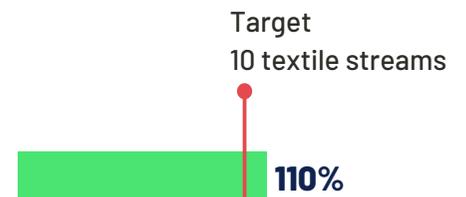
Number of textile specific city resources identified

Projected Target: 100
Achieved Result: 200
+100



Number of textile streams identified

Projected Target: 10
Achieved Result: 11
+1



Berlin

Key Performance Indicators



3.3 Berlin

3.3.1 Achieved Results

The final list of KPIs for Berlin, including the monitoring approach, can be found in Annex 7.2. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information. Furthermore, the sections are divided into socio-economic KPIs followed by environmental KPIs.

While the projected target for a handful of the socio-economic KPIs had been set as annualised targets, the achieved results presented in the table below reflect the actualised performance that has occurred within the timespan of the REFLOW project. During the reporting period, it was deemed appropriate that the achieved results should only reflect the actualised performance realised over the three-year reporting period. However, in the respective KPI sections below, the annualised projected target is presented to provide a trend analysis beyond the REFLOW project.

It is important to touch upon the circumstances of the Berlin pilot when discussing their achieved KPI results. Many of these challenges were addressed in D1.2 Cities' Circular Action Plans, whereby they were actively addressed throughout the project. However, challenges associated with the publishing of critical infrastructure data became a delay within the Berlin pilot's activities and the development of the Wastewater Heat Radar app. This was however resolved through the solution of utilising a slightly randomised data set to be displayed on the Wastewater Heat Radar app (more details on this in D5.4 REFLOW Pilot Applications). As a result, this caused some delays in carrying out certain activities in relation to specific KPIs. Moreover, this also shifted the target groups of the Wastewater Heat Radar, which is further reflected in the results and detailed below.

KPI	Achieved Results	Projected Target
Total volume of wastewater heat capacity installed in megawatts.	0.095 (2019) 0.613 (2020) 1.3 (2021) 1.4 (Q1 2022)	2.2 (2019) 3.0 (2020) 4.5 (2021) 6.0 (Q1 2022)
Number of managers or owners of properties with wastewater heat potential who have expressed interest through the	7	40 (annualised)



REFLOW app, to learn more about the technology.		
Number of managers or owners of properties with wastewater heat potential, who have expressed firm interest through the REFLOW app to adopt the technology	5	9 (annualised)
Number of realised or near-realised implementations, triggered through the REFLOW app.	0	2 (annualised)
Number of Berlin-based target group members reached through showcases.	650	320 (annualised)
Number of Berlin-based inhabitants engaged through educational programs	62	220 (annualised)
Approached 25 relevant cities by project end for their interest to adopt Berlin REFLOW wastewater heat recovery technology	Approached 22 cities 1 interested city	At least 3 cities showing high or very high interest to adapt the technology.
Approach at least 5 financial stakeholders by project end	5 approached 0 indicating interest	At least 2 indicating their high or very high interest to support and/ or advise cities in their funding needs to adapt the technology.
Described and evaluated five business models for post-project continuation	5	Clear recommendation (go ahead or stop) for post-project exploitation
Energy return on energy input (EROEI) rate	See below	Positive ratio
Estimate on CO ₂ emission change	44,184 CO ₂ reduction	Reduction in CO ₂ emissions

Table 3: Berlin KPI Achieved Results Overview

3.3.2 Socio-Economic Impact

The following section presents the results of the socio-economic KPIs for the Berlin pilot and where further details on the results can be found across other REFLOW deliverables and resources.

3.3.2.1 Total volume of wastewater heat capacity installed in megawatts

The achieved results of this KPI did not reach the projected target during the period of the REFLOW project due to the following reasons:



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

- Long lead times from the first idea (this is where the Wastewater Heat Radar is facilitating the process) to project start and finally the start of the construction work
- The Wastewater Heat Radar developed has no effect on how many projects will be implemented. It only facilitates the pre-planning process.
- Late start of the Wastewater Heat Radar and ongoing challenges with the publication from BWB's side

3.3.2.2 Number of managers or owners of properties with wastewater heat potential who have expressed interest through the REFLOW app, to learn more about the technology

47 letters have been sent to directors of large property management firms in the Berlin-Brandenburg area. Follow-up calls were placed mostly by end of April 2022, some until mid-May. For some of those who the Berlin Pilot has spoken to, the solution provided (the Wastewater Heat Radar) does not have a high priority due to the long-term aspect of changing an energetic setup of a property. 7 developers, only 1 of which are housing cooperatives which the Berlin pilot thought of as the primary target group earlier, have articulated a more binding interest in considering wastewater heating due to the results of the application. The Berlin Pilot assumes that the corporate goals of high sales/ high occupancy and rental rates naturally have highest priority. At the same time, particularly in Berlin, many of these companies currently face harsh criticism from large parts of the population and some political parties over the perceived driving-up of rental prices. Calls for expropriation have been made.

Some of the directors the Berlin Pilot spoke to have indicated interest to discuss in greater detail but asked for additional time to review and discuss internally. The Berlin Pilot concludes that this stakeholder group is less relevant as initially assumed. Other groups not considered initially have proven to be of much higher relevance: both, the energy provider Vattenfall and the German Heat Pump Association, have shown continued interest in working on further development of the Wastewater Heat tool, particularly if it is opened to other forms of waste heat. More than before, it becomes clear that the tool can only develop its full impact when it is used in cooperation with urban planning authorities.

In relation to the achieved results within the REFLOW timespan, the Berlin has therefore achieved 7 managers or owners of properties who have expressed interest. When this result is annualised to reflect a forecasted trend, the result translates into 42 annualised.



3.3.2.3 *Number of managers or owners of properties with wastewater heat potential, who have expressed firm interest through the REFLOW app to adopt the technology*

Similarly to what has been stated above, the Berlin Pilot concludes that focusing on already strongly engaged stakeholders, such as Vattenfall and the Heat Pump Association will lead to greater impact at an earlier point-of-time than focusing on real estate developers and managers. In fact, the interest of the two organisations mentioned is concrete and has been stated repeatedly. A meeting, initiated by BWB on May 12, 2022, with large stakeholders from the energy and transportation sector in Berlin further underlined this point. It also provides for a tentative business model scenario in which water utilities and energy firms play a much greater role for rolling out the final solution beyond Berlin.

At the meeting on May 12, 2022, BWB held an expert workshop on wastewater heat recovery technology. Participants included four major infrastructure firms of Berlin: (i) Berliner Stadtreinigungsbetriebe (BSR), which handles waste management in Berlin, (ii) Berliner Verkehrsbetriebe (BVG), the city's public transportation company, (iii) Stromnetz Berlin, the operator of the city's electricity grid and (iv) Vattenfall, a large energy provider. The participants were introduced to the REFLOW project and the Wastewater Heat Radar that had been developed by the Berlin pilot. The four infrastructure firms all maintain a significant number of buildings in the city for their own operations. The Wastewater Heat Radar was very well received by the four firms, who expressed firm interest in adopting the technology and agreed to explore the opportunities arising out of the work performed in the near future. In addition to these four leads mentioned above, the Berlin pilot has also acquired a fifth lead – which is responsible for several buildings.

3.3.2.4 *Number of realised or near-realised implementations, triggered through the REFLOW app*

The challenges with critical data infrastructure impacted the results of this KPI. A decision was made late in the project by BWB to not (yet) make data public that theoretically could be compromised or lead to data privacy issues. As a consequence, the data sets that are used to show the functionality of the Wastewater Radar do not reflect reality. However, the tool is intended to be open for professional target groups and as such will still, or even better, achieve its purpose, while admittedly a broad awareness among the public can't be achieved at this stage. While the Berlin Pilot in May 2022 was still trying to get firm interest into the tool, primarily through social media activities, a boost in general support was met in the above-mentioned May 12 meeting, when the Berlin Pilot introduced the Wastewater Heat Radar to several large industry players. Through this meeting, the Berlin pilot was able to gather five serious leads covering multiple buildings for each lead. However, reaching this KPI during the timespan of the



REFLOW project has not been possible, as a near-realised implementation from start to finish takes at least 18 months and is a complicated negotiation and implementation process. Despite not reaching the KPI within the period of the REFLOW project, the serious leads that the Berlin pilot has gained sets up promising future next steps on the way to implementations.

3.3.2.5 Number of Berlin-based target group members reached through showcases

The impact of COVID-19 with widespread and long lockdowns and directives to work from home made the initial idea of producing 3D-showcases for Berlin-based stakeholders unfeasible. The risk of losing large resources of time and money was considered too high. Instead, the Berlin Pilot came up with the solution of (i) producing an explanatory 10-minute video and (ii) delivery of a speech at a congress of German heat pump producers. It was accepted and actually welcomed that stakeholders outside Berlin would be reached. The video until now (end April 2022) has been exposed to about 120 professionals and used in discussions either in full form or by using snippets. This is supported by a social media campaign, primarily on Twitter. The speech delivered to members of the German pump producers was followed by about 450 people online and 200 in person. Further, a two-page article was published in 'Modern Building Technology' printed edition, as well as an online article, both in April 2022. This spans its reach to 17,182 readers.

3.3.2.6 Number of Berlin-based inhabitants engaged through educational programs

As a result of the decision to not develop a 3D model of the tool, the educational program in its initial form was modified into an outreach to professors and educators in the Berlin-Brandenburg region. 50+ individuals with relevant research and teaching background have been approached in writing. The purpose of this outreach was to (i) identify their interest in the solution that the Wastewater Heat Radar provides, (ii) gather opinions and input from them and (iii) potentially engage with students at a later point of time. Moreover, the Berlin pilot has also sent out the case study (see Deliverable 6.5 Collaborative Case Studies for Higher Education Curricula) developed as part of Task 6.5 in the REFLOW project to these educators and professors. Letters will be followed-up by phone calls. At the point of this writing the follow-up is underway where 6 have responded positively.

3.3.2.7 Approached 25 relevant cities by project end for their interest to adopt Berlin REFLOW wastewater heat recovery technology

Over the course of the REFLOW project, the Berlin pilot has approached and engaged with several cities about the Wastewater Heat Radar solution they have developed. The cities approached have included Helsinki, Tampere, and Turku who were engaged during a meeting with Finnish industry and research



experts on wastewater heat. The Berlin pilot and WP7 have also been in contact with target groups across St. Petersburg, Orkanger (NO), Ghent, Kalundborg (DK), and Copenhagen. Interest in the solution was well-received across these cities emulated in the following quote from Kalundborg:

“The app-solution sounds like an interesting way of managing supply and demand, which we could definitely see the potential in contributing to or using.”

Moreover, the Berlin pilot initiated conversations with various city networks in Europe including through the EU project, HOOP, ICLEI, ACR+, and Cities Mission (a city network of 100 cities).

Solid interest to adopt the Wastewater Heat Radar has been received from the City of Mannheim whereby the city would like to involve Prototypes for Europe in the development of a Living Lab for green technologies. In this context, the Wastewater Heat Radar will be taken up and used in the Mannheim context.

3.3.2.8 Approach at least 5 financial stakeholders by project end

The Berlin pilot reached out to five European investors that are active in the field of energy/wastewater/climate change. These have been selected from a longer list of suitable organisations. The main aim was to identify what would be necessary from their point of view to attract investment. However, the Berlin pilot has yet to receive feedback at the time of writing. Moreover, the Berlin pilot does not expect positive feedback, as these investors, though focusing on climate change and renewable energy, will likely not see any significant return on their investment because the business model is in favour of cities and water utilities, bringing the Berlin pilot closer to other funding sources. Instead, the Berlin pilot addressed this KPI through referring cities to the ICLEI climate finance decision making tree which has been included in the City Information Sheet (see section 2.3.2.5.3 in this deliverable).

3.3.2.9 Described and evaluated five business models for post-project continuation

The Berlin pilot has described 1 business for the Wastewater Heat Radar which is detailed in D7.5. Despite having 1 business model described in D7.5, the process to this development involved several discussions, iterations, and evaluations of multiple business models. Initial plans had been set out to develop 5 distinct business models for the same solution and then to evaluate and compare these. The



business modelling task leaders in REFLOW had determined with the Berlin pilot that making 5 business models on the same solution – the Wastewater Heat Radar – was not practical to do within REFLOW. However, defining one viable business model in REFLOW for future iteration was. While the concrete result described in D7.5 is just one business model, the process of getting to this model involved evaluation and discussion between the task leaders and the Berlin pilot. During these discussions the teams worked together to describe and evaluate multiple business models there reaching this KPI target and leading to the final result in D7.5. In cooperation with the City of Mannheim, a business model could be developed that sees the Wastewater Heat Radar as the basis of a larger cartography of energy potentials to be made visible. The City of Mannheim has offered the project partner, Prototypes for Europe e.V., the prospect of awarding a corresponding subcontract.

3.3.3 Environmental Impact

The following sections present short description of each environmental KPI's results for the Berlin pilot. The overall environmental impact assessment for the Berlin pilot can be found in D3.3 Urban Metabolism Strategy Final Report.

3.3.3.1 Energy return on energy input (EROEI) rate

During the REFLOW project, there have been no implementations of heat pumps associated with the activities of the Berlin pilot in REFLOW. As a result, this KPI is not considered calculable. The lack of implementations is explained by the length it took to get the Wastewater Heat Radar to be up and running, following all strategic and technology development steps that have already taken place, in addition to long lead times from definite user interest to result in an implementation.

3.3.3.2 Estimate on CO₂ emission change

Calculations presented from BWB show that there is a potential of 44.184 tonnes of CO₂ emissions change. This analysis is based on an internal BWB analysis, research values and assumptions. The CO₂ emission factor of the German power mix has a big impact on the possible CO₂ emission changes. The assumption is, that the Wastewater Heat Radar leads on a full usage of the technical exploitable wastewater heat potential in Berlin on a long-term perspective. A further analysis of the environmental impact is presented in D3.3 Urban Metabolism Strategy Final Report.



3.3.4 Berlin Key Performance Indicators Conclusion

This section has presented the achieved results of the Berlin pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

Regarding Berlin's socio-economic KPIs, the projected targets for seven of their KPIs were unmet due to changes within the pilot's action plan late in the project – including hinderances to the development of the Wastewater Heat Radar app due to the solution's use of critical infrastructure data. Despite these hinderances, the Berlin pilot managed to recalibrate and continue their performance throughout REFLOW. At the end of the REFLOW project, the Berlin pilot has garnered future plans for post-project continuation, taking the learnings and work to other cities – namely, the City of Mannheim. Moreover, the work undertaken during REFLOW to generate the firm interest of influential infrastructure firms in their Wastewater Heat Radar has led to important continuation of post-project exploitation for the Berlin pilot as these players will explore new opportunities and look into adopting the technology the pilot has developed within REFLOW.

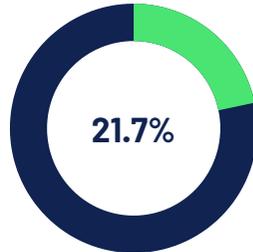
In relation to the environmental KPIs for Berlin, the impact of the above-mentioned hinderances to the pilot's plan and activities have impacted the calculability of one of their environmental KPIs. However, when addressing the estimation on CO2 emissions change, the results based on the Berlin pilot's performance throughout the REFLOW project has highlighted the potential for 44.184 tonnes of CO2 emissions reduction as a result of their solutions. The results of this environmental KPI have only been reported in this deliverable however, a full assessment of the environmental impact is elaborated within D3.3.





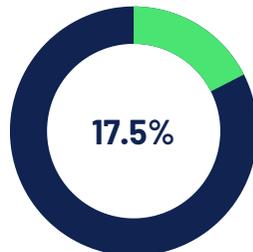
Total Volume of wastewater heat capacity installed in megawatts

Projected Target: 15.7 MW
Achieved Result: 3.408 MW
-12.292 MW



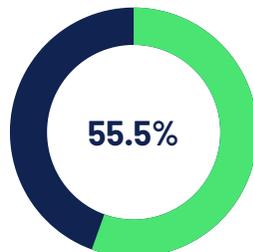
Number of managers or owners of properties with wastewater heat potential who have expressed interest through the REFLOW app, to learn more about the technology.

Projected Target: 40 (annualised)
Achieved Result: 7
-33



Number of managers or owners of properties with wastewater heat potential, who have expressed firm interest through the REFLOW app to adopt the technology

Projected Target: 9 (annualised)
Achieved Result: 5
-4

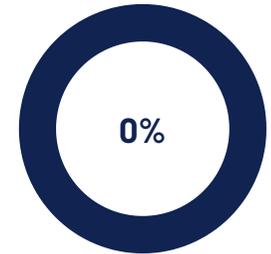


Berlin Socio-Economic

KPIs

Number of realised or near-realised implementations, triggered through the REFLOW app.

Projected Target: 2 (annualised)
Achieved Result: 0
-2



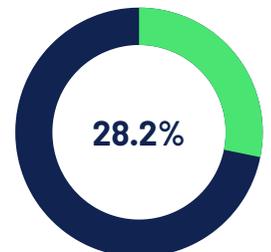
Number of Berlin-based target group members reached through showcases.

Projected Target: 320 (annualised)
Achieved Result: 650
+330



Number of Berlin-based inhabitants engaged through educational programs

Projected Target: 220 (annualised)
Achieved Result: 62
-158



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

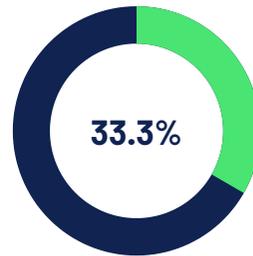


Berlin Socio-Economic KPIs

Approached 25 relevant cities by project end for their interest to adopt Berlin REFLOW wastewater heat recovery technology

Projected Target: 3 cities showing high or very high interest to adopt the technology
Achieved Result: 22 cities approached, 1 showing very high interest

-2



Approach at least 5 financial stakeholders by project end

Projected Target: 2 indicating their high or very high interest to support and/or advise cities in their funding needs to adapt the technology
Achieved Result: 5 approached, 0 indicating interest

-2



Described and evaluated five business models for post-project continuation

Projected Target: Clear recommendation (go-ahead or stop) for post-project exploitation
Achieved Result: 5 evaluated, 1 described, prospect for post-project continuation (City of Mannheim)





Berlin Environmental KPIs

Energy return on energy input (EROEI) rate

Projected Target: positive ratio
Achieved Result: N/A

NON-CALCUABLE

Estimate on CO2 emission change

Projected Target: Reduction in CO2 emissions
Achieved Result: 44,184 CO2 reduction

44,184
tonnes
CO2 Reduction



Cluj-Napoca

Key Performance Indicators



3.4 Cluj-Napoca

3.4.1 Achieved Results

The final list of KPIs for Cluj-Napoca, including the monitoring approach, can be found in Annex 7.3. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information. Furthermore, the sections are divided into socio-economic KPIs followed by environmental KPIs.

KPI	Achieved Results	Projected Target
Number of governance/business models developed	5	5
Overall stakeholder satisfaction with new models	95%	85%
Number of tech solutions for energy efficiency developed	6	6
Willingness to test and implement the solutions developed	92%	80%
Number of energy providers, distributors and businesses reached through project activities	324	300
Number of citizens engaged through awareness raising and educational programmes	707	500
Increase in knowledge and awareness about energy efficiency by citizen meetings (workshops, trainings, consultations)	90%	70% reported increased awareness after event
Number of people reached directly and indirectly by REFLOW communication and dissemination activities	Directly: 827 Indirectly: 5000	Directly: 500 Indirectly: 1000+
Number and type of stakeholders involved in REFLOW activities	687	300 participants 10 categories of stakeholders
Number of stakeholders participating actively (contributions and feedback) in relevant policy meetings	47	40 participants 2 policy input proposals
Availability of public information from REFLOW pilot	12	4 press releases 6 blog posts



Reduction in energy use	26.5%	15%
CO ₂ emissions	3.06 tonnes avoided	Equivalent percentage estimation from the reduction of energy use
Number of public buildings and energy efficiency city resources identified (materials, infrastructure)	745	150
% of energy consumption reduced after installation of retrofit kits	26.5%	15%

Table 4: Cluj-Napoca KPI Achieved Results Overview

3.4.2 Socio-Economic Impact

The following section presents the results of the socio-economic KPIs for the Cluj-Napoca pilot and where further details on the results can be found across other REFLOW deliverables and resources.

3.4.2.1 Number of governance/business models developed

Two business models in the Cluj-Napoca pilot have been developed in REFLOW and which are detailed in D7.5 Sustainability and Business Models. These include business models for the Green Energy Tree and the Retrofit Kit. Linked to the Retrofit Kit is also the Monitoring App which provides visualized information and data on energy consumption and recommendations for how to improve the users' circular practices and behaviours with regards to energy. Within the business model for the Retrofit Kit, both the modular hardware and the software (Monitoring App) are detailed and described as a holistic model. However, for the Cluj-Napoca pilot, the software in itself has been counted towards this KPI as an additional business model.

For the governance models, the Cluj-Napoca pilot has produced two during their time in the REFLOW project. The first involves the Integrated Urban Development Strategy (SIDU) 2021 to 2030. This strategy was developed by the Municipality of Cluj-Napoca, whereby the Cluj-Napoca REFLOW pilot put forward the proposal to integrate circular economy practices into the SIDU. This process was carried out during a Centre for Innovation and Civic Imagination (CIIC) meeting where the topics of economic and social aspects were being discussed. The CIIC meetings are based on participative decision-making, whereby citizen involvement is integrated at the pre-design stage of projects. The second governance model focuses on policy proposal for Cluj-Napoca on the city's energy transition seeking to embrace the goal of energy neutrality by 2050 through more efficient and circular solutions. Further details on governance in D4.4 REFLOW Collaborative Governance Toolkit v1.1.



3.4.2.2 Overall stakeholder satisfaction with new models

The overall stakeholder satisfaction with new models was measured across three events held by the Cluj-Napoca pilot where they presented and engaged with a variety of different stakeholder groups about their results, the work they have undertaken in the REFLOW project and the solutions including the Retrofit Kit, the Energy Tree, and educational models. These meetings included the Final Event held by the Cluj-Napoca pilot in March 2022, the Transylvania Clusters International Conference¹³ (TCIC), and the Future of Work¹⁴ (FoW).

The stakeholders represented at these meetings included public institutions, universities and research centres, companies, NGOs, and citizens. Stakeholders were asked to respond via Mentimeter if they agreed with the following statement: *The examples provided are interesting and applicable*. The survey was analysed using the 5-point Likert-scale. A total of 32 stakeholders responded to the survey across the three meetings. The responses from the participants were averaged out, yielding a 95% satisfaction level (Table 4).

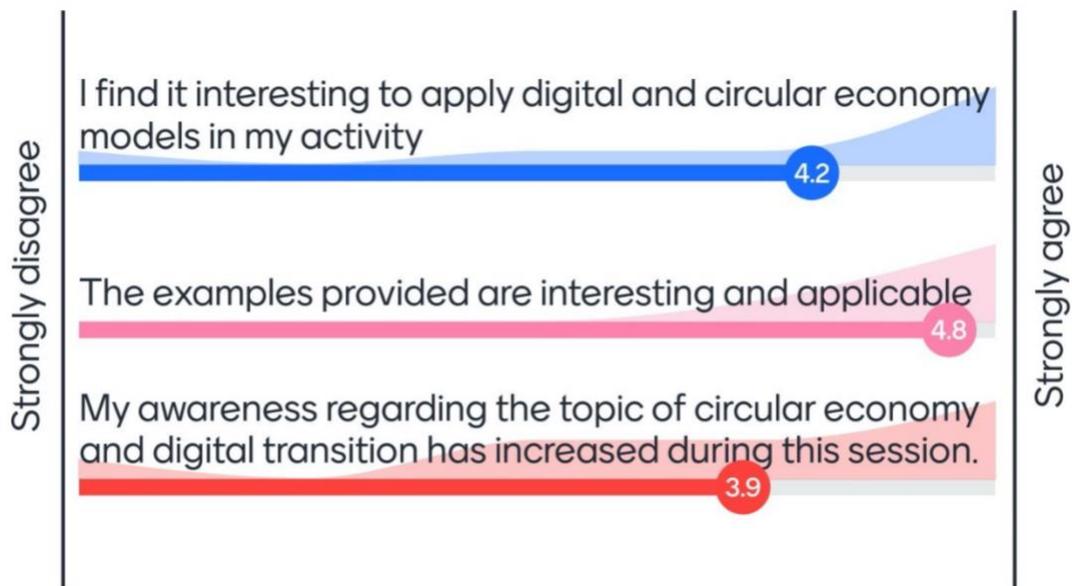


Figure 11: Survey results from the Future of Work event.

¹³ <https://www.transilvaniait.ro/post/transylvanian-clusters-international-conference-2021-the-6th-edition>

¹⁴ <https://www.uia-initiative.eu/en/uia-cities/clujnapoca>



3.4.2.3 Number of tech solutions for energy efficiency developed

The Cluj-Napoca pilot has developed key pilot solutions within REFLOW including the Retrofit Kit and the Energy Tree concept. As part of these tech solutions, the Cluj-Napoca pilot has also brought in the development of tech solutions which make up these key pilot solutions. Within the Energy Tree concept, tech solutions for energy efficiency are developed including an electro smog recovery , photovoltaic panels, and a micro-wind turbine. The Retrofit Kit solution developed by the Cluj-Napoca pilot in REFLOW is also made up of key tech solutions implemented and developed as a key tech solution in the pilot. This includes a smart metering system, the hardware including LED lighting and smart sockets, and the Monitoring App. Within the Cluj-Napoca pilot, the team has utilized the Open Data Dashboard in their tech solutions that have been developed.

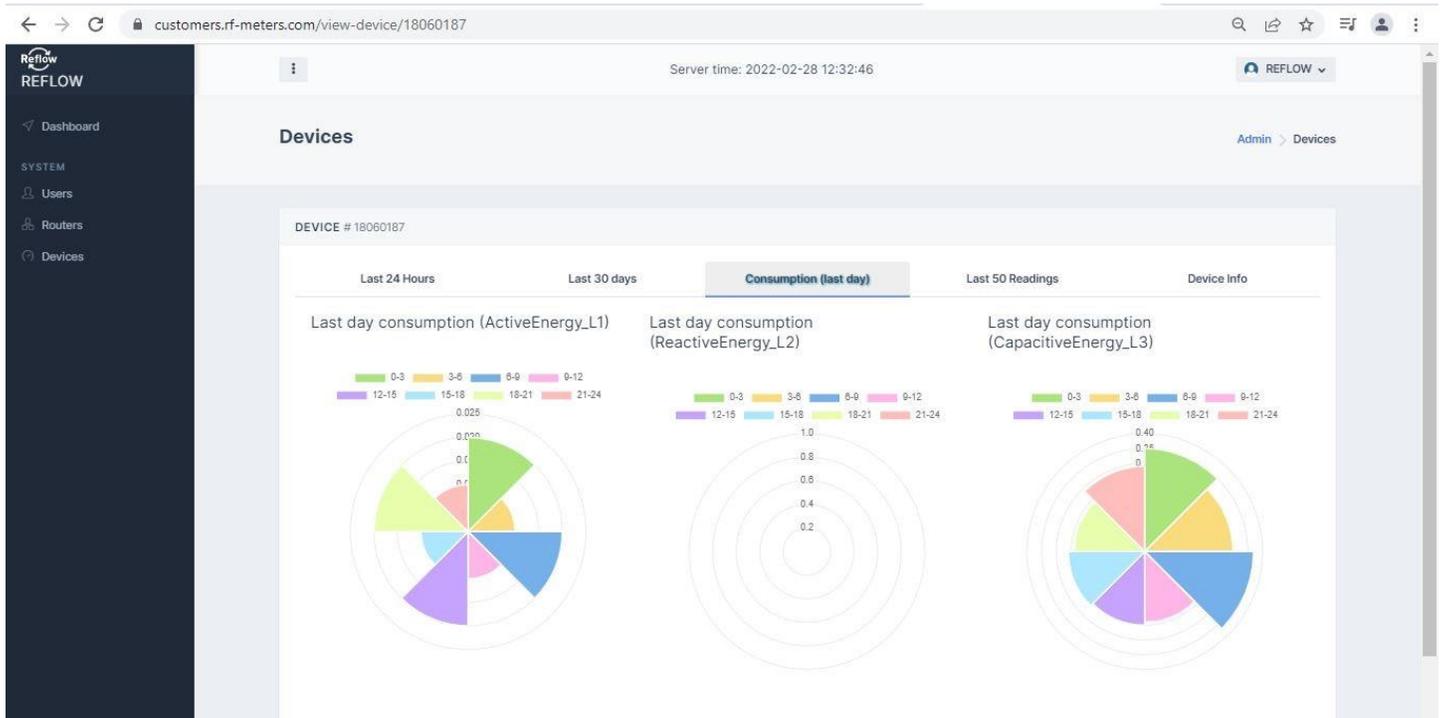


Figure 12: Screenshot of the tech solution- the Monitoring App linked to the Retrofit Kit (Source: D5.4 REFLOW Pilot Applications)

The pilot had hopes to utilize REFLOW OS and to generate material passports for their energy resource stream that they were tackling in the project, however, since energy is seen as an intangible material, the Open Data Dashboard’s visualization capabilities to examine a snapshot of the material quantity over time rather than a flow became more suitable for the Cluj-Napoca pilot. See D5.4 REFLOW Pilot Applications for more details on how this affected the tech prototypes developed in Cluj-Napoca.

3.4.2.4 Willingness to test and implement the solutions developed

The willingness to test and implement the solutions developed by the Cluj-Napoca pilot was based on the solutions developed in REFLOW outlined in section 2.4.2.5 of this deliverable. During three events (Cluj-Napoca Final Event, TCIC, and FoW) held by the Cluj-Napoca pilot, stakeholders were asked to agree or disagree based on the statement, *I find it interesting to apply circular economy principles and models in my activity*. The overall response to this willingness to test and implement circular economy principles and the models resulted in a 92% willingness rate (Table 4).

3.4.2.5 Number of energy providers, distributors and businesses reached through project activities

Project activities carried out by the Cluj-Napoca pilot in REFLOW have included the events and dissemination meetings and information newsletters used to raise awareness on energy efficiency and the circular economy, engage, and gather feedback for the work of the pilot. Through these project activities, the Cluj-Napoca pilot have reached 324 energy providers, distributors and businesses. This is calculated based on the number of participants within these categories (energy providers, distributors, and businesses) who have been involved in the Cluj-Napoca pilot REFLOW events (total 70) and dissemination meetings (over 100 estimated as minimum based on comments and visualisations from these events). Moreover, the number of members within the Transylvania IT Cluster (total 124) and the Transylvania Energy Cluster (total 30) were repeatedly reached through information newsletters and the events showcasing REFLOW activities (Table 4).

3.4.2.6 Number of citizens engaged through awareness raising and educational programmes

Awareness raising programmes included the events hosted by the Cluj-Napoca pilot, the meetings and events where they were involved as speakers or panellists in policy meetings, as well as in events where the Cluj-Napoca REFLOW pilot was presented. Educational programmes which have further engaged citizens have included the Educational Kits and the M.A. course on Circular Economy (see section 2.4.2.5.5 and 2.4.2.5.6 for more details).

3.4.2.7 Increase in knowledge and awareness about energy efficiency by citizen meetings (workshops, trainings, consultations)

The increase in knowledge and awareness about energy efficiency was measured across the 3 previously mentioned events held by the Cluj-Napoca pilot (Final Event, TCIC, and FoW). Following the meetings, participants were asked to agree or disagree with the following statement: *My awareness regarding the topic of circular economy has increased during this session*. Based on these three events



and a total of 32 respondents, 89% of stakeholder participants agreed that they experienced an increase in awareness on circular economy, including the topic of energy efficiency.

Additionally, awareness levels were also measured at the school workshops held by the Cluj-Napoca pilot. During these interactions, 100% of the students involved in the workshops on energy efficiency and circular economy stated that their information and awareness levels on these topics had increased. This increase in knowledge and awareness was based on the students who indicated an agreeance to the statement, *My awareness regarding the topic of circular economy has increased during this session*, with 70% or higher. This was measured using the Likert-scale.

3.4.2.8 Number of people reached directly and indirectly by REFLOW communication and dissemination activities

Direct reach of people through REFLOW communication and dissemination activities were achieved through the REFLOW Cluj-Napoca pilot events as well as through engaging with the speakers and participants at events for REFLOW. This direct reach has been an important mode for communication between the Cluj-Napoca pilot and with stakeholders and other interested actors. Indirect reach is based on the recipients of newsletters disseminating REFLOW activities and outreach on social media of posts and videos. With this indirect reach, the achieved results are above 5000 people (Table 4).

3.4.2.9 Number and type of stakeholders involved in REFLOW activities

The involvement of stakeholders in REFLOW activities carried out by the Cluj-Napoca pilot has spanned across 10 different stakeholder groups:

- Industry
- Public administration/policymakers
- EU Associations and Clusters
- Circular Economy Stakeholders
- General Public
- Scientific Community
- Media
- High School Students
- Teachers
- University Students



The REFLOW activities have included project meetings with stakeholders, sending press releases, the Cluj-Napoca final event, testing the Retrofit Kit solution at the High School test site, and the MA course on Circular Economy among others.



Figure 13: The Cluj-Napoca pilot's first public meeting on January 1, 2020. Held in Cluj-Napoca, Romania.

3.4.2.10 Number of stakeholders participating actively (contributions and feedback) in relevant policy meetings

There were 47 stakeholders who participated in the CIIC meetings. Based on these meetings the Cluj-Napoca pilot was able to contribute and put forward 2 policy proposals including the Integrated Urban Development Strategy 2021-2030 and centred around the energy transition which have been referred to previously in the number of governance/business models KPI section (3.4.2.1).

3.4.2.11 Availability of public information from REFLOW pilot

Over the timespan of the REFLOW project, the Cluj-Napoca team has had 4 press releases. At the pilot level, a press release for Circular Economy and Energy Efficiency: Arguments, Solutions and Eco-



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

Business Opportunities reached 100 press actors and 2000 readers following its release¹⁵ in October 2020. The remaining 3 were releases at the project-level which were disseminated at the pilot-level across local media. These included the following:

- 1) REFLOW Project Launch (October 23, 2019)
- 2) First year of REFLOW (June 30, 2020)
- 3) REFLOW selected as a Best Practice (January 12, 2021)

The Cluj-Napoca pilot also released 2 blog posts on the REFLOW project website¹⁶, a blog post on Transilvania IT Cluster's webpage¹⁷ and a business case study¹⁸ on the Circle Lab's Knowledge Hub in English. The Cluj-Napoca pilot also released 4 blog posts in the local language available on the ITIM's¹⁹, ARIES²⁰, and the Municipality of Cluj-Napoca's²¹ webpages.

3.4.3 Environmental Impact

The following sections present short description of each environmental KPI's results for the Cluj-Napoca pilot. The overall environmental impact assessment of Cluj-Napoca can be found in D3.3 Urban Metabolism Strategy Final Report.

3.4.3.1 Number of public buildings and energy efficiency city resources identified (materials, infrastructure)

The Cluj-Napoca pilot identified 715 consumption points across the city's public building and infrastructure. This included categories such as schools and high schools, kindergartens, public administration buildings, hospitals, police headquarters, traffic lights, canteens, and innovation parks.

¹⁵ <http://http://www.romaniapozitiva.ro/transilvania/cluj-economie-circulara-si-eficienta-energetica-argumente-solutii-si-opportunitati-de-eco-business/>

¹⁶ <https://reflowproject.eu/pilots/cluj-napoca/>

¹⁷ <https://www.transilvaniait.ro/post/reflow-project-finished-its-first-year-with-the-release-of-five-public-reports>

¹⁸ <https://knowledge-hub.circle-lab.com/article/12390?n=Cluj-Napoca---an-immediate-shift-towards-resource-efficiency-->

¹⁹ <http://ro.itim-cj.ro/blog/2020/01/29/lansarea-proiectului-reflow/>

²⁰ <https://aries-transilvania.ro/proiectul-reflow-cinci-rapoarte-publice-pentru-a-sprijini-orasele-in-tranzitia-catre-un-model-productiv-si-regenerativ/>

²¹ [https://primariaclujnapoca.ro/informatii-publice/comunicate/primul-an-din-cadrul-proiectului-reflow/;](https://primariaclujnapoca.ro/informatii-publice/comunicate/primul-an-din-cadrul-proiectului-reflow/)

<https://primariaclujnapoca.ro/informatii-publice/comunicate/proiectul-reflow-selectat-ca-model-de-bune-practici-la-nivel-european/>



Additionally, there were 30 energy efficiency city resources identified from stakeholder mapping activities, where stakeholders with their respective infrastructure and capacities represent a resource.

3.4.3.2 *Reduction in energy use*

The energy use based on the intervention of the Retrofit Kit at the test site of the Energetic High School resulted in the reduction of 21 MWh. This translates to a 26.5% reduction in energy use. More details on these results are available in D3.3.

3.4.3.3 *CO₂ emissions*

The CO₂ emissions prior to the Retrofit Kit intervention at the Energetic High School test site was 13.5 tonnes of CO₂-equivalent. Following the installation of the Retrofit Kit, the Energetic High School's CO₂-eq fell to 9.91 tonnes, resulting in 3.6 tonnes of CO₂-eq avoided. More details on these results are available in D3.3.

3.4.3.4 *% of energy consumption reduced after installation of Retrofit Kits*

Linked to the previous KPI on reduction of energy use, the results achieved based on the installation of the Retrofit Kit at the Energetic High School resulted in a 26.5% reduction of energy consumption. More details on this result are available in D3.3.

3.4.4 Cluj-Napoca Key Performance Indicators Conclusion

This section has presented the achieved results of the Cluj-Napoca pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

In relation to Cluj-Napoca's socio-economic KPIs, the pilot city has reached their projected target for eleven KPIs – with some over-and-above the initial aim. These results evidence the change that the Cluj-Napoca has worked towards throughout their activities in REFLOW, focusing in on awareness on the topic of energy consumption, behaviour, and circular economy across citizens, industry, and policymakers. Their performance is further evidenced in the change that the Cluj-Napoca pilot has influenced within their Integrated Urban Development Strategy 2021-2030. Through working towards the KPI of involving stakeholders in relevant policy meetings, this outcome has materialised.

For the environmental KPIs in Cluj-Napoca, the pilot city had focused on an intervention – the Retrofit Kit – which resulted in concrete achieved results related to this solution being tested at the Energetic High



School in the city. Through their environmental KPI reporting, the Cluj-Napoca has evidenced the environmental change that can occur through their Retrofit Kit solution as well as measured the effects to which these changes have occurred. While this deliverable has reported on the achieved results of the environmental KPIs for the Cluj-Napoca pilot, a full assessment of the environmental impact is elaborated within D3.3.





Number of Governance/Business Models Developed

Projected Target: 5
Achieved Result: 5



Overall Stakeholder Satisfaction with New Models

Projected Target: 85%
Achieved Result: 95%
+10%



Number of tech solutions for energy efficiency developed

Projected Target: 6
Achieved Result: 6



Willingness to test and implement the solutions developed

Projected Target: 80%
Achieved Result: 92%
+12%



Cluj-Napoca Socio-Economic KPIs

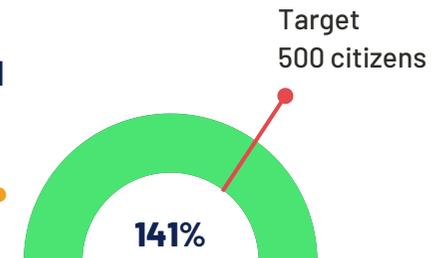
Number of energy providers, distributors and businesses reached through project activities

Projected Target: 300
Achieved Result: 324
+24



Number of citizens engaged through educational programmes

Projected Target: 500
Achieved Result: 707
+207





Cluj-Napoca Socio-Economic KPIs

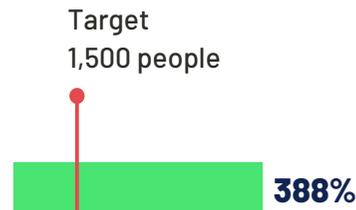
Increase in knowledge and awareness about energy efficiency by citizen meetings

Projected Target: 70%
Achieved Result: 90%
+20%



Number of people reached directly and indirectly by REFLOW communication and dissemination activities

Projected Target: 1,500
Achieved Result: 5,827
+4,327



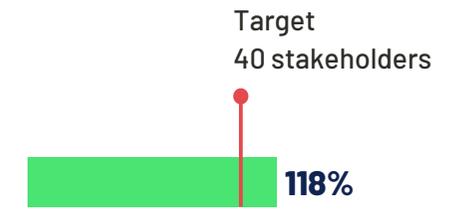
Number and type of stakeholders involved in REFLOW activities

Projected Target: 300
Achieved Result: 687
+387



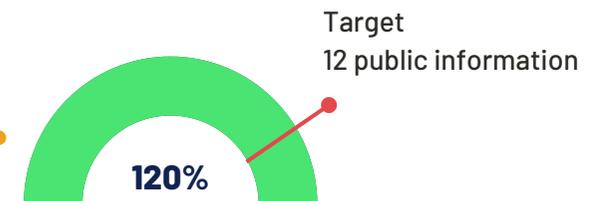
Number of stakeholders participating actively (contributions and feedback) in relevant policy meetings

Projected Target: 40
Achieved Result: 47
+7



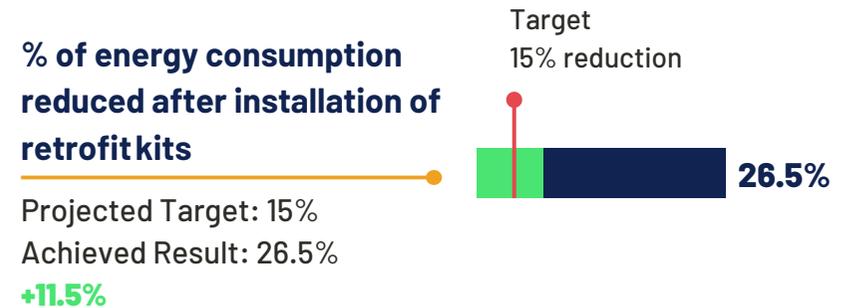
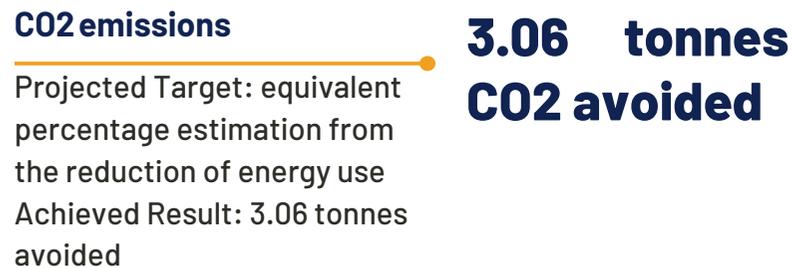
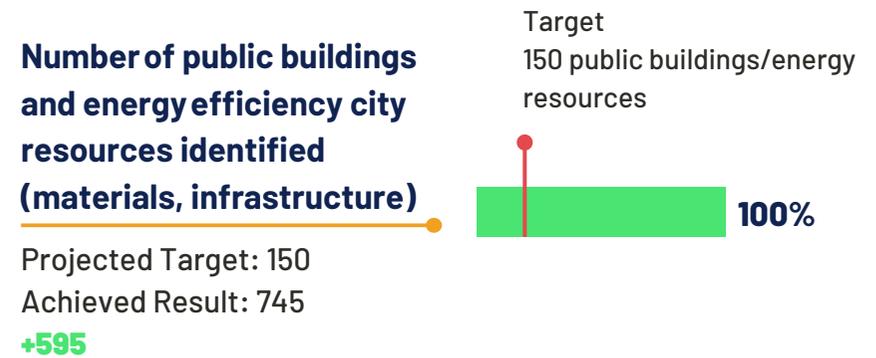
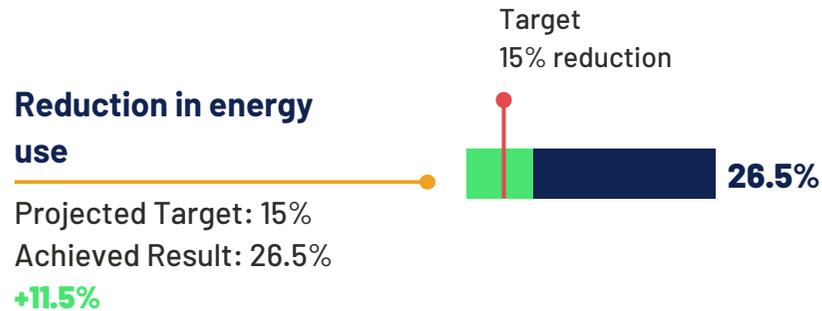
Availability of public information from REFLOW pilot

Projected Target: 10
Achieved Result: 12
+2





Cluj-Napoca Environmental KPIs



Milan

Key Performance Indicators



3.5 Milan

3.5.1 Achieved Results

The final list of KPIs for Milan, including the monitoring approach, can be found in Annex 7.4. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information.

KPI	Achieved Results	Projected Target
Number of business models/applications developed	3	3
Overall stakeholder satisfaction with new technological solutions for better implementation of circular business models and practices	89%	75%
Willingness to pay for regenerated products and materials	93%	75%
Number of citizens reached through events/awareness campaign	150	250
Number of policy makers involved in adapting policies and strategic plans and participating to workshops/dissemination activities	19	15
Circular material use rate (%)	33%	+5-10% increase
Food waste index (%)	146%	~10% increase in agri-food saved and donated
Circular intervention on specific agri-food flows	100%	~10% increase in agri-food tracked and traced
Number of agri-food specific city actors and resources identified	708	150
Number of agri-food specific city resources identified with partners (Foody Hub - SoGeMI)	67	30

Table 5: Milan KPI Achieved Results Overview



3.5.2 Socio-Economic Impact

The following section presents the results of the socio-economic KPIs for the Milan pilot and where further details on the results can be found across other REFLOW deliverables and resources.

3.5.2.1 Number of business models/applications developed

Through principles of co-creation, co-design, and co-production, the Milan pilot has developed three applications addressing challenges within the urban food system. These include Food Market 4.0 Dashboard, BOTTO, and Milano Prima Seconda which have been elaborated on previously in sections 2.5.2.5.1, 2.5.2.5.2, and 2.5.2.5.3 of this deliverable. Three business models have been developed for these solutions which can be found in full detail in D7.5 Sustainability and Business Plans.

3.5.2.2 Overall stakeholder satisfaction with new technological solutions for better implementation of circular business models and practices

Overall stakeholder satisfaction was measured across the 3 new technological solutions developed within the Milan pilot: Food Market 4.0 Dashboard, BOTTO, and Milano Prima Seconda. A total of 5 stakeholders provided answers: 1 for Food Market 4.0 Dashboard, 3 for BOTTO, and 1 for Milano Prima Seconda. Stakeholders were asked to respond to a series of statements, based on a 7-point Likert scale. Moreover, stakeholders also provided their responses based on if the solution helped them to become more circular with their practices and work. They were presented the following statements:

- *The solution helps me to be more circular in my work*
- *Without the solution, I would struggle implementing circular practices*

To understand overall satisfaction level with the new technological solutions, the stakeholders were asked to give their satisfaction across a 7-point Likert scale based on the following statement:

- *Overall, how satisfied or dissatisfied are you with the [technological solution]?*
 - *Extremely satisfied*
 - *Satisfied*
 - *Somewhat satisfied*
 - *Neither satisfied no dissatisfied*
 - *Somewhat dissatisfied*
 - *Dissatisfied*



- *Extremely dissatisfied*

For Food Market 4.0 Dashboard, the stakeholder was using the solution on a weekly basis. Prior to Food Market 4.0 Dashboard, the stakeholder's practices were only slightly circular but since using Food Market 4.0 Dashboard, the stakeholder felt that they had increased the circularity of their practices to be moderately circular. To increase circularity, the aims of Food Market 4.0 Dashboard seek to make the retailers' practices more circular by using accurate and granular data to plan their purchases, and as a result, preventing waste. When it came to better implementation of these circular practices, the stakeholder agreed that Food Market 4.0 Dashboard had helped them become more circular and that without the solution, circular practices would be difficult to implement. Overall, the stakeholder was satisfied, with a satisfaction level of 86% (Table 5).

To increase circularity, the aims of BOTTO is to give those supplying surplus/unwanted food and those demanding the reallocation of food new ways of operating their food flows – ultimately preventing food waste. In essence, the solution helps suppliers of surplus/unwanted food with an easy way to display their food supply to charity organisations in search of food donations for redistribution. For the charity organisations seeking food, the solution supports their logistics and operations in coordinating the redistribution of food, allowing them to aid in the recovery of food. The 3 respondents for BOTTO all stated an increase in their circular practices after using BOTTO while also reporting that BOTTO had helped them become more circular and that without it, they would struggle to implement circular practices. The overall number of satisfied stakeholders was 100% and the overall satisfaction level across the respondents was a high 95% (Table 5).

To increase circularity, Milano Prima Seconda aims to support organisations that embed circular principles with technical tools to track and trace their flows so that they can evidence this circularity. The stakeholder respondent for Milano Prima Seconda reported an increase to their circularity after using the solution, going from moderately circular to extremely circular. As such, Milano Prima Seconda also played a key role for the stakeholder in becoming more circular and implementing circular practices. The stakeholder was satisfied with Milano Prima Seconda overall responding with an overall satisfaction level of 86% (Table 5).

Across the 5 responses to overall stakeholder satisfaction, the satisfaction level is 89% with 100% of the stakeholder respondents being satisfied with the solutions. Additionally, all respondents for the 3



solutions have declared that they are somehow “unique” with their features, and therefore the pilot could really bring some innovation in the circularity of food markets.

3.5.2.3 Willingness to pay for regenerated products and materials

Willingness to pay was based on the two solutions that could have immediately a value-price on the market as a service for private companies: Food Market 4.0 Dashboard and Milano Prima Seconda. The calculation was based on the estimated price of the product on the market and the price which the stakeholders would be willing to pay for the product. Based on Milano Prima Seconda (100%) and Food Market 4.0 Dashboard (86%), the willingness to pay was 93% (Table 5).

Stakeholders were asked to respond to the following question: *how much would you expect this product/service to cost (in EUR)?* The responses are as follows:

- Milano Prima Seconda: as a service between 0,05 – 0,15€ per label (item tracked)
- Food Market 4.0 Dashboard: 3.000 to 4.000€ (Digital dashboard/Physical touchpoints)

These expectations were then divided by the estimated price of the product on the market based on insights from the Milan pilot. For Milano Prima Seconda, this price was estimated at €0,05 per label and for Food Market 4.0 this was estimated between €4.350 to €4.650.

While the achieved result for this KPI is positive, it is important to understand that this is an early indication of performance based a small sample size. The sample size to calculate this KPI has been based on 1 stakeholder response for Food Market 4.0 Dashboard and 1 stakeholder response for Milano Prima Seconda. While the sample size is small and does not seemingly represent a diversity of stakeholder views, the timing of the project’s testing and the scope of stakeholder involvement with the solutions was limited. Therefore, while a small sample size cannot provide a more diversified response, it is still reflective of the stakeholders who have been involved with the testing of the solutions for this KPI within this time period, i.e., the only ones that could really evaluate the solutions and answer the question.

3.5.2.4 Number of citizens reached through events/awareness campaign

A total of 150 citizens were reached through the following events/awareness raising activities of the Milan pilot:

- City Science Initiative, Circular Economy, Virtual Workshop



- Cooperative Urban Futures #1 Circular Economy: Partnerships for Local Ecosystems
- As good as gold. From waste to biomaterials
- EAT.SAVE.MAKE: Learn how food waste can become biomaterials
- Fab City Round Table – Platform Ecosystems
- Circular Economy in Cities: Tools to Steer the Transition
- Citizens involved in RECUP as volunteers

As already mentioned in Deliverable 1.3 with the re-calibration of KPIs, with respect to a wider range of events and activities that could involve citizens, many of these have suffered the uncertainties generated by the COVID-19 pandemic. Therefore, the interaction in-person with citizens over different periods during the project were not possible and these difficulties had some reflections on the planning activity. In this total number of citizens engaged, the participation at the local pilot final event in Milan (end of May, in a local covered market) is not still accounted for, however the Milan pilot expects to be in contact with at least 50 citizens during this event. People reached through via social media posts related to REFLOW Milan pilot by local partners are not considered here as well.

3.5.2.5 Number of policy makers involved in adapting policies and strategic plans and participating to workshops/dissemination activities

Across a series of activities within the Milan pilot in REFLOW, a total of 19 policymakers have been involved in adapting policies, strategic plans, and participating in workshop and dissemination activities. An overview of the specific activities and these outcomes are listed in the table below.

Activity	Outcome
Introduction to the REFLOW project for representatives of the Commerce Department (responsible for the management of covered municipal markets) and the Food Policy Office of the Municipality of Milan	The input gave valuable insights into the idea to include REFLOW among “circular food” actions and to work on food markets (both at neighbourhood level and urban level) as relevant nodes for agri-food material flows at the urban level.
Sharing with Councillor in Milan and staff the project progress	Based on results of the first phase of analysis of a sample of covered municipal markets, new interpretative elements of the circularity of food markets and possible new challenges for policies have emerged and have been discussed with decision-makers, including drafting guidelines for



	the development of future tenders for the management of covered municipal markets
Introduction to the REFLOW project (value proposition, goals, activities, and expected outcomes)	SogeMi's active involvement in the REFLOW project and the strengthening of a common vision with the Municipality of Milan regarding the circularity of the general food markets
An event aiming to discuss the modalities of cooperation at city level for various stakeholders in building a local ecosystem for circular economy on different flows.	Development of a pilot with different stakeholders and how they work together. How citizens can be engaged more actively in circular economy projects.
Pilot final event of REFLOW in Milan	Discussion about the future of REFLOW project related to the Municipality policies, specifically related to circular economy
Sharing with staff and press officers of the new councillor the main results of REFLOW	First ideas on potential communication tools/strategies to communicate project achievements to local target audiences

3.5.3 Environmental Impact

The following sections present short description of each environmental KPI's results for the Milan pilot. The overall environmental impact assessment for the Milan pilot can be found in D3.3 Urban Metabolism Strategy Final Report.

3.5.3.1 Circular material use rate (%)

This KPI was based on the amount of bread saved and used to replace malt within the use case of Ibrida, which is connected to the pilot solution, Milano Prima Seconda. The achieved results for this KPI were calculated based on the use case - Ibrida Birra. The value is calculated with the amount of CE material (breadcrumbs) divided by the total malt needed in a non-circular process. The fraction of breadcrumbs that can substitute the malt is decided by the brew master with the objective of taste for the product (beer), therefore the improvement given by the co-designed solution does not tackle this aspect meaning that there was no increase or decrease in the circular material use rate. The usual methodology to calculate is probably not completely adequate for the small initiatives that transform a cascade product into a new one because the ratio of recycled material is often linked to "specification" of the product that need to be addressed primarily.



3.5.3.2 Food waste index(%)

The current value (3535 kg) is given by RECUP for the period from 4/2 to 25/2 in 2021. This is based on their collection frequency of once per week. The test conducted with BOTTO in 2022 for the same period (10/2 to 25/2) with collection once per week, resulted in 8702 kg saved and therefore an increase of 146%. Below is a screenshot from REFLOW OS Dashboard displaying the tracked food saved across resource types and their respective quantities. See D3.3 for more information on the environmental impact analysis.

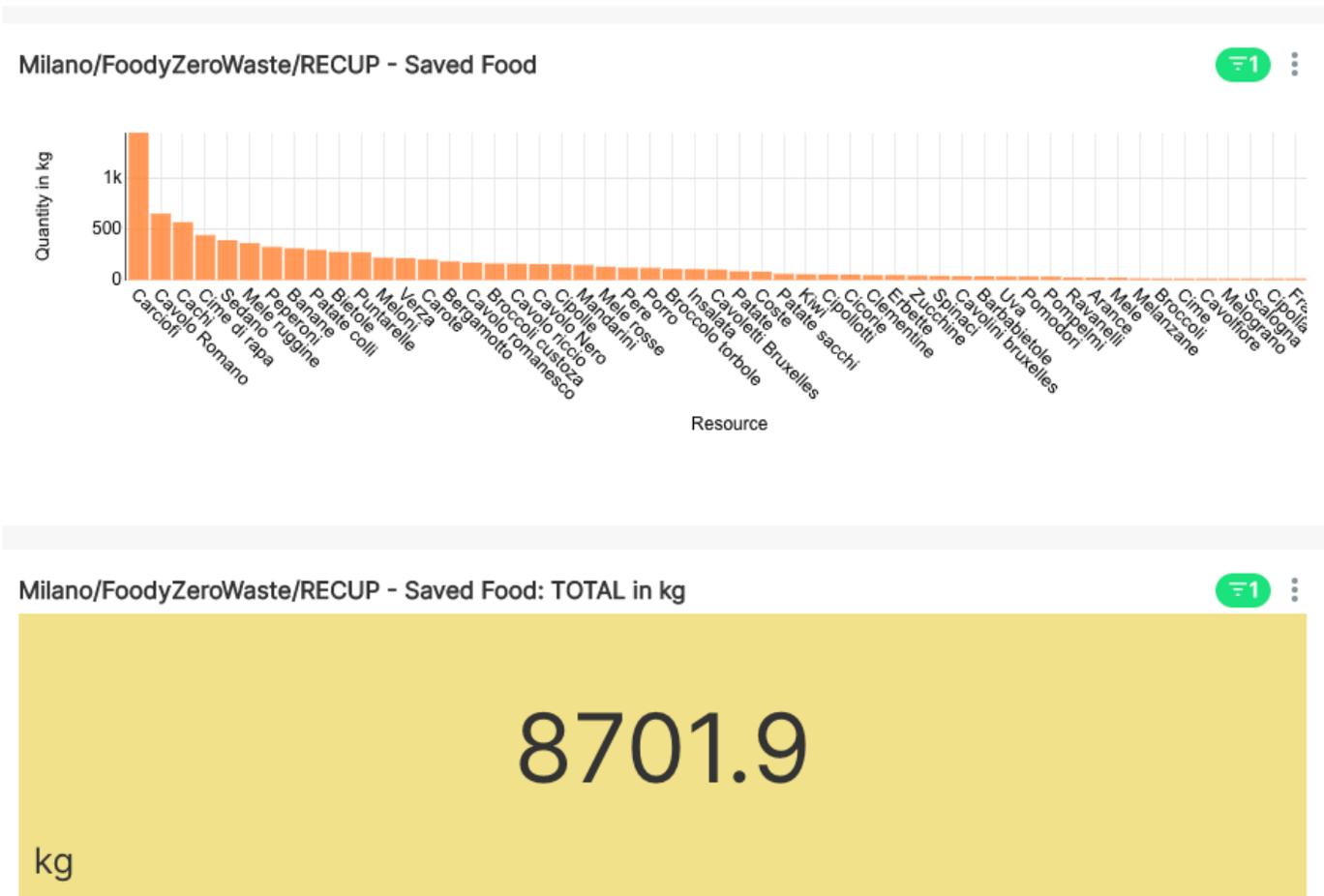


Figure 14: Screenshot from the REFLOW OS Dashboard tracking the Food Saved through BOTTO

3.5.3.3 Circular intervention on specific agri-food flows

The circular intervention developed by the Milan pilot – Food Market 4.0 – has been tested within the Morsenchio Market tracking fruit and vegetables at one stall in the market to understand the flows



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

impacting the market. The agri-food flows considered are related to the inbound and outbound goods within the one stall in the Morsenchio Market. These goods are purchased from the SogeMi wholesale market by the stall owner which then enter the Morsenchio Market (the municipal market), and which are finally sold to the stall owner’s customers. Prior to Food Market 4.0, no food flows were tracked, meaning that the baseline for this KPI started at zero. Therefore, the percentage related to the inbound and outbound flows within the market is 100%. In concrete numbers, the Milan pilot tracked a total of 577 kilograms of inbound and outbound fruit and vegetables while testing Food Market 4.0 within the Morsenchio Market. This testing covered the period from 2/2/2022 to 4/2/2022. Moreover, the Milan pilot also tracked a total of 119 kilograms of fruits and vegetables sold during the 3 days of testing. On average, the results came to 40 kilograms of outbound goods per day.

3.5.3.4 Number of agri-food specific city actors and resources identified

Through the identification of 32 city actors, the Milan pilot created collaborations with some of key city actors identified including Ibrida Beer, Recup, City of Milan (various departments), and SogeMi. The 32 city actors identified by the Milan pilot have been grouped into following 5 categories:

Public Sector and Public Companies	4	<ul style="list-style-type: none"> • City of Milan (Urban Economy Sector, Commerce Area) • City of Milan (Food Policy) • SogeMi • AMSA
Municipal Covered Market Managers	21	<ul style="list-style-type: none"> • 21 trustees of the public covered markets
Commerce Association	1	<ul style="list-style-type: none"> • AssoFood
NGOs preventing food waste	3	<ul style="list-style-type: none"> • Recup • Caritas Ambrosiana • Pane Quotidiano
Circular Start-up and Experts	3	<ul style="list-style-type: none"> • Ibrida Beer • Coffeefrom • Krill Design
Total City Actors Identified		32

Table 6: List of agri-food city actors identified in Milan

Undertaken as part of the MFA presented in D3.2 Urban Metabolism Analysis - Initial Assessments, there were 676 resources identified in Milan. Of this amount, 67 were fruits and vegetables, 600 were fish species, and 9 were meat and eggs. See Milan’s chapter in D3.2 for a full overview of the MFA, which also resulted in a set of Recommendation for future action such as further assessment on products and



supplying countries which are responsible for the majority of environmental impacts associated with the products sold by SogeMi vendors; setting standards for sustainable sourcing; introducing standards and certifications across SogeMi's product portfolio, etc.

3.5.3.5 *Number of agri-food specific city resources identified with partners (Foody Hub - SogeMi).*

The key partner reflected in this KPI is SogeMi Foody Hub which is the wholesale market in Milan. As previously outlined, an MFA was carried out as part of D3.2 Urban Metabolism Analysis: Initial Assessments, where 67 resources were identified. These 67 resources consisted of different fruit and vegetable types which were sold in SogeMi's Foody Hub. See Milan's chapter in D3.2 for more details.

3.5.4 Milan Key Performance Indicators Conclusion

This section has presented the achieved results of the Milan pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

Across the Milan pilot's socio-economic KPIs, four of the five projected targets have been met during the timespan of REFLOW. Due to challenges associated with COVID-19, the outreach of citizens was not able to be fully exploited during the REFLOW project, however, this does not reflect poorly on the achieved efforts, results, and successes of the Milan pilot's performance within the project. The activities, outputs, and outcomes generated through their work within the REFLOW project which have focused on providing key players in the urban food system access to new ways of operating through the technological solutions developed within the REFLOW Milan pilot is demonstrated in the achieved results that the pilot has made in their socio-economic KPIs which relate to the business models created for further exploitation. It is also evident in the measurement of stakeholder satisfaction and willingness to pay for the three technological solutions developed: Food Market 4.0 Dashboard, BOTTO, and Milano Prima Seconda. Moreover, the engagement of policymakers in adapting policies and strategic plans has led to several outcomes which have shaped the pilot plan and the future of the urban food system.

The achieved results of the environmental KPIs have demonstrated the impacts that the technological solutions which the Milan pilot has developed within REFLOW has created. This includes giving access to new ways of operating for the key players in the urban food system, including the ability for them to track their materials, which for example was not being done prior to the solution Food Market 4.0 Dashboard. Moreover, it has demonstrated the increase in circularity of food materials, as evidenced through the KPI related to the pilot solution, Milano Prima Seconda. It has also showcased the affects to



food waste as a result of the pilot solution, BOTTO, measuring and tracking the food saved through the wholesale market. While this deliverable has reported on the achieved results of the environmental KPIs for the Milan pilot, a full assessment of the environmental impact is elaborated within D3.3.





Milan Socio-Economic KPIs

Number of Business Models/Applications Developed

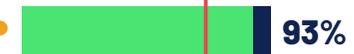
Projected Target: 3
Achieved Result: 3



Willingness to pay for regenerated products and materials

Projected Target: 75%
Achieved Result: 93%
+18%

Target
75% Satisfaction



Overall stakeholder satisfaction with new technological solutions for better implementation of circular business models and practices

Projected Target: 75%
Achieved Result: 89%
+14%

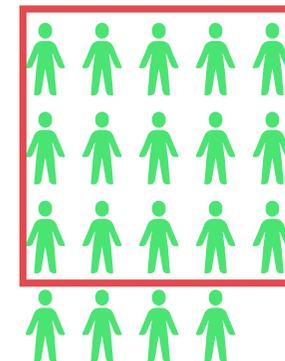
Target
75% Satisfaction



Number of policy makers involved in adapting policies and strategic plans and participating to workshops/dissemination activities

Projected Target: 15
Achieved Result: 19
+4

Target
15 policy makers

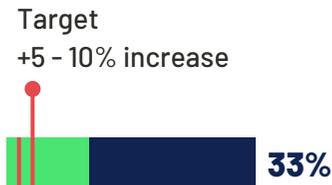




Milan Environmental KPIs

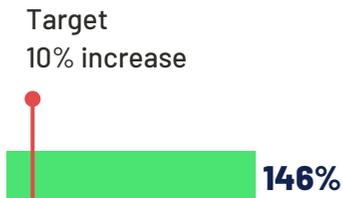
Circular material use rate (%)

Projected Target: +5 - 10% increase
Achieved Result: 33%
+23%



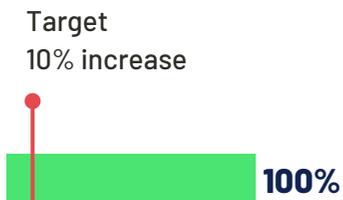
Food waste index (%)

Projected Target: ~10% increase in agri-food saved and donated
Achieved Result: 146%
+136%



Circular intervention on specific agri-food flows

Projected Target: ~10% increase in agri-food tracked and traced
Achieved Result: 100%
+90%



Number of agri-food specific city actors and resources identified

Projected Target: 150
Achieved Result: 708
+558



Number of agri-food specific city resources identified with partners (Foody Hub - SoGeMI)

Projected Target: 30
Achieved Result: 67
+37



Paris

Key Performance Indicators



3.6 Paris

3.6.1 Achieved Results

The final list of KPIs for Paris, including the monitoring approach, can be found in Annex 7.5. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information. Furthermore, the sections are divided into socio-economic KPIs followed by environmental KPIs.

KPI	Achieved Results	Projected Target
Number of governance / business models developed	5	5
Overall stakeholder satisfaction with new models	88%	80%
Number of new applications to minimise wood waste	10	10
Willingness to pay for regenerated products and materials	80%	75%
Number of local makers and business reached through showcases	2400	200
Number of people remote from employment engaged through formation	17	17
Number of stakeholders involved in counselling activities to orient the project direction	23	7
Number of workshops and makers in the target group that has been reached and/or activated by the project	Training: 47 Tracking label: 12 Data base user: 38 Handbook user: 77	Training: 5 Tracking label: 4 Data base user: 5 Handbook user: 50
Number of projects that receive financial and non-financial support in form of assets, counselling, facility access, etc.	8	5
The extent to which the project has contributed to, or inspired, changes in municipal rules and regulations to support implementation and “mainstreaming”	See section 3.6.2.10 for a detailed overview of the contributions of	Qualitative; unitless



	the REFLOW Paris Pilot	
Circular reuse of MDF waste	2,5	2 tons (15% of the 2019 baseline)
Numbers of solutions related to waste management and recycling: applicable and replicable	1	1
Number of wood specific city actors and resources identified (organization, materials, infrastructure)	185	150
Number of scoring variables on wood reuse	7	5

Table 7: Paris KPI Achieved Results Overview

3.6.2 Socio-Economic Impact

The following section presents the results of the socio-economic KPIs for the Paris pilot and where further details on the results can be found across other REFLOW deliverables and resources.

3.6.2.1 Number of governance / business models developed

The Paris pilot in collaboration with CBS has developed 4 business models for their pilot: (1) Dimension-use, (2) Re-Loop Consulting SaS, (3) Re-Label, and (4) the Driven Incubator Studio. A full overview of these business models is available in D7.5 Sustainability and Business Plans. Additionally, 1 governance model has been developed for the Paris pilot which can be found in more detail in D4.4 REFLOW Collaborative Governance Toolkit v1.1.

3.6.2.2 Overall stakeholder satisfaction with new models

Overall stakeholder satisfaction was calculated through a feedback collection survey on the Paris pilot solution, Dimension-use. Both the overall stakeholder satisfaction with new models and willingness to pay for the solution were evaluated in the same survey which was sent out to both our beta-testers and potential future users. The survey was sent to a limited number of people, as the product is not publicly available in the market yet, which is becoming quite competitive. The stakeholder satisfaction was collected using a Likert scale.



3.6.2.3 Number of new applications to minimise wood waste

The applications measured within this KPI refers to the solutions that have been developed by the Paris pilot and the incubated companies as part of Driven. See more details on the applications in D5.4 REFLOW Pilot Applications and D7.5 Sustainability and Business Plans.

<p>Elements Reuse²²</p>	<p>Elements-Reuse is developing a solution to transform any construction material into a digital canvas, for all trades to annotate and generate information. Through the combination of a low-tech digital tag and a SaaS platform, we generate up and downstream communication channels, as close as possible to the workers, to implement digital productivity tools on site. The construction materials are the only elements shared by all the protagonists. By using them to distribute information, we seamlessly integrate into a usual workflow, assist workers in avoiding errors, and generate high quality data sent to managers.</p>
<p>Mattersite²³</p>	<p>Mattersite was incubated in Driven's second incubation round under REFLOW Mattersite is a digital support system for the deconstruction and demolition of buildings, supporting a circular economy transition for the construction and demolition waste (CDW) sector. Mattersite regards buildings as materials banks with intrinsic digital inventories and employs low-cost data acquisition and cutting-edge machine learning algorithms for the digitalisation of the pre-demolition site. With our technology we are increasing the recovery potential and confidence in reclaimed materials aiming to improve the quality, value and security of upcycled material supply.</p>
<p>RESTORE²⁴</p>	<p>RESTORE is an association that federates a small network of actors in the field of reusable wood with diverse applications : construction, furniture and scenography. All actors commit to use as much as possible reusable wood in their project. With this aim, the association installed a storage dedicated to store the reused wood retrieved by the members of the association.</p>
<p>Maison et Objet²⁵ Scenography</p>	<p>REFLOW exhibition space by FCGP made out of 100% reused materials collected from M&O's previous edition.</p>

²² <https://elements-reuse.com/>

²³ <https://mattersite.co/>

²⁴ <https://re-store.xyz/le-collectif/>

²⁵ <https://www.maison-objet.com/>



Dimension-use	Dimension-use is a low-cost semi-automated 3D scanning device and database, which enables the creation of a digital material catalogue for material reuse from a series of reused elements from construction.
SKOP ²⁶	Skop is a solution for identifying and managing the resources of the circular economy with a single gesture. It is a solution for creating and managing reuse inventories On the same mobile application, project owners, diagnosticians, curators, valuers or even private individuals can collaborate thanks to an easy traceability of reuse resources.
Re-Label ²⁷	Re-Label puts forward responsible and virtuous productions that contribute to the development of a new way of producing and consuming.
UBLIK	UBLIK was incubated in Driven's first incubation round under REFLOW. UBLIK is a collective digital craft workshop and studio born from the desire to make and experiment with the parametric design process. At Paris design week 2020, UBLIK created an installation combining local resources from event waste in a modular and reversible system, defining a shape but also its future developments. Through these ideas, the Isocene design is based on a smart link between material and discrete elements.
Damien Coquet ²⁸	Incubated and supported by Driven, in Driven's first incubation round under REFLOW. Damien Coquet is a design studio for the eco-conception of useful objects. Under Driven, Damien Coquet designed a series of modular, reusable and easily foldable event furniture from wood
Unwasted ²⁹	A zero-waste desk fabrication studio. The desks are fabricated in Paris with locally-sourced wood in French-managed forests, and only sold in a 10km radius from the fabrication workshops. The Unwasted desk is made from a single panel of French pine plywood. No chipboard, no plastic and no waste.

Table 8: Paris Applications which minimise wood waste overview.

3.6.2.4 Willingness to pay for regenerated products and materials

The willingness to pay for regenerated products and materials was calculated through a feedback collection survey on the Paris pilot solution, Dimension-use. Both the overall stakeholder satisfaction with new models and willingness to pay for the solution were evaluated in the same survey which was

²⁶ <https://www.skop.app/>

²⁷ <https://re-label.eu/>

²⁸ <https://www.design-damiencoquet.com/>

²⁹ <https://unwasted.fr/>



sent out to both the solution's beta-testers and potential future users. The survey was sent to a limited number of people, as the product is not publicly available in the market yet, which is becoming quite competitive. The willingness to pay was surveyed both as a percentage (shown in the achieved results of the KPI, 80%), and as potential price to support business model development.

3.6.2.5 Number of local makers and business reached through showcases

The Paris pilot held a total of 31 showcases over the project with 2400 local makers and businesses participating, which included Fab Labs and makerspaces, circular economy stakeholders, industry stakeholders, investors, the scientific and academic community, civil society, and policy makers. Showcases consisted of but were not limited to Pecha Kucha Night Paris, workshops hosted by Driven, incubation program call for projects, installations, trainings, website publications, and webinars. Through reaching out to local makers and businesses, the Paris pilot was able to spread the message and work of REFLOW in their pilot city, to activate the local ecosystem around reuse in the temporary construction and event industry, to engage with these stakeholders on the solutions they were developing, and to onboard potential incubation projects in Driven. Data was tracked at these events by the Paris pilot including the name of showcase, description, level of involvement, date, number of attendees, type of attendees, and further links of information. All this data was tracked and uploaded in the Action & Event Tracker developed by WP7.

3.6.2.6 Number of people remote from employment engaged through formation

Paris pilot partners, Ars Longa and Fab City Grand Paris hosted a training workshop which was part of the overarching training program, Circular Making³⁰ run by ARSL and FCGP. The program focuses on training people remote from employment in circular practices and conception. As part of the training workshop, 17 participants remote from employment received free access to the training and programme through Pôle emploi, which is the French public employment service. Over the first week of training, participants gained important knowledge and skills in the field of circularity through a series of lectures, tours, and workshops. For example, the participants were presented the work of the REFLOW project and the Paris pilot activities, mainly focusing on the material flows and data generation projects. The participants then took part in a workshop on preliminary data collection, building their knowledge and taking the first step of carrying out a Material Flow Analysis. The group of participants also received insights into the Paris pilot solution Re-Label and took part in a learning tour of the different partner

³⁰ <http://fabcity.paris/circular-making/>



sites in the Paris pilot (La Réserve des Arts, General Metal Edition, Depuis 1920/u2026) with Ars Longa. Through this engagement in training people remote from employment, the Paris pilot gave these actors the ability to learn about the tools and concepts needed to build the circular city of tomorrow.

3.6.2.7 Number of stakeholders involved in counselling activities to orient the project direction

The development of the Paris pilot over the REFLOW project’s timespan has involved the collaboration of 23 stakeholders who have provided counselling activities over the course of this period to guide and direct the Paris pilot. These activities have provided valuable contributions to the Paris pilot which has helped to shape the development of their prototypes, refine their focus, gather important feedback and to test their solutions in the real-world. For example, understanding the real needs of resource centres and the challenges which actors of the cultural sector are faced with towards their circular transition helped to pinpoint and orient the co-development of the Paris pilot’s solutions Re-Label and Dimension-use to incorporate these conditions. An overview of the counselling activities with stakeholders is listed below, including their influence on the pilot’s direction.

Stakeholders	Counselling Activities
La ressourcerie du cinéma	Feedback on the needs of resource centres, testing of the Dimension-use on site, and needs redefinition
City Hall of Paris – Circular economy and Culture Les Augures – Workshop facilitation	Organization of workshops with actors of the cultural sectors to identify key challenges with the transition towards circular economy Fast co-development on how to facilitate the implication of cultural actors in the MFA process
Plaine Commune	Co-development of a joint software facilitating reuse in the construction sector Understanding of the current ecosystem
Re-Store	Counselling, feedback and co-development of “Re-Stock” Expertise on wood reuse
Atelier Jocko	Identification of wood worth reusing during events



	Support on recuperation logistics and management at Maison et Objet
IT-Link	Technical development of the software of the Dimension-use
Safi-salon - Maison et Objet	Counselling on the recuperation process of wood to set-up during large fairs
Reed-Expo - FIAC	Counselling on the recuperation process of wood to set-up during large fairs
Vinci, ENPC, SPie Batignolles, Bollinger & Grohmann, Impulse Partners, La Forge, Atelier WOA, Poolp	Participants to the incubation challenge session Driven demo day
SKOP	Re-Label project development - shared feedback
Fab City Store	Re-Label first test, questionnaire development
WOMA	Re-Label testing on the workshop level
Morning OS	Re-Label testing on the workshop level
Director of the Master MSC Strategy & Design for Anthropocene	Re-Label discussion and feedback on the project
Utopies	Communication around the project

Table 9: Overview of the counselling activities that the Paris pilot has carried out with respective stakeholders

3.6.2.8 Number of workshops and makers in the target group that has been reached and/or activated by the project

Reaching and activating workshops and makers in the target group of the Paris pilot has been achieved through three training sessions (Circular Making, online workshop in Nancy, and Résiliences Productives) hosted and created by the Paris pilot. These trainings have reached and activated 47 makers and workshops in the pilot’s target group including those remote from employment, designers, architects, artisans, creators, and engineers. The online workshop in Nancy was held with students from the Nancy Artem Campus, the National Art Design School, Mines National Engineer School, and ICN Business



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

School. The Paris pilot activated these students around the notion of community in creative and manufacturing environments and the establishment of supportive ecosystems of actors. Students were engaged in debates and discussions, they were involved in validating the need for Re-Label, and they were also supported with a guide of best practices for young designers and young professionals. The Résiliences Productives training resulted in the workshops and makers involved creating a community on Re-Label³¹.

A total of 12 projects using the Tracking Label have been activated on the Re-Label website³² developed by the Paris pilot project. There have also been 33 database users on Re-Label listed as structures – these structures are the nodes which contribute and carry out projects. Additionally, there are 5 database users of ReStock at Restore. The Handbook on the Re-Label website has garnered 77 users.

3.6.2.9 *Number of projects that receive financial and non-financial support in form of assets, counselling, facility access, etc.*

Through the incubation program, DRIVEN by Volumes, 8 projects received financial and non-financial support as they worked towards creating impact in the circular economy. DRIVEN offered support to these projects across 4 key areas³³:

1) Driven Knowledge

- Mentoring: one-on-one or group mentoring with professionals, entrepreneurs, and experts in the fields of advanced computational design
- Online Workshops: to upgrade skills and broaden visions on computation

2) Driven Ecosystem

- Support: a diverse team at Driven in the fields of architecture, computational design, and business innovation
- Funding: guidance in obtaining specific funding opportunities
- Partners: potential connections to partners looking to embed CE features in the industry
- Community: access to community of experts, makers, and changemakers
- Pitch events: organized at the end of incubation as well as large networking events

³¹ See the community created [here](#).

³² See projects activated by Re-Label here: <https://re-label.eu/projects>

³³ <https://drivenbyvolumes.io/about/>



3) Driven Facilities

- Coworking: office space and meeting rooms
- Fab Lab: digital fabrication space with access to a CNC machine, 3D printers, laser cutter, and standard woodworking equipment
- Location: in a dynamic Parisian neighbourhood

4) REFLOW

- Research: access to REFLOW
- Visibility: gaining exposure through the consortium of European partners and to test the project on a larger scale
- Resources: joining the REFLOW Community to take advantage of shared resources, knowledge, and tools for CE

Project	Financial/Non-Financial Support
Elements-Reuse	Coaching, access to training and facility
Mattersite	Coaching, access to training
Modular Shelving	Coaching, access to training
UBLIK	Coaching, access to training and facility
Dimension-use	Coaching, access to funding
Unwasted	Access to facility
Damien Coquet	Coaching, access to training and facility
SKOP	Coaching, access to training and facility

Table 10: Projects that have received support from Volume's incubation programme, DRIVEN

3.6.2.10 The extent to which the project has contributed to, or inspired, changes in municipal rules and regulations to support implementation and "mainstreaming"

The Paris pilot has been in touch with the Office de tourisme Paris (OCTP) which is the tourism office of the City of Paris where they presented REFLOW and the work being undertaken by the pilot city. OCTP was also invited to the Pecha Kucha Paris Night, an event hosted by Paris pilot partners, Volumes. At the event, the issues of tourism in Paris were presented and with specific attention to the issues that the member of the OCTP (professionals) are facing within this sector and the actions which could be taken



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to create sustainable and circular events. Out of these proceeding, the Paris pilot succeeded in enhancing the conversation on sustainable development across tourism professionals. The REFLOW project within Paris and as a whole was important and useful in convincing them that practices in the field of tourism and large events held in the city need to change. Some of the changes already experienced within this field has included the end of single-use plastics.

The Paris pilot has also been in dialogue with the Cultural Affairs Department since the launch of the REFLOW project. The Cultural Affairs Department has participated in two brainstorm meetings with the Paris pilot on the needs of the cultural and creative sector. The contribution of the REFLOW Paris pilot was solidified when the Department's working group on circular economy decided to take the REFLOW project in the Paris pilot into account. As a result, the Paris pilot took part in the new national group on sustainable scenography, and came into contact with Paris Musées, who manage museums in the City of Paris.

A link between the association La Réserve des Arts and the REFLOW Paris pilot was established through the involvement of the Social Economy and Circular Economy Office at the launch of the project and across different meetings throughout the project period. The connection to La Réserve des Arts is a key fundament for the REFLOW Paris pilot to further inspire and contribute to changes as the association is an operator which organizes reuse materials from cultural events and who aim to support cultural, creative, and the crafts sector in incorporating circular economy practices and the reuse of materials.

In addition to these acts of contribution and inspiration from the REFLOW Paris pilot, other offices and departments in France have been involved with the team through presentations and meetings. These have included:

- The City of Paris, Green Spaces and the Environment Department
- Les Canaux, the operator who gathers social economy actors
- French Event Booster, an incubator linked with Re-Loop Consulting SaS (the innovation agency)
- We Love Green, a big music festival in Paris involved in sustainable development

3.6.3 Environmental Impact

The following sections present short description of each environmental KPI's results of the Paris pilot. The overall environmental impact assessment of the Paris pilot can be found in D3.3 Urban Metabolism Strategy Final Report.



3.6.3.1 Circular reuse of MDF waste

During the September edition of Maison&Objet³⁴ (an international trade fair for interior design) in 2019, the Paris pilot collected 2.5 tons of wood waste at the fair. While the original KPI was stipulated as the circular reuse of MDF waste, this material was changed from MDF to wood. This change from MDF to wood was because the Paris pilot changed from collecting data from the FIAC³⁵ event to the Maison&Objet fair. Since Maison&Objet operates differently than the FIAC event, the material needed to be changed from MDF to wood. See D3.3 Urban Metabolism Strategy Final Report for the environmental impact.

3.6.3.2 Numbers of solutions related to waste management and recycling: applicable and replicable

The development of the pilot solution, Dimension-use tackles waste management and recycling in the Paris pilot in relation to wood material flows. Additionally, the solution is also replicable for future endeavours, not limited to wood materials. In fact, the scanning device can be further used for other materials and in other contexts to enable material reuse. See section 2.6.2.5.1 for a detailed overview of Dimension-use and D5.4 REFLOW Pilot Applications for more details.

3.6.3.3 Number of wood specific city actors and resources identified (organisation, materials, infrastructure)

There were 185 individuals, companies, and associations involved in the flow of wood materials and those in the event and temporary construction industry who were identified by the Paris pilot. The identification of these actors and resources played a foundational role in the pilot's first steps with REFLOW OS, as it helped them to understand who potential users of their pilot solutions could be, as well as what goes where and what these actors sell to each other. Further details can be found in D3.2 Urban Metabolism – Initial Assessment.

³⁴ <https://www.maison-objet.com/en/paris>

³⁵ <https://www.fiac.com/>



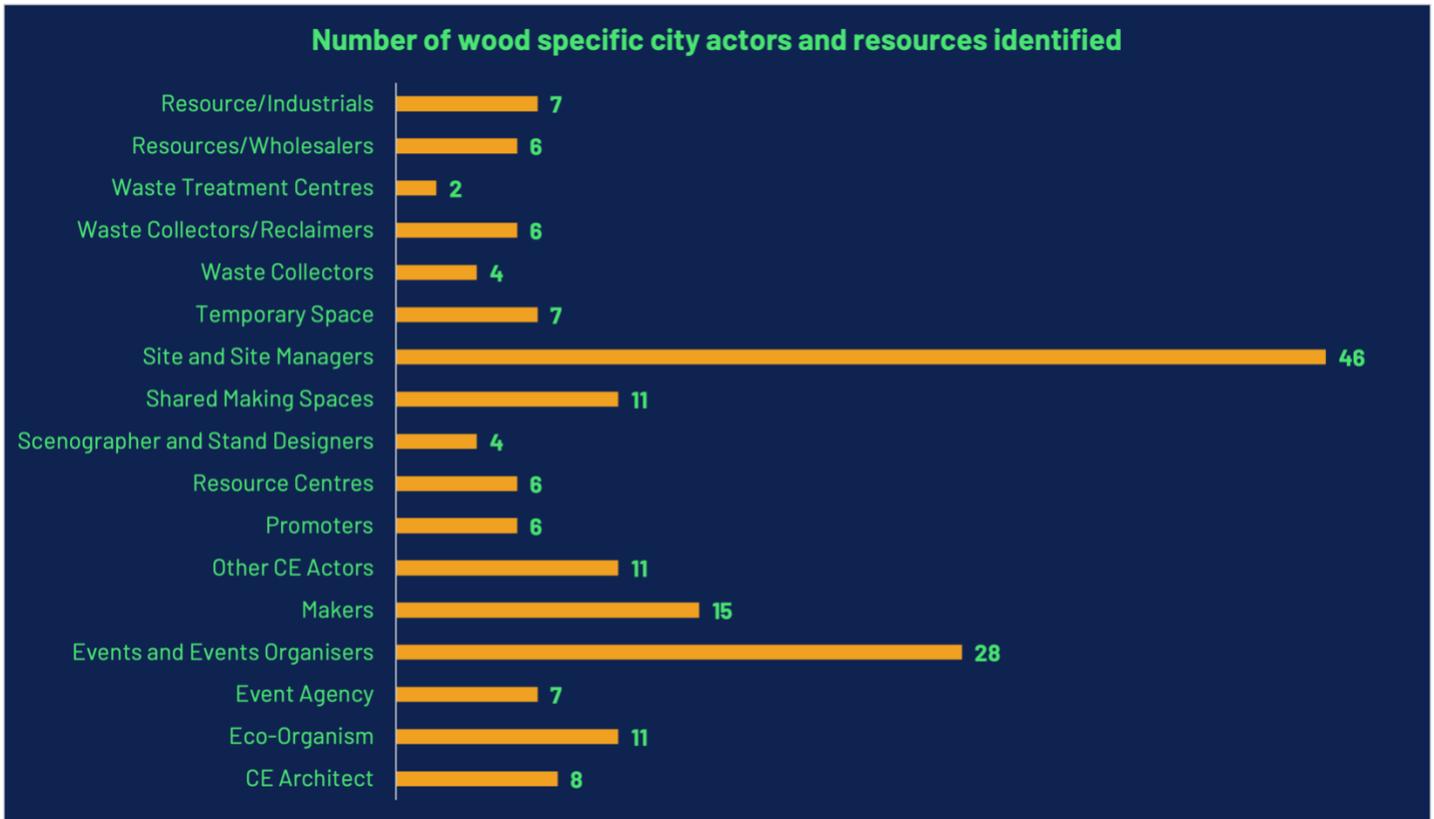


Figure 15: Identification of wood actors and resources in Paris

3.6.3.4 Number of scoring variables on wood reuse

The Paris pilot solution, Re-Label, has proposed a new observation scheme, made up of tools and methods, to valorise and make visible the practices of reuse and recycling across Parisian actors including workshops, storage spaces, and designers. As part of this scheme, practices undertaken by these actors are reported under the Re-Label form and methodology which is inscribed as an open label on a map³⁶. In addition to this, the Re-Label certification allows the seller to communicate to the buyer qualitative and quantitative information of a project. Making up this observation scheme, the Paris pilot identified 7 scoring variables on wood reuse to extract valuable efforts that are often invisible, devalued, and underpaid³⁷. These variables are as follows:

- Man/Woman time on re-used material production (conception, production)
- Man/Woman time on re-used material management (dismantling, storage, research)

³⁶ See the <https://re-label.eu/> website for a more in-depth look at the solution.

³⁷ Read more on Re-Label on the [REFLOW website blog](#).



- What is the % of re-used materials on the total volume of your productions
- How much wood type is available in the workshop for distributed storage?
- Number of partner structures on recycling activities
- Average distance between the recycling material recovery site and the workshop
- Average distance between the place of production and the place of exploitation or sale

See D7.5 Sustainability and Business Plans for more details on the scoring variables on wood reuse.

3.6.4 Paris Key Performance Indicators Conclusion

This section has presented the achieved results of the Paris pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

Across all KPIs, the Paris pilot has successfully achieved their targets within REFLOW. These results evidence the change in which the Paris pilot has successfully worked towards to achieve their objectives and goals within the timeframe of REFLOW. Importantly, they demonstrate the efforts and successful performance of the pilot's activities and the outputs and outcomes generated to create a city with culture of circular events and circular temporary constructions.

Through the socio-economic KPIs, the Paris pilot has achieved results which have helped to strengthen the reduction of wood waste and increase wood reuse through their focus on business model development and the incubation activities as part of Driven in the creation of sustainable applications to minimise wood waste. Moreover, it was evidenced that one of the key pilot solutions – Dimension-use – was positively perceived by stakeholders' satisfaction and willingness to pay. The Paris pilot has also evidenced and measured their socio-economic impact of their activities through their outreach and engagement activities with local makers, workshops, and businesses as well as engaging with people remote from employment into circular practices and conception. Moreover, the Paris pilot has inspired a series of cultural and event industry actors within the municipality towards embedding circular practices and the reuse of materials into their work and activities.

The achieved results of the environmental KPIs for the Paris pilot reported in this deliverable has measured and evidenced the changes towards Paris becoming a city with a culture of circular events and circular temporary constructions through the circular reuse of wood within a key international trade fair held in Paris, the development of the solution – Dimension-use – to tackle waste management and



recycling in Paris' wood material flows, and introducing a new observation scheme to valorise and make visible circular practices of reuse and recycling across Paris' actors of workshops, makers, designers, and storage spaces. While this deliverable has reported on the achieved results of the environmental KPIs for the Paris pilot, a full assessment of the environmental impact is elaborated within D3.3.





Paris Socio-Economic KPIs

Number of Governance/Business Models Developed

Projected Target: 5
Achieved Result: 5



Overall stakeholder satisfaction with new models

Projected Target: 80%
Achieved Result: 88%
+8%



Number of new applications to minimize wood waste

Projected Target: 10
Achieved Result: 10



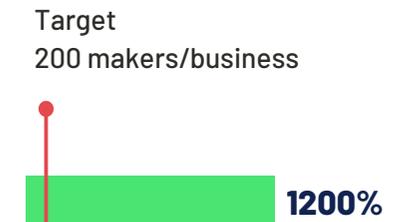
Willingness to pay for regenerated products and materials

Projected Target: 75%
Achieved Result: 80%
+5%



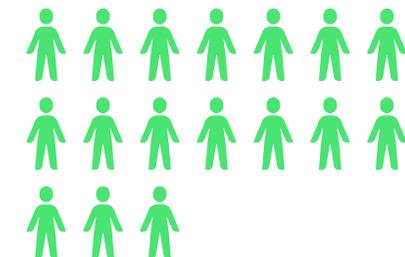
Number of local makers and business reached through showcases

Projected Target: 200
Achieved Result: 2400
+2200



Number of people remote from employment engaged through formation

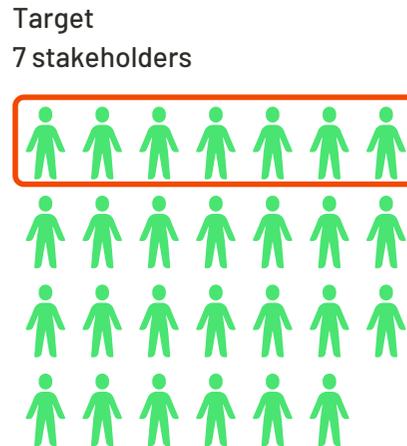
Projected Target: 17
Achieved Result: 17



Paris Socio-Economic KPIs

Number of stakeholders involved in counselling activities to orient the project direction

Projected Target: 7
Achieved Result: 23
+16



Number of projects that receive financial and non-financial support in form of assets, counselling, facility access, etc.

Projected Target: 5
Achieved Result: 8
+3



Number of workshops and makers in the target group that has been reached and/or activated by the project

Projected Target: 64
Achieved Result: 174
+110



The extent to which the project has contributed to, or inspired, changes in municipal rules and regulations to support implementation and "mainstreaming"

Projected Target: Qualitative

Inspiring and contributing to change within tourism, events, cultural affairs, and the cultural, creative and crafts sector



Paris Environmental KPIs

Circular reuse of MDF waste

Projected Target: 2 tonnes
Achieved Result: 2.5 tonnes
+0.5 tonnes



Numbers of solutions related to waste management and recycling: applicable and replicable

Projected Target: 1
Achieved Result: 1



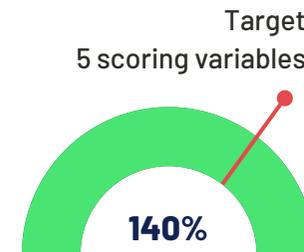
Number of wood specific city actors and resources identified (organization, materials, infrastructure)

Projected Target: 150
Achieved Result: 185
+35



Number of scoring variables on wood reuse

Projected Target: 5
Achieved Result: 7
+2



Vejle

Key Performance Indicators



3.7 Vejle

3.7.1 Achieved Results

The final list of KPIs for Vejle, including the monitoring approach, can be found in Annex 7.6. The table below presents the results of these KPIs followed by detailed information on the data collection, justifications for achievements, and other relevant information. Furthermore, the sections are divided into socio-economic KPIs followed by environmental KPIs.

KPI	Achieved Results	Projected Target
Participation of minimum 50 households distributed on different types of housing and public and private buildings	525	50
Number of governance / business models developed	5	10
Overall stakeholder satisfaction with new models	100%	75%
Number of new applications for plastic developed	13	12
Willingness to test or implement the new models and tools	100%	70%
Number of local makers and business reached through showcases	153	50
Number of citizens engaged through educational programmes	424	250
Increase in the awareness about circularity of plastics among the citizens	100%	75%
Active community involvement through meetings in shaping the implementation	50	Local steering group: 3/year Working groups: 3/year NMU: 2/year AB: 2/year
Reduction in the amount of plastics sent to incineration from the test sites	REMA 1000: 50% Sofiegården: 92% Den Gamle Gård: 17%	25% reduction



Plastic streams identified at the different test sites	6	5
Number of plastic streams going into circular use within REMA 1000	8	5

Table 11: Vejle KPI Achieved Results Overview

3.7.2 Socio-Economic Impact

The following sections present short description of each socio-economic KPI's results and where further analysis can be found across other REFLOW deliverables and resources.

3.7.2.1 Participation of minimum 50 households distributed on different types of housing and public and private buildings

The initial plastic analysis across the seven test sites carried out by the Vejle pilot at the beginning of the project encompassed the participation of 498 households spread across two types of housing: 200 private homes/villas in the Trædballe neighbourhood and the 298 apartment residences at Den Gamle Gård in the West of Vejle, 1 public elderly care centre, 1 public school, 1 food retailer, 1 innovation hub, and 1 construction company. This led to a total of 503 participants distributed across different public and private buildings. The participation of these actors was fundamental in building up the first insights into the Vejle pilot's initial 7 test sites to understand the plastic flows and possibilities at each site.

Based on this initial analysis and participation of the households and buildings at the beginning of the project, the Vejle pilot focused in on 3 specific households and buildings including: 1 food retailer (REMA 1000), 20 apartments in Den Gamle Gård, and 1 elderly care centre (Sofiegården). These became the test sites where the Vejle pilot would co-create circular plastic interventions with citizens (Table 11).

3.7.2.2 Number of governance / business models developed

The Vejle has had a strong focus on their citizens, lessening the emphasis on developing business models within REFLOW. Due to this focus, the Vejle pilot had instead focused on how established businesses could transition towards circularity and make the steps towards future change through nudging, rather than business model development. As such, the Vejle pilot intervened into established businesses' internal existing processes and sought to rework these to advance circular plastics. Due to this approach, Vejle has reached the development of 3 business models including: Mobile Sorting, Educational Material for Mind the Future, and Facilitation of Value Chain Game. These business models are described in detail in D7.5 Sustainability and Business Plans.



Additionally, the Vejle pilot has developed 2 governance models including: the integration in NMU (political committee – Nature and Environment Committee) and in the local steering group and procurement policy. D4.4 REFLOW Collaborative Governance Toolkit provides more details on the governance process undertaken in the Vejle pilot.

3.7.2.3 Overall stakeholder satisfaction with new models

Satisfaction levels associated with the prototypes developed by the Vejle pilot in REFLOW were based on qualitative interviews and analysis by the Vejle pilot team. To measure the satisfaction of the prototypes across the three test sites, participants were asked: *What do you think has worked well?* Based on these answers, the Vejle pilot team qualitatively analysed the results and determined that there was 100% satisfaction for the new prototypes overall and across the test sites, as no participant expressed dissatisfaction with the functionality and their experiences with the solutions. For those that did express dissatisfaction, this was related to a desire for the initiative to be further scaled, which the Vejle pilot team interpreted as a positive response (Table 11).

3.7.2.4 Number of new applications for plastic developed

During the REFLOW project, the Vejle pilot has developed applications for plastic to close the loop on plastic material streams as well as tackling knowledge, awareness and data gaps. Within this KPI, the term application refers to websites, apps, technology, videos, and data that has been generated. The following applications for plastic developed are:

- WeLoop
- Bonfire
- Material Passport
- Value Chain Game¹
- 3 SoMe applications (application of online knowledge using Facebook², LinkedIn³ and newsletters using Mailchimp)
- Webinar with the Danish Design Center as an application for online knowledge⁴
- Video Materials as an application for online knowledge⁵
- 2 Webpages as applications for online knowledge^{6,7}
- 2 Datasets from the baseline and endline analysis

As seen across the diversity of applications, there is a large focus on generating change and moving towards a circular transition through the development of applications which tap into human-centred approaches. In addition to these applications, detailed information on more technological applications



including WeLoop, Bonfire, Material Passport, and the Value Chain Game can be found in D5.4 REFLOW Pilot Applications.

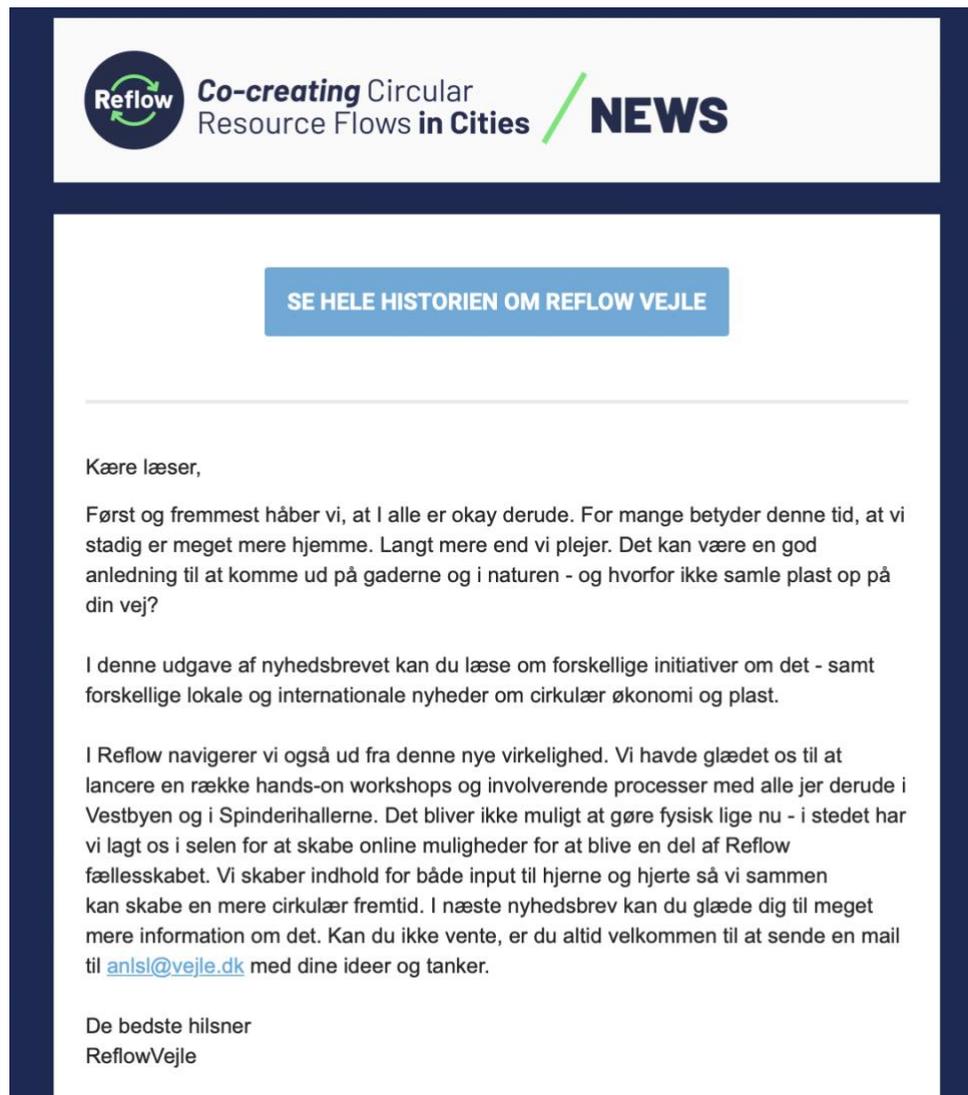


Figure 16: REFLOW Vejle's Newsletter

3.7.2.5 Willingness to test or implement the new models and tools

The willingness to test or implement the new models and tools created in the Vejle pilot was based on the pilot solutions that the team had prototyped across the three test sites. At Sofiegården, in relation to the scaling of the developed Mobile Sorting Unit, both employees and the manager expressed that there is a great desire to implement the waste solution in the other care centres in the Municipality. If



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the effort is introduced and has the same effect on all Vejle Municipality's 17 care centres, it can potentially result in a reduction of 2200 kg of plastic per year per care centre. That is more than 37 tonnes of plastic that can be sent for recycling instead of being incinerated. In REMA 1000, the willingness to implement the solutions have been well-received. This is evident in the help that the REFLOW Vejle pilot is providing REMA 1000 to introduce the same efforts in all of their 360 stores in Denmark. This implementation has already begun. At Den Gamle Gård, the willingness to test and implement the sorting bin solution was high for both the residents at the apartment block and the housing association, AAB. Moreover, this willingness to implement the solution has been realized through the anchoring scaling this solution to AAB's new building in Vejle on Nordholmen.

3.7.2.6 Number of local makers and business reached through showcases

Through webinars, workshops, a conference, and visits to the FabLab at Spinderihallerne, the Vejle pilot has interacted and reached 153 local makers and businesses. These showcases included the hosting of a webinar where 30 local makers and businesses participated, with 48 participants in total. Hosted in Spinderihallerne, REFLOW partners, Materiom, paid the Vejle pilot a visit and hosted a workshop on biomaterials where 4 makers and businesses were involved. At this workshop, there were a total of 12 participants outside this target group. The Vejle pilot also organised and facilitated workshops held at their test sites (Den Gamle Gård, Sofiegården, and REMA 1000). At these test site workshops, the Vejle pilot engaged 12 businesses including REMA 1000, Cloetta, Marius Pedersen ApS. and P. Fournaise. Reaching these businesses through the test site workshop showcases proved to be crucial in the Vejle pilot's co-creation processes in developing their solutions, gaining feedback, and understanding the reality of needs of the actors on the ground. With the headquarters of the Vejle pilot coordinated based at Spinderihallerne, 10 local makers in the FabLab were also involved in the creation of a BioLab, a part of the FabLab. Lastly, on May 3, 2022, the Vejle pilot hosted their final event conference for REFLOW Vejle, "The Future is Now: Radical Experiments with the Circular Economy"³⁸. The event brought together 87 participants to learn, debate, and explore circular economy from a practical and explorative perspective (Table 11).

³⁸ https://www.spinderihallerne.dk/om-spinderihallerne/udvikling-og-projekter/projekter-i-huset/reflow/fremtiden-er-nu-radikale-eksperimenter-med-cirkulaer-oekonomi/?fbclid=IwAR2wYUBI00s-B_TmW_8estN3WP-6mZ6hzLyAf0A0a5AD8wAvP4rh5Wfx4C4



3.7.2.7 Number of citizens engaged through educational programmes

With a large focus on engaging and empowering the citizens of Vejle, the pilot city has engaged 424 citizens through educational programmes over the course of the REFLOW project. Educational programmes have included a workshop where 22 citizens could interact with plastic waste and rethink its value and use as a resource by turning these materials in lamps. The Vejle pilot also hosted a workshop with 20 citizens where they focused on plastic sorting.

The Vejle pilot has also hosted two exhibitions at Spinderihallerne, with the first exhibition in 2020 and the second opening up to the public May 2022. These exhibitions have been important educational programmes which have engaged citizens and students with teaching materials and installations on giving plastic a new life³⁹. At the first exhibition held in 2020, 80 citizens were engaged while the second exhibition attracted 172 citizens through the installations as well as activities such as exhibition tours (34), Open Nights Spinderihallerne (58), and welcoming students and residencies in Spinderihallerne (80).

The Vejle pilot has also engaged with 105 students from the Southern University of Denmark, Brandbjerg Højskole, and the 10. Klasse UngdomsCenter Vejle. Lastly, at Den Gamle Gård test site, the pilot city engaged with the residents at the apartment block in the West of Vejle at an event, attracting 70 citizens (Table 11).

3.7.2.8 Increase in the awareness about circularity of plastics among the citizens

Based on the second and final exhibition hosted by the Vejle pilot (as mentioned above), an increase in awareness on the circularity of plastics among citizens was measured using a 10-point Likert scale. The results of this KPI took place on May 11, 2022, with a total of 58 respondents.

To collect this data, the Vejle pilot made a voting site at the beginning and end of the exhibition. At the start, the Vejle pilot asked citizens, "how much do you feel you know about plastics and circularity?". The respondents were asked to answer on a scale of 1 to 10 (1 being nothing and 10 being everything). At the end of the exhibition, the same question was asked to the citizens asking them to rank their awareness from a scale of 1 to 10 after the exhibition. Based on the results from this data collection, all respondents had moved several numbers up the scale in awareness about the circularity of plastics.

³⁹ <https://reflowproject.eu/event/vejles-pilot-virtual-opening-exhibition-when-plastic-is-given-new-life/>



This initial result was also complemented with informal interviews held with people visiting the exhibition to get feedback on their learnings. All participants interviewed gave positive feedback that the exhibition had made them more aware of what plastic could be used for and that they had increased their knowledge on what circularity is. As a result, this data led to the achieved result of 100% for this KPI based on 100% of respondents stating that they have experienced an increase in awareness about circularity of plastics following the exhibition (Table 11).

3.7.2.9 Active community involvement through meetings in shaping the implementation

The involvement of the community in shaping the implementation is based on the workshops and meetings where three communities have been involved with: (1) local steering group committee, (2) the political committee, NMU (Nature & Environment), and (3) working groups at the test sites (Sofiegården, REMA 1000, and Den Gamle Gård). Active involvement took place across a total of 50 meetings and workshops held with these different communities.

Community	Type of Meeting	Number
Local Steering Group Committee	Meetings (physical & online)	11
NMU	Meetings (physical & online)	6
Working Groups at the Test Sites	Meetings and workshops	33

Table 12: List of and number of meetings that Vejle has held

Importantly, the active involvement of the community relayed through these meetings translated into important decisions to be made regarding the Vejle pilot including choosing the test sites and gathering understandings of the everyday life of those who live at the test sites. Through these inputs, the Vejle pilot could shape their decisions and implementation around informed insights from the community. D7.4 provides more details on this KPI.

3.7.3 Environmental Impact

The following sections present short description of each environmental KPI's results of the Vejle pilot. The overall environmental impact assessment of the Vejle pilot can be found in D3.3 Urban Metabolism Strategy Final Report.



3.7.3.1 Plastic streams identified at the different test sites

The identification of plastic streams across the different test sites in the Vejle pilot was conducted over two moments in the REFLOW project. The first involved the initial plastic analysis carried out by the Vejle pilot across the 7 potential test sites in the West Vejle neighbourhood. This analysis identified 6 different plastic streams that were flowing through the initially identified test sites, instead of the original target of 5. This was because the Vejle pilot wanted to include problem plastics as stream. When undertaking this analysis, the Vejle pilot had originally wanted to sort and identify plastic streams based on the compulsory labelling system, but it soon became clear to them that this was not an option since not all plastics were labelled and they did not have any technical aids during this process. As such, they chose to identify problem plastics as a stream to find out whether it was possible any plastics within this stream to work with, however, there were no plastics which clearly stood out.

The six plastic streams identified at the different test sites were as follows:

- PP/PE: the hard products of these two types of plastic are sorted together. Their abbreviations stand for, respectively, polypropylene and polyethylene, and together they are referred to as polyolefins. They are widely used as packaging for various food and cleaning products.
- PET: PET stands for polyethylene terephthalate. It is used in the packaging industry and for soda and water bottles.
- PE film: this refers to soft polyethylene which when found in household waste was most often as plastic bags in different configurations.
- PP film: this refers to soft polypropylene which is used in bread and candy bags.
- Problem plastic: problem plastic entails composites such as plastic products, laminates, and other products composed of both hard and soft plastics.
- Other/mixed plastic: this refers to other plastics such as PS (polystyrene), ABS, and unidentifiable plastic.

The second activity to identify plastic streams was conducted at the city-level as part of the MFA conducted by WP3. These results and overview of the plastic streams identified at the city-level can be found in D3.2 Urban Metabolism Scans. The identification of plastic streams at the neighbourhood-level across the different test sites and at the city-level were fundamental in the Vejle pilot's decision-making process during their test site evaluation and in helping to scope out their key focus areas for their plastic interventions in REFLOW.



3.7.3.2 Reduction in the amount of plastics sent to incineration from the test sites

The REMA 1000 test site has reported a 50% reduction of plastic in residual waste that has been sent to incineration, corresponding to 33 kilograms per week. At the Sofiegården test site, the amount of plastic in residual waste that is sent for incineration has been reduced by 92%, corresponding to 42 kilograms per week. The third test site has reported a 17% reduction on plastics sent to incineration. More details on the environmental impact can be found in D3.3 Urban Metabolism Strategy Final Report (Table 11).

3.7.3.3 Number of plastic streams going into circular use within REMA 1000

At the test site, REMA 1000, a total of 8 plastic streams went into circular use. These were as follows:

- Return of other bottles/boxes not part of the deposit program
- Coloured film
- Candy Boxes
- Flowerpots
- Bottle return part of the deposit program
- Transparent film
- Schulstad boxes
- Milk boxes from Arla

See D5.4 REFLOW Pilot Applications for more details on the plastic streams.

3.7.4 Vejle Key Performance Indicators Conclusion

This section has presented the achieved results of the Vejle pilot's socio-economic and environmental Key Performance Indicators over the 3-year duration of the REFLOW project. The results of each KPI have been accompanied by details and justifications of the achieved outcomes.

In relation to Vejle's socio-economic KPIs, the pilot city has reached their projected target for eight of their nine KPIs. The strong focus and adoption of a citizen-centred approach within Vejle shaped the success for the pilot in reaching their socio-economic KPIs focusing on citizen involvement, engagement, and awareness which is thus reflected in their expectational performance. While the target for business model and governance was not reached within REFLOW, efforts within Vejle had instead focused on the reworking established processes within businesses towards becoming more circular. Despite being in short of this target, the overall results of Vejle's performance have evidenced the effect of their focus on citizens and the change towards activating a citizen movement around plastics and circular economy. While this deliverable has reported on the achieved results of the



environmental KPIs for the Vejle pilot, a full assessment of the environmental impact is elaborated within D3.3.





Vejele Socio-Economic KPIs

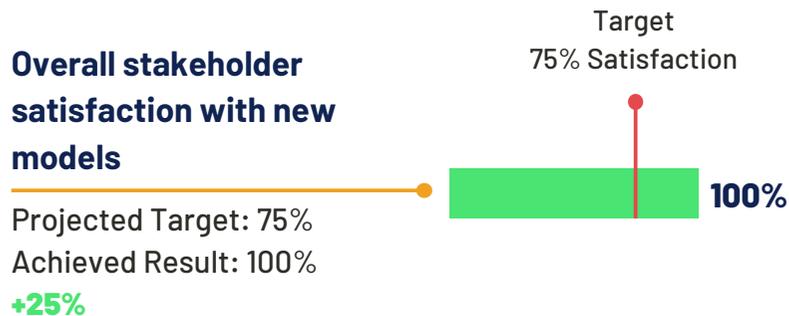
Participation of minimum 50 households distributed on different types of housing and public and private buildings



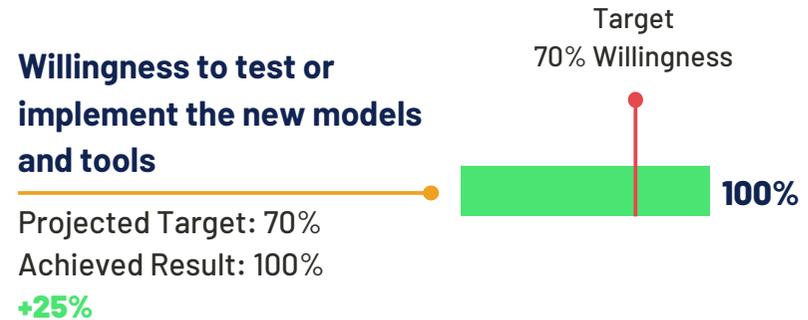
Number of Governance/Business Models Developed



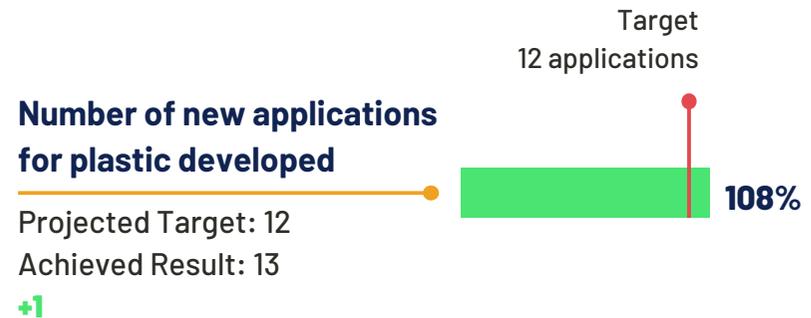
Overall stakeholder satisfaction with new models



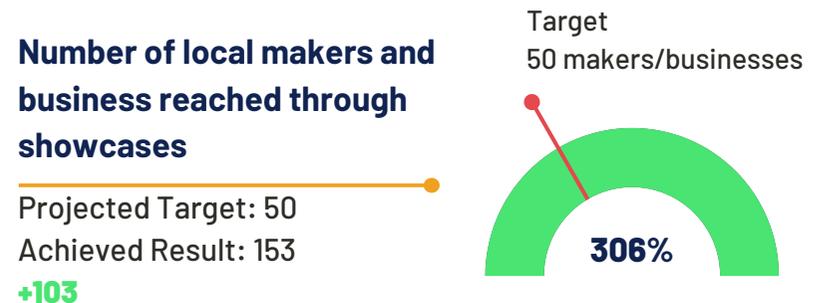
Willingness to test or implement the new models and tools



Number of new applications for plastic developed



Number of local makers and business reached through showcases





Vejle Socio-Economic KPIs

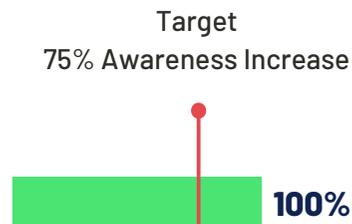
Number of citizens engaged through educational programmes

Projected Target: 250
Achieved Result: 424
+174



Increase in the awareness about circularity of plastics among the citizens

Projected Target: 75%
Achieved Result: 100%
+25%



Active community involvement through meetings in shaping the implementation

Projected Target: 30
Achieved Result: 50
+20

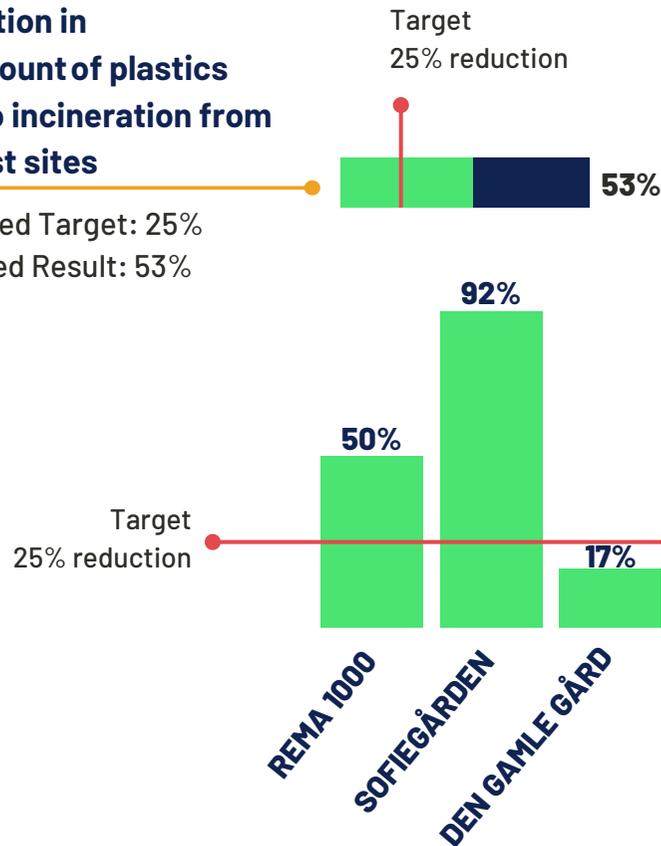




Vejle Environmental KPIs

Reduction in the amount of plastics sent to incineration from the test sites

Projected Target: 25%
Achieved Result: 53%
+28%



Plastic streams identified at the different test sites

Projected Target: 5
Achieved Result: 6
+1



Number of plastic streams going into circular use within REMA 1000

Projected Target: 5
Achieved Result: 8
+3



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

3.8 Key Performance Indicator Conclusions

This chapter has presented the Key Performance Indicators for the six pilot cities in REFLOW. The chapter has reported on the achieved results of the pilot cities' socio-economic and environmental KPIs within the duration of the REFLOW project's three-year timespan. It has furthermore supplemented these achievements with details on the results, including where to find further elaborations, and necessary justifications in the cases where KPI targets were not met. In this way, the chapter has focused on the project impact assessment task of evidencing and measuring change within the pilot cities during REFLOW to determine the success the pilots have made throughout their journey towards becoming circular and regenerative. In this context of project impact, the pilot cities' KPIs have monitored and measured their progress and performance throughout the duration of REFLOW which have set out towards achieving environmental and socio-economic impact across areas of materials, local manufacturing capacity, local governance and business models that contribute to circularity, and through empowering citizens and engaging with policymakers and SMEs.





Chapter 4

Social Return on Investment

Valuing and Monetising Change



4 Social Return on Investment: Valuing and Monetising Change

This chapter presents the Social Return on Investment (SROI) for six of the solutions developed in REFLOW – one solution for each pilot city. Each city selected one solution for the SROI calculation in collaboration with CBS team. The selection of the solutions was based on the future potential of the solutions and their need to rely on the SROI calculations to test the relevance of these projects over a period of five years. The results could support the cities to communicate the value to their stakeholders and to attract additional funds. Before diving into the final social return calculation, the chapter presents a background on the SROI approach to understanding the changes and impacts of the pilot city solutions. Next, an overview of the methodology is presented, including the principles of SROI that were adhered to during the process of conducting the SROI and key terminology used within SROI. Further, the reasoning behind the level of the SROI analysis, based on one pilot solution is also detailed. Following this introduction to SROI, the solutions of the pilot cities are presented across the stages of the SROI process. Finally, the chapter concludes with an overall sum-up and recommendations.

4.1 SROI Background

To account for value that extends past profit-driven return on investments, the Social Return on Investment (SROI) framework seeks to broaden the conceptualisation of value creation from projects, organisations, and interventions. In this way, SROI accounts for and measures the value being created through activities that benefit the social, economic, and environmental well-being of communities beyond solely fiscal benefit. With a broader perspective towards value, SROI relies on understanding the changes (also known as outcomes) that people or organisations experience or contribute to. SROI is a story about change. Thus, SROI relies heavily on the involvement of stakeholders – those who affect and are affected by change – to understand and account for experienced outcomes which can then be accounted and measured through applying monetary values that can represent these changes. By attaching monetary values to social, economic, and environmental outcomes, a ratio of benefits to costs can be calculated to demonstrate the social value that is generated based on the amount invested.

The initial development and use of the concept of Social Return on Investment has its roots in philanthropic foundations and use by NGOs to measure and express the impact that their social projects and programmes have generated through financing (Hamelmann et al., 2017). SROI has been largely taken up within the United Kingdom, eventually spreading its reach to the United States. In a traditional sense, SROI has mainly been used by non-profits, NGOs, and other social enterprises to communicate



and measure impact to attract donations and funding. Today, the use of SROI is being experimented with in public administration for some pilot projects at the local level.

4.2 SROI Methodology

4.2.1 SROI Principles

Social Return on Investment is based on a set of principles that should be applied when undertaking this task (Nicholls et al., 2012). These principles include:

1. Involve Stakeholders
2. Understand what changes
3. Value the things that matter
4. Only include what is material
5. Do not overclaim
6. Be transparent
7. Verify results

4.2.2 Stages of the SROI

The process of conducting an SROI analysis covers six stages which include (Nicholls et al., 2012):

1. Establishing the scope and identifying key stakeholders
2. Mapping outcomes
3. Evidencing outcomes and giving them a value
4. Establishing impact
5. Calculating the SROI
6. Reporting, using and embedding

4.2.3 SROI Terminology

Clarifying and providing a clear understanding of the terminology used within Social Return on Investment plays an important role in communicating results and ensuring that terms are clear and being used consistently. The following sections provide key terminology used within Social Return on Investment according to Social Value UK's guide to Social Return on Investment (Nicholls et al., 2012).



4.2.3.1 Stakeholder

When referring to a stakeholder in the SROI analysis, we are speaking about any person, organisation, or group that experiences change, negative or positive, as a result of the activity.

4.2.3.2 Outcome

Outcomes refer to the changes that occur as a result of an activity (Nicholls et al., 2012). Outcomes can be both positive and negative, and both intended and unintended.

4.2.3.3 Impact

Within SROI, impact refers to the outcomes that were achieved through the activity (The Wise Group, 2007). Impact considers what would have happened regardless of the organisation's intervention, the contribution of others outside the organisation, and how long the outcomes last (Nicholls et al., 2012). Thus, deadweight, drop-off, attribution or displacement are considered.

4.2.3.4 Deadweight

Deadweight involves the amount of outcome that would have already taken place had the activity being analysed not been carried out (Nicholls et al., 2012). In this way, deadweight can account for the social impact that would have been otherwise created, without the effects of the intervention. Deadweight is calculated through analysing available baseline data which gives a picture of this social benefit that would have anyways occurred and deducting this from the outcomes linked to the actual intervention (Nicholls et al., 2012).

4.2.3.5 Drop-off

Drop-off looks at the deterioration of an outcome over time (Nicholls et al., 2012). In other words, it looks at the outcome's lifespan if it is not continued. Drop-off is assessed through the use of benchmarking information or evidence from research (Nicholls et al., 2012).

4.2.3.6 Attribution

Attribution gauges how much of the outcome that was experienced by the stakeholders was caused by the contributions from other organisations or people (Nicholls et al., 2012). Through assessing the attribution, the shared value that has been created and shared across other organisations will be accounted for. This allows for the pinpointing of only the returns that were generated by the



organisation carrying out the intervention itself to be included in the SROI calculation (Nicholls et al., 2012).

4.2.3.7 Displacement

Displacement assesses the outcomes from the intervention being analysed and how much they have displaced other outcomes (Nicholls et al., 2012). In practice, this involves understanding how positive outcomes that are experienced by certain stakeholders can be offset by negative outcomes for others (Nicholls et al., 2012).

4.2.3.8 Proxy

A proxy seeks to attach an approximate value where an exact measure cannot be obtained (Nicholls et al., 2012). In practice, a proxy financialises an outcome within the SROI which does not traditionally have a financial value associated with it (Nicholls et al., 2012).

4.3 SROI in REFLOW

Building upon the background and uses of SROI, REFLOW sets out to implement and adapt this methodology for the measurement of social and economic impact within cities transitioning towards circular economy. An SROI can be carried out in two ways: evaluative and forecast. An evaluative SROI “is conducted retrospectively and based on actual outcomes that have already taken place” (Nicholls et al., 2012, p. 8), whereas a forecast SROI “predicts how much social value will be created if the activities meet their intended outcomes” (Nicholls et al., 2012, p. 8). Within REFLOW, forecast SROIs for each of the pilot solutions has been carried out to predict what the social value of these interventions may be following the activities of the pilot city solutions within the REFLOW project.

The level of analysis for the SROIs conducted within REFLOW has taken place at the level of one solution per pilot city. Establishing this level of analysis was based on conversations between the CBS team and the pilot cities. The selection of the solutions was based on the future potential of the solutions and their need to rely on the SROI calculations to test the relevance of these projects over a period of five years.

The SROI in REFLOW provides an integral component of the final project impact assessment presented in this deliverable. In addition to measuring the social impact of REFLOW, the results of this analysis can



be used as a valuable tool for the improvement of activities, communicating impact, and attracting future investment beyond REFLOW for the pilot cities.

4.3.1 The Pilot Cities SROIs

The following sections presents each of the pilot cities' SROIs at the level of one pilot solution. Forecast SROI analyses have been carried out for Amsterdam, Cluj-Napoca, Milan, Paris, and Vejle based on the following solutions:

Amsterdam Pilot	The Swapshop
Cluj-Napoca Pilot	The Retrofit Kit
Milan Pilot	BOTTO
Paris Pilot	Re-Label
Vejle Pilot	Den Gamle Gård

As highlighted across previous deliverables and lessons learned over the timespan of the REFLOW project, the acknowledgement of diversity across the pilot cities' solutions, contexts, challenges, and stakeholders involved has been a key point of attention during this task. With that being said, the following SROIs across the pilot cities have followed a common framework of the stages of SROI mentioned above. With both structure and diversity being accounted for, the following pilot city SROIs reflects a common reading structure, following the stages of the SROI while telling the different stories of change across the diversity of pilot-level solutions. The pilot cities' SROI reports are organised as follows:

- Establishing Scope
- Stakeholder Analysis
- Inputs and Outputs
- Stakeholder Outcomes
 - Indictors and Financial Proxies Identification
- Measuring Impact
 - Factoring in Deadweight, Attribution, Displacement and Drop-off
- Social Return Calculation
- Conclusions and Recommendations

A full SROI has not been undertaken within the Berlin pilot due to the lack of stakeholder involvement as a result of the delays and challenges the pilot experienced with the development of the Wastewater Heat



Radar. However, an analysis of social value created based on assumptions and approximations has been undertaken to monetise the predicted value of change as a result of the Berlin pilot's solution – the Wastewater Heat Radar.

It is important to note that the following analyses across the pilot cities has been carried out by the WP1 CBS in collaboration with the pilot cities and stakeholders. This collaboration has allowed for understanding the intended and expected outcomes as a result of the chosen pilot city solution as well as for gathering other data to support the analyses. While there is stakeholder data that has been collected in the process of undertaking the SROIs for the 5 pilot cities and data derived from the Berlin pilot, a series of assumptions and approximations were made to ensure measurable outcomes and adequate results. These assumptions and approximations were based on internal consultations with the WP1 CBS team undertaking this SROI task and through desk research – scoping out previous SROI reports, following the Social Value UK's SROI Guide, and additional sources of material where necessary. With this being said, undertaking an SROI entails that informed judgments and decisions are made, meaning that assumptions and approximations are to be expected, especially for forecast analyses.



Amsterdam

Swapshop SROI



4.4 Amsterdam: Swapshop

4.4.1 Establishing Scope

4.4.1.1 The Amsterdam Pilot Overview

The REFLOW Amsterdam pilot consists of 4 organisations: the Municipality of Amsterdam, BMA Techne, WAAG, and Pakhuis de Zwijger. The Amsterdam pilot seeks to transition their textile material stream from linear to circular through the implementation of innovative circular solutions tackling textiles at the citizen- and industry-levels. Over the course of the REFLOW project's 3-year timespan, the Amsterdam pilot has worked to co-design, create, test and implement a variety of solutions which seek to close the loop on textiles in the city and region. A full overview of these solutions is listed in section 2.2.2.5 of this deliverable.

4.4.1.2 The Swapshop Overview

The Amsterdam pilot has worked in close collaboration with the existing entity, The Swapshop. The Swapshop is a start-up that aims to extend the life cycle of textiles through the concept of swapping second-hand clothing. As an organisation in itself, they seek to address overconsumption and the huge amounts of waste within the clothing industry. They do this through many avenues including: channelling unswappable items made of high percentages of cotton through the Denim Deal (see section 2.2.2.5.5), sending wearable items to charities such as Dress for Success, and sending items to organisations who can recycle the textiles and produce them into new materials and/or product. Moreover, social cohesion is tackled within the Swapshop as they work towards the inclusion of newcomers to the Netherlands and those at distance to the labour market as employees in the Swapshop.

The Swapshop started its journey in 2018 with a shop in Rotterdam. The founders of the Swapshop initially met studying together and found out that they work and complement each other well. With backgrounds and experience in facility management, politics, urban geography, and society and behavioural change, they joined forces to create the Swapshop. Following the success of the shop in Rotterdam, they started their whirlwind adventure leading them to new funding opportunities and collaborations across a variety of programmes and networks of organisations. In 2020, the Swapshop became a resident of the Municipality of Amsterdam's Start-up in Residence Program. Through this program, the Swapshop was able to receive funding and support in developing their business model.



Parallel to this, the Swapshop (Amsterdam location) was able to get its feet off the ground through the funding and support of the REFLOW Amsterdam pilot.

As a budding organisation that is growing and learning every day, the REFLOW Amsterdam pilot has been an important necessity in accelerating and tending to this growth of the Swapshop. The Amsterdam pilot has been a foundation for the Swapshop in Amsterdam, lifting them up to a point where they can be able to generate long-lasting impact and show that should be taken seriously.

4.4.1.3 Scope of Analysis

The SROI for the Swapshop is a forecast of the value created by the REFLOW Amsterdam pilot. The REFLOW Amsterdam pilot has been heavily involved in the present situation of the Swapshop by providing initial funding, networks, visibility, technology, and knowledge. This has translated into activities that include:

- Support from REFLOW with existing programmes running in the Swapshop
- Launching of the Amsterdam Swapshop location
- Building networks with the Amsterdam Economic Board
- Increasing the visibility of the Swapshop
- Integrating REFLOW OS into the Swapshop to generate material passports and humanized stories attached to clothing

While it is recognized that the Swapshop functions as an entity in itself and collaborates with other organisations and programmes (for example, the Start-up in Residence programme run by the Municipality of Amsterdam), this SROI scope of analysis focuses on assessing the change generated by the REFLOW activities of the Amsterdam pilot.

4.4.2 Identifying Stakeholders

4.4.2.1 Stakeholder Analysis

The initial identification of stakeholders was first identified by WP1. During an SROI workshop session, the Amsterdam pilot analysed the list of stakeholders and mapped out the expected changes that each stakeholder could experience because of their activities in the Swapshop. This information is presented below alongside a contextual understanding of the stakeholders' involvement with the Swapshop. The



analysis of stakeholders led to the next steps of involving key stakeholders into discussions to find out the changes they have experienced already and what they expect to experience in the future.

Stakeholders	Context	Expected Outcomes
Swapshop	They are the entity where the REFLOW pilot solution is implemented	<ul style="list-style-type: none"> • Increase of swappers using the Swapshop • Increased perceived value of clothing items in the Swapshop • More clothing channelled to other organisations from the Swapshop
Swapshop Employees	They operate the daily functions at the Swapshop	<ul style="list-style-type: none"> • Volunteers gain new skills and experience acquired through the job at the Swapshop • New understanding of clothing is gained • Financial stability and independence of newcomers to the Netherlands
UWV	They are an employment agency which links people who are unemployed and need to get back to into the labour market with job opportunities at the Swapshop	<ul style="list-style-type: none"> • Decrease of people who are at distance from the job market • Increase of experience and skills to enter the job market • New skills and experiences acquired through the job at the Swapshop
Charity	They are a non-profit that dresses lower-income citizens for free. Through the Swapshop, the organisation receives unswappable items that are too valuable to be discarded	<ul style="list-style-type: none"> • New source of textile exchange developed
I-DID	They are a social enterprise which receives unswappable items from the Swapshop and recycles these through felt production to make new consumer products	<ul style="list-style-type: none"> • Increase of textile feedstock received
Makers Unite	They are a production company who provides in-house tailoring to the Swapshop for their repair and upcycling services	<ul style="list-style-type: none"> • Increase in tailoring work. • Increase opportunities for tailoring jobs for newcomers



Sympact	They are a company which makes granulate from textiles and process them into new interior products. Discarded textiles are channelled through Sympact when the Swapshop contacts the designers for these textiles to be upcycled/redesigned	<ul style="list-style-type: none"> • Increase of textile feedstock for the recycling industry • Enhanced ability for the development of new products from recycled resources
Current Textile Collects (AMS Municipality)	They collect the discarded, unwanted, and unswappable clothing collected at the Swapshop which are unsuitable for reuse/rewear processes	<ul style="list-style-type: none"> • Increase of collected textiles
Municipality of Amsterdam	They awarded the Swapshop in 2020 with the start-up in residence program which the municipality organises and provide REFLOW funding to the Swapshop.	<ul style="list-style-type: none"> • Amsterdammers value textiles and clothing more • Amsterdammers have a place to "dispose" their unwanted clothing and to swap in a circular way • Amsterdammers have a change in behaviour • More insights into textile streams in the city as a first step in actual behaviours of citizens in relation to clothing • Future planning and decisions are informed by concrete data retrieved • Cleaner and healthier city (less CO₂) • Circular economy becomes accessible to all Amsterdammers • Less textiles in residual waste, less textile waste incinerated, less contaminated textiles
Fibresort	They receive all unswappable items that are 100% cotton as they are part of the Denim Deal (see section 2.2.2.5.5 for description of the Denim Deal)	<ul style="list-style-type: none"> • Increase of feedstock for the recycling industry • Enhanced ability for the development of new products from recycled resources
Swappers (Citizens)	They are the swappers who supply and swap the clothing feedback in the Swapshop	<ul style="list-style-type: none"> • Good and rewarding feeling after swapping



		<ul style="list-style-type: none"> • More incentivized to swap based on the rewards and feelings received after swapping • Increased feelings of trust in citizens regarding textile disposal processes (process is transparent) • High quality brands and materials are more accessible citizens • Easier and more accessible for citizens to swap • New relationship with clothing (from material to digital, attaching personal memories) • New understanding of the story and value of each piece of clothing in the Swapshop • Change in behaviour and increase of awareness • Enhanced understanding of both the material and immaterial value of clothing
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Table 13: Amsterdam SROI Stakeholder Analysis

4.4.2.2 Stakeholder Involvement

After the stakeholder analysis, the Amsterdam pilot kick-started the process of involving key stakeholders. While there are many stakeholders who may experience change as a result of the REFLOW activities, due to time constraints and external demands and duties of the stakeholders initially identified, 3 stakeholders became initially involved. The first round of information gathering was administered by the Amsterdam pilot. These 3 stakeholders were sent questionnaires to gauge an understanding of experienced and potential changes. It was determined after the collection of initial responses that a more in-depth approach to understanding what has changed and will change for the stakeholders was needed. As a result, the WP1 team facilitated a meeting online with the Swapshop founder and a Swapshop employee. Through this meeting, the stakeholders were given the opportunity to reflect on the contributions of REFLOW and the changes that they have experienced within their organisations and themselves. Based on the scope of analysis and the materiality of the changes brought up in conversation, the stakeholders involved were assessed regarding their inclusion in the SROI. An overview of these processes is in the table below.



Stakeholders	Included in SROI?	Reason for Inclusion/Exclusion	Number of Representative Stakeholders	Method of Engagement
Swapshop	Yes	They are included because they are the founders of the entity where the REFLOW pilot solution is being implemented	2	Questionnaire Interview
Swapshop Employees	Yes	They are included because they operate the daily functions at the Swapshop	1	Questionnaire Interview
Sympact	No	They are excluded because they do not experience direct material change from the REFLOW activities in the Swapshop	1	Questionnaire
Municipality of Amsterdam	Yes	They are included because they experience change from the REFLOW activities in the Swapshop and have been instrumental stakeholders in the activities in the Swapshop Amsterdam.	1	Questionnaire Interview

Table 14: Amsterdam SROI Stakeholder Involvement

4.4.3 Inputs and Outputs

The inputs that have made the REFLOW activities in the Swapshop possible consist of the funding that the REFLOW Amsterdam pilot provided to the Swapshop, and the time used by the Amsterdam pilot within the Swapshop.

This amounts to an estimated €109.250,00⁴⁰.

Through these inputs, the following activities were able to take place:

- Support from REFLOW with existing programmes running in the Swapshop
- Launching of the Amsterdam Swapshop

⁴⁰ Based on the rough estimation of the funding of the Amsterdam pilot city divided by the number of the pilot solutions produced within REFLOW. As well as funding for newly designed products and track and trace labels.



- Building networks with the Amsterdam Economic Board
- Increasing the visibility of the Swapshop
- Integrating REFLOW OS into the Swapshop to generate material passports and humanized stories attached to clothing

As a result, these activities have produced the following outputs:

- The Amsterdam location for the Swapshop
- Swapshop web-based application and Telegram Bot
- 1 additional employee hired

4.4.4 Outcomes

4.4.4.1 Stakeholder Outcomes

By engaging with the stakeholders, experienced changes, and projected future changes as a result of the REFLOW Amsterdam pilot's activities were extrapolated from these dialogues. Within SROI terminology, the changes that result from an activity and which are experienced by stakeholders are outcomes. Since SROI is stakeholder-informed rather than led, the outcomes presented below were realised through both the involvement with the stakeholders and the intended outcomes expected through the Swapshop by the Amsterdam pilot and WP1. Presented in the following section are the changes that each stakeholder has and will experience in narrative form, telling the story of change as a result of REFLOW's involvement with the Swapshop. These stories were then analysed by the WP1 team to extract the key outcomes which would be monetised and valued.

4.4.4.1.1 The Swapshop

The Swapshop founders were at a point of growth and development when the REFLOW Amsterdam pilot came along. As an already established business, they had activities and initiatives up and running but found themselves in a position where they were ready for the next leg of their journey. Through the REFLOW Amsterdam pilot, the Swapshop was able to launch their Amsterdam location and most importantly, land a good location, which is something that they would have not been able to do as easily without the REFLOW Amsterdam pilot. Moreover, the Swapshop founders were able to support their employees with finances received through the funding and increased visibility brought on from REFLOW, allowing for the Swapshop to grow their team by 1 person who has a paid job through REFLOW Amsterdam's inputs in the Swapshop. The integration of REFLOW OS track and trace technology also provided the Swapshop founders with insights into understanding the way clothing items come and go



through the Swapshop while also creating a digital storyline in collaboration with the Swappers. As a team of 2 passionate, experienced and transdisciplinary members, the Swapshop founders were able to become more focused and more professional. Through REFLOW, they felt lifted up putting them into a position where people started to take them more seriously. They were also able to reflect on their growth path and learned to take a step back and to realise that growing fast was not necessarily the way to go. Rather, they should take stock of their priorities and pinpoint the areas through which they could focus in on.

The leverage through REFLOW has had the effects of making the Swapshop feel more professional through the experienced changes of being taken more seriously and the attainment of new business modelling skills. As a result, the Swapshop as an organisation is in a position to enhance their mission across the city of Amsterdam and to increase the capacity for clothing collection and the life-span of clothing.

The Swapshop	The Outcomes (What Changes?)
	The Swapshop concept and the importance of sustainability is spread more in the city
The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	

Table 15: The Swapshop Stakeholder Outcomes

4.4.4.1.2 The Swapshop Employees

Establishing yourself in a new society or navigating your way through barriers that can prevent individuals to enter the labour market comes with challenges. As a newcomer to the Netherlands, entering into the labour market provides a launch pad that can bridge social and economic gaps that individuals face in their new environments. For those who may be at distance from the labour market, struggling to enter an environment that can feel closed off or unattainable can be discouraging and isolating. At the Swapshop, individuals finding themselves in these situations are presented with the opportunity to find their footing in society as a Swapshop employee. By taking individuals who are vulnerable, experiencing these hardships or who may need a platform for building up their social and economic foundations, the Swapshop provides access to work experience, social skills, and provides a wage to help individuals to lead and feel as though they have a self-sufficient life, have a sense of belonging, and gain personal agency. With the funding from the Amsterdam pilot, these changes are made possible.



The Swapshop Employees	The Outcomes (What Changes?)
	Employees feel more independent and have more control of their lives
	Employees feel an increased sense of belonging to society
	Employees feel more confident in themselves from a work and social perspective

Table 16: The Swapshop Employees Stakeholder Outcomes

4.4.4.1.3 The Municipality of Amsterdam

With Amsterdam’s position as a frontrunning city when it comes to circular economy, the Municipality of Amsterdam had set its course on becoming fully circular by 2050. With their involvement of REFLOW, the Municipality of Amsterdam was able to leverage this opportunity to push forward this transition across its textile streams. As a key partner in the Amsterdam pilot in REFLOW, the Municipality of Amsterdam sought to have a positive social impact on circular textiles through supporting the broadening of access to practices within the circular economy to all Amsterdammers. It was through this focus that the Municipality of Amsterdam was able to funnel their resources into the blossoming start-up, the Swapshop. With the activities of the Swapshop already offering a more accessible option for circular clothing through the concept of swapping as well as donating clothing to social enterprises and organisations helping Amsterdammers across a variety of circumstances and socioeconomic backgrounds, the support from the Municipality helped to advance this mission forward through their involvement. As a result, the Municipality of Amsterdam experiences the overall change that the circular economy is made more accessible to all Amsterdammers.

In addressing the challenges of the Municipality’s inhabitants and helping to shift their behaviours when it comes to textiles and clothing consumption, discarding, and valuing, their involvement with the Swapshop through REFLOW strengthens better behaviours towards clothing and textiles in Amsterdam. With the Swapshop, Amsterdammers have access to more places for making more circular and responsible clothing consumption, while also having a wider range of options for handling their unwanted clothing items. In addition, with the revaluing of clothing items passing through the Swapshop initiated through REFLOW OS and the stories attached to these items, the citizens of Amsterdam begin to shift their mindsets around clothing and textiles the value that they hold in them. As a result, the



Municipality of Amsterdam experiences that more circular practices and attitudes are established for better textile behaviours in the city.

Becoming a circular city does not happen overnight. This journey takes time and efforts to build up a portfolio of initiatives that can be the lifeblood to making this circular transition a reality. While the Municipality of Amsterdam has received attention in its over 70 circular economy initiatives already implemented into the city, increasing these efforts through the Swapshop lifts up Amsterdam and drives them forward toward their 2050 goal for circularity. Ongoing work, testing, innovation, and attention to these efforts is required to hold the city in its position as a frontrunner while also ensuring that the efforts already made, do not backpedal. Through the REFLOW activities in the Swapshop, the Municipality of Amsterdam as results, gains more attention as a circular city and continually improves its image.

The Municipality of Amsterdam	The Outcomes (What Changes?)
	Circular economy is made more accessible to all Amsterdammers
	More circular practices and attitudes are established for better textile behaviours in the city
	The Municipality of Amsterdam gains more attention as a circular city and improves their image

Table 17: The Municipality of Amsterdam Stakeholder Outcomes

4.4.4.2 Indicators of Change

To demonstrate that the changes presented in the earlier section have actually occurred for the stakeholders, the following indicators of change are used to measure the extent of the change. For most of the indicators, subjective and objective indicators for the outcomes were used to account for both the individual perspectives of the stakeholders who experience the change as well as indicators that reflect more fact-based values.

Stakeholder	Outcomes	Indicator	Source of Indicator
The Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	% of textiles diverted from incineration; amount of textiles with a second life through the Swapshop	Data from material passports in the Swapshop; data from the Swapshop



	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	Number of Swapshops opened; number of jobs created	Questionnaire with the Swapshop
The Swapshop Employees	Employees feel more independent and have more control of their lives	Employees who state they feel financial independence and more control of their lives; if employees are still employed	Questionnaire with the Swapshop Employees
	Employees feel an increased sense of belonging to society	Employees who state that they feel part of a community	Questionnaire with the Swapshop Employees
	Employees feel more confident in themselves from a work and social perspective	Number of jobs the employees have applied for; number of social activities or clubs the employees are a part of	Questionnaire with the Swapshop Employees
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	Number of Amsterdammers who state that they have access to circular economy initiatives; number of circular economy initiatives across the different neighbourhoods in Amsterdam	Questionnaire and data from the Municipality
	More circular practices and attitudes are established for better textile behaviours in the city	Number of circular initiatives in the city	Data from the Municipality and desk research
	The Municipality gains more attention as a circular city and improves their image	Number of new policies, projects, initiatives on circularity in the city; amount of funding received for projects on circular economy	Data from the Municipality and desk research

Table 18: Amsterdam SROI Indicators of Change

4.4.4.3 Quantity and Duration of Change

The quantity of change has been estimated based on content within D5.3 and the 5-year goals for the Swapshop. This has included the goal to divert 200 tons of textiles from incineration within 5 years and to open up 20 Swapshops in Amsterdam. Moreover, the quantity was also estimated based on the interviews with the stakeholders to understand how many employees were involved in the Swapshop.



With this information, the quantity was estimated. The duration of change was identified through a questionnaire conducted with the stakeholders, where they were asked how long they expected the outcomes to last and why they thought that. The results are presented below in the table.

Stakeholder	Outcomes	Quantity	Duration
The Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	200 tonnes based on the projected 20 Swapshops with 10 tonne capacity for textile collection	More than 5 years
	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	40 employees based on the projection of 20 Swapshops with 2 employees	More than 5 years
The Swapshop Employees	Employees feel more independent and have more control of their lives	40 employees based on the projection of 20 Swapshops with 2 employees	More than 5 years
	Employees feel an increased sense of belonging to society	40 employees based on the projection of 20 Swapshops with 2 employees	More than 5 years
	Employees feel more confident in themselves from a work and social perspective	40 employees based on the projection of 20 Swapshops with 2 employees	More than 5 years
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	1	More than 5 years
	More circular practices and attitudes are established for better textile behaviours in the city	1	More than 5 years
	The Municipality gains more attention as a circular city and improves their image	1	More than 5 years

Table 19: Amsterdam SROI Quantity and Duration of Change

4.4.4.4 Financial Proxies of Outcomes

The final step of this stage involved the identification of financial proxies. This process has been done through the review of existing SROI reports through Social Value UK’s SROI report database. Similar



outcomes were analysed in the reports and used as a first step towards identifying appropriate financial proxies. The HACT Social Value calculator⁴¹ was also used to monetise the changes experienced by the Swapshop stakeholders. In addition to these sources, financial proxies were also identified through desk research where values were attributed to the outcomes based on information that could be representative and a fair value.

Stakeholder	Outcomes	Financial Proxies	Source	Value
Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	Cost of incineration/ton (including operations, labour, fuel, equipment, maintenance)	"The High Cost of Incineration" report from Gaia ⁴²	€118,00
	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	Unemployment benefits received in the Netherlands	Based on minimum wage as of 1 January 2022 ⁴³ and up to 3 months of unemployment benefits at 75% of minimum wage for 2 months and at 70% of minimum wage for 1 month ⁴⁴ in the Netherlands	€5.553,50
The Swapshop Employees	Employees feel more independent and have more control of their lives	Annual part-time salary of an employee at minimum wage	Based on minimum wage as of 1 January 2022 ⁴⁵ in the Netherlands and 20 hours a week	€10.350,00

⁴¹ <https://hact.org.uk/tools-and-services/uk-social-value-bank/>

⁴² Access here: <https://zerowasteworld.org/wp-content/uploads/The-High-Cost-of-Waste-Incineration-March-30.pdf>

⁴³ <https://www.government.nl/topics/minimum-wage/amount-of-the-minimum-wage>

⁴⁴ <https://ec.europa.eu/social/main.jsp?catId=1122&langId=en&intPagId=4996#:~:text=You%20receive%2075%25%20of%20your,unemployment%20benefit%20is%203%20months>

⁴⁵ <https://www.government.nl/topics/minimum-wage/amount-of-the-minimum-wage>



	Employees feel an increased sense of belonging to society	Cost of integration courses and exam in the Netherlands	Fiolet taaltrainingen's ⁴⁶ civic integration costs for course and exam based on 300 study hours	€4.850,00
	Employees feel more confident in themselves from a work and social perspective	Costs associated with job centre workshops	From Gemeente Amsterdam's application training (total of 8 hours) ⁴⁷ multiplied by the costs of one person working at minimum wage	€636,96
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	Cost of a sustainable clothing item	The price of a pair of MUD Jeans ⁴⁸	€119,95
	More circular practices and attitudes are established for better textile behaviours in the city	Cost of an underground waste container (including installation and operations)	From Ondergrondse Afvalcontainer ⁴⁹ and emptying 12 times a year	€5.200,00
	The Municipality gains more attention as a circular city and improves their image	Amount of a contract awarded to the Municipality for a circular initiative	AMS REFLOW Contract	€336.250,00

Table 20: Amsterdam SROI Financial Proxies

4.4.5 Measuring Impact

To measure the impact, the SROI analysis considers deadweight, displacement, attribution, and drop-off. These elements help to frame a realistic analysis of the impact that has been generated from

⁴⁶ <https://fiolet.nl/civic-integration-course/#:~:text=The%20Civic%20Integration%20Course%20will,least%20around%20300%20study%20hours>

⁴⁷ <https://www.amsterdam.nl/werk-inkomen/jongerenpunt/werk/#h6f674bf6-0b64-47d4-b02f-31724ad68dba>

⁴⁸ <https://mudjeans.eu/collections/straight-w/products/piper-straight-stone-breeze>

⁴⁹ <http://www.ondergrondse-afvalcontainer.nl/#:~:text=Het%20huren%20van%20een%20ondergrondse,bedrijfsafval%20en%20een%20nieuwe%20zak>



REFLOW Activities in the Swapshop. The following tables summarise the ways in which impact was measured in this SROI analysis.

Would the change have happened anyway/will the change happen anyway?	Assigned Deadweight (%)
The change would not happen without the REFLOW	0%
The change would have happened, but only a little without the REFLOW	25%
The change would have happened partly without the REFLOW	50%
The change would have happened mostly without the REFLOW	75%
The change would have happened anyway without the REFLOW	100%

Table 21: Amsterdam SROI Deadweight Questionnaire

How much of this change is because of REFLOW?	Assigned Attribution (%)
The change is a complete result of the REFLOW and no other contributors	0%
Other contributors had a minor role in this change	25%
Other contributors had a shared role in the change	50%
Other contributors have a significant role in the change	75%
The change is a complete result of other contributors	100%

Table 22: Amsterdam SROI Attribution Questionnaire

Did any of these changes impact other changes? Was there anything that could have happened but didn't because of this change?	Assigned Displacement (%)
The change did not negatively impact any other changes	0%
The change negatively impacted other changes only a little	25%
The change negatively impacted other changes partially	50%
The change negatively impacted other changes significantly	75%
The change negatively impacted other changes completely	100%

Table 23: Amsterdam SROI Displacement Questionnaire

Do you think that the impact will decrease year by year over a 5 year period? In other words, do you think any of the changes will stop or fade away in the future?	Assigned Drop-Off (%)
The impact of the change will not decrease at all over 5 years	0%
The impact of the change decreases a little every year over 5 years	25%
The impact of the change decreases by half every year over 5 years	50%
The impact of the change decreases significantly every year over 5 years	75%
The impact of the change is stopped completely after 5 years	100%

Table 24: Amsterdam SROI Drop-off Questionnaire

4.4.5.1 Deadweight, Displacement, Attribution, Drop-Off

To measure impact, the deadweight, displacement, attribution, and drop-off were classified through further involvement with the stakeholders. After the outcomes to be measured in the Swapshop’s SROI were identified, the stakeholders were sent questionnaires to gauge their perspectives on the contributions of REFLOW to the changes experienced by them, if the changes would have happened anyway, and how long they thought the changes would last and to what extent. The table below presents the results from the questionnaires accounting for deadweight, displacement, attribution, and drop-off.

Stakeholder	Outcomes	Deadweight	Displacement	Attribution	Drop-off
Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	75%	0%	25%	25%
	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	50%	0%	0%	25%
The Swapshop Employees	Employees feel more independent and have more control of their lives	50%	0%	50%	25%



	Employees feel an increased sense of belonging to society	50%	0%	50%	25%
	Employees feel more confident in themselves from a work and social perspective	50%	25%	50%	25%
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	100%	0%	75%	0%
	More circular practices and attitudes are established for better textile behaviours in the city	25%	0%	25%	0%
	The Municipality gains more attention as a circular city and improves their image	100%	0%	75%	0%

Table 25: Swapshop SROI Stakeholder Impact Measurement Results for Deadweight, Displacement, Attribution and Drop-off per stakeholder outcome

4.4.5.2 Total Impact

To calculate and understand the sole impact of REFLOW activities in the Swapshop, the attribution, displacement, and deadweight were used to calculate the impact for each outcome. This calculation was completed based on the following equation:

$$(Financial\ proxy\ value\ of\ each\ outcome \times the\ quantity\ of\ the\ outcome) \times (1,0 - Deadweight\ \%) \times (1,0 - Displacement\ \%) \times (1,0 - Attribution\ \%)$$



Based on the impact for each outcome, these were combined to generate the total impact of REFLOW activities in the Swapshop. The table below presents the impact calculation for each outcome and the total impact.

Stakeholder	Outcomes	Impact Calculation
Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	€4.425,00
	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	€111.070,00
The Swapshop Employees	Employees feel more independent and have more control of their lives	€103.500,00
	Employees feel an increased sense of belonging to society	€48.500,00
	Employees feel more confident in themselves from a work and social perspective	€4.777,20
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	€0,00
	More circular practices and attitudes are established for better textile behaviours in the city	€2.925,00
	The Municipality gains more attention as a circular city and improves their image	€0,00
Total Impact		€275.197,20

Table 26: The Swapshop SROI Impact Calculation per Stakeholder



4.4.6 Social Return Calculation

4.4.6.1 Future Projections

Calculating the social return was based on a 5-year projection. Based on the duration of the outcomes identified earlier in section 0, outcomes were valued accordingly. The social return calculation was completed as follows:

$$\begin{aligned} \text{Impact in Year 1} &= \text{impact calculation of outcome} \\ \text{Impact in Year 2} &= \text{Impact in Year 1} - (1,0 - \text{Drop-off \%}) \\ \text{Impact in Year 3} &= \text{Impact in Year 2} - (1,0 - \text{Drop-off \%}) \\ \text{Impact in Year 4} &= \text{Impact in Year 3} - (1,0 - \text{Drop-off \%}) \\ \text{Impact in Year 5} &= \text{Impact in Year 4} - (1,0 - \text{Drop-off \%}) \end{aligned}$$

The results of the social return projected into the future for each outcome are presented in the table below.

Stakeholder	Outcomes	Year 1	Year 2	Year 3	Year 4	Year 5
Swapshop	The Swapshop concept and the importance of sustainability is spread more in the city	€4.425,00	€3.318,75	€2.489,06	€1.866,80	€1.400,10
	The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	€111.070,00	€83.302,50	€62.476,88	€46.857,66	€35.143,24
The Swapshop Employees	Employees feel more independent and have more control of their lives	103,500.00	77,625.00	58,218.75	43,664.06	32,748.05



	Employees feel an increased sense of belonging to society	48,500.00	36,375.00	27,281.25	20,460.94	15,345.70
	Employees feel more confident in themselves from a work and social perspective	4,777.20	3,582.90	2,687.18	2,015.38	1,511.54
The Municipality of Amsterdam	Circular economy is made more accessible to all Amsterdammers	€0,00	€0,00	€0,00	€0,00	€0,00
	More circular practices and attitudes are established for better textile behaviours in the city	€2.925,00	€2.925,00	€2.925,00	€2.925,00	€2.925,00
	The Municipality gains more attention as a circular city and improves their image	€0,00	€0,00	€0,00	€0,00	€0,00
Total Social Return		275,197.20	207,129.15	156,078.11	117,789.83	89,073.63
Present value of each year		265,891.01	193,357.28	140,773.52	102,647.04	74,997.60
Total Present Value (PV)						777,666.45



Net Present Value (PV minus the investment)					656,312.45
Social Return (Value per amount invested)					7.12

Table 27: The Swapshop SROI Social Return Calculation

4.4.7 Swapshop SROI Conclusions and Recommendations

This forecast SROI analysis on the Amsterdam pilot’s REFLOW activities in the Swapshop has indicated that **for every €1 invested into the Swapshop through REFLOW activities, a total of €7,12 of predicted value is created.**

The SROI analysis for the Amsterdam pilot’s Swapshop solution has presented how their intervention creates impact on key stakeholders and the predicted social value that is generated through REFLOW activities. While the Swapshop as an entity itself had already been up and running prior to the Amsterdam REFLOW pilot becoming involved, the SROI analysis has demonstrated how REFLOW’s contributions have helped to lift up the Swapshop as a whole and how the investment made through REFLOW is predicted to generate increased social value in the years to come. Importantly, this SROI analysis has also shed light on the impact that circular textile interventions can have on society from a broader perspective. However, it is also important to understand the influence of the assumptions and approximations that have been incorporated into this SROI analysis. While undertaking this task has involved stakeholders, it is important to reiterate that the assessment of outcomes generated by the Swapshop is stakeholder-informed, rather than led. Critical judgements and decision-making have been undertaken by the WP1 team involved with the SROI analysis to derive necessary assumptions and approximations where needed.

Building off of the assumptions and approximations calculated within the SROI for the Amsterdam REFLOW pilot activities in the Swapshop, the results demonstrate the broad range of outcomes that interventions seeking to close the loop on circular textiles can create. This is exhibited in the outcomes of the Swapshop Employees. As a stakeholder group with people who are newcomers to the Netherlands and who experience challenges associated with labour market entry and social inclusion, the forecast SROI analysis for the Swapshop has highlighted that outcomes addressing feelings of belonging and



control of life can be created through circular interventions such as the Swapshop. The Swapshop Employees stakeholder group also holds the majority of the value created by the Swapshop solution within the Amsterdam REFLOW pilot, followed closely by the Swapshop organisation itself (Figure 17: The Swapshop SROI Value Creation per Stakeholder Group).

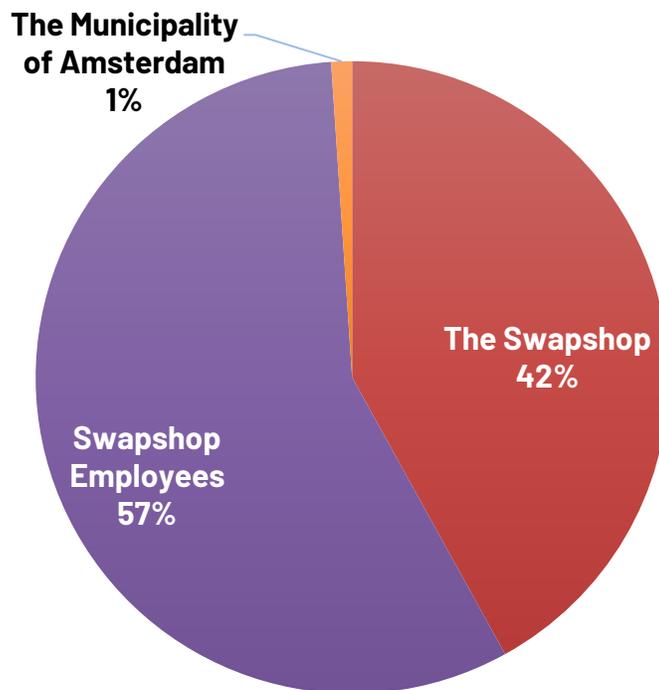


Figure 17: The Swapshop SROI Value Creation per Stakeholder Group

Through forecasting the predicted social value created by the Amsterdam REFLOW pilot activities within the Swapshop, the analysis has also helped to identify suggestions on future improvements of the activities within the Swapshop and points of attention for undertaking further assessments.

The Activities

The focus on newcomers and those at distance from the labour market should be continued within the Swapshop’s employment structure. The SROI has helped to showcase the wide-ranging social benefits that can arise through the Swapshop including not just the opportunity for employment, but also enhanced feelings of belonging and confidence. With future scaling of the Swapshop across the city, the



potential for greater social value creation can be highly impactful at the local level if this focus is maintained.

While the total impact of the Amsterdam's REFLOW activities within the Swapshop does not play a significant role within the share of value created for the Municipality of Amsterdam, it became clear during the analysis that these activities play a critical role in circular interventions at the scale of the local Amsterdammers. Shifting behaviours at the citizen-level proves to be an important step towards transitioning Amsterdam to become fully circular by 2050. Continuing ongoing collaboration with the Municipality of Amsterdam should be a sustained activity with the Swapshop. The analysis of activities and the changes experienced by both stakeholder groups has shown that their collaboration plays a critical role in necessitating impact and the creation of social value across the city and for Amsterdammers.

Future Iterations of the Analysis

Firstly, it will be important to prioritise data collection of the Swapshop Employees for further assessments. It is within this stakeholder group where there is great potential for social value creation, especially with the future goals of the Swapshop to expand their franchise across the city of Amsterdam. Taking initial assessments of the changes experienced by Swapshop Employees through preliminary informal conversations should be a priority in future data collection processes to build up a larger repository of qualitative evidence and understanding of their stories of change. Ensuring that there is also a larger sample of Swapshop Employees will also be vital to extracting additional key outcomes within this stakeholder group while also paying mind to the diversity and quantity of change that occurs to the individuals affected by the Swapshop. While key outcomes have been mined and measured within this present forecast analysis, follow-up analysis in future iterations can lead to better understandings of experiences and increased data confidence.

Secondly, while citizens were not involved in this present SROI analysis as a result of resource constraints and the timing of the project's testing and implementation of REFLOW OS, their involvement should also be considered when undertaking a future study. Additionally, it will be important that this sample size is large and that the different segments of this stakeholder group are considered during future iterations. This will include the variety of backgrounds of Amsterdammers interacting with the Swapshop across age, gender, socioeconomic status, and other notable characteristics of diversity that can influence experiences of change.



Lastly, for the financial proxies identified within this SROI analysis, future iterations should seek to increase the participation of stakeholders within the identification and verification process. With this in mind, this will also require more time and attention to this stage of the SROI process, whereby due time and resources should be considered and allocated to this activity. While an increase of resources would be needed, the initial financial proxies identified within this analysis provide a foundational starting point for understanding value creation from the stakeholders' own perspectives. The incorporation of other methods to derive financial proxies from a more participatory approach can include conducting Value Game workshops with stakeholders, whereby they are given the opportunity to equate a change they experience to a monetary value.



Berlin

Wastewater Heat Radar Social Value



4.5 Berlin: Wastewater Heat Radar

One of the key principles when undertaking a Social Return on Investment entails the involvement of stakeholders. Stakeholder involvement is also a key stage in carrying out an SROI analysis. In the case of the Berlin pilot, stakeholder involvement did not play a role in the completion of this task as a result of delays with the development of the solution. As a result, the following SROI chapter for the Berlin pilot does not present a full SROI analysis of their pilot solution, the Wastewater Heat Radar. Rather, an impact narrative generated in collaboration with the Berlin pilot is presented in the following sections to value and monetise change based on an example implementation provided by BWB. The impact narrative based on this work is used as the story of change for the key stakeholders affecting and affected by the Wastewater Heat Radar. Based on these stories, measurable outcomes were obtained which were then attributed values by defining representative financial proxies. While the principle of stakeholder involvement has not played a role in this task, the following analysis provides an initial foundation for future iterations of this analysis.

4.5.1 Establishing Scope

4.5.1.1 The Berlin Pilot Overview

The REFLOW Berlin pilot consists of 4 organisations: Prototypes for Europe (PROT), Fraunhofer Fokus (FOKUS), MCS Data Labs (MCS), and Berliner Wasserbetriebe (BWB). Within the REFLOW project, the Berlin pilot has focused on wastewater heat as a circular and climate-neutral heating source. The challenge addressed by the Berlin pilot revolves around the low awareness and subsequent low recovery rates of wastewater heat. The potential of wastewater heat recovery in the city of Berlin sits at around 275 MW, however, only 3 MW of this potential is being utilised as a circular heating source. This large gap in potential and recovery demarcated a key point of intervention for the pilot city. The answer to this low recovery of wastewater heat lies in the lack of knowledge and awareness about how to tackle and leverage the opportunities embedded in wastewater heat potential, as well as the inadequate overview of wastewater heat supply and demand across city structures. To solve this, the Berlin pilot has worked towards producing a web application that can close this knowledge and awareness gap and to close the loop on its wastewater heat potential and recovery. In addition to this web application, known as the Wastewater Heat Radar, the Berlin pilot has also produced complementary outputs that aid this key solution including explanatory videos and an information kit (see Section 2.3.2.5 in this deliverable for a full detailed description).



The realisation of these key outputs has been made possible through the activities that the Berlin pilot has carried out across its three years in REFLOW. The Berlin pilot has strived towards creating long-term impact that would result in a higher recovery rate of waste heat, more municipal procurement, less CO₂ emissions, and the mainstreaming of waste heat.

4.5.1.2 *The Wastewater Heat Radar Overview*

Driving up demand for wastewater heat is hampered by the lack of awareness among potential user and a disconnectedness between these potential users and the water utility. To address this challenge, the Berlin pilot has developed the Wastewater Heat Radar, an application that enables users to identify whether their property is available for wastewater heat recovery whereby a connection between this user and the water utility in Berlin, BWB, is established. The Wastewater Heat Radar has set out to clearly present data on heat potentials and requirements in the Berlin metropolitan region through a web application to support more implementations of wastewater heat-based heating concepts for residential and commercial properties. The solution is largely open-source and aims to encourage replication by other metropolitan regions in Europe. The potential users of the Wastewater Heat Radar are urban planners, engineers and architects, and property developers while the secondary beneficiaries of this solution impact the lives of the city and its citizens. Strategically, the Berlin pilot has pinpointed their focus on ensuring that the Wastewater Heat Radar is a proven robust and sustainable business model that will drive implementations across Berlin and other municipalities.

4.5.1.3 *Scope of Analysis*

The assessment of impact on the Wastewater Heat Radar is calculated as a forecast of the value created by the REFLOW Berlin pilot. In this way, the impact assessment predicts the social value that can be created as if the Wastewater Heat Radar has lived up to its full potential and generated the outcomes it has set out to produce. These include empowering and activating target user who are ready to support the solution and adopt it for themselves, leading to more wastewater heat implementations in the city.

During the REFLOW project, the Berlin pilot has undertaken a series of activities that have built the foundation for developing this emergent circular solution. This has included the development of a strategic foundation, an outreach campaign, prototype development, enabling of monitoring, and business modelling and exploitation. These activities have occurred during the lifespan of the REFLOW project and have set the stage for generating social and economic impact beyond the project.



To value and monetise change, the scope of analysis has focused on this work and used an example implementation to calculate the forecasted social return on investment for the Berlin pilot.

4.5.2 Stakeholder Analysis

The initial identification of stakeholders was first undertaken by WP1 based on previous stakeholder mapping activities carried out during the project. The Berlin pilot then provided their inputs based on the initial stakeholder identification by WP1. The Berlin pilot outlined the stakeholder context, highlighting their relation to the Wastewater Heat Radar and the expected outcomes based on the solution. The table below presents this work and provides an overview of the key stakeholders that have been involved in understanding the creation social value by the Wastewater Heat Radar.

Stakeholders	Context	Expected Outcomes
BWB	They provide the know-how and proven expertise on wastewater.	<ul style="list-style-type: none"> Increased (financial) benefit from leads Promoting the tool of wastewater heating which is almost invisible
The City of Berlin	They own the critical infrastructure via BWB.	<ul style="list-style-type: none"> Present itself as the German hub for climate change
Urban Planners	They are part of the stakeholders that can drive change; close to policy makers.	<ul style="list-style-type: none"> Become role model on data-based city planning Use app for potential projects
Property Developers	They are the actual implementers. Important stakeholder (potential end customer) involved in the implementation process of using energy from wastewater.	<ul style="list-style-type: none"> Image improvement Improved control over energy costs
Citizens	This group will provide end user experience/ opinions and can be vital to 'word of mouth' propaganda (spreading the message)	<ul style="list-style-type: none"> Participate in a more sustainable living "Have a say" when it comes to clean energy supply

4.5.3 Outcomes

4.5.3.1 Stakeholder Outcomes

4.5.3.1.1 BWB

The Wastewater Heat Radar’s function as a matchmaker and awareness raising tool on the topic of wastewater heat potential and its recovery will directly affect BWB through increased interest and implementations for wastewater heat recovery in Berlin. In one way, this change will impact BWB’s environmental performance and image. With an increase of wastewater heat recovery in the city, BWB can improve their image as an organisation and also contribute further to their ongoing work towards the ecological and social sustainable management of the water cycle. It also enhances BWB’s economic profile by providing the organisation with an environmentally and socially sustainable stream of revenue.

Importantly, the Wastewater Heat Radar seeks to close the supply and demand gap on wastewater heat potential and its recovery. This process entails physical interventions in the existing sewage infrastructure to capture and recover this heat, which BWB is responsible for. As such, increased interest and wastewater heat recovery projects leads to an increased amount of work to be undertaken by BWB. However, realising the full potential of wastewater heat in the city takes time and will not affect employment levels significantly in the short-term. Nevertheless, BWB becomes an important player in implementations to recover wastewater heat, increasing their experience with implementations but also becoming a stimulus for incentivising the educational sector to focus in on the skills gap within the field of heating installations in Germany.

The Outcomes (What Changes?)	
BWB	BWB improves their environmental and social image
	BWB are experts in wastewater heat implementations and become significant influencers within the educational sector’s development and focus for future generations

4.5.3.1.2 The City of Berlin

Leveraging wastewater heat potential within Berlin is set to impact the City of Berlin in positive economic, social, and environmental ways. Economically, the recovery of wastewater heat potential is a



This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement number 820937.

way of heating where the water utility company (BWB) is being paid for by supplying these recovery services. In this way, there are economic savings that can be made at the city level since the costs of providing wastewater heat recovery services are paid for by the user. Additionally, the Wastewater Heat Radar supports the city in reaching its sustainability and climate-neutrality goals that they have set out. It further improves the city’s image in the realm of environmental efforts as it seeks to close the supply and demand gap on a climate-neutral and local heating source.

	The Outcomes (What Changes?)
The City of Berlin	The City of Berlin improves their environmental image and increases the trust of Berliners with regards to meeting climate-neutrality goals

4.5.3.1.3 Urban Planners

As target users of the Wastewater Heat Radar, urban planners are expected to experience change as a result. Urban planners have the ability to influence the built environment and socioeconomic conditions in the city through policies and instilling requirements for winning projects of building developments in the city to adopt wastewater heat technology at the site. In this way, a neighbourhood’s sustainability profile can be enhanced.

With the Wastewater Heat Radar, urban planners are also challenged to broaden their perspective of the city’s energy sources, becoming more knowledgeable and aware about the potential of wastewater heat recovery, but also across the whole portfolio of energy sources. While the topic of wastewater heat recovery is highly technical, with knowledge and interest in the subject often reserved to experts in the field, the Wastewater Heat Radar increases the amount of knowledge and awareness across disciplinary fields. This includes reaching urban planners who are instrumental in shaping the future development of the city.

	The Outcomes (What Changes?)
Urban Planners	Urban planners begin to incorporate more wastewater heat requirements into the development of the built environment
	Urban planners become more knowledgeable and aware about wastewater heat potential and its recovery



4.5.3.1.4 Property Developers

For property developers who invest in the implementation and recovery of wastewater heat potential at their building sites, they have the ability to meet their environmental, social, and governance (ESG) goals and other regulations and requirements needed for development. Moreover, implementing wastewater heat recovery has the potential to increase property values⁵⁰ for the developers over time and allows for the tenants at the site of the building to have a more secure supply of energy.

Property Developers	The Outcomes (What Changes?)
	Property developers improve their environmental image

4.5.3.1.5 Citizens

For the citizens of Berlin living in residences that are tapping into wastewater heat potential, it is expected that they will experience increased feelings of autonomy and security in relation to energy. Moreover, citizens feel a greater deal of satisfaction when it comes to contributing to the greater good of society by living at a property where they feel as though they are contributing to climate-neutral future. With the energy and climate crises coming to the forefront of discussion and affecting the daily lives of citizens in Berlin and across other cities around the world, the responsibility of contributing to efforts to combat these challenges and to mitigate the effects on well-being become a part of the everyday life for citizens.

Citizens also gain greater awareness on the topic of wastewater heat through living in a residence that is supplied by wastewater heat as a heating source. It provides citizens with the knowledge and empowerment to voice their view on energy autonomy, which currently, is a large subject of debate and discussion in Germany.

Citizens	The Outcomes (What Changes?)
	Citizens gain awareness and knowledge about wastewater heat

⁵⁰ Increased property values can also negatively impact the socio-spatial and socio-economic make-up and development of the city as a whole. Issues associated with affordability have been acknowledged with this change for property developers.



	Citizens increase their autonomy and security in relation to energy
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4.5.4 Valuing Change

To understand the value of change created by the Wastewater Heat Radar, the measurable outcomes derived from the key stakeholders' narratives were assigned financial proxies to represent the value of each outcome.

Stakeholders	Outcomes	Financial Proxies	Source	Value (€)
BWB	BWB improves their environmental and social image	Cost of Public Relations campaign	Kemp Kjær overview of European PR prices ²	9150,00
	BWB are experts in wastewater heat implementations and become influencers within the educational sector's development and focus for future generations	Heat Pump Installer course fee	NAPIT Training ³	654,35
The City of Berlin	The City of Berlin improves their environmental image and increases the trust of Berliners with regards to meeting climate-neutrality goals	Socially balanced CO ₂ price/tonne in Germany	Clean Energy Wire – study commissioned by the Agora Energiewende and Agora Verkehrswende ⁴	50,00
Urban Planners	Urban planners begin to incorporate more wastewater heat requirements into the development of the built environment	Cost of carbon tonne in Germany	OECD Carbon Pricing in Germany ⁵	30,26
	Urban planners become more knowledgeable and aware about wastewater heat potential and its recovery	Course on wastewater heat	Wage of urban planner ⁶ for a 4-day course ⁷	812,00
Property Developers	Property developers improve their environmental image	Cost of PR campaign	Kemp Kjær overview of	9.150,00



			European PR prices ⁸	
Citizens	Citizens gain awareness and knowledge about wastewater heat	Cost of awareness campaign	Average annual cost of campaigning from a marketing agency ⁹	60.000,00
	Citizens increase their autonomy and security in relation to energy – improved sense of personal agency	Feel in control of life	HACT Social Value Calculator	18.831,80

Table 28: Berlin Wastewater Heat Radar Financial Proxies of Stakeholder Outcomes

The impact calculations of the value of changes were then calculated based on the assumed potential quantity of change. Within total value of change impact calculation, deadweight, displacement, attribution, and drop-off have not been factored in.

Stakeholders	Outcomes	Quantity	Value of Change in € (Impact Calculation)
BWB	BWB improves their environmental and social image	1	9.150
	BWB are experts in wastewater heat implementations and become influencers within the educational sector’s development and focus for future generations	256 vocational training spots	167.513,60
The City of Berlin	The City of Berlin improves their environmental image and increases the trust of Berliners with regards to meeting climate-neutrality goals	48 tonnes of CO ₂ reduction based on 1 MW heat exchanger estimate	2.400



Urban Planners	Urban planners begin to incorporate more wastewater heat requirements into the development of the built environment	48 tonnes of CO ₂ reduction based on 1 MW heat exchanger estimate	1.452,48
	Urban planners become more knowledgeable and aware about wastewater heat potential and its recovery	27 based on 2019 number of urban planning employees at the city of Berlin	21.924
Property Developers	Property developers improve their environmental image	1	9.150
Citizens	Citizens gain awareness and knowledge about wastewater heat	1	60.000
	Citizens increase their autonomy and security in relation to energy – improved sense of personal agency	30 based on a rough estimate of number of citizens within one 6-storey apartment building	564.930,00
Total			836.520,08

Table 29: Berlin Wastewater Heat Radar Impact Calculation

Since there have been no implementations during the lifetime of the REFLOW project due to delays in the development of the Wastewater Heat Radar, the onboarding of BWB, and challenges associated with critical infrastructure data, an estimated forecast of the value of change has been based on the 5-year goal and scaled impacts presented in D3.3 as well as the estimates provided by BWB regarding the costs of implementation should they be triggered from the Wastewater Heat Radar.

According to BWB, the costs of an implementation which would recover wastewater heat are not fixed. They are determined by a variety of factors which impact the investment and operational costs. These factors include the installed heat exchanger system, the distance to the sewer, and the underground and planning complexity. Based on an estimate, the investment for an implementation would incur the following costs:

BWB Feasibility Study	Sewer feasibility study including flow measurements and analysis of planned construction work	€5.600
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	Pressure pipe feasibility study including pump station data analysis and analysis of planned construction work	€2.600
Pre-Planning Costs (rough dimensioning, cost estimation)	Sewer pre-planning is a service provided by the manufacturer of the heat exchanger	€0,00
	Pressure pipe pre-planning costs involves an external engineering office	€5.000 to €8.000
Execution-Planning Costs	Sewer execution-planning is a service provided by the manufacturer of the heat exchanger	€0,00
	Pressure pipe execution-planning costs involves an external engineering office	€15.000 to €20.000
Heat Exchanger Installation (including material and installation) Installation costs depend on the project (i.e., the type of heat exchange, in combination with other construction work, distance to the heating centre)	Sewer heat exchanger installation per kW	€500
	Pressure pipe heat exchanger installation per kW	€500 to €1.000
Connection pipe to heating centre	Per metre	€500
BWB Annual Fee calculated individually based on the possible savings concerning fuel costs	<200 kW	€3.500
	200 kW to 700 kW	€3.500 to €15.000
	>1000 kW	€25.000 to €90.000

Based on BWB's preliminary assessment in 2020, there was a theoretical potential of 275,000 kW of wastewater heat in the city. Of this amount, 33% of this would be recoverable from heat pumps – leading to 90,750 kW of extractable heat from Berlin's sewer system per year. Covered in more details in D3.3, it is estimated that a fully scaled wastewater heat recovery system at the city-level would result in 44,184 tonnes of CO₂ emissions saved.

Factoring in the value of change derived from the financial proxies, the 5-year goal and impact assessment, and the investments needed for implementation, a forecasted value of change can be predicted.



Since the investment and annual fees associated with an implementation varies from project to project, an example implementation of a 1 MW heat exchanger, 150 metres to the pressure pipe provided by BWB has been used to calculate the social return of investment. Based on this example, the total investment costs would amount to €845.000,00 with an annual fee of around €25.000,00 a year. This brings the total input value to €870.000,00 in the first year of the implementation example. The following years until year 5 would amount to an input value of around €25.000,00 a year based on the assumption that the initial investment costs would be within the first year only. This leads the total input value based on a 5-year period to €945.000,00.

Based on the assumption that changes would last the whole 5-year period, there would be a total net present value of €2.831.931,97. As a result, the final social return based on this implementation example would be **€4.00 based on every €1 invested**. However, when considering deadweight, attribution, displacement, and drop-off this value is bound to change.

4.5.5 Conclusions and Recommendations

This forecast analysis on the Berlin pilot's Wastewater Heat Radar has indicated that **for every €1 invested a total of €4.00 of predicted value is created** based on an implementation example to recover wastewater heat.

The analysis for the Berlin pilot's Wastewater Heat Radar (WWHR) solution has presented how their intervention creates impact on key stakeholders and the predicted social value that is generated through REFLOW activities. Based on valuing and monetising the changes to stakeholders, it is predicted that the Citizens stakeholder group will be affected most by the WWHR. A great deal of this social value is created through the increased sense of personal agency as wastewater heat provides citizens with a way to increase their energy autonomy and security – decreasing a sense of worry or reliance on conventional sources of energy and their sensitivity to fluctuating prices. Within BWB, the WWHR has potential to upgrade the professional skills of those employed within BWB and to influence the importance of the skillset needed to install heat pumps to recover wastewater heat. As an organisation which takes in vocational trainees, the value created through the WWHR has potential to not only impact BWB from within, but to influence the development of vocational education. While the remaining stakeholder groups – the City of Berlin, Property Developers, and Urban Planners – do not hold a large proportion of the value created through the WWHR, they still play an important role in the creation of value, as they have the ability to instigate changes and implementations in the existing urban environment. In this way, much of the value creation through these stakeholder groups is felt within the Citizens stakeholder group.



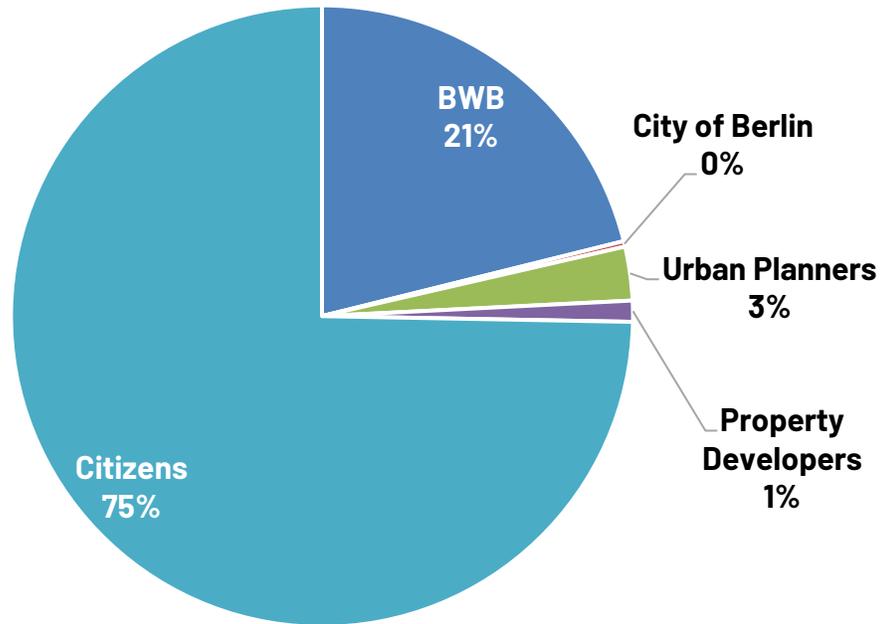


Figure 18: The Berlin Value Creation per Stakeholder Group

Through forecasting the predicted social value created by the Berlin REFLOW pilot’s Wastewater Heat Radar solution, the analysis has also helped to identify suggestions on future improvements of the Wastewater Heat Radar activities and points of attention for undertaking further assessments.

The Activities

The Wastewater Heat Radar has the capacity to generate value for the citizens of the city in which it is exploited in and used to trigger implementations for the recovery of wastewater heat. Therefore, it becomes clear that the future activities associated with the WWHR should continue to focus on leveraging the wastewater heat potential in cities through targeting the stakeholders who have the decision-making ability to realize these changes in the urban environment. This includes urban planners, the city, and property developers.



Future Iterations of the Analysis

First and foremost, the analysis on Berlin's Wastewater Heat Radar provides a solid foundation for future iterations and for conducting a full Social Return on Investment. However, future iterations need to ensure the involvement of stakeholders in this task to truly understand the changes that they experience as a result of the Wastewater Heat Radar. Despite the lack of stakeholder involvement in this present analysis, the changes and their values presented provide a good starting point when involving stakeholders in the future to corroborate if the outcomes expected from the perspective of the Berlin pilot hold true across all stakeholders. Depending on the result of this stakeholder involvement, the financial proxies for future iterations of this analysis have the potential to change.

Additionally, stakeholder involvement will also give additional data for conducting the impact measurement of the SROI for the Wastewater Heat Radar. Stakeholders should be involved not only to describe the changes experienced based on the Wastewater Heat Radar, but they should also give their input regarding the outcomes' deadweight, attribution, drop-off, and displacement.



Cluj-Napoca

Retrofit Kit SROI



4.6 Cluj-Napoca: Retrofit Kit

4.6.1 Establishing Scope

4.6.1.1 *The Cluj-Napoca Pilot Overview*

The REFLOW Cluj-Napoca pilot city consists of 3 organisations: the Municipality of Cluj-Napoca, ARIES, and ITIM. As part of the REFLOW project, they seek to increase energy efficiency and circular economy practices in the city through implementing circular energy solutions. The Cluj-Napoca pilot focuses on energy through improving the efficiency and consumption of energy in public buildings throughout the city. To work towards this goal, the pilot sets out the following objectives: to assess how the measures taken to date by the city have impacted the energy efficiency of selected buildings; to involve local stakeholders in implementing and furthering these measures; and to encourage different actors in the ecosystem to propose new ideas regarding renewable energy sources to be integrated into the city's strategy for a circular economy. Coinciding with these objectives, the pilot seeks to educate its citizens on circular economy, its benefits, and possibilities. Over the course of 3 years in the REFLOW project, the Cluj-Napoca pilot has produced a set of solutions that aim to enable the city's energy transition. A full overview of these solutions is listed in section 2.4.2.5 of this deliverable.

4.6.1.2 *The Retrofit Kit Overview*

Within the Cluj-Napoca pilot, the team have developed the solution, the Retrofit Kit (explained in detail in section 2.4.2.5.1. See also D7.6 and D5.4). In short, the Retrofit Kit is a collection of energy efficiency components that allows users to bypass costly renovations to improve their energy efficiency in existing buildings. With the Retrofit Kit, users are able to reduce their energy consumption by an estimated 15%. The Retrofit Kit is comprised of five components: 1) smart sockets, 2) electrical panels, 3) motion sensors, 4) lighting fixtures, and 5) a smart metering system. Each component is owned by a separate company outside of the REFLOW consortium.

Linked to the smart metering system component of the Retrofit Kit is a Monitoring App which allows building administrators to track consumption in almost real-time. The development of this App was made possible through collaborations with a local business. The Monitoring App offers visualisations and pinpoints where energy is being consumed. In this way, while the Retrofit Kit components seek to increase energy efficiency and mitigate energy waste, the Monitoring App is an important knowledge



and awareness raising tool for users to understand more about energy efficiency, consumption, and circularity in general.

The Retrofit Kit's co-design, co-development, implementation, and testing has been a collaborative process. With long-term visions and placing value upon the future generations of Cluj-Napoca, the Cluj-Napoca pilot in REFLOW has prioritized the testing of the Retrofit Kit solution at a high school known as the Energetic High School Dormitory during the REFLOW project.

4.6.1.3 Scope of Analysis

The development, implementation, and testing of the Retrofit Kit took place during the three-year timespan of the REFLOW project from June 2019 to May 2022. The SROI for the Retrofit Kit is a forecast of the value created by the REFLOW Cluj-Napoca pilot, meaning that the scope of analysis focuses on and predicts the social value that will be created by the Retrofit Kit as a result of REFLOW. To understand the change that has been created by the activities the Cluj-Napoca pilot, the scope of analysis for the Retrofit Kit's SROI focused on the following activities:

- Co-creation and development of the Retrofit Kit
- Installation of the Retrofit Kit into buildings enabling them to avoid cost/time of renovation and to reduce energy consumption
- Providing knowledge on energy savings and circular behaviour on energy consumption through a recommender app for focused intervention

4.6.2 Identifying Stakeholders

4.6.2.1 Stakeholder Analysis

The identification of initial key stakeholders who could experience change as a result of the Retrofit Kit were first identified by WP1. This was done through an analysis of stakeholders who had already been identified in other tasks in REFLOW such as Task 5.3 and Business Modelling. A long-list of stakeholders which was then analysed by the Cluj-Napoca pilot to pinpoint important stakeholders and outline how they were/are/will be affected by the Retrofit Kit. This information is presented in the table below which gives a contextual understanding of the stakeholders' relation to the Retrofit Kit and the outcomes that the Cluj-Napoca pilot expected.



Stakeholders	Context	Expected Outcomes
The Energetic High School	They are the site where the Retrofit Kit is being installed and tested within REFLOW	<ul style="list-style-type: none"> • Energy waste is reduced • Energy efficiency is increased
University and Research Institute	They develop research in the field	<ul style="list-style-type: none"> • Increase of opportunities for research and innovation • New educational opportunities to incorporate and develop courses at the university on Circular Economy
Businesses	They are companies who develop products regarding energy	<ul style="list-style-type: none"> • Increase of business model ideas • New potential customers
Organisations with Public Outreach	They are a regional stakeholder which consists of municipalities around Cluj-Napoca	<ul style="list-style-type: none"> • Opportunity to replicate the concept in other municipalities in the Metropolitan Area
Software Specialists	They provide the smart metering system as part of the Retrofit Kit	<ul style="list-style-type: none"> • Gain experience in developing products • New perspectives and increase of awareness in a new theme (circularity)
Municipality of Cluj-Napoca	They are the urban authority where the Retrofit Kit is installed	<ul style="list-style-type: none"> • Enhanced ability to focus interventions for further energy savings and circular behaviour on energy consumption • Better energy efficiency in targeted municipal buildings
Large Building Managers	They manage existing and new buildings where the Retrofit Kit can be adopted	<ul style="list-style-type: none"> • New knowledge/tools to help increase energy efficiency in buildings
Citizens of Cluj-Napoca	They are the energy consumers who benefit from having the components of the Retrofit Kit installed in their buildings	<ul style="list-style-type: none"> • Citizens reduce their energy consumption and increase energy efficiency • Energy bills are lower • Citizens are more aware

Table 30: Retrofit Kit SROI Stakeholders Identified



4.6.2.2 Stakeholder Involvement

After identifying and analysing relevant stakeholders, the Cluj-Napoca pilot began the process of involving stakeholders. While there are many stakeholders who experience change as a result of the Retrofit Kit, due to time constraints, the scope of stakeholder involvement needed to be realistic within the time period of the SROI. A total of 6 stakeholders who were defined by the Cluj-Napoca pilot as relevant to the Retrofit Kit’s SROI were sent questionnaires to obtain an understanding of the experienced and potential changes. Following this first interaction and an analysis of the responses, it was determined by WP1 that further information was needed to extract more in-depth data from the stakeholders. Moreover, it was decided to focus in on the 3 key stakeholders (High School Dormitory, Businesses, and the Municipality of Cluj-Napoca) who experience direct change as a result of the Retrofit Kit based on the SROI’s scope of analysis and materiality of changes. Additionally, time and resource constraints played a role in this decision.

During the Cluj-Napoca pilot’s local final REFLOW event, the 3 stakeholders were interviewed to further elaborate on the changes they have experienced and expect to experience based on the Retrofit Kit. The table below presents an overview of stakeholder involvement for the Retrofit Kit’s SROI.

Stakeholders	Included in SROI?	Reason for Inclusion/Exclusion	Number of Representative Stakeholders	Method of Engagement
The Energetic High School	Yes	They are included because they are the site where the Retrofit Kit is being installed and tested and experience direct change.	1	Questionnaire Interview
University and Research Institute	No	They are excluded because they do not experience material change.	2	Questionnaire
Businesses	Yes	They are included because they are the producers of the components of the Retrofit Kit and experience direct change.	1	Questionnaire Interview
Organisations with Public Outreach	No	They are excluded because they do not experience material change.	1	Questionnaire



Software Specialists ⁵¹	Yes	They are included because they provide a component of the Retrofit Kit – the smart metering system and experience direct change.	1	Questionnaire
Municipality of Cluj-Napoca	Yes	They are included because they are responsible for public buildings in Cluj-Napoca and therefore experience direct material change as a result of the Retrofit Kit.	1	Questionnaire Interview

Table 31: Retrofit Kit SROI Stakeholder Involvement

4.6.3 Inputs and Outputs

The inputs that have made the activities of the Cluj-Napoca pilot consist of the time and funding used by the pilot to develop the Retrofit Kit, engage with stakeholders, and to test the solution on site.

This amounts to an estimated €123.750,00⁵².

Through these inputs, the following activities were able to take place:

- Co-creation and development of the Retrofit Kit
- Installation of the Retrofit Kit into buildings enabling them to avoid cost/time of renovation and to reduce energy consumption
- Providing knowledge on energy savings and circular behaviour on energy consumption through a recommender app for focused intervention

As a result, these activities have produced the following outputs:

- The Retrofit Kit (including the combination of all components)
- The Monitoring App (linked to the Retrofit Kit)

⁵¹ They have been combined with the Businesses stakeholder group.

⁵² Based on a rough estimate of the total funds for the Cluj-Napoca pilot divided by the pilot solutions developed plus the funding for the Retrofit Kit.



4.6.4 Outcomes

4.6.4.1 Stakeholder Outcomes

By engaging with the stakeholders, experienced changes, and projected future changes as a result of the Retrofit Kit were comprehended from these dialogues and the expected changes that the Cluj-Napoca pilot had earlier identified. Within SROI terminology, the changes that result from an activity and which are experienced by stakeholders are outcomes. Since SROI is stakeholder-informed rather than led, the outcomes presented below were realised through both the involvement with the stakeholders and the intended outcomes expected through the Retrofit Kit by the Cluj-Napoca pilot and WP1. Presented in the following section are the changes that each stakeholder has and will experience in narrative form, telling the story of change as a result of the Retrofit Kit. These stories were then analysed by the WP1 team to extract the key outcomes which would be monetised and valued for the Social Return on Investment.

4.6.4.1.1 The Energetic High School

The Energetic High School is located in Cluj-Napoca. The school has 50 employees, both within teaching and administration positions and 300 students. The building is comprised of teaching facilities, a canteen, laboratories, workshops, offices, a school museum, a library, and a dormitory which houses 300 students. The Energetic High School prepares its students for trade professions such as electricians and maintenance and repair technicians where they can specialise in electrical installations, electrical engineering, and automation. Coming on board as a test site for the Retrofit Kit therefore, made sense.

The installation of the Retrofit Kit and the use of the Monitoring App has allowed for the students, teachers, and staff at the Energetic High School to incorporate the topics of energy efficiency, consumption, and circularity into their everyday lives. While the Retrofit Kit's installation is made on site at the Energetic High School, the learnings from the solution inspires and motivates the students and employees to improve their behaviours and strengthen their knowledge on energy consumption and efficiency. It also provides the students with hands-on experience and the opportunity to interact with the hardware and to grasp a deeper understanding around the energy transition which the Cluj-Napoca pilot has strived for. Through practical experiences with the Retrofit Kit solution, students can become specialists within more sustainable practices of electricity and energy consumption and efficiency, taking this knowledge forward into their future careers and ambitions. Moreover, the ability to interact with the Retrofit Kit allows for both students and employees at the Energetic High School to understand



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and see the real effects and impacts that the Retrofit Kit solution creates. To this end, their confidence in knowing about the technology and understanding more about energy efficiency, consumption, and circularity is built up through the Retrofit Kit.

For teachers at the Energetic High School, the Retrofit Kit is a prime case study which can be used for educational purposes and in courses at the school. The Retrofit Kit is a tangible learning tool that teachers can leverage, and which students can have an easier time to wrap their heads around the technology and theories behind energy efficiency and consumption.

The principal of the school has also deepened their understanding of energy efficiency and consumption and seeks to push these efforts further. Importantly, the Retrofit Kit generates a reduction in energy consumption and increases energy efficiency, thereby introducing important cost savings. With these savings from the Retrofit Kit, more resources can be redirected to other services for the school. The principal has set out a visions for the Energetic High School that will see that new spaces are organised for the students to relax and socialise in.

The Outcomes (What Changes?)	
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity
	Students and employees feel more motivated to improve their energy consumption behaviours
	Energy consumption is reduced in the High School
	The High School environment is improved, and students/teachers have improved ability to learn/teach
	Students and employees have improved confidence on the topic of energy efficiency, consumption, and circularity



4.6.4.1.2 Businesses

Co-developed in collaboration with local stakeholders, the concept for the Retrofit Kit was born. The Retrofit Kit components consist of modular hardware including a smart metering system, LED lighting fixtures, motion sensors, smart sockets, and electrical panels. These components are sourced from existing businesses and are combined in a modular fashion to make up the Retrofit Kit. Additionally, the Monitoring App is administered by a local business.

Becoming a part of the Retrofit Kit as a supplier of hardware and software has allowed businesses to grow their opportunities within their existing organisations and to also become more specialised, branch out their networks, and strengthen their economic situations. This is particularly the case for a key business stakeholder involved with the Retrofit Kit, which was able to establish a business vertical, allowing them to gain crucial feedback for improvements to their existing products and services and to establish a new product to reduce energy consumption. Before becoming involved with the Retrofit Kit, the business felt as though they were just a company that sold a product and that was it. Since becoming involved in the Retrofit Kit activities in the Cluj-Napoca pilot, they have started to feel that they have become more than that. Now, they have become a business which has a story, and this is much more meaningful than just a product. Further, this particular business was able to establish new partnerships and collaborations with other projects, where they will continue to develop new knowledge, specifically within the field of Artificial Intelligence. The Retrofit Kit has lifted up this business and strengthened its networks and connections and image.

This business has also been able to be more economically stable. As a result, this has translated into the ability to hire 2 new students in the near future to help with the projects and work. Additionally, economic stability is further reinforced by the partnerships with offering their product for use in public buildings across the Municipality of Cluj-Napoca. Through this chain of events, the business increases its economic stability further, leading to the future hiring of 2 engineering jobs in the coming year.

A key change experienced by businesses is the gathering of new knowledge that they would not have had such easy access to if the Retrofit Kit activities had not taken place. Importantly, through the Retrofit Kit, businesses have been able to gain and enhance knowledge, experience, and skills on circularity, energy efficiency, and energy consumption. This is made possible through the activities involved with the Retrofit Kit in REFLOW whereby the research and findings from the co-design,



implementation and testing of the Retrofit Kit have allowed for businesses as a whole, and their employees to upgrade their professional skills and to incorporate new knowledge into the businesses.

Businesses	The Outcomes (What Changes?)
	Business employees have improved their professional skills, experience, and knowledge
	Businesses increase their connections with other businesses and create new partnerships and collaborations
	Businesses have more economic stability
	Businesses improve their image

4.6.4.1.3 The Municipality of Cluj-Napoca

With Cluj-Napoca growing both demographically and economically, the city has developed and evolved into an emergent city in Romania. Coming with this growth, however, spurred a trend of increasing energy consumption and waste in the municipality. As a key partner in the Cluj-Napoca pilot, the Retrofit Kit provides an important solution to reverse this trend and to tap into the awareness its local citizens, students, businesses, industry, scientific community, and policy makers on the topics of energy efficiency, consumption, and circularity.

As a role model to its citizens and with its sights on becoming a lighthouse city for energy and circular transitions, the Municipality of Cluj-Napoca lasered its focus on a key source of consumption and a foundation for building up a future generation of circular movers and shakers – schools. The value of education and the Municipality’s young citizens sits as a priority with the Municipality of Cluj-Napoca. Leveraging the Retrofit Kit as a tool to start conversations, raise awareness, and to teach a diversity of citizens about the importance of Cluj-Napoca’s energy transition and making the city circular and regenerative is a vital action for the Municipality.

With the Retrofit Kit, not only would energy consumption and carbon emissions decrease for the Municipality, resulting in cost savings and a reduction of the Municipality’s environmental and carbon



footprint, but the Retrofit Kit is also an important intermediary step towards full refurbishment to increase energy efficiency. With the cost savings, there can be more funds which can be consolidated for future investments into the city’s energy and circular transition. The Retrofit Kit also provides the grounds for attracting interest and attention to the Municipality of Cluj-Napoca as they advance forward on energy and circular transitions.

The Municipality of Cluj-Napoca	The Outcomes (What Changes?)
	Energy costs of public buildings are lowered in the municipality
	Decrease in carbon emissions
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life
	The Municipality gains more attention as a lighthouse city on energy and circular transitions

4.6.4.2 Indicators of Change

To demonstrate that the changes presented in the earlier section have actually occurred for the stakeholders, the following indicators of change are used to measure the extent of the change. For most of the indicators, subjective and objective indicators for the outcomes were used to account for both the individual perspectives of the stakeholders who experience the change as well as indicators that reflect more fact-based values.

Stakeholder	Outcomes	Indicators	Source
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity	Level of awareness on energy and circularity of students and employees; number of courses on these topics	Questionnaire; Data from the High School



	Students and employees feel more motivated to improve their energy consumption behaviours	Those who state that they have implemented better and more circular behaviours at home	Questionnaire
	Energy consumption is reduced in the High School	Energy consumption of the High School	Data from Monitoring App
	The High School environment is improved, and students/teachers have improved ability to learn/teach	Level of satisfaction with the environment of the school; number of facilities for student and employees to relax/study	Questionnaire Data from High School
	Students and employees improve their confidence on the topic of energy and circularity	Those who state they feel confident; Grades	Questionnaire Data from High School
Businesses	Business employees have improved their professional skills, experience, and knowledge	Degree of professional skills improvement	Data from Businesses
	Businesses increase their connections with other businesses and create new partnerships and collaborations	Number of collaborations with other business/organisations	Data from Businesses
	Businesses have more economic stability	Number of new jobs created	Data from Businesses
	Businesses improve their image	Employee and citizen perceptions of the company; awards or certifications for the businesses	Questionnaire Data from Businesses
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	Expected energy costs; actual energy costs	Data from Municipality

	Decrease in carbon emissions	Expected carbon emissions; actual carbon emissions	Data from Municipality
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	Youth who state that they are more aware of energy and circularity	Questionnaire
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	Number of new funding opportunities received	Data from Municipality

Table 32: Cluj-Napoca Retrofit Kit SROI Stakeholder Outcome Indicators

4.6.4.3 Quantity and Duration of Change

The quantity of change has been estimated based on content within D5.3 and the 5-year goals for the Retrofit Kit. Moreover, the quantity was also estimated based on the interviews with the stakeholders. With this information, the quantity was estimated. The duration of change was identified through a questionnaire conducted with the stakeholders, where they were asked how long they expected the outcomes to last and why they thought that. The results are presented below in the table.

Stakeholder	Outcomes	Quantity	Duration
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity	350 students and employees	More than 5 years
	Students and employees feel more motivated to improve their energy consumption behaviours	350 students and employees	More than 5 years
	Energy consumption is reduced in the High School	1	More than 5 years
	The High School environment is improved, and students/teachers have improved ability to learn/teach	350 students and employees	More than 5 years
	Students and employees improve their confidence on the topic of energy and circularity	350 students and employees	More than 5 years



Businesses	Business employees have improved their professional skills, experience and knowledge	50 employees	More than 5 years
	Businesses increase their connections with other businesses and create new partnerships and collaborations	1	More than 5 years
	Businesses have more economic stability	2 jobs created	1 year
	Businesses improve their image	1	4 years
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	1	More than 5 years
	Decrease in carbon emissions	3 based on estimates in D3.3	More than 5 years
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	1	More than 5 years
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	1	More than 5 years

Table 33: Cluj-Napoca Retrofit Kit SROI Stakeholder Outcome Quantity and Duration

4.6.4.4 Financial Proxies of Outcomes

The final step of this stage involved the identification of financial proxies. This process has been done through the review of existing SROI report and desktop research. Similar outcomes were analysed in the reports and used as a first step towards identifying appropriate financial proxies. In addition to these sources, financial proxies were also identified through desk research where values were attributed to the outcomes based on information that could be representative and a fair value.

Stakeholder	Outcomes	Financial Proxies	Source	Value (€)
The Energetic High School	Students and employees are more informed about energy	Course on sustainable energy	VHS Learning ⁵³	237,31

⁵³ <https://www.vhslearning.org/get-started/individual-student-pricing>



	efficiency, consumption, and circularity			
	Students and employees feel more motivated to improve their energy consumption behaviours	Energy cost savings at the private household level	Average consumption per dwelling in Romania ⁵⁴ times the current costs ⁵⁵ subtract a 15% estimated decrease	38,10
	Energy consumption is reduced in the High School	Savings on energy costs	Based on D3.2 MFA with estimated 15% reduction of energy from the Retrofit Kit multiplied by current cost of kWh	588,44
	The High School environment is improved, and students/teachers have improved ability to learn/teach	Cost of field trip and public transit	One ticket for students at the Museum of University History ⁵⁶	1,81
	Students and employees improve their confidence on the topic of energy and circularity	Improvements in confidence	Self-Confidence, self-esteem, and identity course ⁵⁷	500,00
Businesses	Business employees have improved their professional skills, experience, and knowledge	Course fee for energy efficiency in buildings certificate	The Renewable Energy Institute – European Centre of Technology ⁵⁸	649,00
	Businesses increase their connections with other businesses and create new	Cost of trade fair admission	Trenchless Romania Conference and Exhibition ⁵⁹	149,00

⁵⁴ <https://www.odyssee-mure.eu/publications/efficiency-by-sector/households/electricity-consumption-dwelling.html>

⁵⁵ <https://balkangreenenergynews.com/romania-caps-electricity-gas-prices-for-another-12-months/>

⁵⁶ <https://muzee.ubbcluj.ro/en/museums>

⁵⁷ <https://www.summerschoolsineurope.eu/course/16215/self-confidence-self-esteem--identity>

⁵⁸ <https://theect.org/energy-efficiency-buildings-distance-learning/>

⁵⁹ <https://trenchless-romania.com/>



	partnerships and collaborations			
	Businesses have more economic stability	Annual Salary of Electrical Engineer	Salary Explorer ⁶⁰	19.506,36
	Businesses improve their image	Costs of marketing	The Romanian Journal article ⁶¹	1.000,00
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	Savings on energy costs	Based on D3.2 MFA of municipal buildings with estimated 15% reduction of energy from the Retrofit Kit multiplied by current cost of kWh	142.296,00
	Decrease in carbon emissions	External costs of carbon (per metric ton)	Cost of carbon per tonne ⁶²	25,00
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	Cost of awareness campaign	Mediterranean Urban Waste Management Project (MUWM) 2001-2003 ⁶³	8.600,00
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	Amount of contract	REFLOW as a baseline	336.250,00

Table 34: Cluj-Napoca Retrofit Kit SROI Financial Proxies

⁶⁰ <http://www.salaryexplorer.com/salary-survey.php?job=259&jobtype=3&loctype=1&loc=178>

⁶¹ <https://www.romaniajournal.ro/business/how-much-do-companies-in-romania-allot-to-social-media-marketing/>

⁶² <https://balkangreenenergynews.com/romania-mulls-carbon-price-compensation-scheme/>

⁶³ Parpal, Joan & Torre, Franco & Georghiou, Herodotos & Ciccolo, Daniela & Morettini, Daniele & Tilly, Jean & Boronicola, Penelope & Coudounaris, Dafnis & Glekas, Ioannis & Misseris, Timos & Psillakis, Lucas. (2003). Mediterranean Urban Waste Management Project (MUWM) 2001-2003. 10.13140/RG.2.1.2014.5681.



4.6.5 Measuring Impact

To measure the impact, the SROI analysis considers deadweight, displacement, attribution, and drop-off. These elements help to frame a realistic analysis of the impact that has been generated from the Retrofit Kit. The following tables summarise how impact was measured within the Retrofit Kit's SROI analysis.

Would the change have happened anyway/will the change happen anyway?	Assigned Deadweight (%)
The change would not happen without the Retrofit Kit	0%
The change would have happened, but only a little without the Retrofit Kit	25%
The change would have happened partly without the Retrofit Kit	50%
The change would have happened mostly without the Retrofit Kit	75%
The change would have happened anyway without the Retrofit Kit	100%

Table 35: Cluj-Napoca Retrofit Kit SROI Deadweight Questionnaire

How much of this change is because of REFLOW?	Assigned Attribution (%)
The change is a complete result of the REFLOW and no other contributors	0%
Other contributors had a minor role in this change	25%
Other contributors had a shared role in the change	50%
Other contributors have a significant role in the change	75%
The change is a complete result of other contributors	100%

Table 36: Cluj-Napoca Retrofit Kit SROI Attribution Questionnaire

Did any of these changes impact other changes? Was there anything that could have happened but didn't because of this change?	Assigned Displacement (%)
The change did not negatively impact any other changes	0%
The change negatively impacted other changes only a little	25%
The change negatively impacted other changes partially	50%
The change negatively impacted other changes significantly	75%
The change negatively impacted other changes completely	100%

Table 37: Cluj-Napoca Retrofit Kit SROI Displacement Questionnaire



Do you think that the impact will decrease year by year over a 5 year period? In other words, do you think any of the changes will stop or fade away in the future?	Assigned Drop-Off (%)
The impact of the change will not decrease at all over 5 years	0%
The impact of the change decreases a little every year over 5 years	25%
The impact of the change decreases by half every year over 5 years	50%
The impact of the change decreases significantly every year over 5 years	75%
The impact of the change is stopped completely after 5 years	100%

Table 38: Cluj-Napoca Retrofit Kit SROI Drop-Off Questionnaire

4.6.5.1 Deadweight, Displacement, Attribution, Drop-Off

To measure impact, the amount of deadweight, displacement, attribution, and drop-off were obtained through further involvement with the stakeholders. After the outcomes to be measured in the Retrofit Kit's SROI were identified, the stakeholders were sent questionnaires to gauge their perspectives on the contributions of the Retrofit Kit to the changes experienced by them, if the changes would have happened anyway, and how long they thought the changes would last and to what extent. The table below presents the results from the questionnaires accounting for deadweight, displacement, attribution, and drop-off.

Stakeholder	Outcomes	Deadweight	Displacement	Attribution	Drop-off
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity	50%	0%	25%	0%
	Students and employees feel more motivated to improve their energy consumption behaviours	25%	0%	25%	0%
	Energy consumption is reduced in the High School	0%	0%	0%	0%
	The High School environment is improved, and students/teachers	50%	0%	25%	0%



	have improved ability to learn/teach				
	Students and employees improve their confidence on the topic of energy and circularity	25%	0%	25%	0%
Businesses	Business employees have improved their professional skills, experience, and knowledge	13%	0%	38%	0%
	Businesses increase their connections with other businesses and create new partnerships and collaborations	38%	0%	38%	13%
	Businesses have more economic stability	38%	0%	50%	50%
	Businesses improve their image	38%	0%	25%	13%
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	50%	0%	50%	0%
	Decrease in carbon emissions	50%	0%	50%	0%
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	50%	0%	50%	0%
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	50%	0%	50%	0%

Table 39: Cluj-Napoca Retrofit Kit Impact Measurement of Outcomes through Deadweight, Attribution, Displacement, and Drop-Off



4.6.5.2 Total Impact

To calculate and understand the sole impact of the Retrofit Kit, the attribution, displacement, and deadweight were used to calculate the impact for each outcome. This calculation was completed based on the following equation:

$$(Financial\ proxy\ value\ of\ each\ outcome \times the\ quantity\ of\ the\ outcome) \times (1,0 - Deadweight\ \%) \times (1,0 - Displacement\ \%) \times (1,0 - Attribution\ \%)$$

Based on the impact for each outcome, these were combined to generate the total impact of the Retrofit Kit. The table below presents the impact calculation for each outcome and the total impact.

Stakeholder	Outcomes	Impact Calculation (€)
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity	31.146,94
	Students and employees feel more motivated to improve their energy consumption behaviours	7.500,94
	Energy consumption is reduced in the High School	588,00
	The High School environment is improved, and students/teachers have improved ability to learn/teach	237,56
	Students and employees improve their confidence on the topic of energy and circularity	98.437,50
Businesses	Business employees have improved their professional skills, experience, and knowledge	17.604,13
	Businesses increase their connections with other businesses and create new partnerships and collaborations	57,28
	Businesses have more economic stability	12.093,94
	Businesses improve their image	465,00
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	35.574,00
	Decrease in carbon emissions	18,75
	Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	2.150,00
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	84.062,50



Total Impact	€289.936,53
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Table 40: Cluj-Napoca Retrofit Kit SROI Impact Calculation

4.6.6 Social Return Calculation

4.6.6.1 Future Projections

Calculating the social return was based on a 5-year projection. Based on the duration of the outcomes identified earlier, the outcomes were valued accordingly. The social return calculation was completed as follows:

$$\begin{aligned}
 \text{Impact in Year 1} &= \text{impact calculation of outcome} \\
 \text{Impact in Year 2} &= \text{Impact in Year 1} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 3} &= \text{Impact in Year 2} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 4} &= \text{Impact in Year 3} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 5} &= \text{Impact in Year 4} - (1,0 - \text{Drop-off } \%)
 \end{aligned}$$

The results of the social return projected into the future for each outcome are presented in the table below.

Stakeholder	Outcomes	Year 1	Year 2	Year 3	Year 4	Year 5
The Energetic High School	Students and employees are more informed about energy efficiency, consumption, and circularity	31.146,94	31.146,94	31.146,94	31.146,94	31.146,94
	Students and employees feel more motivated to improve their energy consumption behaviours	7.500,94	7.500,94	7.500,94	7.500,94	7.500,94
	Energy consumption is reduced in the High School	588,00	588,00	588,00	588,00	588,00



	The High School environment is improved, and students/teachers have improved ability to learn/teach	237,56	237,56	237,56	237,56	237,56
	Students and employees improve their confidence on the topic of energy and circularity	98.437,50	98.437,50	98.437,50	98.437,50	98.437,50
Businesses	Business employees have improved their professional skills, experience, and knowledge	17.604,13	17.604,13	17.604,13	17.604,13	17.604,13
	Businesses increase their connections with other businesses and create new partnerships and collaborations	57,28	49,83	43,35	37,72	32,81
	Businesses have more economic stability	12.093,94	0,00	0,00	0,00	0,00
	Businesses improve their image	465,00	404,55	351,96	306,20	0,00
The Municipality of Cluj-Napoca	Energy costs of public buildings are lowered in the municipality	35.574,00	35.574,00	35.574,00	35.574,00	35.574,00
	Decrease in carbon emissions	18,75	18,75	18,75	18,75	18,75
	Young citizens (students and children) in the municipality become	2.150,00	2.150,00	2.150,00	2.150,00	2.150,00



	more involved and aware of energy and circularity as part of their everyday life					
	The Municipality gains more attention as a lighthouse city on energy and circular transitions	84.062,50	84.062,50	84.062,50	84.062,50	84.062,50
Total Social Return		289.936,53	277.774,69	277.715,62	277.664,23	277.353,13
Present Value of each year		280.131,91	259.305,65	250.483,58	241.968,34	233.523,89
Total Present Value (PV)						1.265.413,37
Net Present Value (PV minus the investment)						1.141.663,37
Social Return (Value per amount invested)						10,23

Table 41: Cluj-Napoca Retrofit Kit SROI Calculation

4.6.7 Retrofit Kit SROI Conclusions and Recommendations

This forecast SROI analysis on the Retrofit Kit has indicated that **for every €1 invested, a total of €10,23 of predicted value is created.**

The SROI analysis for Cluj-Napoca's Retrofit Kit has detailed the stories of change across three key stakeholders affected by the solution. The SROI has highlighted that the predicted social value generated from the Retrofit Kit solution is much more than just energy savings costs, although this is still important. This has been evidenced in the increased awareness, knowledge, and skills profiles across all stakeholders when it comes to the topics of energy efficiency, consumption, and circular economy. A significant proportion of the predicted social value created by the Retrofit Kit (see Figure below) is connected with the Energetic High School stakeholder group encompassing students, teachers, and other employees at the school. Through analysing outcomes from this stakeholder group, it became apparent that the social benefits generated by the Retrofit Kit reached a broad span of value creation, including knowledge/awareness creation and confidence building.



For the Municipality of Cluj-Napoca, while energy consumption and cost savings offer significant social return, the importance of being seen as a lighthouse city for energy and circular transitions will be central for pushing the city forward along its transition as well as across other Romania cities. The predicted social benefits that come with increased attention as a lighthouse city can help to surpass financial challenges that the Municipality of Cluj-Napoca currently faces alongside the behavioural challenges in shifting the mindsets and work processes of businesses and citizens in the municipality (see D5.3 City Ecosystem Design, p. 55). In this way, the Municipality of Cluj-Napoca is lifted up as a role model and a leader in making an overall energy and circular transition in the city and can leverage this position to access resources for increased interventions.

While the proportion of social value for Businesses is minor within across the key stakeholders, the predicted social value creation is set to impact the levels of employment and improve skills, experience, and knowledge within this stakeholder group. With the movement towards Cluj-Napoca’s energy and circular transition, businesses are expected to play an important role, providing innovative services and products to accelerate and support this transition, consequently accruing positive changes to their employment and knowledge bases, networks, and their overall image.

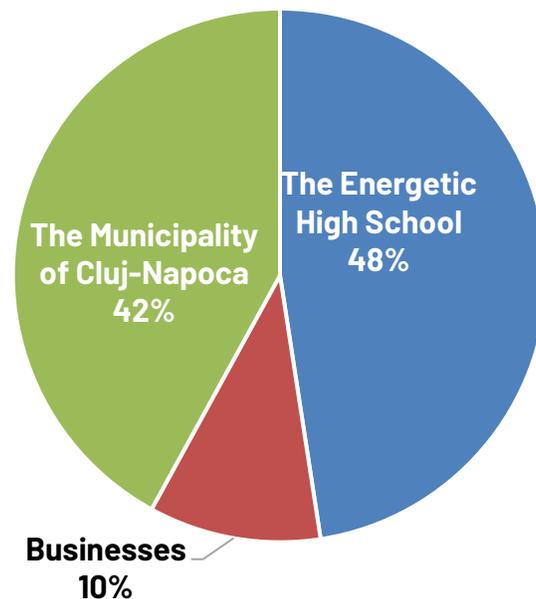


Figure 19: The Retrofit Kit SROI Value Creation per Stakeholder



Through forecasting the predicted social value created by the Cluj-Napoca REFLOW pilot solution, the Retrofit Kit, the analysis has also helped to identify suggestions on future improvements of the activities associated with the Retrofit Kit implementation and points of attention for undertaking further assessments.

The Activities

The decision to implement the Retrofit Kit at the Energetic High School as a test site has shown predicted positive changes and impact to this stakeholder group. Future activities associated with the Retrofit Kit's scaling and implementation should focus on sites of intervention such as educational institutions which offers the possibility of a broadened spectrum of social value creation as demonstrated within the Energetic High School. By focusing activities which target young citizens at the site of intervention, the opportunity to take energy efficiency, the reduction of energy consumption, and the topic of circular economy from savings to added social value through education and behavioural change can be extended.

Future Iterations of the Analysis

This SROI analysis undertaken for the Retrofit Kit has brought to the forefront the valuable changes that occur within an educational setting – The Energetic High School. While this forecast SROI analysis has provided a list of changes experienced by stakeholders at the Energetic High School, future iterations of this analysis should seek to subdivide this stakeholder group in specific categories to fully comprehend the changes that occur based on varying backgrounds. For example, placing students, teachers, and administrative employees in separate stakeholder groups will allow for a more comprehensive understanding of the social value created across different stakeholder profiles and situations. Additionally, ensuring a large enough sample size as representatives of these stakeholder groups will be essential for eliciting increased data confidence in future iterations of the SROI analysis.



Milan

BOTTO SROI



4.7 Milan: BOTTO

4.7.1 Establishing Scope

4.7.1.1 The Milan Pilot Overview

The REFLOW Milan pilot consists of 4 organisations: OpenDot, WeMake, the Municipality of Milan, and Politecnico Milano. The Milan pilot seeks to transition to a circular economy for key players of the urban food system through innovative circular interventions. Over the Milan pilot's journey in the REFLOW project, they have worked in close collaboration with the key stakeholders including SogeMi, Ibrida, RECUP, among others. Co-design, co-creation, and co-production activities have led to a diversity of solutions tackling the challenges of food material streams in the city. A full overview of these solutions has been detailed in the earlier section 2.5.2.5 of this deliverable.

4.7.1.2 BOTTO Overview

As part of the Milan pilot's scenario, Foody Zero Waste, which aimed to recover surplus food through process optimisation, support in the sorting of damaged packages, the creation of innovative systems to streamline communication, and to make the transactions between actors working within SogeMi more efficient, the solution, BOTTO was developed. In short, BOTTO is a communication system which aids organisations who fight against food waste and social exclusion with technology to ensure efficient donation processes from receiving food to redistributing food to citizens in need. In this way, BOTTO has set out to encourage donation and to facilitate the management and increase the distribution of unsold goods. BOTTO involves stakeholders at every level in the city's food ecosystem, from managers of the SogeMi Foody Hub, its wholesalers, intermediary organisations, receiving organisations, citizens of Milan in need, and the municipality itself. BOTTO also provides an opportunity to digitise flows, monitor the movement of goods, generate timely data for impact assessments and communication. Through BOTTO and the involvement of these stakeholders, changes to the city's social, environmental, and economic challenges can be improved for citizens of today and the future.

4.7.1.3 Scope of Analysis

The SROI on BOTTO is a forecast of the value created by the REFLOW Milan pilot. The development, implementation, and testing of BOTTO took place during the three-year timespan of the REFLOW project from June 2019 to May 2022. The development of BOTTO has been spearheaded by the partners,



OpenDot in collaboration with the other partners in the Milan pilot and with external organisations. The scope of the SROI analysis focuses on the activities of BOTTO which include:

- Providing a communication platform for urban food and social actors to ensure an efficient donation process, recover surplus food, and to redistribute this to people in need
- Providing the opportunity to digitise flows, monitor the movement of goods, and generate reports with data that can be used to disseminate and communicate on impact

4.7.2 Identifying Stakeholders

4.7.2.1 Stakeholder Analysis

The identification of initial key stakeholders who could experience change as a result of BOTTO were first identified by WP1. The Milan pilot then analysed the list of stakeholders, mapping out the changes they were expected to experience because of BOTTO and how they affect the activities. Stakeholders’ contextual relation to BOTTO was also documented to provide an overview of how they were connected to BOTTO. This information is presented in the table below.

Stakeholders	Context	Expected Outcomes
SogeMi Manager	They host the direct providers (wholesalers) of food and can potentially trace the flows of waste (after quality controls)	<ul style="list-style-type: none"> • Gain in image • Reduction in the quantity of waste to manage • Improved/changed protocols regarding food flows for wholesalers • Improved optimisation of time, resource, and space management
Wholesalers in SogeMi	They are the direct providers of food	<ul style="list-style-type: none"> • Gain in image • Reduction in the quantity of waste to manage, constituting a potential tax reduction as well • Personal satisfaction • Easier and quicker for the wholesalers to use BOTTO instead of just throwing out food • Enhanced influence, awareness raising and constraints from SogeMi • Improved optimisation of time, resource, and space management



RECUP	They are the intermediary association which receives food from the wholesalers and distributes this out to other organisations. BOTTO helps them to carry out their own mission in a more simplified way by optimising the flow between provider and the recipient	<ul style="list-style-type: none"> • Reduction of food waste • Job creation within the association • Increase support for those in need
Italian Red Cross	They are the recipient organisation of food from the intermediary. BOTTO allows them to fulfil their mission and provides food for those in need through simplifying the processes and access to resources (food waste)	<ul style="list-style-type: none"> • Improved efficiency in resource and time management • Increased donations • Enhanced knowledge on donation through traceability and data from donations
Citizens in Need	They are the main target for the associations who help people in need	<ul style="list-style-type: none"> • Better health • Enhanced feelings of equality • Better access to food
Municipality of Milan	They are key in policy making interventions (food waste, tax incentives) and are impacted by the optimisation of covered market management	<ul style="list-style-type: none"> • Gain in image/political consensus • Milan manages to better track and communicate the amount of food recovered and redistributed • Greater quantities of food saved and redistributed • Food poverty is reduced • Citizens have healthier diets • Concrete data for process improvements and policy support (Milan Foody Policy) • New jobs created/transformed (from garbage collector to resource enhancer) • Narrative on circular food is more present in the public agenda
Fab Lab	They provide BOTTO and are responsible for prototyping, UX, and UI	<ul style="list-style-type: none"> • Enhanced active role in building a more circular economy



		<ul style="list-style-type: none"> • New opportunities to develop tailor-made solutions for different organisations • Enhanced contribution to social inclusion • Increased sense of community and circularity through the role as intermediary between different stakeholders
Start-ups active in CE (biomaterials)	They use the inedible food waste that associations are not taking	<ul style="list-style-type: none"> • More resources received to work/experiment with
Universities/ Research institutes on CE (biomaterials)	They use the inedible food waste that associations are not taking	<ul style="list-style-type: none"> • More resources received to work/experiment with

Table 42: Milan BOTTO SROI Stakeholder Analysis

4.7.2.2 Stakeholder Involvement

Following the stakeholder analysis, the next step of the SROI consisted of involving the key stakeholders- While there are many stakeholders who may experience change as a result of BOTTO’s activities, due to time constraints and ensuring that meaningful value and outcomes could be obtained from stakeholder involvement and the later analysis, 6 key stakeholders were included in the SROI. The team in the Milan pilot and two members from the CBS team conducted face-to-face interviews with some of the stakeholders in Milan. Following this initial involvement, the data from this interview was documented and analysed by WP1. The remaining stakeholders’ involvement was completed by the Milan pilot themselves. Based on the scope of analysis and the materiality of change, not all stakeholders who were involved were included in the SROI. An overview of these reasons is mentioned in the table below.

Stakeholders	Included in SROI?	Reason for Inclusion/Exclusion	Number of Representative Stakeholders	Method of Engagement
SogeMi	Yes	They are included because they are directly affected by the project as they host the direct providers and could potentially trace the flow of waste	1	Questionnaire



Wholesalers	Yes	They are included because they are directly affected by the project as they are direct providers.	1	Questionnaire
Intermediary Association - RECUP	Yes	They are included because Foody Zero Waste helps them to carry out their own mission (acting as an intermediate) in a more simplified way by optimizing the flow between the provider and the recipient.	1	Questionnaire
Demand for Food Association - Italian Red Cross	Yes	They are included because Foody Zero Waste allows them to fulfil their mission and provides food for those in need through simplifying the processes and access to resources (food waste)	1	Questionnaire
Citizens in Need	Yes	They are included because they are the main target for the associations who help people in need	1	Questionnaire
Policymakers- Municipality of Milan	Yes	They are included because they are key in policy making interventions (food waste, tax incentives). They are also impacted by the optimization of covered market management.	1	Questionnaire
Fab Lab - OpenDot	No	They are excluded because it was determined that the changes, they experience are not directly connected to the activities within the scope of analysis	1	Questionnaire
Biomaterial Development	No	They are excluded because it was determined that the changes, they experience are not directly connected to the activities within the scope of analysis	1	Questionnaire

Table 43: Milan BOTTO SROI Stakeholder Involvement



4.7.3 Inputs and Outputs

The inputs that have allowed for the activities of BOTTO to be put into place have consisted of the time spent by the Milan pilot to develop the solution.

This has amounted to an estimated €100.00,00⁶⁴.

Through the inputs the following activities were made possible:

- Providing a communication platform for urban food and social actors to ensure an efficient donation process, recover surplus food, and to redistribute this to people in need
- Providing the opportunity to digitise flows, monitor the movement of goods, and generate reports with data that can be used to disseminate and communicate on impact

As a result, the following output was generated:

- BOTTO

4.7.4 Outcomes

4.7.4.1 Stakeholder Outcomes

By engaging with the stakeholders, experienced changes, and projected future changes as a result of BOTTO's activities were analysed. Within SROI terminology, the changes that result from an activity are outcomes. Since SROI is stakeholder-informed rather than led, the outcomes presented below were realised through both the involvement with the stakeholders and the intended outcomes expected through BOTTO by the Milan pilot and WP1. Presented in the following section are the changes that each stakeholder has and will experience in narrative form, telling the story of change as a result of BOTTO. These stories were then analysed by the WP1 team to extract key outcomes which would then be monetised and valued within the SROI.

4.7.4.1.1 SogeMi

As the organisation behind Italy's biggest wholesale market, SogeMi's role in closing the loop within Milan's urban food system was critical. With the increase in attention and awareness to more sustainable, circular, and regenerative agri-food chains, ensuring social and environmental responsibility was a core component that businesses needed to uphold. Being not only Italy's largest

⁶⁴ Based on a rough estimate provided by the Milan pilot.



wholesaler, but also one of the largest in Europe, integrating BOTTO into the wholesale markets to help facilitate a more circular urban food system would have ripple effects within Milan and across borders. The ability to influence a large scale of change across other key actors in the urban food system would mean a lot of the image of SogeMi across social and environmental dimensions.

The Outcomes (What Changes?)	
SogeMi	The social and environmental image of SogeMi is improved

4.7.4.1.2 Wholesalers

Over a day's work at the wholesale market, there is often food that has not been sold. For the wholesalers, throwing out the food was often thought to be easier than having to go through painstaking and time-consuming actions in order to donate this food to organisation. BOTTO intercepts this linear action by making the process of donation easier for them. Wholesalers also build up their ability to communicate about these donations through the reporting from BOTTO, allowing them to speak about the social and environmental impacts that they are addressing. Additionally, wholesalers begin to think of food waste in a different light becoming more aware of the impacts that food waste can have and the possibilities of recovering this food waste for social purposes. The wholesalers will also improve their awareness about how they operate, getting a deeper understanding of how much and of what product they are wasting, allowing them to further optimise their orders to reduce food waste.

The Outcomes (What Changes?)	
Wholesalers	The social and environmental image of the wholesaler is improved
	The wholesaler has improved awareness about food waste

4.7.4.1.3 RECUP

RECUP's role as the intermediary in the food donation process between wholesalers and the social organisations redistributing food to citizens in need allows them to tackle both food waste and social exclusion. The organisation strives to revalue food waste, by turning food that loses economic value into



social value. The association is volunteer run with some employees running the operations behind RECUP.

As the link between the wholesalers and the redistribution of this food to organisations and people in need, the communication and logistical process of setting up the donations was a time-consuming and resource extensive task. Prior to BOTTO, RECUP would need to go around and remind wholesalers to donate their food. With BOTTO, RECUP can reach out to them every time they want to redistribute food and they will also know in advance how much food will be available, making it easier to prepare the logistics for the day’s pick-up which is done by volunteers. Of course, BOTTO has allowed RECUP to structure their operations and digitise flows and monitor the movement of food, which was being written on a whiteboard prior to BOTTO. Additionally, RECUP gains in a better understanding of their own operations, leading to their improvement as an organisation, but also impacting the employees and volunteers who have the opportunity to gain these skills and experience. With BOTTO, RECUP has also garnered an increase of attention which leads to more economic stability. As a result, RECUP will be able to hire 2 to 3 people working full time in the near future.

The Outcomes (What Changes?)	
RECUP	RECUP volunteers and employees gain more skills and experience
	RECUP becomes more economically stable

4.7.4.1.4 The Italian Red Cross

The Italian Red Cross’ mission to help those in need by providing them with access to food is supported by BOTTO. Being a non-profit organisation, the importance of volunteers and ensuring that processes are simplified and that they have access to the resources (such as food) is critical to fulfilling their mission. Prior to BOTTO, the donation process of receiving food took more time and resources to handle and organise. Through BOTTO, the Italian Red Cross is supported in the simplification of donation processes and through increasing the ease of access to food for redistribution. As a result, they are able to save more resources associated with the food redistribution and they are also able to improve their efficiency. With these changes, the Italian Red Cross reaps the benefits of being able to funnel these saved resources into other channels of their work and to strengthen their existing efforts. The ability to



have reports which document the food flows and donations through BOTTO also plays an important role in providing the Italian Red Cross a communication tool so that they can have better reporting to their funders and donors. Moreover, this further evidences the impacts that the Italian Red Cross are creating and can allow for future funding and donor opportunities because they can prove and communicate their impact in concrete numbers.

	The Outcomes (What Changes?)
The Italian Red Cross	More resources are saved
	There are more future funding and donor opportunities

4.7.4.1.5 Citizens in Need

The fear and worry about going hungry or having to worry about how you will put food on the table is physically and emotionally taxing. With efficiency, operations, and logistics challenges addressed at the earlier points of the donation chain, citizens in need will be able to have more access to food and to more food. As a result, citizens in need will feel more included into society as the worry of fulfilling a basic human need will be made easier.

	The Outcomes (What Changes?)
Citizens in Need	Citizens in need feel more included in society

4.7.4.1.6 The Municipality of Milan

In recent years, the Municipality of Milan has held a global status as a frontrunning city for addressing food-related matters. The Milan Foody Policy is just one the important initiatives that have accelerated the innovative and forward-thinking municipality to this status. Alongside an incredible repertoire of other projects running in the municipality, BOTTO has been an important solution which strengthens the Municipality of Milan’s ability to promote initiatives against food waste even more. BOTTO provides key information on flows and allows for the Municipality to understand the movement of goods, increasing their knowledge about data (including food and waste data), provisioning them with concrete data to



make informed decisions and the know-how on the possibilities that data holds. BOTTO has also supported the Municipality of Milan to tackle the urban food system as a whole in the city while also aiding and supporting the citizens that inhabit Milan. It not only helps organisations to be more efficient in the city and to feed more people in need, but it also feeds into the overall urban system of Milan and showcases an important case for addressing the challenges in the complex urban food system. As a result, the Municipality of Milan gains in image and more positive attention is received.

The Municipality of Milan	The Outcomes (What Changes?)
	Strengthened ability to promote initiatives against food waste
	Increased knowledge about data (including food and waste data)
	Improved image and more positive attention received

4.7.4.2 Indicators of Change

To demonstrate that the changes presented in the earlier section have actually occurred for the stakeholders, the following indicators of change are used to measure the extent of the change. For most of the indicators, subjective and objective indicators for the outcomes were used to account for both the individual perspectives of the stakeholders who experience the change as well as indicators that reflect more fact-based values.

Stakeholder	Outcomes	Indicator	Source of Indicator
SogeMi	The social and environmental image of SogeMi is improved	How people perceive the social and environmental image of SogeMi; number of certificates, accolades etc...	Questionnaire Data from SogeMi
Wholesalers	The social and environmental image of	How people perceive the social and environmental image of	Questionnaire Data from wholesalers



	the wholesaler is improved	wholesalers; certifications	
	The wholesaler has improved awareness about food waste	Wholesalers who state they have improved their awareness of food waste; amount of food waste before and after	Questionnaire Data from wholesalers
RECUP	RECUP volunteers and employees gain more skills and experience	Degree of professional skills improvement	Questionnaire
	RECUP becomes more economically stable	Number of jobs created in RECUP	Data from RECUP
The Italian Red Cross	More resources are saved	Volunteer time spent on coordinating donation process and redirected to other activities	Data from Red Cross
	There are more future funding and donor opportunities	Number of funding and donor opportunities	Data from Red Cross
Citizens in Need	Citizens in need feel more included in society	Number of citizens in need who receive meals; those who state they feel more included in society	Questionnaire Data from Red Cross
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	Updates to the Food Policy	Data from Municipality
	Increased knowledge about data (including food and waste data)	Degree of professional skills improvement	Data from Municipality
	Improved image and more positive attention received	Number of new initiatives, grants, funding etc...	Data from Municipality

Table 44: Milan BOTTO SROI Stakeholder Outcome Indicators



4.7.4.3 Quantity and Duration of Change

The quantity of change has been estimated based on content within D5.3 and the 5-year goals for BOTTO. With this information, the quantity was estimated. The duration of change was identified through a questionnaire conducted with the stakeholders, where they were asked how long they expected the outcomes to last and why they thought that. The results are presented below in the table.

Stakeholder	Outcomes	Quantity	Duration
SogeMi	The social and environmental image of SogeMi is improved	1	2 years
Wholesalers	The social and environmental image of the wholesaler is improved	170 wholesalers	More than 5 years
	The wholesaler has improved awareness about food waste	170 wholesalers	More than 5 years
RECUP	RECUP volunteers and employees gain more skills and experience	50 volunteers	1 year
	RECUP becomes more economically stable	3 employees	1 year
The Italian Red Cross	More resources are saved	2 employees	1 year
	There are more future funding and donor opportunities	1	1 year
Citizens in Need	Citizens in need feel more included in society	1	More than 5 years
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	1	More than 5 years
	Increased knowledge about data (including food and waste data)	1	More than 5 years



	Improved image and more positive attention received	1	More than 5 years
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Table 45: Milan BOTTO SROI Outcome Quantity and Duration

4.7.4.4 Financial Proxies of Outcomes

The final step of this stage involved the identification of financial proxies. This process has been done through the review of existing SROI reports through Social Value UK's SROI report database. Similar outcomes were analysed in the reports and used as a first step towards identifying appropriate financial proxies. The HACT Social Value calculator was also used to monetise the changes experienced by the BOTTO stakeholders. In addition to these sources, financial proxies were also identified through desk research where values were attributed to the outcomes based on information that could be representative and a fair value.

Stakeholder	Outcomes	Financial Proxy	Source	Value (€)
SogeMi	The social and environmental image of SogeMi is improved	Cost of PR services	Kemp & Kjær's overview of PR costs ⁶⁵	6.750,00
Wholesalers	The social and environmental image of the wholesaler is improved	Cost of branding workshop	Coursera brand identity and strategy course monthly subscription ⁶⁶	55,95
	The wholesaler has improved awareness about food waste	Food waste course	Future Learn – From Waste to Value: How to Tackle Food Waste course ⁶⁷	15,00
RECUP	RECUP volunteers and employees gain more skills and experience	Employment training	HACT Social Value Calculator	970,39

⁶⁵ <https://kempkjaer.dk/en/insider-tip-pr-prices-in-europe/>

⁶⁶ <https://www.coursera.org/learn/brand-identity-strategy?action=enroll#syllabus>

⁶⁷ <https://www.futurelearn.com/courses/from-waste-to-value>



	RECUP becomes more economically stable	Annual salary in Italy	Fundraising and non-profit average salaries in Italy 2022 ⁶⁸	27.720,00
The Italian Red Cross	More resources are saved	Average minimum wage	Garnero, A. (2018). The dog that barks doesn't bite: coverage and compliance of sectoral minimum wages in Italy. <i>IZA J Labor Policy</i> . 7, 3. https://doi.org/10.1186/s40173-018-0096-6	9,41
	There are more future funding and donor opportunities	Amount of one-off donation	ENI donation ⁶⁹	600.000,00
Citizens in Need	Citizens in need feel more included in society	Feeling in control of life	HACT Social Value Calculator	19.114,43
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	Cost of lobbying firm	Lobby It firm costs ⁷⁰	5.091,12
	Increased knowledge about data (including food and waste data)	Employment training	HACT Social Value Calculator	970,32
	Improved image and more positive attention received	Amount in contract	REFLOW project as a baseline	418.750,00

Table 46: Milan BOTTO SROI Financial Proxies

⁶⁸ <http://www.salaryexplorer.com/salary-survey.php?loc=105&loctype=1&job=5&jobtype=1>

⁶⁹ <https://www.eni.com/en-IT/media/press-release/2020/04/eni-italian-red-cross.html>

⁷⁰ <https://lobbyit.com/pricing/#:~:text=Most%20lobbying%20firms%20charge%20as,for%E2%80%9D%20activities%20remaining%20largely%20undefined.>



4.7.5 Measuring Impact

To measure the impact, the SROI analysis considers deadweight, displacement, attribution, and drop-off. These elements help to frame a realistic analysis of the impact that has been generated from BOTTO. The following tables summarise how impact was measured for BOTTO’s SROI analysis.

Would the change have happened anyway/will the change happen anyway?	Assigned Deadweight (%)
The change would not happen without BOTTO	0%
The change would have happened, but only a little without BOTTO	25%
The change would have happened partly without BOTTO	50%
The change would have happened mostly without BOTTO	75%
The change would have happened anyway without BOTTO	100%

Table 47: Milan BOTTO SROI Deadweight Questionnaire

How much of this change is because of BOTTO?	Assigned Attribution (%)
The change is a complete result of BOTTO and no other contributors	0%
Other contributors had a minor role in this change	25%
Other contributors had a shared role in the change	50%
Other contributors have a significant role in the change	75%
The change is a complete result of other contributors	100%

Table 48: Milan BOTTO SROI Attribution Questionnaire

Did any of these changes impact other changes? Was there anything that could have happened but didn't because of this change?	Assigned Displacement (%)
The change did not negatively impact any other changes	0%
The change negatively impacted other changes only a little	25%
The change negatively impacted other changes partially	50%
The change negatively impacted other changes significantly	75%
The change negatively impacted other changes completely	100%

Table 49: Milan BOTTO SROI Displacement Questionnaire

Do you think that the impact will decrease year by year over a 5 year period? In other words, do you think any of the changes will stop or fade away in the future?	Assigned Drop-Off (%)
The impact of the change will not decrease at all over 5 years	0%



The impact of the change decreases a little every year over 5 years	25%
The impact of the change decreases by half every year over 5 years	50%
The impact of the change decreases significantly every year over 5 years	75%
The impact of the change is stopped completely after 5 years	100%

Table 50: Milan BOTTO SROI Drop-Off Questionnaire

4.7.5.1 Deadweight, Displacement, Attribution, Drop-Off

To measure impact, the amount of deadweight, displacement, attribution, and drop-off were obtained through further involvement with the stakeholders. After the outcomes to be measured for BOTTO's SROI were identified, the stakeholders were sent questionnaires to gauge their perspectives on the contributions of BOTTO to the changes experienced by them, if the changes would have happened anyway, and how long they thought the changes would last and to what extent. The table below presents the results from the questionnaires accounting for deadweight, displacement, attribution, and drop-off.

Stakeholder	Outcomes	Deadweight	Displacement	Attribution	Drop-off
SogeMi	The social and environmental image of SogeMi is improved	50%	0%	50%	25%
Wholesalers	The social and environmental image of the wholesaler is improved	50%	0%	50%	25%
	The wholesaler has improved awareness about food waste	50%	0%	50%	25%
RECUP	RECUP volunteers and employees gain more skills and experience	50%	25%	50%	25%
	RECUP becomes more economically stable	50%	25%	50%	25%
The Italian Red Cross	More resources are saved	25%	0%	25%	25%
	There are more future funding and donor opportunities	75%	0%	50%	25%



Citizens in Need	Citizens in need feel more included in society	50%	0%	50%	0%
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	50%	0%	50%	0%
	Increased knowledge about data (including food and waste data)	25%	0%	25%	0%
	Improved image and more positive attention received	50%	0%	50%	0%

Table 51: Milan BOTTO SROI Stakeholder results for measuring impact

4.7.5.2 Total Impact

To calculate and understand the sole impact of BOTTO, the attribution, displacement, and deadweight were used to calculate the impact for each outcome. This calculation was completed based on the following equation:

$$(Financial\ proxy\ value\ of\ each\ outcome \times the\ quantity\ of\ the\ outcome) \times (1,0 - Deadweight\ \%) \times (1,0 - Displacement\ \%) \times (1,0 - Attribution\ \%)$$

Based on the impact for each outcome, these were combined to generate the total impact of BOTTO. The table below presents the impact calculation for each outcome and the total impact.

Stakeholder	Outcomes	Impact Calculation (€)
SogeMi	The social and environmental image of SogeMi is improved	1.687,50
Wholesalers	The social and environmental image of the wholesaler is improved	2.377,88
	The wholesaler has improved awareness about food waste	637,50
RECUP	RECUP volunteers and employees gain more skills and experience	9.097,41
	RECUP becomes more economically stable	15.592,50
The Italian Red Cross	More resources are saved	10,28



	There are more future funding and donor opportunities	75.000,00
Citizens in Need	Citizens in need feel more included in society	4.778,61
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	1.272,78
	Increased knowledge about data (including food and waste data)	363,90
	Improved image and more positive attention received	104.887,50
Total Impact		215.505,85

Table 52: Milan BOTTO SROI Impact Calculation

4.7.6 Social Return Calculation

4.7.6.1 Future Projections

Calculating the social return was based on a 5 year projection. Based on the duration of the outcomes identified earlier, outcomes were valued accordingly. The social return calculation was completed as follows:

$$\begin{aligned}
 \text{Impact in Year 1} &= \text{impact calculation of outcome} \\
 \text{Impact in Year 2} &= \text{Impact in Year 1} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 3} &= \text{Impact in Year 2} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 4} &= \text{Impact in Year 3} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 5} &= \text{Impact in Year 4} - (1,0 - \text{Drop-off } \%)
 \end{aligned}$$

The results of the social return projected into the future for each outcome are presented in the table below.

Stakeholder	Outcomes	Year 1	Year 2	Year 3	Year 4	Year 5
SogeMi	The social and environmental image of SogeMi is improved	1.687,50	1.265,63	0,00	0,00	0,00
Wholesalers	The social and environmental	2,377.88	1,783.41	1,337.55	1,003.17	752.37



	image of the wholesaler is improved					
	The wholesaler has improved awareness about food waste	637,50	478,13	358,59	268,95	201,71
RECUP	RECUP volunteers and employees gain more skills and experience	9.097,41	0,00	0,00	0,00	0,00
	RECUP becomes more economically stable	15.592,50	0,00	0,00	0,00	0,00
The Italian Red Cross	More resources are saved	10,28	0,00	0,00	0,00	0,00
	There are more future funding and donor opportunities	75.000,00	0,00	0,00	0,00	0,00
Citizens in Need	Citizens in need feel more included in society	4.778,61	4.778,61	4.778,61	4.778,61	4.778,61
The Municipality of Milan	Strengthened ability to promote initiatives against food waste	1.272,78	1.272,78	1.272,78	1.272,78	1.272,78
	Increased knowledge about data	363,90	363,90	363,90	363,90	363,90



	(including food and waste data)					
	Improved image and more positive attention received	104.687,50	104.687,50	104.687,50	104.687,50	104.687,50
Total Social Return		215.515,89	114,629.94	112,798.93	112,374.90	112,056.87
Present Value of each year		208,218.21	107,008.28	101,738.17	97,928.23	94,348.88
Total Present Value (PV)						609,241.76
Net Present Value (PV minus the investment)						509,241.76
Social Return (Value per amount invested)						6.09

Table 53: Milan BOTTO SROI Calculation

4.7.7 BOTTO SROI Conclusions and Recommendations

This forecast SROI analysis on BOTTO has indicated that **for every €1 invested, a total of €6,09 of predicted value is created.**

This forecast SROI analysis for the Milan pilot's solution, BOTTO, has detailed the predicted social value creation across 6 key stakeholders affected by the solution. The SROI has outlined the stories of change for these stakeholders, highlighting the importance of BOTTO as a tool for communicating social impact as well as improving efficiency within the key organisations dealing with the redistribution of food waste and donations. The results indicate the positive impact of BOTTO on the stakeholders who receive food donations and work to redistribute these food flows to other organisations or to citizens in need. Importantly, BOTTO supports these stakeholders (RECUP and the Italian Red Cross) in improving their efficiency levels and reporting, leading to increased economic stability, and funding opportunities, allowing for them to continue their missions towards creating social and environmental impact. On the other side of the food flows facilitated through BOTTO, the wholesalers supplying the food and SogeMi



as the organisation overseeing the overall wholesale market operations, BOTTO generates key changes to the images of these stakeholders.

At the municipal level, BOTTO produces important changes for the Municipality of Milan in relation to building upon their efforts in tackling food waste through policy and other initiatives. The increased attention towards the Municipality has the potential to produce knock-on impacts for the entire urban food system, funnelling further work towards closing the loop on food flows and fuelling innovative holistic solutions that advance the city towards becoming circular and regenerative.

For those at the end of this food chain flowing through BOTTO - the citizens of Milan in need - the forecast SROI analysis does not necessarily paint the overall picture of impact for this stakeholder group. In fact, the creation of social value is predicted to be much more than what has been calculated in this analysis. However, within this SROI scope of analysis, the primary beneficiaries of BOTTO were those handling food waste (at the wholesale market) and those receiving and redistributing these resources. As for citizens in need, the impacts of BOTTO affects their everyday lives whereby they experience changes, but within the time constraints and scope limitations, their participation within the SROI analysis was not a key focus during stakeholder involvement. The figure below presents a snapshot of the value creation across the stakeholder groups based on BOTTO.



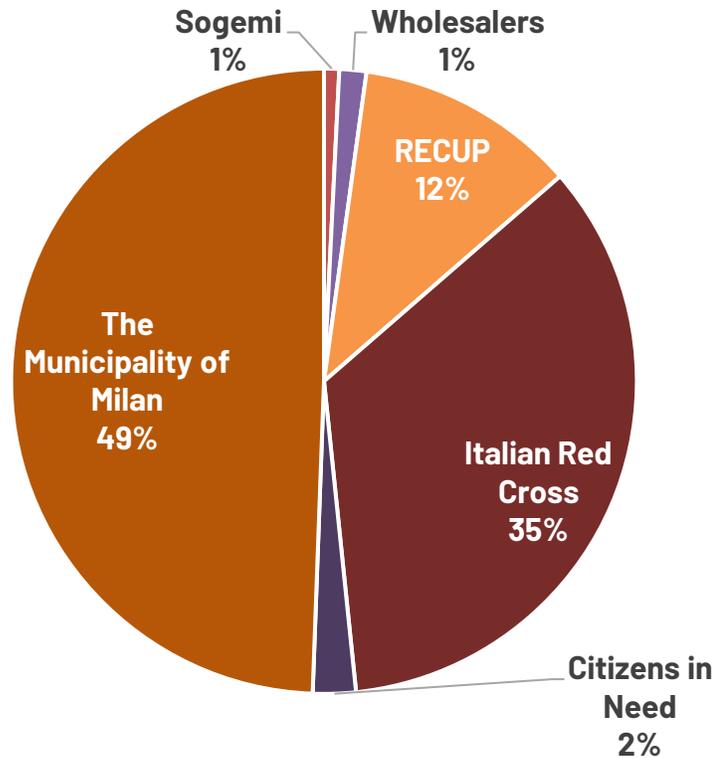


Figure 20: BOTTO SROI Value Creation per Stakeholder

Through forecasting the predicted social value created by the Milan REFLOW pilot through BOTTO, the analysis has also helped to identify suggestions on future improvements of the activities of BOTTO and points of attention for undertaking further assessments.

The Activities

The forecasted social return for BOTTO has shown for the organisations handling the recovery and redistribution of food waste donations that there is conceivable positive impact not only on the operations of these organisations, but also towards the potential opportunities for job creation and the enhancement of skills and experience for those involved. Future activities connected to BOTTO should aim to focus on these enhancements, particularly for those volunteering within the organisations by providing them with the foundations for future opportunities based on the skills and experience they gain through their placements within these organisations. The future scaling of BOTTO across all Sogemi wholesale markets and the municipal covered markets will also present important social value creation



opportunities for the providers of the surplus food for donation. Placing an emphasis on these activities at the start of the food chain will play an important role for increasing the awareness of food waste, but also for increasing the attention towards the act of donating surplus foods and the ease of this action, as opposed to throwing away these resources at the end of the day.

Future Iterations of the Analysis

As mentioned above, the involvement of citizens as a stakeholder group did not play a significant role in the social return calculation for this forecast analysis. However, for future iterations of this analysis, involving the citizens in need who receive the food donations should be considered. Since this forecast SROI analysis has included assumptions and approximations, the involvement of citizen stakeholders will help to refine the associated outcomes of this stakeholder group and to monetise the value of the changes they experience. Additionally, future iterations should also consider incorporating additional valuation methods associated with the financial proxies used to monetise change as well as collecting further in-depth stories of change to analyse for extracting outcomes.

In this current analysis of BOTTO, the stakeholder groups, particularly RECUP and Italian Red Cross were based on an overall organization rather than the various actors involved in the organisation's operations. For future iterations, focus on dividing these organizations into subgroups will help to provide a more comprehensive overview of social value creation through the activities of BOTTO. This can include for example, allocating separate stakeholder groups for the employees and volunteers involved in these organizations. Their baseline situations and changes experienced most likely vary from each other, so demarcating these as individual stakeholder groups will help to gain a deeper understanding of changes and social value created.



Paris

Re-Label SROI



4.8 Paris: Re-Label

4.8.1 Establishing Scope

4.8.1.1 *The Paris Pilot Overview*

The REFLOW Paris pilot consists of 4 organisations: Municipality of Paris, Fab City Grand Paris, Volumes, and Ars Longa. The Paris pilot focuses on the wood in the city's events and temporary construction industries towards becoming circular. Within REFLOW, the Paris pilot has produced innovative circular solutions that tackle the challenges of logistics, valorisation of circular processes, circular businesses, and reuse of wood materials. A full overview of these solutions is found in section 2.6.2.5 of this deliverable.

4.8.1.2 *Re-Label Overview*

Within the Paris pilot, the team developed the solution, Re-Label (explained in detail in section 2.6.2.5.3). In short, Re-Label is a methodology that gives value to the invisible circular processes carried out by local manufacturers, makers, and designers. This increased value is administered through the certification of a finished product on the market. Through Re-Label members of the community can also share and learn from a catalogue of best practices.

4.8.1.3 *Scope of Analysis*

The development, implementation, and testing of Re-Label took place during the three-year timespan of the REFLOW project from June 2019 to May 2022. Since the SROI analysis was conducted prior to the end of the project, the SROI on Re-Label is a forecast of the value created by the activities of the REFLOW Paris pilot. To understand the change that is created by the Re-Label activities of the REFLOW Paris pilot, the scope of analysis focused on the following:

- Providing certification to valorise invisible work of local makers
- Collaboration support, network creation, and knowledge sharing provided to Re-Label community members to exchange ideas and best practices
- Catalogue of good practices to avoid wood scraps provided to makers



4.8.2 Identifying Stakeholders

4.8.2.1 Stakeholder Analysis

The identification of initial key stakeholders who could experience change as a result of the *Re-Label* were first identified by WP1. The Paris pilot team then analysed the list of stakeholders, mapping out the changes they were expected to experience because of *Re-Label* and how the stakeholders themselves could affect the activity. The following table outlines the context of the stakeholder’s involvement in the project and the expected outcomes as a result of the activities.

Stakeholders	Context	Expected Outcomes
Communities – Fab City Store	They are an established community that brings together designers from the Parisian manufacturing ecosystem. Re-Label allows the Fab City Store to bring new variables to the work of designers.	<ul style="list-style-type: none"> • Work by manufacturers/designers in the community is valued more • More circular principles are incorporated into the community’s practice and production
Structures: Workshops – WOMA	They are a user of Re-Label. They experience the impact of the solution because it allows them to better quantify the activities of their workshop and exchange good storage practices for re-use materials or techniques for quantifying human time with other workshops. They also add to impact by providing their good practices.	<ul style="list-style-type: none"> • Enhanced ability to quantify the activities of the workshop • Exchange good storage practices for reuse materials or techniques for quantifying human time with other workshops
Structures: Designers – Entrepreneur	They are a user of Re-Label who benefits from Re-Label through the promotion of their practice around re-use wood. Also adds to impact by providing information into the platform.	<ul style="list-style-type: none"> • Work is valued more • More circular principles are incorporated into practice and production • Builds network around CE practices

Structures: Architectural Agency – WAO	They are a user of Re-Label who benefits from the alignment of future laws on reuse in construction. They are able to communicate the impact of reuse in their designs.	<ul style="list-style-type: none"> • Work is valued more • More circular principles are incorporated into practice and production • Better alignment with future laws on reuse in construction
Consumers	They retrieve information on manufacturing processes and reuse rates at the time of purchase through Re-Label’s certification which builds their knowledge of the entire manufacturing processes	<ul style="list-style-type: none"> • More aware of circular processes • Consumes more responsibly
Local Cooperatives and Associations – Ville de Paris	They are municipality under which Re-Label allows City Hall to bring together actors and to have a good vision of circularity of materials across a territory	<ul style="list-style-type: none"> • Paris becomes a circular city for events and construction • There is a strong community and vision for circularity in the city

Table 54: Paris Re-Label SROI Stakeholder Analysis

4.8.2.2 Stakeholder Involvement

After identifying relevant stakeholders, the Paris pilot team took the most relevant stakeholders and conducted interviews using a structured guide to understand what changes for them. In collaboration with the Paris pilot, the WP1 team analysed the stakeholder list and outlined reasons for inclusion or exclusion in the SROI. Following further analysis of the stakeholders, those that were included into the SROI were distributed questionnaires to understand more of the changes they experience and to gather information for the impact and social return calculation. Moreover, it was decided to group the individual stakeholders who were interviewed into stakeholder groups according to the structure of Re-Label: Community and Structures. The results of these process are in the table below.

Stakeholders	Stakeholder Sub-group	Included in SROI?	Reason for Inclusion/Exclusion	Number of Representative Stakeholders	Method of Engagement
Community	Fab City Store	Yes	They are included because they are an established community	1	Questionnaire



			that brings together designers from the Parisian manufacturing ecosystem.		
Structures	Workshops	Yes	They are included because they are a user of Re-Label and experience the impact of the solution because it allows them to better quantify the activities of their workshop and exchange good storage practices for re-use materials or techniques for quantifying human time with other workshops. They also add to impact by providing their good practices.	1	Questionnaire
	Designers	Yes	They are included because they are a user of Re-Label, and they benefit from Re-Label through the promotion of his practice around re-use wood. They also add to impact by providing information into the platform.	1	Questionnaire
	Architectural Agency	Yes	They are included because they are a user of Re-Label which helps in the alignment of future laws on reuse in construction.	1	Questionnaire



Consumers		Yes	They are included because they are the end user of Re-Label's certification	1	Questionnaire
Local Cooperatives and Associations - Ville de Paris		Yes	They are included because they are the territory where Re-Label is implemented, and the community is built up within	1	Questionnaire

Table 55: Paris Re-Label SROI Stakeholder Involvement

4.8.3 Inputs and Outputs

For these activities to take place the monetary and non-monetised inputs invested by each of the stakeholders. These inputs were necessary for the activities to be delivered. From the inputs invested by each stakeholder, outputs were generated which highlight the tangible product resulting from the activity. The inputs that have made the activities of Re-Label possible is associated with the time used by the Paris pilot to develop Re-Label.

This has amounted to an estimated €100.000,00⁷¹.

The activities that made possible were as follows:

- Providing certification to valorise invisible work of local makers
- Collaboration support, network creation, and knowledge sharing provided to Re-Label community members to exchange ideas and best practices
- Catalogue of good practices to avoid wood scraps provided to makers

The outputs as a result are:

- Re-Label
 - Including catalogue
 - Labels
 - Webpage

⁷¹ Based on a rough estimate provided by the Paris pilot.



4.8.4 Outcomes

4.8.4.1 Stakeholder Outcomes

By engaging with the stakeholders, experienced changes, and projected future changes as a result of Re-Label were analysed from these dialogues. Within SROI terminology, the changes that result from an activity are outcomes. Since SROI is stakeholder-informed rather than led, the outcomes presented below were realized through both the involvement with the stakeholders and the intended outcomes expected through *Re-Label* by the Paris pilot and WP1. Presented in the following section are the changes that each stakeholder has and will experience in narrative form, telling the story of change as a result of Re-Label. These stories were then analysed by the WP1 team to extract the key outcomes which would be monetised and valued.

4.8.4.1.1 Community

Communities bring together and organize networks of designers, workshops, makers, and other actors involved in the Parisian manufacturing and making ecosystem around circular initiatives. Through the introduction of Re-Label, communities become more connected to other communities of circular economy stakeholders, places, and designers, opening them up to new ecosystems of knowledge, experience, and opportunities. As a community on Re-Label, these networks are centred around common ecological and circular principles and issues. Re-Label has fostered the community's ability to support their network of members even more around circular principles and practices through Re-Label. Transpiring out of this improved support generates a community who are more aware of their practices and have the ability to change and recognise their impact resulting in an increased sense of community ready to make impactful change.

	The Outcomes (What Changes?)
Community	The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections
	Increased sense of community

4.8.4.1.2 Structures

Structures are the nodes within communities and consist of workshops, agencies, makers, designers and other entities that carry out and contribute to production projects. Re-Label offers these structures a place to enhance their collaborations and provides them with access to ways to improve or start their



reuse practices. By incorporating these reuse and circular practices in existing work processes, structures need to adapt their work processes and workload to incorporate this new methodology. Because of the time and attention needed to apply the Re-Label methodology, this can be reflected in higher purchase prices of the products that structures produce. While there is the potential for this to have an impact on demand, it simultaneously provides craftspeople the opportunity to have a better salary through valuing the invisible work of adapting projects to reuse materials and circular economy.

Through Re-Label, the perceptions on materials and how structures view their jobs have shifted. Structures experience an adjustment in the way they think about waste management and the scrap wood that is produced as well as placing themselves in a position where they must rethink their jobs in addressing the pressing ecological crisis. This leads the structures towards a change in their mindset and valuation of these waste materials no longer being treat as such. Thus, structures experience a shift in their attitudes in relation to the circularity and value of materials.

Joining Re-Label as a structure has also enhanced their feelings of belonging and trust as they can join a dynamic network of other creators based on the idea of an open and distributed community. Structures also gain the ability to share their own work processes in relation to circularity and become inspired through access to other’s circular practices being shared.

Structures	The Outcomes (What Changes?)
	Structures feel more valued
	Structures become more circular
	Structures feel an increased sense of belonging and trust

4.8.4.1.3 Consumers

Re-Label opens up new knowledge and understandings of the production processes to consumers. Through the certification functionality of Re-Label, the visibility of recycling, reuse, and ecological initiatives are made more visible for consumers. In a sense, the Re-Label certificate becomes a communication tool between the consumer and the producer. As a result, citizens become more aware and knowledgeable about the circular processes that local manufacturers, designers, and makers incorporate into their products. Further, Re-Label opens up new avenues of information where the consumer can become aware of what is happening in their city, region, and neighbourhood. Consumers also experience a shift in their attitudes and behaviours in the way they consume as they begin to ask themselves new questions regarding the production process and circular practices that they hadn’t



considered before and pay more attention to what they buy. Consumers become more conscientious and alert.

Consumers	The Outcomes (What Changes?)
	Consumers have an increased sense of agency

4.8.4.1.4 Local Cooperatives and Associations

At the city-level, Re-Label brings better knowledge of reuse into the territory and facilitates reuse to small businesses within the city. Moreover, it enhances networks through the establishment of new or stronger links with other territories participating in Re-Label creating a community of feedback and exchanges at the scale of the territory. Re-Label facilitates the involvement of communities and their services getting involved in circular practices across their work such as through purchasing and public contracts.

Re-Label also generates more discussions and forms communities that share good practices between local designers and workshops but also between territories. The creation of these communities within cities results in the city becoming a place with a strong sense of community and vision for circularity.

Local Cooperatives and Associations	The Outcomes (What Changes?)
	Parisian small businesses are better positioned to facilitate reuse and have better access to the market
	Paris strengthens its circular community and vision

4.8.4.2 Indicators of Change

To demonstrate that the changes presented in the earlier section have actually occurred for the stakeholders, the following indicators of change are used to measure the extent of the change. For most of the indicators, subjective and objective indicators for the outcomes were used to account for both the individual perspectives of the stakeholders who experience the change as well as indicators that reflect more fact-based values.

Stakeholder	Outcomes	Indicator	Source of Indicator
Community	The community is more connected with other communities and increases the amount	Numbers of members in the community; feelings of belonging in the community	Questionnaire Re-Label website data



	of knowledge on circular practices from these connections		
	Increased sense of community	Number of new connections to other communities; number of exchanges of information, knowledge	Questionnaire Data from Re-Label
Structures	Structures feel more valued	Number of labelled projects sold; those who state they feel more valued	Questionnaire Data from structures
	Structures become more circular	Number of Re-Label variables incorporated; Those who state they know about circularity	Questionnaire Re-Label website data
	Structures feel an increased sense of belonging and trust	Those who feel less alone in their circular practices; number structures they are in contact with	Questionnaire
Consumers	Consumers have an increased sense of agency	Those who state they are more aware and have knowledge	Questionnaire
Local Cooperatives and Associations	Parisian small businesses are better positioned to facilitate reuse and have better access to the market	Number of circular business created in Paris; number of employed in reuse and circularity; number of jobs created	Business registration Data from Municipality
	Paris strengthens its circular community and vision	Number of circular policies, action plans, etc... introduced	Data from Municipality

Table 56: Paris Re-Label SROI Outcome Indicators

4.8.4.3 Quantity and Duration of Change

The quantity of change has been estimated based on content within D5.3 and the 5-year goals for Re-Label and through the current data on the Re-Label website. With this information, the quantity was



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

estimated. The duration of change was identified through a questionnaire conducted with the stakeholders, where they were asked how long they expected the outcomes to last and why they thought that. The results are presented below in the table.

Stakeholder	Outcomes	Quantity	Duration
Community	The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections	40 community members	More than 5 years
	Increased sense of community	1	More than 5 years
Structures	Structures feel more valued	40 structures on Re-Label	More than 5 years
	Structures become more circular	40 structures on Re-Label	More than 5 years
	Structures feel an increased sense of belonging and trust	40 structures on Re-Label	More than 5 years
Consumers	Consumers have an increased sense of agency	1	More than 5 years
Local Cooperatives and Associations	Parisian small businesses are better positioned to facilitate reuse and have better access to the market	1	More than 5 years
	Paris strengthens its circular community and vision	1	More than 5 years

Table 57: Paris Re-Label SROI Outcome Quantity and Duration

4.8.4.4 Financial Proxies of Outcomes

The final step of this stage involved the identification of financial proxies. This process has been done through the review of existing SROI reports through Social Value UK’s SROI report database. Similar



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outcomes were analysed in the reports and used as a first step towards identifying appropriate financial proxies. The HACT Social Value calculator was also used to monetise the changes experienced by the Re-Label stakeholders. In addition to these sources, financial proxies were also identified through desk research where values were attributed to the outcomes based on information that could be representative and a fair value.

Stakeholder	Outcomes	Financial Proxies	Source	Value (€)
Community	The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections	Feelings of belonging to the neighbourhood	HACT Social Value Calculator	4.512,86
	Increased sense of community	Cost of going to a conference	Ticket fee for an international architecture conference	500,00
Structures	Structures feel more valued	Increase in income associated with circular processes	Cost of an Ikea chair with 85% markup (average price of sustainable piece)	460,65
	Structures become more circular	Cost of training	Circular economy masterclass costs	2.107,68
	Structures feel an increased sense of belonging and trust	Feelings of belonging to the neighbourhood	HACT Social Value Calculator	4.512,86
Consumers	Consumers have an increased sense of agency	Costs associated with responsible consumption and production	3-hour course (at minimum wage to factor time spent)	31,71
Local Cooperatives	Parisian small businesses are better positioned to facilitate	Unemployment benefits (annual)	The French Social Security System ⁷²	31.090,00

⁷² https://www.cleiss.fr/docs/regimes/regime_france/an_5.html



and Associations	reuse and have better access to the market			
	Paris strengthens its circular community and vision	External costs of carbon (per metric ton)	US government ad hoc group technical report/LITE-ON SROI	57,16 ⁷³

Table 58: Paris Re-Label SROI Financial Proxies

4.8.5 Measuring Impact

To measure the impact, the SROI analysis considers deadweight, displacement, attribution, and drop-off. These elements help to frame a realistic analysis of the impact that has been generated from Re-Label. The following tables summarise the ways in which impact has been measured within Re-Label’s SROI analysis.

Would the change have happened anyway/will the change happen anyway?	Assigned Deadweight (%)
The change would not happen without Re-Label	0%
The change would have happened, but only a little without Re-Label	25%
The change would have happened partly without Re-Label	50%
The change would have happened mostly without Re-Label	75%
The change would have happened anyway without Re-Label	100%

Table 59: Paris Re-Label SROI Deadweight Questionnaire

How much of this change is because of Re-Label?	Assigned Attribution (%)
The change is a complete result of Re-Label and no other contributors	0%
Other contributors had a minor role in this change	25%
Other contributors had a shared role in the change	50%
Other contributors have a significant role in the change	75%
The change is a complete result of other contributors	100%

Table 60: Paris Re-Label SROI Attribution Questionnaire

Did any of these changes impact other changes? Was there anything that could have happened but didn’t because of this change?	Assigned Displacement (%)
The change did not negatively impact any other changes	0%

73



The change negatively impacted other changes only a little	25%
The change negatively impacted other changes partially	50%
The change negatively impacted other changes significantly	75%
The change negatively impacted other changes completely	100%

Table 61: Paris Re-Label SROI Displacement Questionnaire

Do you think that the impact will decrease year by year over a 5 year period? In other words, do you think any of the changes will stop or fade away in the future?	Assigned Drop-Off (%)
The impact of the change will not decrease at all over 5 years	0%
The impact of the change decreases a little every year over 5 years	25%
The impact of the change decreases by half every year over 5 years	50%
The impact of the change decreases significantly every year over 5 years	75%
The impact of the change is stopped completely after 5 years	100%

Table 62: Paris Re-Label SROI Drop-Off Questionnaire

4.8.5.1 Deadweight, Displacement, Attribution, Drop-Off

To measure impact, the amount of deadweight, displacement, attribution, and drop-off were obtained through further involvement with the stakeholders. After the outcomes to be measured in Re-Label’s SROI were identified, the stakeholders were sent questionnaires to gauge their perspectives on the contributions of Re-Label to the changes experienced by them, if the changes would have happened anyway, and how long they thought the changes would last and to what extent. The table below presents the results from the questionnaires accounting for deadweight, displacement, attribution, and drop-off.

Stakeholder	Outcomes	Deadweight	Displacement	Attribution	Drop-off
Community	The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections	50%	0%	50%	25%



	Increased sense of community	25%	0%	50%	0%
Structures	Structures feel more valued	0%	0%	0%	0%
	Structures become more circular	50%	25%	25%	0%
	Structures feel an increased sense of belonging and trust	50%	0%	25%	0%
Consumers	Consumers have an increased sense of agency	50%	25%	50%	0%
Local Cooperatives and Associations	Parisian small businesses are better positioned to facilitate reuse and have better access to the market	50%	0%	50%	0%
	Paris strengthens its circular community and vision	75%	0%	75%	0%

Table 63: Paris Re-Label SROI Stakeholder results for measuring impact

4.8.5.2 Total Impact

To calculate and understand the sole impact of Re-Label, the attribution, displacement, and deadweight were used to calculate the impact for each outcome. This calculation was completed based on the following equation:

$$(Financial\ proxy\ value\ of\ each\ outcome \times the\ quantity\ of\ the\ outcome) \times (1,0 - Deadweight\ \%) \times (1,0 - Displacement\ \%) \times (1,0 - Attribution\ \%)$$

Based on the impact for each outcome, these were combined to generate the total impact of Re-Label. The table below presents the impact calculation for each outcome and the total impact.



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Stakeholder	Outcomes	Impact Calculation (€)
Community	The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections	45.128,60
	Increased sense of community	187,50
Structures	Structures feel more valued	18.426,00
	Structures become more circular	23.711,40
	Structures feel an increased sense of belonging and trust	67.692,90
Consumers	Consumers have an increased sense of agency	5,95
Local Cooperatives and Associations	Parisian small businesses are better positioned to facilitate reuse and have better access to the market	7.772,50
	Paris strengthens its circular community and vision	3,57
Total Impact		162.928,42

Table 64: Paris Re-Label SROI Impact Calculation

4.8.6 Social Return Calculation

4.8.6.1 Future Projections

Calculating the social return was based on a 5-year projection. Based on the duration of the outcomes identified earlier, outcomes were valued accordingly. The social return calculation was completed as follows:

$$\begin{aligned}
 \text{Impact in Year 1} &= \text{impact calculation of outcome} \\
 \text{Impact in Year 2} &= \text{Impact in Year 1} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 3} &= \text{Impact in Year 2} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 4} &= \text{Impact in Year 3} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 5} &= \text{Impact in Year 4} - (1,0 - \text{Drop-off } \%)
 \end{aligned}$$

The results of the social return projected into the future for each outcome are presented in the table below.

Stakeholder	Outcomes	Year 1	Year 2	Year 3	Year 4	Year 5
Community	The community is more	45.128,60	33.846,45	25.384,84	19.038,63	14.278,97



	connected with other communities and increases the amount of knowledge on circular practices from these connections					
	Increased sense of community	187,50	187,50	187,50	187,50	187,50
Structures	Structures feel more valued	18.426,00	18.426,00	18.426,00	18.426,00	18.426,00
	Structures become more circular	23.711,40	23.711,40	23.711,40	23.711,40	23.711,40
	Structures feel an increased sense of belonging and trust	67.692,90	67.692,90	67.692,90	67.692,90	67.692,90
Consumers	Consumers have an increased sense of agency	5,95	5,95	5,95	5,95	5,95
Local Cooperatives and Associations	Parisian small businesses are better positioned to facilitate reuse and have better access to the market	7.727,50	7.727,50	7.727,50	7.727,50	7.727,50
	Paris strengthens its circular	3,57	3,57	3,57	3,57	3,57



	community and vision					
Total Social Return		162,928.42	151,646.27	143,184.66	136,838.45	132,078.79
Present Value of each year		157,418.76	141,563.41	129,144.36	119,246.80	111,206.80
Total Present Value (PV)						658,580.13
Net Present Value (PV minus the investment)						558,580.13
Social Return (Value per amount invested)						6.59

Table 65: Paris Re-Label SROI Calculation

4.8.7 Re-Label SROI Conclusions and Recommendations

This forecast SROI analysis on Re-Label has indicated that **for every €1 invested, a total of €6,59 of predicted value is created.**

The forecast SROI analysis for the Paris pilot solution, Re-Label, has presented the stories of change across 4 key stakeholder groups affected by the solution. This analysis has demonstrated the diversity of changes that solutions focusing on circular and regenerative transitions can have across a broadened concept of value. A significant portion of social value created through Re-Label is attributed to the Structures stakeholder group. The outcomes experienced by these stakeholders demonstrated that the social value includes much more than increasing knowledge and awareness on the topic and integration of circular practices into their work. While Re-Label actively seeks to valorise and make visible the hidden work processes of circular practices of local communities of makers, manufacturers, designers, and other actors, this in turn translates into much more value. The analysis of changes affecting Structures and Community stakeholders through Re-Label exhibited the importance of valuing feelings of belonging, sense of community, the feelings of being valued within society in advancing circular and regenerative transitions.



For the Municipality of Paris, Re-Label has demonstrated extended social value creation through its contributions to the local environment through strengthened visions for circularity and easing market access for circular players in the future. While Re-Label's contributions support these changes for the Municipality, other contributors are also attributed to these changes, however, the social benefits generated by Re-Label still greatly support those involved in the production of circular products – the Structures.

When it comes to Consumers affected by Re-Label, the results of the SROI analysis revealed the importance of Re-Label in addressing the agency of consumers through increasing their capacity to make informed choices before purchasing a product. It also demonstrated that Re-Label is a key tool in bridging knowledge gaps between production and consumption, as consumers are often in the dark when it comes to the invisible processes related to circular practices and what actually goes into the products they consume.

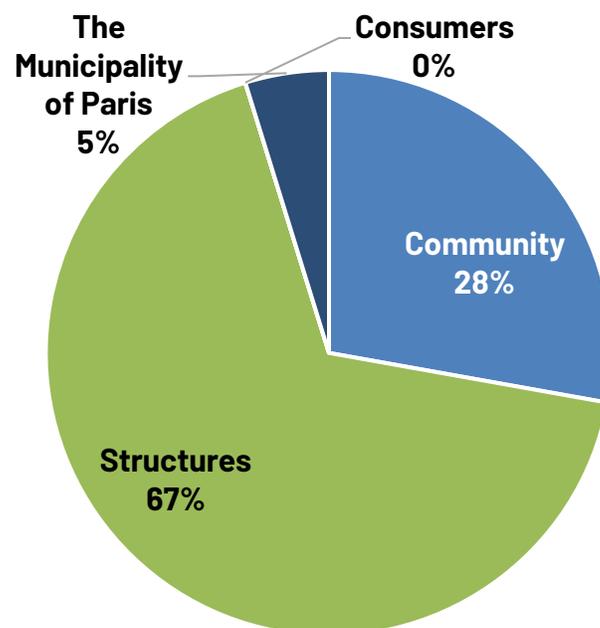


Figure 21: Re-Label SROI Value Creation per Stakeholder

Through forecasting the predicted social value created by the Paris REFLOW pilot through Re-Label, the analysis has also helped to identify suggestions on future improvements of the activities of Re-Label and points of attention for undertaking further assessments.

The Activities

Based on the forecasted social return for Re-Label, activities which focus on building up the Community through Re-Label should continue. Furthermore, supporting Structures will also be a critical activity of focus through Re-Label, as these are the actors who not only benefit from Re-Label, but they also have the ability to instigate and nourish the transition towards circularity within Paris and beyond through their practices. Ensuring the continuous sharing of practices and exchange of knowledge across structures and communities will be an important activity to focus on moving beyond REFLOW.

While consumers did not substantiate a large portion of value creation as a stakeholder group in themselves, Re-Label activities should continue to highlight their role in supporting the valorisation of the invisible work of the structures and advancing the shift towards more circular practices forward. Their role in consuming more responsibly and gaining awareness on circular processes can validate the feelings of being more valued experienced by the structures and can help to influence the practices of the structures further.

Future Iterations of the Analysis

Attention to the indicators of change and the financial proxies should be prioritized within future iterations of this analysis. Seeing that a large proportion of the social value generated from Re-Label has impacted the Structures stakeholders, increased involvement of this stakeholder group should be undertaken for further iterations. Opening up additional methods for monetizing the changes, that are perhaps more intangible, can be explored. This can include utilizing the involvement of stakeholder perspectives and their perceptions of what certain changes are worth in monetary values to them. While the HACT Social Value database was used to value the more intangible feelings of change, the intensity and importance of these changes are expected to differ across a variety and diversity of actors involved in circular processes. Additionally, future iterations should seek to incorporate a larger stakeholder sample. In particular, focus on gathering stories of change from consumers across a broad range of backgrounds can also be incorporated into future iterations of the SROI analysis.



Vejle

Den Gamle Gård SROI



4.9 Vejle: Den Gamle Gård

4.9.1 Establishing Scope

4.9.1.1 The Vejle Pilot Overview

The REFLOW Vejle pilot is made up of 2 organisations: The Municipality of Vejle and the Danish Design Center. The Vejle pilot focuses on a bottom-up approach to increasing the circularity of the city's plastic value chains through gaining insights into urban plastic consumption. Within REFLOW, the Vejle pilot has collaboratively developed circular plastic solutions with the involvement of citizens, associations, organisations, SMEs, and public institutions. A full overview of these solutions can be found in section 2.7.2.5 of this deliverable.

As part of the REFLOW project, the Vejle pilot carries out their work across three micro-scale test sites in the Western neighbourhood of the city – Vestbyen. At each test site, the Vejle pilot runs targeted experiments, workshops, and engagement sessions where they implement solutions that increase awareness of plastic waste and circularity in plastics. These test sites include a retail store in the supermarket chain REMA 1000, the public elderly home Sofiegården, and the public housing block Den Gamle Gård. The Vejle pilot places a large emphasis on its citizens as changemakers towards reaching their long-term goal of circular plastics. As such, this citizen focus is evidenced in the activities and solutions that the Vejle pilot undertakes and develops which seek to activate a citizen movement through empowering them to become informed and active and changemaking.

"We focus on plastic as a resource. How can we reduce, use, increase recycling and recycling? Our approach is: (1) Work from the bottom up, i.e., based on the real needs and reality of human beings, (2) Co-create solutions across segments and social boundaries, (3) Work with change from the perspective that it is people who must drive them, (4) Anchor from day 1 of the project (governance)."

Vejle Pilot



4.9.1.2 Den Gamle Gård Overview

The Vejle pilot has worked in close collaboration with residents and the management of the housing association, AAB Vejle, at Den Gamle Gård. Den Gamle Gård is an apartment in the western neighbourhood of Vejle, known as Vestbyen. The residence is owned and managed by AAB Vejle and is home to 298 residential apartments. Within the Vejle pilot in REFLOW, the solution *Better Sorting Systems in Small Apartments* was developed to increase awareness of plastic and waste sorting and to decrease the amount of plastic found in residual waste, subsequently increasing the amount of plastic that is sorted for recycling at Den Gamle Gård test site (see section 2.7.2.5.3 for more details).

Better Sorting Systems in Small Apartments is a set of “recycling bin packages” that 16 apartments with approximately 30 residents at Den Gamle Gård who have tested the new solution. The systems consist of a series of bins, with 2 to 3 compartments which are set up into the kitchen cabinets in a residence. The setup of the bins is based on the size of the kitchen cabinets and the residents’ own wishes and needs.

Through events and the involvement of residents, the Vejle pilot conveys how the recycling of plastics can be seen as a resource and turned into new products by making this topic visible and tangible for the residents at Den Gamle Gård. Importantly, the *Better Sorting Systems in Small Apartments* solution provides residents with sorting bins that can be adapted and fitted into their apartments, allowing them to sort their plastic and other waste within the comforts of their own homes in an easy, intuitive way. In addition to an intuitive design, the sorting solution provides instructions of how to sort waste for the residents. The Vejle pilot has worked in collaboration with the management of AAB Vejle to supply residents with these intuitive sorting bins that can fit into the residents’ kitchens. By having the intuitive sorting bins in their homes, residents can undertake waste sorting activities in their apartment kitchens before putting it in the waste containers in the yard.

Better Sorting Systems in Small Apartments aims to empower and activate a community movement at the residence to inspire others in their community to take part in plastic and waste sorting. Through this, the sorting of waste is made into an easy, everyday activity for everyone.

4.9.1.3 Scope of Analysis

The development, implementation, and testing of the *Better Sorting Systems in Small Apartments* at Den Gamle Gård took place during the three-year timespan of the REFLOW project from June 2019 to May 2022. Since the SROI analysis was conducted prior to the end of the project, the SROI on Den Gamle Gård is a forecast of the value created by the activities of the REFLOW Vejle pilot. To understand the change



that has been created by the activities of the Vejle pilot at Den Gamle Gård, the scope of analysis for the Den Gamle Gård’s SROI focused on the following activities:

- Placing sorting bins with intuitive design and the ability to fit into small apartments in the residences at Den Gamle Gård
- Sorting waste in the small apartments
- Awareness raising activities with the residents at Den Gamle Gård

The analysis of Den Gamle Gård sets out to measure the impact that is both seen as tangible and easily recognised by the stakeholders.

4.9.2 Identifying Stakeholders

4.9.2.1 Stakeholder Analysis

The identification of initial key stakeholders who could experience change as a result of Den Gamle Gård were first identified by WP1. The Vejle pilot team then analysed the list of stakeholders, mapping out the changes they were expected to experience because of *Den Gamle Gård* and how the stakeholders themselves could affect the activity. The following table outlines the context of the stakeholder’s involvement in the project and the expected outcomes as a result of the activities.

Stakeholders	Context	Expected Outcomes
Residents at Den Gamle Gård	They are the residents where the REFLOW solution is being implemented. They are affected by the impact of the solution and is also affected through new waste sorting behaviours.	<ul style="list-style-type: none"> • Residents become better at sorting waste • Increased community among residents • Increased knowledge and awareness on sorting plastic, recycling and waste in general
AAB Housing Association	They are the site where the solution is implemented. They affect the solution because they are necessary for implementation and enabling the solution.	<ul style="list-style-type: none"> • AAB becomes a frontrunner in sustainable and circular solutions • Less residual waste from residences and better sorting rates
Vejle Municipality	They provide knowledge and experience on waste management that ensures that	<ul style="list-style-type: none"> • More plastic resources are collected and processed



Waste Management	the solution works in theory and practice. They are affected by the solution through the volumes of wastes/resources being sorted by residents that need to be processed	<ul style="list-style-type: none"> • Increase of resources to handle
Sorting System Producers	They are the one who deliver the sorting solution for Den Gamle Gård.	<ul style="list-style-type: none"> • Improved business and scaling of solution across other residences or organisations
Wild Studio	They design and develop flowerpots and co-create the architectural setting in Den Gamle Gård to benefit the awareness creation on plastic recycling.	<ul style="list-style-type: none"> • Increase social and environmental contribution to community members • New capacities in relation to plastics reuse and recycling

Table 66: Vejle Den Gamle Gård Stakeholder Analysis

4.9.2.2 Stakeholder Involvement

After identifying stakeholders, the Vejle pilot team took the most relevant stakeholders who were within the scope of analysis and conducted interviews using a structured guide to understand what changes for them. In collaboration with the WP1 team, the Vejle pilot analysed the stakeholder list and outlined reasons for inclusion or exclusion in the SROI. Following the process of stakeholders who were to be included into the SROI, additional questionnaires were sent to the stakeholders to gather data to calculate the impact and social return. The results of these process are in the table below.

Stakeholders	Included in SROI?	Reason for Inclusion/Exclusion	Number of Representative Stakeholders	Method of Engagement
Residents at Den Gamle Gård	Yes	They are included because they are the main target group for the solution. They also affect and are affected by the impact of the solution	3	Interview conducted by the Vejle pilot
AAB Housing Association	Yes	They are included because they are the site where the solution is implemented, and they enable the solution	1	Interview conducted by the Vejle pilot



Vejle Municipality Waste Management	Yes	They are included because they impact the solution with knowledge and waste management experience. They are also affected by the impact of the solution	1	Interview conducted by the Vejle pilot
Sorting System Producers	No	They are excluded because they are a secondary target group. When doing the SROI, due to resource restrictions, interviews with the target group that has been directly involved in the solution were chosen.	-	-
Wild Studio	No	They are excluded because they are a secondary target group. When doing the SROI, due to resource restrictions, interviews with the target group that has been directly involved in the solution were chosen.	-	-

Table 67: Vejle Den Gamle Gård SROI Stakeholder Involvement

4.9.3 Inputs and Outputs

The inputs that have made these activities possible were realised through the funding received by the Vejle pilot through the REFLOW project. Moreover, inputs from residents included dedicating their time and motivation for participating in the REFLOW project at the Vejle pilot.

This amounts to an estimated €16.500⁷⁴.

These inputs therefore resulted in the following activities:

- Placing sorting bins with intuitive design and the ability to fit into small apartments in the residences at Den Gamle Gård
- Sorting waste in the small apartments
- Awareness raising activities with the residents at Den Gamle Gård

⁷⁴ Based on an estimate provided by the Vejle pilot.



Activities became possible through these inputs and were thus able to produce the following outputs:

- 16 sorting bins
- 16 residences equipped with sorting bins in their homes
- A series of awareness raising events and meetings and an installation at Den Gamle Gård

4.9.4 Outcomes

4.9.4.1 Stakeholder Outcomes

By involving the stakeholders, outcomes were identified based on the changes that the stakeholders had already experienced or any changes that they could foresee because of Den Gamle Gård. The outcomes were mapped out by WP1 into a chain of events of which the final outcome was measured in the SROI. Since SROI is stakeholder-informed rather than led, the outcomes presented below were realized through both the involvement with the stakeholders and the intended outcomes expected through Den Gamle Gård by the Vejle pilot and WP1.

4.9.4.1.1 Residents at Den Gamle Gård

The changes that the residents at Den Gamle Gård experience through the installation of the sorting bins fitted into their kitchen apartments has made the activity of sorting plastic waste easier and more intuitive for all residents. Through this increased ease, residents experience changes within their home and their community at Den Gamle Gård.

At the level of the home, residents feel motivated to either begin sorting or to continue to sort even more waste than they did before because the sorting bin solution is able to fit into their apartment kitchens. Residents are able to see the visible difference in the amount of residual waste being created in their own homes which further fuels their motivation to sort waste. Prior to the bin system, residents had experienced sorting as a frustrating activity, perceived as both time-consuming and space-consuming. With the sorting bins, waste sorting has become a more easily integrated part of their daily practices. The sorting bins have also allowed residents to gain new plastic sorting skills and abilities across all age groups and household types. These changes experienced by residents help to relieve the burden of sorting waste turning it into an easy everyday activity where they have the confidence, knowledge, and ability to sort their waste correctly. While one resident stated that they spend more time examining their waste in order to decide which bin it should go in, this results in the residents becoming



better at sorting their plastic and waste and eventually less time used on sorting as they increase their knowledge and awareness of sorting. As a result, they can spend more time on other activities.

At the community level, residents feel an increased sense of community as more take part in sorting plastic and waste because it has become so easy to do. Residents exchange experiences with those in their community, increasing communication and community across the apartments. This is further increased through the influence of that REFLOW has had at Den Gamle Gård as a way to gather people around the topics of sorting waste and plastic. However, residents who take part in sorting and who build a community around these actions also feel an increased sense of responsibility to spread the message to other residents by sharing tips and knowledge. By having the sorting bin solution integrated into all kitchens of the apartments at Den Gamle Gård, the community of residents will experience an increase in common responsibility, making the act of sorting a norm and expectation for the community.

	The Outcomes (What Changes?)
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste
	Residents are better waste sorters and are able to sort plastic waste correctly
	Residents feel an increased sense of community

4.9.4.1.2 AAB Housing Association

Through the *Den Gamle Gård*, the housing association, AAB Vejle, imagines that the solution will allow for residents living in their properties to live more environmentally correct. The sorting bins provided at AAB residences allow residents the opportunity to live in an easy and worry-free way as it will no longer be a burden for them to sort their waste, but rather an easy everyday action. Through this lens, the changes that AAB Vejle as an organisation experiences include their improved image as frontrunners in circular and sustainable solutions and their enhanced contributions to society's goals for sustainable development as a result of less residual waste being created and better sorting rates within their residences.

	The Outcomes (What Changes?)
AAB Housing Association	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs



	There are reduced costs at the administration level for AAB
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4.9.4.1.3 Vejle Municipality – Waste Management

Den Gamle Gård also leads to changes in Vejle’s Waste Management. During the development of the sorting bin solution, the Waste Management department at the Municipality of Vejle provided their expertise and knowledge on waste management to ensure that the solution would work both in theory and practice. Through this interaction, the development of the solution was able to address the needs of the Waste Management department and to fully maximise the ability of this solution to get residents to sort their waste and to do it correctly while also considering the reality of the citizens who were handling the waste. Importantly, these interactions increased the interest and experience of the Waste Management to continue to collaborate with citizens and to undertake a bottom-up approach to their future projects.

Through the activities of the REFLOW Vejle pilot’s solution at *Den Gamle Gård*, the Municipality of Vejle’s Waste Management expects to experience the effects of a higher degree of awareness among citizens in relation to handling plastic and sorting in their everyday lives at the logistic level within waste management. As a result, this increased division of waste (generated through sorting) requires the Municipality’s Waste Management to increase their focus and resources on the need for greater logistical optimisation to manage the division of waste. Furthermore, through proper sorting at the citizen level, there will be less plastic waste being incinerated.

The data and collected experiences from *Den Gamle Gård* plant the seeds for the Waste Management to continue further with addressing the challenges associated with plastic and waste. As a result, they gain enhanced experience on plastic and its recycling opportunities.

	The Outcomes (What Changes?)
Vejle Municipality – Waste Management	Waste management works more with citizens on projects
	Waste management improves their knowledge and experience on plastic and its recycling opportunities
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting



4.9.4.2 Indicators of Change

To demonstrate that the changes presented in the earlier section have actually occurred for the stakeholders, the following indicators of change are used to measure the extent of the change. For most of the indicators, subjective and objective indicators for the outcomes were used to account for both the individual perspectives of the stakeholders who experience the change as well as indicators that reflect more fact-based values.

Stakeholder	Outcomes	Indicator	Source of Indicator
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	Residents who state that they sort; Residents who state they have started to sort; amount of plastic waste at residence	Questionnaire Plastic analysis
	Residents are better waste sorters and are able to sort plastic waste correctly	Amount of correctly sorted waste at the household level	Plastic analysis
	Residents feel an increased sense of community	Those who state they feel an increased sense of community; number of community events and organisations	Questionnaire Data from residence
AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	Number of certifications, awards received, press releases relating to AAB's sustainability; perception of AAB from its residents/citizens	Questionnaire Data from AAB
	There are reduced costs at the administration level for AAB	Amount spent on waste disposal administration costs for AAB	Data from AAB



Vejle Municipality – Waste Management	Waste management works more with citizens on projects	Number of projects with citizens	Data from Waste Management
	Waste management improves their knowledge and experience on plastic and its recycling opportunities	Increase of knowledge of Waste Management; new recycling opportunities; degree of professional skills development	Data from Waste Management Questionnaire
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	Number of jobs created to handle resources and management of waste	Data from Waste Management

Table 68: Vejle Den Gamle Gård SROI Outcome Indicators

4.9.4.3 Quantity and Duration of Change

The quantity of change has been estimated based on content within D5.3 and the 5-year goals for Den Gamle Gård and desktop research found through the organisations' websites. With this information, the quantity was estimated. The duration of change was identified through a questionnaire conducted with the stakeholders, where they were asked how long they expected the outcomes to last and why they thought that. The results are presented below in the table.

Stakeholder	Outcomes	Quantity	Duration
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	1	More than 5 years
	Residents are better waste sorters and are able to sort plastic waste correctly	16 residents	More than 5 years
	Residents feel an increased sense of community	16 residents	4 years



AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	1	More than 5 years
	There are reduced costs at the administration level for AAB	52 weeks	4 years
Vejle Municipality – Waste Management	Waste management works more with citizens on projects	1	1 year
	Waste management improves their knowledge and experience on plastic and its recycling opportunities	444 employees	1 year
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	1	1 year

Table 69: Vejle Den Gamle Gård SROI Outcome Quantity and Duration

4.9.4.4 Financial Proxies of Outcomes

The final step of this stage involved the identification of financial proxies. This process has been done through the review of existing SROI reports found on Social Value UK’s SROI report database. Similar outcomes were analysed in the reports and used as a first step towards identifying appropriate financial proxies. The HACT Social Value calculator was also used to monetise the changes experienced by the Den Gamle Gård stakeholders. In addition to these sources, financial proxies were also identified through desk research where values were attributed to the outcomes based on information that could be representative and a fair value.



Stakeholder	Outcomes	Financial Proxies	Source	Value (€)
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	Cost of awareness campaign on waste sorting	Municipality of Vejle 2021 Budget for Development projects divided by 12 districts in Vejle ⁷⁵	23.156,00
	Residents are better waste sorters and are able to sort plastic waste correctly	Affald Genbrug administration costs per apartment	Municipality of Vejle 2021 Budget ⁷⁶	50,14
	Residents feel an increased sense of community	Feeling of belonging to the neighbourhood	HACT Social Value Calculator	4.512,86
AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	Cost of PR services	Kemp & Kjær's overview of PR costs ⁷⁷	6.700,00
	There are reduced costs at the administration level for AAB	Cost savings related to waste disposal (Municipality of Vejle, difference of weekly emptying of a 660	Municipality of Vejle waste rates for municipal companies and institutions – January 2022 ⁷⁸	230,69

⁷⁵ See page 135 of budget report. <https://www.vejle.dk/media/34685/budget-2021-til-net.pdf>

⁷⁶ See page 85. <https://www.vejle.dk/media/34685/budget-2021-til-net.pdf>

⁷⁷ <https://kempkjaer.dk/en/insider-tip-pr-prices-in-europe/>

⁷⁸ <https://www.vejle.dk/erhverv/min-virksomhed/erhvervsaffald-og-miljoe/priser-og-gebyrer-for-erhverv/affaldstakster-for-kommunale-virksomheder-og-institutioner-januar-2022/>



		litre residual waste container vs 370 litre residual waste container)		
Vejle Municipality – Waste Management	Waste management works more with citizens on projects	Cost of Market research	The Farnsworth Group market research costs ⁷⁹	18.498,00
	Waste management improves their knowledge and experience on plastic and its recycling opportunities	Employment Training	HACT Social Value Calculator	970,39
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	Annual Salary of Waste Sorter	Ministry of Children and Education – Denmark ⁸⁰	49.793,80

Table 70: Vejle Den Gamle Gård SROI Financial Proxies

4.9.5 Measuring Impact

To measure the impact, the SROI analysis considers deadweight, displacement, attribution, and drop-off. These elements help to frame a realistic analysis of the impact that has been generated from Den Gamle Gård. The following tables summarise how impact was measured for Den Gamle Gård’s SROI analysis.

⁷⁹ <https://www.thefarnsworthgroup.com/blog/market-research-cost#:~:text=customer%20and%20market,-.In%20general%2C%20you%20should%20plan%20to%20spend%20about%20%2420%2C000%20to,higher%20end%20of%20that%20range.>

⁸⁰ <https://www.ug.dk/job/job-fordelt-paa-erhvervsomraader/rengoeringejdservicerenovation/renovationsarb/renovationsarbejder>



Would the change have happened anyway/will the change happen anyway?	Assigned Deadweight (%)
The change would not happen without REFLOW	0%
The change would have happened, but only a little without the REFLOW	25%
The change would have happened partly without REFLOW	50%
The change would have happened mostly without REFLOW	75%
The change would have happened anyway without REFLOW	100%

Table 71: Vejle Den Gamle Gård SROI Deadweight Questionnaire

How much of this change is because of REFLOW?	Assigned Attribution (%)
The change is a complete result of REFLOW and no other contributors	0%
Other contributors had a minor role in this change	25%
Other contributors had a shared role in the change	50%
Other contributors have a significant role in the change	75%
The change is a complete result of other contributors	100%

Table 72: Vejle Den Gamle Gård SROI Attribution Questionnaire

Did any of these changes impact other changes? Was there anything that could have happened but didn't because of this change?	Assigned Displacement (%)
The change did not negatively impact any other changes	0%
The change negatively impacted other changes only a little	25%
The change negatively impacted other changes partially	50%
The change negatively impacted other changes significantly	75%
The change negatively impacted other changes completely	100%

Table 73: Vejle Den Gamle Gård SROI Displacement Questionnaire

Do you think that the impact will decrease year by year over a 5 year period? In other words, do you think any of the changes will stop or fade away in the future?	Assigned Drop-Off (%)
The impact of the change will not decrease at all over 5 years	0%
The impact of the change decreases a little every year over 5 years	25%
The impact of the change decreases by half every year over 5 years	50%
The impact of the change decreases significantly every year over 5 years	75%
The impact of the change is stopped completely after 5 years	100%



Table 74: Vejle Den Gamle Gård SROI Drop-Off Questionnaire

4.9.5.1 Deadweight, Displacement, Attribution, Drop-Off

To measure impact, the amount of deadweight, displacement, attribution, and drop-off were obtained through further involvement with the stakeholders. After the outcomes to be measured in Den Gamle Gård’s SROI were identified, the stakeholders were sent questionnaires to gauge their perspectives on the contributions of REFLOW to the changes experienced by them, if the changes would have happened anyway, and how long they thought the changes would last and to what extent. The table below presents the results from the questionnaires accounting for deadweight, displacement, attribution, and drop-off.

Stakeholder	Outcomes	Deadweight	Displacement	Attribution	Drop-off
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	0%	0%	13%	13%
	Residents are better waste sorters and are able to sort plastic waste correctly	13%	0%	13%	13%
	Residents feel an increased sense of community	25%	0%	13%	13%
AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	0%	0%	0%	25%
	There are reduced costs at the administration level for AAB	25%	0%	0%	25%



Vejle Municipality - Waste Management	Waste management works more with citizens on projects	100%	25%	50%	50%
	Waste management improves their knowledge and experience on plastic and its recycling opportunities	100%	50%	50%	25%
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	0%	0%	0%	50%

Table 75: Vejle Den Gamle Gård SROI Stakeholder results for measuring impact

4.9.5.2 Total Impact

To calculate and understand the sole impact of REFLOW activities at Den Gamle Gård, the attribution, displacement, and deadweight were used to calculate the impact for each outcome. This calculation was completed based on the following equation:

$$(Financial\ proxy\ value\ of\ each\ outcome \times the\ quantity\ of\ the\ outcome) \times (1,0 - Deadweight\ %) \times (1,0 - Displacement\ %) \times (1,0 - Attribution\ %)$$

Based on the impact for each outcome, these were combined to generate the total impact of REFLOW activities at Den Gamle Gård. The table below presents the impact calculation for each outcome and the total impact.



Stakeholder	Outcomes	Impact Calculation (€)
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	20.261,50
	Residents are better waste sorters and are able to sort plastic waste correctly	614,22
	Residents feel an increased sense of community	47.385,03
AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	6.700,00
	There are reduced costs at the administration level for AAB	8.996,91
Vejle Municipality - Waste Management	Waste management works more with citizens on projects	0,00
	Waste management improves their knowledge and experience on plastic and its recycling opportunities	0,00
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	49.793,80
Total Impact		133.751,46

Table 76: Vejle Den Gamle Gård Impact Calculation

4.9.6 Social Return Calculation

4.9.6.1 Future Projections

Calculating the social return was based on a 5-year projection. Based on the duration of the outcomes identified earlier, outcomes were valued accordingly. The social return calculation was completed as follows:

$$\begin{aligned}
 \text{Impact in Year 1} &= \text{impact calculation of outcome} \\
 \text{Impact in Year 2} &= \text{Impact in Year 1} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 3} &= \text{Impact in Year 2} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 4} &= \text{Impact in Year 3} - (1,0 - \text{Drop-off } \%) \\
 \text{Impact in Year 5} &= \text{Impact in Year 4} - (1,0 - \text{Drop-off } \%)
 \end{aligned}$$



The results of the social return projected into the future for each outcome are presented in the table below.

Stakeholder	Outcomes	Year 1	Year 2	Year 3	Year 4	Year 5
Residents at Den Gamle Gård	Residents feel more motivated to either begin or to continue sorting plastic and other waste	20.261,50	17.728,81	15.512,71	13.573,62	11.876,92
	Residents are better waste sorters and are able to sort plastic waste correctly	614,22	537,44	470,26	411,48	360,04
	Residents feel an increased sense of community	47.385,03	41.461,90	36.279,16	31.744,27	0,00
AAB	The position as a frontrunner in sustainable waste management is improved and AAB enhances its contributions to the UN's SDGs	6.700,00	5.025,00	3.768,75	2.826,56	2.119,92
	There are reduced costs at the administration level for AAB	8.996,91	6.747,68	5.060,76	3.795,57	0,00
Vejle Municipality - Waste Management	Waste management works more with citizens on projects	0,00	0,00	0,00	0,00	0,00



	Waste management improves their knowledge and experience on plastic and its recycling opportunities	0,00	0,00	0,00	0,00	0,00
	Waste management increases their resources and logistical optimisation to handle the larger division of waste sorting	49.793,80	0,00	0,00	0,00	0,00
Total Social Return		133.751,46	71.500,83	61.091,64	52.351,50	14.356,88
Present Value each year		129.228,46	66.746,79	55.101,16	45.621,31	12.088,11
Total Present Value						308.785,83
Net Present Value (PV minus the investment)						292.285,83
Social Return (Value per amount invested)						18,71

Table 77: Vejle Den Gamle Gård SROI Calculation

4.9.7 Den Gamle Gård SROI Conclusions and Recommendations

This forecast SROI analysis on Den Gamle Gård has indicated that **for every €1 invested, a total of €18,71 of predicted value is created.**

The forecast SROI analysis has detailed the stories of change for 3 key stakeholders affected by the Vejle pilot's Den Gamle Gård intervention through REFLOW. These stakeholders have included the



Residents at Den Gamle Gård, the housing association managing Den Gamle Gård, and the Municipality of Vejle's waste management department. Through the analysis of the changes across these 3 stakeholder groups, the results from the SROI have demonstrated that Residents experience a significant proportion of the created social value through the Vejle pilot's REFLOW intervention at Den Gamle Gård. This result is reflective of the citizen-centred focus that the Vejle pilot has implemented throughout their activities within REFLOW, placing a large focus on a bottom-up approach to their circular and regenerative transition.

The social value created for the Residents at Den Gamle Gård illustrates the value of co-designing solutions which tackle the everyday challenges and needs from the perspectives of their users – the Residents. Importantly, the additional value creation through increased motivation and sense of community at Den Gamle Gård demonstrates the broadened concept of value creation as it taps into community building aspects and shifting citizen behaviours. Moreover, it also brings to attention the series and magnitude of impact that the Vejle pilot intervention at Den Gamle Gård has the potential to create as it moves from the individual residents to the community as a whole.

In this way, the social value created for the residents affected by the Vejle REFLOW pilot's intervention at Den Gamle Gård, the SROI analysis has also pointed towards the changes that the waste department at the Municipality of Vejle expects to experience as a result from citizen-centred projects and the increase of correctly sorted plastic and other waste.

While the share of social value creation for the housing association, AAB, is relatively low compared to the other stakeholders presented within the SROI analysis for Den Gamle Gård, the predicted social value from Den Gamle Gård which is connected to AAB as an organisation trickles down mostly to the residents living at their housing complexes. With this being said, the changes experience within AAB's image and reputation as a frontrunner in sustainable living and waste management still holds important value.



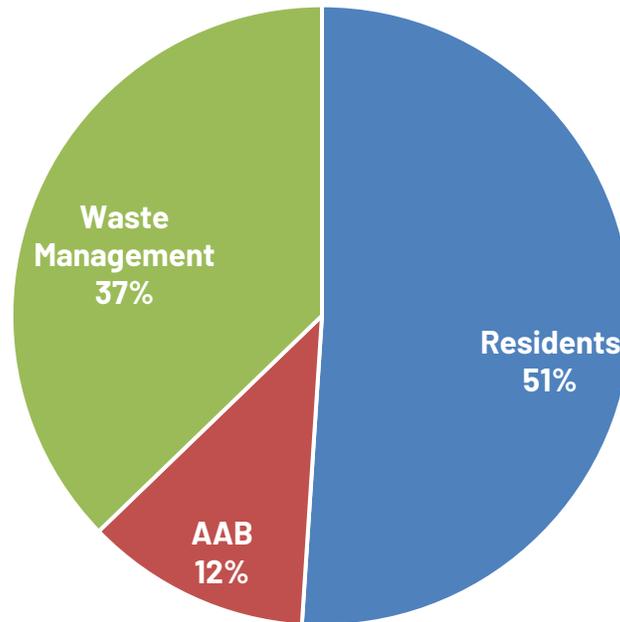


Figure 22: Den Gamle Gård SROI Value Creation per Stakeholder

Through forecasting the predicted social value created by the Vejle REFLOW pilot through Den Gamle Gård, the analysis has also helped to identify suggestions on future improvements of the activities of Den Gamle Gård intervention and points of attention for undertaking further assessments.

The Activities

Continued focus on the implementation of sorting bins into apartments for residents to use will be a key activity moving forward beyond REFLOW. The scaling opportunities for integrating the Vejle pilot’s intervention across multiple sites across the city is expected to be a significant activity which will impact the quantity and intensity of outcomes initially analysed and measured within this forecast analysis of predicted social value. Attention to activities which target not only the frontrunning residents who already sort their waste, but also focusing in on the residents who may have a harder time sorting, lack the knowledge, or who experience other barriers can be an important focal point for future activities associated with the intervention.



Future Iterations of the Analysis

It is recommended that further iterations of this analysis include a larger sample size of the residents affected by the Vejle REFLOW pilot's intervention. Moreover, it is recommended that future iterations focus in dividing the Residents stakeholder group into sub-groups. This can be done through stakeholder profiling, where the Residents can be categorized based on characteristics such as age, gender, household size, education levels, employment status, their experience with sorting waste, among other possible categories. This will provide more in-depth descriptions and analysis on the creation of social value across different sub-groups of residents affected by circular interventions.

The exploration of other valuation methods can also be undertaken for future iterations. This can be carried out through methods such as value games, where the stakeholders themselves can attribute value to the changes they experience based on what they perceive. For example, residents may equate an increase in motivation to begin sorting to the cost of a movie ticket. These values can change and differ across a diversity of stakeholder backgrounds. However, it is also important to remember that when undertaking an SROI, much of the analysis and decision relies on informed decisions and judgements by the team carrying out the task. With this being said, the increased involvement of stakeholders especially within the Residents stakeholder group will help to identify and validate a range of values to monetise the changes they experience and will present a realistic view of the perceived social value of changes that are traditionally more intangible and where financial proxies are not so obvious.



4.10 Social Return on Investment Conclusion

This chapter has valued and monetised the changes across the six pilot cities in REFLOW. This has been completed through undertaking the task of calculating the forecasted Social Return on Investment at the scale of one pilot solution for five of the pilot cities – Amsterdam, Cluj-Napoca, Milan, Paris, and Vejle. For the case of Berlin, an analysis of the stakeholder outcomes based on inputs from the Berlin pilot have been used to value and monetise change – assessing the societal impact of their Wastewater Heat Radar. A preliminary return on societal investment has been calculated for the Berlin pilot, however, a full analysis of the SROI has not been undertaken due to the lack of stakeholder involvement. Despite the absence of stakeholder involvement within Berlin, a social return on investment has been estimated and predicted for the pilot.

The results of the forecast Social Returns on Investment for the pilot cities are summarised in the table below giving each of the pilot cities and the solution analysed an SROI ratio:

REFLOW Pilot City and Solution	SROI Ratio
Amsterdam – The Swapshop	7.12:1
Berlin – Wastewater Heat Radar	4:1
Cluj-Napoca – The Retrofit Kit	10.23:1
Milan – BOTTO	6.09:1
Paris – Re-Label	6.59:1
Vejle – Den Gamle Gård	18.71:1

Table 78: REFLOW Pilot Cities' SROI Ratio

These values predict a positive SROI ratio across all the pilot cities' solutions. Importantly, the pilot solutions analysed within this chapter vary from each other in terms of who they affect, how the solutions operate, and the specific resources (referring to the different materials) they tackle. When comparing impact across the pilot cities' solutions analysed in this chapter, the Vejle pilot's solution – Den Gamle Gård, stands out for of its higher SROI ratio. Much of this is due to the lower investment input into the solution at Den Gamle Gård and the high value it creates across the residents – the main beneficiary of the solution. Despite this difference, the remaining pilot cities and their solutions prove to



generate forecasted impact across key stakeholder outcomes. For Amsterdam, a large portion of impact is attributed to the outcomes which Swapshop Employees experience – whereby the Swapshop as an organisation seeks to support newcomers to the Netherlands via employment and professional and social experience and skills while supporting the city’s transition towards circular textiles. For Berlin, the Wastewater Heat Radar places a large degree of its impact on the outcomes experienced by citizens living in the buildings which can be affected by the Wastewater Heat Radar – shifting them towards becoming more autonomous with regard to their energy consumption. While citizens are predicted to experience the weight of the impact, the degree of their outcomes are in turn affected greatly by decision makers who are influential in taking the topic of wastewater heat from idea to implementation. In Cluj-Napoca, the focus on tapping into testing the Retrofit Kit in an educational setting has forecasted a large portion of impact for the students, teachers, and employees within the Energetic High School. They experience important outcomes, not least, a decrease in energy consumption and thereby cost savings, but also towards their knowledge, awareness, and confidence in understanding the topic of energy transitions and circularity. For Milan, the forecasted value of BOTTO is expected to generate considerable impact for the NGOs involved in the redistribution of food and for the municipality as they move towards making their urban food system circular. While citizens in need are those that receive the food donations as meals – the degree of change experienced through the activities in which BOTTO operates focuses mainly on the redistribution actors themselves – with citizens in need as a secondary beneficiary of BOTTO. Lastly, in Paris, Re-Label is forecasted to impact the local makers, designers, entrepreneurs (the structures) the most in terms of social value creation. This is also a reflection of the aims behind Re-Label as it seeks to support local makers in valorising their invisible circular work processes and promoting reuse and circular practices amongst these stakeholders.

The SROI analyses presented in this chapter are forecast analyses, meaning that they predict the social value creation if the activities meet their intended outcomes. Thus, the societal returns on investment in this chapter paint a picture of the overall impact that each of the pilot cities have been forecasted to create through their circular interventions developed during the REFLOW project and how these will generate social value beyond the project. While some of the outcomes have already been experienced by stakeholders affected by the pilot solutions analysed in this chapter, there are still long-term outcomes that are intended to be created beyond the REFLOW project. As such, these forecast analyses present a solid framework for future iterations, namely evaluative SROI analyses. In this way, the forecast SROIs presented in this deliverable set up the framework which can capture the extent of

outcomes (the outcome indicators and financial proxies), and future evaluative SROIs can be conducted to gather the data on the extent of outcomes experienced by the stakeholders.



Conclusion



5 Conclusion

Deliverable 1.5 Project Impact Assessment has presented the social and economic impact of the REFLOW project across the six pilot cities: Amsterdam, Berlin, Cluj-Napoca, Milan, Paris, and Vejle. The report has assessed the social and economic impact of the project through three phases: (i) exploring and describing change, (ii) evidencing and measuring change, and (iii) valuing and monetising change. These phases have been presented across three chapters in the deliverable: (i) Theory of Change, (ii) Key Performance Indicators, and (iii) Social Return on Investment.

The first chapter of the deliverable, the Theory of Change, has reported on the final iteration of the Theory of Change for the pilot cities where they have explored change throughout the 3-year timespan of REFLOW. The report has also described change through the Narratives of Change for each pilot city, highlighting the different pathways to change taken and the diversity of contexts, foci, activities, solutions, and outcomes the pilot cities have undertaken and worked towards. This chapter has demonstrated that the transition towards becoming a circular and regenerative city holds many pathways to change as shown in the diversity of pilot activities and outputs presented in the Theories of Change.

The second chapter of D1.5 has presented the Key Performance Indicators for each of the pilot cities which have undergone co-creation and calibration processes throughout the project – providing specific indicators for measuring performance within the field of circular and regenerative city transitions. The chapter presented the achieved results of the pilot cities' KPIs alongside details of data collection and justifications. This chapter has also drawn-out strong connections to Deliverable 3.3 Urban Metabolism Strategy Final Report where the environmental impact assessment has been presented, while environmental KPI results have only been reported in this deliverable. The content of this chapter – the achieved results of the pilot cities' socio-economic and environmental KPIs – have thus tackled the second phase of the project impact assessment task by evidencing and measuring change through the performance and results the REFLOW pilot cities have achieved. During REFLOW, the pilot cities together have measured their progress across 74 KPIs – with 25 environmental KPIs and 49 socio-economic KPIs. Across the six pilot cities, 60 KPIs (81% of the total KPIs) have reached their projected targets within the reporting period of the REFLOW project.

Finally, the third chapter, Social Return on Investment, has presented the valuation and monetisation of change at the level of a pilot city solution through calculating the forecasted social return. The chapter has outlined the Social Return on Investment background and methodology which has set up the



framework for which the pilot cities' SROIs were conducted. There are six analyses which have been presented in the SROI chapter, each highlighting the stakeholders affected by the pilot cities' respective solutions and the activities. The involvement of stakeholders (for five of the six pilot cities) has been used in this chapter to present the outcomes that have and will be experienced by the stakeholders. Value has been ascribed to these stakeholder outcomes within their respective pilot solutions through the identification of financial proxies. Based on this valuation of change, the SROI chapter has presented a monetisation of the social value created across the six pilot city solutions and has provided a forecasted prediction of social value creation. Furthermore, this chapter has provided the framework for future Social Return on Investment analyses by identifying what should be measured, how to capture the changes, and the basis for valuing these outcomes.

5.1 Lessons Learned and Contributions

The work that has been undertaken in the development of this deliverable alongside the project-level and pilot-level activities during the REFLOW project has surfaced important lessons learned for future cities looking to replicate REFLOW and key contributions for circular transitions and the field of impact assessment.

5.1.1 Theory of Change

The Theory of Change has acted as a crucial resource for the pilot cities' circular and regenerative transitions within REFLOW as a guiding light for ensuring that the activities they undertook within the project were impactful and meaningful. Building off of the pilot city experiences mentioned in D1.4 Validation and Performance Evaluation, the Theory of Change has played a significant role for helping to establish the initial scope for the pilot cities – highlighting it as a foundational methodology for other cities kickstarting their circular and regenerative transitions.

Importantly, during the initial implementation and the several Theory of Change iterations undertaken throughout the REFLOW project with the pilot cities, lessons emerged which were incorporated during REFLOW and which can be taken forward for future cities embarking on circular and regenerative transitions. Firstly, Theory of Change deals with complexity – which can be difficult to navigate at the start of a project. In the case of REFLOW, the iterative process of the Theory of Change carried out with the pilot cities has been an important method in tackling this complexity and allowing for the REFLOW pilot cities to reflect and iteratively define and develop their Theories of Change. Secondly, while initially difficult to understand during its early implementation in the project, the Theory of Change proved to be a useful resource for the pilot cities as they worked through the iterations. In this way, the Theory of



Change became seen as a useful tool for them to strategically envision their impact and to reflect on the activities which would get them there. Lastly, the migration of the initial Theory of Change board from a word document to the online visualisation tool, Miro, provided a supportive instrument for visualising the pathways to change and allowing for a collaborative and flexible work environment.

The end result presented in this deliverable as well as the iterative Theory of Change journey presented in the other WP1 deliverables (D1.2, D1.3, and D1.4) contribute as meaningful sources of inspiration for future cities seeking to kickstart their journey towards becoming circular and regenerative.

5.1.2 Key Performance Indicators

The achieved results of the Key Performance Indicators presented in this deliverable has shaped key lessons learned within the context of REFLOW's project impact assessment. Notably, for the KPIs which did not reach their projected targets, the timing and implementation of all other aspects within an innovation project can greatly affect the results. In the case of Berlin, the long-lead times associated with implementing wastewater heat recovery infrastructure has affected the results of the pilot city. Moreover, unexpected challenges related to critical infrastructure data hindered and delayed the activities of the pilot city and the development of the Wastewater Heat Radar. For the Amsterdam pilot, the delayed implementation of the REFLOW OS within the Swapshop affected the results of the pilot city in reaching specific KPIs which drew upon this data. In turn, this offers future cities lessons to take forward based on these learnings. Given the innovative circumstances of the REFLOW project, plans, activities, and ideas continued to evolve and as such, flexibility, and adjustments to KPIs and their targets should be necessary to reflect these developments. There can also be other factors involved in reaching targets, including the gap between short-term and long-term outcomes which can affect the achieved results towards projected targets. Having the flexibility within KPI targets and understanding the scales and time horizons within targets can provide future cities with informed awareness when calibrating their KPIs towards matching their own urban circular transitions. This flexibility can be reached through iterative and multi-stage processes in the definition of KPIs and their targets. In this way, KPIs can be iteratively assessed to ensure that they that align with goals and that appropriate adjustments can be made.

The co-created Key Performance Indicators and the calibration of the KPIs proposed in the Grant Agreement of the project contribute to the flourishing database of KPIs related to circular economy. As mentioned in D1.3 The REFLOW Framework, there are a vast number of indicators related to circular economy. However, the co-creation and calibration process implemented within the REFLOW project



and the resulting 74 context specific KPIs and their respective targets for the six pilot cities has been an important output of the project and provides future cities starting points for measuring their performance in circular and regenerative transitions.

5.1.3 Social Return on Investment

The undertaking of the Social Returns on Investment across the REFLOW pilot cities has resulted in key learnings gathered throughout this process within the REFLOW project as well as contributions to the method and research.

Firstly, approaching the task of Social Return on Investment is a large activity. Clearly defining the scope of analysis and the parameters in which the analysis can be accomplished has been an important lesson learned during REFLOW. The scope of analysis is what defines the subsequent stages involved in the SROI and thus attention and focus should be paid towards this first stage before diving into the later stages. Moreover, clearly defining the parameters of analysis is essential for ensuring that the analysis being conducted is feasible in terms of time and resources.

Secondly, when conducting the SROI for the task of REFLOW's project impact assessment, the constant involvement of stakeholders was necessary across the different stages of the SROI. As such, the time and effort needed to engage with stakeholders should be set aside when undertaking an SROI. Tapping into different methods of data collection and qualitative and quantitative analysis including the use of semi-structured interviews, questionnaires, and surveys can help to gather stakeholder insights across the different stages of their involvement in the SROI while also accounting for the different amount of resources which are needed to conduct each method. This has proved to be useful, and an important lesson learned within the REFLOW project. Starting out stakeholder involvement with open-ended questions permits the flexibility of stakeholder responses and allows them the space to reflect on the changes they have or will experience. This method is more resource intensive as it involves the qualitative analysis of stakeholder responses. However, this data collection provides the basis for which the SROI analysis is grounded in and therefore, sufficient time should be allotted to this stage of stakeholder involvement. On the other hand, following the analysis of stakeholder outcomes, the use of more close-ended questions provides distinct and quantitative data needed for certain stages of the SROI, such as measuring impact. Utilising this method of data collection is also more time effective as the results are easier to analyse and provide the measurable and quantifiable data needed to calculate the SROI.



Thirdly, the diversity of the pilot cities, their solutions, and the stakeholders affected by their circular interventions proved to be a rewarding challenge during the SROI task. Grasping the differences and defining the scope of analysis across six diverse pilot solutions came with early challenges during the initial phase of stakeholder involvement. Throughout this stage, it became clear that the diversity of the pilot cities' activities and solutions being analysed varied greatly and that additional guidance from the WP1 CBS team would be needed for ensuring that both the diversity of circumstances would be reflected in the SROI analysis but also the alignment and meeting the aims of the task for the project. Despite these challenges, the diversity of the pilot solutions and activities under analysis subsequently led to a vast portfolio of outcomes across the stakeholders and the exploration of varied social value linked to this diversity.

Lastly, ensuring that the pilot cities were onboard with the task and understood the aims and purpose of the task in relation to the project impact assessment for REFLOW was an important step to kickstart the process of undertaking the SROI. For individuals who have never used the SROI approach or who are unfamiliar with the methodology, SROI can be confusing and overwhelming. Breaking down the stages of the SROI in manageable tasks can help to mitigate the overwhelmingness of an SROI. Additionally, utilising other SROI reports as sources of inspiration has been extremely useful for the WP1 CBS team to gain insights of how other organisations have carried out their analyses.

The use of the SROI methodology within REFLOW's project impact assessment has also led to contributions. By implementing this tool into the REFLOW project, we have extended its practice from traditionally being used within public administration and in small projects towards a complex innovation project whereby the interventions being analysed aimed to advance circular and regenerative transitions in cities while also accounting for the societal impact created.

The SROIs presented in this deliverable also contribute to the development of financial proxies used to value social change in circular economy interventions and projects. The practice of SROI is still being developed and increasing its reach as an established methodology for accounting for social value created as a result of projects, interventions, and program activities. As such, the database of credible financial proxies for monetising change is also emerging. The process and results of financial proxy identification within this deliverable lends and contributes to this growing database of financial proxies.





6 Bibliography

ADEME, Bio by Deloitte (2017). Bilan National du Recyclage 2005-2014. Retrieved from:

https://www.ademe.fr/sites/default/files/assets/documents/bilan-national-recyclage-bnr_2005-2014_201705_rapport-final.pdf

Gürtler, H. (2020). Potentialermittlung zur dezentralen Bereitstellung von Wärme aus Abwasser (WaA) in Berlin und Dokumentation in Form eines Wärme-Atlas, unveröffentliche Diplomarbeit, Technische Universität Dresden

Hamelmann, C., Turatto, F., Then, V., Dyakova, M. (2017). *Social return on investment: accounting for value in the context of implementing Health 2020 and the 2030 Agenda for Sustainable Development*. Copenhagen: WHO Regional Office for Europe. Investment for Health and Development Discussion Paper.

Nicholls, J., Lawlor, E., Neitzert, E., & Goodspeed, T. (2012). *A guide to Social Return on Investment*. The SROI Network.

Parisi, C. (2022), Social Impact Assessment in Circular Cities' Ecosystems: the Case for Social Return on Investment Implementation. In P. Nijkamp and L. Fusco Girard (Eds.), *Measuring and Controlling Sustainability: Spanning Theory and Practice*, Franco Angeli (Milan)(accepted for publication).



7 Annexes

7.1 Amsterdam Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organization
GA	Number of textile specific city resources identified (materials, infrastructures, etc.)	100	MRA	End of project	Circularity in hotel linen: 20 stakeholders present in 1st meeting	AMS
GA	Number of specific textile streams identified	10	International	End of project	Hotel linen, isolation gowns, denim, clothing, workwear	AMS
GA	Number of business models developed	5	National	End of project	Citizens, industry, policies	WAAG
GA	% of textile regenerated (current 20% of complete stream)	25%	Total of all identified streams	End of project	Overall	WAAG/AMS/BMA
GA	Overall stakeholder satisfaction with new models	80%	National	End of project	Overall	AMS
GA	Number of new initiated developments for textile waste developed	10	National	End of project	Citizens, industry, policies	AMS/WAAG/BMA
GA	Number of local makers and business reached through showcases	2,000	National	End of project	Local makers and businesses	AMS/WAAG/BMA/PDZ
GA	Number of citizens engaged through educational programmes	500	National	End of project	Citizens, students, teachers	AMS/WAAG/PDZ
D3.1	% of textiles diverted from incineration	20%	Neighbourhood	Beginning and end of project	Manufacturers, entrepreneurs,	Municipality



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 820937.

				period, with expected projections	industries, community of Amsterdam, Sympany.	
D3.1	Amount of AMS textiles with a second life through REFLOW OS	3 Swapshops x 15k kg = 45k kg	User - dependent on REFLOW OS	Baseline from OS and then end of project period	Manufacturers, entrepreneurs, industries	WP2 leader
D3.1	% of reduction in textile waste found in mixed waste	20%	Neighbourhood	Annually	Municipality, citizens, Sympany.	Municipality
D3.1	CO₂ reduction through REFLOW activities	Reduction of 2.6 kton	City-wide	Interim report and at the end of the project	Anton, Ger AMS pilot	Municipality

Table 79: Amsterdam KPIs

7.1.1 Overall Stakeholder Satisfaction with New Models Questionnaire

Dear participant,

By means of this questionnaire we would like to assess the satisfaction of stakeholders who have participated in Reflow activities. You are receiving this questionnaire because you participated in one of the Reflow live events at Pakhuis de Zwijger.

The questionnaire will not take longer than 5 minutes.
Thank you very much in advance for your cooperation.

For recommendations, questions and other you can always reach out to amsterdam@reflowproject.eu

Reflow Amsterdam pilot team

The Organisation of the Live Events at PdZ

Please indicate if you agree or disagree with the following statement(s).

1) I feel satisfied with the overall organisation of the live events at Pakhuis de Zwijger.

Strongly Disagree

Disagree

Somewhat Disagree

Neither Agree nor Disagree

Somewhat Agree

Agree



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2) Which REFLOW Live Events did you attend?

- Reflow #1 Op weg naar circulair textiel - 9 Juni 2020
- Reflow #2 Garen spinnen uit oude kleren - 9 September 2020
- Reflow #3 Een nieuw beleid voor circulair textiel - 16 September 2020
- Reflow #4 Fashion education - 8 October 2020
- Reflow #5 Green Deal circulair textiel - 3 December 2020
- Reflow #6 Een nieuw leven voor oude kleren - 10 December 2020
- Reflow #7 Redesigning the textile industry - 15 February 2021
- Reflow #8 Lenen, ruilen, delen - 15 February 2021
- Reflow #9 Circulaire mode: wat is het businessmodel? - 22 February 2021
- Reflow #10 Textielindustrie langs het duurzame meetlint - 31 May 2021
- Reflow #11 Weet wat je aantrekt - 7 June 2021
- Reflow #12 Redesigning fashion: Het deadstock dilemma - 4 November 2021
- Reflow #13 De toekomst van textiel: Biobased materialen - 11 November 2021

The Format of the Live Events at PdZ

Please indicate if you agree or disagree with the following statement(s).

3) I feel satisfied the format of how the Live Events at PdZ were carried out.

- | | | | | | |
|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|--------------------------|
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Topic of Discussions at the Live Events at PdZ

Please indicate if you agree or disagree with the following statement(s).



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4) I feel satisfied with the quality of the conversation during the Live Events.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

Participants at the Live Events at Pakhuis de Zwijger

Please indicate if you agree or disagree with the following statement(s).

5) I feel satisfied with the other speakers who were invited at the Live Events.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

6) I feel satisfied that many groups were represented at the Live Events such as governance, industry, research and education and citizens.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

Being heard and involved at the Live Events at Pakhuis de Zwijger

Please indicate if you agree or disagree with the following statement(s).

7) I feel satisfied that I was heard during the Live Events.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

8) I feel satisfied with my involvement in the Live Events.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree



9) I feel satisfied that my inputs during the Live Events were taken into consideration.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

Community Building and Collaboration

Please indicate if you agree or disagree with the following statement(s).

10) The Live Events contributed as a tool for community building.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

11) The Live Events resulted in new collaborations.

Strongly
Disagree

Disagree

Somewhat
Disagree

Neither Agree
nor Disagree

Somewhat
Agree

Agree

Wrap-Up

12) Do you have any recommendations on how to improve the Live Events in the future? Please tell us!



7.2 Berlin Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organization
GA	Total volume of wastewater heat capacity installed in megawatts.	2.2 (2019) 3.0 (2020) 4.5 (2021) 6.0 (Q1 2022)	Berlin city level	Quarterly (annualised)	Municipality	BWB
GA	Number of managers or owners of properties with wastewater heat potential who have expressed interest through the REFLOW app, to learn more about the technology.	40 (annualised)	Berlin city level	Quarterly (annualised)	Managers and owners of private, public, business and industrial properties. Municipality.	BWB
GA	Number of managers or owners of properties with wastewater heat potential, who have expressed firm interest through the REFLOW app to adopt the technology	9 (annualised)	Berlin city level	Quarterly (annualised)	Managers and owners of private, public, business, and industrial properties. Municipality.	BWB
GA	Number of realised or near-realised implementations, triggered through the REFLOW app.	2 (annualised)	Berlin city level	Quarterly (annualised)	Managers and owners of private, public, business, and industrial properties. Municipality.	BWB
GA	Number of Berlin-based target group members reached	320 (annualised)	Berlin city level	Quarterly (annualised)	Owners and managers of buildings.	AH (PROT)



	through showcases.				Journalists and bloggers, city representatives, general population.	
GA	Number of Berlin-based inhabitants engaged through educational programs	220 (annualised)	Berlin city level	Quarterly (annualised)	General population, students, and educators. Journalists and bloggers.	AH (PROT)
D3.1	Energy return on energy input (EROEI) rate	Positive ratio	Berlin city level	Once, as reference number from four previous installations	Municipality, owners, and managers of properties	BWB
D3.1	Estimate on CO ₂ emission change	Reduction in CO ₂ emissions	Berlin city level	Once, as reference number from four previous installations	Municipality, manufacturers, educational institutions, industry; journalists and bloggers	BWB
D1.3	Approached 25 relevant cities by project end for their interest to adopt Berlin REFLOW wastewater heat recovery technology	At least 3 cities showing high or very high interest to adapt the technology.	Europe	Quarterly	Municipalities, international governmental or near-governmental bodies	AH (PROT)
D1.3	Approach at least 5 financial stakeholders by project end	At least 2 indicating their high or very high interest to support and/ or advise cities in their funding needs to adapt the technology.	Europe	Quarterly	Municipalities, financial organisations, private and public investors, foundations	AH (PROT)
D1.3	Described and evaluated five business models	Clear recommendation (go ahead or stop)	Project-internal	End of project	Berlin Pilot members	AH (PROT)



	for post-project continuation	for post-project exploitation				
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Table 80: Berlin KPIs

7.3 Cluj-Napoca Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organisation
GA	P1: Number of public buildings and energy efficiency city resources identified (materials, infrastructure)	150	City	End of the project	Municipality, public authorities, clusters, university, research institute	Municipality of Cluj-Napoca
GA	P2 Number of governance/business models developed	5	City	End of the project	Municipality, clusters	Municipality of Cluj-Napoca
GA	P3 % of energy consumption reduced after installation of retrofit kits	15%	Energy high school	End of the project	Municipality, university, clusters, high school	Municipality of Cluj-Napoca
GA	P4 Overall stakeholder satisfaction with new models	85%	City	Depending on activities (after each session)	Municipality, public authorities, university, clusters, research institute	Municipality of Cluj-Napoca
GA	P5 Number of tech solutions for energy efficiency developed	6	City	End of the project	Municipality (users); university, clusters, research institute (developers)	Municipality of Cluj-Napoca
GA	P6 Willingness to test and implement the solutions developed	80%	City	End of the project	Public authorities, citizens, businesses	Municipality of Cluj-Napoca
GA	P7 Number of energy providers, distributors and businesses reached through project activities	300	National/ international	End of the project	Businesses and energy providers, distributors	Municipality of Cluj-Napoca



GA	P8 Number of citizens engaged through awareness raising and educational programmes	500	City	End of the project	Universities, clusters, research institute	Municipality of Cluj-Napoca
D3.1	Reduction in energy use	15%	REFLOW site (building)	Beginning and end of project period.	Municipality, citizens, industries, manufacturers, educational institutes.	Municipality of Cluj-Napoca
D3.1	CO₂ emissions	Equivalent percentage estimation from the reduction of energy use	REFLOW site (building)	Beginning and end of project period.	Manufacturers, entrepreneurs, educational institutes.	Municipality of Cluj-Napoca
D1.3	Increase in knowledge and awareness about energy efficiency by citizen meetings (workshops, trainings, consultations)	70% reported increased awareness after event	City	Depending on activities (before/ after each session)	Primary (direct) beneficiaries, citizens, students, educators, businesses.	Municipality of Cluj-Napoca
D1.3	Number of people reached directly and indirectly by REFLOW communication and dissemination activities	Directly: 500 Indirectly: 1000+	City	End of the project	Primary and secondary beneficiaries of activities, citizens, universities, businesses	Municipality of Cluj-Napoca
D1.3	Number and type of stakeholders involved in REFLOW activities	300 participants 10 categories of stakeholders	City	End of the project	Primary beneficiaries, e.g., meeting/consultation attendees	Municipality of Cluj-Napoca
D1.3	Number of stakeholders participating actively (contributions and feedback) in relevant policy meetings	40 participants 2 policy input proposals	City	Depending on activities (before/ after each session)	Citizens (attendees to CIIC meetings)	Municipality of Cluj-Napoca
D1.3	Availability of public information from REFLOW pilot	4 press releases 6 blog posts	City	End of the project	All	Municipality of Cluj-Napoca

Table 81: Cluj-Napoca KPIs





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7.4 Milan Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organisation
GA (P1)	Number of agri-food specific city actors and resources identified	150	City Level	End of project	SoGeMI-Foody Hub, based on MFA	Comune di Milano supported by METABOLIC
GA (P2)	Number of agri-food specific city resources identified with partners (Foody Hub - SoGeMI)	30	City Level	End of project	SoGeMI-Foody Hub, based on MFA	Comune di Milano supported by METABOLIC
GA (P3)	Number of business models/applications developed	3	Scenario level (3 Scenarios)	End of project	SoGeMI Foody Hub/Indoor Municipal Market; Recup NGO, Ibrida	Comune di Milano
GA (P5)	Overall stakeholder satisfaction with new technological solutions for better implementation of circular business models and practices	75%	Scenario level (3 Scenarios)	End of project	SoGeMI; Recup; Ibrida	Comune di Milano
GA (P7)	Willingness to pay for regenerated products and materials	75%	Scenario level (Scenario 3 - "Milan Secondary Raw Materials")	End of project	Ibrida; others	Comune di Milano
GA (P9)	Number of citizens reached through events/awareness campaign	250	City level	End of project	SoGeMI; Amsa; Recup; Ibrida	Comune di Milano
D3.1 (E2)	Circular material use rate (%)	+5-10% increase	Scenario level (Scenario n. 3, "Milan Secondary Raw Materials" - Ibrida business model)	At the beginning/end of the project	Ibrida	Milan Pilot team (lead OpenDot)
D3.1 (E3)	Food waste index (%)	~10% increase in	Scenario level (Scenario n. 2, "Foody Zero Waste")	At the beginning/e	Recup; SoGeMI	Milan Pilot team (lead We Make)



		agri-food saved and donated	- Recup good practice at SoGeMI-Foody Hub)	nd of the project		
D3.1	Circular intervention on specific agri-food flows	~10% increase in agri-food tracked and traced	Scenario level (Scenario n. 1, "Food Market 4.0 Dashboard")	At the beginning/end of the project	SoGeMI; Indoor Municipal Markets; Recup; Ibrida	Milan Pilot team (lead Polifactory)
D1.3 (S10)	Number of policy makers involved in adapting policies and strategic plans and participating to workshops/dissemination activities	15	City level	Continuous tracking through a register	Different departments of City of Milan (Urban economy, Urban planning, Food policy)	Comune di Milano

Table 82: Milan KPIs

7.4.1 Stakeholder Satisfaction & Willingness to Pay Survey Questions

1. How long have you used **[PRODUCT NAME]**?
 - Less than a week
 - A week to a month
 - A month to half a year

2. How often do you use **[PRODUCT NAME]**?
 - Weekly
 - Monthly
 - Rarely
 - Never

3. How circular were your practices **before** using the solution(s)?
 - Extremely circular
 - Moderately circular



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- Slightly circular
 - Not circular at all
4. How circular are your practices becoming **after** using the solution(s)?
- Extremely circular
 - Moderately circular
 - Slightly circular
 - Not circular at all
5. How would you feel if you could no longer use **[PRODUCT NAME]**?
- Very unhappy
 - Unhappy
 - Somewhat Unhappy
 - Neither happy nor unhappy
 - Somewhat happy
 - Happy
 - Very Happy
6. How easy or difficult is it to use **[PRODUCT NAME]**?
- Extremely easy
 - Moderately easy
 - Neither easy nor difficult
 - Moderately difficult
 - Extremely difficult
7. How well does **[PRODUCT NAME]** help you complete the task you are trying to do?
- Extremely well
 - Moderately well
 - Slightly well
 - Not well at all
8. Do you agree or disagree with the following statement: The solution helps me to be more circular in my work.
- Strongly Disagree
 - Disagree
 - Somewhat Disagree



- Neither Disagree nor Agree
- Somewhat Agree
- Agree
- Strongly Agree

9. Do you agree or disagree with the following statement: Without the solution I would struggle with implementing circular practices.

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Disagree nor Agree
- Somewhat Agree
- Agree
- Strongly Agree

10. How unique is [**PRODUCT NAME**]?

- Extremely unique
- Moderately unique
- Slightly unique
- Not unique at all

11. How likely are you to recommend [**PRODUCT NAME**] to friends or colleagues?

- Very Unlikely
- Unlikely
- Somewhat Unlikely
- Undecided
- Somewhat Likely
- Likely
- Very Likely

12. How much would you expect this product/service to cost (in EUR)?

Or, instead of question n.12, make these (or some of these) questions from n.13 to n.16:

13. What price would be so low that you would start to question this product's quality (in EUR)?



14. At what price would you consider this product a bargain (in EUR)?

15. At what price does this product begin to seem expensive (in EUR)?

16. At what price is this product too expensive (in EUR)?

17. Overall, how satisfied or dissatisfied are you with [**PRODUCT NAME**]?

- Extremely satisfied
- Satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Dissatisfied
- Extremely dissatisfied

18. What would you change or improve about [**PRODUCT NAME**]?

7.4.1.1 Explanation of Food Market 4.0 Dashboard Price Estimate

FOOD MARKET 4.0 DASHBOARD ESTIMATED COST

Basic kit for running FM4.0D

- 1) Smart gate (Minimum set of three smart gates for van, warehouse, and stall):
 - RFID antennas
 - Sensors (humidity, position and temperature)
 - RFID reader (long range)
 - 1500 Euros
- 2) Smart scale
 - RFID reader (short range)



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- Thermal Printer
 - Pc and monitor/Tablet
- 750 Euros*

*Additional cost may include a digital scale if the vendor is not already equipped (estimated cost 1000 Euros)

- 3) Smart RFID equipped reusable foldable crates (a minimum of 100 crates at 15 Euros each)
→ 1500 Euros
- 4) Assembling and installation cost (lump sum)
→ 150 Euros
- 5) Dashboard for yearly subscription ranges from 50-75 Euros per month cost per one year
→ 600 – 900 Euros

Cost for gear and one year dashboard subscription and excluded the additional cost for the scale

→ **4350/4650 Euros****

**** The total amount of the cost is amortized through the optimisation given by the usage of the dashboard itself.**



7.5 Paris Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organisation
GA	Number of wood specific city actors and resources identified (organization, materials, infrastructure)	150	City	End of project	Individuals, companies, or associations involved in the wood flow or temporary structure industry	FCGP
GA	Number of scoring variables on wood reuse	5	City	End of project	Wood workshop users	ARS LONGA
GA	Number of governance / business models developed	5	City	End of year	Business Model	FCGP
GA	Overall stakeholder satisfaction with new models	80%	Project	End of project	Incubated companies, pilot partners, users of developed solutions	FCGP
GA	Number of new applications to minimise wood waste	10	Project	End of year	Driven incubated companies, REFLOW internal solutions + partnership with events / companies	Volumes
GA	Willingness to pay for regenerated products and materials	75%	City	End of project	Key REFLOW partners and solutions users	FCGP
GA	Number of local makers and business reached through showcases	200	Project	End of year	Local makers and businesses	Volumes
GA	Number of people remote from employment engaged through formation	17	Project	End of year	People remote from employment	FCGP
D1.3	Circular reuse of MDF waste	2 tons (15% of the 2019 baseline)	Event	End of year	FIAC	FCGP
D1.3	Number of stakeholders involved in counselling	7	Project	End of year	Organisations or individuals involved in	FCGP



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	activities to orient the project direction				project meeting and data collection sessions.	
D1.3	Number of workshops and makers in the target group that has been reached and/or activated by the project	Training: 5 Tracking label: 4 Data base user: 5 Handbook user: 50	Project	End of year	Participants in trainings; users that receive the outputs of the project.	ARS LONGA
D1.3	Number of projects that receive financial and non-financial support in form of assets, counselling, facility access, etc.	5	Project	End of year	Project owners supported in financial and non-financial form.	Volumes
D1.3	The extent to which the project has contributed to, or inspired, changes in municipal rules and regulations to support implementation and "mainstreaming"	Qualitative; unitless	City	End of year	Parisian policy makers, city council of Paris	City of Paris
D1.3	Numbers of solutions related to waste management and recycling: applicable and replicable	1	Project	End of year	Incubated companies and innovative project owners	Volumes

Table 83: Paris KPIs



7.6 Vejle Key Performance Indicators

Source	KPI	Target	Monitoring approach			
			Scale	Regularity	Stakeholders	Lead organisation
GA	Participation of minimum 50 households distributed on different types of housing and public and private buildings	50	West Vejle (test area)	Beginning and end of project	Test sites	Vejle/DDC
GA	Plastic streams identified at the different test sites	5	West Vejle (test area)	Beginning and end of project	Test sites	Vejle/DDC
GA	Number of governance / business models developed	10	Project	End of project	REFLOW Vejle stakeholders	Vejle/DDC
GA	Reduction in the amount of plastics sent to incineration from the test sites	25% reduction	Selected test sites: Den Gamle Gård; Sofiegården; REMA 1000	End of project	Waste management within the Municipality and selected test sites (Den Gamle Gård: Sofiegården, REMA 1000)	Vejle/DDC
GA	Overall stakeholder satisfaction with new models	75%	Primarily test sites	End of project	REFLOW Vejle stakeholders	Vejle/DDC
GA	Number of new applications for plastic developed	12	Project	End of project	Vejle Pilot	Vejle/DDC
GA	Willingness to test or implement the new models and tools	70%	National	End of project	REFLOW Vejle stakeholders	Vejle/DDC
GA	Number of local makers and business reached	50	National	Track regularly,	Vejle Pilot	Vejle/DDC



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	through showcases			report end of project		
GA	Number of citizens engaged through educational programmes	250	City	Track regularly, report end of project	REFLOW Vejle stakeholders	Vejle/DDC
D3.1	Number of plastic streams going into circular use within REMA 1000	5	REMA1000, Vejle	Beginning and end of project activity.	Municipality, industries, manufacturers.	Vejle/DDC
D1.3	Increase in the awareness about circularity of plastics among the citizens	75%	City	Before and after events	Spinderihallerne visitors	Vejle/DDC
D1.3	Active community involvement through meetings in shaping the implementation	Local steering group: 3/year Working groups: 3/year NMU: 2/year AB: 2/year	Project	Yearly	Working groups, local steering groups, Advisory Board, NMU	Vejle/DDC

Table 84: Vejle KPIs



7.7 Social Return on Investment Stakeholder Questionnaire – Understanding Change

1) Do you foresee / have you already experienced any changes as a result of the “solution”?

Please include all changes you imagine and provide as many details as possible: How would you describe the effect of this change on yourself, others, your organisation/community? Consider also any negative or unintended effects.

a. *Positive Changes*

a. *Negative Changes*

2) How long (months, years) do you believe the changes you foresee/are experiencing will last? *Please explain.*

3) What do you think you will do differently because of these changes? *Please give concrete examples and explain.*

4) Were these changes intended to occur at the time you defined the solution?

a. Yes

a. No

a. I don't know

If NO:

What are the unintended changes that you foresee? Are they positive or negative?

5) Do you expect to experience or witness any broader changes (e.g. in terms of the stakeholders involved) in the future as a result of the “solution”?

Please include all changes expected and provide details of this change: How do you expect this change to have an effect on yourself, others, your organisation/community? Consider also any negative or unintended effects.

a. *Positive Changes*

a. *Negative Changes*

6) Of all the changes you have mentioned, which one is the most important to you?

7) Do you think the changes you have mentioned would occur without the involvement of the “solution”? *Please explain.*



8) Do you think the changes you have mentioned will be/have been influenced by exposure to other initiatives or experiences? *Please explain.*



7.8 Amsterdam Impact Map

REFLOW Amsterdam Swapshop																								
Social Return on Investment																								
Stage 1			Stage 2			Stage 3										Stage 4			Stage 5					
Stakeholders	Inputs		Outputs	Outcomes	Outcome Indicator	Source of Indicator	Quantity (scale)	Duration of outcomes	Outcomes start	Weighting (Importance to Stakeholders 1-10)	Financial Proxies	Source	Monetary Value of Change	Deadweight %	Displacement %	Attribution %	Drop off %	Impact calculation						
Who do we have an effect on?	What will/did they invest and how much (money, time)?	Financial value (for the total population for the accounting period)	Summary of activity in numbers.	What is the change experienced by stakeholders?																				
Swapshop	Time	0		The Swapshop concept and the importance of sustainability is spread more in the city	% of textiles diverted from incineration; amount of textiles with a second life through the Swapshop	Data from material passports	200	6	Period after	10	Costs of incineration (including operations, labour, fuel, equipment, maintenance)	https://zerowasteworld.com/wp-content/uploads/The-High-Cost-of-Waste-Incineration-March-30.pdf	118,00	75%	0%	25%	25%	4.425,00						
				The Swapshop feels more professional and serious, improving their ability to grow in a sustainable and focused way	Number of Swapshops opened; number of jobs created	Swapshop data	40	6	Period after	8	Unemployment Benefits received (based on minimum wage and up to 3 months of benefits)	https://www.government.nl/topics/minimum-wage/amount-of-the-minimum-wage ; https://ec.europa.eu/social/main.jsp?catId=1122&langId=en&intPageId=4996#--:text=Your unemployment benefit 2020 is 203% 20 months	5.553,50	50%	0%	0%	25%	111.070,00						
Swapshop Employee	Time	0		Employees feel more independent and have more control of their lives	Employees who state they feel financial independence and more control of their lives	Questionnaire	40	6	Period after	-	Annual part-time salary of employee	https://www.government.nl/topics/minimum-wage/amount-of-the-minimum-wage	10.350,00	50%	0%	50%	25%	103.500,00						
				Employees feel an increased sense of belonging to society	Employees who state that they feel part of a community	Questionnaire	40	6	Period after	-	Costs of integration courses and exam	https://oiet.nl/civic-integration-course/#:~:text=The%20Civic%20Integration%20Course%20will,assist%20around%20300%20study%20hours	4.850,00	50%	0%	50%	25%	48.500,00						
				Employees feel more confident in themselves from a work and social perspective	Number of jobs employees have applied for; Number of social activities or clubs the employees are a part of	Questionnaire	40	6	Period after	-	Costs associated with job centre workshops	https://www.amsterdam.nl/werk-in-komen/jobopeningswerk/#/61674bf6-0b64-47d4-b02f-31724a6688ba	636,96	50%	25%	50%	25%	4.777,20						
Municipality of Amsterdam	Time	0,00		Circular economy is made more accessible to all Amsterdammers	Number of Amsterdammers who state that they have access to circular economy initiatives; number of circular economy initiatives across the different neighbourhoods in Amsterdam	Questionnaire; data from Municipality	1	6	Period after	10	Cost of sustainable clothing item (jeans)	https://mudjeans.eu/collections/straight-w/producs/paper-straight-stone-breeze	119,95	100%	0%	75%	0%	0,00						
				More circular practices and attitudes are established for better textile behaviours in the city	Number of circular textile initiatives in the city	Data from Municipality	1	6	Period after	10	Cost of Underground Waste Container (including installation and operations)	http://www.ondergrondse-afvalcontainer.nl/#:~:text=Het%20uren%20van%20een%20ondergrondse%20bedrijfsafval%20een%20een%20nieuwe%20zak	5.200,00	25%	0%	25%	0%	2.925,00						
				The Municipality gains more attention as a circular city and improves their image	Number of new policies, projects, initiatives on circularity in the city; amount of funding received for projects on circular economy	Data from Municipality	1	6	Period after	10	Amount of a contract awarded to the municipality for a circular initiative (REFLOW)	REFLOW as a baseline	336.250,00	100%	0%	75%	0%	0,00						
EC - H2020 EU	Funding to the Swapshop to develop new product design of collected items in their shop	2.500,00	Newly designed products	The changes experienced by the EC are not included in the SROI calculation as they are not direct beneficiaries																				
	Funding to the Swapshop for REFLOW OS Track & Trace Labels	1.500,00	Track & Trace Labels for Clothing in the Swapshop																					
	Total AMS pilot budget of key partners associated with the Swapshop solution divided by 10 solutions (estimate)	105.250,00	REFLOW Activities in the Swapshop																					
Total		108.250,00																						

Calculating Social Return					
Discount rate		3.5%			
Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
0,00	4.425,00	3.318,75	2.489,06	1.866,80	1.400,10
0,00	111.070,00	83.302,50	62.476,88	46.857,66	35.143,24
0,00	103.500,00	77.625,00	58.218,75	43.664,06	32.748,05
0,00	48.500,00	36.375,00	27.281,25	20.460,94	15.345,70
0,00	4.777,20	3.582,90	2.687,18	2.015,38	1.511,54
0,00	0,00	0,00	0,00	0,00	0,00
0,00	2.925,00	2.925,00	2.925,00	2.925,00	2.925,00
0,00	0,00	0,00	0,00	0,00	0,00
Total	275.197,20	207.129,15	156.078,11	117.789,83	89.073,63

Present value of each year
0,00
265.891,01
193.357,28
140.773,52
102.847,04
74.997,60
Total Present Value (PV)
777.666,45
Net Present Value (PV minus the investment)
668.416,45
Social Return (Value per amount invested)
7,12

7.9 Berlin Impact Map

REFLOW Berlin Wastewater Heat Radar																		
Social Return on Investment																		
Stage 1		Stage 2										Stage 4						
Who and how many?	At what cost?		Outputs	What changes?		How much?			How long?		How valuable?			How much caused by the activity?				Still material?
	Stakeholders	Inputs		Outcomes		Outcome Indicator	Source of Indicator	Quantity (scale)	Duration of outcomes	Outcomes start	Express the relative importance (value) of the outcome			Deadweight %	Displacement %	Attribution %	Drop off %	
Who do we have an effect on?	What will/did they invest and how much (money, time)?	Financial value (for the total population for the accounting period)	Outcome description		What is the change experienced by stakeholders?						How long (in years) does the outcome last for?	Does the outcome start in Period of activity or in the Period after?	Financial Proxies					Source
BWB			Wastewater Heat Radar - Implementation	BWB improves their environmental and social image	Certifications, awards, press releases; how people or employees perceive BWB's image	Desk research; Data from BWB; Questionnaire	1	6	Period after	Cost of Public Relations campaign	Kamp: Klier overview of European EEP-Discuss	9.150,00	0%	0%	0%	0%	9.150,00	
				BWB are experts in wastewater heat implementations and become significant influencers within the educational sector's development and focus for future generations	Degree of professional skills of BWB's installers; number of apprentices at BWB in the field	Data from BWB	256	6	Period after	Heat pump installer course fee	NANT Training	654,35	0%	0%	0%	0%	167.513,60	
The City of Berlin				The City of Berlin improves their environmental image and increases the trust of Berliners with regards to meeting climate-neutrality goals	CO2 emission reduction; perception of Berliners in relation to climate-neutrality and the efforts of the municipality	Data from City of Berlin; Questionnaire	48	8	Period after	Socially balanced CO2 price per ton in Germany	Clean Wire Energy - study commissioned by Agora Energiewende and Agora Verkehrswende https://www.clean-wire.de/ueber-uns/policy-on-carbon-credits-germany.pdf	50,00	0%	0%	0%	0%	2.400,00	
Urban Planners				Urban planners begin to incorporate more wastewater heat requirements into the development of the built environment	Building regulations and policies implemented; number of projects which require WWH technology to be implemented	Data from urban planners at the city	48	6	Period after	Cost of carbon tonne in Germany	Wage of urban planner for a 5 day course (7 hours a day)	30,28	0%	0%	0%	0%	1.452,48	
				Urban planners become more knowledgeable and aware about wastewater heat potential and its recovery	Those who state that they know more about wastewater heat	Questionnaire	27	6	Period after	Course on wastewater heat	Kamp: Klier overview of European EEP-Discuss	8.200,00	0%	0%	0%	0%	21.924,00	
Property Developers				Property developers improve their environmental image	Number of awards, certifications, accolades awarded to the property developers; number of property developers who have implemented WWH technology	Questionnaire; desk research	1	6	Period after	Cost of Public Relations campaign	Average annual cost of campaigns from a marketing agency	9.150,00	0%	0%	0%	0%	9.150,00	
Citizens				Citizens gain awareness and knowledge about wastewater heat	Those who state they are more aware and knowledgeable about wastewater heat	Questionnaire	1	8	Period after	Cost of awareness campaign	HACT Social Value Calculator	80.000,00	0%	0%	0%	0%	80.000,00	
				Citizens increase their autonomy and security in relation to energy	Those who feel that they do not worry about their energy bills or where their energy comes from; those who say they feel in	Questionnaire	30	6	Period after	Feel in control of life	HACT Social Value Calculator	18.831,00	0%	0%	0%	0%	564.930,00	
Wastewater Heat Recovery		Implementation	845.000,00															
			100.000,00															
			Total														845.000,00	

Calculating Social Return						
Discount rate	3.5%					
Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	
0,00	856.520,00	856.520,00	856.520,00	856.520,00	856.520,00	856.520,00
0,00	167.513,60	167.513,60	167.513,60	167.513,60	167.513,60	167.513,60
0,00	2.400,00	2.400,00	2.400,00	2.400,00	2.400,00	2.400,00
0,00	1.452,48	1.452,48	1.452,48	1.452,48	1.452,48	1.452,48
0,00	21.924,00	21.924,00	21.924,00	21.924,00	21.924,00	21.924,00
0,00	9.150,00	9.150,00	9.150,00	9.150,00	9.150,00	9.150,00
0,00	80.000,00	80.000,00	80.000,00	80.000,00	80.000,00	80.000,00
0,00	564.930,00	564.930,00	564.930,00	564.930,00	564.930,00	564.930,00
Total	856.520,00	856.520,00	856.520,00	856.520,00	856.520,00	856.520,00
Present value of each year	0,00	808.231,86	780.900,45	754.483,16	728.978,92	704.327,48
Total Present Value (PV)						3.776.931,87
Net Present Value (PV minus the investment)						2.831.931,87
Social Return (Value per amount invested)						4,00



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7.10 Cluj-Napoca Impact Map

REFLOW Cluj-Napoca Retrofit Kit
Social Return on Investment

Stage 1		Stage 2							Stage 4								
Who and how	At what cost?	Outputs	What changes?	How much?			How long?	How valuable?			How much caused by the activity?			Still material?			
Stakeholders	Inputs		Outcomes	Outcome description	Outcome Indicator	Source of Indicator	Quantity (scale)	Duration of outcomes	Express the relative importance (value) of the outcome			Deadweight %	Displacement %	Attribution %	Drop off %	Impact calculation	
Who do we have an effect on?	What will/did they invest and how much (money, time)?	Financial value (for the total population for the accounting period)	Summary of activity in numbers.	What is the change experienced by stakeholders?	Outcome Indicator	Source of Indicator	Quantity (scale)	How long (in years) does the outcome last for?	Weighting (Importance to Stakeholders 1-10)	Financial Proxies	Source	Monetary Value of Change	What will happen/what would have happened without the activity?	What activity would/did you displace?	Who else contributed to the change?	Does the outcome drop off in future years?	Quantity times value, less deadweight, displacement and attribution
High School	Time, motivation	0	Retrofit Kit Pilot Solution	Students and employees are more informed about energy efficiency, consumption and circularity	Level of awareness on energy and circularity of students and employees	Survey of High School	350	6	10	Course on sustainable energy	VHS Learning Course	237,31	50%	0%	25%	0%	31.146,94
				Students and employees feel more motivated to improve their energy consumption behaviours	Those who state that they have implemented better and more circular behaviours at home	Survey of High School	350	6	10	Energy cost savings at the private household level	Average consumption per dwelling in Romania times the current costs subtract a 15% estimated decrease	38,10	25%	0%	25%	0%	7.500,94
				Energy consumption is reduced in the High School	Energy consumption of the High School	Survey of High School	1	6	10	Savings on energy costs	Based on D3.3 multiplied by current cost of kWh	588,00	0%	0%	0%	0%	588,00
				The High School environment is improved and students/teachers have improved ability to learn/teach	Level of satisfaction with the environment of the school; number of facilities for student and employees to relax/study	Survey of High School	350	6	8	Cost of field trip and public transit	One ticket for students at the Museum of University History	1,81	50%	0%	25%	0%	237,56
				Students and employees improve their confidence on the topic of energy and circularity	Those who state they feel confident; Grades	Survey of High School	350	6	10	Course on improving self-confidence and self-esteem	Self-Confidence, Self-Esteem and Identity Course	500,00	25%	0%	25%	0%	98.437,50
Businesses	time, equipment	0,00	Retrofit Kit Pilot Solution	Business employees have improved their professional skills, experience and knowledge	Degree of professional skills improvement	Data from Businesses	50	6	8	Course fee for energy efficiency in buildings certificate	The Renewable Energy Institute - European Centre of Technology	649,00	13%	0%	38%	0%	17.604,13
				Businesses increase their connections with other businesses and create new partnerships and collaborations	Number of collaborations with other business/organisations	Data from Businesses	1	6	9	Cost of trade fair admission	Trenchless Romania Conference and Exhibiting	149,00	38%	0%	38%	13%	57,28
				Businesses have more economic stability	Number of new jobs created	Data from Businesses	2	1	6,5	Annual Salary of Electrical Engineer	Salary Explorer	19.506,36	38%	0%	50%	50%	12.093,94
				Businesses improve their image	Employee and citizen perceptions of the company; awards or certifications for the businesses	Survey and Data from Businesses	1	4	9	Costs of marketing	The Romanian Journal article	1.000,00	38%	0%	25%	13%	465,00
Municipality of Cluj-Napoca	time	0,00	Retrofit Kit Pilot Solution	Energy costs of public buildings are lowered in the municipality	Expected energy costs; actual energy costs	Data from Municipality	1	6	10	Savings on energy costs	Based on D3.3 multiplied by current cost of kWh	142.296,00	50%	0%	50%	0%	35.574,00
				Decrease in carbon emissions	Expected carbon emissions; actual carbon emissions	Data from Municipality	3	6	10	Carbon costs per tonne	https://balkangreenenergynews.com/romania-mulls-carbon-price-compensation-scheme/	25,00	50%	0%	50%	0%	18,75
				Young citizens (students and children) in the municipality become more involved and aware of energy and circularity as part of their everyday life	Youth who state that they are more aware of energy and circularity	Survey	1	6	10	Cost of awareness campaign	Mediterranean Urban Waste Management Project (MURM) 2001-2003	8.600,00	50%	0%	50%	0%	2.150,00
				The Municipality gains more attention as a lighthouse city on energy and circular transitions	Number of new funding opportunities received	Data from Municipality	1	6	10	Amount of contract	REFLOW as a baseline	336.250,00	50%	0%	50%	0%	84.062,50
EC - H2020 EU	Funding for the Retrofit Kit	40.000,00		The changes experienced by the EC are not included in the SROI calculation as they are not direct beneficiaries													
	Pilot funding	83.750,00															
	Total	123.750,00															

Total	289.936,53
Present value of each year	
Total Present Value (PV)	233.523,89
Net Present Value (PV minus the investment)	1.265.413,37
Social Return (Value per amount invested)	10,23

Calculating Social Return					
Discount rate		3,5%			
Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
0,00	31.146,94	31.146,94	31.146,94	31.146,94	31.146,94
0,00	7.500,94	7.500,94	7.500,94	7.500,94	7.500,94
0,00	588,00	588,00	588,00	588,00	588,00
0,00	237,56	237,56	237,56	237,56	237,56
0,00	98.437,50	98.437,50	98.437,50	98.437,50	98.437,50
0,00	17.604,13	17.604,13	17.604,13	17.604,13	17.604,13
0,00	57,28	49,83	43,35	37,72	32,81
0,00	12.093,94	0,00	0,00	0,00	0,00
0,00	465,00	404,55	351,96	306,20	0,00
0,00	35.574,00	35.574,00	35.574,00	35.574,00	35.574,00
0,00	18,75	18,75	18,75	18,75	18,75
0,00	2.150,00	2.150,00	2.150,00	2.150,00	2.150,00
0,00	84.062,50	84.062,50	84.062,50	84.062,50	84.062,50

0,00	289.936,53	277.774,69	277.715,62	277.664,23	277.353,13
0,00	280.131,91	259.305,65	250.483,58	241.968,34	233.523,89
					1.265.413,37
					10,23

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7.12 Paris Impact Map

REFLOW Paris Re-Label Social Return on Investment																							
Stage 1			Stage 2				Stage 3							Stage 4				Stage 5					
Stakeholders	Inputs		Outputs	Outcomes	Outcome Indicator	Source of Indicator	Quantity (scale)	Duration of outcomes	Outcomes start	Weighting (Importance to Stakeholders 1-10)	Financial Proxies	Source	Monetary Value of Change	Deadweight %	Displacement %	Attribution %	Drop off %	Impact calculation					
Who do we have an effect on?	What will/did they invest and how much (money, time)?	Financial value (for the total population for the accounting period)	Summary of activity in numbers.	What is the change experienced by stakeholders?																			
Community	Time	0	Re-Label	There is an increased sense of community	Numbers of members in the community; feelings of belonging in the community	Questionnaire; Re-Label website	40	6	Period after	10	Feelings of belonging to the neighbourhood	HACT Social Value Calculator	4,512.86	50%	0%	50%	25%	45,128.60					
				The community is more connected with other communities and increases the amount of knowledge on circular practices from these connections	Number of new connections to other communities; number of exchanges of information, knowledge	Questionnaire	1	6	Period after	8	Cost of going to a conference	Ticket fee for an international architecture conference	500.00	25%	0%	50%	0%	187.50					
Structures feel more valued	Number of labelled projects sold; those who state they feel more valued	Questionnaire, data from structures		40	6	Period after	10	Increase in income associated with circular processes	Cost of an Ikea chair with 85% markup (average price of sustainable piece)	460.65	0%	0%	0%	0%	18,426.00								
Structures become more circular	Number of Re-Label variables incorporated; Those who state they know about circularity	Re-Label website; questionnaire		40	6	Period after	10	Cost of training	Circular economy masterclass costs	2,107.68	50%	25%	25%	0%	23,711.40								
Structures feel an increased sense of belonging and trust	Those who feel less alone in their circular practices; number structures they are in contact with	Questionnaire		40	6	Period after	8	Feelings of belonging to the neighbourhood	HACT Social Value Calculator	4,512.86	50%	0%	25%	0%	67,692.90								
Consumers have an increased sense of agency	Those who state they are more aware and have knowledge	Questionnaire		1	6	Period after	10	Costs associated with responsible consumption and production	3 hour UNSDG course (at minimum wage to factor in time spent)	31.71	50%	25%	50%	0%	5.95								
Parisian small businesses are better positioned to facilitate reuse and have better access to the market	Number of circular business created in Paris; number of employees in reuse and circularity; number of jobs created	Business registration platform; municipal data		1	6	Period after	8	Unemployment benefits (annual)	French Unemployment Benefits	31,090.00	50%	0%	50%	0%	7,772.50								
Paris strengthens its circular community and vision	Number of circular policies, action plans, etc... introduced	Municipal data; desk research		1	6	Period after	5	External costs of carbon (per metric ton)	US government ad hoc group technical report/LITE-ON SROI	57.16	75%	0%	75%	0%	3.57								
EC - H2020 EU	Funding used for Re-Label	100,000.00		The changes experienced by the EC are not included in the SROI calculation as they are not direct beneficiaries										0%	0%	0%	0%	0%	0.00				
Total		100,000.00																		Total	162,928.42		
																		Present value of each year					
																		Total Present Value (PV)	658,580.13				
																		Net Present Value (PV minus the investment)	558,580.13				
																		Social Return (Value per amount invested)	6.59				

Calculating Social Return						
Discount rate		3.5%				
Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	
0.00	45,128.60	33,846.45	25,384.84	19,038.63	14,278.97	
0.00	187.50	187.50	187.50	187.50	187.50	
0.00	18,426.00	18,426.00	18,426.00	18,426.00	18,426.00	
0.00	23,711.40	23,711.40	23,711.40	23,711.40	23,711.40	
0.00	67,692.90	67,692.90	67,692.90	67,692.90	67,692.90	
0.00	5.95	5.95	5.95	5.95	5.95	
0.00	7,772.50	7,772.50	7,772.50	7,772.50	7,772.50	
0.00	3.57	3.57	3.57	3.57	3.57	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	162,928.42	151,646.27	143,184.66	136,838.45	132,078.79	
0.00	157,418.76	141,563.41	129,144.36	119,246.80	111,206.80	
						658,580.13
						558,580.13
						6.59



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