

TAKING
COOPERATION
FORWARD



Training session | 04 November 2020



Joint training for hub staff members



Luc Schmerber | BWCON

CONTENT

1 Objective

2 Overview of knowledge available

3 Methodology for mentoring activities

4 Discussion - Survey on needs

5 ...



OBJECTIVE

- Provide an overview of the knowledge already available through City Circle activities

- Initiate the mentoring activities



OVERVIEW OF KNOWLEDGE AVAILABLE

- Starter Kit

- Advanced knowledge-base
 - > Initial version
 - > Upgraded version (work in progress)

- Online trainings - recordings



- **Collective** approach

D.T2.4.3 - Transnational thematic interactive mentoring sessions for pilot staff, focussing on collective sessions addressing topics of interest to several or all pilot staff members.

- **Individual (hub/region)** approach

D.T2.4.4 - Documented mentoring process for pilot staff, including specific support activities provided to each pilot individually.



COLLECTIVE MENTORING ACTIVITIES (1)

□ Practical implementation

- > 5 online sessions - 1 to 2 hours
- > Jointly with exchange experiences workshops whenever possible
- > Involving external experts as relevant (good practices, knowledge ...)
- > Provisional timeline (example)
 1. January 2021
 2. March 2021
 3. June 2021
 4. September 2021
 5. December 2021



COLLECTIVE MENTORING ACTIVITIES (2)

□ Topics

- > **Circular business models from a city's perspective** (suggestion from the previous meeting)
 - > Example: sustainable use (re-use) of buildings and landscapes
 - > We could have 5 sessions on different “topics” from a city perspective (buildings and landscape, mobility, energy, waste, smart infrastructure...)
- > **Focus on specific technologies**, e.g. how digital technologies can support the circular transition of the economy
 - > Also here 5 sessions could focus on different technologies (digital + others)
- > **Other topics**
 - > Business models of the pilots and sustainability
 - > Stakeholder involvement
 - > Scale up



COLLECTIVE MENTORING ACTIVITIES (3)

- Further ideas?
- Discussion



INDIVIDUAL MENTORING ACTIVITIES (1)

□ Practical implementation

- > Specific support shall be provided to each pilot **on-demand via e-mail, phone call or video conference.**
- > **Depending on the complexity** of the questions raised and the amount of expertise requested, an expert review (e.g. a meeting bringing together several experts and representatives of a pilot) can be organised (online meeting).
- > The support will be provided **within the limits of the resources available** (~ 3 to 5 days from BWCON per region) for the project.



INDIVIDUAL MENTORING ACTIVITIES (2)

□ Topics

- > Questions related to the pilots
- > Questions related to the circular economy strategy in general
- > ...

□ Sources

- > Capitalisation from other projects
- > Expert input
- > Literature overview
- > Signposting to relevant organisations
- > ...



INDIVIDUAL MENTORING ACTIVITIES (3)

- Further ideas?
- Discussion



MENTORING ACTIVITIES - SURVEY

- **Building on**
 - > First experience exchange workshop
 - > Discussion on mentoring activities

- **Launch within a few days after discussion with WPT3 leader**



Starter Kit

Knowledge-base - Starter kit

Version 1
09 2019





D.T2.1.1: Knowledge-base – Starter kit

A.T2.1 Starter kit

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Content

Reader’s Guide	4
I. Introduction.....	5
1. Objectives and scope of the Starter kit	5
2. Why circular economy	5
3. The Circular economy as a multi-governance approach.....	8
3.1. The circular economy within strategic EU documents. Current policy debates	8
3.2. Dedicated national strategies for circular economy.....	9
3.3. Circular economy on regional and city levels. Some examples of regional and urban policies	11
II. Introduction to Circular business models	15
III. Circular and collaborative business models. Concepts and definitions. EU framework. What can cities do? Examples.....	18
1. Industrial symbiosis and urban metabolism.....	18
2. The sharing (collaborative) economy	26
3. Smart and circular design	30
4. Extending the lifetime of products and materials	38
4.1. Second-hand sale	40
4.2. Remanufacturing	40
5. Regenerative sources - bio-based materials, regenerative water	42
5.1. Bioeconomy	42
5.2. Bio-plastics	43
5.3. Water reuse	45
1) Reuse in integrated water planning and management	47
2) Minimum quality requirements for water reuse in irrigation and aquifer recharge	47
3) Water reuse in industrial activities.....	48
4) Support to research and innovation in water reuse.....	48
5) EU funds for investments in water reuse	48
6. The Waste as a Resource	50
6.1. Recycling.....	50
6.2. Waste heat recovery	53
6.3. Upcycling	53



IV. Towards a Comprehensive CE strategy in your territory. Planning for circular economy.	55
1. Assessing local context and potential	55
2. Analysis of enabling and hindering factors.....	61
3. Defining vision and priorities	64
4. Governance and stakeholders	66
V. Overall recommendations for city-level policy makers.....	70
VII. References.....	74

Figure 1 Circularity strategies within the production chain actors in order of priority	6
Figure 2 The basic loops of a circular economy.....	13
Figure 3 Urban policy levers	14
Figure 4 Types of CEBM according to the production and consumption cycle and main actors.....	15
Figure 5 Sectors in collaborative economy	16
Figure 6 Types of resources transacted by area.....	20
Figure 7 Types of policies to support IS at EU, national and regional level	23
Figure 8 The pillars of a circular city.....	31
Figure 9 Principles for smart and circular design	32
Figure 10 Design for maintainability and reparability.....	33
Figure 11 The Eco-design checklist.....	37
Figure 12 Bio-based plastics	44
Figure 13 Benefits of water reuse	46
Figure 14 Waste hierarchy.....	50
Figure 15 Building blocks of the transition to a circular economy	55
Figure 16 Framework for sector prioritisation	65
Figure 17 Example of a possible combination of sectors for the transition to the circular economy	66
Figure 18 Stages in good governance in the transition to the circular economy.....	66
Figure 19 Stakeholders' role in the circular economy.....	67

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Reader's Guide

[Chapter I Introduction](#) describes the objective of the Starter Kit and its target. It introduces the concept of the circular economy and briefly lists some of the EU strategic policy documents relevant to the CE. In this chapter we introduce a definition of the CE and the 9R framework around which the Starter Kit is structured. In this chapter we discuss the CE as a multi-governance approach and pinpoint the role of the cities and their levers.

[Chapter II defines the concept of Circular Business Models](#) and introduces a classification of CBM depending on the actors involved and the stage of the sourcing, production and consumption cycle. In this chapter we give several examples of CBM which we later elaborate. The role of the cities with regards of CBM is briefly explained.

[Chapter III, Section 1](#) we elaborate on the concepts of **industrial symbiosis** and urban metabolism. We introduce different typologies of networks as well as different territorial policies for IS. In the chapter there are number of examples of both IS and urban metabolism.

[Chapter III Section 2](#) is dedicated to the **sharing (collaborative) economy** which is often considered a part of the circular economy as it optimises available accommodation, transport and other stock and forgoes the necessity of additional consumption.

[Chapter III Section 3](#) elaborates concepts and issues around the **smart and circular design**. The 8 R framework is applied to design. We also describe how cities can apply the notion of smart and circular design for their purposes.

In [Chapter III Section 4](#) we talk about **extending lifetime of products and materials**. While we addressed repair and reparability from the point of view of smart and circular design in this chapter it is approached as a practice with social dimensions. The chapter elaborates on concepts such as product durability, planned obsolescence. The section also includes remanufacturing of as a trend to increase the life of industrial products such as engines.

[Chapter III Section 5](#) is introducing some basic concepts associated with regenerative sources, the bioeconomy and water reuse. Bioplastics is also addressed as a topic.

[Chapter III Section 6](#) elaborates on the **waste management** as a key pillar of the transition to the circular economy. It talks of the waste hierarchy and the instruments in the hands of cities for optimising waste management.

In [Chapter IV](#) we introduce a methodology for **developing a CE strategy in a territory**. It includes instructions on how to assess local context and potential and provides tips on analysing enabling conditions and hindering factors. The chapter finishes with defining a vision and priorities for the city in its transition to the circular economy.



I. Introduction

1. Objectives and scope of the Starter kit

This Starter Kit has been developed within the CITY CIRCLE project. It is targeted at urban practitioners and policy makers and is meant to introduce concepts and notions related to the circular economy. The Starter Kit does not have the ambition to cover all sectors of the economy which are of relevance of the circular economy. Its scope has been agreed with the participants in the project and covers sectors close to their reality. These could be subsequently explored more in-depth.

2. Why circular economy

The concept of the circular economy has been studied for many years. However, it only became a mainstream concept in the European Union with the adoption of the EU Circular Economy Package in 2015. Before that time the notion of ‘greening the economy’, ‘greening different economic sectors’ was much more common. One of the proofs for that is that circular economy was missing in all documents associated with the Programming Period 2014-2020 of the European Structural and Cohesion Funds (ESIF).

The ambition of the **Circular Economy Package** was to “help European businesses and consumers to make the transition to a stronger and more circular economy where resources are used in a more sustainable way”. The package includes new and revised legislation with focus on waste prevention and management, with clear timeframe for implementation and financing. The actions aim to contribute to “closing the loop” of product lifecycles through greater recycling and re-use. The Circular Economy Package¹ refers to five priority areas to be addressed in a targeted way: plastics, food waste, critical raw materials, construction and demolition, as well as biomass and bio-based products.

Since the adoption of the Circular Economy Package circular economy has gained enormous traction in EU discourse but also in national, regional and urban policy making. Circular economy strategies and action plans are mushrooming on all governance levels. Businesses are also exceedingly considering ‘going circular’. This whole activity is praiseworthy and is a proof of a growing attention to global problems. However, in order to avoid a situation where circular economy becomes just an empty buzz word, experts and policy makers need to keep filling it with concrete action and meaning.

This Starter kit’s ambition is exactly this. It addresses the circular economy from the point of view of cities and more specifically it focuses on what cities can concretely do in order to make certain sectors of their economy ‘more circular’.

¹ http://ec.europa.eu/environment/circular-economy/index_en.htm



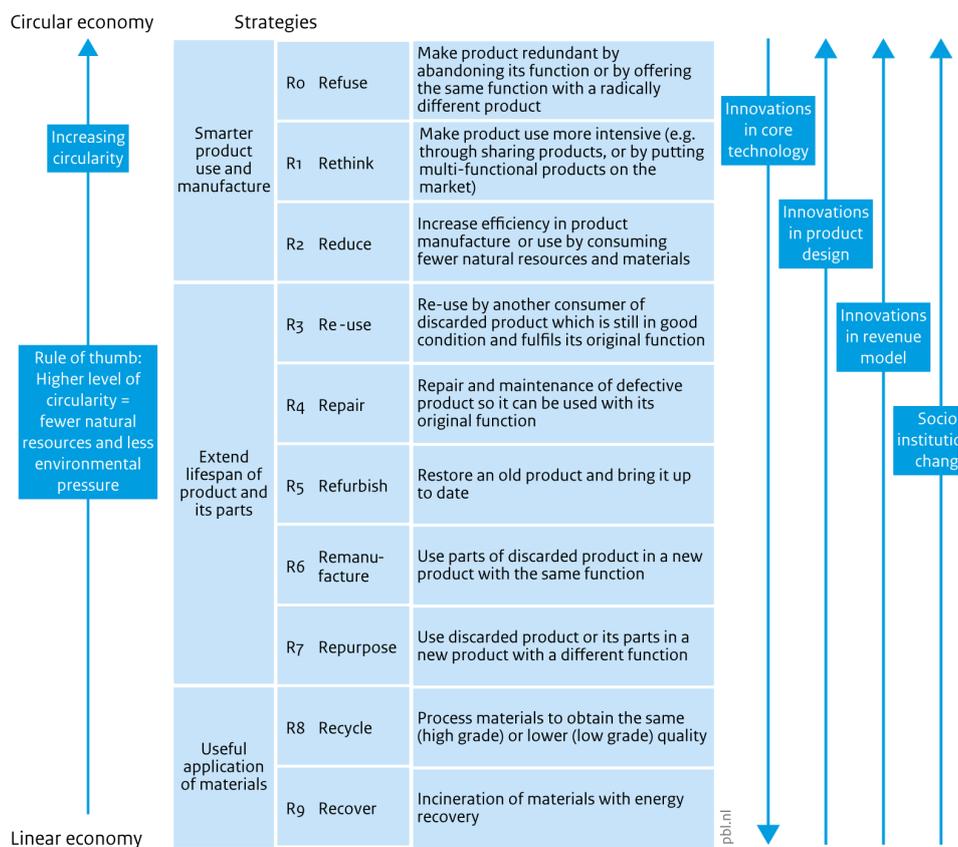
Definition of the circular economy

The **Circular Economy (CE)** can be defined in numerous ways and there are more than 100 definitions in use. While the knowledge on CE is growing, scientists are yet to get to grips with different aspects, implications and impacts of the circular economy. Overall, the CE adopts a systems approach and aims at **reducing the societal production-consumption systems' linear material and energy throughput flows**. It promotes high value material cycles and cooperation of producers, consumers and other societal actors in sustainable development work. (Source: Korhonen et al. (2018b)).

Several circularity strategies exist that can be ranked by level of circularity and hence - environmental priority. The underlying logic of this circular hierarchy is that the higher a strategy is, the more circular it is. Different chapters of the Starter Guide deal with different circular strategies.

The model suggested by the PBL Netherlands Environmental Assessment Agency (2017) is presented in Figure 1. The model which defines ten strategies for circularity that can be used to build a successful circular product and material flows across the EU: Refuse (R0), Rethink (R1), Reduce (R2), Reuse (R3), Repair (R4), Refurbish (R5), Remanufacture (R6), Repurpose (R7), Recycle (R8), Recover energy (R9). Each strategy is based on making use of different business models, infrastructures, relationships with different stakeholders, and potentially also policies.

Figure 1 Circularity strategies within the production chain actors in order of priority



Source: based on Potting et al. (2017)



Smarter product use and manufacture

R0 Refuse: Refuse the use of raw materials, design production processes to avoid waste. On consumers' side it is about choosing to buy and use less, reject packaging waste.

R1 Rethink: Make product use more intensive (e.g. through sharing products, or by putting multi-functional products on the market). This strategy engages producers in a process of re-designing or 'rethinking' their products, in order to minimise the environmental footprint and reduce the amount of resources used in the production process.

- Product as a service;
- Sharing of assets;
- Industrial symbiosis;
- Performance-based input sharing.

R2 Reduce: Increase efficiency in product design or manufacturing by using fewer natural resources and materials as inputs. The strategy of reducing the products' ecological footprint by increasing resource efficiency can involve different levels of ambition in the transformation of the products.

- Deploying different processes or technologies that use less energy, water, raw materials, etc.,
- Re-organising logistical chains and suppliers (e.g. buying from more local suppliers).

Strategies extending the lifespan of products and its parts

- **R3 Reuse** of discarded products by another consumer. This strategy is key to supporting material flows in the economy, and advocates the designing of products with longer lifespans, more robust composition, and which are easily repaired.
- **R4 Repair** and maintenance of a defective product so it can be used for its original purpose, and
- **R5 Refurbish** to bring an old product up to date are further strategies that can be used along the same thinking lines of prolonging the lifespan of products.
- **R6 Remanufacturing** or using parts of a discarded product in new products with the same functions.
- **R7 Repurposing** or using parts of a discarded product in a new product with different functions.

Useful application of materials

- **R8 Recycling:** Treating waste to generate secondary raw materials as inputs for processed materials.
- **R9 Recover:** Incineration of materials with energy recovery. Incineration of materials is a waste-treatment technology, based on the combustion of waste that is used for energy recovery. It is one of the last waste management resorts used before landfilling



3. The Circular economy as a multi-governance approach

3.1. The circular economy within strategic EU documents. Current policy debates

As previously described, the notion of circular economy quickly finds its way in EU policy making. In the section below, we will briefly sketch some of the EU policy documents closely linked to the circular economy. In the subsequent chapters dedicated to different sectors and circular approaches we will also briefly remind the key EU policies linked to the sector.

One of the key policies that supports the move towards a circular economy is the EU's five-step waste hierarchy established in the **2008 EU Waste Framework Directive**. It sets the basic concepts and definitions related to waste management and includes two new recycling and recovery targets to be achieved by 2020: 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households, and 70% preparing for re-use, recycling and other recovery of construction and demolition waste.

The [EU Action Plan for the Circular Economy](#) (CEAP), provides the backbone of Europe's Circular Economy Package. It outlines a series of measures that aim to boost global competitiveness, foster sustainable economic growth and generate new jobs. It also mentions product design, production processes, consumption, food waste, critical raw materials and biomass and bio-based products. Eco-innovation and investment are also highlighted as horizontal measures. The Final Circular Economy Package can be found [here](#).

The CEAP establishes a concrete and ambitious programme of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials and a revised legislative proposal on waste. The [update of the waste management rules](#) was approved in 2018. The package includes, among others, clarified legal status of recycled materials, strengthened waste prevention and waste management measures, including for marine litter, food waste, and products containing critical raw materials. New recycling targets for different waste streams were introduced, among which recycling target for plastic waste: 50% (by 2025) and 55% (by 2030). The EC will also take measures to restrict the use of microplastics in products.

On 4 March 2019, the Commission reported on the complete implementation of the CEAP. All 54 actions included in the 2015 plan have now been delivered or are being implemented.



Box 1 Implementing the actions: circular economy benefits

In 2016, sectors relevant to the circular economy employed more than four million workers, a 6% increase compared to 2012. Additional jobs are bound to be created in the coming years in order to meet the expected demand generated by fully functioning markets for secondary raw materials.

In 2016, circular activities such as repair, reuse or recycling generated almost €147 billion in value added while standing for around €17.5 billion worth of investments. In Europe, recycling of municipal waste during the period 2008-2016 has increased and the contribution of recycled materials to the overall materials demand shows continuous improvement.

Source: https://ec.europa.eu/environment/circular-economy/pdf/report_implementation_circular_economy_action_plan.pdf

Circular economy has been organically fostered upon the earlier resource efficiency related policy developments, namely Europe's **Roadmap to a Resource Efficient Europe** (European Commission 2011) - a core instrument of the **Resource Efficient Europe Flagship Initiative** of the **Europe 2020 Strategy** promoting agenda for growth and jobs with an emphasis on smart, sustainable and inclusive growth.

Building upon previous efforts to tackle the problem of plastic pollution, in January 2018 the EU adopted the [European Strategy for Plastics in a Circular Economy](#). The Strategy aims to protect the environment and citizens from plastic pollution and to demonstrate the business case for transforming the way that products are designed, produced, used and recycled. Under the new plans, all plastic packaging on the EU market will be recyclable by 2030, the consumption of single-use plastics will be reduced and the intentional use of microplastics will be restricted. The strategy highlights the main commitments for action at EU level but also emphasizes the important role of businesses, together with national and regional authorities, and citizens.

As a next step towards transition to circular economy, more efforts will be needed to implement the revised waste legislation and develop markets for secondary raw materials. As noted in [report](#) on the implementation of CEAP, many other sectors with high environmental impact and potential for circularity such as IT, electronics, mobility, the built environment, mining, furniture, food and drinks or textiles could benefit from a similar holistic approach to become more circular. The European Strategy for Plastics in a Circular Economy can serve as a good example in this regard.

3.2. Dedicated national strategies for circular economy

The circular economy has also gained momentum in the policies of Member States, largely due to the political priority given to it by the EU in recent years. Some MS have developed dedicated circular economy strategies and roadmaps (e.g. France, Netherlands, Finland, etc.). A growing number of regions (Flanders, the Basque country, etc.) are now acting to develop a circular



economy and they have been joined by a number of cities (e.g. Amsterdam, London, etc.). Some have adopted circular economy strategies, while others have introduced the circular economy in their sectoral policies on waste, economy, agriculture, bio-economy, construction etc., as well as in their Smart Specialisation Strategies (RIS3). This is now triggering the deployment of various types of circular business models.

Box 2 The Dutch Programme “A circular economy in the Netherlands by 2050”

The Netherlands set up an ambitious plan to become a totally circular country by 2050. Its ambition is to realise, together with a variety of stakeholders, an (interim) objective of a 50% reduction in the use of primary raw materials (minerals, fossil and metals) by 2030. Agendas have been formulated for five key raw material chains to make this shift towards circularity: biomass and food (1); plastics (2); manufacturing (3); construction (4); and consumer goods (5).

The following barriers for the transition to a circular economy are mentioned: regulations, the non-internalisation of external effects, the lack of knowledge for technical, social and system innovation, non-circular behaviour of citizens and professionals, adaptation problems in the production chain, consolidated investments and interests, limited influence in the international playing field. Interventions to address these barriers are focused on improving the regulatory framework, introducing smart market incentives, financing, stimulating knowledge and innovation.

Source: Dutch Ministry of Infrastructure and the environment

<https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050>

Box 3 The Roadmap towards the Circular Economy in Slovenia

The Roadmap towards the Circular Economy in Slovenia sets the path for Slovenia to become a circular economy front runner in the region. Designed through an inclusive, multi-stakeholder approach, it identifies four priority sectors, give recommendations to the government and identifies best practices. The Roadmap introduces the Circular Triangle, a model which unites three inseparable elements - Circular Economy (business models), Circular Change (government policies) and Circular Culture (citizens), three interdependent aspects that are at the core of systemic change from a linear to a circular economy in Slovenia.

Sources: <https://circulareconomy.europa.eu/platform/en/strategies?page=1>



3.3. Circular economy on regional and city levels. Some examples of regional and urban policies

In times of dwindling resources transition to a **circular economy** is both a **necessity** and an **opportunity for cities**, with the potential to offer long-lasting economic, environmental and social benefits. Many local authorities are already making efforts towards a more circular economy by setting clear framework conditions, fostering innovation and collaborating with local and regional stakeholders.

European city and region may take different paths on the way to circular economy, depending on geographic, environmental, economic or social factors. The industrial profile of a city or region plays an important role, with, for example, service and resource-intensive sectors each calling for different types of support. Implementing more resource-efficient transport systems, district heating systems or a sharing economy could be a greater challenge for less accessible than for metropolitan areas. The diversity of territorial contexts translates into different needs and opportunities that circular economic approaches should address. The territorial dimension of a region is an important factor in the transition process (ESPON GREECO).

While national strategies or roadmaps towards circular economy provide the general framework for the transition to circular economy at national level, regions and cities still need to adapt their instruments and actions to their local resources, economic and social realities. Examples of efforts in this regard at city and regional level are presented below.

Circular economy is also a theme of one of the [Urban Agenda for the EU \(Pact of Amsterdam\)](#) partnerships. This is one of the four new partnerships approved in October 2016. One of the 12 themes included in the Pact of Amsterdam, circular economy is linked to waste management, sharing economy and resource efficiency. The partnership will work to develop an Action Plan to achieve better regulation, better funding and better knowledge, aiming to increase the re-use, repair, refurbishment and recycling of existing materials and products.

Box 4 Amsterdam on the way to circular economy

Amsterdam, one of the leaders in the application of circular economy concepts to city governance, follows seven principles in its transition towards a circular economy. These principles can be extended to define a vision and an action roadmap on circularity in cities:

- **Closed loop** - all materials enter into an infinite cycle (technical or biological).
- **Reduced emissions** - all energy comes from renewable sources.
- **Value generation** - resources are used to generate (financial or other) value.
- **Modular design** - modular and flexible design of products and production chains increases adaptability of systems.
- **Innovative business models** - new business models for production, distribution and consumption enable the shift from possession of goods to (use of) services.
- **Region-oriented reverse logistics** - logistics systems shift to a more region-oriented service with reverse logistics capabilities.
- **Natural systems upgradation** - human activities positively contribute to ecosystems



Amsterdam launched the initiative [Amsterdam Smart City](#) (ASC) which is a partnership between different stakeholders to offer a common ground for cooperation towards a sustainable urban model. ASC works as a facilitator and an open platform which is able to connect citizens, businesses, government and knowledge institutes. It is also a living lab to test solutions in a real setting.

One of the themes of the initiative is circular city. Specifically, the city of Amsterdam aims to redesign twenty product- or material chains. The implementation of material reuse strategies has the potential to create a value of €85 million per year within the construction sector and €150 million per year with more efficient organic residual streams. By converting waste into electricity, urban heating and construction materials, the Amsterdam Electricity Company generates 900 kWh per 1000 kg of waste. 75% of the sewage system is separated for waste and rain water and the silt which remains after treating waste water is converted into natural gas.

Sources: *Circle Economy, TNO and Fabric, 2016,*
www.amsterdamsmartcity.com/circularamsterdam

Box 5 Circular economy route map, London, United Kingdom

With the capital's population predicted to reach over 11 million by 2050, London needs a more flexible and sustainable approach to products, housing, office space and critical infrastructure. In June 2017, London Waste and Recycling Board launched its [Circular Economy Route Map](#) to accelerate London's transition to become a circular city. The document outlines a vision of a capital city thriving through the adoption of the principles of circular economy.

By 2036, the circular economy could provide London with net benefits of at least £7bn every year in the sectors of built environment, food, textiles, electricals and plastics, as well as 12,000 net new jobs in the areas of re-use, remanufacturing and materials innovation.

The [Route Map](#) recommends actions for a wide range of stakeholders, including London's higher education, digital and community sectors as well as London's businesses, social enterprises and finance sector.

Source:

<https://www.lwarb.gov.uk/what-we-do/circular-london/circular-economy-route-map/>

Box 6 Regional road map to circular economy of Päijät-Häme region, Finland

For the Päijät-Häme region in Finland it all started with including circular economy in their regional innovation strategy for smart specialisation (RIS3 strategy), thus defining circular economy as a priority sector for the region. The biggest city of Lahti also included circular economy in its urban development strategy. Hence, a decision was taken to create a regional road map (launched in Oct 2017) which would serve as a joint regional circular economy strategy



for the nine municipalities in Päijät-Häme. Local stakeholders were involved in the definition of a common vision, goals and concrete actions. The Lahti University of Applied Sciences coordinated the process on behalf of the regional council.

The Päijät-Häme roadmap has five main themes and regional level goals, which provide the framework for the actions to be implemented.

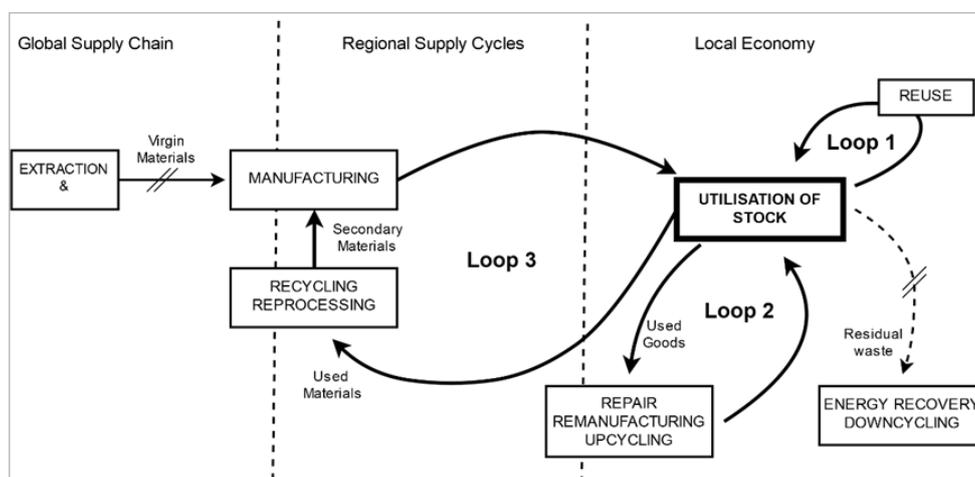
- **Closed loops of technical streams to create added value.** Actions: Digital platforms to optimise logistics, material collection pilots, circular material library, inclusion of circular economy criteria in public procurement.
- **Sustainable business from bio circular economy.** Actions: Closing of nutrient loops, support for new R&D innovations, promotion of open databanks on biological side streams, awareness raising on consumer choices, and reducing food waste.
- **Towards energy self-sufficiency by sustainable transport and energy solutions.** Actions: decentralised renewable energy solutions, biomass power plant, adapting building construction regulations, promotion of electric and biogas vehicles.
- **Shared economy generates new consumption models and business opportunities.** Actions: energy and material efficient solutions for everyday life, digital platform for circular economy services; support to local sharing platforms, piloting of consumer repair services and food solutions.
- **Piloting and demonstrating innovative circular economy solutions.** Actions: promotion of internationally interesting reference sites, circular economy training and education.

Source: Interreg Europe [BIOREGIO](#) project

Positioning of the urban dimension of the circular economy

In order to pinpoint those aspects of the circular economy which could be addressed at an urban level there is a need to illustrate different levels of the supply chain starting from the global supply chain through the regional one down to the local supply chain.

Figure 2 The basic loops of a circular economy



Source: modified from on Stahel and Clift (2016)



- ✓ **Loop 1** focuses on product *reuse*, through second-hand markets and/or platforms as well as commercial and private reuse of goods. While most of these activities take place on a local level this is not always the case.
- ✓ **Loop 2**, includes product *repair*, *remanufacturing* to meet new technical requirements and *upgrading* to meet new uses and markets. These may be local activities (e.g. *refurbishing* of domestic appliances) or may be carried out via regional service centres (e.g. *remanufacturing* of industrial equipment).
- ✓ **Loop 3** represents recycling in which materials are reprocessed to substitute secondary materials for return to the production system for same or another use(*recycling*).

Urban levers

When discussing the circular economy in cities we have to be fully aware which are those elements of the system which city authorities can influence through their ambition and action. We start with the possibility of the city to formulate a long-term vision of the city system and to engage stakeholders with this vision. Cities are in charge of urban management and wield the instruments of urban planning. Cities are also in the position to adopt certain policies and regulations. In each of the chapters in this Starter Guide we try to draw the attention to this. Cities can also mobilise its coordination power to generate long-term partnerships between different kinds of actors for the achievement of the vision. Cities can also fuel the transition to the circular economy by creating financial incentives for business actors and households to modify their consumption and production behaviour.

Figure 3 Urban policy levers



Source: <https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities/policy-levers>



II. Introduction to Circular business models

Circular Business Models (CBM) are those types of innovative (business) consumption and production which **put into practice the circular economy processes and principles**. These models could be business-to-business (B2B), business-to-consumer (B2C) and consumer-to-consumer (C2C). Usually, these offer new opportunities for companies and transform the relation between producers and consumers. **Product/service systems** and **service-based business models** are concepts which are close to CBM.

Figure 4 Types of CEBM according to the production and consumption cycle and main actors

CE Strategic Areas	Single firms and consumers	Industries, clusters, regions
Material sourcing and circular input	Material substitution Energy neutrality	Diversity and cross-sector linkages Bio-based materials Urban mining
Production (design, manufacturing, distribution)	Cleaner Production Eco-Design, including de-materialization, design for disassembly, design for modularity, design for reparability, etc	Industrial symbiosis Eco-industrial park/networks
Consumption and use	Green Purchase and consumption Renting service Product re-use Virtualization	Community involvement Sharing economy Socially responsible consumption Eco-labelling schemes Stewardship Product-Service-System
Waste-as-a-resource (collection, recycling, recovery, remanufacturing)	Product recycle system Element/substance recovery Energy recovery Upgrading, Maintenance and Re-pair	Separation Take-back and trade-in systems Upcycling/Downcycling

Source: ESPON CIRCTER project

The figure above is a nice summary of possible CBM in line with the production and consumption cycle. It is organised by actors involved in the model. While within single firms there is a possibility for precise, targeted actions like material substitution or cleaner production activities, groups of industries can create systems of industrial symbiosis for example.



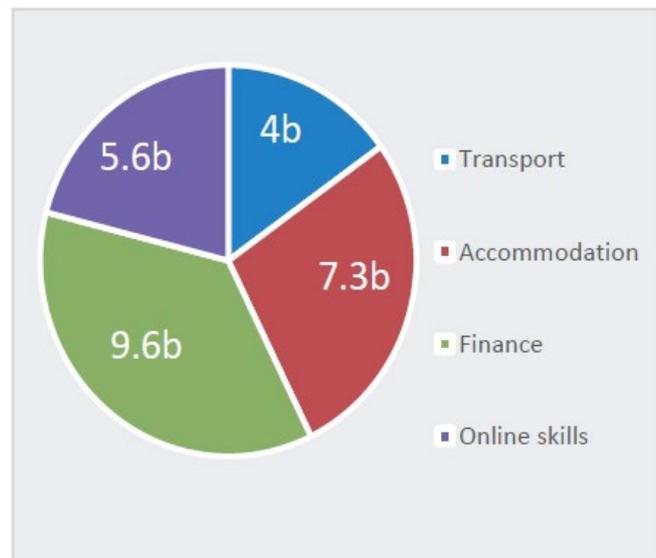
Examples of CBM

In the section below, we are presenting a short summary of several of the **main types of CBM**. This is not an exhaustive list. The presented models comply with the CBM aspect of changing the relationship between producers and consumers. It has to be noted that sometimes action as simple as recycling can be considered as CBM. These are not presented below.

Industrial symbiosis (IS) is an approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products. This often involves finding innovative solutions to identify business opportunities that capture the value of underutilised resources and or optimise the value of the industrial processes in question benefits. IS is a system which maintains the highest value of materials and products.

The **collaborative economy** is rapidly emerging across Europe. *Figure 5 Sectors in collaborative economy*
 It consists in a new way of offering and using products and

services, mostly through online platforms. Transactions usually involve three parties: the service provider, the online platform and the customer. It covers a great variety of sectors, from sharing houses and domestic services to car journeys and it often encompasses the development of new business models. The collaborative/sharing economy changes the utilisation patterns. A Technopolis Group study from 2018 estimated the potential of the collaborative economy at more than 26 billion EUR.



Source: Technopolis Group

Reverse logistics is managing the return flows of materials in a circular economy. It is mainly driven by Extended Producer Responsibility (EPR) policies which are gaining importance in the European Union. Reverse logistics is essential in closing the loop in a circular economy.

While recycling processes recover only a portion of the materials and embedded energy from a product, much of the industrial phases of new product development and production can be avoided via **remanufacturing**. Through remanufacturing, a used product is brought to at least the quality level of a new product through a treatment process consisting of e.g. dismantling, cleaning, testing, processing and remounting collected old parts (VDI ZRE 2017). In this way, the highest value of materials and products are maintained.

Obstacles to regional and municipal authorities

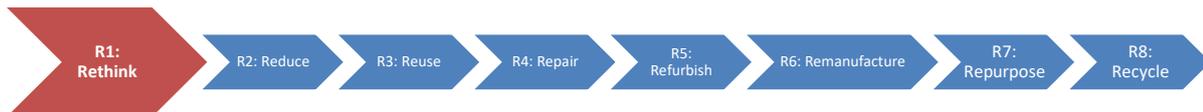
- Key challenges that hinder further adoption of CEBMs are related to measuring profitability and financial benefits, missing exchange of information on material flow data, perception of CEBMs as well as technological and operational issues. **Financial challenges** are considered the most pressing. Consequently, in order to overcome the current constraints, financial benefits and CBM parameters need to be demonstrated through **concrete examples and sectoral analysis**.



- CBM are incompatible with current procurement rules, taxation rules and infrastructural barriers (EEA, 2017). These are enabling factors/barriers which need to be addressed in order to trigger a stronger uptake of CBMs. An example of a policy measure with the potential to tackle institutional barriers related to product-service systems is the German state of Baden-Württemberg's promotion of car-sharing parking spaces (which are marked and cannot be used by private cars)



III. Circular and collaborative business models. Concepts and definitions. EU framework. What can cities do? Examples.



1. Industrial symbiosis and urban metabolism

Concept

Industrial symbiosis (IS) is an approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products. This often involves innovative solutions to identify business opportunities that capture the value of underutilised resources and / or optimise the value of the industrial processes in question benefits (Domenech et al, 2018, Lombardi & Laybourn, 2012).

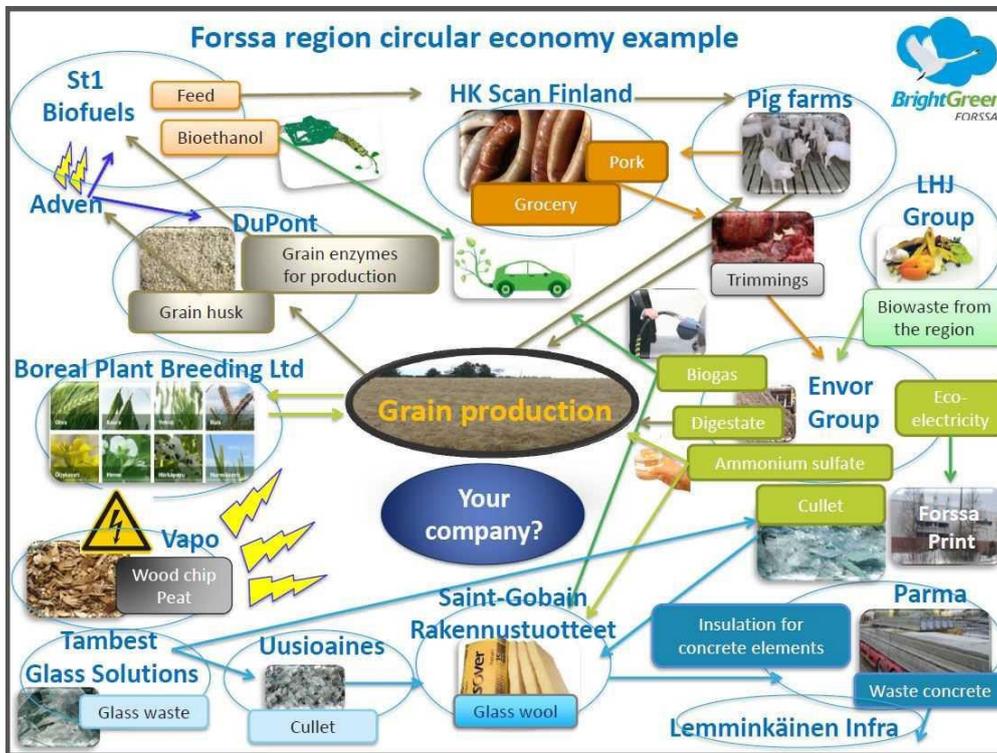
Making industrial symbiosis happen depends on many governance and policy factors. Market conditions for by-products and reused materials are often not favourable and specific materials are strongly regulated. Symbiotic initiative originate in two ways:

- As self-organised activities (e.g. with the well-documented example in Kalundborg, Denmark)
- as managed processes.

Self-organised activities usually emerge in industrial clusters and in a limited geographical perimeter.



Box 7 Forssa circular economy system



Source: Interreg Europe [SYMBI project](#)

Managed (and especially facilitated networks) networks can have a larger geographic scope.

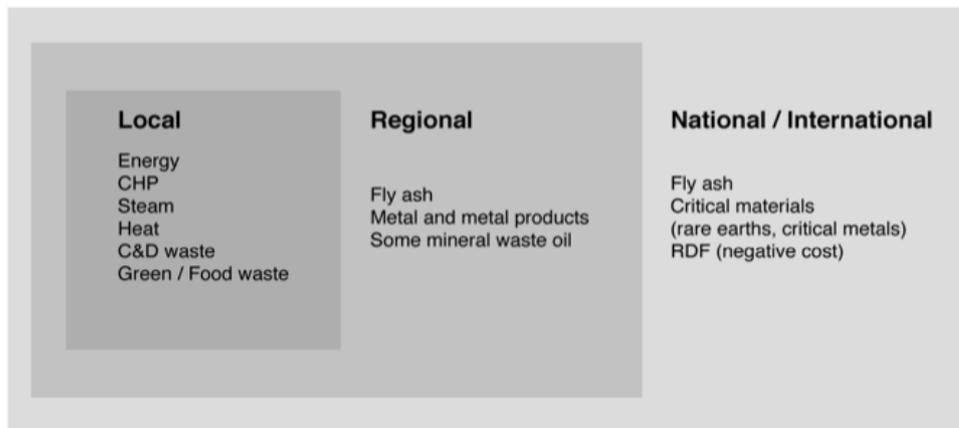
Domenech et al. (2018) distinguish between two types of managed IS initiatives:

- a) **facilitated networks:** a coordinating entity promotes the development of the network and works with existing companies to identify IS opportunities.
- b) **planned networks:** within legally and territorially well-defined areas (i.e. eco-industrial parks), where businesses are attracted to shared infrastructures and services. Often times these planned networks are developed in eco-industrial parks.

IS synergies can be implemented in any type of regions or area, depending of the types of resources transacted. Overall, IS activity has been found to be common in manufacturing clusters across Europe, whether as self-organised or as facilitated networks (Domenech et al, 2018). Clusters show high opportunities for facilitating resource efficiency improvements and industrial symbiosis in companies (Cluster Observatory, 2015).



Figure 6 Types of resources transacted by area



Source: Domenech et al, 2018

In a context of urban development, Industrial symbiosis could be one way to support urban planning for sustainable development, although systemic IS initiatives at urban level are not numerous, specifically in EU (Mulder et al, 2016).

Box 8 Japan's eco-towns programme

Eco-towns in Japan were developed in the last 10 years by utilizing regional technology and industry in Japan. Local governments and enterprises have worked in partnership to build such complexes. Eco-towns have enabled a number of developmental objectives to be met simultaneously. It has helped to stimulate the local economy, secure employment, as well as dispose waste in an environmentally sound manner, and protect air and water resources.

The eco-towns programme is a government-led approach to facilitating IS at urban level. The initiative established 26 eco-towns across Japan, providing support for investments in innovative recycling projects, resulting in industry savings and improved environmental results (Van Berkel, 2009).

Van Berkel finds that opportunities for IS can be facilitated at city level through engaging separate urban cycles in urban areas, to create local circular flows of energy and materials, that give rise to more sustainable urban development (ibid).

Source: UN Environment <https://www.unenvironment.org/resources/report/research-eco-towns-japan-implications-and-lessons-developing-countries-and-cities>

In EU, the concept of urban symbiosis has been linked to the concept of urban metabolism, which maps the existing flows of materials and energy in a city. The practice could be a very useful impact to urban planning.



Box 9 Urban metabolism project in Amsterdam

For instance, the city of Amsterdam has initiated an urban metabolism project. The project is implemented by the Technical University (TU) Delft and the Amsterdam Institute of Advanced Metropolitan Solutions (AMS). It focuses on the field of flow analysis and urban design and aims at making urban metabolism an integral part of urban design and associated goals such as circularity and sustainability in an urban context.

As a result, it presents possible interventions for each flow with the goal of:

- replacing the current source;
- re-use the flow.

New sources need to be renewable. Reuse concerns the reuse of residual flows and efficient use of depletable resources.

These interventions are on an urban level as they can be implemented by urban designers and planners.

Source: <https://amsterdamsmartcity.com/projects/meaningful-circular-metabolism>

Box 10 "Metabolism of cities" platform

The global platform "Metabolism of cities" is a source of valuable information on urban metabolism and material flow analysis. Among other things, it offers the so-called city platforms including an overview of the city; a presentation of different sectors relevant for the city (i.e. energy, transport, waste, etc.). It also offers a Starter Kit and a Massive Open Online Course (MOOC).

Source: <https://metabolismofcities.org>

Box 11 Urban symbiosis in Hammarby Sjöstad

In 1996, an environmental programme for Hammarby Sjöstad was approved by Stockholm City Council, in order to develop a sustainable urban district primarily by implementing innovative technologies, such as urban symbiosis strategies. The programme was about the revitalisation of a former large industrial and harbour area in southern Stockholm as a locale for sustainable urban development. The goal was to be at least twice as good as any other urban district built in 1995. The Hammarby Sjöstad programme is an example of urban symbiosis as a strategy for achieving environmental goals.

The case study demonstrates how combining the experience from facilitating Industrial Symbioses projects, the utilisation of the urban metabolism methodology, as well as encouraging the participation of citizens at district levels can be a route for implementing urban symbiosis (see Iveroth, 2014). The case study finds that formulating an environmental programme at the



level of the city, together with formulating goals for the city-level symbiosis was fundamental in achieving a holistic vision for the city and supported the achievement of environmental benefits (ibid). Nevertheless, the success of the programme depends on radical changes in household energy consumption, the implementation of new more efficient technologies and the introduction of stricter anti-landfilling rules.

Source: S. Iveroth, 2014, Industrial ecology for sustainable urban development - the case of Hammarby Sjöstad

Box 13 Example of an institution providing support for the uptake of CBM

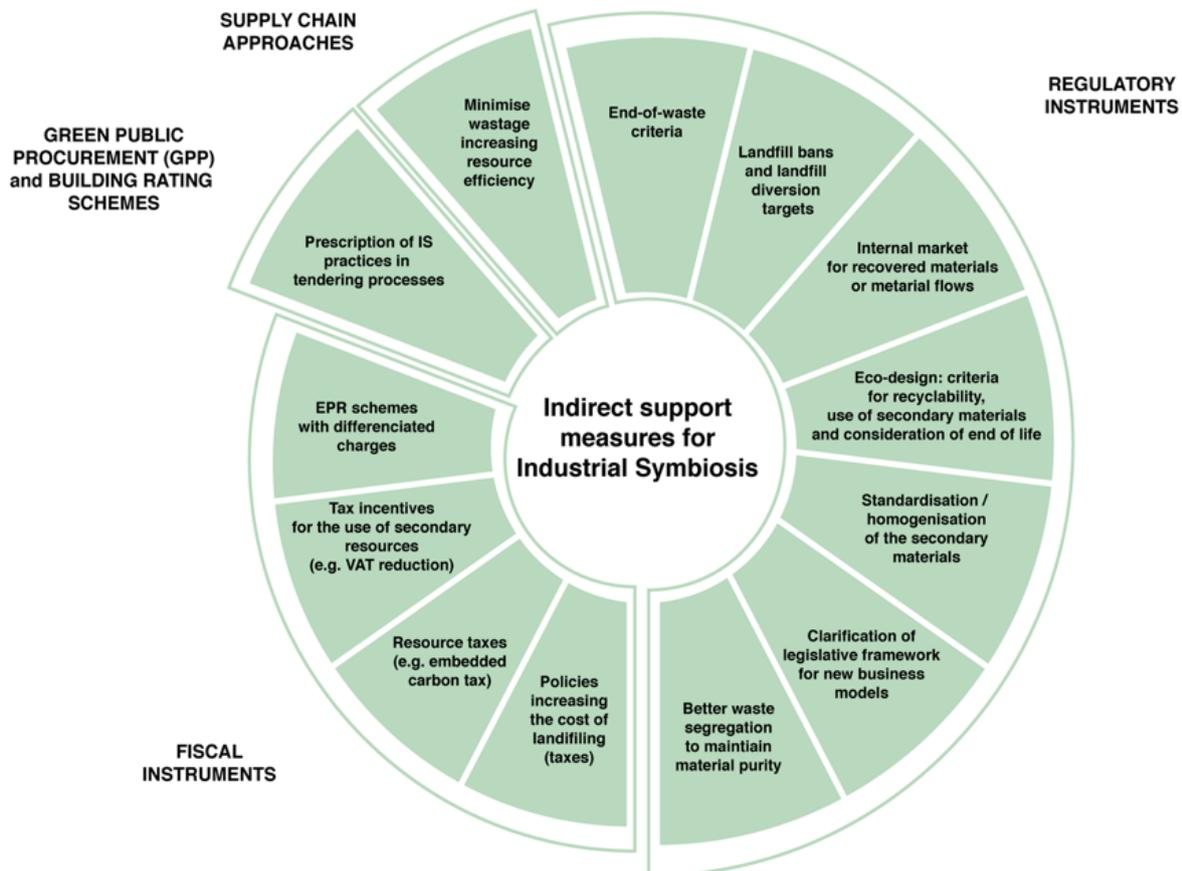
Zero Waste Scotland is an excellent example of an institution providing support for the uptake of CBM. It manages an 18 million pound Circular Economy Investment Fund for SMEs 'development and adopting innovative business models for new circular economy products and services. The Fund is well-linked with Scotland's strategic framework namely the Smart Specialisation Strategy (RIS3), A Manufacturing Future for Scotland - a programme for Government commitment and Making Things Last, Scotland's circular economy strategy.

Source: <https://www.zerowastescotland.org.uk/>

Territorial policies in support of IS

The figure below is a good illustration of the fact that Industrial Symbiosis is connected to a big number of policies. While this Starter Kit is not the place for exploring all links we would like to draw the attention of urban policy makers to the importance of policy enablers. Policy makers can either act directly on those policies which they could influence or work with national authorities on policies which could be decided and modified at national level.

Figure 7 Types of policies to support IS at EU, national and regional level



Source: Domenech et al, 2018.

There have been several initiatives in the EU and in the MS which are promoting the facilitation of IS transactions. Regions and cities wanting to support IS can take either a direct or indirect route to supporting the implementation of synergies.

One of the early programmes, which has been replicated in the past years in several MS, is the National Industrial Symbiosis Programme (NISP) in UK, which managed to achieve substantial economic and environmental results, due to its lean approach to managing the network and communicating with businesses, but also significant government contributions. Similar programmes have followed in Ireland (i.e. SMILE Resource Exchange, already disconnected), Finland ([FISS](#)), France ([PNSI](#)), or Flanders ([Symbiose Platform](#)), with public financial support in the form of grants.

Role of the cities and selected city-level policies/measures

How to get started?

Based on a study on the role of IS coordination (Domenech et al, 2018), the main added value of supporting IS facilitator organisations has been to:

- **Mobilise network members and raise awareness about the opportunities of reusing resources and waste streams generated by others;**



- **Support the matchmaking, knowledge sharing and connection of companies;**
- **Support the assessment of benefits of specific IS synergies identified, e.g. through offering funding for feasibility studies, legal advice or access to technology experts, researchers or consultants for e.g. assessing materials flows.**

Cities or regions may launch facilitation programmes, however, such an initiative should be based on assessing the potential for IS synergies in the region, as well as good practices in other countries. Employing consultants with strong technical expertise and industry experience is key.

Regions and cities can take the example of several other instruments that can be incentivising IS activities and emphasise circularity aspects. The difficulties faced by IS facilitators in scaling up and in becoming commercially viable largely stem from the policy environment and creating incentives for the private sector.

Cities can influence the following policies:

- Prescription of IS practices in tendering processes;
- Better waste segregation to keep material purity;
- Level of landfill taxes and other policies increasing the cost of landfilling
- Policy incentives for the reuse;

Minimise wastage

In the box below we have elaborated a set of recommendations for concrete actions both for cities with some experience with Industrial Symbiosis and for cities who are at early stage of IS development.

Box 4 Recommended actions for cities who want to engage in Industrial Symbiosis

For cities more advanced in IS:

- **Raise awareness of companies** on the potential benefits of engaging in IS such as increased competitiveness, productivity and resource efficiency, enhanced innovation capacity and knowledge about alternative business models. Environmental and social benefits to be emphasized as well. Initiatives like FRUSH (see below) help to address this knowledge gap. Including the concept of circular economy in the curriculum and sharing of good examples (as mentioned in the Finnish roadmap to circular economy) can also contribute to improving knowledge, raising awareness of potential benefits and mind-set change in companies.
- **Further exchange on information** on the experiences with closed database vs. open database will be useful.

For cities that are at an early stage with IS development:

- **Organise campaigns** that aim to raise awareness of companies about circular economy, and the benefits of IS.
- Start with small first steps such as **mapping the industrial ecosystem** and potential opportunities for IS synergies. Waste flow mapping could support in identifying areas of potential. Targeting the biggest emitters in a database is also important.
- **Map the most important stakeholders** that can support bringing companies together and facilitate IS synergies.



- **Mapping legislation:** it is important to make an inventory of legislation that could be an obstacle and communicate this to the respective authorities. The Green Deals example from the Netherlands can be helpful in this regard. Make efforts to include IS and circular economy activities in regional strategies. The Finnish Roadmap to Circular economy can serve as a good example.
- **Develop a simple waste exchange platform** (either open or closed) in the beginning and upgrade it on the way. The scope of the platform depends on the ambition of the IS system. Very often the platform is developed on a national level within a national IS system (i.e. FISS). However, when such a central platform is missing cities can develop their own solutions.
- With regards to **matchmaking:** start small and scale up gradually contacting companies one by one. The question of building trust in IS is crucial for creating IS synergies and can be addressed by adopting an inclusive approach, promoting open data as well as an open-minded communication.

Source: Workshop on Industrial Symbiosis, Interreg Europe, Helsinki, Finland, May 2019

Box 5 Example of a city-level action for facilitating Industrial Symbiosis

[FRUSH - Circular economy and IS event for start-ups and growth enterprises, Finland, SYMBI project](#)

FRUSH originates from the results of SYMBI project, as from the studies conducted within the project a general lack of knowledge among businesses about circular economy and IS was noticed. It aims to boost the development of start-ups and create and promote new business opportunities around circular economy and IS. Since its launch in 2017 the number of participants quadrupled. The pitching competition has helped start-ups and growth enterprises to get funding and promotion. The competition has also helped some businesses to launch their products.

Source: SYMBI project

Box 12 Example Industrial Symbiosis on city level (Waste Exchange System, Valencia, Spain)

The Spanish Chambers of Commerce have set up a regional waste exchange scheme (Bolsa de residuos) that allows companies to easily exchange waste as by-products. The Chamber of commerce of Valencia began working on the By-product Exchange in 1989 in collaboration with the regional government. In 2017, 219 offers and 59 requests have been processed by these programmes in the region. The five Valencian Chambers of Commerce were involved in the dissemination and management of the by-product exchange.

Source: [TRIS project](https://www.interregeurope.eu/policylearning/good-practices/item/653/waste-exchange-scheme/), <https://www.interregeurope.eu/policylearning/good-practices/item/653/waste-exchange-scheme/>



Box 13 Green Deals, the Netherlands. Possibility of green growth agreements with local governments

The Green Deal approach in the Netherlands is an accessible way for companies, local and regional government and interest groups to work with the Central Government on green growth and social issues. A Green Deal is a mutual agreement or covenant under private law between a coalition of companies, civil society organizations and local and regional government to supplement existing regulation and legislation. It is a flexible method for jointly finding solutions to regulatory barriers experienced by companies trying to introduce new sustainable products, technologies or services to the market. The Green Deal approach is particularly suitable when innovations are put into practice, a phase during which projects often encounter barriers. In the period between 2011 and 2014, 176 Green Deals were closed in the Netherlands, involving a total of 1,090 participants.

Source: <https://www.greendeals.nl/english>

2. The sharing (collaborative) economy

The sharing (collaborative) economy is considered to be a part of the circular economy. The sharing economy entails the “peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services”. It can be coordinated within a local community or network, or function on a larger-scale “coordinated through community-based online services” (Hamari et al., 2015). It mostly covers consumer to consumer (C2C) business relationships. The concept is not novel per se but the novelty of the current sharing economy concept is that it is taking place digitally on a far larger scale, extending the geographical constraints of a peer to peer (P2P) community.²

The sharing economy also deals with the ways in which people and businesses organize themselves to create social and environmental benefits (e.g. community supported agriculture, repair cafés). Although environmental protection is usually not the main purpose of sharing platforms, in some cases sharing economy models help achieve circular economy goals. Examples from transport and housing sector is presented below.

The collaborative economy can create new opportunities for consumers and entrepreneurs that could contribute to competitiveness, jobs and growth. As a disruptive innovation, it can also generate tensions between existing operators and innovative service providers. One major difference between platforms is their underlying commercial or non-commercial activities: platforms can be established for profit or non-profit purposes. In addition, the collaborative economy business model could cover the following types of exchanges: peer-to-peer (P2P) services; peer-to-business (P2B) services; and business-to-business (B2B) services.

Recognising the rapid uptake of these new practices, the European Commission issued a European Agenda for the Collaborative Economy in 2016. The document aimed at providing insights on key issues, such as market access requirements, liability regimes, protection of users, self-employed

² https://www.ceps.eu/wp-content/uploads/2016/07/SR%20No143%20Circular%20Economy_0.pdf



and workers and taxation, but also set the base for the establishment of a monitoring framework.

A recent study carried out by Technopolis Group estimated the size of the collaborative economy in the EU in 2016 at EUR 26.5 billion and number of jobs at 314,000.

Sharing of buildings

Roughly half of owner-occupied homes are ‘under-occupied’, with at least two bedrooms more than needed. Airbnb is an example of increasing the “utility” of the floor space by launching its peer-to-peer platform for housing space in 2008. Since then Airbnb’s booking rates has grown by 80-90% in the last few years and is expected to overtake worldwide hotel listings in four to five years. Meanwhile, a number of not-for-profit communities for sharing living space are growing rapidly, such as Hoffice and Couchsurfing. The concept of Hoffice can be seen as a hybrid in floor-space sharing, where higher utilisation of living space leads to a reduced demand for office space.³

60-65% of European office space is under-utilised even during working hours. Business already rethink the role of the office and working remotely is encouraged. This would entail increased desk sharing and reduced need for floor space. Another option is to temporarily rent out unused space, an idea LiquidSpace⁴ capitalises on by connecting people in need of desks or conference rooms with nearby suppliers, much like an Airbnb for office space.

Increased repurposing of existing floor space would make it possible to better utilise old buildings and change the use of freed-up office space to, e.g. residential housing, in a cost-efficient way and reduce the need for demolition and renovation. This is particularly relevant since ~80% of Europeans live in buildings that are at least 30 years old.

Complementary to repurposing, which changes the sequential use of a building, public buildings could be multi-purposed for parallel use of the floor space, meaning that different activities can take place during a short and repetitive time cycle.

Box 14 The example of Denmark

By 2035, Danish companies could be expected to reduce their need for office space due to shared desk policies and increased teleworking, which together with multi-purposing of public buildings, repurposing of old buildings and freed-up office space, and the accelerating sharing of residential floor space could increase the overall utilisation of buildings by 60% (20%) by 2035 (2020). This could lead to a reduced demand for new buildings by 9-10% (3-4%) by 2035 (2020), saving the Danish economy an estimated EUR 300-450 million.

Source: Ellen MacArthur Foundation

https://www.ellenmacarthurfoundation.org/assets/downloads/20151113_DenmarkCaseStudy_FINALv02.pdf

³

https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf

⁴ <https://liquidspace.com/>



In the transport sector the societal, economic, and environmental effects of peer-to-peer transport platforms such as Uber are only just starting to emerge. With regards to sharing privately owned cars there is an increasing trend in recent years. Nowadays, 14% of EU car sharing services are taking care of facilitating the shared use of private cars. Despite the potential for some short-term benefits there are some concerns as well, e.g. whether the commercial objectives of those who have developed and own these platforms align with the public interest of cheap, clean, efficient transport.

Box 15 Car sharing business models

An analysis of car sharing business models in Europe was carried out as part of the H2020 STARS project. Initial results reveal five basic types, but a huge diversity of interpretations. Despite mixed strengths and weaknesses, as well as large differences in the scale and scope of operations, it is unlikely that any one model will become dominant in the near future - but ultimately some rationalisation seems inevitable. The five business model types are:

1. Free-floating within an operational area (e.g. Car2Go)
2. Free-floating with pool stations (e.g. Autolib)
3. Round trip, home zone based (e.g. Partago)
4. Round trip, pool station based (e.g. Greenwheels)
5. Peer-to-peer and community schemes (e.g. Drivy)

Source: [H2020 STARS project](#)

The sharing economy is increasingly associated with governance aspects, such as participative urban governance. Sharing economy solutions can drive new business opportunities and generate social benefits. However, if not managed appropriately in relation to the local context, unintended negative consequences might arise - such as a reduction in long-term rental accommodation availability. Some of the policy measures that cities could consider could focus on:

- Understanding commercial digital platforms (e.g. Uber and AIRBNB) and their cultural context, and relevant multilevel policies. This will help to identify evidence-based policy options and develop place-based strategies.
- Clarifying the legislation governing sub-letting residential and office space, and sharing business platforms (like Airbnb) by defining unambiguously who is entitled to practice it (private tenants, commercial players) and which regulation they need to follow.



- Creating financial incentives or financial support to local public-sector entities such as schools and other public infrastructure could help overcome hesitance towards renting out their properties when not in use.

There is a need to develop a ‘common language’ across Europe regarding sharing economy. Also there is a need to increase understanding how the collaborative economy can be better understood, communicated, and implemented across Europe. Cities can play an important role in this regard. In addition, initiatives aiming at promoting collaborative economy need to be encouraged. Funding for such type of activity could be obtained for example from [Urban Innovative Actions](#) (UIA), an initiative of the EU that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges.

Box 16 Amsterdam’s Sharing Economy Action Plan

Amsterdam’s Sharing Economy Action Plan outlines five pillars to focus on: supporting pilot projects, leading by example, extending the sharing economy to all Amsterdam residents, developing rules and regulations, and establishing a sharing city. It addresses multiple opportunity areas including housing, office space and product sharing, and transport.

The action plan supports Amsterdam to ensure:

- ✓ This new market has the freedom to innovate and grow
- ✓ The city’s citizens and visitors, and businesses have increased access and use of resources in the city
- ✓ Unintended adverse effects are mitigated

The city’s Sharing Economy Action Plan sits alongside other city initiatives, such as StartupAmsterdam, that are designed to grow and improve the startup and business environment in Amsterdam. There are currently over 150 sharing economy platforms active in Amsterdam. Local platforms include, for example: 1/ Peerby - an app that connects people who need to borrow or rent an item; 2/ MotoShare - an app that connects motorbike and car owners to those in need of temporary use of one; 3/ LENA - a ‘fashion library’ where customers can rent high quality fashion items on a one-off basis or gain access to the clothing offered via a subscription service

Source: https://www.ellenmacarthurfoundation.org/assets/downloads/Amsterdam_-_Case-Study_Mar19.pdf



3. Smart and circular design



Concepts

Smart and circular design is a horizontal concept which is relevant to several of the Rs which we adopted earlier as a methodological framework.

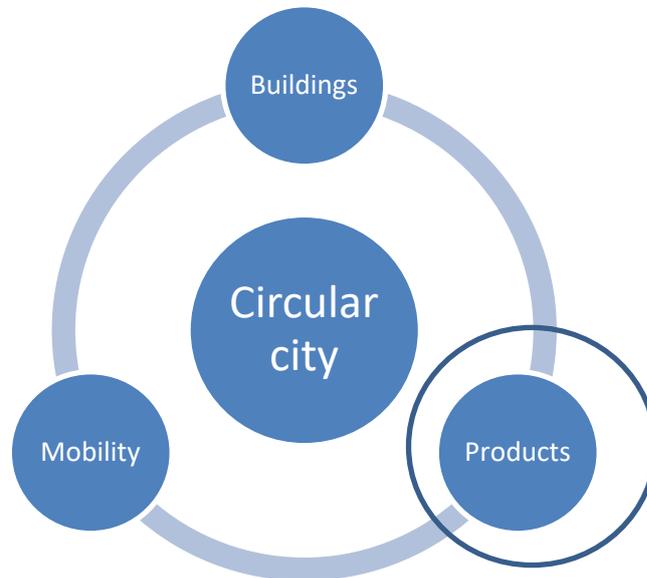
Table 1

What	Who
R1 Rethink:	Producers rethink and redesign their products. Service providers redesign their offers. Local authorities rethink the design of urban ecosystem.
R2 Reduce:	Producers increase efficiency in product design or manufacturing by using fewer natural resources and materials as inputs. Local authorities reduce the impact of their activities.
R3 Reuse:	Consumers reuse discarded products. Businesses and local authorities support reuse of material flows in the economy. Producers design products with longer lifespans, more robust composition and easily repaired.
R4 Repair:	Businesses and communities organise repair services. Local authorities support the repair and maintenance services.
R8 Recycling:	Treating waste to generate secondary raw materials as inputs for processed materials.

Design and the cities. A vision.

In parallel to the urban plan, **circular economy principles transform the design of elements within cities.** Infrastructure, vehicles, buildings, and products need to be designed to be a combination of durable, adaptable, modular, and easy to maintain and repurpose elements. Ideally, materials should be locally sourced and from renewable feedstocks where appropriate. These need to be composted, recycled, and reused. Cities should be powered on renewable energy. (based on Ellen Macarthur)

Figure 8 The pillars of a circular city



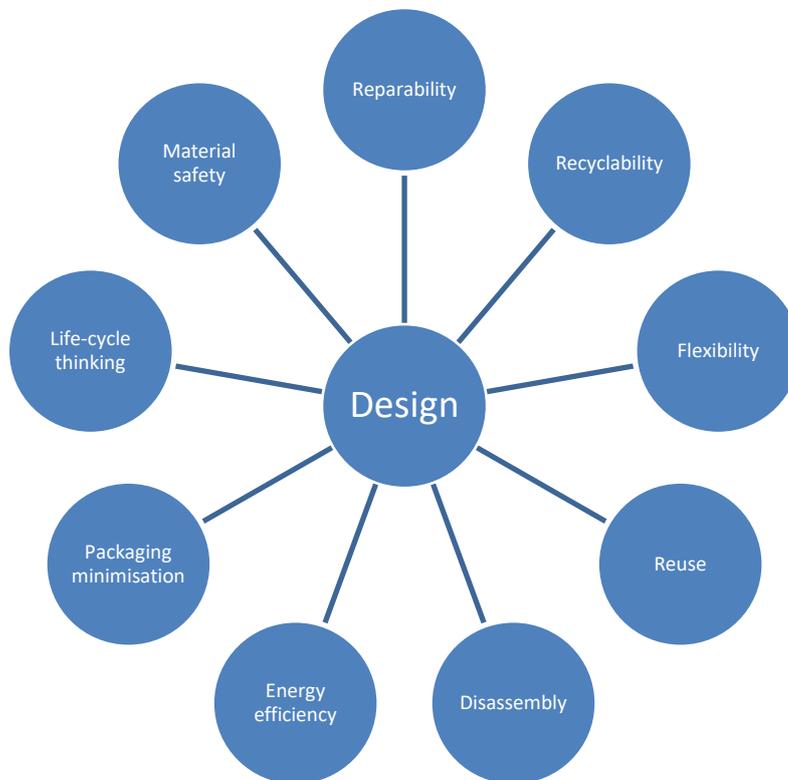
Source: based on Ellen Macarthur

Because of the limited scope of this Smart Kit in this chapter we will only focus on smart and circular design for products. The principles are applicable for many of the services provided by the city. In addition, knowing the principles of eco-design allows cities to engage in more sustainable procurement also known as Green Public Procurement (GPP).

Design for the environment (eco-design)

Eco-design is a principle that calls for minimizing the negative environmental impacts of a product across its life cycle. It includes other design principles including:

Figure 9 Principles for smart and circular design



Source: own elaboration

When working on circular design both companies and local authorities can decide on which elements to focus. While companies are in the position to address all of these issues local authorities have the mandate and the possibility to focus only on some of these directly and on the others – to a smaller extent.

EU policy framework

At the EU level, smart and circular design legal requirements remain limited, and have not, until recently, been the main focus of policy-makers. Currently, the **Eco-design directive** (2009/125/EC) is the piece of legislation that offers excellent prospect for the future. It was adopted in 2005 to target energy-using products and extended in 2009 to include all energy-related products (air conditioners, computers, household devices, etc.). It mainly focuses on energy efficiency, but also incorporates some elements of resource efficiency (see requirements on weight and volume of product in Annex I). However, these requirements have largely been left aside, due to lack of standards, fear of regulatory burden and lack of cost-efficiency (EC, 2015a).

In its **Circular Economy Action Plan (CEAP)**, the EC mentioned both the extension of the Eco-design directive and additional actions to boost repair and reuse. Three main lines of action are foreseen: inclusion of requirements for the availability of spare parts and repair information in the Eco-design directive revision, a testing programme against premature obsolescence under Horizon 2020, and the development of reuse activities as part of the revised Waste proposals. The Action plan acknowledged the role that can be played by Member States, but also regional and local authorities (RREUSE, 2015).

In parallel, the **Eco-design Working Plan 2016-2019** includes actions to develop requirements for



product durability, reparability, upgradeability, design for disassembly, information and ease of reuse and recycling. A circular economy toolbox for Eco-design will also be prepared to help manufacturers. In order to develop the missing standards in the domain, the European Commission has also published calls for the development of new standards.

While the Eco-design directive and EU policy on reparability in general act at the production level, other types of policies have been implemented at the national and local level to boost repair at a later stage of the product’s life-cycle. Tax incentives for the development of repair services and jobs have been introduced in Member States (*see below examples*). Additionally, the development of the repair and reuse sector is being widely supported and is likely to develop in the following years. This is also illustrated by the trend in repair cafés and second-hand shops.

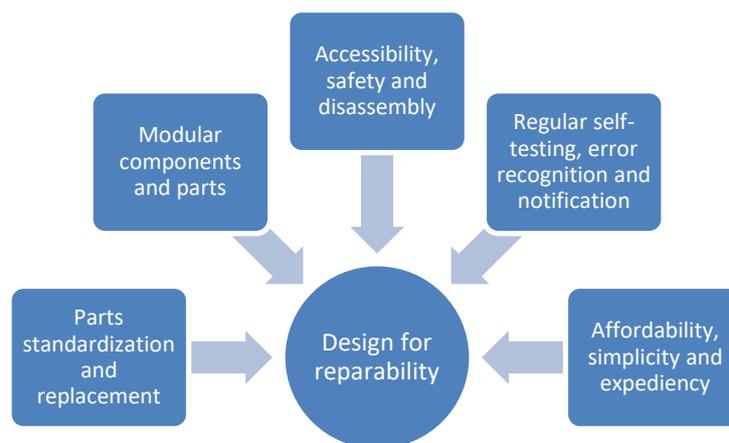
Box 17 Italian policy on smart and circular design

Apart from binding targets, Member States have implemented a number of measures to improve reparability and reuse. In 2016, Italy adopted the Decree 140/2016, which aims to boost reuse and recycling possibilities of electrical and electronic equipment by incentivising producers to adopt eco-design strategies. The objectives include optimising reparability and increasing durability of products. The incentive comes as a possibility for producers to request a reduction of their eco-contribution.

Design for maintainability/reparability

Design for maintainability or reparability prolongs product use, extending its useful lifetime. While this is not directly applicable to local authorities, they have to be aware of the principles of design for reparability in order to be able, for example, to include it as a requirement within Green Public Procurement (GPP). There are multiple elements that designers should consider in this case:

Figure 10 Design for maintainability and reparability



Source: own elaboration

In addition, in order to improve the recoverability and recyclability there are multiple things to consider when optimising the recyclability products. This is especially relevant for local authorities as they are ultimately in charge of waste recycling:



- Recyclable materials
- Limit the number of material types and composites
- Modularity and ease of disassembly
- Limit use of adhesives, dyes, paints and coatings
- Limit or eliminate hazardous materials and contamination

In the absence of legislation, designers and producers are in the position to decide how easy to recover and recycle their products. In line with existing legislation on separate collection and recycling there are huge possibilities for working together with producers in order to improve the recoverability and recyclability of products.

Smart design in the building sector

The design principles described above can be applied by cities in the building sector. In Circular Amsterdam (A Vision and Action Agenda for the City and the Metropolitan Area) the municipality has taken up the smart design concept and has translated it in the following directions:

- Modular and flexible design

In this particular case modular and flexible design means easy adaptability to new users and applications leading to a more functional and durable real estate. Flexibly designed houses can adapt to changing lifestyles. Flexibly designed offices are also more appealing to businesses.

- 3-D printing

New technologies can play a significant role in reducing cost and material use. These can lead to less waste and open up the possibilities to using new, bio-based materials.

- Bio-based materials

Materials with biological origin can be used for construction of smarter buildings. For this purpose cities can use the residues of agricultural activities around the cities. These applications are still in early stages of development but there are more and more examples of efforts in this direction, i.e. generating building composites from bio-waste.

- Experimental construction areas

In order to be able to experiment freely with smarter building design, municipalities have to make the rules more flexible allowing the testing of innovative building designs.

- Dismantling of buildings

The end-of-life of a building is often ignored by local authorities. By organizing building demolition in a smarter way high-quality, reusable materials can be separated. From a smart design point of view decommissioning has to be incorporated early on in the design phase. Efficient separation of waste streams is also needed in order to facilitate recycling and reuse of materials.

Box 18 The example of a company recycling building demolition material



For example, the company SmartCrusher has developed a technique for recovering the sand, the gravel and the cement from concrete. It creates almost climate-neutral new concrete from the concrete waste.

Source: <https://www.slimbreker.nl/smartcrusher.html>

Additional concepts

In the section below we are presenting some additional concepts which could be explored and applied by local authorities when applying Eco-design principles.

❖ Biomimicry

Biomimicry is when designers and policy makers get inspired from nature to address human challenges. The concept revolves around the idea that many of the challenges that business faces have already been solved in nature. From material engineering and product design, to business models and infrastructure development, nature has derived solutions that can spark innovation. The concept can be adapted to the functioning of a city, the construction of buildings, etc. To integrate biomimicry into your design process, answer the following questions:

- What challenge am I trying to address?
- How does nature address this challenge?
- Does this solution account for context (how, where, and by whom the solution will be used)?

❖ Life cycle thinking

Life cycle thinking means considering and minimizing the economic, environmental and social impacts across all stages of a product or process life cycle. It is not simple for companies (as producers) or local authorities (as users) to decide which is the better design alternative. Life cycle thinking could rely on some form of Life Cycle Assessment (LCA), such as:

- Environmental LCA
- Social LCA
- Life cycle cost analysis or total cost of ownership
- Streamlined LCA

The typical life cycle stages companies consider when evaluating the impacts of a product or service are listed below. Transportation between all stages should be included as well:

1. Raw material extraction
2. Material processing
3. Manufacturing
4. Use
5. End-of-Life⁵

⁵ [Life Cycle Initiative, UN Environment & SETAC](#)



Smart Material Choices: Materials play an essential role in a circular economy. Hence, a local authority should have a say on the materials used in city infrastructure projects such as public building renovations; playgrounds for kids; public space renovation, etc. Preference should go to safe ingredients that can be continuously cycled. By designing or using products with materials that come from, and safely flow, into their respective nutrient cycles, one can be part of creating an optimised materials economy that eliminates the concept of waste. (Circular Economy Practitioners Guide)

What can cities do about it? City-level policies/measures/initiatives

Repair and reuse policies can have some territorial implications. Although nation-wide sectors can (and will likely develop), the collect and resell of second-hand products is currently mostly organised at a local level. In Flanders for example, products are collected by the nearest reuse and repair centre⁶, and usually redistributed in the area. Repair services are also locally embedded. In both cases, mapping the surface of the functional urban area helps in establishing centres in the right location

The capacity of regions and cities to set up economic incentives depend on their power and budget. However, they can play a strong role in the management of local relationship between producers, shops, consumers and waste management centres, but also in the testing of policy pilots before they are implemented at a larger scale. In the case of Graz, the pilot benefited from being implemented in a city with a population large enough to show some results, even though Graz is located in a predominantly rural region. It also shows that pilots need not be implemented in one of the most dynamic parts of the country. The link between circularity and eco-design on one hand and the territory on the other hand is visible in the case of buildings, public spaces, etc. (ADEME, 2017).

As described earlier in this section, cities can explore the endless possibilities for making the building and construction sector more circular. They can start by addressing the barriers which, for the time being, make this relatively difficult. These barriers include: financing (it could be more expensive to implement new systems); technological (i.e. 3-D printing is a very recent innovation); conservative approach in the sector; lack of information on design for decommissioning and reuse, etc.

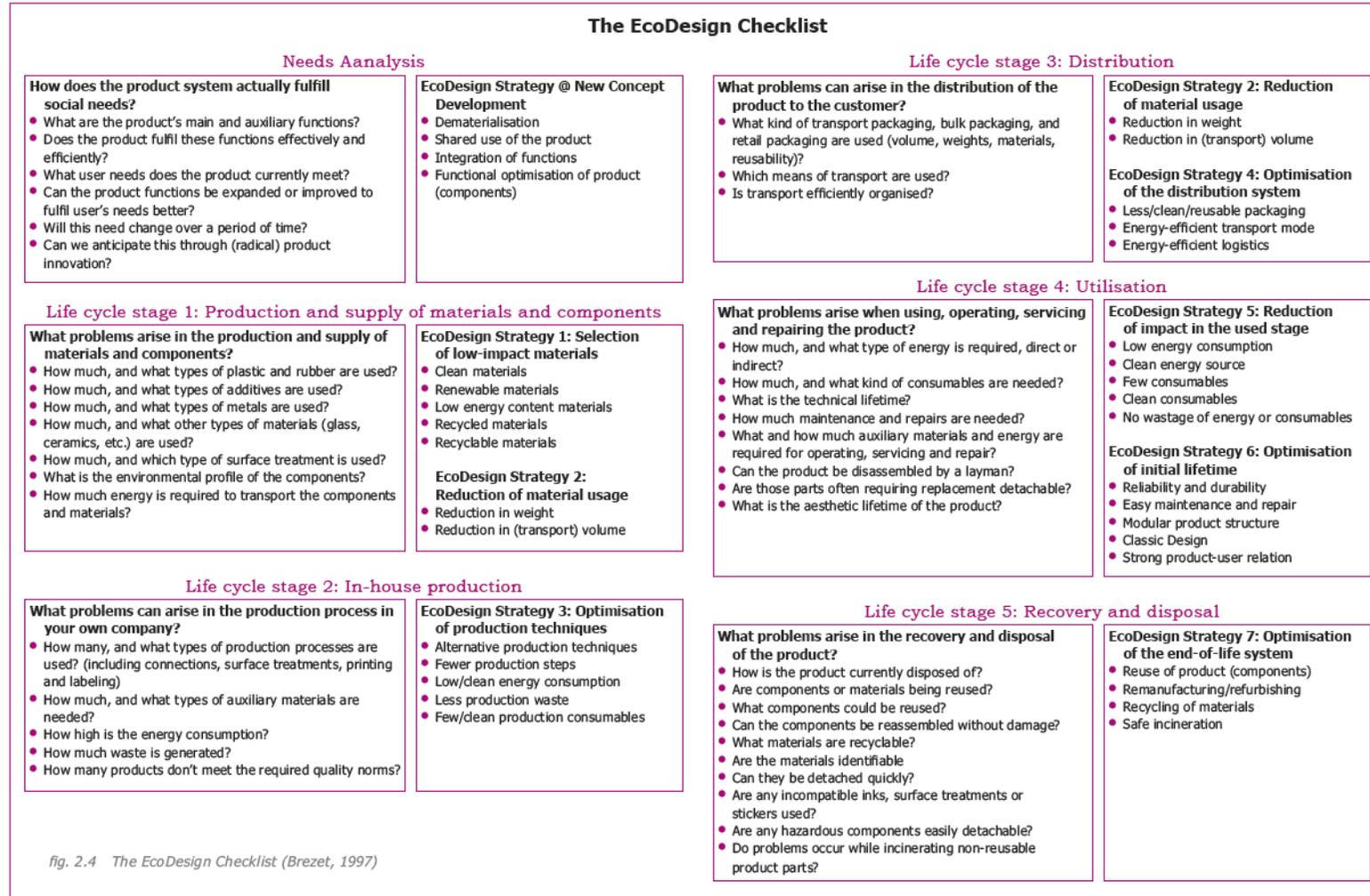
Additionally, cities can explore the following possible actions:

- Assigning pilot projects in new areas
- Tender criteria for smart design principles in soil, road and water construction
- Challenge start-ups to develop solutions for smart design
- Establish procurement criteria for separation for demolition projects
- Initiate dialogue for better dismantling and waste separation in demolition projects
- Encourage local companies in the processing and reverse logistics of waste
- Adjust zoning plans for allow for multi-functional buildings
- Aim for high-value reuse in waste processing contracts
- Initiative a 'materials showroom' for construction waste
- Facilitate the exchange and use of high value building materials
- Encourage companies to use a materials passport

⁶ <https://www.dekringwinkel.be/>



Figure 11 The Eco-design checklist



Source: Delft Design Guide, The EcoDesign Checklist



4. Extending the lifetime of products and materials



Extending the lifetime of products is a central enabler of the circular economy, and reusing products and their components, as well as remanufacturing, is one of its key strategies. Reuse conserves the physical assets of raw materials as well as the energy embedded in products or components.

While in the previous chapter we approached repair and repairability from a smart and circular design point of view here we are sharing several policies which emphasise repair as a business model with social dimensions. Cities has a significant role to play.

To this day, Spain is the only Member State with a national binding target for reuse. Adopted in 2016 as part of the national 2016-2022 waste management plan, it sets a 50% target of all waste to be recycled and prepared for reuse, and a minimum of 2% of furniture, textiles and electrical items to be sent for repair and resale. This follows a previous law which set a 2% reuse target for large electrical goods and 3% reuse target for IT equipment by 2017 (McDowall, 2016).

Apart from binding targets, Member States have implemented a number of measures to improve reparability and reuse. We are sharing some policies and initiatives below.

Examples of policies on extending the life of products

Box 19 Swedish tax refund system

Sweden currently has two main forms of tax-based incentives to increase the use of repairs and in extension increase the life span of products and mitigate consumption of new products. These incentives are one attempt to help steer the Swedish economy from a linear economy to a circular economy and redirect parts of the workforce from production of new products to repair and maintenance. The Swedish RUT, an acronym for the Swedish words for Cleaning, Maintenance and Laundry, enables tax deductions for the cost of labour when employing businesses for domestic work. There are in particular two aspects of RUT of significance for the enablement of a more circular economy. The first is the deduction one can make when conducting repairs of major appliances (such as refrigerators or dishwashers) and the second is the deductions possible when conducting repairs, maintenance or installation of computer- or IT-equipment in or in close connection to your residence. With the RUT-system one has the possibility to make tax deduction of up to 50% of the labour cost. Another form of tax-based incentive is the VAT reduction for services which carries out repairs of bicycles, shoes, leather goods our household linen. The VAT was reduced from 25% to 12% January 1st of 2017.

Source: <https://www.skatteverket.se/>



Box 20 National or sectoral targets for repair and reuse, Flanders

The initiative 'network conscious use of consumer goods' aims at stimulating the reuse and repair of consumer goods. The network organises a variety of projects such as for example: repair meetings and share and trade fairs. The network has a wide reach and is supported by the Flemish regional government. The networks aims to empower the consumer in making a more conscious purchasing decision. The repair meetings take place over the entire country. The initiatives have a regional character and are entirely voluntary.

Besides preventing waste and stimulating reuse the initiative is also working on the general opinion on how to use resources in the most efficient way.

Source: <https://www.bewustverbruiken.be/waarom>

Box 21 Example of Repair cafe

A repair café is a meeting in which people repair household electrical and mechanical devices, computers, bicycles, clothing, etc. They are organised by and for local residents. Repair cafés are held at a fixed location where tools are available and where they can fix their broken goods with the help of volunteers. Its objectives are to reduce waste, to maintain repair skills and to strengthen social cohesion. The first repair café was held in Amsterdam in 2009 and since then has become a global movement. Repair cafes are mainly relevant where the cost of labour is high and where repair through the regular channels usually does not make any sense. One of the most important impacts of the Repair cafes is the change of mentality.

Source: <https://repaircafe.org/en/>

Box 22 Tax-based incentives on repair and reuse in Austria

In general, tax-based incentives for repair and reuse are set up at the national level. However, other economic incentives can be implemented at a regional or local level depending on public budget. In the case of Austria, the reimbursement of repair services was first organised at city level in Graz. In addition, the development of repair and reuse centres, fostering relations between producers and waste management companies, and the support of the repair and reuse community (e.g. repair shops) offers a bigger opportunity for regional and local authorities.

Source: http://www.rreuse.org/wp-content/uploads/RREUSE-position-on-VAT-2017-Final-website_1.pdf

Extending the lifetime of products is also associated with several other debates like the one on fighting premature (or planned) obsolescence together with increasing the durability of products. It includes a wide



range of techniques that certain manufacturers might use to shorten the functional lifespan of products and force consumers to make premature replacements in order to continue selling in saturated markets” (BEUC, 2015),

France is the first Member State to adopt a law on the topic. The Act on Consumption and Prevention of Planned Product Obsolescence (2015), provides for prison and fines up to EUR 300 000 or 5% of annual turnover for companies who have deliberately reduced their products’ lifetime. Cities play little or no role in fighting planned obsolescence.

4.1. Second-hand sale

One successful traditional type of practice (often practice in an urban setting) is the linking of reuse and second-hand sale to social employment policies, offering jobs to lower skilled or long-term unemployed workers. These kinds of synergies are demonstrated by, inter alia, the Kringloop Reuse Centres in Flanders, Belgium, presented below:

Box 23 Second-hand shops grouped in reuse centres, Flanders (Belgium)

Flanders introduced a network of reuse centres in 1992 with the primary goal of preventing waste by reselling discarded products. In more than 140 second-hand shops grouped into 31 reuse centres, products such as textiles, electronics, furniture, kitchen appliances, books, records and bicycles are sorted, repaired and resold (OVAM, 2014). Apart from saving 4 kilograms of waste per inhabitant per year, the network also guaranteed employment to more than 3 800 workers in 2012 (full-time equivalent). The majority of these have been long-term unemployed or have received only limited education, and the network's reuse centres provide them with both a stable income and practical workplace experience. Added to this, the network enables those with limited resources to obtain goods they could otherwise not afford.

Source: <https://www.eea.europa.eu/publications/circular-economy-in-europe>

4.2. Remanufacturing

Remanufacturing is “a comprehensive and rigorous industrial process by which a previously sold, worn, or non-functional product or component is returned to a ‘like-new’ or ‘better-than-new’ condition and warranted in performance level and quality” (Remanufacturing Industries Council, 2017). The essential steps include: disassembly, cleaning, repair/replacement of damaged components, reassembly and testing, although the emphasis on each step will vary by product. The must-have feature for a remanufactured product is the assurance that the quality and performance of the item is like that of a new product. This is where it differs from repair: in repair, only the apparent fault is rectified while in remanufacturing the whole product is prepared for a new life.

Currently, the remanufacturing industry accounts for approximately 2% of the total European manufacturing sector (VDI ZRE 2017) and remanufacturing has been largely focused on the automotive industry (Guidat et al. 2015). However, the EU market potential of remanufacturing



is higher and estimated to be EUR 90 billion by 2030 (ERN 2015), with the option of expanding onto other sectors and products such as the medical sector, aircraft and railway. Thus, remanufacturing is considered not only vital to the EU circular economy objectives, but also to preserving economic growth and employment in a dematerialised economy and making European industries more competitive on a global level. To further encourage remanufacturing business practices, EU support is available through Horizon 2020, Cohesion Policy funds and through the implementation of the Eco-Innovation Action Plan (European Commission 2015).

Box 24 Scottish Institute for Remanufacture

SIR centre of excellence to increase innovation in remanufacturing

The Scottish Institute for Remanufacture (SIR), backed by the Scottish Funding Council and Zero Waste Scotland, is a pan-Scotland centre of excellence to increase innovation in remanufacturing. They aim to do this by stimulating and co-funding collaborative projects that address industry challenges, enabling companies to increase reuse, repair and remanufacture in their manufacturing operations. If innovation or the latest technology could help a company's remanufacturing operations, SIR can match it with the right academic experts from universities across Scotland and through a matched-funding model fostering collaborative projects that apply knowledge, expertise and specialist equipment to operational improvements for Scottish businesses. SIR funding of £5,000 to £50,000 per project is available. SIR pays for the cost of a researcher's time on the project. Companies match the SIR contribution through staff time, equipment or equivalent. The partner university contributes the indirect and estate costs (FTE costs) for the researchers on the project. Alternative funding can be investigated for projects with partners outside of Scotland.

Source: <http://www.scot-reman.ac.uk/>, ESPON CIRCTER project

What can regions do?

There is a need for policy aiming to incentivise companies to manufacture their products for longer life, and develop more schemes to mobilise the customers to return used products. Developing eco-design strategies, such as design for recycling or disassembly, can facilitate remanufacturing and closed loops.

While remanufacturing is largely business-driven and the manufacturing industry a complex ecosystem of various (regional, national, and international) players, regions and cities can play an important role in increasing awareness. For example, public procurement policies can address the procurement of remanufactured products or local events and campaigns can sensitize the public on the benefits of remanufacturing.

Cities can help promote remanufacturing to financial institutions as well as create financial incentives for businesses wishing to take up remanufacturing.

Research plays a vital role in developing new and optimized remanufacturing methods. Thus, close



cooperation between research institutes and manufacturing industries will be increasingly important. National, regional and city authorities can facilitate this cooperation.

5. Regenerative sources - bio-based materials, regenerative water

5.1. Bioeconomy

The bioeconomy has the potential to address environmental and energy challenges by boosting the production of renewable materials and bioenergy. It contributes to the effort of transition towards a more circular and sustainable economy, by the exploitation and utilisation of renewable resources instead of fossil-based ones. Furthermore, the bioeconomy (including the blue bioeconomy in the coastal areas) is a source of growth and jobs. It is an important sector for the EU covering sectors such as agriculture, forestry, fisheries food and chemicals. The scope of the bioeconomy in 2015 was 2.3 trillion EUR and employed some 8.2% of the EU workforce. (EU Strategy, 2018)

The **European Bioeconomy Strategy and action plan** (2012) (updated in 2018) defines the bioeconomy as *‘the production of renewable biological resources and the conversion of these resources and waste streams into value-added products, such as food, feed, bio-based products as well as bio-energy’*.

Box 25 Scope of the bioeconomy

The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services

The strategy is structured around three pillars: 1/ Investments in research, innovation and skills; 2/ Reinforced policy interaction and stakeholder engagement; 3/ Enhancement of markets and competitiveness. The renewed EU industrial policy strategy (adopted in 2017) includes elements to further support the uptake of bioeconomy.

Bioeconomy strategies have been implemented at various territorial levels in Europe. Several countries and regions have adopted national or regional bioeconomic strategies (e.g. Finland, Scotland, Saxony-Anhalt, South-west Netherlands). The approach of each region revolves approach, around its distinctive assets (terrestrial, marine and maritime biological resources) (as one of the driver was the requirement of EU smart specialisation strategies), with a main objective of economic development fostered by the bioeconomy. Each strategy could thus focus on certain types of biomass, or on certain sectors, depending on availabilities and local priorities.

According to the updated bioeconomy strategy bioeconomy deployment will has a significant potential for job creation, notably in coastal and rural areas and with the participation of primary producers. **For urban**



areas, the strategy points out that cities should become major circular bioeconomy hubs, with significant and economy gains. It concerns mostly the management of organic waste. The example of Amsterdam is provided, with the recycling of value organic residue streams that could generate 150 MEUR of added-value per year, create 1,200 new jobs and decrease CO₂ emissions by 60, 000 tonnes.

Whatever the territorial scale, several types of policy instruments can be mobilised to support the development of bio-sourced materials:

- Regulatory measures, for prohibition or obligation. The specific territorial implementation of such measures is often not relevant, as the measures are usually implemented horizontally across EU territories.
- Fiscal and financial measures. It can be financial support (e.g. subsidies, guarantee) or fiscal incentives (e.g. tax exemption). Some measures can be implemented at the territorial level, such as call for projects or R&I support scheme. In its updated bioeconomy strategy, the Commission indicate that regions and municipalities will be mobilised for pilot action to support local bioeconomy development (rural, coastal, urban) through Commission instruments and programmes;
- Procurement measures, to support the uptake of specific products. Some measures can be implemented at the territorial level;
- Communication and awareness raising measures. While the development of norms, labels or certification schemes might be more relevant at a bigger territorial scale, some communication measures can be undertaken at the territorial level;
- Sector organisation measures. The territorial level can be relevant for the implementation of such measures. The development of a regional or local bioeconomy strategy is often linked to the willingness to foster the regional industry, either because it is losing importance (A1) or they are fears that it will do in the near future, and thus that structural changes need to be supported (A3). For instance, in France, the biorefinery of Pomacle-Bazancourt (Burgundy) supported industry diversification and fostered the arrival of new industrial stakeholders. Another example is the on-going development of a local strategy in a sub-territory of the Haut-de-France region, to create new industrial activities in a crisis-affected region. (CIRCTER policy report)

5.2. Bio-plastics

The European Strategy for Plastics in a Circular Economy (2018) supports the development of alternative types of feedstock (e.g. bio-based plastics or plastics produced from carbon dioxide or methane), offering similar performance as traditional plastics. With the upcoming ban of single-use plastics the share of the market for these products will grow exponentially. The strategy also emphasises the importance of labelling, adequate waste collection and treatment. These objectives are in line with the renewed EU industrial policy strategy, with a target of having all plastics packaging placed on the EU market be reusable or recyclable in a cost-effective manner.

At the national and regional levels, it is possible to set specific objectives and requirements for bio-plastics. For instance, France set up a ban on single-use non-biodegradable plastic bags, with a periodic increase of the biodegradable content that may come from biomass. However, the lower the geographical scale, the more difficult to implement such mandatory policies. Indeed, it could generate extra charges for companies operating locally, as they are potentially forced to adopt specific and more expensive solutions. It could also

create confusion for stakeholders, with coexistence of different systems or requirements from various territories. It would thus be recommended that local policies remain non-mandatory, in order for the market to adopt them autonomously.

Link to the EU waste legislation

The revised Waste Framework Directive (in line with the Circular Economy Action Plan) allows biodegradable and compostable packaging to be collected together with the bio-waste and recycled in industrial composting and anaerobic digestion, which has already successfully been implemented in several Member States. By 2023, separate collection of bio-waste is set to be mandatory throughout Europe. Biodegradable plastics verifiably help to collect more bio-waste and ultimately contribute to reaching the new recycling targets.

The Packaging and Packaging Waste Directive acknowledges bio-based and recycled materials are equally viable solutions to make packaging more sustainable. While Member States are encouraged to promote the use of bio-based recyclable packaging and bio-based compostable packaging, the Directive still lacks concrete legislative measures stimulating their use and improving market conditions for such products.⁷

Figure 12 Bio-based plastics



Source: European Bioplastics

Box 26 Properties and applications of bio-based plastics

Properties: Bio-based or partly bio-based durable plastics, so called "drop-in bioplastics", such as bio-based or partly bio-based PE, PET or PVC, possess identical properties to their conventional versions. These bio-based plastics cannot be distinguished from conventional plastics other than by scientific analyses.

Applications: Bio-based plastics, such as starch blends, PLA, bio-PET and bio-PE, are mostly used in packaging applications. They are also used in fibres in the textiles sector. Bio-based acid is suitable for several applications in sports and footwear, automotive, packaging, agriculture, non-woven and fibres applications.

Source: [Bio-Based World News, https://www.european-bioplastics.org/](https://www.european-bioplastics.org/)

⁷ <https://www.european-bioplastics.org/policy/circular-economy>



What can cities do about it?

For the bioeconomy, the territorial perspective is important: indeed, it is linked to the distribution of terrestrial, marine and maritime biological resources. Furthermore, the bioeconomy has the potential to foster the economic development of rural areas, by opening up new opportunities for the agricultural and forestry sectors (e.g. food processing, bio-based industries, bioenergy). The development of local strategies can contribute to identifying priority resources for the territories, settle conflict of usage (e.g. competition between food crops and energy crops) and promote the development of new economic activities by sustaining the transition towards sustainable agriculture and forestry. A local strategy can create the enabling conditions for the development of the territory and can further assist in identifying the public and private resources than could encourage research and development. This recommendation is more suitable for predominantly rural and intermediate regions, as predominantly urban regions can further rely on public transport.

Box 27 Potential gains from recycling organic residue streams

The city of Amsterdam estimates that the better recycling of high value organic residue streams could generate EUR 150 million in added value per year, create new 1.200 jobs in the long run and save 600.000 tonnes of carbon dioxide annually.

5.3. Water reuse

Concept

Numerous regions and cities in Europe are subject to water stress due to over-abstraction. Over-abstraction is caused by irrigation (in the predominantly agricultural areas) and consumer demand including tourism. There is a wide agreement among scientists that, in the future, drought and water scarcity will become more frequent due to climate change and increasing population. According to a 2007 Communication on Water Scarcity and Droughts, over the past 30 years droughts have increased their intensity in the EU and at least 11% of the European population and 17% of its territory have been affected by water scarcity .

The potential role of treated wastewater reuse as an alternative source of water supply is well acknowledged and incorporated in international, European and national strategic documents. UN Sustainable Development Goal on Water (SDG 6) specifically targets a substantial increase in recycling and safe reuse globally by 2030. Water reuse is a top priority area in the **Strategic Implementation Plan of the European Innovation Partnership on Water**, and maximisation of water reuse is a specific objective in the Communication "**Blueprint to safeguard Europe's water resources**".

Applications

There are several immediate applications of reused treated wastewater and these are:

- crop and landscape irrigation (mainly relevant for countries in Southern Europe);
- industry (relevant for all countries and mainly used by chemical industry, the steel and metallurgy industries, the pulp and paper industry);
- fire extinction (idem);
- aquifer recharge (idem);
- urban non-potable use (increasing pattern in Austria, Belgium, Italy Switzerland).

In an urban context several applications of reused water for irrigation are of the highest relevance:



irrigation for parks and green spaces; fire-fighting; golf courses; road washing; etc.

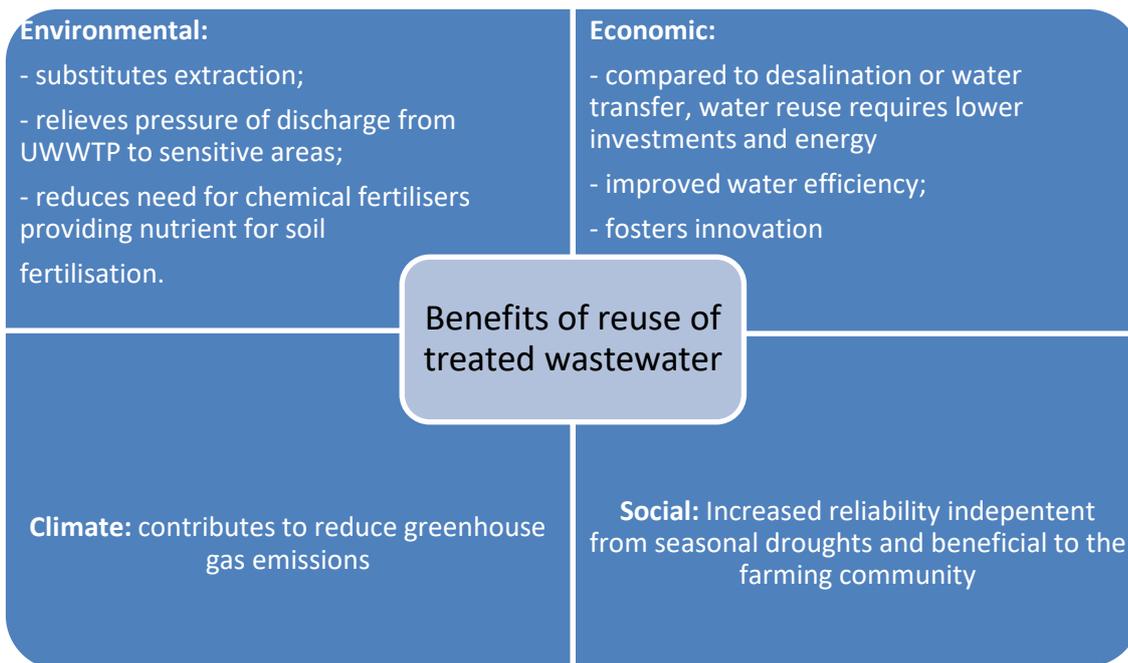
Box 28 Example of reuse of treated waste water for municipal use in Spain

Tres Cantos is a “satellite city” of Madrid, with around 40,000 inhabitants. As it has expanded, the construction of WWTPs has included the provision to treat water for reuse⁴⁰. Currently, the WWTP has a treatment capacity of 37,000 m³ per day. The advanced treatment for reuse supplies 3,000 m³ per day for the municipal area, where it is used for irrigation of green spaces such as parks. Previously, water from the drinking water supply was used for this purpose.

Source: <http://www.iaqua.es/noticias/reutilizacion/14/07/11/tres-cantos-ya-riega-los-parques-de-la-ciudad-con-agua-reciclada-51951>

Benefits

Figure 13 Benefits of water reuse



Source: own elaboration

In addition, water reuse is expected to become an important part of the EU water sector and holds significant potential in terms of creating green jobs in the water industry. At present, about 1 billion cubic metres of treated urban wastewater is reused annually, which accounts for approximately 2.4% of the treated urban wastewater effluents and less than 0.5% of annual EU freshwater withdrawals. However, the potential is much higher.

EU and national policies

Both southern Member States such as Spain, Italy, Greece, Malta and Cyprus and northern Member States like Belgium, Germany and the UK already have in place a number of initiatives regarding water reuse for



irrigation, industrial uses and aquifer recharge. Cyprus and Malta already reuse more than 90% and 60% of their wastewater respectively, while Greece, Italy and Spain reuse between 5 and 12% of their effluents, clearly indicating a huge potential for further uptake.

Box 29 Examples of national policies driving water reuse in EU countries

- water consumption for industries is limited to a value which could be reached only through recycling water (Austria);
- There are standards for treated wastewater reuse with quality criteria for irrigation. These standards are stricter than the WHO Guidelines and take the specific conditions of Cyprus into. These criteria are followed by a code of practice to ensure the best possible application of the water for irrigation (Cyprus)
- High water prices encourage industries to recycle process and cooling water. One of the best known examples is the industrial symbiosis of Kalundborg where several companies mutually provide and recycle wastewater (Denmark)
- Health Authorities issued in 1991 the “Health Guidelines for reuse, after treatment, of wastewater for crop and green spaces irrigation” (CSHPF, 1991) French Guidelines impose a stringent monitoring of the microbiological and chemical quality of reclaimed waters. Financial incentives have been available from the Catchment Authorities for reuse projects in industry that demonstrate an environmental benefit (France)
- Four regional areas in Germany provide subsidies for rainwater reuse and rainwater catchment is included in building Regulations with a fee for discharging rainwater into the sewer. (Germany)
- Very stringent hygienic requirements for reused water for irrigation which pushes up the cost and makes it difficult to practice (Italy)
- With the Dutch Government imposing taxes and limits on aquifer abstraction to reinstate original groundwater level, industrial wastewater reuse is becoming increasingly interesting (Netherlands)
- Reused water for irrigation is practiced but strictly regulated. Guidelines exist. (Portugal)
- Financial incentive for industry to reuse wastewater through tax reductions under the previously applied for energy efficiency schemes (UK)

Source: EU, 2013, Typsa, Updated Report on Wastewater Reuse in the EU

1) Reuse in integrated water planning and management

There is a need to better integrate water reuse in water planning management. Water reuse is a way to address water scarcity and achieve good status under the Water Framework Directive. It can also be considered as a measure under the Urban Waste Water Treatment Directive. Therefore, in 2016, the European Commission published guidelines on Integrating Water Reuse into Water Planning and Management in the context of the WFD. They contain they contain recommendations on how to better integrate water reuse in water planning and management within the EU policy framework.

2) Minimum quality requirements for water reuse in irrigation and aquifer recharge

One of the obstacles for the more tangible take-off of wastewater reuse is the lack of comprehensive legal framework. Despite the fact that some MS have developed standards they differ from each other. This might potentially lead to distrust among the public and trade restrictions with agricultural goods. Therefore, the Commission proposed in 2018 **legislation on minimum requirements for water reuse in irrigation and aquifer recharge**. It has not been approved yet.



3) Water reuse in industrial activities

Industrial water reuse is already a common practice in many sectors. The European Commission will look into further integration of water reuse in the development and review of the [Best Available Techniques Reference Documents \(BREFs\)](#) under the scope of the [Industrial Emissions Directive\(2010/75/EU\)](#) and the [Sectoral Reference Documents on best environmental management practice \(BEMP\)](#) as part of the EU Eco-Management and Audit Scheme (EMAS) for relevant sectors.

4) Support to research and innovation in water reuse

Water reuse and associated wastewater treatment continue to be the object of research and innovation namely the improvement of treatment facilities, development of smart technologies and reduction in energy consumption. Within the [European Innovation Partnership \(EIP\) on Water](#), several action groups set up in recent years address water reuse, such as: [Industrial Water Reuse and Recycling \(InDuRe\)](#), [Water & Irrigated agriculture Resilient Europe \(WIRE\)](#), [Real Time Water Quality Monitoring \(RTWQM\)](#), [Verdygo - modular & sustainable wastewater treatment](#). Funding opportunities are also available within the European Regional Development Fund (ERDF) in line with the regional smart specialization strategies (RIS3). Specific calls on water reuse in the context of the circular economy are launched with Horizon 2020. Projects can be supported by [LIFE \(Programme for the Environment and Climate Action\)](#). Water reuse is subject to the first [Innovation Deal](#) signed in 2017. This voluntary cooperation between the European Commission and 14 partners from national and regional authorities, universities, knowledge centres, innovators and end-users **addresses existing regulatory barriers to innovation in this sector.**

5) EU funds for investments in water reuse

EU funding for water reuse infrastructure is **already available** under the ERDF, the Cohesion Fund (CF) and the European Agricultural Fund for Rural Development (EARDF). For the upcoming programming period Member States are encouraged to prioritise water reuse investments in their Operational Programmes. As an example, water reuse is included in the [Thematic Guidance Fiche on Water Management](#) as a **key priority for investments in the water sector and action of high European added value** for the ERDF and the CF. Investments in water reuse infrastructure can also be eligible for the [European Fund for Strategic Investments \(EFSI\)](#).

Examples

Box 30 Innovation Deal on Sustainable wastewater treatment combining anaerobic membrane technology (AnMbr) and water reuse

The Innovation Deal is about the shift from the conventional treatment of urban waste water to using it as a water resource.

The anaerobic membrane technology accelerates treated water reuse for irrigation by facilitating the extraction of energy and nutrients. The intense reuse of treated waste water will contribute to overcoming the challenge of water scarcity. In the list of innovators and authority stakeholders it is possible to find all kinds of stakeholders such as water ministries and utilities, research institutes and others: Confederación Hidrográfica del Júcar (Spain); Portuguese Waters; Sustainable Energy and Water Conservation Unit and Water Services Corporation (Malta); Conselleria de Agricultura, Medio Ambiente, Cambio Climático y



Desarrollo Rural (Spain); Public Entity on Wastewater Treatment (Spain); Valencia University and Politecnical University (Spain); New University (Portugal); Institut Européen des Membranes and Laboratory on Environmental Biotechnology (France); H2020 SMART Plant project consortium; ECOFILAE (France); and Canal de Riego del Río Turia (Spain).

Source: <https://ec.europa.eu/research/index.cfm?pg=newsalert&year=2017&na=na-070417>

How to get started?

- Integrate water reuse in planning documents such as River Basin Management Plans; Drought Management Plans; land-use planning; irrigation plans; water supply and sanitation plans.
- Compare costs with other alternatives and define how these compare to the benefits. Determine the funding sources for the development of the operation. Who pays and who benefits?
- Determine which (legally binding) standards for the quality of reused water will be used and if national ones are not available use the guidelines of the World Health Organisation (WHO).
- Ensure practical application of standards to all relevant parties through an active communication campaign
- Develop inspection plans and programmes targeting with priority those activities which present the greatest risk to health.
- Engage with stakeholders and discuss possible legitimate public concern.

Box 31 Engaging with stakeholders in Milan

Since its operations began, the Nosedo and San Rocco WWTPs have been open to scheduled visits, particularly for schools or educational institutions and citizens from various local or non-local associations. Environmental awareness from citizens and schools is fostered through guided visits of the treatment plants. In particular, local non-profit associations have developed, in cooperation with staff of the purification plant of Nosedo, an educational pathway related to the agricultural and food environment with visits to the plant. Occasionally, farmers hold their meetings at the plant's conference room.

Several local politicians, representing the Milan town administration, province or the Lombardy regional administration, hold meetings with enterprise unions, citizens, farmers or environmental associations, in order to discuss environmental requalification, agriculture development, food safety or energy reuse. Environmental associations also organise their meetings in the plant's conference room to address issues regarding water and its reuse, as well as different environmental matters related to the research sector.

Source: *Mazzini et al, 2013*

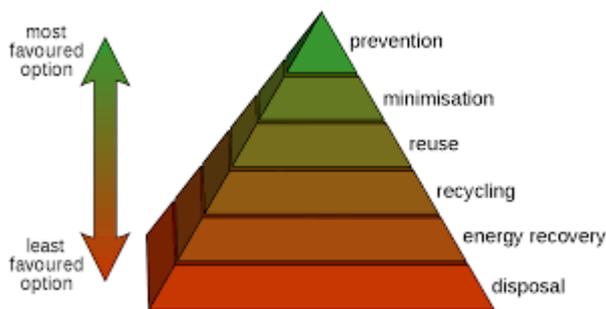


6. The Waste as a Resource

The overall impact of waste-related policy on the circular economy is significant. All efforts in terms of policy and initiatives to prevent the generation of different categories of waste fit into the notion of circular economy despite the fact that there is no closing of the loop per se.

The objectives and targets set in European legislation have been key drivers to improve waste management and create incentives to change consumer behaviour. The overarching logic guiding EU policy on waste is the waste hierarchy, which prioritises waste prevention, followed by preparing for reuse, recycling, other recovery and finally disposal, including landfilling as the least desirable option.

Figure 14 Waste hierarchy



This should help Europe to extract more value from the resources it uses, reduce negative impact on the environmental associated with waste management and create jobs.

6.1. Recycling

Recycling is a well-established eco-industry for processing materials (already considered waste) to obtain new materials of different quality levels (depending on the technological process applied). In the EU, the Waste Framework Directive sets a target of 50% of selected materials in household and similar waste to be recycled and prepared for reuse by 2020 by each EU Member State for at least four categories (i.e. paper, glass, metals, plastics) of waste. The Circular Economy Package also includes ambitious targets related to recycling as illustrated below:

Box 32 New recycling targets as per the [revised legislative framework on waste](#) adopted in July 2018

The framework that entered into force in July 2018 sets clear targets for reduction of waste and among which for recycling:

- A common EU target for recycling 65% of municipal waste by 2035;
- A common EU target for recycling 70% of packaging waste by 2030;

There are also recycling targets for specific packaging materials:



- Paper and cardboard: 85 %
- Ferrous metals: 80 %
- Aluminium: 60 %
- Glass: 75 %
- Plastic: 55 %
- Wood: 30 %

Other important targets:

- A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2035;
- Separate collection obligations are strengthened and extended to hazardous household waste (by end 2022), bio-waste (by end 2023), textiles (by end 2025).

Source: Revised legislative framework on waste

Recycling rates – the amount of waste recycled as a share of waste generated – can be calculated from regularly reported European waste data for several waste streams. The amount of municipal waste being recycled has been steadily increasing in Europe thanks to investments in appropriate collection and handling, financial incentives to move away from landfilling of waste and landfill bans. It is to be noted that the data include all forms of material recovery, with no distinction between down-cycling, recycling or up-cycling. The performance of EU Member States on the recycling of municipal waste varies. Despite the progress being made in nearly all since 2004, in a number of Member States significant efforts are still needed to achieve the 2020 target.

With regards to the material flows in the recycling loop, abiotic technical materials (such as metals and minerals) and biological materials should be distinguished. In practice, technical and biological materials are often mixed, which has implications for biodegradability and recyclability. Furthermore, using more biological materials may exert additional pressure on natural capital, with impacts on ecosystem resilience.

Driven by EU waste policies many EU Member States took steps to introduce and pursue ambitious recycling targets. Examples of these are presented below.

Box 33 Examples of recycling targets adopted by EU Member States

- Recycle 50 % of organic waste, paper, cardboard, glass, wood, plastic and metal waste from households by 2022 (Denmark)
- Recycle 70 % of paper, cardboard, glass, metal and plastic packaging from the service sector by 2018 (Denmark)
- Recycle 60 % of organic waste by 2018 (Denmark)
- Recycle 80 % of phosphorus in sewage sludge by 2018 (Denmark)
- Recycle some 50 % of all municipal waste for materials and use 30 % for energy recovery by 2016, with not more than 20 % of the total deposited in landfill (Finland)
- Replace 5 % of the gravel and crushed stone used in earthworks with industrial and mining waste by 2016 (Finland)



- Increase the share of recycled quarry materials from 6 % to more than 10 % of domestic production within the next 10-15 years (France)
- Recycle 80 % of collected waste by 2030 (Latvia)
- Recycle at least 85 % of industrial waste by 2015 (Netherlands)
- Recycle at least 95 % of construction and demolition waste by 2015 (Netherlands)
- Recycle and compost 45 % of household waste by 2016 (Northern Ireland, United Kingdom)
- Recycle 60 % of household waste by 2020 and 70 % of all waste by 2025 (Scotland, United Kingdom)
- Recycle 70 % of industrial and commercial waste by 2024/25 (Wales, United Kingdom)
- Recycle 70 % of municipal waste by 2024/25 (Wales, United Kingdom)
- Recycle 90 % of construction and demolition waste by 2019/20 (Wales, United Kingdom)

Source: European Environmental Agency,

<https://www.eea.europa.eu/publications/more-from-less>

What can cities do?

Waste collection and recycling are two of the responsibilities most often associated with the local level. Improved waste collection can be the first step towards a circular economy but many cities and regions are taking further steps, for example related to extended producer responsibility or transformation of waste into secondary raw materials and separate collection of different types of waste.

When it comes to progress to circular economy from materials perspective some of the policy questions that cities need to consider are the following:

- Is waste increasingly recyclable?
- How far do the materials keep their value in the recycling process avoiding downscaling?
- How far is the recycling system optimised for environmental and economic sustainability?
- Are materials designed to be recycled avoiding pollution from recycling loops (link to eco-design)?

Attention therefore needs to be paid to extending the quality and value of recycled material, starting from the design of materials and products. More innovation and increased efficiency are also required at all stages of the recycling system: collection, pre-treatment and processing.

In France, there is an interesting example of an award targeted at different types of territories - Territoires Zéro Déchet Zéro Gaspillage (TZDZG)⁸. (Territories with Zero Waste and Zero Wasting) bringing together the waste issue with the territorial dimension.

⁸ <https://www.ecologique-solidaire.gouv.fr/territoires-zero-dechet-zero-gaspillage>



6.2. Waste heat recovery

Waste heat recovery is the process of capturing heat from waste streams of existing industrial processes and using this heat directly. It is also possible to upgrade it to a more useful temperature, and/or converting it to electrical power or cooling. The energy generated from heat recovery, if not required by the process or industrial site can be exported to neighbouring facilities or to electrical or heat distribution networks. Waste heat recovery results in energy savings and greenhouse gas emission reductions. There is increasing interest in the development and application of heat recovery systems. Key drivers are the national regulatory requirements with regards to emissions and emission reduction targets, increased energy costs and energy security considerations. Technological improvements and innovations are essential for enabling European industries to benefit from these developments. Efforts should focus on improving the energy efficiency of heat recovery equipment and reducing installed costs.

Better use of waste heat represents a significant source of energy savings for industries. In a context of reducing greenhouse gas emissions and introducing the concept of circular economy in heat management in view of industrial process electrification, European industries have a clear interest in finding new ways to capture the heat produced by their process and to reuse it or to produce electricity.

A vast amount of waste heat is produced in urban areas from a range of local sources (e.g. from metros, large buildings, extensive ventilation systems) and from urban waste or waste-water systems. Thermal energy captured can be supplied through individual central heating and cooling systems or distributed through district heating and cooling networks to multiple buildings. In some cases, it might be needed to combine the recovery of waste heat with different technologies, (e.g., heat pumps) in order to bring the temperature level of the waste heat to those matching the existing heating and cooling applications addressed in the proposal.

In urban areas there is significant potential for waste heat and waste-water heat recovery, in services sector and transport system facilities and their connection and integration into the existing heating and cooling supply systems in buildings/facilities or district heating/cooling systems. To achieve this, there is a need to develop sustainable business models and organisational, managerial, and financial solutions for deployment of the proposed technological solutions in the EU, with due regard to the legislative framework. [v1]

Under Horizon 2020 Programme EU is supporting research activities related to waste heat recovery. One of these projects is [I-ThERM](#) which is aiming to investigate organisational, technoeconomic and socioeconomic barriers to the wide adoption of advanced heat recovery technologies and ways of overcoming them and identify streams of waste heat from industrial processes in the EU 28 and potential for energy recovery.

6.3. Upcycling

Value Recovery Models focus on maximising recovery and recycling of products and materials after use into new products or useful resources in order to reduce wastage and conserve resources. The development of reverse logistics, i.e. the return from point of consumption to the point of production, is essential for this model. It should be considered that for some materials, recycling



involves a loss of quality and for products also loss of design, and technical and energy inputs. Acknowledging this, difference can be made between downcycling, which results in lesser quality and reduced functionality, and upcycling. **Upcycling is a process of transforming by-products and waste into new materials or products of higher quality than the original one or better environmental value.**

Box 34 Producing newly designed furniture from waste and abandoned materials: experience of Api'Up Association (Nouvelle Aquitaine region, France)

The focus of the activity of the association is the production of a series of new furniture from waste and abandoned materials which are collected following an upcycling logic. In addition, the association aims to raise awareness of sustainable consumption and production. The material is collected in the local area, sorted and transformed to obtain wooden panels that are used to create a specifically designed collection of furniture, which adds value to the waste material used. Api'Up is also involved in social inclusion projects and advocates for the preservation of local skills and traditional know-how in carpentry and sewing.

The activities of the association started in 2012, when an interest in upcycling started to emerge. Nowadays the association works primarily with wood, but it is performing several tests to use textile and leather. Financial support was received from European funds, national funds, Region of Aquitaine Limousin Poitou-Charentes, Landes department, urban centers, Aquitaine Active and banks. The project resulted in the creation of new jobs. Half of the collected waste was treated towards a more environmentally responsible recycling and the other half was upcycled or reused.

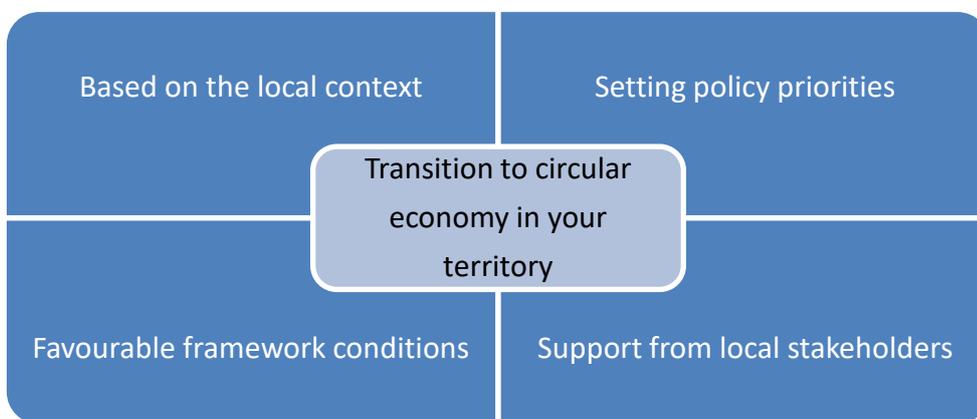
The experience of Api'Up is interesting for two aspects: one is related to the products created and the other to the philosophy behind it. Many other recycling and upcycling activities exist; however, they consist mainly in reaggregation of different pieces of furniture to create new ones. Api'Up instead transforms old pieces of furniture to obtain again wooden panels from which new furniture is created following a defined design style. In addition to this, the activities of Api'Up are closely connected to the local territory.

Sources: <http://www.dudechetaudesign.com/>, *Interreg Europe RETRACE project*

IV. Towards a Comprehensive CE strategy in your territory. Planning for circular economy.

The transition to a circular economy is place-specific. It depends on the structure of the regional and local economy, on the existing policy mix (national legislation and local incentives) as well as on cultural and behavioural factors. The transition to the circular economy is a complex process requiring multi-sector and multi-governance effort requiring the buy-in, the efforts and the backing of numerous stakeholders. The circular economy also requires changes in the current production and consumption system and as such it is conditioned by a number of policy interventions. This transition often has both winners and losers therefore when addressing the change on a local level different trade-offs are to be carefully explored and properly communicated.

Figure 15 Building blocks of the transition to a circular economy



The transition to the circular economy is often hampered by a number of lock-ins which should be addressed individually:

- Lack of systemic vision;
- Unfavourable policy framework;
- Vested interests;
- Risk-averse organisational models;
- Practices of producers and consumers

In the following sections we will present approaches and techniques for addressing the above lock-ins and obstacles.

1. Assessing local context and potential





The circular economy depends to a certain extent on the availability of natural assets. Before embarking on the road to transition to the circular economy, it is paramount to analyse the local potential, resources and capabilities. It is also important to have a very clear idea of potential obstacles and blockages.

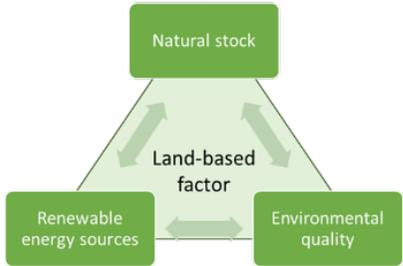
Box 35 Cities and their territorial capital

Cities and regions should make use of the territorial capital. They hold significant assets that are key building blocks on the road to a circular economy. This capital varies across territories (geographical location, natural resources, social capital and institutions, etc.), their economic role in the cities and regions, and how much they can be leveraged to foster transition to the circular economy. Being able to realise the potential of the territorial capital depends on a number of factors including policy, institutions, political will and the financial context.

The analysis of the local context and potential could be guided by the below framework including assessment elements, guiding questions and presentation of the assessment. The framework starts with a number of guiding questions asked by categories of assets. For each category of questions, we introduce the types of indicators measuring the relevant territorial feature and also the potential use of the indicator. This framework will give the baseline of the territory which will represent its starting point and on which it will base prioritisation and future policies and actions.



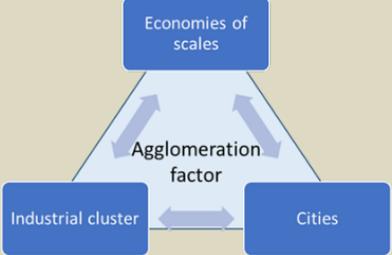
Table 2 Methodological framework for analysing the local context in the context of a transition to circular economy

Assessment elements	Guiding questions	Presentation of the assessment	Potential use
A. Physical (land-based) endowment of the city	<ul style="list-style-type: none"> What are the natural resources (land, water, timber, minerals, solar radiation, wind, biomass, etc.) on the territory of the city or in peri-urban areas? What ecosystem/environmental services are available on your territory? 	<p>Indicators of material and energy resources and description of ecosystem services that support economic activities in your territory.</p>  <pre> graph TD NS[Natural stock] --> LF[Land-based factor] RE[Renewable energy sources] --> LF EQ[Environmental quality] --> LF LF <--> RE LF <--> EQ RE <--> EQ </pre>	<p>Enabler for bio-based materials</p> <p>Type of renewable energy which could be produced</p> <p>Possibility for ‘circular brown use’</p> <p>Baseline for monitoring and reporting</p>
B. City performance	<ul style="list-style-type: none"> What is the performance of the city in terms of resource productivity/ efficiency? How dependant is it on the import of resources (raw materials, energy resources, etc.)? 	<p>Indicators on resource/water/energy productivity (GDP/domestic material consumption, GDP/ water consumption, GDP/gross energy consumption).</p>	<p>Baseline for monitoring and reporting</p>
C. Business capabilities	<ul style="list-style-type: none"> What are the capabilities and competitive advantages of local industries and SMEs in areas related to the circular economy and sustainability? How dynamic is the local entrepreneurial environment in relation to developing circular businesses? Are there any new 	<p>Based on expert analysis and consultation with stakeholders, define and describe whether local industries and SMEs have the necessary knowledge and expertise to start CE activities, and whether there are CE technology providers</p> <p>Describe if there are any start-ups focusing on CE innovations. Present the opinion of local experts and</p>	<p>Baseline for monitoring and reporting</p> <p>Potential for disseminating good practices and inspiring others</p>

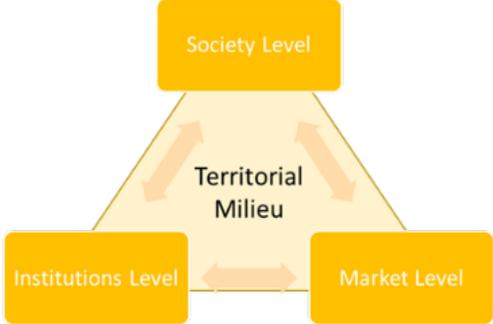


	<p>businesses, start-ups, business models?</p> <ul style="list-style-type: none"> • Number of companies with eco-innovations <p>—</p> <ul style="list-style-type: none"> • How many companies are EMAS-certified? • How many eco-labels are there on the territory of the city? 	<p>stakeholders on innovation and entrepreneurship environment in the region/city.</p>	
D. Capabilities of knowledge organisations	<ul style="list-style-type: none"> • What is the existing expertise and knowledge in the city, including research and innovation (R&I) capacities such as those within universities, which relate to circular economy, eco-innovation and sustainability? • Are there any skills in the city related to the circular economy? 	<p>Describe if local academic organisations have been dealing with CE-related R&I activities, and if they have any projects, publications, patents.</p>	
E. Industrial potential	<ul style="list-style-type: none"> • What are the potential for circular economy activities in the different economic sectors? 	<p>Based on the expert analysis and consultation with stakeholders, define and describe whether any CE activities (R0- R9) are appropriate in the local industries.</p> <p>Start with the most problematic ones or the ones with the highest potential</p> <p>If available, present indicators on waste streams from each industry</p>	<p>Develop specific sectoral approaches</p>
F. Agglomeration-related potentials	<ul style="list-style-type: none"> • Is there a ‘critical mass’ for circular activities to benefit? E.g. are there compact cluster of industries that can potentially 	<p>Complement analysis on industries (above) with the qualitative review based on expert analysis and consultation with stakeholders</p>	<p>To be used for prioritisation</p>



	<p>benefit from resource sharing, exchange, efficiencies, symbiosis?</p> <ul style="list-style-type: none"> • Can the existing agglomerations/proximities (urban, industrial, etc.) potentially offer “closing material loop on the territory” and enable economies of scale? 	<p>Identify the industrial clusters in the territory, collect and present their views on potential resource sharing, exchange, collaboration.</p> 	
<p>G. Accessibility</p>	<ul style="list-style-type: none"> • Is the city well connected internally and with other locations with which resource and side stream exchange can be set up? • Is the existing transportation and logistics infrastructure sufficient for potential CE activities and projects? 	<p>Accessibility and logistics infrastructure review can be done as part of the industry analysis.</p> <p>Additional consultation with stakeholders will help to map all logistics infrastructure connecting the region/cities internally and with other territories and industrial/economic zones.</p>	
<p>H. Explore trade-offs and define winners and losers</p>	<ul style="list-style-type: none"> • Who are the winners and the losers from the transition to the circular economy? • Would the loss of a specific source of revenue be replaced by another potential gain? • What does it take to make CE champions out of winners? 	<p>Based on analysis</p>	<p>Engage the winners as champions of CE</p> <p>Manage the losers</p>



<p>I. Territorial milieus</p>	<ul style="list-style-type: none"> Are there interactions happening over time between companies and residents living in the immediacies? 	<p>Based on expert analysis and interviews with companies</p>  <p>The diagram illustrates the 'Territorial Milieu' as a central concept within a light yellow triangle. At the top vertex is a yellow box labeled 'Society Level'. At the bottom-left vertex is a yellow box labeled 'Institutions Level'. At the bottom-right vertex is a yellow box labeled 'Market Level'. Double-headed arrows connect each of these three levels to the others, indicating mutual interaction and influence.</p>	<p>Build upon the momentum created by such interactions</p>
<p>J. Technological lock-ins</p>	<ul style="list-style-type: none"> Are there any technological lock-ins in your city such as waste-to-energy facilities? 	<p>Based on local knowledge, analysis and meetings</p>	<p>Design strategies for overcoming technological lock-ins</p>

Source: Inspired by ESPON CIRCTER Policy Guide



2. Analysis of enabling and hindering factors



In addition to knowing the contextual situation in the territory it is also important to understand what can hinder or intensify the circular economy transition in order to efficiently address the barriers and build on existing drivers in the envisaged strategy and actions.

The widely applied framework for analysis of barriers and drivers differentiates factors of economic, regulatory, socio-cultural/behavioural and technological/knowledge origin. In the second column of the table we have singled out a non-exhaustive sample list of drivers/barriers. We have not separated drivers and barriers in two column as in the majority of the cases the (non-)availability of a policy or an incentive may be a driver while the opposite represents a barrier. In the right-hand column of the table there are examples of policies which address the corresponding driver/barrier.

While we are not in the position to list all possible drivers and barriers for the sectors presented in this guide what is important is the methodology of analysis. Drivers and barriers will be context-specific and should be developed (as well as the solutions) in the process of a dialogue with local stakeholders.

It has to be noted that often the solution to a problem is only in the hands of the national authorities and in such a case the only useful initiative of the local authority would be to draw the attention to the issue and eventually trigger action from the national authority.

An alternative methodology to analysing drivers and barriers could be the SWOT analysis whereby drivers should become strengths and barriers should become weaknesses. Opportunities lie in acting on and amplifying the drivers and addressing the barriers through policies, initiatives and dialogues. Threats lie in obstacles deepening because they have not been addressed.



Table 3 Framework of analysis of drivers for and barriers to the transition to the circular economy at local level and corresponding city-level policies

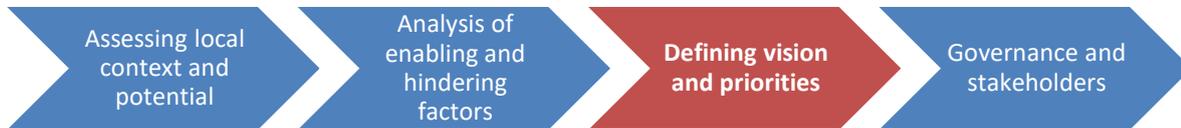
Types of barriers and drivers	Examples of CE drivers and barriers	What can cities do about that?
Economic	<p><i>Drivers:</i></p> <ul style="list-style-type: none"> • Economic savings • Profit increase • Funding/investment sources for CE businesses or initiatives • new market/business opportunities • attractive prices for circular products and services <p><i>Barriers:</i></p> <ul style="list-style-type: none"> • no or limited returns from investment • limited market for recycled products • high prices for imported or raw materials 	<ul style="list-style-type: none"> • City-level programmes could keep educating companies in a multitude of ways and should keep demonstrating to other companies and society the benefits of the transition to the CE • Work with financial institutions and EU programmes to channel more funding into circular economy initiatives • Cities can do little or nothing about it
Regulatory	<p><i>Drivers:</i></p> <ul style="list-style-type: none"> • High charges for waste/high landfill taxes • Tax benefits for green activities • charges, taxes on unsustainable/harmful activities <p><i>Barriers:</i></p> <ul style="list-style-type: none"> • subsidies for traditional polluting/inefficient activities (e.g. for coal, water and energy costs) • no ban of specific products (e.g. single use plastic) • Rigid 'end of waste' criteria preventing repurposing waste streams for recycling, reuse, remanufacturing, etc. 	<ul style="list-style-type: none"> • Cities could gradually increase waste landfill charges to steer waste away from the landfill at the same time ensuring predictability for businesses and households and tightening enforcement • Green activities could be exempted from local taxes
Behavioural/socio-cultural	<ul style="list-style-type: none"> • CSR culture and leadership in companies • Awareness of consumers 	<ul style="list-style-type: none"> • Development of CSR support programmes: integrate CSR in relevant city policies; ensure political support and buy-in for CSR; enhance CSR partnership and network; development of a sectoral CSR pilot project; use ESIF funds



	<ul style="list-style-type: none"> • Level of entrepreneurial culture 	<p>for CSR and circular economy activities; develop CSR support tools.</p> <ul style="list-style-type: none"> • Develop awareness programmes for citizens and households on transition to CE, CE business models, etc. • De-risk certain circular economy endeavours by providing financial and in-kind support
Technological/ knowledge	<ul style="list-style-type: none"> • Qualified staff, local experts • R&I capabilities in companies and universities • Research, testing, piloting infrastructure 	<ul style="list-style-type: none"> • Develop educational programmes for managers and employees in different high-priority sectors • Establish partnerships with (local) universities and provide a platform for linking science and business



3. Defining vision and priorities



The analysis of the local strengths allows the identification of the areas with the highest potential for development. This analysis is enriched by the review of drivers and barriers. The two together would lead to the formulation of a vision for the territory and also a set of policies and initiatives to be undertaken in order to move in the direction of the vision.

Prioritisation need to take place both in terms of sectors of the national economy (NACE) and also in terms of business models to focus on. For example, while industrial symbiosis is a new business model it is not a sector itself and is relevant to different sectors of the economy.

While defining the sectors to concentrate on during the transition to the circular economy it would be worthwhile to start with the Regional Innovation Strategy for Smart Specialisation (RIS3). Usually, the sectors in the strategy have been defined based on a detailed economic analysis and stakeholder consultation. The integration of the transition to the circular economy and RIS3 will be very important in the context of European Structural and Investment Funds (ESIF) for the period 2021-2027. Local authorities are encouraged to analyse and integrate priority sectors for circular economy with other sectoral strategies (i.e. National/regional/local Waste Management Plan for waste; bioeconomy strategy for bio-regenerative sources; water management strategy or water catchment plans for water reuse, etc.).

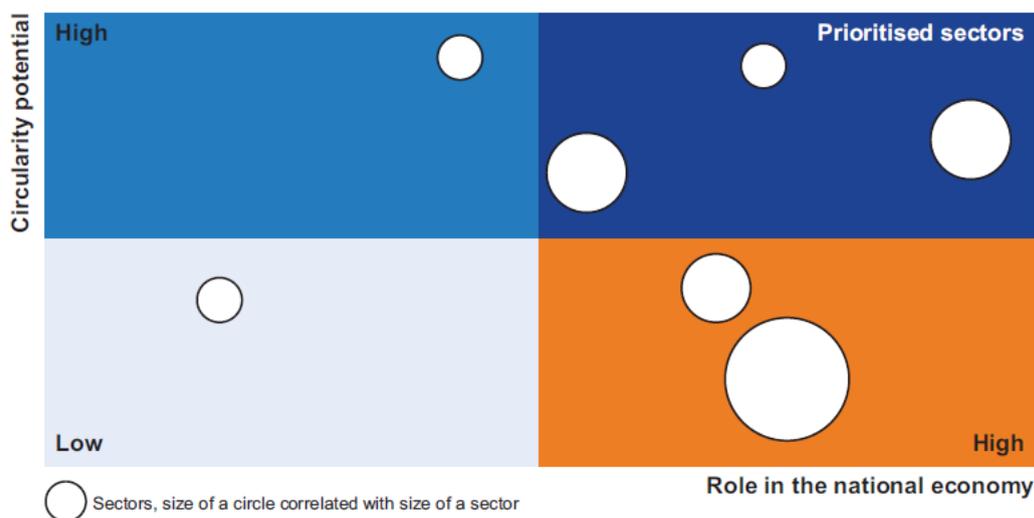
There are also other factors and criteria to be taken into consideration when defining the priorities:

- Existing environmental problems. Logically, if there is a serious environmental problem (i.e. droughts and lack of water) a given sector (water reuse) can be prioritised even if drivers (water reuse regulation) are missing.
- Availability of data: this is not a criteria which would be sufficient per se for the selection of a certain sector as a priority one. However, it would be much easier to define the baseline if data are available.

The below figure introduces a visual approach to sector prioritisation.



Figure 16 Framework for sector prioritisation



Source: Ellen MacArthur Foundation, 2016, Toolkit for policy makers

The above analysis, combined with extensive stakeholder consultation should lead to the formulation of vision for the city as well as quantitative and qualitative targets that go with it. Below we will present several examples of visions, not necessarily city-level ones.

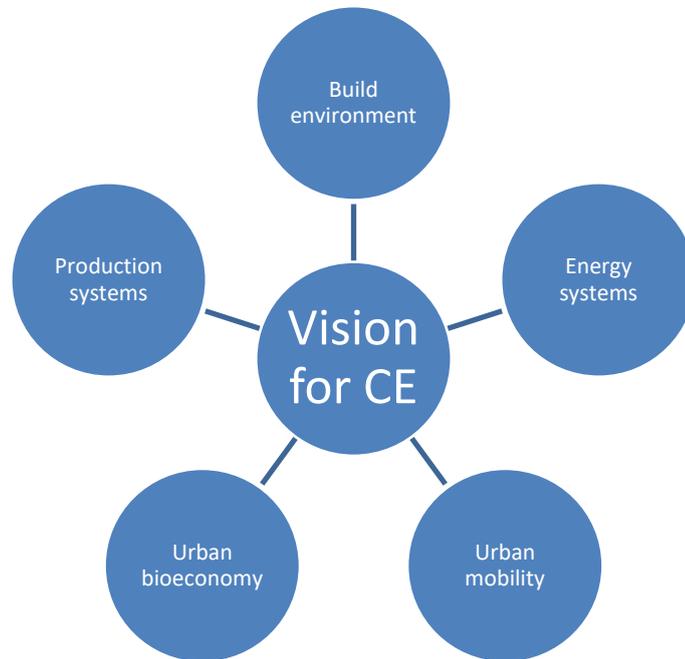
Box 36 WRAPs vision for UK circular economy till 2020

Goal	Target
Lean production	30 Mt fewer material inputs
Reducing waste	20% less waste produced (20 Mt less)
Reducing the amount of working products thrown away	20 Mt more materials recycled
Goods to services	NA

Source: <http://www.wrap.org.uk/content/wraps-vision-uk-circular-economy-2020>



Figure 17 Example of a possible combination of sectors for the transition to the circular economy



Source: Ellen MacArthur, *Cities in the Circular Economy: an Initial Exploration*

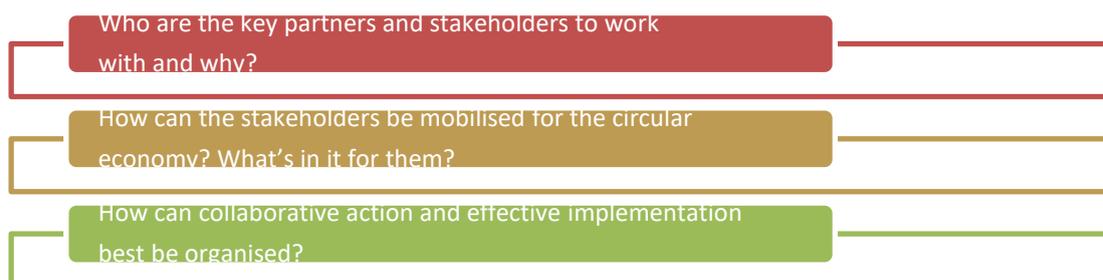
Naturally, when defining the city vision the policy makers will aim at high-level objectives and impacts related to the environmental problems and pressures mapped during the initial stages of the process.

4. Governance and stakeholders



Defining the governance of the transition to the circular economy is key to its success. There are three phases to governance definition.

Figure 18 Stages in good governance in the transition to the circular economy





Key partners and stakeholders

Partners include specific flagship projects and actors from sectors with significant potential for improvement in terms of circular economy and resource efficiency. The **private sector** is a fundamental partner and stakeholder as provider of goods and services. They are the among the first to take actions and subsequently benefit. The circular economy is also an excellent opportunity to create an **entrepreneurial ecosystem** around it including green start-ups, cleantech incubators and universities for example.

Governments are important stakeholders in the transition to the circular economy. They partly create the local policy mix and are an important enabler of the transition in many different ways.

In the figure below we have listed different types of stakeholders and their respective roles in the transition to the circular economy on urban level.

Figure 19 Stakeholders' role in the circular economy

STAKEHOLDERS	ROLE IN CIRCULAR ECONOMY
Local champions	Goodwill ambassadors Community mobilisers
Public sector allies	Key implementation partners Improve framework conditions
Sectoral representatives	High impact on economy and environment Target sectors for transformation
Eco-industries	Capitalise on their infrastructure Strengthened roles in promoting CE
Entrepreneurs	Direct beneficiaries of the strategy Can be activated for the circular economy
Business support structures	Key allies for circular economy promotion Service providers to local entrepreneurs and
Academia and knowledge providers	Knowledge generation on local CE features Assessments and advice
Educators	Teach the circular economy principles Mobilise the young and lifelong learners
Investors	Mobilise finance for CE Develop new financing models
Grassroots	Demonstrate benefits to citizens Reach out to all citizens

Source: CIRCTER Policy Guide

Local CE champions - could serve as an example and inspiration for others

Public sector allies - economic or environmental departments in city administrations

Sector representatives - from industries which are either transition leaders or have the highest



untapped potential to shift to new ways of working

Eco industries - representatives of industries which are dealing with sectors such as waste management, water supply and sanitation, etc.

Entrepreneurs - open minded companies and individuals who can take up circular economy principles early on in their activities

Business intermediaries - such as Chambers of Commerce who have a large member base and who can incorporate circular transition in their training programme for example. Local industrial zones are also a good possible partner

Universities - especially the ones with relevant departments such as environmental studies, technology, innovation, etc.

Investors and funding sources - Banking institutions are yet to get to grips with the concept of circularity, the business models associated with it and their financial flows. Relevant national and/or regional Managing Authorities of European Structural and Investment Funds (ESIF) are a good potential source for funding aspects of the CE transition

Box 37 Good practice example of Maribor Circular Economy strategy development

The Maribor Strategy was initially inspired by one major challenge: re-using the waste, surplus energy and wastewater generated by one sector as a resource commodity for another sector (following re-processing). Solving this issue required the integration of concerted waste management processes into the city's energy and water supply systems. A significant lever for strategy implementation was the mobilisation and federation of public utility companies within a city-level circular waste management strategy. All in all, the strategy was implemented along six selected sectors (pillars). This association of interests was then embodied by the establishment of a new institution: the Wcycle Institute Maribor (IWM).

The Municipality, the public utility companies and newly-established IWM, together with the business sector, identified 20 joint collaboration projects for the coming years. The Wcycle Institute is the main piece of the multi-stakeholder CE approach as a platform where the utility companies can speak about general strategy and the projects. There are monthly discussion and exchanges of documents. Thanks to the Institute, every company is aware of what the others are doing.

The Maribor approach has been considered truly innovative as a bottom-up, cross-sectoral solution for re-using material, energy and aquatic waste. It represents a crucial mind-shift with regard to the management of public utility companies.

Source: CIRCTER case study on Circular Economy Strategy in the Maribor Region, Slovenia

The Scottish Circular Economy Business Network (SCEBN) has been established as a follow-up of the Scotland's Circular Economy strategy. Its goal is to support and 'develop business-led initiatives to promote the opportunities of a more circular approach' by providing a platform for engaged and innovative business leaders to help build responsive and networked supply chains in Scotland.



The founding members of the network include public-sector and nongovernmental organisations, such as Scottish Enterprise (SE), Highlands and Islands Enterprise (HIE) and Scottish Environment Protection Agency (SEPA), and Zero Waste Scotland.

Source: CIRCTER case study on Scotland's Circular Economy Strategy

Stakeholder mobilisation

The governance structure of the circular economy transition varies from case to case. The example from the Brussels Region is just one example of a government structure based on a steering committee and a coordination committee.

Box 38 Governance of the Brussels' Regional Plan for a Circular Economy (RPCE)

For example, Brussels' Regional Plan for a Circular Economy (RPCE), adopted in 2016 as part of the Brussels regional Strategy 2025, is a flagship CE initiative in Belgium's capital. It established an innovative governance structure for stakeholder engagement, which enabled both top-down and bottom-up involvement in defining the plan and implementing it.

The governance of the RPCE is structured around the following elements: The steering committee is composed of representatives from the three ministries in charge of the RPCE, the region presidency, regional ministries associated with the initiative, and the 11-chapter coordinators within the respective administration of the RBC (e.g. Bruxelles Environnement, Impulse.brussels, Brussels Economy Employment, Actiris, Bruxelles Formation, VDAB Brussel, Innoviris, Citydev, Finance.Brussels, Agence Bruxelles - Propreté, the Brussels Office of Planning, the Port of Brussels, Atrium, Bruxelles Mobilité, the CIRB, as well as the Economic and Social Council). The PREC Coordination Committee is the daily management unit at Bruxelles Environnement that organises the concrete implementation of the PREC.

Source: CIRCTER case study



V. Overall recommendations for city-level policy makers

- The transition to the circular economy is complex and requires the **introduction and enforcement of complex policy landscapes** on all governance levels ranging from the strategic to the operational. Policies should address all stages of the product from material sourcing to disposal and secondary material treatment. Similar types of policies should be adapted to different sectors of the economy and their specific value chains.
- With regards to territories policies need to be analysed from a point of view of policy design but also **policy implementation**. Policies differ in their contribution to the transition to the circular economy, their capacities to trigger radical changes of behavioural models for companies and citizens.
- Rural regions are more suitable to hosting bioeconomy policies and business models, changes in food production, urban regions are more apt to deploy different collaborative methods, municipal waste management, new business models for repair and reuse, etc. This recommendation is mainly targeted at national level and is in fact only a recognition that not all sectors are equally relevant to different types of territories.
- **Policies should take into consideration different factors** such as the agglomeration economies; the land-based resources of the territory; its accessibility conditions; knowledge- and technology-based enablers; available technology; as well as governance and institutional drivers.
- The development of **regional development strategies and local circular economy strategies and action plans** is also gaining speed in the European Union and should be further stimulated. They allow focusing on the regional economies and value chains, sectors of specialisation, regional and local knowledge and other intangible assets, etc.
- **Cities and regions hold significant assets that are key building blocks on the road to circular economy**. This territorial capital varies across territories (geographical location, natural resources, social capital and institutions, etc.), their economic role in the cities and regions, and how much they can be leveraged to foster transition to the circular economy. The realisation of the potential of the territorial capital depends on a number of factors including policy, institutions, political will and financial context. This recommendation is targeted both at regional and city level.
- **Regions and cities as main actors in waste management**. Regions and cities have a significant leverage in waste management in a number of countries. In most cases individual municipalities are responsible for waste management. Also, regions are a suitable geographical level for coordinating the efforts of individual municipalities and setting up systems for integrated waste management. Therefore, the role of cities and regions for enhancing the circular economy dimensions of waste management should be actively promoted and supported. Regions can also elevate the level of their ambitions and strive to become zero waste territories.
- **Regional/city vision for better waste management**. Meeting the increased targets can happen through setting action plans for the prevention and reduction of different waste streams as a part of their long-term visions and strategies for waste prevention and development of circular economy. Additionally, regional and local authorities can take action to raise consumer awareness on waste by establishing focused educational



- programmes and providing practical tips to consumers on how to prevent waste. The effectiveness of such campaigns can be increased by using new media and technologies to reach out to consumers. This recommendation is targeted both at regional and city level.
- **Multi-stakeholder cooperation for waste management.** In stimulating innovation with regards to addressing food waste policy-makers need to focus on development of cooperation mechanisms with universities, other cities and regions, entrepreneurs and civil society organizations. This recommendation is targeted mainly at regional level.
 - **Better awareness for better plastics management.** Cities and regions have an important role for the improvement of knowledge in the whole value chain and increase awareness of citizens; improve waste collection systems and better separate collection: in cooperation with waste management operators; increase plastics recycling capacity; extend EPR models and provide economic incentives such as introducing obligatory price for plastic bags. They can also use public procurement as an instrument to stimulate change of models, better plastics and better recyclability. . Citizens and NGOs should also exert pressure on businesses to sort out the plastic they use through substitution or other innovative ways and also change habits: use less plastics for single use; and sensibilise the citizens on the problem of microplastics. This recommendation is targeted both at regional and city level.
 - **Stimulate companies to adopt new business models.** Regions and cities should also stimulate companies to adopt new business models such as reverse logistics for (plastic) packaging and alternatives for disposable plastics. Policy makers and mainly business associations and NGOs could also have a role here and the main action should be awareness raising and demonstrating successful models. This recommendation is targeted both at regional and city level.

Industrial symbiosis

- **Application of economic and regulatory instruments.** Several economic and regulatory instruments introduced by regional and local authorities can drive industrial symbiosis indirectly, through favouring higher and penalising lower waste hierarchy options. Examples include relatively high landfill and incineration taxes, pay-as-you-throw schemes, local landfill bans of various waste streams (e.g. on organic waste), targeted economic incentives. In addition, actions such as promoting Green public procurement (GPP) or supply chain approaches that provide collective solutions to logistical difficulties in IS (e.g. treatment and recovery facilities shared by a number of companies or a circular supply chains voluntary protocol) can also be helpful. This recommendation is targeted both at regional and city level.
- **Development of cooperation platforms for industrial symbiosis.** The establishment of cooperation platforms can bridge the co-operation and coordination deficit between the suppliers of the production residuals, the potential clients of these residuals and the providers of know-how and technology. Such platforms may help provide potential markets with minimum required scale and scope of industrial symbiosis arrangements, as well as knowledge. The services provided by cooperation platforms can include offering support in



‘material scans’ and matchmaking for SMEs; providing industrial symbiosis-related technical trainings on the valorisation of material streams; and providing support in securing funding mechanisms.

- **Assessing opportunities for industrial symbiosis at urban, rural or regional level.** Local or regional authorities can get involved in understanding the potential for optimising material flows at the level of their region, city or village or in inter-regional exchanges, by undertaking material flow analyses especially in the case of public services or public works. Many opportunities can be found in optimising the management of construction and demolition waste, food waste or waste water. Involving local private or non-governmental partners in understanding their potential contribution can be beneficial for initiating industrial symbiosis.
- **Strengthening local re-use and repair ecosystem.** Regions and cities should work on strengthening their local reuse and repair ecosystem, by supporting the local organisations involved, and informing citizens of services’ availability. Future Cohesion funds should continue to support this sector. One possible way of doing this is through the introduction of tax incentives for the development of repair services and jobs in Member States. Other efforts should be targeted at setting up and capacity building of repair and reuse centres. This recommendation is mainly targeted at local level.
- **Predominantly rural areas** are likely to face more difficulty in opening or strengthening a network or reuse and repair centres since their efficiency and capacity to provide the service for a wide range of products is likely to depend on the size that they can reach. Adequate choice of location and products covered, as well as the set-up of exchanges within a network of centres within a region are instrumental in making these services sustainable. This recommendation is mainly targeted at local level.
- **Predominantly urban areas** benefit from the critical mass to set up not only repair and reuse centres, but also, if governance structures allow, other initiatives such as tax incentives. In countries where these policies are still underdeveloped, they can provide the right environment to set up pilots to test new policies. This can be done at the level of a city or of a region depending on the institutional setting.
- **Repair and reuse services** usually include social employment, and it can represent an opportunity, to boost local recruitment, in particular for industrial regions that are losing importance (although this is applicable in any region). This recommendation is mainly targeted at regional level.

Bioeconomy

- For the bioeconomy, the territorial perspective is important: indeed, it is linked to the distribution of terrestrial, marine and maritime biological resources. Furthermore, the bioeconomy has the potential to foster the economic development of rural areas, by opening up new opportunities for the agricultural and forestry sectors (e.g. food processing, bio-based industries, bioenergy). The development of local strategies can contribute to identifying priority resources for the territories, settle conflict of usage (e.g. competition between food crops and energy crops) and promote the development of new



economic activities by sustaining the transition towards sustainable agriculture and forestry. A local strategy can create the enabling conditions for the development of the territory and can further assist in identifying the public and private resources that could encourage research and development. This recommendation is more suitable for predominantly rural and intermediate regions, as predominantly urban regions can further rely on public transport.



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Advanced knowledge-base – initial version

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Content

Figures	VII
Tables	VIII
I. Introduction – Advanced Knowledge Base in CITYCIRCLE.....	1
1. The <i>Starter KIT</i> – available documents/ materials.....	1
2. The Advanced Knowledge-Base – Understanding, objective and development procedure	4
2.1 The Advanced Knowledge-Base in the Application.....	4
2.2 Advanced Knowledge-Base	5
2.3 Initial version – Understanding and development procedure during COVID-19.....	5
II. “Knowledge-Bases” on Circular Economy.....	9
1. “Knowledge-Bases” – Overview.....	9
1.1 “Knowledge-Bases” - central institutions / players dealing with CE	9
1.2 Other Circular City initiatives, networks, resources,	12
1.3 Project Funding Programmes	14
2. In depth information on “knowledge” bases.....	16
2.1 European Commission	16
2.1.1 European Circular Economy Action Plan	16
2.1.2 European Circular Economy Stakeholder Platform	17
2.1.3 Urban Agenda for the EU > Circular Economy.....	20
2.2 EIB _ European Investment Bank.....	21
2.2.1 Circular economy – one initiative of the EIB	21
2.2.2 EIB publications _ further reading – guides, studies, books and stories	23
2.2.3 Circular City Funding Guide	24
2.3 EIT Climate KIC	27
2.3.1 Circular Economy _ one area of focus	27
2.3.2 Circular Cities Project (Start: April 2018 – December 2019)	28
2.4 OECD.....	28
2.4.1 The Circular Economy in Cities and Regions.....	28
2.4.2 OECD iLibrary.....	30
2.5 Ellen MacArthur Foundation	31
2.5.1 Ellen MacArthur Foundation	31
2.5.2 Circular Economy in Cities	32
2.6 ACR+’s Circular Europe Network.....	34



2.6.1	ACR _ Association of Cities and Regions for sustainable Resource management.....	34
2.6.2	Circular Europe Network (CEN)	34
2.7	World Business Council for Sustainable Development _ WBCSD.....	37
2.7.1	WBCSD _ circular economy	37
2.7.2	WBCSD _ Circular Economy Practitioner Guide	37
III.	Circular Economy HUBs – presentation, trainings/ webinars and materials.....	39
1.	Circular Economy HUBs - Understanding in CITYCIRCLE	40
2.	Classification of cities when examining literature, cases and examples	42
3.	Enablers of CE transition to a Circular City	45
3.1	City governments and their role	45
3.2	Clusters and their role.....	47
3.3	Circular Economy HUBs _ Cases / examples transforming municipality districts into learning centres of CE.....	47
3.3.1	Circular Cities Project at EIT Climate-KIC.....	47
3.3.2	IMPACT HUB - Entrepreneurial Networks as Drivers for Positive Change	50
4.	The Role of Cities in CE – training/ webinar on “How cities around Europe cope with the transition to CE and what they have done”	52
5.	CE HUBs – training/ webinars on three good practice cases on “How to setup CE HUBs”	53
5.1	Circular economy in Maribor, Slovenia	53
5.2	Circular economy in Flanders, Belgium	55
5.3	Kemi, Finland - Digipolis.....	57
IV.	Circular Business Models, Industrial Symbiosis, Marketplaces	60
1.	Circular Business Models for SMEs	60
2.	Industrial Symbiosis	62
2.1	Industrial Symbiosis - definition	63
2.2	Industrial Symbiosis project examples – EU funded H2020.....	64
2.2.1	SHAREBOX – Secure sharing	65
2.2.2	EPOS – Symbiosis in industry.....	67
2.2.3	MAESTRI – Resource and Energy Efficiency for Process.....	68
2.2.4	SYMBIOPTIMA – Human-mimetic approach to the integrated monitoring, management and optimization of a symbiotic cluster of smart production units	69
2.2.5	SCALER - SCALing European Resources with industrial symbiosis.....	69
2.2.6	FISSAC - Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain	73
2.2.7	URBANREC – Bulky Waste Management.....	75



2.2.8	PAPERCHAIN	78
2.2.9	Interreg Europe project: SYMBI - Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy	79
2.3	Industrial Symbiosis Activity in Europe – an overview and cases	80
2.3.1	A brief overview on two recent publications with a lot of examples mentioned	80
2.3.2	Kalundborg Symbiosis	83
2.4	More Links on Industrial Symbiosis-	84
	EREK.....	85
	NORDREGIO.....	86
	Swedish Network for Industrial and Urban Symbiosis.....	87
	Linköping University – Industrial Symbiosis.....	87
3.	Marketplaces	88
3.1	Marketplaces – definition	88
3.2	Marketplaces – presented in the CITYCIRCLE MARKETPLACES/ INDUSTRIAL SYMBIOSIS presentation.....	89
	C-Voucher project	90
	Materials Marketplace.....	90
	FLOOW2.....	91
	FLOOW2 Healthcare	91
	MATERIAL TRADER.COM.....	92
	PLASTSHIP.....	92
	WASTLY.....	93
3.3	More Marketplaces -	93
V.	Topics addressed by the CITYCIRCLE project partners during the implementation of their Circular Economy Pilot Projects.....	95
1.	Agriculture and food industry (Košice, Slovakia)	96
1.1	Pilot project – Circular Agri-food value chains.....	96
1.1.1	Pilot project scope.....	96
1.1.2	Main goal and specific objectives.....	97
1.1.3	Stakeholders and external initiatives	97
1.1.4	Pilot activities, milestones/ outputs.....	99
1.2	References and Knowledge Base	99
1.2.1	References.....	99
1.2.2	Knowledge Base	101
2.	Waste management and reuse (Varaždin, Croatia)	102
2.1	Pilot project – city market Gradska Tržnica d.o.o. in the City of Varaždin.....	102
2.1.1	Pilot project scope.....	102
2.1.2	Main goal and specific objectives.....	102



2.1.3	Stakeholders and external initiatives	103
2.1.4	Pilot activities, milestones/ outputs	104
2.2	References and Knowledge Base	105
2.2.1	References	105
2.2.2	Knowledge Base - International Solid Waste Association (ISWA)	106
3.	Value chain in waste-waste water-waste energy (Udine, Italy).....	109
3.1	Pilot project – Udine	109
4.	Management of land - industrial sites, public spaces (Kranj, Slovenia)	110
4.1	Pilot project – Management of land in Primskovo area	110
4.1.1	Pilot Project scope	110
4.1.2	Main goal and specific objectives	110
4.1.3	Stakeholders and external initiatives	111
4.1.4	Pilot activities, milestones/ outputs	112
4.2	References and Knowledge Base	113
4.2.1	References	113
4.2.2	Knowledge Base - Will be further elaborated	114
5.	Advanced manufacturing and ICT (Dornbirn, Austria)	115
5.1	Pilot project – Dornbirn	115
5.1.1	Pilot Action field	115
5.1.2	Main goal and specific objectives	116
5.1.3	Stakeholders and external initiatives	116
5.1.4	Pilot activities, milestones/ outputs	118
5.2	References and Knowledge Base	119
5.2.1	References	119
5.2.2	Knowledge Base – Advanced Manufacturing for Circular Economy	121
VI.	Circular Economy Maturity Index for cities	122
1.	Introduction.....	122
1.1	Description of <i>Circular Economy Maturity Index for cities</i> according to application	122
1.2	Preparatory work in the Starter Kit – introduction to chapter on “Towards a Comprehensive CE strategy in your territory. Planning for circular economy.”	122
1.3	Procedure chosen for this chapter	123
2.	Urban Agenda Partnership on Circular Economy - Indicators for a circular economy transition in cities	125
2.1	Basics – definitions, indicator needs, challenges and objectives	125
2.2	“Mapping and suggested indicators”	127
2.3	Long list of CE indicators	130



2.4	Suggested indicators.....	135
2.5	Suggested next steps	143
3.	OECD – Programme on CE in Cities and Regions – working on CE indicators	145
3.1	Some words about the programme _ content and timeline.....	145
3.2	Towards an OECD CE indicator framework.....	147
4.	CITYCIRCLE – suggested next steps before and for developing the CE maturity index ...	150
5.	References	151



Figures

Figure 1:	Four quadrants – integration of CE principles into a city framework	43
Figure 2:	Emerging economy and pioneering city	43
Figure 3:	Building blocks of the transition to a CE.....	122
Figure 4:	CE monitoring framework	128
Figure 5:	A simplified model of the CE for materials and energy.....	136
Figure 6:	The OECD Programme on the CE in Cities and Regions	145
Figure 7:	Measuring “circularity” in Cities and Regions	147
Figure 8:	New CE action plan – updating the monitoring framework.....	150



Tables

Table 1:	Long list of CE indicators (without indication of the reference framework)	130
Table 2:	List of suggested CE indicators (without indication of the reference framework)	137

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I. Introduction – Advanced Knowledge Base in CITYCIRCLE

Keywords in the CITYCIRCLE project are amongst others *knowledge-base* and *capacity building* (toolbox-train the trainers).

The goal in this context is to develop a comprehensive shared Knowledge-Base taking into account the needs of the project partners. The knowledge will be documented and the transfer will be ensured through training sessions, webinars, mentoring, etc.

The following outputs - besides trainings and mentoring of different regional stakeholder groups, accelerator managers, staff members, etc. - are foreseen:

- a **Starter Kit** - objective to raise awareness and increase knowledge - presenting generic knowledge relating to the principles of the CE and tools for promoting and implementing the CE;
- an **Advanced Knowledge-Base**, including *CE Maturity Index*. This knowledge-base will especially take into account the requirements of the hubs, i.e. addressing targeted technology areas or value chains, critical materials, methodologies, technology and market readiness levels, etc.

The **Advanced Knowledge-Base** will be the focus of this paper from the second chapter onwards. The following first chapter describes which basic documents/ materials have already been developed.

1. The **Starter KIT** – available documents/ materials

The **Starter Kit** has been published in September 2019:

“This Starter Kit has been developed within the CITY CIRCLE project. It is targeted at urban practitioners and policy makers and is meant to introduce concepts and notions related to the circular economy. The Starter Kit does not have the ambition to cover all sectors of the economy which are of relevance of the circular economy. Its scope has been agreed with the participants in the project and covers sectors close to their reality. These could be subsequently explored more in-depth.” (p 5)

The **Starter Kit** is available on the project website: <https://www.interreg-central.eu/Content.Node/CITYCIRCLE/D.T2.1.1-Starter-Kit.pdf>:

The content is the following:



Reader's Guide	4
I. Introduction.....	5
1. Objectives and scope of the Starter kit	5
2. Why circular economy	5
3. The Circular economy as a multi-governance approach.....	8
3.1. The circular economy within strategic EU documents. Current policy debates	8
3.2. Dedicated national strategies for circular economy	9
3.3. Circular economy on regional and city levels. Some examples of regional and urban policies	11
II. Introduction to Circular business models	15
III. Circular and collaborative business models. Concepts and definitions. EU framework. What can cities do? Examples.....	18
1. Industrial symbiosis and urban metabolism.....	18
2. The sharing (collaborative) economy	26
3. Smart and circular design	30
4. Extending the lifetime of products and materials	38
4.1. Second-hand sale	40
4.2. Remanufacturing	40
5. Regenerative sources - bio-based materials, regenerative water	42
5.1. Bioeconomy	42
5.2. Bio-plastics	43
5.3. Water reuse	45
1) Reuse in integrated water planning and management	47
2) Minimum quality requirements for water reuse in irrigation and aquifer recharge	47
3) Water reuse in industrial activities.....	48
4) Support to research and innovation in water reuse.....	48
5) EU funds for investments in water reuse	48
6. The Waste as a Resource	50
6.1. Recycling.....	50
6.2. Waste heat recovery	53
6.3. Upcycling	53
IV. Towards a Comprehensive CE strategy in your territory. Planning for circular economy.	55
1. Assessing local context and potential.....	55
2. Analysis of enabling and hindering factors.....	61
3. Defining vision and priorities	64
4. Governance and stakeholders	66
V. Overall recommendations for city-level policy makers.....	70
VII. References.....	74



The essential contents of the **Starter Kit** were bundled in a presentation, also available on the CITYCIRCLE website (also in all other languages).

It is structures as follows:

CONTENTS		 CENTRAL EUROPE CITYCIRCLE
Part 1: Introduction to circular economy	Part 2: Circular business models: concept and definition	Part 3: Types of circular business models: <ul style="list-style-type: none">• Industrial Symbiosis;• Sharing economy• Smart and circular design• Extending the lifetime of products and materials (second-hand sale, remanufacturing)• Regenerative sources (bio-economy, bio-plastics, water reuse)• The waste as a resource (recycling, waste heat recovery, upcycling)
	Part 4: Planning for circular economy	

 TAKING COOPERATION FORWARD  2

This presentation – called basic material – was delivered to all project partners around mid November 2019. The project partners in turn presented this to their respective regional stakeholders in the framework of a regional workshop.



2. The Advanced Knowledge-Base – Understanding, objective and development procedure

2.1 The Advanced Knowledge-Base in the Application

In the application version/ content and delivery month of the *Advanced Knowledge-Base* are described as follows:

<i>Advanced knowledge-base</i>
<p><i>Initial version of the advanced knowledge-base</i></p> <p>Upgraded version of the advanced knowledge-base addressing specific topics (concrete value chains, specific technology development...) taking into account the scope of the hub/accelerator concepts developed for each target region. (online tool and files) (p 43)</p> <p>Delivery month: 06.2020</p>
<p><i>Upgraded version of the advanced knowledge-base</i></p> <p>Upgraded version of the advanced knowledge-base addressing specific topics identified by the hub/accelerators in their initial implementation phase and integrating their field experience. (online tool and files) (p 43)</p> <p>Delivery month: 03.2021</p>
<p><i>Final version of the advanced knowledge-base</i></p> <p>Ongoing improvement of the knowledge-base through the integration of new materials, including 6-monthly feedback loops with each hub/accelerator. A final public version will be delivered and endorsed by CE hubs. (online tool and files) (p 43)</p> <p>Delivery month: 03.2022</p>

The final version shall include a Circular Economy Maturity Index (CEMI):

<p><i>Circular Economy Maturity Index</i></p> <p>Description of deliverable Circular economy maturity index for cities enabling self-assessment and the identification of improvement potential. The maturity index shall be multi-dimensional and address economic, societal and environmental aspects. (online tool, files for printing) (p 45)</p> <p>Delivery month: 03.2022</p>



2.2 Advanced Knowledge-Base

With regard to the actual Advanced Knowledge-Base and its development, we would first like to state that we regard it as a *living document*, which fills with information and knowledge during the project period according to the 3 steps - initial, upgraded, final and always in between - depending on the progress of the project.

When the application says

A knowledge-base will be developed in the form of electronic documents (presentations, videos, case studies) and encompass good practices, methodologies related to the circular economy (business models, technologies, capabilities...).

then we would like to make it very clear at this point that we are aiming for a well-organized and structured knowledge platform in order to make the information more accessible and usable.

We would also like to make it very clear that this Advanced Knowledge Base is intended to encourage "snooping" on the web. Thus, many links are given, described and websites shown to invite you to take a closer look at the topics in order to find out for yourself which websites are best suited for me.

The CITYCIRCLE Knowledge Base is targeted especially at urban practitioners and policy makers.

In analogy to the development the Starter Kit, the Advanced Knowledge Base cannot pursue the objective of presenting the entire subject area of CE. It does not have the ambition to cover all sectors of the economy which are of relevance of the circular economy. Its scope will be agreed with the project partners and cover sectors close to their reality.

2.3 Initial version – Understanding and development procedure during COVID-19

The CITYCIRCLE project partners kept their project rolling throughout COVID-19 time and lockdowns across Europe although this could not be 100% in all places. Nevertheless, it was not possible to prevent some activities from being somewhat delayed.

For the initial version of the Advanced Knowledge Base this means that we have slightly changed the procedure compared to the initially planned one.

This applies in particular to the work at CEMI.

- ***Circular Economy Maturity Index for Cities***

As mentioned in the previous section, only the final version of the AKB will contain explanations of the CEMI. We have preferred to deal with this deliverable already now:

- on the one hand, because the preparation of the topic could be carried out largely independently of the project partners and they could therefore deal with their own upcoming deliverables in this new Corona time;



- on the other hand, this proved to be advantageous in that the status of work in this area could be examined in detail at an early stage and can therefore be updated and adapted to project-specific requirements comparably easy in the further course of the project.
- Moreover, the project partners can deal with this topic at an early stage.

The information concerning the CEMI is the final chapter in this initial version.

As CE was already defined in the Starter Kit, it will not be discussed in the following.

- ***“Knowledge-Bases” on Circular Economy***

But due to the diversity of the CE topic as well as the large number of institutions/ players and corresponding websites, the following chapter will first provide an overview. This should give the reader an orientation support and show what information can be found where and finally support the decision which one/ ones are best for me to follow in the future.

Chapter II provides an overview on “Knowledge-Bases” as well as in-depth information on the content of the websites. The information will be permanently updated - if necessary.

- ***Circular Economy HUBs – presentation, trainings/ webinars and materials***

For the moment a chapter on Circular Economy Hubs follows. An information package on the topic HUBs was provided upfront the trainings/ webinars to the project partners with the following content:

CONTENT	
1 CE HUBs - Understanding and further focus	
2 City governments and their role in enabling a CE transition	
3 Special focus: Clusters in the CE transition	
CE HUBs : overview on cases / examples	
4 Focus on city governments and clusters	
5 Industrial symbiosis	
6 Focus on regional and two “smaller” national HUBs	



In this chapter only the central content from the *CITYCIRCLE HUBs* presentation is presented.



This content is complemented by the 3 webinars on good practices on "How to setup CE HUBs" practices from Maribor (Slovenia), Flanders (Belgium) and Kemi (Finland).

- **Circular Business Models, Industrial Symbiosis, Marketplaces**

An information package on the topic CIRCULAR BUSINESS MODELS FOR SMEs is currently being developed – the content and status end of July 2020 is described:

CONTENT



- 1 Objective of the document
- 2 Rationale for the circular transformation of businesses
- 3 Typology of existing circular business models for businesses
- upcoming
- 4 Examples from the industry
- 5 Supporting materials - tools



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For the next two chapters an information package MARKETPLACES/ INDUSTRIAL SYMBIOSIS was provided upfront the trainings/ webinars to the project partners:

CONTENT



- 1 Market Places
- 2 Industrial Symbioses
- 3 Smart Maps
- 4 Marketplace Startup Ideas



TAKING COOPERATION FORWARD



In both cases new content has been added to the Knowledge Base:



- ***Topics addressed by the CITYCIRCLE project partners during the implementation of their Circular Economy Pilot Projects***

5 Pilot Actions are to be implemented in the 5 Central European Cities and Regions, each one with different thematic focus, to demonstrate the potentials benefits of the CE for the sustainable development of local and regional economies.

In this chapter the central content of the topics addressed are/ will be presented as well as references. The search on references will be continued.

II. “Knowledge-Bases” on Circular Economy

1. “Knowledge-Bases” – Overview

1.1 “Knowledge-Bases” - central institutions / players dealing with CE

<i>European Commission</i>	
<p>European Circular Economy Action Plan</p> <p>https://ec.europa.eu/environment/circular-economy/</p> 	<p>A new Circular Economy Action Plan for a Cleaner and More Competitive Europe</p> <p>The European Commission has adopted a new Circular Economy Action Plan - one of the main blocks of the European Green Deal, Europe’s new agenda for sustainable growth.</p>
<p>#CEstakeholderEU</p> <p>European Circular Economy Stakeholder Platform</p> <p>https://circulareconomy.europa.eu/platform/</p>	<p>A joint initiative by the European Commission and the European Economic and Social Committee:</p> <p>The virtual platform is a space to exchange and interact. It is a valuable resource to find good practices, publications, information about events, networks, Via submission forms information can be uploaded. In a discussion forum an exchange with other stakeholders is possible.</p> <p>A newsletter informs about all ongoing activities of the Platform.</p>
	
<p>Urban Agenda for the EU</p>	<p>The CE Partnership aims to stimulate the re-use, repair, refurbishment and recycling of existing materials and products to promote new growth</p>



<p>https://ec.europa.eu/futurium/en/circular-economy</p> 	<p>and job opportunities. The focus will be on: waste management (turning waste into resources), the sharing economy, and resource efficiency.</p>
--	--

EIB _ European Investment Bank	
<p>Circular economy – one initiative of the EIB https://www.eib.org/en/about/initiatives/circular-economy/index.htm</p>	<p>EIB supports the CE through awareness raising, advisory support and finance. For further reading the website offers publications – guides, studies, books - related to the CE, including the guide The 15 circular steps for cities.</p>
<p>Circular City Funding Guide</p> 	<p>The Urban Agenda Partnership for CE  initiated the Guide; EIB experts were mobilised and funded by the European Investment Advisory Hub .</p> <p>The Circular City Funding Guide supports municipalities, businesses, and other urban actors in creating circular cities.</p>

OECD	
<p>The Circular Economy in Cities and Regions http://www.ecd.org/cfe/regionaldevelopment/circular-economy-cities.htm</p>	<p>This OECD programme supports cities and regions in their transition towards circularity by offering information - case-studies, communications and articles and information about conferences are provided.</p>



<p>OECD iLibrary https://www.oecd-ilibrary.org/</p>	<p>Offers search results for the following CE categories;</p> <div style="border: 1px solid black; padding: 5px;"> <input type="text" value="circular"/>  <ul style="list-style-type: none"> circular circular economy, waste and materials circular business models circular economy award-winning projects in 2017 and 2018 circular economy in umeå, sweden </div>
---	---

Ellen MacArthur Foundation	
<p>Ellen MacArthur Foundation https://www.ellenmacarthurfoundation.org/</p>	<p>This website provides a range of reports, frameworks, and other publications related to the CE. Topics range from plastics to fashion and food, presenting which issues should be tackled and how cities can contribute to this.</p>
<p>Circular Economy in Cities https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities</p>	

ACR+	
<p>ACR _ Association of Cities and Regions for sustainable Resource management https://www.acrplus.org/en/</p>	<p>ACR+ is an international network of cities and regions sharing the aim of promoting a sustainable resource management and accelerating the transition towards a CE on their territories and beyond.</p>
<p>Circular Europe Network (CEN) https://www.circular-europe-network.eu/</p> <div style="display: flex; align-items: center;">  <p>Circular europe network</p> </div>	<p>Through CEN, best practices are shared from cities and regions throughout Europe. Factsheets describe the nature of the projects and the actors that are involved.</p>



1.2 Other Circular City initiatives, networks, resources, ...

“Momentum is building around circular economy in cities. In addition to the Ellen MacArthur Foundation's Systemic Initiatives (for plastics, fashion, and food), multiple other organisations are integrating circular economy into their programmes and tools.

This reference page provides an interactive overview of the relevant resources, tools, and initiatives from our partners and other organisations in the field.”

<https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities/other-networks-resources>

<i>Circular City initiatives, networks, resources, ...</i>	
 <p> http://www.eurocities.eu/ http://www.eurocities.eu/eurocities/issues/circular-economy-issue </p>	<p>EUROCITIES is a partner of the urban agenda partnership on CE as well as being part of the coordination group of the CE stakeholder platform.</p> <p>EUROCITIES facilitate sharing of knowledge among cities on CE best practises and case studies. Advocates and represents cities’ interest in CE towards the EU institutions.</p> <p>Among its 140 EUROCITIES members, the EUROCITIES task force on CE is a dedicated expert group of cities which meets frequently to share knowledge on their progress towards a more circular city. The meetings are an opportunity to learn from best practises and to exchange on how to overcome barriers posed by the linear economy model.</p>
 <p> https://www.circle-economy.com/ https://www.circle-economy.com/programmes/cities </p>	<p>The CIRCLE ECONOMY member community is an active group of businesses and institutions that have a shared ambition to make the CE a reality.</p> <p>CIRCLE ECONOMY offers insights, reports and publications as well as a knowledge hub, where it is possible to explore, search, and find inspiring examples of the CE in practice.</p>



	<p>The CIRCLE CITY PROGRAMME accelerates the transition towards circular cities throughout the following core services:</p> <ul style="list-style-type: none"> ◦ Circle City Scan - is a fact-based innovation and transformation process based on a local multi-stakeholder model that aims to develop practical and scalable solutions in cities to accelerate the transition to a circular economy. ◦ Thriving Cities Initiative - is designed to be a journey for cities to explore and embrace a vision for a thriving city that appreciates what makes cities unique while understanding its global influence and responsibility. ◦ Capacity Building and Empowerment – transformative change towards truly circular cities requires engagement and action throughout the city. ◦ Measuring Circular Employment in Cities - Support cities answer questions related to where there is potential for the CE to create jobs, and what skills are needed to execute them using our circular employment metrics and methodologies. Measuring the current state of circular jobs of a city or region can help to inform education, training, and talent policy in order to foster a CE that works for all.
<p>Circularity Gap Report Initiative</p>  <p>https://www.circularity-gap.world/</p>	<p>In context with CIRCLE ECONOMY the CGRI – Circularity Gap Report Initiative – has to be mentioned.</p> <p>In 2017 they recognised the need to measure the CE. In 2018 the first report was published, the second in 2019 followed by the 2020 report.</p> <p>Also country reports can be ordered – Austria and the Netherlands already did this; one for Norway is announced.</p>
 <p>https://www.c40.org/</p>	<p>C40 is a network of the world’s megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change.</p> <p>C40 has multiple research projects and networks exploring how city governments can take a lead in the transition to a CE, and provides tools, knowledge sharing and support</p>



	<p>for cities to plan, measure and implement action.</p>
 <p>https://www.circulareconomyclub.com/</p> <p>https://www.circulareconomyclub.com/circular-cities-week/</p>	<p>The Circular Economy Club (CEC) is the international non-profit network of over 4,500 CE professionals and organisations from over 140 countries.</p> <p>CEC is driven by more than 280 Organizers around the globe. These volunteers have opened CEC chapters in their cities in order to raise awareness of the CE and bring together the local community to start proposals for the design and implementation of a local CE strategy.</p> <p>Yearly CEC organises its inaugural "Circular Cities Week" decentralized global event. In 2019 this was celebrated from Oct. 28 to Nov. 3. The goal: to push, with a united voice, for the design and implementation of circular economy strategies in cities worldwide. Over 80 CEC Chapters signed up to organize workshops to identify opportunities and next steps to encourage implementation of the circular economy in their cities.</p>
 <p>https://fab.city/</p>	<p>Fab City Network - Core to the initiative is a network of cities, regions and countries that have pledged to work towards producing everything they consume by 2054. The initiative is enabling this shift away from the industrial paradigm of Product-in Trash-out, by enabling the return of manufacture to cities supported by a Data-in Data-out urban model. Citizens, FabLabs and City officials collaborate locally to implement new urban models through interventions in governance and policy.</p>

1.3 Project Funding Programmes



Project funding programmes	
	<p>Interreg Europe - https://www.interregeurope.eu/</p> <p>Interreg Central Europe - https://www.interreg-central.eu/Content.Node/home.html</p> <p>Interreg Danube Transnational Programme - http://www.interreg-danube.eu/</p> <p>Interreg Baltic Sea Region - https://www.interreg-baltic.eu/home.html</p> <p>...</p>
 https://urbact.eu/ https://urbact.eu/circular-economy	<p>“URBACT’s mission is to enable cities to work together and develop integrated solutions to common urban challenges, by networking, learning from one another’s experiences, drawing lessons and identifying good practices to improve urban policies.”</p> <p>URBACT topics are:</p>
 <p>The screenshot shows the URBACT website header with the logo and European Union flag. Below the header is a navigation menu with the following items: ABOUT URBACT, <u>URBAN TOPICS</u>, NETWORKS, COUNTRY, NEWS & EVENTS, LIBRARY, and URBACT GOOD PRACTICES. Under the 'URBAN TOPICS' menu, there are five main categories: PHYSICAL URBAN DEVELOPMENT, ECONOMY, ENVIRONMENT, GOVERNANCE, and INCLUSION. Each category has a list of sub-topics:</p> <ul style="list-style-type: none"> PHYSICAL URBAN DEVELOPMENT: Abandoned Spaces, Culture & Heritage, Mobility, Priority Neighbourhoods, Urban Planning, Urban Renewal ECONOMY: Digital transition, Entrepreneurship & SMEs, Financial Engineering, Jobs and skills, Local Economy, Procurement, Research & Innovation ENVIRONMENT: Carbon Neutrality, Circular Economy, Climate Adaptation, Energy Efficiency, Food, Waste GOVERNANCE: City Branding, Health, Integrated Management, Participation, Social economy, Urban-rural INCLUSION: Ageing, Education, Housing, Migrants, Minorities, Poverty, Youth, Gender Equality 	
<p>Concerning CE URBACT writes: “Cities are heavily dependent on external resources to meet the demands of their citizens. At the same time, cities are also responsible for the largest amount of generated waste. Urban administrations therefore have a crucial role in the development of the circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised.”</p> <p>Information concerning the following topics are provided:</p>	



- Related networks
- Related good practices
- Latest activities
- Events



<https://www.espon.eu/>

CE – CIRCTER

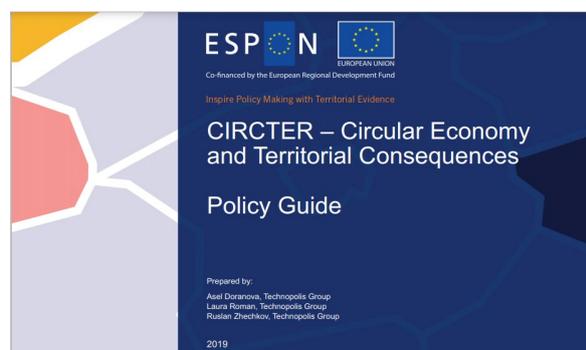
<https://www.espon.eu/circular-economy>

<https://www.espon.eu/sites/default/files/attachments/CIRCTER%20Policy%20guide.pdf>

ESPON delivers territorial evidence for actual policy needs in various areas. The subjects of the user oriented research projects are defined by the European Union, the 32 member states of the **ESPON programme** or even directly by local authorities via so called analysis proposals. This is to guarantee a high usability for the European policy makers who can use ESPON evidence as input to e.g. local development plans.

ESPON projects are divided into long term general **“Applied Research Projects”** and more specific **“Targeted Analyses”**.

One of Applied Research Projects was dealing with CE: CIRCTER - Circular Economy and Territorial Consequences. A [Policy Guide](#) was published in October 2019:



2. In depth information on “knowledge” bases

2.1 European Commission

2.1.1 [European Circular Economy Action Plan](#)

<https://ec.europa.eu/environment/circular-economy/>

A new Circular Economy Action Plan for a Cleaner and More Competitive Europe



“The European Commission has adopted a new [Circular Economy Action Plan](#) - one of the main blocks of the [European Green Deal](#), Europe’s new agenda for sustainable growth.

The new Action Plan announces initiatives along the entire life cycle of products, targeting for example their design, promoting circular economy processes, fostering sustainable consumption, and aiming to ensure that the resources used are kept in the EU economy for as long as possible.

It introduces legislative and non-legislative measures targeting areas where action at the EU level brings real added value.”

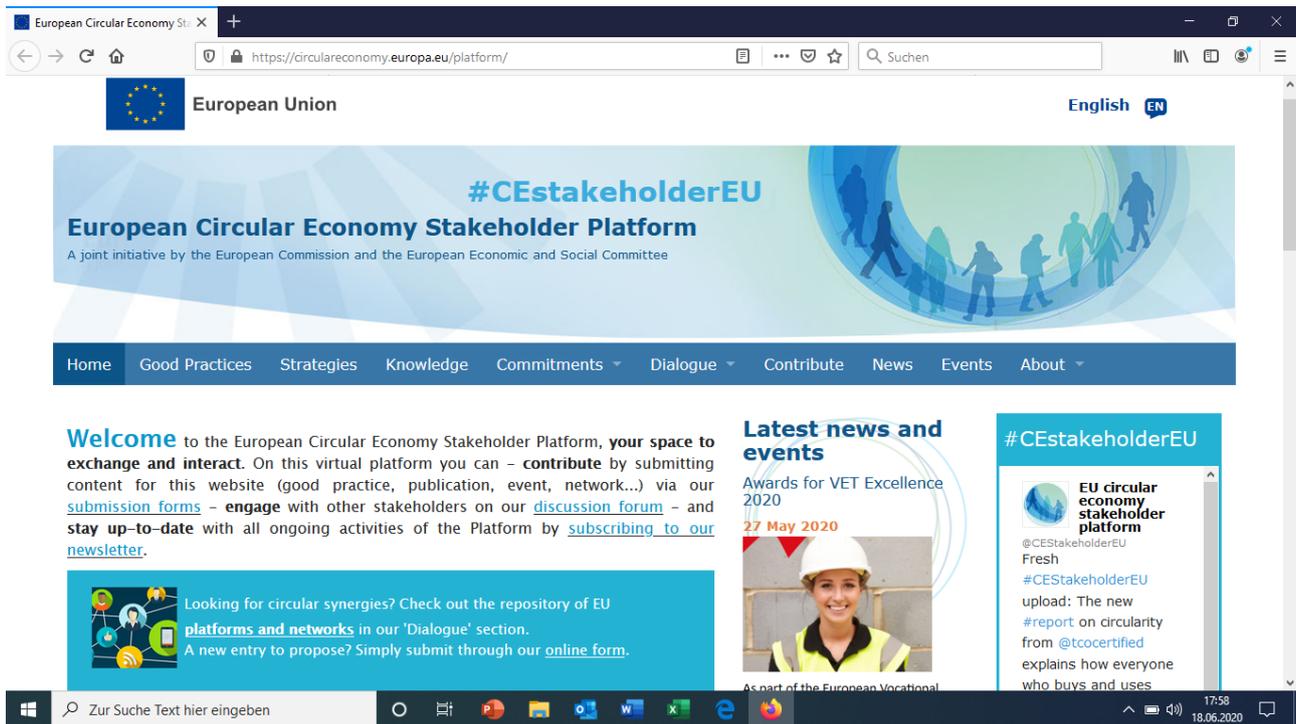
2.1.2 [European Circular Economy Stakeholder Platform](#)

<https://circulareconomy.europa.eu/platform/>

A joint initiative by the European Commission and the European Economic and Social Committee:

The virtual platform is a space to exchange and interact. It is a valuable resource to find good practices, publications, information about events, CE networks, Via submission forms information can be uploaded. In a discussion forum an exchange with other stakeholders is possible.

A newsletter informs about all ongoing activities of the Platform.



The following information is provided and can be searched by ... :

Good Practices	Search by ...
<p>... relevant practices, innovative processes and 'learning from experience' examples.</p> <p>... All information is provided by the stakeholders themselves who remain responsible for accuracy and veracity of the content.</p> <p>... # 362</p>	<p>... key area</p> <p>... sector</p> <p>... country</p> <p>... type of organisation or company</p> <p>... type of funding</p> <p>... identified challenge</p> <p>... scope</p>
Strategies	Search ...
<p>... find existing strategies for the transition to a CE adopted at national, regional or local level by public authorities.</p> <p>... # 35</p>	<p>... key area</p> <p>... sector</p> <p>... country</p> <p>... scope</p>
Knowledge	Search ...
<p>... find knowledge such as studies, reports, presentations and position papers, ... submitted by stakeholders.</p>	<p>... type</p> <p>... key area</p> <p>... sector</p>



... # 221	... country ... scope
Commitments	Search ...
... to become circular ... # 4	... key area ... sector ... country ... scope
Pledges	Search ...
... collected under the European Strategy for Plastics in the CE. In January 2018, the European Commission invited stakeholders to submit voluntary pledges to use or produce recycled plastics. The target is that 10 million tonnes of recycled plastics find their way into products in the EU by 2025. ... # 46	... type of plastic material ... type of pledger ... market area
European Circular Economy Networks / Platforms	Search ...
... different ones – e.g. educational / training, interest group, knowledge community, national or regional, # 74	... platform type ... key area ... sector ... country ... scope
News	Search ...
... sorted according to date of publication. ... # 218	... key area ... sector ... country ... news type ... scope
Events	Search ...
... calendar of upcoming events on the CE, sorted chronologically. ... # 17	... event type ... country ... key area ... sector ... scope



2.1.3 Urban Agenda for the EU > Circular Economy

<https://ec.europa.eu/futurium/en/circular-economy>

The CE Partnership aims to stimulate the re-use, repair, refurbishment and recycling of existing materials and products to promote new growth and job opportunities. The focus will be on: waste management (turning waste into resources), the sharing economy, and resource efficiency.



Members are:

Members		
Urban Areas	Member States	Other participants
<ul style="list-style-type: none"> ▪ Oslo (NO, Coordinator) ▪ Flemish Region (BE) ▪ Kaunas (LT) ▪ Porto (PT) ▪ Prato (IT) ▪ The Hague (NL) 	<ul style="list-style-type: none"> ▪ Finland ▪ Greece ▪ Poland ▪ Slovenia 	<ul style="list-style-type: none"> ▪ European Commission (DG REGIO, DG ENV, DG CLIMA, DG GROW, DG RTD) ▪ Council of European Municipalities and Regions (CEMR) ▪ EUROCITIES ▪ European Investment Bank (EIB) ▪ URBACT ▪ Association of Cities and Regions for sustainable Resource Management (ACR+)

Information can be found on the topics news and events (upcoming and past). A library is provided as well as a blog.



2.2 EIB _ European Investment Bank

2.2.1 Circular economy – one initiative of the EIB

<https://www.eib.org/en/about/initiatives/circular-economy/index.htm>

“In a circular economy, the value of products and materials is maintained for as long as possible. Waste and resource use are minimised and when a product reaches the end of its life, it is used again to create further value.

The transition towards a circular economy can help reduce environmental impact, but also bring major economic benefits, contributing to innovation, growth and job creation.

The EU bank embraces the potential of a circular economy and we support the public and private sector in their circular transition.”

<i>EIB’s circular support</i>
<p>▪ Awareness raising</p> <p><i>develop and share knowledge on the circular economy transition by</i></p> <ul style="list-style-type: none"> ○ improving the framework conditions for financing (e.g. through involvement in multi-stakeholder circular economy fora), ○ facilitating knowledge sharing and capacity building (e.g. in conferences), ○ preparing studies to identify market barriers and funding gaps, ○ preparing circular economy guidance material and documents.
<p>Advisory support</p> <p><i>help circular businesses mitigate risks and improve the investment readiness of their projects:</i></p> <ul style="list-style-type: none"> ○ support in circular economy project pipeline development,



- review circular projects, identification of gaps/weaknesses, advise on improvements,
- advise on financing options within and outside the EIB Group,
- facilitate contacts to relevant market actors.

Finance

provide finance to circular economy projects/promoters with a typically higher risk profile:

- leveraging horizontal (market) studies to further define funding gaps,
- recommending internal EIB-managed instruments and/or Investment Platforms (IP), where necessary,
- structuring/implementing Investment Platforms that mobilise public/private investors.

Types of CE projects

Circular design and production

Smart design and production that reduce waste and recycle materials at the beginning of a product's lifecycle are essential to ensure circularity.

Strategies: reduce, recycle

Circular use and life extension

Business models that increase the value and use of a product during an extended life are essential to shift to a circular economy. Over time, extending product life through proper care and repair reduces the need for people to buy more.

Strategies: reuse, repair, repurpose, refurbish, remanufacture

Circular value recovery

Value recovery models aim to maximise recovery and recycling of a product after its end-of-life stage. The value recovery models reduce waste and conserve resources.

Strategies: recycle, recover

Circular support

Business models that increase the value and use of a product during an extended life are essential to Support and facilitation of all circular strategies in all lifecycle phases.

Strategies: reduce, recycle, reuse, repair, repurpose, refurbish, remanufacture, recover



2.2.2 EIB publications _ further reading – guides, studies, books and stories

<i>Guides, studies, books</i>
<p>EIB _ 15 May 2020 The EIB Circular Economy Guide - Supporting the circular transition.</p>
<p>EIB _ 29 January 2020 Circular Economy Overview 2020. https://www.eib.org/en/publications/circular-economy-overview-2019</p>
<p>EIB _ 16 October 2019 The Joint Initiative on Circular Economy. https://www.eib.org/en/publications/joint-initiative-on-circular-economy</p> <p>“The European Union produces about 2,5 billion tons of waste per year. The Joint Initiative on Circular Economy (JICE) is a partnership between the European Union’s largest national promotional banks and institutions and the European Investment Bank to invest at least €10 billion in the circular economy by 2023. This will support projects that prevent and eliminate waste, increase resource efficiency and promote circular business models. Eligible projects can be submitted to the respective JICE partners.”</p>
<p>EIB _ 16 October 2019 The Joint Initiative on Circular Economy. https://www.eib.org/en/publications/joint-initiative-on-circular-economy</p> <p>“The European Union produces about 2,5 billion tons of waste per year. The Joint Initiative on Circular Economy (JICE) is a partnership between the European Union’s largest national promotional banks and institutions and the European Investment Bank to invest at least €10 billion in the circular economy by 2023. This will support projects that prevent and eliminate waste, increase resource efficiency and promote circular business models. Eligible projects can be submitted to the respective JICE partners.”</p>
<p>EIB _ 16 October 2019 The Joint Initiative on Circular Economy. https://www.eib.org/en/publications/joint-initiative-on-circular-economy</p> <p>“The European Union produces about 2,5 billion tons of waste per year. The Joint Initiative on Circular Economy (JICE) is a partnership between the European Union’s largest national promotional banks and institutions and the European Investment Bank to invest at least €10 billion in the circular economy by 2023. This will support projects that prevent and eliminate waste, increase resource efficiency and promote circular business models. Eligible projects can be submitted to the respective JICE partners.”</p>
<p>EIB _ 6 December 2018 The 15 circular steps for cities https://www.eib.org/en/publications/circular-economy-15-steps-for-cities</p>



“This document outlines problems facing many linear cities today, and argues the case for circular change. It highlights elements that make cities suitable as both cradles and catalysts for a circular transition. The document also provides concrete guidance on how a linear city can start the circular journey, presented in the form of 15 circular steps.”

EIB _ 10 December 2015

Access-to-finance conditions for projects supporting Circular Economy

<https://www.eib.org/en/publications/access-to-finance-conditions-for-financing-the-circular-economy>

“This study, carried out under the InnovFin Advisory mandate, reviews the access-to-finance conditions for the circular economy, in particular three key circular economy business model transitions, and proposes potential solutions that could catalyse investments into the sector.”

Highlighted stories

EIB _ 12 December 2019

Turning reindeer feed into sweets this Christmas

EIB _ 18 July 2019

Bread, trains and exfoliating creams

2.2.3 [Circular City Funding Guide](#)

“The Guide was initiated as one of the actions under the [Urban Agenda Partnership for CE](#) . The Guide was developed by external service providers and EIB experts mobilised and funded by the [European Investment Advisory Hub](#) .

“The Circular City Funding Guide supports municipalities, businesses, and other urban actors in creating circular cities. As an introduction and for context, the Guide describes the potential and benefits of the CE in an urban context.

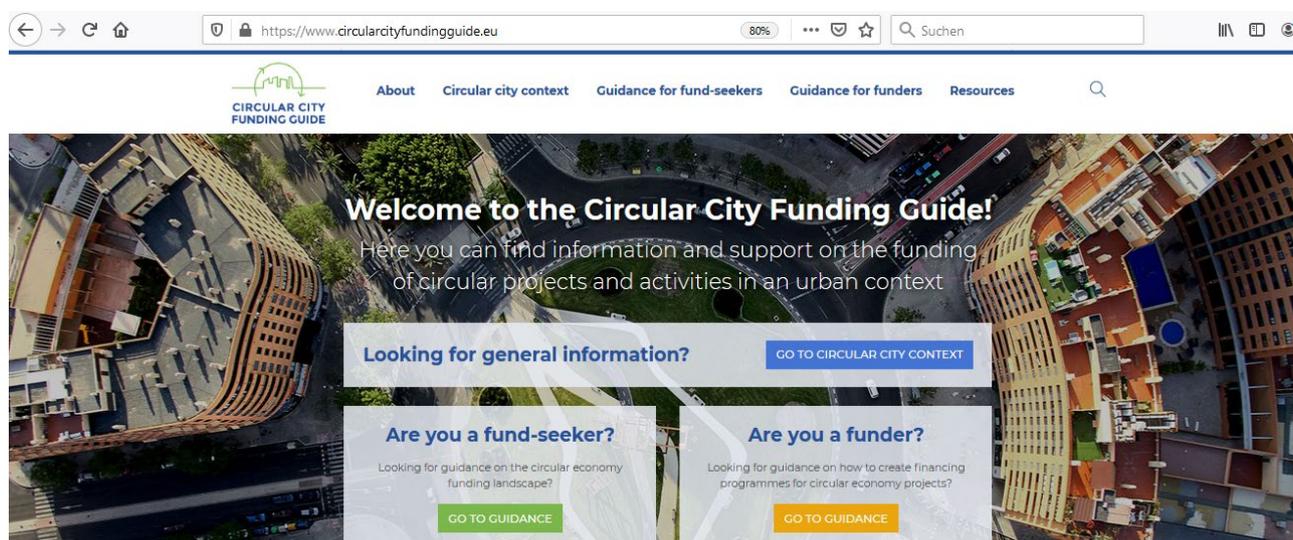
The main focus of the guide is to

- 1) provide information on financing and funding sources that are available for circular initiatives and projects, and
- 2) provide guidelines for setting up funding programmes to support the transition to a CE.



While the name of the guide includes funding, i.e. grant and subsidy types of financial support, the guide itself also covers different types and sources of financing such as debt, equity, and guarantees.”

“The aim of the Guide is, therefore, **to share knowledge, best practices, and information on circular solutions, and on ways to finance the preparation and implementation of such solutions.** The content of the Guide is prepared following an extensive review of existing [literature](#) and other resources on this topic. Since the body of knowledge is rapidly growing, we appreciate getting [suggestions](#) for updates. Sharing learnings, questions, success stories and anything else around financing of circular economy initiatives in cities is also possible in the [LinkedIn group](#).”



Closer look on **RESOURCES**, which encompasses:

- **Case studies**
- **Library**
- Circular city glossary
- Circular city resources

▪ **Case studies**

“This part of the Circular City Funding Guide contains a series of case studies that illustrate different practical implications of the CE. These cases come from cities and organisations in different parts of Europe, and cover both funders and fund-seekers.”

The following filters can be set:



Filter by: Circular strategy Circular sector

Support
 Use and life extension
 Value recovery

Built environment
 Consumer goods
 Food and biomass
 mobility
 Textiles
 Waste management and material recycling

The European Investment Bank: supporting the circular transition with awareness building, advisory and financing

As the EU Bank, the circular economy has been high on the European Investment Bank's (EIB) agenda since the launch of the European Commission's Circular Economy Package in 2015. Since then, the

WCYCLE Institute: re-thinking the business model of Maribor

The City of Maribor recognized at an early stage the potential of the circular economy as an approach to regional development. However, the Slovenian city acknowledged that it did not have enough implementation capacity to [...]

Growing circular attention from commercial banks

The size of the circular economy is directly related to the availability of financing for circular projects. It is therefore of paramount importance that circular economy will be understood and supported by commercial banks. This [...]

▪ **Library**

The library offers a lot of search possibilities:



Home | Library

Searching for a specific topic?

Enter keywords here

SEARCH

Search by tags

BUILT ENVIRONMENT

CIRCULAR CITIES

CIRCULAR ECONOMY

CIRCULAR ECONOMY FUNDING

CONSUMER GOODS

DESIGN AND PRODUCTION

FOOD AND BIOMASS

MANUFACTURING

MOBILITY

SUPPORT

TEXTILES

TOURISM

USE AND LIFE EXTENSION

VALUE RECOVERY

WASTE MANAGEMENT AND MATERIAL RECYCLING

WATER AND WASTEWATER

The Club of Rome - 2019

City Water Resilience Approach: Literature Review

[Link](#)

The Rockefeller Foundation, The Resilience Shift, SIWI and ARUP - 2019

The City Water Resilience Approach

[Link](#)

2.3 EIT Climate KIC

2.3.1 Circular Economy _ one area of focus

<https://www.climate-kic.org/areas-of-focus/circular-economy/>

“EIT Climate-KIC empowers entire countries, regions, industries and communities to implement a bold transition towards circular economy. To us, this means combining a portfolio of tailored actions **across policy, finance, education, entrepreneurship and innovation** to change whole systems from linear to circular.”

“The CE is a powerful tool to help communities transition to climate-friendly, regenerative and resilient economies.

We contribute to these systems change by:

- Reshaping **European policy** and public funding
- Supporting the transformation of the **private financial sector**
- Orchestrating all actors needed for **systemic transformation**
- Producing **thought leadership** on Circular Economy transition
- Developing scientific methodologies for **participatory engagement**
- Transforming industrial **value chains**



- Building **networks of actors** to address specific challenges”

2.3.2 Circular Cities Project (Start: April 2018 – December 2019)

<https://nordic.climate-kic.org/success-stories/circular-cities-project/>

“Cities across Europe now unite in a project with the aim of developing a shared circular economy approach to urban development. The aim of the project is to identify best practices and act as city role models to engage other cities on the track towards circularity.”

Several reports have been produced:

- [The challenges and potential of circular procurements in public construction projects](#)
- [Municipalities as drivers for circular economy in refurbishment and construction projects](#)
- [Municipality-led circular economy case studies](#)
- [Transforming Municipality Districts into Learning Centres of Circular Economy](#)
- [Circular Cities – A practical approach to develop a city roadmap focusing on utilities](#)

Three webinars have been produced:

<https://vimeo.com/showcase/6625715>

<p>Engage with Circular Economy... Climate-KIC Circular Cities Webinar 1: Connecting start-ups and Cities Hosted by Cleantech Bulgaria and 2Ei Veolia...</p>	<p>Engage with Circular Economy... Climate-KIC Circular Cities Webinar 2: Circular Economy in Cities Hosted by the City of Helsinki and C40 Cities, with...</p>	<p>Engage with Circular Economy... Climate-KIC Circular Cities Webinar 3: Circular Materials Hosted by the City of Copenhagen and the City of Malmö. Webi...</p>

2.4 OECD

2.4.1 [The Circular Economy in Cities and Regions](#)

<http://www.ecd.org/cfe/regionaldevelopment/circular-economy-cities.htm>

Transitioning to a circular economy is key for a prosperous, inclusive and sustainable future.



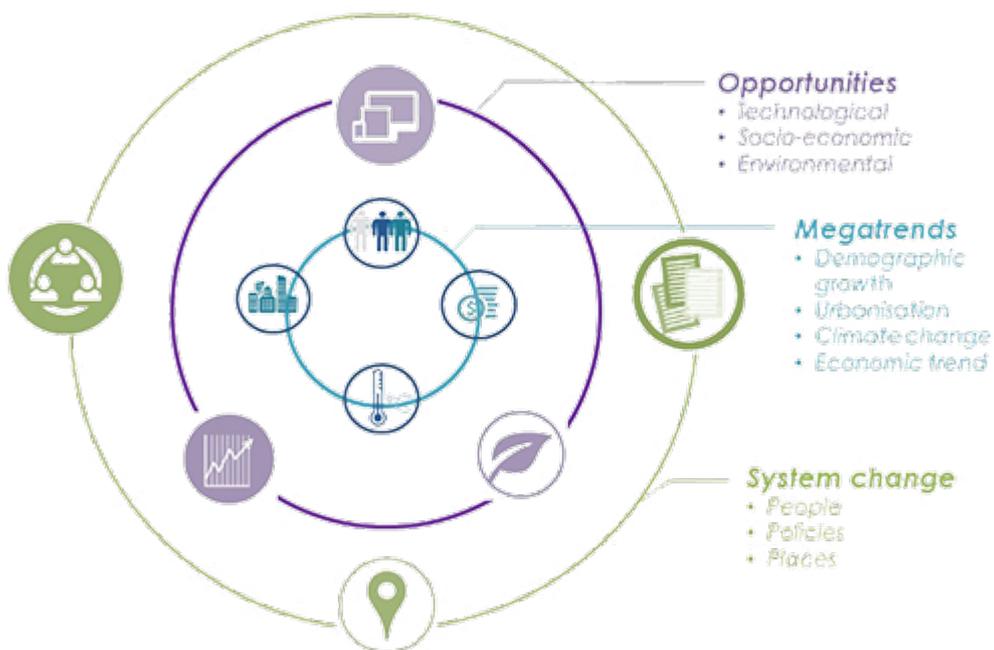
“Today, cities demand almost two-thirds of global energy, produce up to 80% of greenhouse gas emissions and 50% of global waste. The circular economy can provide a policy response to cope with the above challenges, as a driver for economic growth, jobs and environmental quality.

Cities and regions have a key role to play as promoters, facilitators and enablers of circular economy. Adequate economic and governance conditions should be in place to unlock its potential.”

“The OECD Programme on the CE in Cities and Regions supports cities and regions in their transition towards a circular economy, through:

- *Measuring*: developing an indicator framework for decision making and evaluation of CE strategies
- *Learning*: engaging multi-level dialogues in cities and regions to identify challenges and opportunities
- *Sharing*: favouring peer-to-peer learning, best practice and lessons from international experience”

The conceptual framework for CE in cities and regions :



Via website case-studies, communications and articles and information about conferences are provided:



The screenshot shows a web browser window with the URL www.oecd.org/cfe/regionaldevelopment/circular-economy-cities.htm. The page is titled "Case-studies" and features a grid of six images representing different cities: Groningen (The Netherlands), Umeå (Sweden), Glasgow (United Kingdom), Valladolid (Spain), Granada (Spain), and Ireland. Below the grid is a "Presentation" section with a large blue graphic that says "THE CIRCULAR ECONOMY IN CITIES". To the right, there are sections for "Communications and Articles" and "Conferences", each containing a list of links to various reports, interviews, and events. A Windows taskbar is visible at the bottom of the browser window.

2.4.2 [OECD iLibrary](#)

Searching for CIRCULAR in the OECD iLibrary the following categories are given:

The screenshot shows a search bar with the word "circular" entered. Below the search bar, a dropdown menu displays several suggestions:

- circular
- circular economy, waste and materials
- circular business models
- circular economy award-winning projects in 2017 and 2018
- circular economy in umeå, sweden



The screenshot shows the OECD iLibrary search results page. The search term 'circular' is entered in the search bar, and a dropdown menu shows suggestions: 'circular', 'circular economy, waste and materials', 'circular business models', 'circular economy award-winning projects in 2017 and 2018', and 'circular economy in umeå, sweden'. The search results show 1 - 20 of 35 results. The first result is 'The Consequences of a more resource efficient and circular economy for international trade patterns : A modelling assessment' (Working Paper, English) by Rob Dellink, dated 12 Jun 2020. The page includes navigation links like 'Browse by Theme', 'Country', 'Catalogue', and 'Statistics'. There are also buttons for 'New Search', 'Share', 'Export citation', 'Save This Search', and 'View Search History'. The Windows taskbar at the bottom shows the time as 14:31 on 18.06.2020.

2.5 [Ellen MacArthur Foundation](#)

2.5.1 Ellen MacArthur Foundation

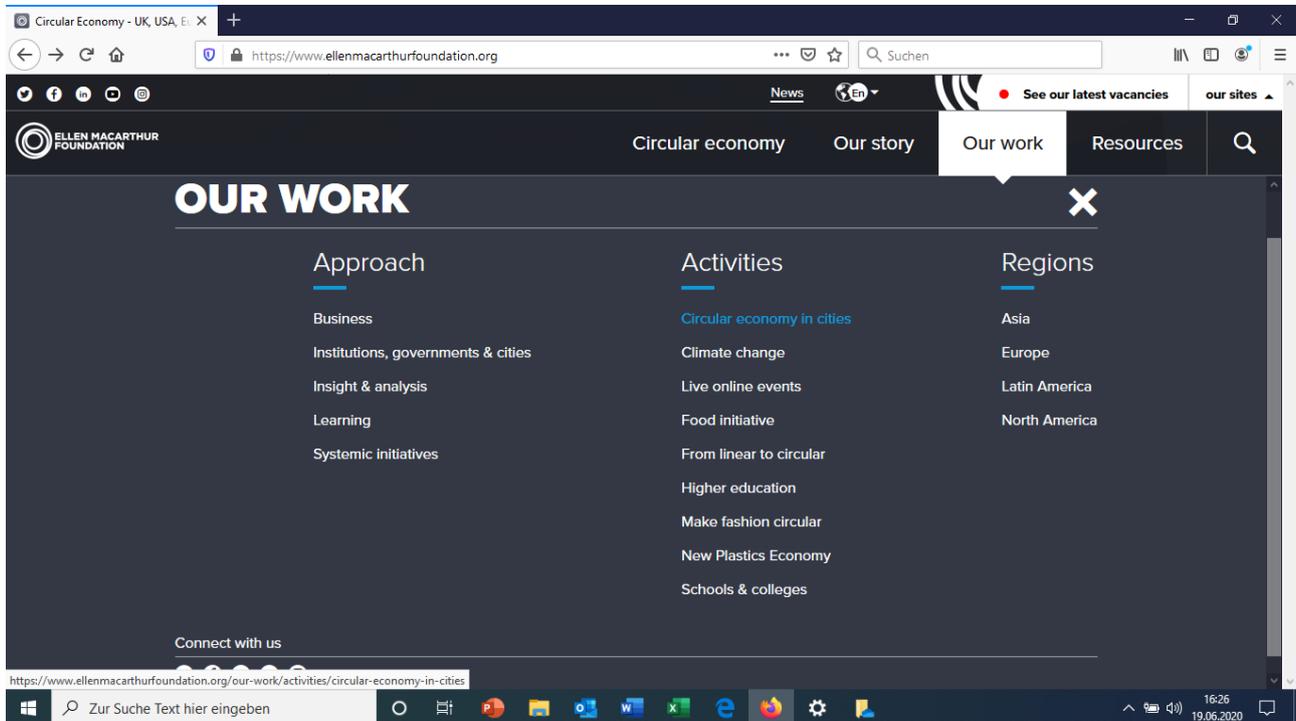
<https://www.ellenmacarthurfoundation.org/>

The Ellen MacArthur Foundation was launched in 2010 to accelerate the transition to a CE. Since its creation the charity has emerged as a global thought leader, establishing the CE on the agenda of decision makers across business, government, and academia. With the support of its strategic partners, the Foundation's work focuses on six interlinking areas:

- **Learning** - Developing the vision, skills and mindsets needed to transition to a CE
- **Business** - Catalysing circular innovation and creating the conditions for it to reach scale
- **Institutions, Governments and Cities** - Creating the enabling conditions for a circular economy to thrive
- **Insight and Analysis** - Providing robust evidence about the benefits and implications of the transition
- **Systemic Initiatives** - Transforming key material flows to scale the CE globally
- **Communications** - Engaging a global audience around the CE



The Foundation’s work is shown on the following screenshot:



2.5.2 [Circular Economy in Cities](#)

<https://www.ellenmacarthurfoundation.org/our-work/activities/circular-economy-in-cities>

The question is: “How can we embed circular economy principles to build thriving, liveable, and resilient cities?”

Ellen MacArthur Foundation developed a vision, offers factsheets for the interrelated urban systems – buildings, mobility and products, deals with policy levers, publishes case studies.



Overview **Vision** **Factsheets** **Policy levers** **Case studies** **Other networks & resources**

Explore how city governments around the world are taking action to enable circular economy opportunities that deliver on a range of mayoral priorities, Sustainable Development Goals, and climate objectives. Be inspired and give us your suggestions.



Amsterdam: the sharing economy action plan
Shaping a sharing economy that works for businesses and citizens alike



Austin: developing the materials marketplace
Creating new value and saving city and business costs



Belo Horizonte: computer reconditioning centre
Combining resource recovery, skills training, and digital inclusion



Brussels: regional programme for circular economy
Collaborating to achieve systemic change



Glasgow: the business community kick-starting



London: Advance London circular economy SME



New York City: The #WearNext campaign



Peterborough: developing a measurement framework for



2.6 [ACR+'s Circular Europe Network](#)

2.6.1 [ACR Association of Cities and Regions for sustainable Resource management](#)

<https://www.acrplus.org/en/>

“ACR+ is an international network of cities and regions sharing the aim of promoting a sustainable resource management and accelerating the transition towards a CE on their territories and beyond.

ACR+ is open to other key players in the field of material resource management such as NGOs, academic institutions, consultancy or private organisations.”

“ACR+, the Association of Cities and Regions for sustainable Resource management, wants to support local and regional authorities in being ambitious on CE and will therefore support and help them to adopt aspiring CE strategies. That is why ACR+ decided to launch a specific project on CE planning by cities and regions: the Circular Europe Network (CEN).”

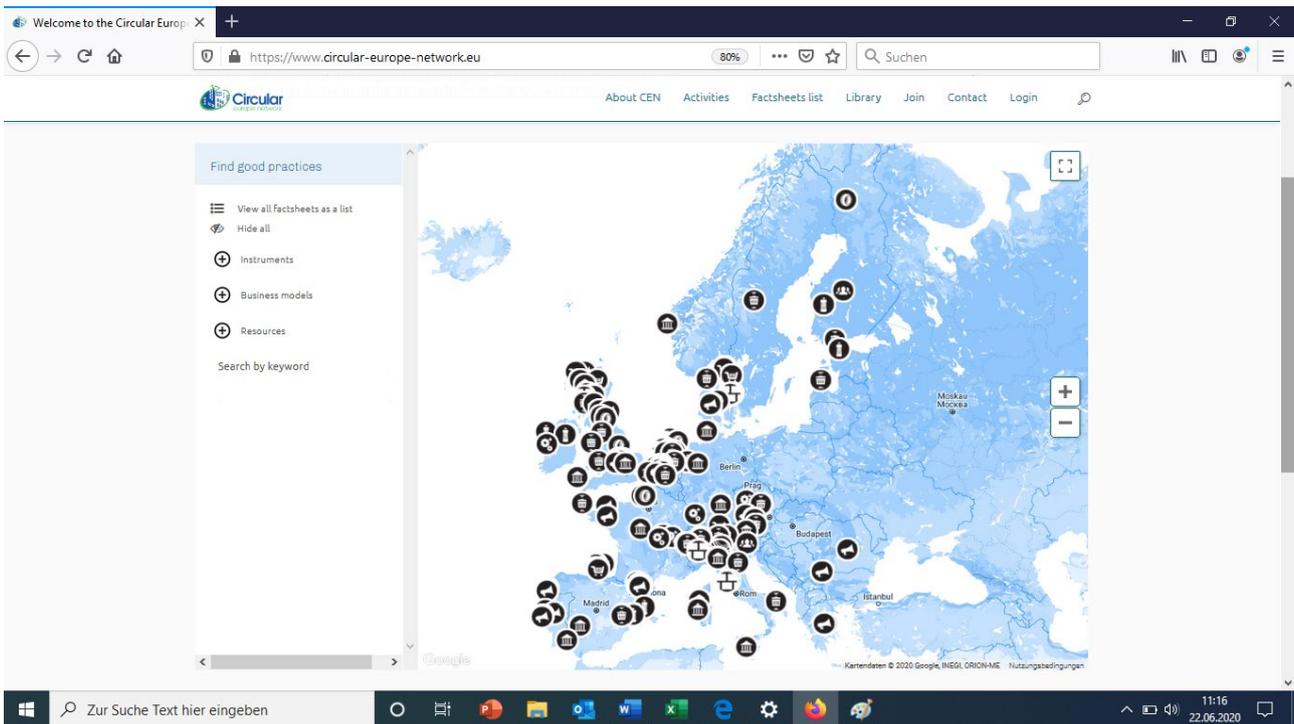
2.6.2 [Circular Europe Network \(CEN\)](#)

<https://www.circular-europe-network.eu/>

The CEN “gathers [ACR+ members](#) committed to improve their resource strategies and strengthen the sustainable development of their territory. The Circular Europe Network builds on the expertise of European front runners within the ACR+ network in order to gather, analyse and exchange information on efficient circular economy strategies implemented by cities and regions.

Based on ACR+ vision for CE, CEN aims to work on the priorities defined by its members, delivering methodological tools and access to good practices on those priorities. The CEN currently focuses on the governance of CE, public procurement and indicators to monitor CE transition.”

Through CEN, best practices on CE from cities and regions are shared. The cases can be browsed on a map and by category. Factsheets describe the nature of the projects and the actors that are involved.



The following search functions are offered:

Find good practices

-  View all factsheets as a list
-  Hide all
-  Instruments
-  Business models
-  Resources

Search by keyword



- | | | | | |
|---|---|---|--|---|
| <p>+ Instruments</p> <ul style="list-style-type: none">  Governance, Strategy and Planning  Legal  Economic  Technical and Research  Communication and Education | <p>+ Business models</p> <ul style="list-style-type: none">  Eco Design  Eco Production  Eco Consumption  Waste Prevention  Reuse and preparing for reuse  Recycling  Product Service Systems  Industrial and Territorial Ecology  Collaborative Economy | <p>+ Resources</p> <table border="0"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> + Material fractions  Energy  Water  Land use  Biodiversity </td> <td style="vertical-align: top; padding-left: 20px;"> <ul style="list-style-type: none"> + Material fractions  Biogenic fraction  Construction Material  Paper  Metal  Glass  Plastic  EEE  Wood  Other bulky items  Other Fractions </td> </tr> </table> | <ul style="list-style-type: none"> + Material fractions  Energy  Water  Land use  Biodiversity | <ul style="list-style-type: none"> + Material fractions  Biogenic fraction  Construction Material  Paper  Metal  Glass  Plastic  EEE  Wood  Other bulky items  Other Fractions |
| <ul style="list-style-type: none"> + Material fractions  Energy  Water  Land use  Biodiversity | <ul style="list-style-type: none"> + Material fractions  Biogenic fraction  Construction Material  Paper  Metal  Glass  Plastic  EEE  Wood  Other bulky items  Other Fractions | | | |

A factsheet looks like this – to view the full content a login is necessary:



[About CEN](#)
[Activities](#)
[Factsheets list](#)
[Library](#)
[Join](#)
[Contact](#)
[Login](#)

Arctic innovations in Lapland

Action leader(s)
Regional Council of Lapland

Summary
Circular economy has been implemented in Lapland through industrial symbiosis, in the so-called "arctic way", creating an ecosystem and investing on the natural resources present in the region. The main site of arctic innovation in Lapland is the Kemi-Tornio sub-region, where a technology park which utilises industries' byproducts has been developed. The region also hosts the Finnish National Industrial Circular Economy Centre, working on circular economy and bioeconomy at national level.

[View full content of this factsheet](#)

[Please login to access full content](#)

Username or Email Address

Password

Main partners:

- Kemin Digipolis Oy
- Finnish Innovation Fund Sitra

Localisation: Lapland (FI)

Population: 179,997 inhabitants (2016)

Categories:














2.7 World Business Council for Sustainable Development _ WBCSD

2.7.1 WBCSD _ circular economy

<https://www.wbcsd.org/>

“Under the leadership of WBCSD’s Executive Committee, over three dozen member companies from 16 countries, representing more than ten industry sectors and with a combined USD \$2 trillion in annual revenue, have signed up to lead this project. To help guide and inform these efforts, WBCSD has also assembled an external review committee comprised of a diverse collection of global thought-leaders and experts. The result is a collective, business-led effort to shape how business can help to unlock the transformations that are needed to allow over 9 billion people to live well, within the boundaries of the planet by mid-century.”

<https://www.wbcsd.org/Overview/About-us/Vision-2050-Refresh>



The screenshot shows the WBCSD website navigation and a grid of program categories. The navigation menu includes: Overview, Programs & projects (selected), Sector projects, and Hubs. Social media icons for YouTube, Twitter, and LinkedIn are visible. The grid lists the following categories and their sub-items:

Circular Economy	Cities & Mobility	Climate & Energy	Food & Nature	People	Redefining Value
Factor10 The Alliance to End Plastic Waste	Policy Case Study: New Mobility and MaaS Transforming the Built Environment Transforming Urban Mobility	Climate Action and Policy Low-Carbon Freight Natural Climate Solutions New Energy Solutions REscale SBT4utilities SOS 1.5 Transforming Heavy Transport	Circular water management Climate Smart Agriculture FReSH Soft Commodities Forum WASH - access to water, sanitation and hygiene Water Stewardship Water-Smart Agriculture	Finance for Social Impact Future of Work Human Rights SDG Action & Policy SDG Sector Roadmaps	Aligning Retirement Assets Assess & Manage Performance Assurance & Internal Controls Enterprise Risk Management Governance & Internal Oversight Purpose-Driven Disclosure (PDD) Reporting matters TCFD Preparer Forums The Reporting Exchange

2.7.2 WBCSD _ Circular Economy Practitioner Guide

<https://www.ceguide.org/>

The Circular Economy Practitioner Guide is designed to help in the acceleration of the transition towards circularity. The website offers resources related to different stages of the production phase and shares circular strategies and business cases.



8 BUSINESS CASES FOR THE CIRCULAR ECONOMY



The circular economy moves away from the traditional "take-make-dispose" economic model to one that is regenerative by design. The goal is to retain as much value as possible from products, parts and resources to create a system that allows for long life, sharing, digitization and resource recovery.

By applying these principles, companies can design out waste, increase resource productivity and decouple growth from natural resource consumption.

The Practitioner Guide is designed to help you accelerate your transition towards the circular economy.

III. Circular Economy HUBs – presentation, trainings/ webinars and materials

An information package on the topic HUBs was provided upfront the trainings/ webinars to the project partners:

- CITYCIRCLE presentation *WP T2 – CE Hubs – Examples, Structure & Services, Economic Sustainability* – <https://www.interreg-central.eu/Content.Node/CITYCIRCLE/D.T2.2.4-CE-HUBS-2020-03-30.pdf>



The content is the following:



CONTENT

- 1 CE HUBs - Understanding and further focus
- 2 City governments and their role in enabling a CE transition
- 3 Special focus: Clusters in the CE transition

CE HUBs : overview on cases / examples

- 4 Focus on city governments and clusters
- 5 Industrial symbiosis
- 6 Focus on regional and two "smaller" national HUBs



TAKING COOPERATION FORWARD



In the following chapters only the central content from the *CITYCIRCLE HUBs* presentation is presented here.

This content is complemented by the 3 webinars on good practices on "How to setup CE HUBs" practices from Maribor (Slovenia), Flanders (Belgium) and Kemi (Finland).

1. Circular Economy HUBs - Understanding in CITYCIRCLE

▪ Application - Objectives, project relevance & approach

Objective 1	Specific objectives
Setting-up quadruple-helix CE hubs in partner cities - non-metropolitan cities of Central Europe in order to establish linkages among key CE stakeholders (companies, public administration, universities and citizens).	All partner cities are dedicated to improve their innovative capacities by interlinking key innovation actors (public administration, companies, public utilities, R&D institutions, end-users) into CE hubs. These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field – material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). ...



Objective 2	Specific objectives
<p>Enabling and facilitating the innovation processes in CE cities by educating quadruple-helix stakeholders and providing tools for the management of efficient CE innovation processes and to deploy CE solutions.</p>	<p>Since the concept of CE is new to many stakeholders in partner cities, building a knowledge base in newly-established hubs is necessary to enable them to work in the field.</p> <p>A set of tools will be provided to equip hubs with guidelines at the development of CE solutions. They will provide instructions and tips on how to design value-chains in CE and will also give RIS3 national strategy framework and showcases from all partner countries.</p>
Project relevance	
<p>By establishing CE quadruple-helix hubs as local innovation networks of private and public institutions in partner cities, CITYCIRCLE will provide innovation systems to facilitate innovation and transfer of technology, services and business models.</p> <p>By providing hubs with tools and knowledge, the project will enable the hubs to generate innovative solutions in CE in their urban ecosystems in a long-run.</p>	
Project approach	
<p>CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix circular economy hubs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level.</p> <p>Thus, CITYCIRCLE is placing the cities and their administrations in a heart of CE ecosystems and is introducing cross-sectorial horizontal approach with quadruple-helix partnership management structure.</p>	

- **Circular Economy HUBs in non-metropolitan cities of Central Europe**



CE HUB _ Understanding	
▪ Where ?	▪ Peripheral urban centres = non-metropolitan cities of Central Europe
▪ Who ?	▪ quadruple-helix - establish linkages among key CE stakeholders → public administration , companies, public utilities, universities, R&D institutions, citizens
▪ What ?	▪ improve innovative capacities ▪ cross-sectorial horizontal approach
<ul style="list-style-type: none"> ▪ By establishing CE quadruple-helix HUBs as local innovation networks of private and public institutions in partner cities. ▪ These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field – material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). 	
<ul style="list-style-type: none"> ▪ CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix CE HUBs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level. 	

2. Classification of cities when examining literature, cases and examples

- Why is a classification of cities needed ?

“Cities are different. So are solutions.”

“The prospect of urban innovation excites the imagination. But dreaming up what a “Circular City” will look like in some gleaming future is, by its nature, a utopian exercise. The fact is that no two cities are same, what’s appealing for the young in Copenhagen certainly won’t help millions of workers in Dhaka or Lagos.”

cscp | Bertelsmann (2019), p 21



▪ **Different classification approaches**

Different classification approaches exist, one is e.g.

▪ **Circular Economy city framework – four quadrants**

cscp I Bertelsmann (2019) use four segments following two distinctions:

- legacy vs. pioneering cities, and
- developed vs. emerging economies.

and use the framework to document how various cities across the globe are in-corporating principles of CE into a city framework.

Figure 1: Four quadrants – integration of CE principles into a city framework



Source: cscp I Bertelsmann (2019), p 21

In the quadrant *emerging economy and pioneering* the city of Maribor is included because of their initiative:

“The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.”

Figure 2: Emerging economy and pioneering city



Source: *cscp* | Bertelsmann 2019, p 21

▪ **City levels – capitals, major cities, capitals**

The Ellen MacArthur Foundation (March 2019) uses in their publication “City Governments and their Role in Enabling a Circular Economy Transition – an Overview of Urban Policy Levers” the following classification of city levels:

- Capitals
- Major cities
- Smaller cities

They included “Over 100 cases from more than 70 cities around the world ... to provide short, practical examples of the various policy steps ...” (Ellen MacArthur Foundation March 2019: p 9.). Also mentioned are the regional and national level.

▪ **References**



<i>Books/ articles/ papers</i>
<p>cscp I Bertelsmann (2019) Monitor Sustainable Municipalities. Report 2019: Key topic Circular Economy. Gütersloh, Germany: November 2019. https://www.bertelsmann-stiftung.de/fileadmin/files/Projekte/Monitor_Nachhaltige_Kommune/MNK_Bericht2019_CircularEconomy_englisch_2.pdf</p>
<p>Ellen MacArthur Foundation (March 2019) City Governments and their Role in Enabling a Circular Economy Transition – an Overview of Urban Policy Levers. https://www.ellenmacarthurfoundation.org/assets/downloads/CE-in-Cities_Policy-Levers_Mar19.pdf</p>

3. Enablers of CE transition to a Circular City

3.1 City governments and their role

“City governments have a key role to play in building thriving, liveable, resilient cities that are regenerative by design.” (Ellen MacArthur Foundation (March 2019))

In our presentation “CE HUBS” we introduced three approaches for city governments:

- **Ellen MacArthur – Urban policy levers**
- **European Investment Bank – The 15 circular steps for cities**

and the

- **Urban Agenda for the EU – Circular City Governance – A first guide for policy makers**

“Circular Economy is a hot topic for local policy makers. But frontrunners confirm: from first interest to the implementation of a circular strategy is a huge step. The current cases and studies mostly focus on facts and results, but what is usually missing is the governance aspect. How can cities support circular models within their current governance? This web page acts as a first guide for policy makers who want to explore circular city governance.”



What can a local authority do?

REORGANISE YOUR CITY

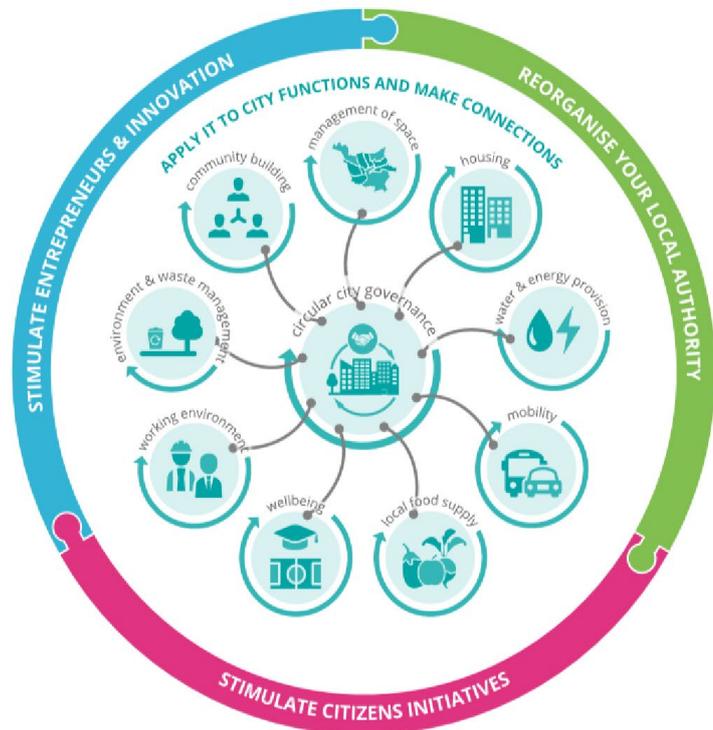
- 1 Create common long term ambition , with political support & use it in your branding
- 2 Set up cooperation between city departments and appoint a coordinator
- 3 Act circular (circular procurement, futureproof urban planning, sustainable building,...)
- 4 Get insights in your resources (waste, water, materials,...)

STIMULATE CITIZENS INITIATIVES

- 5 Promote sharing & functional economy
- 6 Raise awareness and coach citizens
- 7 Support bottom up initiatives through legislation, funding, cooperation, communication,...

STIMULATE ENTREPRENEURS & INNOVATION

- 8 Stimulate local symbioses through (business park) networks, smart technologies,...
- 9 Create incentives to attract circular business (offer space, taxes, subsidies,...)
- 10 Communicate success stories



Circular strategies to focus on

GENERAL AND TECHNICAL NUTRIENTS



BIOLOGICAL NUTRIENTS



Books/ articles/ papers

European Investment Bank (Dec 2018)

The 15 circular steps for cities.

https://www.eib.org/attachments/thematic/circular_economy_15_steps_for_cities_en.pdf

Ellen MacArthur Foundation (March 2019)

City Governments and their Role in Enabling a Circular Economy Transition – an Overview of Urban Policy Levers.

https://www.ellenmacarthurfoundation.org/assets/downloads/CE-in-Cities_Policy-Levers_Mar19.pdf

Urban Agenda for the EU

Circular City Governance – A first guide for policy makers.

<https://vlaanderen-circulair.be/circulargovernance/index.html>



3.2 Clusters and their role

“With at least 250 green clusters the European clusters have a high potential for pushing the CE forward faster and more efficient.

A new study from Denmark documents that many clusters have an active role in the transition towards a CE. In total 2/3 of the Danish clusters are involved in CE – also indicating that clusters not directly related to the classical green sectors are working with CE in their sectors.” (Nielsen & Nielsen (Sept 2019)

Clusters are powering the circular transition by ...

- ... building bridges to circular knowledge
- ... putting circular policy into action
- ... supporting to get access to circular funding for SME
- ... following sustainable development goals
- ... supporting circular public procurement

Books/ articles/ papers

Nielsen, K.; Nielsen, M.D. (Sept 2019)

Clusters in the Circular Economy.

Building Partnerships for Sustainable Transition of SMEs.

https://www.clustercollaboration.eu/sites/default/files/news_attachment/clusters_in_circular_economy_0.pdf

3.3 Circular Economy HUBs _ Cases / examples transforming municipality districts into learning centres of CE

3.3.1 Circular Cities Project at EIT Climate-KIC

Books/ articles/ papers

EIT CLIMATE-KIC (2019)

Transforming Municipality Districts into Learning Centres of Circular Economy.

<https://www.climate-kic.org/wp-content/uploads/2019/06/Learning-Centres-of-Circular-Economy.pdf>

“The aim of this publication is to showcase how different municipalities create innovation platforms where entrepreneurs, NGOs and community groups can turn different waste streams into new



products, new design, new innovative ideas and how these efforts can generate work and at the same time minimise waste.” (p 3)

The report showcases 13 (14) examples of specific CE HUBs at a district and area level to explain how cities across Europe concrete circular economic concepts have been designed and executed, including a detailed explanation for the potential CE business cases and technologies which can cascade circular business opportunities.

2 pages per case with the following outline

- Who was the team?
- What was the vision/goals?
- What is the local waste recycling context?
- How did you do it? (your approach)
- What was done? (activities)
- What was achieved? (impact)
- What were the challenges?
- Next steps
- City Contact Details
- Summary
- Time period
- Information source

The cases are :

CE topic	Where ?	What ?
Product reuse & remanufacture	<ul style="list-style-type: none"> • Gothenburg, Sweden • Berlin, Germany • Hjørring, Denmark 	CURE Pathfinder project – Centres for Urban Remanufacture Repos project – People, preservation, purpose: Reuse of large household appliances
Sustainable living & construction	<ul style="list-style-type: none"> • Trondheim, Norway • Malmö, Sweden • Maribor, Slovenia 	Experimental housing at Svarlamon Sege Park – Urban district for circular living CINDERELA – Resource efficient construction sector
Waste systems	<ul style="list-style-type: none"> • Maribor, Slovenia • Trento, Italy 	Sorting plant for mixed municipal waste Greencycle: introducing a Cesystem to Alpine Space to achieve low carbon targets
Engagement hubs and urban labs	<ul style="list-style-type: none"> • Trondheim, Norway • Copenhagen, DK • Helsinki, Finland • Utrecht, Netherlands 	City libraries as platforms for repair, exchange and lend Circular South Harbour Smart Kalasatama Werkspookwartier: Creative circular manufacturing



Food and agriculture	<ul style="list-style-type: none"> • Aarhus, Denmark • Maribor, Slovenia 	From Grounds to Gourmet Urban soil 4 food
-----------------------------	--	---

The study is rounded off with findings, barriers to successful implement circular learning centre as well as key learnings.

Books/ articles/ papers
EIT CLIMATE-KIC (2018) Municipality-led circular economy case studies. https://www.climate-kic.org/insights/municipality-led-circular-economy-case-studies-c40/

Published in collaboration with C40, this project publication provides a unique overview of concrete circular economy initiatives from cities through 40 examples from around the world. It showcases how cities today are viably putting the circular economy concept into practice to realise systemic change on a district and city level, which can then be scaled-up, not only regionally, but internationally as well.

City-wide circular strategy		Phoenix, USA		Helsinki, Finland		Pécs, Hungary	
Amsterdam, The Netherlands		Redefining waste through a Resource Innovation Campus	46	Coordinating the reuse of excavated land mass in construction projects across the city	78	One of the largest generators of energy from biomass in Europe	104
Amsterdam's circular economy roadmap and projects in the construction value chain	14	Samsø, Denmark	50	Paris, France	80	Civic waste	
Brussels, Belgium		Circular economy for the whole island	50	Transnational responsible procurement working group	80	Austin, USA	108
Regional program for a circular economy: 'Be Circular'	18	Seoul, South Korea	54	Tokyo, Japan	82	Online marketplace for re-using materials	108
Cape Town, South Africa		Sharing City Seoul, aiming to engage all 10 million citizens	54	Circular initiatives within the Tokyo 2020 Olympic and Paralympic Games' Sustainability Plan	82	Eskilstuna, Sweden	110
Industrial symbiosis program	22	Tel Aviv, Israel	58	Journey towards circular economy procurement	86	The world's first circular shopping centre	110
Copenhagen, Denmark		Commencing the journey for the City to reach 10 circular projects	58	Utilities		Kristiansand, Norway	112
Circular Copenhagen – resource and waste management plan	24	Urban refurbishment		Aguascalientes, Mexico	92	Citizen and business collaboration centre	112
Glasgow, Scotland		Houston, USA	64	Water fund to support the City's water shortage	92	Kristiansand, Norway	114
Inspiring businesses to innovate and become future-proof	26	Re-use warehouse for construction materials	64	Arras, France	94	Secondhand store led by the municipal waste company	114
Gothenburg, Sweden		Paris, France	66	Heat recovered from waste-water treatment for a public aquatics centre	94	New York, USA	116
Circular Gothenburg	30	3D mapping project supporting policies for low carbon buildings	66	Basel, Switzerland	96	Donation online market place and supporting initiatives	116
Helsinki, Finland		Sydney, Australia	68	Gold award winner for Basel's progress towards a low-energy city	96	Paris, France	118
The Kalasatama district's urban laboratory	32	Co-creating industry guidelines for circular office refurbishments	68	Helsinki, Finland	98	Local production, repair and re-use initiatives	118
Kristiansand, Norway		Vienna, Austria	72	The largest heat-pump plant in the world to produce heating and cooling	98	Quezon, Philippines	120
Green business idea competition and growth support	36	Supporting dismantling services for large industrial buildings	72	Lille, France	100	Regulations on the use of plastic bags to help curb ocean plastics	120
Ljubljana, Slovenia		Procurement		Biointensive micro-farming in the Concorde district	100	Stockholm, Sweden	124
A national roadmap leading to specific city-level actions	38	Berlin, Germany	76	Industrial symbiosis in the harbour area	102	The world's first large-scale 'biochar' urban carbon sink	124
Maribor, Slovenia		Ecological criteria embedded in the public procurement process	76	Malmö, Sweden		Vienna, Austria	128
Circular economy strategy working closely with the public utility companies	40					Initial government support helped to create Austria's largest independent repair and service centre for electrical goods	128
Paris, France							
City-wide circular economy strategy	44						

More reports have been produced
EIT CLIMATE-KIC (June 2019)



The challenges and potential of circular procurements in public construction projects.

<https://www.climate-kic.org/wp-content/uploads/2019/06/Procurements-in-Public-Construction-v2.pdf>

EIT CLIMATE-KIC (November 2019)

Municipalities as drivers for circular economy in refurbishment and construction projects.

<https://nordic.climate-kic.org/wp-content/uploads/sites/15/2018/05/Municipalities-as-drivers-for-circular-economy.pdf>

EIT CLIMATE-KIC (December 2019)

Circular Cities - A practical approach to develop a city roadmap focusing on utilities.

https://nordic.climate-kic.org/wp-content/uploads/sites/15/2018/05/Circular-Economy-and-Utilities_FINAL.pdf

3 webinars have been recorded



Engage with Circular Economy...

Climate-KIC

Circular Cities Webinar 1: Connecting start-ups and Cities Hosted by Cleantech Bulgaria and 2Ei Veolia....



Engage with Circular Economy...

Climate-KIC

Circular Cities Webinar 2: Circular Economy in Cities Hosted by the City of Helsinki and C40 Cities, with...



Engage with Circular Economy...

Climate-KIC

Circular Cities Webinar 3: Circular Materials Hosted by the City of Copenhagen and the City of Malmö. Webi...

<https://vimeo.com/showcase/6625715>

3.3.2 IMPACT HUB - Entrepreneurial Networks as Drivers for Positive Change

<https://impacthub.net/>

“We are one of the world’s largest networks focused on building entrepreneurial communities for impact at scale — home to the innovators, the dreamers and the entrepreneurs who are creating tangible solutions to the world’s most pressing issues.”

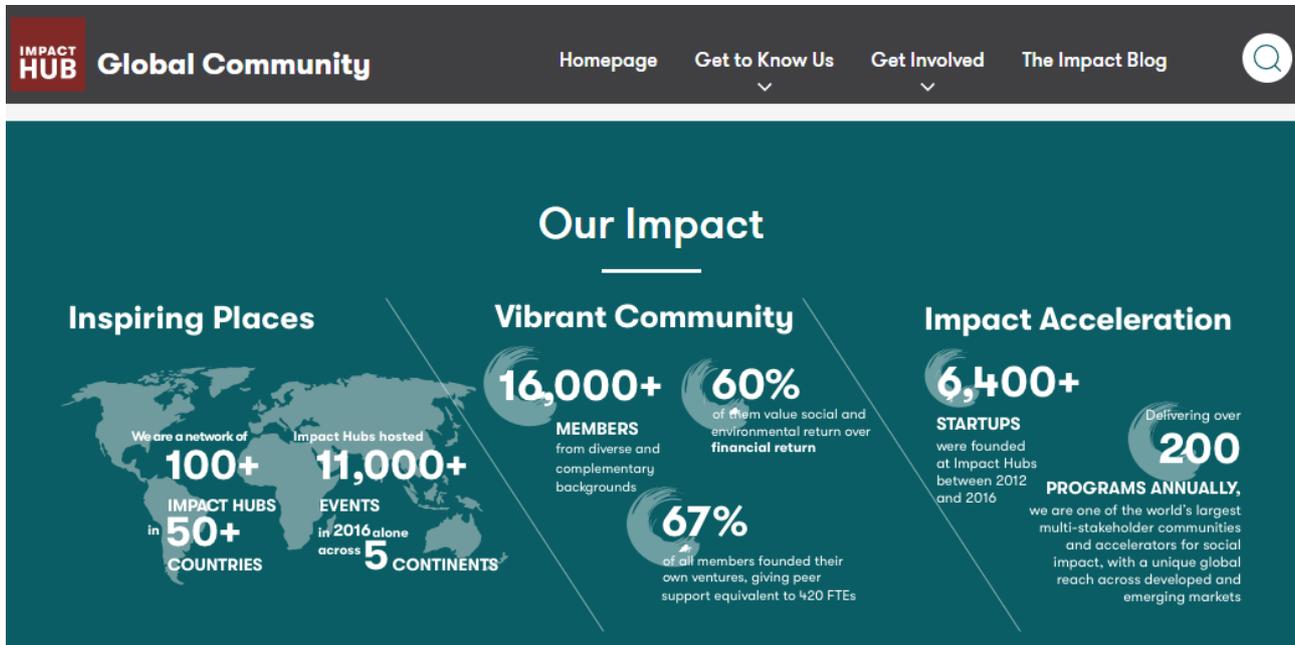
IMPACT HUBs offer:

- Community and Workspace
- Startup Support
- Programs and Events

IMPACT HUBs use the global Sustainable Development Goals (SDGs) as a lens through which to view our impact in the world.



See some figures :



For more information :

<i>Books/ articles/ papers</i>
IMPACT HUB 2019 2019 Impact Report: Networks as drivers for positive change. http://www.bepartofthechange.impacthub.net/

Important to mention – everybody can ...

- ... join the network
- ... become a member
- partner with IMPACT HUB
- ... open an [IMPACT HUB](#)



4. The Role of Cities in CE – training/ webinar on “How cities around Europe cope with the transition to CE and what they have done”

This training/ webinar ties in directly with the previous chapter and the CITYCIRCLE HUBs presentation, embeds the content in a larger context and enriches it with good practices:

Topic	<i>The Role of Cities in Circular Economy</i>
Presenter	Venelina Varbova
Institution	GreenEdge Consulting
Date	2020-02-28
Presentation	The Role of Cities in Circular Economy (links in the presentation are active) https://www.interreg-central.eu/Content.Node/CITYCIRCLE/2020-02-26-Presentation-Webinar-Kranj.pdf
Webinar	Soon available on CityCircle’s website: https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html

The content of the training/ webinar is the following:

CONTENTS			
Part 1: EU policy framework on circular economy	Part 2: Starting the transition to circular economy	Part 3: Good practices on circular economy from European cities	

Part 1 deals with the topics:

- EU GREEN DEAL
- Revised Waste Framework Directive (2018)
- Upcoming Circular Economy Action Plan (2020)- plastics, food waste, critical raw materials, construction and demolition, as well as biomass and bio-based products
- European Strategy for Plastics in a Circular Economy (2018)

Part 2:

- Framework of CE
- Good practice - Amsterdam



Part 3 provides some good practices:

- Linked to two priority areas of the Slovenian roadmap to CE (manufacturing industry, food systems)
- Industrial symbiosis
- Solutions for healthy food systems
- Urban agriculture

The presentation ends with conclusions and sources for further information.

5. CE HUBs – training/ webinars on three good practice cases on “How to setup CE HUBs”

Three webinars on good practice examples were held in April/ May on the topic of CE Hubs. Representatives of the following regions agreed to present and answer questions in a webinar:

- Circular economy in ...
 - ... Maribor, Slovenia
 - ... Flanders, Belgium
 - ... Kemi, Finland

In the following sections basic data for each presentation/ webinar as well as further reading notes will be given.

5.1 Circular economy in Maribor, Slovenia

The case **Maribor, Slovenia** has been chosen for a training/ webinar because it is often cited in different CE contexts.

In the CITYCIRCLE HUBs presentation e.g. it is mentioned

- in the chapter on the CITIES CLASSIFICATION _ emerging economy / pioneering city (p 26 – 27). The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.
- in the EIT Climate-KIC report:

<i>CE topic</i>	<i>Project</i>
Sustainable living & construction	CINDERELA – Resource efficient construction sector
Waste systems	Sorting plant for mixed municipal waste
Food and agriculture	Urban soil 4 food



- See CITYCIRCLE HUBs presentation especially p 55 – 60.

Topic	<i>Circular economy in Maribor, Slovenia</i>
Presenter	Igor Kos
Institution	WCYCLE Institute Maribor https://wcycle.com/
Date	2020-04-09
Presentation	Circular economy in Maribor-Slovenia (links in the presentation are active)
Webinar	Soon available on CityCircle’s website: https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html

<i>Further readings – Maribor and Slovenia (mentioned in the presentation)</i>
<p>Wcycle Institue Maribor (2018) Wcycle Institue Maribor (2018): Strategy for the transition to circular economy in the municipality of Maribor. Maribor: July 2018. https://www.circularchange.com/s/The-Strategy-for-the-transition-of-the-City-of-Maribor-to-the-circular-economy.pdf (https://www.circularchange.com/news/the-strategy-for-the-transition-of-the-city-of-maribor-to-the-circular-economy)</p>
<p>Ministry Slovenia (2018) Ministry of the Environment and Spatial Planning of the Republic of Slovenia (2018): Roadmap towards the circular economy in Slovenia. Ljubljana: April 2018. https://circulareconomy.europa.eu/platform/sites/default/files/roadmap_towards_the_circular_economy_in_slovenia.pdf</p>
<i>Further readings (website search)</i>
<p>Cooperative city magazine (2019) Creating soil from urban waste – experience of Maribor. https://cooperativecity.org/2019/07/03/creating-soil-from-urban-waste-experience-of-maribor/</p>
<p>Wcycle Institue (2018) Project WCYCLE Model of Urban Circular Economy for Municipality of Maribor, Slovenia. Ljubljana: July 2018. https://www.interregueurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1534408182.pdf</p>



(similar: <https://www.newbusinessmodels.info/dl/cityasab/Kos04.10.18.pdf>)

Wcycle Institute – Interview with Igor KOS (2018).

Urban Agenda for the EU: <https://ec.europa.eu/futurium/en/circular-economy/interview-igor-kos-wcycle-institute-maribor>

Wcycle Institute: re-thinking the business model of Maribor.

Circular City Funding Guide: <https://www.circularcityfundingguide.eu/case-studies/wcycle-institute-re-thinking-the-business-model-of-maribor/>

Wcycle in Maribor - circular economy cluster of local public utility companies.

Factsheet visible for members of the Circular Europe network: <https://www.circular-europe-network.eu/factsheets/wcycle-in-maribor/>

Further readings – articles

N. Cudecka-Purina, D. Atstaja & R.Vesere (2019)

The goals of waste framework directive as mechanism securing transition to circular economy.
In: International Scientific Conference: New Challenges of Economic and Business Development – 2019: Incentives for sustainable economic growth. Proceedings; Riga – University of Latvia: May 2019; p 171 – 181.
<https://www.bvef.lu.lv/en/conf/previous-conferences/2019-incentives-for-sustainable-economic-growth/>

D. Kralj, M. Tramšek & M Homšak (2017)

A Circular Economy – An Attractive Challenge. In: WSEAS TRANSACTIONS on BUSINESS and ECONOMICS; vol. 14; p 120 – 128.
<https://pdfs.semanticscholar.org/8363/24ae452158c736e8eae70a4bf41cd4822ac3.pdf>

5.2 Circular economy in Flanders, Belgium

The case **Flanders, Belgium** has been chosen as training/ webinar because it already has a longer history dealing with these kind of topics and also has an interesting approach. Let's have a brief look into the history (see: <https://www.vlaanderen-circulair.be/en/about-us>):

- In 2006, at the initiative of the OVAM – the Public Waste Agency of Flanders –, a small group of committed people were brought together to discuss the necessity of making our materials management more sustainable.
- Until 2012 a thinktank and informal network at OVAM made contributions to the first change in mentality among a broader group of stakeholders: the emphasis was no longer on looking for ways to limit waste, but rather on dealing with materials in a more intelligent way, including manufacturing and consuming differently.
- The achievements and specific projects that were set up and carried out from 2012 to 2015 under the umbrella of the Flanders' Materials Programme were the first step towards a CE in Flanders.



- In early 2016, the OVAM received the Circular Awards for the work that it has done together with all the stakeholders in the Flanders’ Materials Programme.

This is the starting point of the CITYCIRCLE HUBs presentation, see p 95 – 105.

Today „Circular Flanders is the hub and the inspiration for the Flemish circular economy. It is a partnership of governments, companies, civil society, and the knowledge community that will take action together. These organisations are the core of our partnership. Each one has committed to carrying out a specific action.“ <https://circular-impacts.eu/library/1786>

Topic	<i>Circular economy in Flanders, Belgium</i>
Presenter	Veerle Labeeuw
Institution	Circular Flanders https://vlaanderen-circulair.be/en
Date	2020-05-06
Presentation	Circular Flanders: Boosting circular economy in Flanders (links in the presentation are active)
Webinar	Soon available on CityCircle’s website: https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html

<i>Further readings – VISION 2050</i>
<p>Vision 2050. A long-term strategy for Flanders.</p> <ul style="list-style-type: none"> ▪ Jan 2019 - https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders-0 (long version - 104 pages) ▪ Dec 2019 - https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders (short version - 36 pages) ▪ 2016 - http://financeflanders.be/sites/default/files/atoms/files/Vision_2050_eng.pdf (short version - 24 pages)
<p>Retrospective Report 2017 - 2019</p> <p><u><i>Circular Flanders – Retrospective Report 2017 – 2019; an overview of our activities for the CE in Flanders - first period.</i></u></p> <p>The Circular Flanders Report is an interactive PDF; on 104 pages an overview of the work carried out during 2017 – 2019 is given.</p>
<p>Circular Flanders. Together towards a circular economy. Circular Flanders Kick-off Statement.</p> <p><u>Circular Flanders Kick-off Statement.</u></p>



- Pdf for screen viewing: <https://www.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/Circular%20Flanders%20Kick-Off%20Statement.pdf>

Websites

Circular Flanders

- <https://www.vlaanderen-circulair.be/en>

CE Center – Circular Economy Policy Research Centre

- <https://ce-center.vlaanderen-circulair.be/en>

Further readings (website search)

Case study: Belgium: Flanders Materials Programme. Flanders Public Waste, Materials & Soil Agency.

The Flanders Materials Programme (FMP) combines an ambitious long-term vision, a 45-item plan of concrete actions and the development of policy-relevant research. It aims to streamline the many public and private initiatives in the field of sustainable materials management into a coherent whole.

<https://www.ellenmacarthurfoundation.org/case-studies/belgium-flanders-materials-programme>

Further readings – articles/ books

Deckmyn, S. (2018)

Circular Flanders: Adaptive Policy for a Circular Economy.

In: Lehmann, H.: Factor X: Challenges, Implementation Strategies and Examples for a Sustainable Use of Natural Resources. Springer International Publishing.

<https://www.springerprofessional.de/circular-flanders-adaptive-policy-for-a-circular-economy/15095678>

5.3 Kemi, Finland - Digipolis

The case **Kemi, Finland - Digipolis** has been chosen as training because

- The aim of Digipolis Circular and Bioeconomy Centre is to generate a model of industrial symbiosis built around the CE. Its founders and co-actors are Digipolis, the City of Kemi and Lapland University of Applied Sciences.
- Digipolis has already been established in 1993.
- The next steps – new openings - have been:
 - 2008-2016 Expertise on Arctic conditions & Industry, novel wood constructions: CLT development platform
 - 2012- Ecosystem of the Arctic Industry - Innovation Platform
 - 2014- Arctic Industry and Circular Economy Cluster management



- 2016- Digipolis chosen as key actor in national circular economy roadmap and implementation of the key project activities

Some words about Finland: Finland is a forerunner in the CE – the first country in the world to draw up a national road map for the Circular Economy Action Programme, whose goal was to create a common vision for society to promote CE and to define the most effective means for achieving the vision. This was already in 2016 under the leadership of Sitra, the Finnish Innovation Fund. In March 2019 an updated version has been published – *Finland’s road map to the CE 2.0* – which shows the route until 2025.

CITYCIRCLE HUBs presentation, see p 120 - 124.

Topic	Circular economy in Kemi, Finland
Presenter	Tuomas Pussila
Institution	The Circular and Bioeconomy Centre https://www.digipolis.fi/en/teollinenkiertotalous
Date	2020-04-15
Presentation	Circular Economy in Finland and industrial symbiosis as a regional driver
Webinar	Soon available on CityCircle’s website: https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html

Further readings – Digipolis (website search)
Digipolis – Kemi Technology Park https://www.digipolis.fi/en/front-page
Digipolis (November 2018) The Circular Economy Centre is turning into a national success story. https://www.digipolis.fi/news/the-circular-economy-centre-is-turning-into-a-national-success-story
SITRA Competence and training centre for industrial symbiosis in Kemi-Tornio. The Kemi-Tornio region has a well-functioning model for the industrial circular economy. In order for the operating model to spread throughout Finland, Sitra will co-operate with experts and education providers in the region. https://www.sitra.fi/en/projects/competence-training-centre-industrial-symbiosis-kemi-tornio/
SITRA



Finnish road map to a circular economy 2016-2025.

The world's first national road map to a circular economy was published in autumn 2016. The road map's second edition updates Finland's plans to reform its economic model to ensure successful sustainability.

<https://www.sitra.fi/en/projects/leading-the-cycle-finnish-road-map-to-a-circular-economy-2016-2025/>

Further readings

Digipolis (Mai 2020)

Webinar: Learning from Lapland: Digipolis and the circular economy in Finland.

Circular Economy in Finland and industrial symbiosis as a regional driver.

<https://vimeo.com/415565074>

<https://tevi.co.uk/introducing-digipolis-a-leading-circular-economy-cluster-in-northern-finland/>

Digipolis (April 2017)

Modern Cluster of Arctic Industry – Sustainable utilisation of arctic natural resources.

Kemi-Tornio region and Lapland: Arctic Hub of industrial symbiosis - Arctic Industry and Circular Economy Cluster.

https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/Remix%20Digipolis%20Cluster%20&%20%20Industrial%20Symbiosis%20%203.4.2017.pdf

Digipolis

Good Practice: Kemi-Tornio Industrial Symbiosis

<https://www.interregeurope.eu/policylearning/good-practices/item/2046/kemi-tornio-industrial-symbiosis/>

Circular and Bioeconomy Centre

Good Practice: Circular and Bioeconomy Centre: promoting industrial symbiosis in Lapland.

<https://circulareconomy.europa.eu/platform/en/good-practices/circular-and-bioeconomy-centre-promoting-industrial-symbiosis-lapland>

Further readings – articles/ books

Nordic Council of Ministers (2017)

Nordic Bioeconomy: 25 cases for sustainable change.

<https://books.google.de/books?id=gwwLDgAAQBAJ&pg=PA55&lpg=PA55&dq=digipolis+kemi+finnland&source=bl&ots=dwxFYXwbnw&sig=ACfU3U0mtOg3g2BdAOKGiZogAEhg1PLb4g&hl=de&sa=X&ved=2ahUKEwjxqea3rrqAhWUUh1wKHWhNB6wQ6AEwBHoECBwQAQ#v=onepage&q=digipolis%20kemi%20finnland&f=false>



IV. Circular Business Models, Industrial Symbiosis, Marketplaces

<p>Circular Business Models</p>	<p>“Circular business models represent fundamentally different ways of producing and consuming goods and services. They have the potential to drive the transition towards a more resource efficient and circular economy and, in doing so, significantly reduce the environmental pressure resulting from economic activity.”</p> <p>OECD (2018): Business Models for the Circular Economy - Opportunities and Challenges from a Policy Perspective. Paris. https://www.oecd.org/environment/waste/policy-highlights-business-models-for-the-circular-economy.pdf</p>
<p>Industrial Symbiosis</p>	<p>“Industrial symbiosis is a collaborative approach concerning physical exchange of materials, energy, and services among different firms: accordingly, wastes produced by a given firm are exploited as inputs by other firms. This approach is able to generate remarkable environmental benefits, since it allows to reduce the amount of wastes disposed of in the landfill and the amount of primary inputs used by the industrial sector.</p> <p>It has been proved that the economic logic is the basis of symbiotic exchanges. Through industrial symbiosis, firms are interested to achieve competitive advantage coming from lower production costs and revenue increase. Therefore, the first requirement for the establishment of a symbiotic relationship is its economic sustainability for all the firms involved.”</p> <p>Albani, V. & Fraccascia, L. (2015): The industrial symbiosis approach: A classification of business models. In: Procedia Environmental Science, Engineering and Management 2 (2015) (3) 217-223.</p>
<p>Secondary Marketplaces</p>	<p>“Secondary material marketplaces are online or brick-and-mortar forums that facilitate the exchange of secondary raw materials. These marketplaces allow secondary material suppliers and buyers to find each other on a web-based platform. The concept evolved out of industrial symbiosis thinking and gained traction with the arrival of the internet in the 1990s.</p> <p>WBCSD is aware of over 100 marketplaces currently operating globally. Most marketplaces operate at a municipal or regional level as challenges arise with the expansion of geographical coverage (i.e. regulations, economic viability, etc.).</p> <p>Less than half of the marketplaces observed today operate as a private organization, meaning most require government or foundational resources to sustain. The privatized marketplaces finance themselves through advertising, memberships, transaction fees, subscriptions and consulting services.”</p> <p>https://www.ceguide.org/Strategies-and-examples/Dispose/Secondary-material-marketplaces</p>

1. Circular Business Models for SMEs

An information package on the topic CIRCULAR BUSINESS MODELS FOR SMEs is currently being developed:



- CITYCIRCLE presentation **WP T2 – Circular Business Models for SMEs**

This presentation will only be available on CityCircle’s website when completed.



The content and status end of July 2020 is the following:

CONTENT



- 1 Objective of the document
- 2 Rationale for the circular transformation of businesses
- 3 Typology of existing circular business models for businesses
- upcoming
- 4 Examples from the industry
- 5 Supporting materials - tools



TAKING COOPERATION FORWARD



The objective of the document is the following:

- Provide an overview of most popular approaches to circular business models for businesses
- Provide real examples of industrial circular business models
- Provide tools supporting the application of the models in practice



Concerning the first aim the business model CANVAS has been introduced following a definition of circular business model.

In a next step the four business models are introduced:

1. Ellen MacArthur Foundation
2. Accenture
3. PWC
4. PBL (Netherlands Environmental Assessment agency)

2. Industrial Symbiosis

An information package on the topic MARKETPLACES/ INDUSTRIAL SYMBIOSIS was provided upfront the trainings/ webinars to the project partners:

- CITYCIRCLE presentation **WP T2 – CE Marketplaces – information package**

Soon available on CityCircle's website: <https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html>



The content is the following:



CONTENT

1 Market Places

2 Industrial Symbioses

3 Smart Maps

4 Marketplace Startup Ideas



TAKING COOPERATION FORWARD



In the following chapters only the central content from the *CITYCIRCLE MARKETPLACES / INDUSTRIAL SYMBIOSIS* presentation is presented here.

In the case of Industrial Symbiosis new content has been added to the Knowledge Base:

- In chapter IV.2.2 Industrial Symbiosis project examples from EU funded H2020 are presented in kind of factsheet form. These projects offer a lot of interesting information within their resources/ outcomes/ downloads/ ... sections like e.g. training modules, webinars, presentations, documentations,
- In chapter IV.2.3 two recent publications on mapping/ fostering Industrial Symbiosis have analysed Industrial Symbiosis initiatives/ networks in Europe. These have been displayed on a map and described in more detail in table format in an annex. The interested reader will find a variety of information and links.

Furthermore two of the analysed examples will be described in more detail:

- Kalundborg, DK (see the following chapter IV.2.3.2)
- Kemi-Tornio (see chapter III.5.3 before)
- In chapter IV.2.4 finally more links on Industrial Symbiosis are provided. This section can and will be extended.

2.1 Industrial Symbiosis - definition

“Industrial symbiosis is a form of brokering to bring companies together in innovative collaborations, finding ways to use the waste from one as raw materials for another.

The word “symbiosis” is usually associated with relationships in nature, where two or more species exchange materials, energy, or information in a mutually beneficial manner.



Local or wider co-operation in industrial symbiosis can reduce the need for virgin raw material and waste disposal, thereby closing the material loop – a fundamental feature of the circular economy and a driver for green growth and eco-innovative solutions. It can also reduce emissions and energy use and create new revenue streams.

However, in order to make industrial symbiosis a wide-spread commercial reality, more needs to be done to manage the flow of waste material from different sectors and industries, and there is still much to understand about:

- environmental and societal impacts
- harmonization of technologies, processes, policies
- civil society engagement to a circular economy at EU level
- waste resources information
- waste treatment technologies
- business models and coordination between value chain actors.”

<https://fissacproject.eu/en/what-is-industrial-symbiosis/>

2.2 Industrial Symbiosis project examples – EU funded H2020

“There are several initiatives focused on the industrial symbiosis, such as the following EU funded H2020 projects that are developing specific platforms aimed at facilitating and boosting the processes: SHAREBOX; EPOS; MAESTRI; SYMBIOPTIMA; SCALER; FISSAC; SPRING; URBANREC; PAPERCHAIN.” ([ACR+ Sustainable construction guidelines for public authorities](#) (December 2019, p 27)

Factsheets for these projects have been developed (see chapters 2.1.1. – 2.1.8) - except for SPRING – Setting the Framework for Enhanced Impact of SPIRE Projects. “Project SPRING’s objective was to increase progression towards the SPIRE goals and enhance project return on investment by addressing the needs and barriers of those who make the decisions to adopt process innovations in industry. It did this by providing guidance to project participants, decision makers in industry and broader SPIRE stakeholders to:

1. Improve the articulation of the value of project exploitable outputs
2. Improve the articulation of industry needs and barriers-to-uptake of exploitable outputs
3. Improve the mapping of project value to industry needs
4. Identify policy gaps and recommendations to improve project impact”

<https://www.spire2030.eu/spring>

The above-mentioned projects provide a lot of interesting information within their resources/ outcomes/ downloads/ ... sections like e.g training modules, webinars, presentations, documentations,



In the *CITYCIRCLE MARKETPLACES / INDUSTRIAL SYMBIOSIS presentation* we already presented FISSAC and PAPERCHAIN in brief on p 38 – 43 and 44 – 47.

2.2.1 SHAREBOX – Secure sharing

SHAREBOX	http://sharebox-project.eu/
Duration	<ul style="list-style-type: none"> ▪ 1 September 2015 – 31 August 2019
Partners	<ul style="list-style-type: none"> ▪ IRIS TECHNOLOGY SOLUTIONS, SOCIEDAD LIMITADAstrane Innovation (Coordinator) ▪ + 16 participants
Objectives	<p>“To develop and bring to market a secure platform for the flexible management of shared process resources with intelligent decision support tools. To provide plant operations and production managers with the robust and reliable real-time needed to optimise symbiotic connections (plant, energy, water, residues and recycled materials) with other companies in a symbiotic ecosystem.”</p> <p>http://sharebox-project.eu/#overview</p>
Resources	http://sharebox-project.eu/resources/



OPEN ACCESS ARTICLES

Industrial Symbiotic Relations as Cooperative Games

[Download](#)

[Download](#)

Sustainable operations of industrial symbiosis: an enterprise input-output model integrated by agent-based simulation

The supply chain implications of industrial symbiosis

[Download](#)

[Download](#)

The role of online information-sharing platforms on the performance of industrial symbiosis networks

An Introduction to Engineering Multiagent Industrial Symbiosis Systems: Potentials and Challenges

[Download](#)

The recommender canvas: a model for developing and documenting recommender system design

[Download](#)

The influence of knowledge in the design of a recommender system to facilitate industrial symbiosis markets

[Download](#)

A literature survey of information systems facilitating industrial symbiosis identification

[Download](#)

PUBLIC DELIVERABLES

▼ [Communication Report](#)

▼ [Training Report](#)

▼ [CEN Workshop Agreement for Industrial Symbiosis](#)

▼ [Sharebox On-site validation and impact assessment \(report\)](#)

▼ [Implementation and trials of the Sharebox Platform in real Industrial Symbiosis networks \(presentations\)](#)

▼ [The recommender canvas: a model for developing and documenting recommender system design \(report\)](#)

▼ [The effects of stocking configurations in industrial symbiotic networks \(report\)](#)

▼ [Environmental Benefits of a Circular Economy: Connecting Waste Type and Geographic Proximity \(poster\)](#)

▼ [Public Policies creating barriers to the Circular Economy/Policies to improve incentives for Circular Economy in Europe](#)

Integration of Input-Output modelling with Game-Theory for
 ▼ [behaviour-driven operations of Industrial Symbiosis networks \(report\)](#)

▼ [An ABM-based Industrial Symbiosis network design \(report\)](#)

▼ [The influence of knowledge in the design of a recommender system to facilitate Industrial Symbiosis markets \(report\)](#)

▼ [On the non-technical barriers to Industrial Symbiosis \(report\)](#)



Training tool	http://sharebox-project.eu/training-tool/ “With the interactive material available in this section you will be able to get: <ul style="list-style-type: none"> ◦ A solid understanding of the concept of Industrial Symbiosis, including economic benefits and cross-sectoral opportunities. ◦ Knowledge about SHAREBOX and its functionalities that support identification and evaluation of synergy opportunities and the process of creating synergies. ◦ Tips to handle the SHAREBOX software in an effective way.”
▪ Presentation 1	Industrial Symbiosis and its Benefits
▪ Presentation 2	Basic functionalities of SHAREBOX
▪ Presentation 3	Evaluating IS and Cost Allocation
▪ Presentation 4	How AI can support end-users evaluating IS potential
▪ Presentation 5	Water treatment and filtering technologies in the context of industrial symbiosis
▪ Presentation 6	Symbiotic exchange of energy: Technologies and management

2.2.2 EPOS – Symbiosis in industry

EPOS	https://www.spire2030.eu/epos <i>Enhanced energy and resource Efficiency and Performance in process industry Operations via onsite and cross-sectorial Symbiosis</i>
Duration	<ul style="list-style-type: none"> ▪ 1 October 2015 – 30 September 2019
Partners	<ul style="list-style-type: none"> ▪ University Gent (Coordinator) ▪ + 14 participants
Objectives	<p>“With the aim of reinforcing competitiveness of the EU industry, it is the ambition of the EPOS partners to gain cross-sectorial knowledge and investigate cluster opportunities using an innovative Industrial Symbiosis (IS) platform to be developed and validated during the project. The main objective is to enable cross-sectorial IS and provide a wide range of technological and organisational options for making business and operations more efficient, more cost-effective, more competitive and more sustainable across process sectors. The expected impact is clearly in line with the SPIRE roadmap - and sector associations, city councils (in the districts where EPOS is deployed), the SPIRE PPP as well as standardisation bodies are committed to participate in the EPOS transdisciplinary advisory board.”</p> <p>https://www.spire2030.eu/epos</p>
Outcomes - Publications	



<ul style="list-style-type: none"> ▪ Insights 	<ul style="list-style-type: none"> ▪ EPOS insights are publications summarising the most relevant outcomes of the EPOS project. ▪ The overall aim of the EPOS project is to enable cross-sectorial IS and provide a wide range of technological and organisational options for making business and operations more efficient, more cost-effective, more competitive & more sustainable across process sectors. ▪ 19 insights
<p>Technology Watch</p>	<ul style="list-style-type: none"> ▪ The technology watch is the EPOS "eye" on what it is going on around the world that is of interest for the project. ▪ 19 technology foci

2.2.3 MAESTRI – Resource and Energy Efficiency for Process

MAESTRI	https://maestri-spire.eu/project/
Duration	<ul style="list-style-type: none"> ▪ 1 September 2015 – 31 August 2019
Partners	<ul style="list-style-type: none"> ▪ INSTITUTO DE SOLDADURA E QUALIDADE, Portugal (Coordinator) ▪ + 15 participants
Objectives	<p>“The MAESTRI project aims to advance the sustainability of European manufacturing and process industries. This is done by providing a management system in the form of a flexible and scalable platform, and to guide and simplify the implementation of an innovative approach, the Total Efficiency Framework. The overall aim of this framework is to encourage a culture of improvement within process industries by assisting the decision-making process, supporting the development of improvement strategies and helping define the priorities to improve the company’s environmental and economic performance. Its development and validation will be achieved through application in four real industrial settings across a variety of activity sectors.”</p>
Downloads	<p>https://maestri-spire.eu/downloads/</p> <ul style="list-style-type: none"> ◦ Technical Materials ◦ Communication Materials ◦ Research Papers ◦ Training Courses
Training courses	<p>https://maestri-spire.eu/downloads/training-courses/</p> <p>““Total Efficiency Manager 4.0” training is addressed to the industrial community and to all stakeholders wishing to apply MAESTRI managerial tools and methods to their professional contexts. The goal is to provide you with an integrated approach to Total Efficiency for process industries based on four pillars: IoT, Industrial Symbiosis, Eco-efficiency, Lean Management. At the end of the course you will acquire the necessary skills to implement Total Efficiency Framework within your own company.”</p>
<ul style="list-style-type: none"> ▪ Course 1 	Introduction to the MAESTRI Total Efficiency Approach



▪ Course 2	Industrial applications of IoT in the MAESTRI Total Efficiency Framework
▪ Course 3	Eco-efficiency procedures and methodologies
▪ Course 4	Introduction to Industrial Symbiosis
▪ Course 5	Management System: Lean and Eco-Lean applications within the Total Efficiency Framework

2.2.4 SYMBOPTIMA – Human-mimetic approach to the integrated monitoring, management and optimization of a symbiotic cluster of smart production units

SYMBOPTIMA	https://cordis.europa.eu/project/id/680426 http://www.symbioptima.eu
Duration	▪ 1 September 2015 – 28 February 2019
Partners	▪ SPIRAX-SARCO LIMITED, GB (Coordinator) ▪ + 17 participants
Objectives	“SYMBOPTIMA developed an integrated Energy and Resource Management System (ERMS), which offers tools for production scheduling and demand response management and for Life Cycle Sustainability Assessments (LCSAs). It also created hardware for modular ‘plug and play’ monitoring of production plants, as well as an integrated toolset for all thermal energy sources, flows and sinks. Additionally, to maximise the reuse of waste, it developed a unique de-polymerisation process for plastics (PET).” PDF: https://cordis.europa.eu/article/id/401310-securing-europes-industrial-future-through-key-enabling-technologies-and-dedicated-research

2.2.5 SCALER - SCALing European Resources with industrial symbiosis

SCALER	https://www.scalerproject.eu/ <i>Helping industries increase efficiency through resource sharing</i>
Duration	▪ 1 November 2017 – 31 October 2020
Partners	▪ EIT Climate-KIC ▪ Strane Innovation ▪ University of Cambridge ▪ iSQ



	<ul style="list-style-type: none"> ▪ Quantis
Objectives	<p>“SCALER provides mechanisms to accelerate the journey towards efficient and quick implementation of industrial symbiosis in the European process industry. We do this by developing action plans and adapted solutions to industrial stakeholders and communities.</p> <p>We work closely with a wide range of stakeholders including industrial networks, consultancies, researchers and policy makers at various geographic and politic levels, to deliver practical tools and guidelines for industry actors engaging in resource efficiency, reuse and sharing.</p> <p>To achieve this goal, SCALER is developing a set of reports and guides, based on research and consultation with active players in the field of industrial symbiosis.”</p> <p>https://www.scalerproject.eu/about-scaler/objectives</p>
Resources	
<ul style="list-style-type: none"> ▪ Guides & Outlooks 	<ul style="list-style-type: none"> ▪ Quick Guides – Helping industries increase efficiency through resource sharing (February 2020) https://www.scalerproject.eu/wp-content/uploads/2020/02/SCALER-Quick-Guides.pdf ▪ Synergies Outlook – List of 100 potential synergies to increase industrial resource sharing (February 2020) https://www.scalerproject.eu/wp-content/uploads/2020/02/SCALER-Synergies-Outlook.pdf ▪ Guidelines for industrial symbiosis (June 2020) https://www.scalerproject.eu/wp-content/uploads/2020/06/PART-C.pdf
<ul style="list-style-type: none"> ▪ Reports 	<ul style="list-style-type: none"> ▪ Lessons learnt and best practices for enhancing industrial symbiosis in the process industry. (September 2018) https://www.scalerproject.eu/wp-content/uploads/2019/07/Lessons-Best-practices-SCALER-D2.2.pdf <p>«This report provides an evidence base of best practices in IS. Bringing together multiple research methods to build a rich picture and triangulate findings, the study casts light on the various approaches that companies choose to adopt. »</p> <ul style="list-style-type: none"> ▪ <i>Chapter 3. Best practices in industrial symbiosis: lessons learnt from twenty-five crossindustry case studies</i> <p>The analysis and synthesis of existing case studies offers a valuable means of not only understanding the broader landscape of a phenomenon, but also the underlying principles. In relation to this project, twenty-five case studies were reviewed by the authors. This helped build a rich picture across multiple geographies of IS at different stages in their evolution and led to the identification of the triggers, enablers and barriers to the implementation of IS. The case study review is designed to complement the other components of this work package (literature review and survey). Together these provide a portfolio of best practices for scaling IS. (p 27f)</p> <p>In Appendix 1 (p 79f) the 25 cross-industry case studies/ best practices are displayed in table format: location, original source, case narrative, industry insights (non-technological, technological):</p> <ul style="list-style-type: none"> ◦ Taranto industrial district, Puglia region, Italy - Steel, oil refining, cement, power generation ◦ Relvão Eco Industrial Park, Municipality of Chamusca, Portugal - Urban waste, non hazardous industrial waste landfill, plastics recycling ◦ Kalundborg, Denmark - Power generation, oil refining, biotechnology, plasterboard, soil remediation, waste management

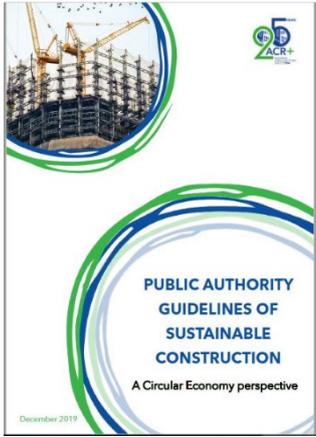


	<ul style="list-style-type: none"> ◦ Humber region, UK - Power generation, fuel manufacturing, food processing, chemicals ◦ Spremborg, Germany - Paper and pulp, energy production ◦ Italy & Spain (ENEA) - Poultry farming, leather tanning ◦ Fife, Scotland, UK - Beverage production, firewood production ◦ Bussi sul Tirino, Abruzzo Region, Italy - Basic chemicals, pesticides, silicates, power generation and distribution ◦ Humberside, UK - Oil and gas ◦ West Midlands, UK - Plastics manufacturing, food processing, automotive ◦ Merseyside, UK - Chemicals, oil, gas and service providers/utilities to these. ◦ Norrköping, Sweden – Biofuels ◦ Trowbridge, UK - Food manufacturing and energy generation ◦ Province of Foggia, Italy - Agriculture and energy ◦ Ballymena, Northern Ireland, UK (Michelin) ◦ Newtownards, Northern Ireland, UK - Aerospace, tarpaulin manufacturing ◦ Norfolk, UK - Sugar production ◦ Helsingborg, Sweden - Energy, waste treatment ◦ Linköping, Sweden - Bio-based production ◦ China – Smelting ◦ Nanning, China - Sugar production ◦ Kawasaki Eco-town, Japan - Steel, chemical, cement, nonferrous metal processing and paper making ◦ Liuzhou city, China - Iron/steel, cement ◦ Ulsan, Korea - Energy generation, water supply and treatment, petrochemicals, chemicals, nonferrous metals ◦ Kwinana Industrial Area, Australia - Alumina, nickel, iron, oil refinery, alumina and aluminium, pigment, cement, chemicals, fertiliser, power generation, water supply and treatment
<ul style="list-style-type: none"> ▪ More Reports 	<ul style="list-style-type: none"> ▪ Intermediaries and key enabling technologies for the ideation and implementation of industrial symbiosis (December 2018) https://www.scalerproject.eu/wp-content/uploads/2019/07/Intermediaries-Technologies-SCALER-D2.1.pdf ▪ How to create incentives for industrial symbiosis while preventing and mitigating implementation risks (March 2019) https://www.scalerproject.eu/wp-content/uploads/2020/06/PART-C.pdf ▪ Pathways to increase industrial symbiosis including tools & methods for stakeholders (June 2019) https://www.scalerproject.eu/wp-content/uploads/2019/07/Pathways-to-increase-industrial-symbiosis-SCALER-D2.4.pdf ▪ Technology database for synergy setups – technology database template and guide for upgrading (June 2019)



	<p>https://www.scalerproject.eu/wp-content/uploads/2019/10/Technology-database-for-synergies-setup-SCALER-D3.2.pdf</p> <ul style="list-style-type: none"> ▪ Synergies environmental impact assessment – industrial symbiosis potential and impacts (June 2019) https://www.scalerproject.eu/wp-content/uploads/2019/10/Synergies-environmental-impact-assessment-SCALER-D3.3.pdf ▪ Synergies socio-economic impact assessment – industrial symbiosis potential and impacts (September 2019) https://www.scalerproject.eu/wp-content/uploads/2019/10/Synergies-socio-economic-impact-assessment-SCALER-D3.4.pdf ▪ Quantified potential of industrial symbiosis in Europe (May 2020) https://www.scalerproject.eu/wp-content/uploads/2020/06/D3.5_SCALER_Quantified-potential-of-industrial-symbiosis-in-Europe_v1.0.pdf ▪ Overall strategy and recommendations to foster a wide application of industrial symbiosis at local, regional and European level (May 2020) https://www.scalerproject.eu/wp-content/uploads/2020/06/D4.1_SCALER_Overall_strategy_and_recommendations_v1.0.pdf 												
<ul style="list-style-type: none"> ▪ External resources 	<p>SCALER believes in the importance of information sharing to increase the uptake of IS. Check out the below initiatives to gain access to project results, publications and tools for IS and resource efficiency.</p> <table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>												
													
													
													
													

2.2.6 FISSAC - Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain

<p>NEWS - 2020-04-28</p> <p>FISSAC as a good practice in the Sustainable construction Guidelines for Public Authorities</p>	
<p><i>“Sustainable construction guidelines for public authorities – A circular economy perspective” aims to help public authorities navigate through sustainable construction, understand what it means and determine how to encourage it. The guidelines are especially targeted at local and regional authorities as they play a crucial role in the whole construction life cycle not only by stimulating innovation and cooperation between all actors but also because they work close to citizens. Unlike most of the literature on the topic, these guidelines are focusing on circularity and material resources efficiency, instead of covering only energy efficiency extensively. Even more, “Sustainable construction guidelines for public authorities – A circular economy perspective” goes beyond waste to integrate the whole value chain of the construction sector.</i></p> <p>https://www.acrfissplus.org/images/technical-reports/2019_ACR_Sustainable_construction_guidelines_for_public_authorities.pdf</p>	

See: CITYCIRCLE MARKETPLACES / INDUSTRIAL SYMBIOSIS, p 38 – 43

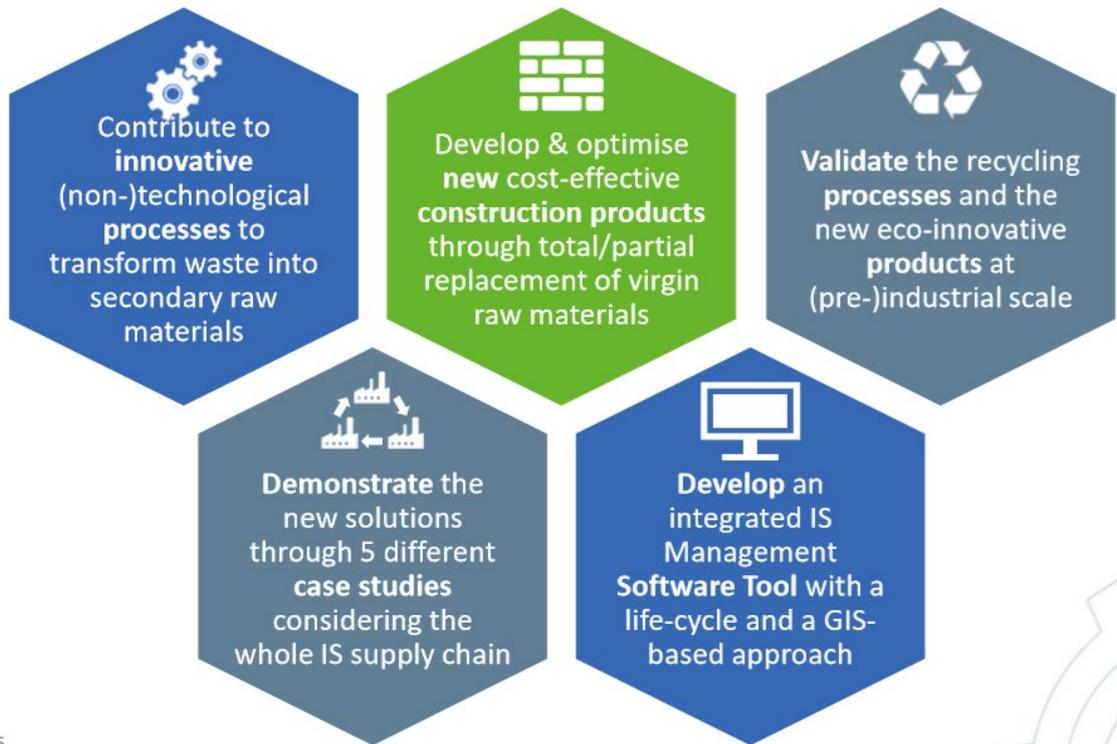
FISSAC	http://fissacproject.eu/en/
Duration	<ul style="list-style-type: none"> ▪ 1 September 2015 – 29 February 2020
Partners	<ul style="list-style-type: none"> ▪ ACCIONA CONSTRUCCION SA, ES (Coordinator) ▪ + 26 participants
Objectives	<p>“The FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology and software platform, to facilitate information exchange, that can support industrial symbiosis networks and replicate pilot schemes at local and regional levels.</p> <p>The model will be based on three sustainability pillars:</p> <ul style="list-style-type: none"> ○ Environmental (with a life-cycle approach) ○ Economic ○ Social (taking into consideration stakeholder engagement and impact on society). <p>The ambition is that the model we create can be replicated in other regions and other value chain scenarios.</p>



FISSAC aims to demonstrate the effectiveness of the processes, services, and products at different levels.”

<http://fissacproject.eu/en/project/>

FISSAC scientific & technical goals



5

<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020- Acciona.pdf>

▪ **Pilots/ case studies**

FISSAC Demonstrations

PRE-INDUSTRIAL SCALE DEMONSTRATION

CSA cement and new blended cement

Green concrete slab

Green precast concrete elements

Rubber wood plastic composites

REAL SCALE DEMONSTRATION

Concrete pavement

Autoclaved aerated concrete blocks

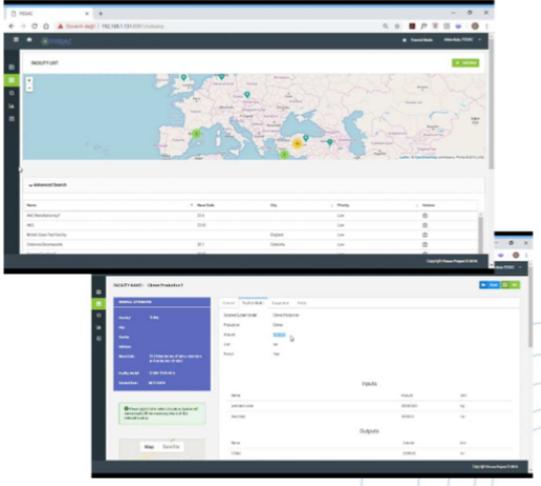
Precast concrete elements

Eco-wall and eco-porcelain tiles

Innovative wood plastic composites

<http://fissacproject.eu/en/case-studies/fissac-case-studies/>



<ul style="list-style-type: none"> Living labs 	<ul style="list-style-type: none"> Within FISSAC nine regional living labs have been established with their own defined purpose and scope. FISSAC Living Labs engage actors from the construction industry value chain to identify and solve appropriate challenges related to industrial symbiosis in their regions.
<ul style="list-style-type: none"> SW platform 	<p>http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020- Acciona.pdf</p> <p>An important objective of the project is the introduction of a model for Industrial Symbiosis. For this, a specific tool is being developed and will be evaluated within the project: the FISSAC Software Platform. It will feature amongst others a Life Cycle based Multiple Factor Analysis, network indicators and GIS based capabilities.</p> <p>Capabilities</p> <ul style="list-style-type: none"> Life-cycle assessment Life-cycle costing Material and energy flow analyses Multi-objective optimization Visualization & Diagrams Network analysis through industrial ecology metrics Graph and network topologies and industrial system modeling Innovative circular economy and industrial symbiosis indicator-based assessment 
<ul style="list-style-type: none"> Webinars 	<ul style="list-style-type: none"> Industrial Symbiosis Tools and Best practices (23 February 2017) Social aspects and impact of Industrial Symbiosis (31 May 2018) Pre-industrial and Industrial scale Demonstrations (15 October 2019) A new industrial symbiosis platform (26 February 2020)

2.2.7 URBANREC – Bulky Waste Management

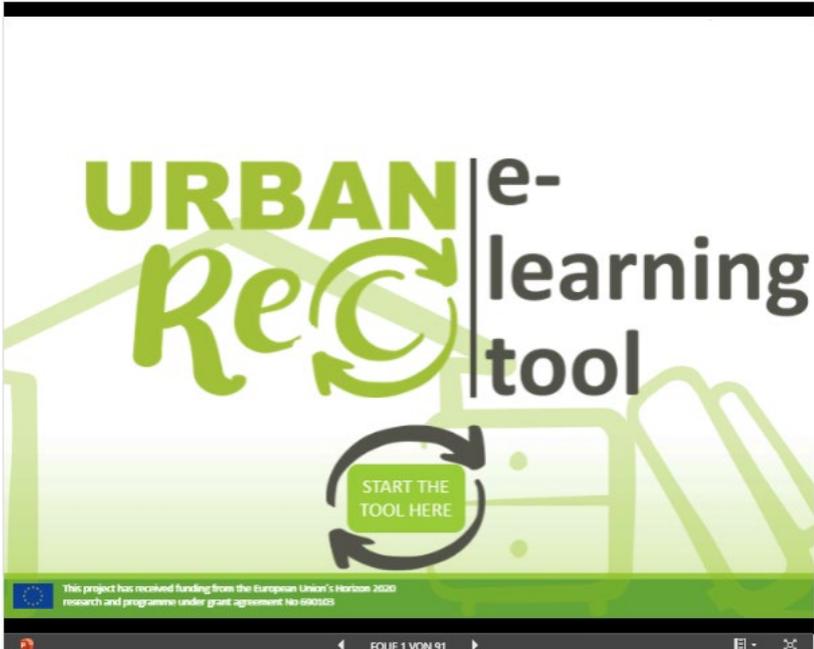
URBANREC	https://urbanrec-project.eu/
Duration	<ul style="list-style-type: none"> 1 September 2015 – 29 February 2020
Partners	<ul style="list-style-type: none"> ACCIONA CONSTRUCCION SA, ES (Coordinator) + 26 participants
Objectives	<p>“URBANREC will implement an eco-innovative and integral bulky waste management system (enhancing prevention and reuse, improving logistics and allowing new waste treatments to obtain high added value</p>

	<p>recycled products) and demonstrate its effectiveness in different EU regions, including a roadmap to improve Eco-efficiency on European waste management & Pro-active standardization strategy. https://urbanrec-project.eu/</p>
<p>Interactive tool</p>	<p>https://urbanrec-project.eu/pre_tool.php</p>
<p>▪ Documents</p>	<p>When opening the container doors you get access to the documents:</p>  <p>The screenshot shows a 3D rendering of a container yard with several yellow and blue containers. In the center, there is a large window titled "Documents" that displays a grid of categories and icons:</p> <ul style="list-style-type: none"> Transversal (blue background) Documents (green background) Reuse & (orange background) Logistics (yellow background) Technologic (yellow background) Treatments (yellow background) <p>Below the grid, there is a detailed list of material categories with corresponding icons:</p> <ul style="list-style-type: none"> MIXED TEXTILE WASTE: Reinforced plastics, Textile Isolation Panel, Needlefelts HARD PLASTICS + WOODS: Methyral for biofuels, Wood plastic composite POLYURETHANE FOAMS: Adhesives, Foam Isolation Panel, New mattresses/Foam
<p>▪ Training material</p>	<p>https://urbanrec-project.eu/e-modules.php</p>



Poland Spain Turkey Belgium **Other territories**

E-LEARNING MODULE – ENGLISH VERSION



URBAN | e-
ReC | learning
tool

START THE TOOL HERE

This project has received funding from the European Union's Horizon 2020 research and programme under grant agreement No 690163

FOUE 1 VON 91

E-tool URBANREC (DE) 

E-tool URBANREC (EN) 



<p>■ Presentation</p>	<p>PRESENTATIONS BASED ON SEVERAL URBANREC DELIVERABLES</p> <p>URBANREC project presentation </p> <p>Adhesive and foams obtained from secondary polyols </p> <p>Definition of the starting situation in URBANREC regions </p> <p>Fibre reinforced PP materials from recycled textiles </p> <p>Fragmentation of bulky waste </p> <p>Implementation and optimization of the CHGP technology for bulky waste </p> <p>Mobile app and customer portal development in Harelbeke-Flanders regions </p> <p>Report on the new in-house dismantling system in Flanders </p> <p>Report on the separation protocol set in CONSORCIO </p> <p>Valorisation routes of materials from urban bulky waste </p> <p>Wood plastic composites from recycled hard plastics and wood </p>
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2.2.8 PAPERCHAIN

See: *CITYCIRCLE MARKETPLACES / INDUSTRIAL SYMBIOSIS*, p 44 – 47.

PAPERCHAIN	https://www.paperchain.eu/
Duration	<ul style="list-style-type: none"> 1 June 2017 – 31 May 2021
Partners	<ul style="list-style-type: none"> ACCIONA CONSTRUCCION SA, ES (Coordinator) + 19 participants +11 third and supporting partners
Objectives	<p>“The overall objective of PAPERCHAIN is to deploy five novel circular economy models centred in the valorisation of the waste streams generated by the Pulp and Paper Industry (PPI) as secondary raw material for a number of resource intensive sectors: construction sector, mining sector and chemical industry.</p> <p>https://www.paperchain.eu/circular-cases/</p> <p>The following 5 different CE models will be major developed through real scale demonstrators:</p>



2.2.9 Interreg Europe project: SYMBI - Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy

SYMBI	https://www.interregeurope.eu/symbi/
Duration	<ul style="list-style-type: none"> 1 April 2016 – 31 March 2021
Partners	<ul style="list-style-type: none"> Foundation FUNDECYT – Scientific and Technological Park of Extremadura, ES (Lead Partner) + 9 partners
Objectives	<p>“SYMBI aims at supporting the transition towards a resource-efficient economy through industrial symbiosis, establishing territorial synergies to manage waste and exchange energy & by-products as secondary raw resources.”</p> <p>“SYMBI General objective is to empower regions to build sustainable economies, resilient to environmental pressures and climate change.</p> <p>The project will support the implementation of policy instruments and measures for the diffusion of industrial symbiosis, to add value, reduce production costs and relieve environmental pressures through increased resource efficiency and green house gas emissions.</p>



	<p>Furthermore, through the development of the activities, SYMBI will get:</p> <ul style="list-style-type: none"> ▪ Encourage regional waste transformation systems; ▪ Promote the use of secondary raw materials and the emergence of regional secondary raw materials market; ▪ Prioritize green public procurement; ▪ Unlock investments by regional and local financial actors; ▪ Explore, assess, expand, and enhance current practices in ecosystems of industrial innovation; ▪ Raise public awareness on industrial symbiosis and circular economy.” ▪ https://www.interregeurope.eu/symbi/
<p>Good Practices</p>	<ul style="list-style-type: none"> ▪ Nearly 30 good practices have been published: ▪ https://www.interregeurope.eu/symbi/good-practices/
<p>NEWS - 2020-06-28</p> <p>SYMBI project has been nominated for RegioStars Award 2020 in the category Sustainable growth: Circular economy for a green Europe.</p>	

2.3 Industrial Symbiosis Activity in Europe – an overview and cases

2.3.1 A brief overview on two recent publications with a lot of examples mentioned

Two recent publications	
<p>European Commission (2018)</p> <p>Main authors: Teresa Domenech; Asel Doranova; Laura Roman; Matthew Smith; Irati Artola</p> <p>Cooperation fostering industrial symbiosis: market potential, good practice and policy actions.</p> <p>Final report. Brussels.</p> <p>https://op.europa.eu/en/publication-detail/-/publication/174996c9-3947-11e8-b5fe-01aa75ed71a1/language-en/format-PDF</p>	



<p>Domenech (2918/ 2019)</p> <p>Teresa Domenech; Raimund Bleischwitz; Asel Doranova; Panayotopoulos, D.; Laura Roman (2018/ 2019)</p> <p>Mapping Industrial Symbiosis Development In Europe_ typologies of networks, characteristics, performance and contribution to the Circular Economy_</p> <p>Article</p> <p>https://discovery.ucl.ac.uk/id/eprint/10056364/1/final%20submitted openaccess-RCR.pdf</p>	<p><small>Article</small></p> <p>Mapping Industrial Symbiosis Development In Europe_ typologies of networks, characteristics, performance and contribution to the Circular Economy_</p> <p><small>Teresa Domenech¹; Raimund Bleischwitz²; Doranova, A.; Panayotopoulos, D.; Roman, L¹</small></p> <p><small>¹ University College London, Central House, 14 Upper Woburn Place, London WC1E 6BT, United Kingdom</small></p> <p><small>² Techopolis Group, Avenue de Terwaan 18A, B-1150 Brussels, Belgium</small></p> <p><small>* Correspondence: E-Mail: lab@ucl.ac.uk</small></p> <p><small>Abstract</small></p> <p><small>Last years have seen a surge of Industrial Symbiosis (IS) development in association with ad-hoc widespread policies to encourage more circular and sustainable practices in the manufacturing sector. Developments in Europe, despite having attracted less attention in the literature, have been significant, driven both by public and private initiative. This paper provides an updated overview of IS activity in Europe, with a mapping of key networks, and a study of prevailing typologies of networks, size, geographical distribution and main streams/ resources traded. The analysis is based on a combination of desk research, gathering of primary data from case studies, a survey to IS network facilitators (n=22) and in-depth interviews and focus groups (3) with IS practitioners, policy officers and industry representatives (n=25). The analysis identified pockets of IS activity across all Europe, although varying in nature, resources exchanged and scale and scope of the initiatives. The average size of the mapped networks is approx. 473 members, but the median is approx. 100 members, which indicates high variability of size. The geographical scope of the synergies also seems to be dependent upon the following factors: 1) the type of waste stream/by-product; 2) transport costs and 3) market value of secondary materials. Types of waste streams exchanged common to most networks, are chemicals (e.g. chemical base products), biomass and agriculture by-products, wood and wood pellets, plastic, reusable construction materials, equipment, inert waste and water (different qualities including industrial water), residual heat and steam. The paper also discusses key obstacles facing IS development in Europe highlighting: 1) weakness of economic incentives given the low margins of IS projects associated to underdeveloped secondary markets; 2) geographical variation of incentives and drivers, given differences in policy frameworks and support mechanisms (e.g. landfill tax levels) and 3) legislative issues that make transport over geographic boundaries extremely complex and administratively burdensome. Finally, the paper concludes with a general discussion of the potential of IS to contribute to the transition to the circular economy (CE) in Europe and identifies some key areas of future research.</small></p>
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In the article the authors wrote in the abstract:

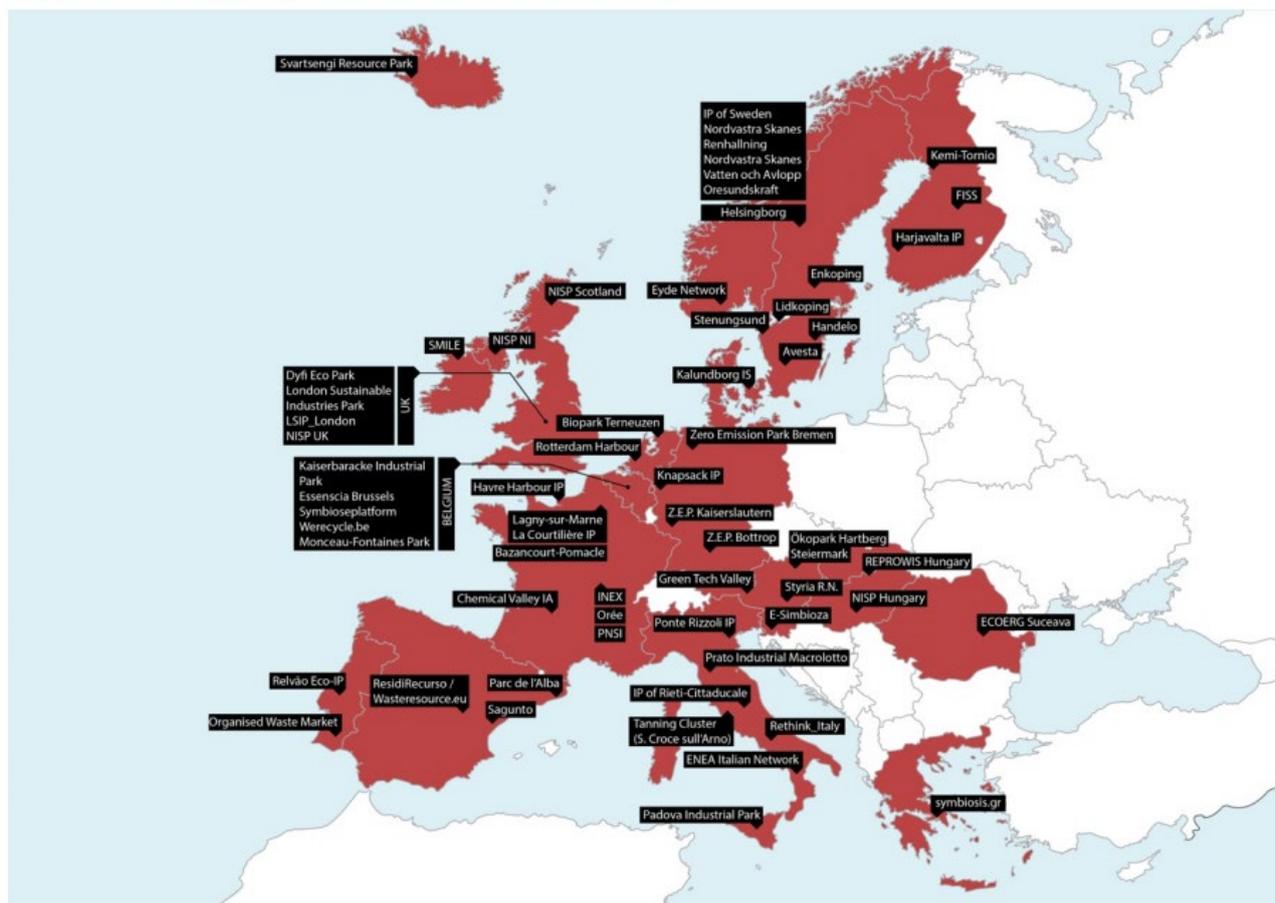
“Last years have seen a surge of Industrial Symbiosis (IS) development in association with ad-hoc widespread policies to encourage more circular and sustainable practices in the manufacturing sector. Developments in Europe, despite having attracted less attention in the literature, have been significant, driven both by public and private initiative.”

They continue:

“This paper provides an updated overview of IS activity in Europe, with a mapping of key networks, and a study of prevailing typologies of networks, size, geographical distribution and main streams/ resources traded. The analysis is based on a combination of desk research, gathering of primary data from case studies, a survey to IS network facilitators (n=22) and in-depth interviews and focus groups (3) with IS practitioners, policy officers and industry representatives (n=25). The analysis identified pockets of IS activity across all Europe, although varying in nature, resources exchanged and scale and scope of the initiatives.”

The IS networks are displayed in the following figure ([analogue in the European Commission report on p 27](#)):

Figure 2: Mapping of IS networks in Europe



and described in more detail in table format at the end of the article ([analogue in the European Commission report on p 132 - 142](#)):

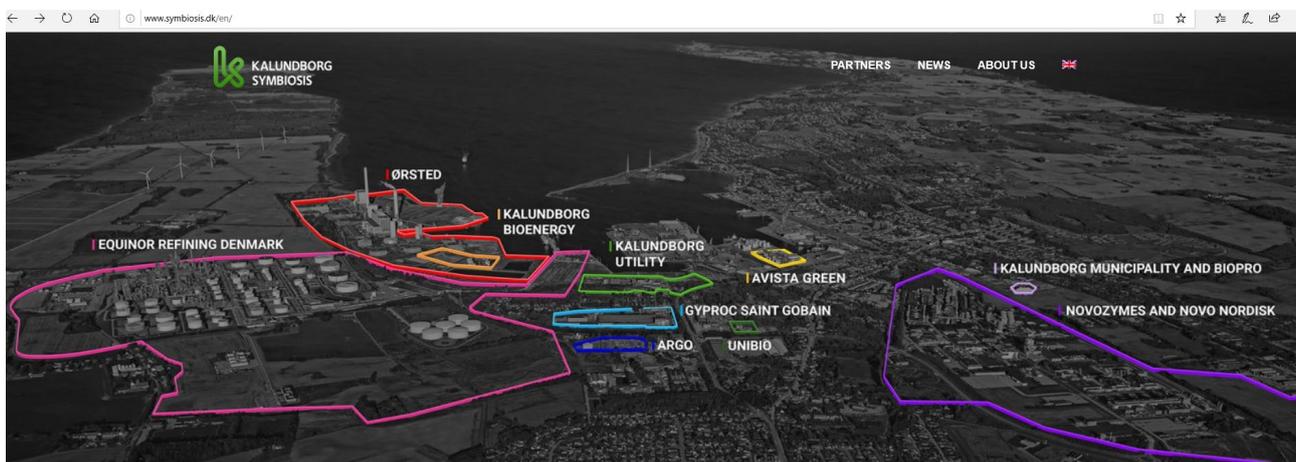
- Country
- Network
- Network size
- Network scope (local/ regional/ national)
- [Number of IS synergies identified](#)
- Number of IS synergies completed
- Facilitated/ planned/ self-organised
- [Economic benefits quantified](#)
- Social benefits (job creation)
- Environmental benefits quantified
- Further references to primary data collection

The first two described in each publication are Kalundborg, DK and Kemi-Tornio, FI. These have been presented in CITYCIRCLE presentations and also in this paper:

- Kemi-Tornio (see chapter 5.3)
- Kalundborg (see next chapter)

For more information on the other IS initiatives/ networks see the publications and mentioned references; see also in chapter 2.1.5 about SCALER project in the report “**Lessons learnt and best practices for enhancing industrial symbiosis in the process industry.** (September 2018) <https://www.scalerproject.eu/wp-content/uploads/2019/07/Lessons-Best-practices-SCALER-D2.2.pdf>, where in chapter 3 *Best practices in industrial symbiosis: lessons learnt from twenty-five crossindustry case studies* have been analysed and displayed in appendix 1.

2.3.2 Kalundborg Symbiosis



Winner of
 WIN-WIN GOTHENBURG SUSTAINABILITY AWARD 2018

See: *CITYCIRCLE MARKETPLACES / INDUSTRIAL SYMBIOSIS*, p 48 - 50

For in-depth information see <http://www.symbiosis.dk/en/>.

If you search for 'Kalundborg Industrial Symbiosis' in google - there are many many results. Here we give only 3:

<p>Ellen MacArthur Foundation Case study: Kalundborg Symbiosis – Effective industrial symbiosis. https://www.ellenmacarthurfoundation.org/case-studies/effective-industrial-symbiosis</p>
<p>European CE Stakeholder Platform Good Practice: Kalundborg Symbiosis – six decades of a circular approach to production.</p>



<https://circulareconomy.europa.eu/platform/en/good-practices/kalundborg-symbiosis-six-decades-circular-approach-production>

Wikipedia

Kalundborg Eco-industrial Park.

<https://circulareconomy.europa.eu/platform/en/good-practices/kalundborg-symbiosis-six-decades-circular-approach-production>

2.4 More Links on Industrial Symbiosis- ...



<p>EREK</p> <p>https://www.resource-efficient.eu/en</p>	<p>European Resource Efficiency Knowledge Centre</p> <p>Searching for 'Industrial Symbiosis' offers a lot of hits:</p> <div>  <p>Event</p> <p>EREK Finland Workshop, 6th of June - Improving resource efficiency through industrial symbiosis – Opportunities for SMEs</p> </div> <div>  <p>News</p> <p>EREK Quarterly #4 - Industrial Symbiosis</p> </div> <div>  <p>Measure</p> <p>Waste has a value through industrial symbiosis</p> </div> <div>  <p>Good practice</p> <p>Industrial symbiosis ecosystem in Denmark</p> </div> <div>  <p>Event</p> <p>A thematic workshop on 'Opportunities for the uptake of industrial symbiosis in European regions'.</p> </div> <div>  <p>Measure</p> <p>Turn wood residues into a valuable raw material through industrial symbiosis</p> </div>
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<p>NORDREGIO https://nordregio.org/ Research centre</p>	<p>Nordregio is an international research centre for regional development and planning, established by the Nordic Council of Ministers (https://www.norden.org/en/nordic-council-ministers).</p> <p>Nordregio’s primary research focus and competence areas are:</p> <ul style="list-style-type: none"> ▪ Regional Rural and Demographic Development ▪ Urban Planning and Sustainable Development ▪ Regional Innovation and Green Growth ▪ Governance and Policy: Regional Reforms and Strategies <p>Searching for ‘industrial symbiosis’ leads to some publications, news, a magazine:</p>
<p>Nordregio Policy Brief (January 2019) Industrial Symbiosis in the Baltic Sea Region - Current Practices and Guidelines for New Initiatives. http://norden.diva-portal.org/smash/get/diva2:1288423/FULLTEXT03.pdf (including case studies: ECO3 Platform; Tampere Region (FI), The Paper Province, Värmland (SWE), Trödelag Industrial Symbiosis (IS) Initiative, Tröndelag (NOR))</p>	
<p>Nordregio Policy Brief (April 2016) Industrial Symbiosis – A key driver of Green Growth in Nordic Regions ? http://norden.diva-portal.org/smash/get/diva2:917631/FULLTEXT01.pdf (including case studies: Kalundborg (DK), Kemi-Tornio Region (FI), Svartsengi Resource Park (IS), Eyde Cluster (NOR), Händelö (SWE))</p>	
<p>NORDREGIO NEWS (2016) #1.16 Industrial Symbiosis. http://norden.diva-portal.org/smash/get/diva2:917624/FULLTEXT01.pdf (including case studies: Kalundborg (DK), Kemi-Tornio Region (FI))</p>	
<p>NORDREGIO Report (2015) The potential of industrial symbiosis as a key driver of green growth in Nordic regions. http://norden.diva-portal.org/smash/get/diva2:875756/FULLTEXT01.pdf (including: Country reviews: DK, FI, IS, NOW, SWE and islands; case studies: Kalundborg (DK), Kemi-Tornio Region (FI), Svartsengi Resource Park (IS), Eyde Cluster (NOR), Händelö (SWE))</p>	



Swedish Network for Industrial and Urban Symbiosis

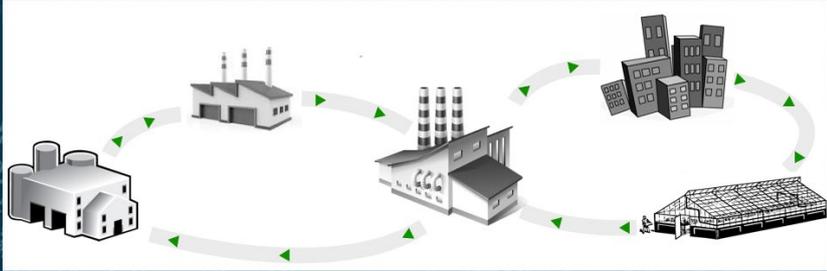
<http://industrial-symbiosis.se/>

An initiative led by Linköping University

Advancing next generation resource productivity by collaborative action

Swedish Network for Industrial and Urban Symbiosis
 Advancing next generation resource productivity by collaborative action

INITIATIVE MEMBERS CASES NEWS CONTACT



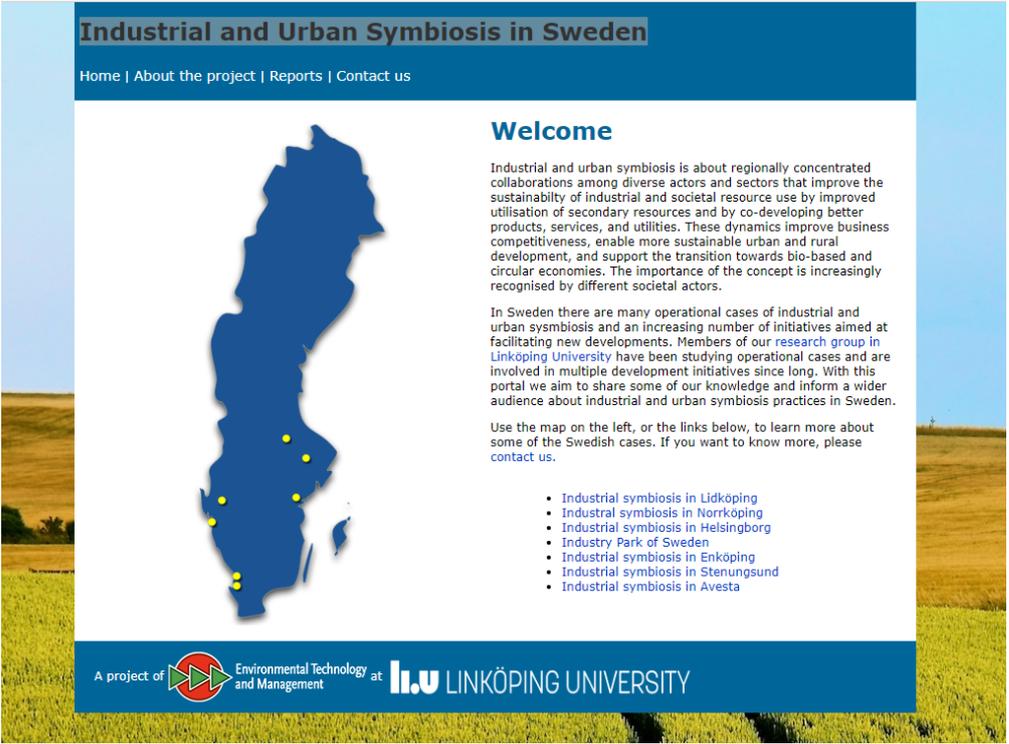
Collaborative Resource Productivity

Linköping University – Industrial Symbiosis

<https://liu.se/en/research/industrial-symbiosis->

e.g. Industrial and Urban Symbiosis in Sweden

<http://www.industriellekologi.se/index.html>



Industrial and Urban Symbiosis in Sweden

Home | About the project | Reports | Contact us

Welcome

Industrial and urban symbiosis is about regionally concentrated collaborations among diverse actors and sectors that improve the sustainability of industrial and societal resource use by improved utilisation of secondary resources and by co-developing better products, services, and utilities. These dynamics improve business competitiveness, enable more sustainable urban and rural development, and support the transition towards bio-based and circular economies. The importance of the concept is increasingly recognised by different societal actors.

In Sweden there are many operational cases of industrial and urban symbiosis and an increasing number of initiatives aimed at facilitating new developments. Members of our research group in Linköping University have been studying operational cases and are involved in multiple development initiatives since long. With this portal we aim to share some of our knowledge and inform a wider audience about industrial and urban symbiosis practices in Sweden.

Use the map on the left, or the links below, to learn more about some of the Swedish cases. If you want to know more, please [contact us](#).

- Industrial symbiosis in Lidköping
- Industrial symbiosis in Norrköping
- Industrial symbiosis in Helsingborg
- Industry Park of Sweden
- Industrial symbiosis in Enköping
- Industrial symbiosis in Stenungsund
- Industrial symbiosis in Avesta

A project of  Environmental Technology and Management at **li.u** LINKÖPING UNIVERSITY



3. Marketplaces

As already introduced beginning of chapter 2 an information package on the topic MARKETPLACES/ INDUSTRIAL SYMBIOSIS was provided upfront the trainings/ webinars to the project partners.

The CITYCIRCLE presentation *WP T2 – CE Marketplaces – information package* (Soon available on CityCircle’s website: <https://www.interreg-central.eu/Content.Node/CITYCIRCLE.html>) includes some Marketplace examples, which are presented here in the Advanced Knowledge Base in section 3.2 only in tabular form, essentially as a collection of links. Further examples are added in section 3.3. This section can and will be extended.

First - a definition is given in 3.1.

3.1 Marketplaces – definition

One goal of the GREENCYCLE project (<https://www.greencycle.si/>) - Introducing circular economy system to Alpine Space to achieve low-carbon targets – was to establish a transnational CE marketplace. In this context the following definition was given:

“This document aims to help define a common vision about the specific digital platform build by the GREENCYCLE project, the Circular Economy Marketplace, and the requirements and functionalities that is going to provide.

A marketplace is a site or an online platform (internet) that allows you to make purchases of products or services. It connects Producer and Consumers through the Internet and thereby fosters efficiency in an otherwise inefficient market. A Marketplace is an ecommerce platform that enables Individuals as well as Business to either list their items for sale or set up online storefronts on the marketplace platform and leverage the platform and its services [search, viewing product information, buying, payment, order management, etc]. It can be considered horizontal when they support the exchange of various types of products or services, or vertical, when the platform allows the exchange of only one type of product.

Marketplace also can act as a guarantor in the transaction between sellers and buyers, as long as the duration of the commercial operation. In particular, it pays attention to the registration of operators (sellers / buyers) by applying anti-fraud controls and rules.”

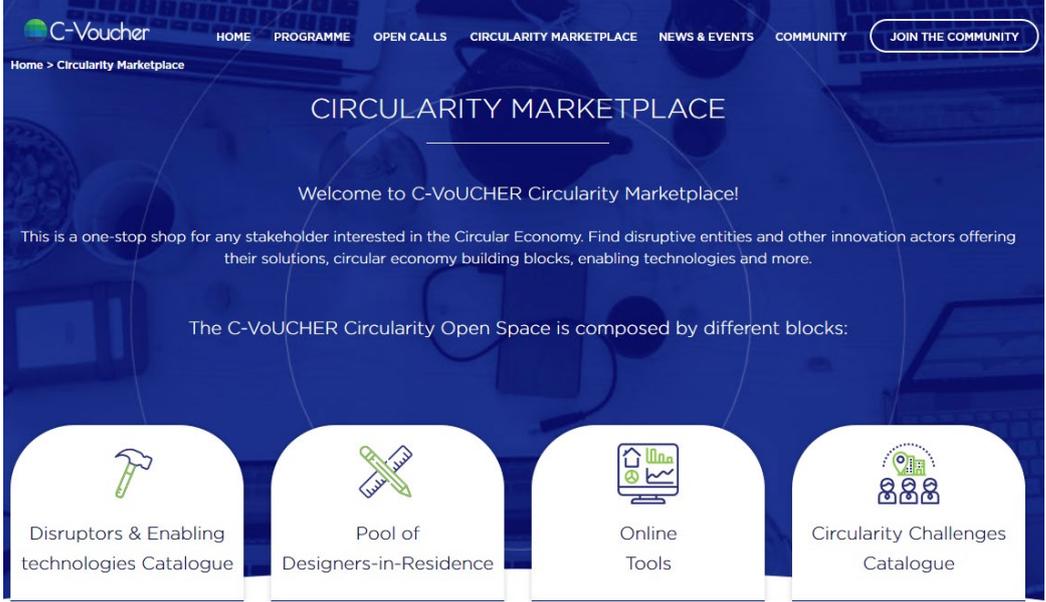
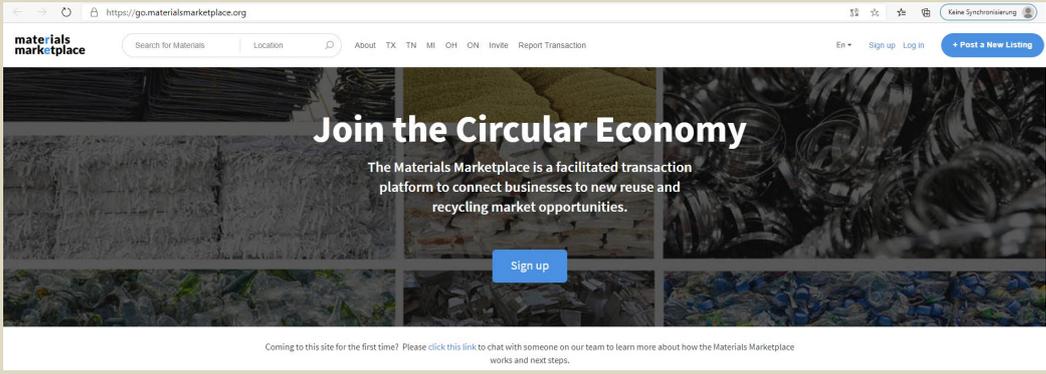
<https://www.alpine-space.eu/projects/greencycle/deliverables/t4/d.t4.2.2-definition-of-the-functionalities-of-the-platform-v1.1.pdf>



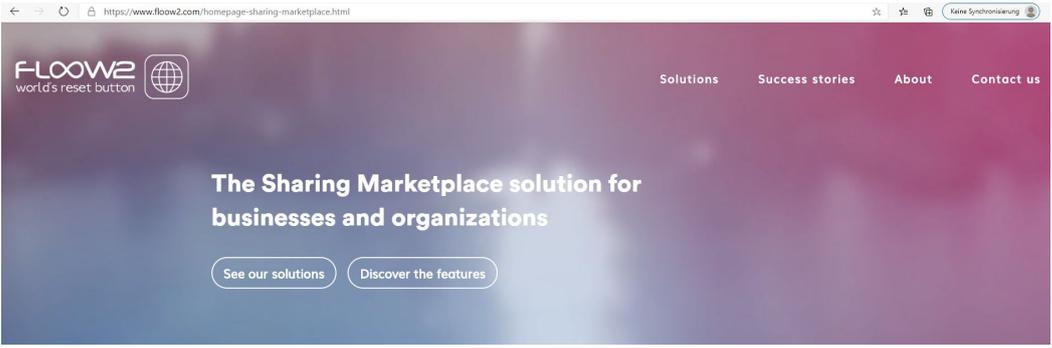
3.2 Marketplaces – presented in the *CITYCIRCLE MARKETPLACES/ INDUSTRIAL SYMBIOSIS* presentation

Marketplaces

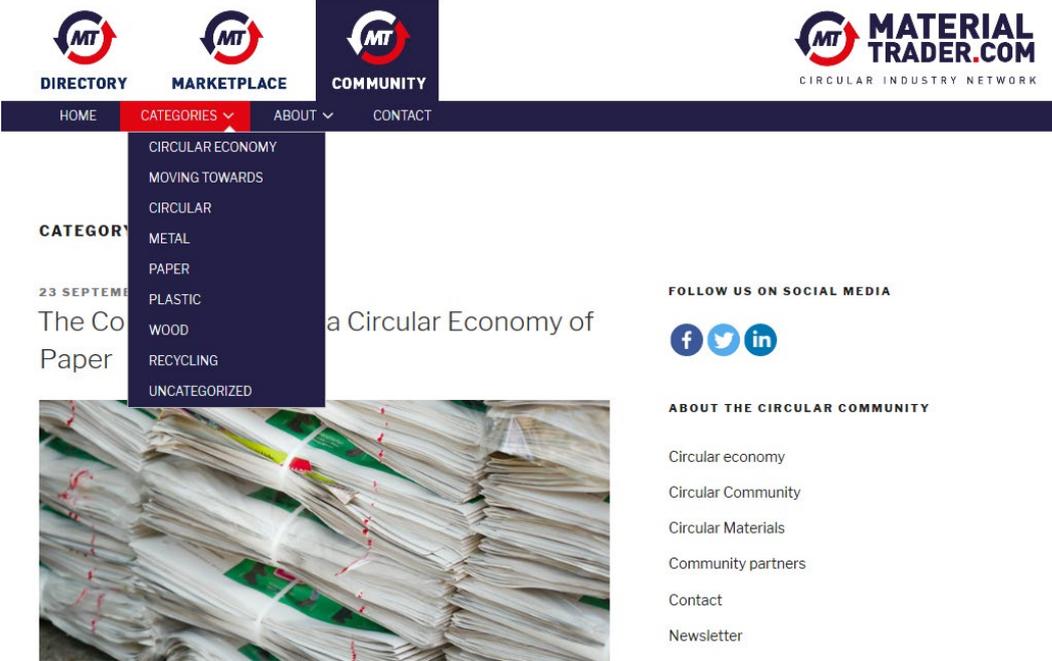
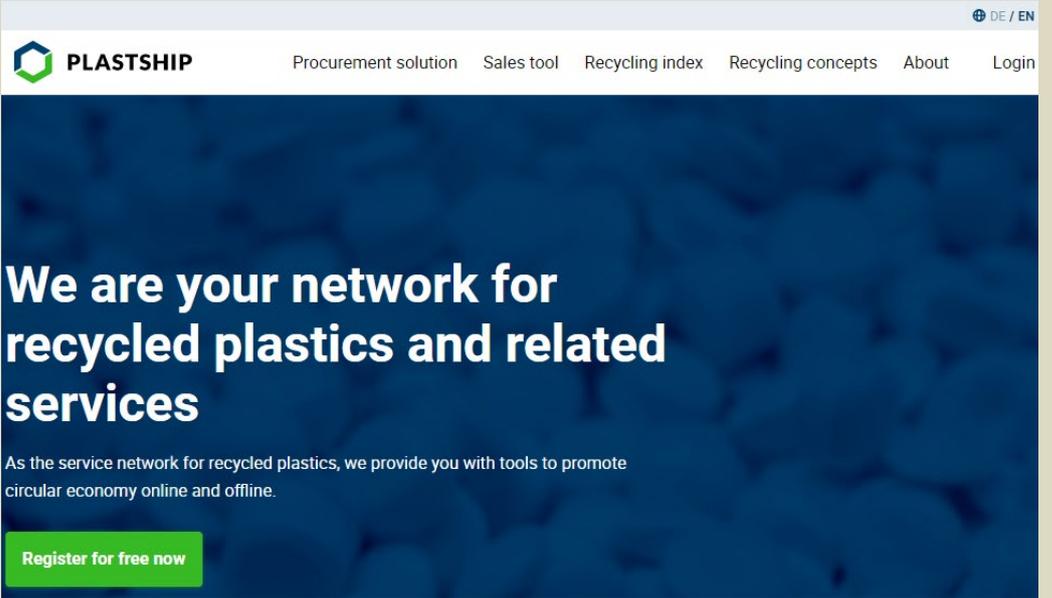


<p>C-Voucher project</p> <p>https://c-voucher.com/</p>	<p>Circularize ValUe CHains across European Regional Innovation Strategies</p> 
<p>Materials Marketplace</p> <p>https://go.materialsmarketplace.org/</p>	<p>“The Materials Marketplace is an award-winning regional and national platform that connects businesses and organizations to develop and scale new reuse and recycling market opportunities. Through our platform, traditional and non-traditional industrial waste streams are matched with new product and revenue opportunities, ultimately enabling the culture shift to a circular, closed-loop economy. In addition to diverting waste from landfills, these recovery activities generate significant cost savings, energy savings, and create new jobs and business opportunities.” (https://usbcsd.org/materials)</p> <p>Meanwhile already in one more site – Austin, Tennessee, Michigan, Ohio and Ontario:</p> 

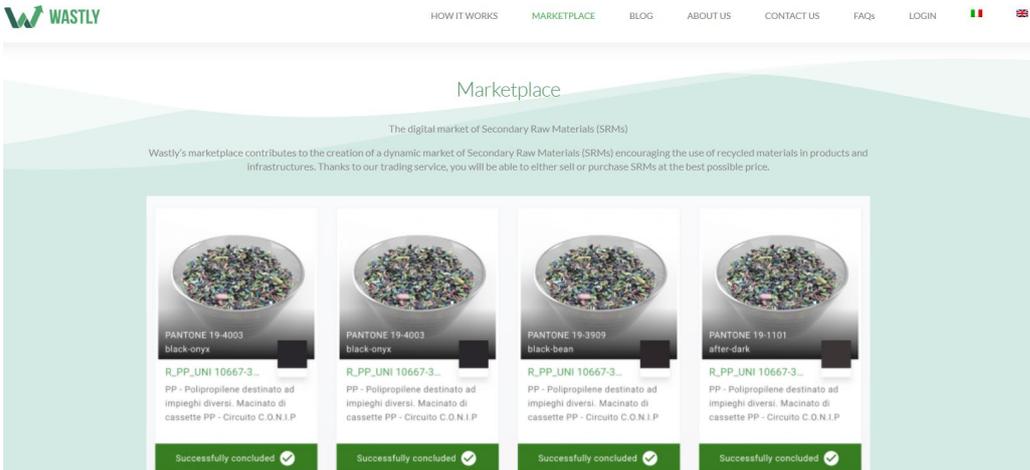


<p>FLOOW2</p> <p>https://www.flow2.com/homepage-sharing-marketplace.html</p>	<p>“FLOOW2 is the first business-to-business sharing marketplace that enables companies and institutions to share overcapacity of equipment, knowledge and skills of personnel. Users can register on the platform for free and participants pay a subscription to advertise their equipment on the platform, providing a revenue stream for FLOOW2.”</p> <p>https://www.ellenmacarthurfoundation.org/case-studies/business-to-business-asset-sharing</p> 
<p>FLOOW2 Healthcare</p> <p>https://www.flow2healthcare.com/healthcare-nl.html</p>	<p>In contrast to the CITYCIRCLE MARKETPLACES/ INDUSTRIAL SYMBIOSIS presentation, the Healthcare section has now been transferred to a separate website, initially in Dutch:</p> 



<p>MATERIAL TRADER.COM</p> <p>https://community.materialtrader.com/</p>	<p>The circular industry network</p>  <p>The screenshot shows the Material Trader website. At the top, there are three circular logos with 'MT' inside, labeled 'DIRECTORY', 'MARKETPLACE', and 'COMMUNITY'. To the right is the 'MATERIAL TRADER.COM' logo with 'CIRCULAR INDUSTRY NETWORK' below it. A dark navigation bar contains 'HOME', 'CATEGORIES', 'ABOUT', and 'CONTACT'. The 'CATEGORIES' dropdown menu is open, listing: 'CIRCULAR ECONOMY', 'MOVING TOWARDS', 'CIRCULAR', 'METAL', 'PAPER', 'PLASTIC', 'WOOD', 'RECYCLING', and 'UNCATEGORIZED'. Below the menu, there's a headline 'The Co... a Circular Economy of Paper' and an image of stacked paper. On the right, there are social media icons for Facebook, Twitter, and LinkedIn, and a list under 'ABOUT THE CIRCULAR COMMUNITY' including: 'Circular economy', 'Circular Community', 'Circular Materials', 'Community partners', 'Contact', and 'Newsletter'.</p>
<p>PLASTSHIP</p> <p>https://plastship.com/about</p>	 <p>The screenshot shows the Plastship website. At the top right, there are language options 'DE / EN'. The navigation bar includes 'PLASTSHIP' (with a logo), 'Procurement solution', 'Sales tool', 'Recycling index', 'Recycling concepts', 'About', and 'Login'. The main content area has a dark blue background with white text: 'We are your network for recycled plastics and related services'. Below this, it says 'As the service network for recycled plastics, we provide you with tools to promote circular economy online and offline.' and a green button that says 'Register for free now'.</p>



<p>WASTLY</p> <p>https://www.wastly.com/marketplace/?lang=en</p>	<p>The digital market of Secondary Raw Materials (SRMs)</p> 
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3.3 More Marketplaces - ...

<i>More Marketplaces</i>	
<p>Circular Economy Club</p>	<p>For more marketplaces have a look at – CIRCULAR ECONOMY CLUB https://www.circulareconomyclub.com/organizations/marketplaces/</p>
<p>PlanetARK</p> <p>https://circular-economyhub.org.au/</p>	<p>In the CITYCIRCLE presentation we introduced the</p>  <p>foreseen to be launched in 2020. This hasn't been the case until now. The Recycling hubs are working.</p>
<p>ASPIRE</p>	<p>One businesses trash is another businesses treasure.</p>



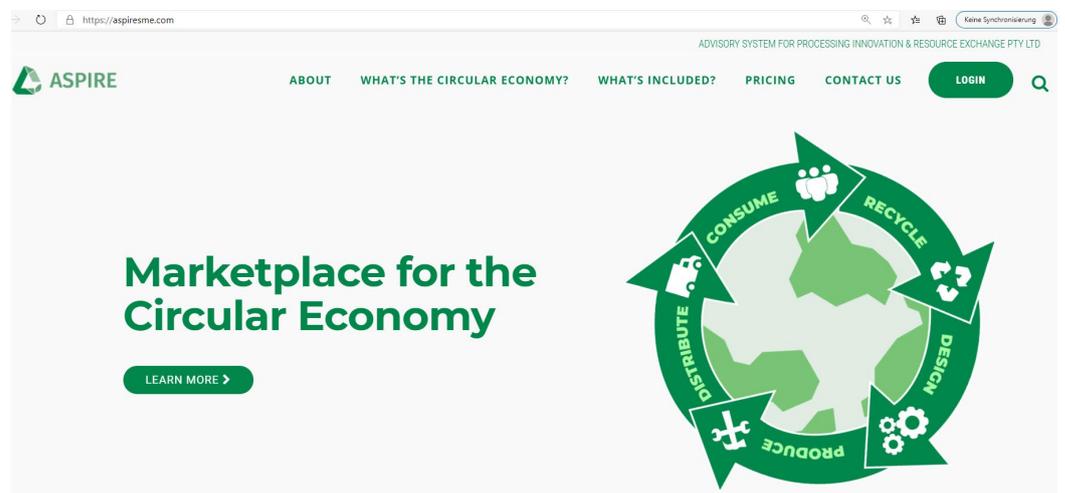
<https://aspireme.com/>

“ASPIRE was developed in response to a need from Australian businesses and their local councils who were seeking a solution to their ever-growing waste disposal costs. They wanted alternative ways to generate revenue from excess resources that would otherwise end up in landfill. ASPIRE transitioned to a commercial operation in 2019 with the endorsement of CSIRO and Data61 and is currently in the process of expanding across local and interstate networks under a new entity.

ASPIRE currently works with councils and businesses Australia-wide and a number of corporations to provide them with a new way to solve their waste issues.

In March 2020, the new ASPIRE platform was launched offering pioneering, innovative software intelligently matching potential remanufacturers, purchasers and recyclers.”

<https://aspireme.com/the-aspire-story/>





V. Topics addressed by the CITYCIRCLE project partners during the implementation of their Circular Economy Pilot Projects

5 Pilot Actions are to be implemented in the 5 Central European Cities and Regions, each one with different thematic focus, to demonstrate the potentials benefits of the CE for the sustainable development of local and regional economies. The pilot projects (PP) reflect the needs and policy priorities of respective target environment, implementing new approaches on technological, societal or economic levels to form new value chains and to initiate the change towards higher circularity.

Target regions/ cities and thematic focus
<ul style="list-style-type: none"> ▪ Košice, Slovakia – setting-up value chains in agriculture and forestry industry on CE principles. New value chains (farmers, enterprises) supported by ICT tools to provide business model for organic cycle.
<ul style="list-style-type: none"> ▪ Varaždin, Croatia - boosting local economy through innovative approach to waste management and reuse. Innovating new business opportunities originating from waste recycling through public-private co-creation.
<ul style="list-style-type: none"> ▪ Udine, Italy – setting-up value chain in waste-waste water-waste energy field on the principles of CE. Integrating different flows and companies into single solution supported by business model and business plan.
<ul style="list-style-type: none"> ▪ Kranj, Slovenia – management of land (industrial sites, public spaces) on the principles of CE. Setting-up the network of land-owners and use-rs to develop joint urban regeneration process.
<ul style="list-style-type: none"> ▪ Dornbirn, Austria – advanced manufacturing and ICT on the principles of CE. Developed holistic concept for covering the whole chain from manufacturing over compiling the right product data to recycling.

In the context of the PPs, the following steps are to be carried out in detail:

Pilot definition - Preparation activities documented in the form of concept and roadmap for implementation.
Implementation of the PPs – Implementation of the activities and timeplan as defined in the roadmap and replanning according the actual development in the local environment, while reported on 6-monthly basis.
Exchange of the experience – Exchange of lessons learnt through various channels – personal and online workshops and online collaboration tools.
Control the process – Monitoring the progress and evaluation of the outcomes, and formulation of the recommendations for others to ensure the replicability of the actions.

In the following 5 chapters the operational set-up of the PPs will be provided in brief. Information on activities and topics such as project management, communication, assumptions, constraints and risk assessment are not considered. Further details – like e.g. characteristics of the respective regions, their current challenges - can be found in the detailed versions of each PP description.



Updates – on the status of implementation, lessons learnt, monitoring and evaluation – will be provided in the next editions of the advanced knowledge base.

1. Agriculture and food industry (Košice, Slovakia)

- **Košice, Slovakia** – setting-up value chains in agriculture and food industry on CE principles. New value chains (farmers, enterprises) supported by ICT tools to provide business model for organic cycle.

1.1 Pilot project – Circular Agri-food value chains

Reference :

Pilot implementation concept **Košice**. D.T3.1.1 – 04 2020.

1.1.1 Pilot project scope

- **Needed actions derived from current challenges**

- Bring together local stakeholders, citizens and institutions to create trust, new links and more efficient exchanges assessing and planning the circular City Region Food System;
- Develop solutions to address gaps in the local food processing, storage and distribution infrastructure by exploring options that could include a food business incubator or the Food-HUB;
- Promote and facilitate all forms of urban and peri-urban agriculture and strengthen relations with all parts of the food system;
- Facilitate local sourcing in public procurement through more effective communication and experience sharing;
- Develop digital platforms where support is given to food-sharing initiatives to promote City Region Food System with attention to reduce food wastage, in particular through the use of ICT;
- Develop initiatives to finance fresh foods and manage public catering services to cook whole foods for nutritional foods and to increase knowledge about nutrition and cooking;
- Facilitate the transition from a charitable food model to a model based on the principles of a fair and sustainable food system
- To reduce food waste in the food system, increase food sharing and recapture in the food chain (e.g. to develop strategies to reduce food packaging in urban shops).

The aim of the CITYCIRCLE pilot is to deliver to proof of the financial, social and environmental potentials behind the CE in the agri-food value chains and food service sector, to support the process of initiation of the transition towards circularity on all levels – public governance, business sector, innovation creation and lifestyle of citizens.



Within the pilot activities, the comprehensive analysis of the opportunities in the flow of the agri-food products throughout the food value chain, covering variety of actors, in Košice City Region Food System will be performed with the help of experts. For the consumption level, the processes of the canteens in the responsibility of the Košice Self-governing Region, will be analyzed. The expected output is the in-depth map of the agri-food products flow, with possible loops and other channels, reducing and preventing the level of food waste generated.

For the most impactful areas, the opportunity study will be prepared covering the technical and financial analysis to prove the concept, captured in the interactive ICT based tool for other organizations and actors willing to replicate the pilot cases and to become the part of circular agri-food value chain.

1.1.2 Main goal and specific objectives

Main goal	<i>To support the decision making processes of the actors of agri-food value chains and food service sector towards implementation of CE solutions and models, by providing them with the proper information, tools, and guidelines to implement the change.</i>
SO 1	<ul style="list-style-type: none"> To analyze the state-of-the-art of the CE solutions and models in the field of agri-food value chains and food service sector and their level of impact.
SO 2	<ul style="list-style-type: none"> To analyze the existing best- and good-practices on EU and global level and its applicability in selected areas of intervention.
SO 3	<ul style="list-style-type: none"> To conduct the on-the-spot analyses of selected CE solutions and models in the real-life environment of piloting partners.
SO 4	<ul style="list-style-type: none"> To conclude the key findings in the form of case studies.
SO 5	<ul style="list-style-type: none"> To formulate the set of recommendations and guidelines for implementation of selected circular economy solutions and models for analogical actors.
SO 6	<ul style="list-style-type: none"> To create the interactive ICT tool supporting the uptake of recommended CE solutions and models, and enabling the creation of circular value chains in agri-food value chains and food service sector.

1.1.3 Stakeholders and external initiatives

Stakeholder



Košice Self-Governing Region	<ul style="list-style-type: none"> ▪ managing more than <ul style="list-style-type: none"> ○ 20 cultural, ○ 70 school and 10 social facilities, which will be cooperating within our initiative.
Agro-Food producers and distributors	<ul style="list-style-type: none"> ▪ Agro-Farmers operating in the region ▪ Companies providing food wholesale and distribution ▪ Agro-Food producers ▪ Shops
Food Service sector - made up of companies who provide meals outside of the home	<ul style="list-style-type: none"> ▪ Contract caterers (schools, hospitals, workplaces and care homes) ▪ Communal catering/Public catering ▪ High street eateries (restaurants, café chains and independents.) ▪ Canteens
Consumption	<ul style="list-style-type: none"> ▪ Citizens – consumers ▪ Visitors -food consumers
Managing and controlling authorities – government	<ul style="list-style-type: none"> ▪ Košice Region Office ▪ Košice City Office ▪ State Veterinary and Food Administration of the Slovak Republic ▪ Ministry of Agriculture and Rural Development of the Slovak Republic ▪ Agricultural Paying Agency (APA) ▪ Slovak Agriculture and Food Chamber (SPPK) ▪ Office off Public Health Policy
Expertize providers - R&D, NGOs etc.	<ul style="list-style-type: none"> ▪ Institute of Circular Economy ▪ Institute of Environmental Policy (analytical unit of the Ministry of the Environment of the Slovak Republic) ▪ Circular Slovakia – a platform for circular economy ▪ Farmer network ▪ Community based initiative ▪ Kitchen managers

External initiatives – able to boost the impact through synergies
<ul style="list-style-type: none"> ▪ Circular Slovakia (Platform) - http://zelene-hospodarstvo.enviroportal.sk/zelene-hospodarstvo/obehove-slovensko/kto-sme ▪ Employment Cross-border Action plan of the Cserehát micro-region (TAPE) - http://www.viacarpatia.eu/novinka-11-may-2018-08-40-15 ▪ From yard to regional development of rural areas (Project) - http://rozvijamevidiek.sk/ ▪ Office without trash can (Project) - https://www.inciens.sk/projekty/kancel-bez-kosa/ ▪ Festival Without Waste (Workshop series) - https://www.inciens.sk/projekty/festivaly-bez-odpadov/ ▪ Less waste (Expert Advisory Group) - https://www.menejodpadu.sk/o-nas/ ▪ WhatCity? (Project) - https://whatcity.sk/



1.1.4 Pilot activities, milestones/ outputs

<i>Pilot activity</i>	<i>Description and milestones/ outputs</i>
1 - State-of-the-art of CE solutions	<p>Analysis of the state-of-the-art of the CE solutions and models in the field of agri-food value chains and their level of impact, taking into account the financial, social and environmental aspect. This will be consulted with experts. The most promising solutions and models will be further analyzed in following activities.</p> <ul style="list-style-type: none"> ▪ <i>List of appropriate good- and best- practice CE solutions</i>
2 – EU and global good- and best-practices	<p>Analysis of existing best- and good-practices on EU and global level and its applicability in selected areas of intervention, taking into account the technical setting and legal aspects.</p> <ul style="list-style-type: none"> ▪ <i>List of feasible CE solutions, Opportunity studies</i>
3 – On-the-spot analyses at piloting partners	<p>The on-the-spot analyses of selected CE solutions and models in the real-life environment of small number of piloting partners (e.g. school canteens, farmers, processing companies, citizens). This will be appointed in the beginning of this activity.</p> <ul style="list-style-type: none"> ▪ <i>List of feasible CE solutions, Opportunity studies</i>
4 – CE use-cases	<p>Conclusion of the key findings and preparation of the case studies to be presented to enable the faster uptake of the CE solutions.</p> <ul style="list-style-type: none"> ▪ <i>CE use cases</i>
5 – Recommendations and guidelines for CE solutions	<p>Formulation of the set of recommendations and guidelines for implementation of selected circular economy solutions and models for analogical actors. These outcomes will be discussed with Košice Self-governing region to enable smooth application of public sector organizations (e.g. other school canteens).</p> <ul style="list-style-type: none"> ▪ <i>Set of recommendations and guidelines for implementation of feasible CE solutions</i>
6 – ICT tool for uptake of CE solutions	<p>Creation of the interactive ICT tool supporting the uptake of recommended CE solutions and models, and enabling the creation of circular value chains.</p> <ul style="list-style-type: none"> ▪ <i>ICT tool</i>

1.2 References and Knowledge Base

1.2.1 References



Further readings – Košice, Slovakia
<p>Transition towards Circular Economy in Slovakia Circular Economy Policy framework https://www.minzp.sk/files/2-sekcia/circular-economy-a4.pdf</p>
<p>Transition towards Green Economy Circular economy is gradually winning political support in Slovakia and several framework conditions have been created to facilitate progress, e.g. in the area of waste management. During the EU Council presidency in 2016, the main goal within the Environment Council was to actively contribute to the current European discussion about the transition to the green economy and circular economy. The Slovak presidency triggered the development the „Bratislava Green Economy Process“ the main goal of which is to enable regular and broad discussion about progress towards the green economy in the context of strategic EU documents such as the Europe 2020 strategy, 7th Environment Action Programme, etc. http://www.t2ge.eu/</p>
<p>Green Economy Information Platform To facilitate the implementation of the principles of circular economy in practice, the Green Economy information platform has been established. It offers the possibility to present green solutions and to share the experience with their implementation. http://green-economy.enviroportal.sk</p>
<p>Greener Slovakia - Strategy Environmental Policy of the Slovak Republic until 2030 The basic vision of Enviro's 2030 strategy is to achieve better environmental quality and a sustainable circulatory economy using as few non-renewable natural resources and hazardous substances as possible. Protecting the environment and sustainable consumption will be part of the general awareness of both citizens and policy makers. By preventing and adapting to climate change, its consequences in Slovakia will be as modest as possible. https://www.minzp.sk/files/iep/greener_slovakia-strategy_of_the_environmental_policy_of_the_slovak_republic_until_2030.pdf</p>
<p>Waste Prevention Program of the Slovak Republic for the years 2019 - 2025 The main objective of the program is to shift from material recovery as the only priority in waste management of the Slovak Republic to the prevention of waste in accordance with the waste hierarchy of the Slovak Republic. This trend is in line with the European Union Action Plan for Circular Economy Link to programmes factsheet: https://www.eea.europa.eu/ds_resolveuid/NY4PBIZOSC</p>
<p>Waste Management Program of the Slovak Republic for 2016 – 2020 The program of the region defines the targeting of the management of the designated types and quantities of waste (waste streams), at a given time, measures to achieve these objectives and the assessment of the need to build new waste treatment facilities and the need to expand existing waste treatment facilities, including plans to build facilities for waste management of regional importance. https://www.minzp.sk/files/sekcia-enviromentalneho-hodnotenia-riadenia/odpady-a-obaly/registre-a-zoznamy/poh-sr-2016-2020_vestnik_en-2.pdf</p>



Further readings - Circular Economy in Agriculture and Food Sector

Food safety and waste policies in EU

https://ec.europa.eu/food/overview_en

https://ec.europa.eu/food/safety/food_waste_en

Reduce Food Waste Initiative by Interreg Central Europe project STREFOWA

<http://www.reducefoodwaste.eu/index.html>

<https://www.interreg-central.eu/Content.Node/STREFOWA.html>

AgroCycle project under H2020 programme

<http://www.agrocycle.eu/>

1.2.2 Knowledge Base

Knowledge Base

FoodDrinkEurope - <https://www.fooddrinkeurope.eu/>

- **Ingredients for a Circular Economy** - <https://circulareconomy.fooddrinkeurope.eu/>
- **Preventing Food Waste** - <https://foodwaste.fooddrinkeurope.eu/>



2. Waste management and reuse (Varaždin, Croatia)

- **Varaždin, Croatia** - boosting local economy through innovative approach to waste management and reuse. Innovating new business opportunities originating from waste recycling through public-private co-creation.

2.1 Pilot project – city market Gradska Tržnica d.o.o. in the City of Varaždin

Reference :

Pilot implementation concept **City of Varaždin**. D.T3.1.2 – 03 2020.

2.1.1 Pilot project scope

The scope of the PP is limited to the city market Gradska Tržnica d.o.o. in the City of Varaždin. It has been decided that the PP will take place there since it is the best representative of the city and it gathers a lot of people throughout the day. The idea is to test the potential of CE on a smaller scale and then, if it possible, extend it on a larger scale. In a period of 24 months all sort of waste from city market will be sorted, collected and properly treated. The emphasize will be on biodegradable waste which will be treated in a biogas plant while produced digestate will be used on a hazelnut farm owned by the city market. That is just one of the ways for closing the loop. Defined PP will serve for utilization of innovation potential of circular economy and for testing tools and guidelines given by CITYCIRCLE project. Besides that, PP will serve for identification of possible problems and will enable necessary changes and adjustments. Nevertheless, it is necessary to emphasize that the project will not have economic performance during the implementation, but it is expected that it will serve as precondition and origin for future activities.

2.1.2 Main goal and specific objectives

Main goal	<i>Once successfully implemented, the PP will represent a valuable blueprint for policymakers who want to stimulate the progression from a linear towards CE.</i>
SO 1	▪ providing education and educational materials about proper sorting of waste
SO 2	▪ procurement of waste bins in different colours for easier and adequate separation of waste
SO 3	▪ proper and timely waste disposal according to needs
SO 4	▪ treatment of biodegradable waste in a biogas plant
SO 5	▪ closing the loop by using the obtained digestate as a fertilizer on the hazelnut farm owned by the <i>Gradska Tržnica d.o.o.</i>



2.1.3 Stakeholders and external initiatives

As part of the PP 'City market Varaždin' various stakeholders will take place. All of them together are part of quadruple helix model and represent a round picture of national circumstances and ambitions.

Development Agency North (DAN) has the partner role in the project. They oversee conducting management and coordination of the project on local/regional level and all activities which are needed to achieve specific goals of the project. They already have experience in preparing and implementing transnational projects focusing on themes related to environmental protection, urban planning and industrial cooperation. *City of Varaždin*, on the other hand, is the founder of business supporting agencies such as aforementioned DAN, Technological Park Varaždin, Čistoća d.d. for waste management and other supporting institutions. It is primarily a public institution and doesn't perform economic activities on the market. As a representative of Varaždin county and public authority it is giving all the support needed for easier implementation of PP and transition towards CE.

Based on several meetings and workshops it has been decided that the PP will take place on the city market named *Gradska Tržnica d.o.o.* since it is the main promotion of the city and it gathers a lot of people throughout the day. It is a public utility that serves as a location where people regularly gather for purchase and sale. Due to large amounts of biodegradable waste throughout the year (around 59 tons of waste), it is considered the best option for the implementation of PP. To meet the goals of circular economy the following public utility companies will take part in taking care of different sort of waste that is produced. As a company responsible for public services and waste management *Čistoća d.o.o.* will participate in waste transportation from one location to another while the dynamics of transportation will be determined over time. According to the morphology of city market waste, biodegradable waste accounts for the largest share. Since *OPG Vrčjek* owns a biogas plant that can treat biodegradable waste and it seems like a perfect cooperation between these two stakeholders. Besides biogas, anaerobic digestion produces a digested waste (digestate) that can be used as a fertilizer. During one of the meetings it has been found that *Gradska Tržnica d.o.o.* owns a couple of acres of hazelnuts and according to that, the produced digestate could be used for fertilization. The possibility of applying the digestate on hazelnut farm will be explored by scientific community. For successful implementation of the PP, valid education of all participants will be indispensable. The proposed idea is to include students from the *Faculty of organization and informatics, Varaždin* to participate in creating of all necessary leaflets, brochures, flyers, presentations and posters.

As an expert for CE, *CROTEH d.o.o.* is responsible for designing a clear and consistent PP concept agreed by all of the stakeholders.

Once again, we see the importance of having a wider group of stakeholders required for valid implementation of the CE.



2.1.4 Pilot activities, milestones/ outputs

<i>Pilot activity</i>	<i>Description and milestones/ outputs</i>
1 - Determination of quantity and composition of city market waste	<p>Prior to PP implementation it was necessary to determine the quantity and composition of produced waste on the city market. It was done by Gradska Tržnica d.o.o. who collected and sorted waste for one week (January 8th – January 14th). Data collected in a period of one week have been used for a monthly estimate. However, bearing in mind the variability of waste during different periods of a year, continuous monitoring will be implemented. The monitoring will also be the measuring tool of successful waste separation.</p> <ul style="list-style-type: none"> ▪ <i>Report on quantity and composition of city market waste</i>
2 – Strategical placements of waste bins	<p>Once the sets of waste bins arrive, they will need to be strategically placed. In order to accomplish that, Croteh d.o.o. and workers from the city market will work together. Since they have already inspected the place and possible locations during the Activity 02, the placement is presenting a simple challenge.</p> <ul style="list-style-type: none"> ▪ <i>Procurement and strategic placement of waste bins</i>
3 – Separation, collection and treatment of waste	<p>Separation of waste by tenants and public during the duration of the PP. Frequency of waste disposal will be dynamic, meaning it will be based on the amount of produced waste. Čistoća d.o.o. will transport the collected biodegradable waste for treatment in the biogas plant OPG Vrček. The produced digestate, will then be transported to the hazelnut farm.</p> <ul style="list-style-type: none"> ▪ <i>Successful separation of waste</i> ▪ <i>Production of high quality digestate</i>
4 – Soil and digestate sampling and analysis and application of digestate on farmland	<p>Sampling of soil from hazelnut farm and digestate from the biogas plant and their analysis. In order to determine the real impact of the digestate on farmland, the digestate will be applied only on half of the farmland. It will be done by city market workers. After application of the digestate, the farmland will be normally cultivated, and the progress will be determined after approx. one year. The results and comparison of the fertilised and unfertilised farmland will be compared, and the benefits will be evaluated. This activity is a research part of the project about the possible use of digestate for hazelnut production. It will be performed by all responsible parties, aided by Croteh d.o.o. and scientific community. Besides the use on a hazelnut farm they will also find alternative solutions about the possible use of digestate on some other city areas such as parks and roadsides with poor soil quality.</p> <ul style="list-style-type: none"> ▪ <i>Utilization of the digestate on the hazelnut farm</i>
5 – Hazelnut harvesting	<p>The difference between the treated part of the farm and the untreated part of the farm will show the effectiveness of the use of the digestate. Depending on the amount of harvested hazelnuts, Gradska Tržnica d.o.o. will decide how to treat</p>



	<p>them. If there is an excess of hazelnuts left after a part has been used for personal needs, it can be sold on their city market. That way a value-added product will be obtained.</p> <ul style="list-style-type: none"> ▪ <i>Successful harvest of hazelnuts</i>
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2.2 References and Knowledge Base

2.2.1 References

<p>Further readings – Varaždin and Croatia (mentioned in the presentation)</p>
<p>City council of Municipality City of Varaždin (2018)</p> <p>Waste management plan for Varaždin for the period 2018 – 2023., February, 2018. https://glasila.hr/upload_data/site_files/svgv318.pdf</p>
<p>Development Agency Sjever DAN Ltd. (2016)</p> <p>Development strategy of the City of Varaždin by 2020, May, 2016. https://varazdin.hr/upload/2016/12/strategija_razvoja_grada_varazdina_do_2020_godine_584e471f6dd4f.pdf</p>
<p>Government of the Republic of Croatia (2017)</p> <p>Waste management plan of the Republic of Croatia for the period 2017 – 2022. Zagreb: January 2017. https://mzoe.gov.hr/UserDocsImages/UPRAVA-ZA-PROCJENU-UTJECAJA-NA-OKOLIS-ODRZIVO-GOSPODARENJE-OTPADOM/Sektor%20za%20odr%C5%BEivo%20gospodarenje%20otpadom/Ostalo/management_plan_of_the_republic_of_croatia_for_the_period_2017-2022.pdf</p> <p>“On January 5th 2017 Croatian Government adopted the Waste Management Plan in the Republic of Croatia for the period 2017 -2022. Adoption of the Plan is an important precondition for the use of funds in the waste sector, from the Operational Programme Competitiveness and Cohesion 2014-2020. The Plan should enable the development of the recycling industry, the creation of new green jobs and fulfilment of the EU’s commitments. An integral part of the Plan is the Waste Prevention Plan, which introduces measures for separate collection at the source, selection of waste and household composting.”</p> <p>Source: http://polocro28.irmo.hr/waste-management-plan-in-the-republic-of-croatia-for-the-period-2017-2022-adopted/</p>
<p>The Ministry of Environment and Energy (2017)</p> <p>National waste management for the period 2017-2022. Zagreb: April 2017. https://www.hgk.hr/documents/prezentacijaradovicjosic458ecda6314806.pdf</p>
<p>Croatian Parliament (2009)</p>



Pursuant to Article 44, paragraph 4 of the Environmental Protection Act (Official Gazette No. 110/07), the Croatian Parliament passed, during its session held on February 20, 2009, the following SUSTAINABLE DEVELOPMENT STRATEGY OF THE REPUBLIC OF CROATIA.

https://narodne-novine.nn.hr/clanci/sluzbeni/2009_03_30_658.html

Croatian Parliament (2005)

Pursuant to Article 8 of the Law on Waste (Official Gazette No. 178/04), the Croatian Parliament passed, during its session held on October 14, 2005, the following STRATEGY OF WASTE MANAGEMENT IN THE REPUBLIC OF CROATIA

<https://vlada.gov.hr/UserDocsImages//ZPPI/Strategije%20OGP/za%C5%A1tita%20okoli%C5%A1a//130%202.11.2005%20Strategija%20gospodarenja%20otpadom%20Republike%20Hrvatske.htm>

Further readings _ Waste Croatia (website search)

Netherlands Enterprise Agency (2018)

Waste management and circular economy efforts in Croatia. The Hague: July 2018.

<https://www.rvo.nl/sites/default/files/2018/07/circular-economy-and-waste-management-in-croatia.pdf>

Flanders Investment & Trade Market Survey (2018)

Waste and Water Management in Croatia. Paper. Zagreb: November 2018.

https://www.flandersinvestmentandtrade.com/export/sites/trade/files/market_studies/2018-Waste%20and%20Water%20Management%20in%20Croatia.pdf

2.2.2 Knowledge Base - International Solid Waste Association (ISWA)

Knowledge Base



International Solid Waste Association (ISWA), Rotterdam, Netherlands

<https://www.iswa.org/>

The ISWA Knowledge Base aims to provide up to date information on all aspects of waste management in order to promote and develop best practices worldwide.

ISWA's mission is to Promote and Develop Sustainable and Professional Waste Management Worldwide
 ISWA achieves its mission through:



- Promoting resource efficiency through sustainable production and consumption
- Support to developing and emerging economies
- Advancement of waste management through education and training
- Promoting appropriate and best available technologies and practices
- Professionalism through its programme on professional qualifications.

ISWA provides a Knowledge Base

<https://www.iswa.org/media/publications/knowledge-base/>

The ISWA Knowledge Base aims to provide up to date information on all aspects of waste management in order to promote and develop best practices worldwide.

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LMDI ANALYSIS OF MUNICIPAL WASTE GENERATION AND MANAGEMENT IN 21 CROATIAN COUNTIES

Published: 2016 | Author(s): Predrag Korica, Đurđica Požgaj, Andreja Cirman, Andreja Žgajnar Gotvajn | Category: Conferences & Workshops | Conference: ISWA World Congress 2016, Novi Sad

Waste Management in Croatia

Published: 2016 | Author(s): Danko Fundurulja | Category: Conferences & Workshops | Conference: ISWA World Congress 2016, Novi Sad

SUB-REGIONAL REPORT: Plastic/PET waste recycling in the South-East Europe sub-region, with a



3. Value chain in waste-waste water-waste energy (Udine, Italy)

Due to COVID-19 and the associated lockdown, Udine is behind schedule. This section will be completed as soon as the implementation concept for the pilot is available.

- **Udine, Italy** – setting-up value chain in waste-waste water-waste energy field on the principles of CE. Integrating different flows and companies into single solution supported by business model and business plan.

3.1 Pilot project – Udine

Reference :

Pilot implementation concept **Udine**. D.T3.1.3 – 0x 2020.



4. Management of land - industrial sites, public spaces (Kranj, Slovenia)

- **Kranj, Slovenia** – management of land (industrial sites, public spaces) on the principles of CE. Setting-up the network of land-owners and users to develop joint urban regeneration process.

4.1 Pilot project – Management of land in Primskovo area

Reference :

Pilot implementation concept **Kranj**. D.T3.1.4 – 05 2020.

4.1.1 Pilot Project scope

Through the CITYCIRCLE pilot project the Municipality of Kranj intends to explore, test and refine its approach on management of land on the principles of CE. The city aims to create an approach that will enable urban regeneration in collaboration with land-owners and users.

The municipality recognises urban space as a key resource for enabling a sustainable, circular and prosperous development of the city. It also recognises that degraded, non-vital areas of the city are a high priority challenge that can be tackled with circular economy approach. Herein the city recognises vital opportunities to regenerate and enhance the value of this crucial resource.

Municipality of Kranj has for this purpose chosen a pilot area, called zone Primskovo. The reason for choosing this area is its current status as low-performing asset at risk of degradation.

Testing the CE based on land management approach in Primskovo area will help the municipality to explore the strengths and weaknesses of this approach with the aim to refine experiential input of involved stakeholders, so that it becomes a blueprint model for regeneration and activation of under-utilised spaces across municipality.

4.1.2 Main goal and specific objectives

The overarching objective of the CITYCIRCLE pilot is to develop an approach on management of land based on the principles of circular economy.

The pilot development process will include the following key phases:

- In-depth analysis of the Primskovo area to understand the context, define key challenges and opportunities for revitalisation and land management improvement as seen by users, potential users, landowners and the municipality.
- Setting-up the network of land owners & users to develop joint established business location.
- Upgrade of municipalities Information system with new relevant data and new potential solutions to support competitiveness of business location.



For all set goals, feedback on the achievement of the goal is available within the project time frame. The goals can be achieved with a positive response from the stakeholders of the Primskovo zone and their participation in the transition to a CE, by finding opportunities for the CE (principles of optimization, circularity, replacement) and with facing the challenges of the transition to it.

The conclusions and results, that will be monitored during and after implementation, will be recognized as long-term goals of the project. The new innovative approach on land management based on the principles of CE tested in Primskovo area will be used in other degraded areas in the Municipality of Kranj.

Main goal	<i>To develop an approach on management of land in Primskovo area based on the principles of CE.</i>
SO 1	<ul style="list-style-type: none"> ▪ In-depth analysis of the Primskovo area.
SO 2	<ul style="list-style-type: none"> ▪ Setting-up the network of land owners & users to develop joint established business location and of coordination support between stakeholders in the area, focused on the CE. ▪ Activation and support for implementation of CE activities in the area.
SO 3	<ul style="list-style-type: none"> ▪ Upgrade of municipality Information system with new relevant data and new potential solutions to support competitiveness of business location for improved spatial planning and space utilization.
SO 4	<ul style="list-style-type: none"> ▪ Monitoring, approach testing and upgrades.

4.1.3 Stakeholders and external initiatives

Stakeholder group of Primskovo area will be established after phase 1 of pilot concept - in-depth analysis. The potential stakeholders for CE transition regarding land management will be selected and grouped for further consideration.

Stakeholder	
Owners and business tenants in Primskovo area (by landuse or activity)	<ul style="list-style-type: none"> ▪ RESIDENTAL BUILDINGS, ▪ BUSINESS-SERVICE ACTIVITIES (business premises, trade, shopping center, gas station, mechanical workshop, car salon, hairdresser, restaurant, warehouse), ▪ PRODUCTION, ▪ INDUSTRY;
Municipality of Kranj	<ul style="list-style-type: none"> ▪ As a representative of the local authority.
Komunala Kranj	<ul style="list-style-type: none"> ▪ As a public institution responsible for public services and waste management.
CITYCIRCLE team	<ul style="list-style-type: none"> ▪ As coordinator and incubator of ideas and others.



External initiatives

The pilot activities will also include possible initiatives for CE from other stakeholders operating in other business areas in municipality and would show interest in (business) cooperation in the Primskovo area.

4.1.4 Pilot activities, milestones/ outputs

Pilot activity	Description and milestones/ outputs
1 – Pilot concept definition	Management of land (industrial sites, public spaces) on the principles of CE in Primskovo area.
2 – In-depth analysis of pilot area	Preparation of database: <ul style="list-style-type: none"> ▪ a list of plots, land registry status and the design of sets of units (land + building) in graphics ▪ Simulation of variants for development of pilot area.
3 – Networking	Preparation of communication activities such as online survey, interviews, workshops, report of results, coordination and awareness raising among stakeholders and others. Setting up the network will help collect data of the users of space in the Primskovo area, what activity they are engaged with and what are their plans for the future. Based on the obtained data it will be possible to place activities in the space that will correspond to the existing ones and create industrial symbiosis between them. It is possible, that new economic activity will appear in the area, with which it will be possible to establish new business model based on circular economy principles.
4 – Upgrade of information system	Upgrade with new relevant data and new potential solutions to support competitiveness of business location for improved spatial planning and space utilization.
5 – Monitoring, evaluation	During all three phases the CE approach will be tested, results monitored, and upgrades made based on results and user feedback. This overall phase will be key to ensure the usability and functionality of support tools and the overall approach with a view for further scaling in to other areas of the city.
6 – Agreement on further work	The conclusions and results, that will be monitored during and after implementation, will be recognized as long-term goals of the project. The new innovative approach on land management based on the principles of circular economy tested in Primskovo area will be used in other degraded areas in the Municipality of Kranj.



4.2 References and Knowledge Base

4.2.1 References

<i>Further readings – Circular economy in Kranj, Slovenia, EU (mentioned in the presentation)</i>
<p>Kažipot prehoda v KG</p> <p>The process of creating the Kažipot is based on regional consultations held in Slovenia in co-organization of the Partnership for the Green Economy of Slovenia and the Ministry of the Environment and Spatial Planning, as the bearers of the preparation of the document. The consultations were carried out in cooperation with the contractors and the authors of the Signpost. A consortium of authors, including dr. Janez Potočnik, representatives of the Jožef Stefan Institute and others, led the Circular Change platform.</p>
<p>Circularity gap report - https://www.circularity-gap.world/</p> <p>The first Circularity Gap Report presented the alarming statistic that our world economy was only 9.1% circular, leaving a massive circularity gap. The Report, launched in January 2018 during the World Economic Forum Annual Meeting in Davos, has since been updated and published every year, with this being the third edition. It aims to contribute to the emerging evidence base that supports decision-makers in business, politics and civil society with key insights and metrics to guide their action in the most impactful way.</p>
<p>EOL_144-145_EIT Climate-kic v Sloveniji</p> <p>Specialized magazine for sustainable development.</p>
<p>Letno-porocilo-2018-_Komunala_Kranj</p>
<p>RIS3_smart_specialisation_sl</p>
<p>Slovenska podjetja in krožno gospodarstvo</p> <p>The first part of the monograph analyzes all companies and sole proprietors in Slovenia for 2016 and compares key data for 2015 and 2014 between Slovenia and the EU-28 or individual members in the non-financial sector of the economy (industry, trade and services). The second part examines the context of the circular economy in terms of challenges and opportunities for Slovenian SMEs. The concept of the circular economy, strategic starting points for the transition to the circular economy at the national level, the issue of measuring the circular economy and the state and possibilities of using ecodesign in Slovenian SMEs in the field of construction and related activities are defined.</p>
<p>Strategija prehoda mesta Maribor v KG_Wcycle</p>
<p>Strategija trajnostnega razvoja MOK 2009-2023</p>
<p>Sustainable_circular_reuse_of_spaces_and_buildings_handbook</p> <p>The book intends to serve as a stimulus and an incentive for strategic planning at the urban level, especially carried out by public authorities, but also supported by the regional and the national level. With a wide review and analysis of good practices of urban re-use offered by the handbook, cities may learn about the different solutions that can be adopted, taking into account their specific urban features.</p>



<i>Further readings – circular economy in management of land, circular economy (website search)</i>
Spatial Development Strategy of Slovenia https://www.gov.si/zbirke/projekti-in-programi/strategija-prostorskega-razvoja-slovenije/
Strategy for the transition to circular economy in the municipality of Maribor https://www.green-cycle.si/static/strategy.pdf
Networks for the transition into circular economy https://srip-krozno-gospodarstvo.si/
Industrial sustainability https://ec.europa.eu/growth/industry/sustainability/circular-economy_sl
Sustainable urban world https://www.citieswithnature.org/

4.2.2 Knowledge Base - Will be further elaborated

<i>Knowledge Base</i>
XXXXX



5. Advanced manufacturing and ICT (Dornbirn, Austria)

- **Dornbirn, Austria** – advanced manufacturing and ICT on the principles of CE. Developed holistic concept for covering the whole chain from manufacturing over compiling the right product data to recycling.

5.1 Pilot project – Dornbirn

Reference :

Pilot implementation concept **Dornbirn**. D.T3.1.5 – 03 2020.

5.1.1 Pilot Action field

The scope of FHV's pilot is in the field of advanced manufacturing and green innovation. Focusing on Industry 4.0 Smart City setting, FHV will test new methods and business models in managing advanced manufacturing innovation systems that stimulate CE expansion in the region.

The pilot will promote defined CE strategy that both triggers the further growth of regional intelligent production systems in Vorarlberg, while simultaneously stimulating regional transition towards CE. The Intelligent production system, in the context of defined smart specialization strategy in Vorarlberg, promotes the economic growth through manufacturing, ICT, Information system activities, professional, scientific and technical activities. In this regard, the pilot will adapt solutions in the field of industrial production and technology that stir economic efficiency and competitiveness, improves industrial production and technology, as well as general advancement of knowledge. More specifically, the pilot will test the application of key enabling technologies – advanced manufacturing systems in the context of the CE strategy execution.

FHV has already conducted successful projects that contribute to Industry 4.0/Smart Manufacturing Systems, collaborating with local industry and international research institutions. These projects, both directly and indirectly, supported discoveries of solutions that utilize green innovation capacities and supports further local openness to CE potentials. FHV pilot will focus on the use of advanced manufacturing technologies (AMT) for stimulating CE growth, by application of green innovation technologies and technologies. The pilot foresees experimentation in a quadruple helix environment aimed at stimulating innovation both through process and business model innovation for green advanced manufacturing innovation. In order to achieve the goal, FHV will test and evaluate the use/adoption of specific AMT techniques aligned with different dimensions of CE strategy. In addition, FHV will test AMT solutions focusing on quadruple helix approaches to innovation, as well as promote community growth and knowledge exchange among actors involved.

In summary, FHV pilot will provide new insights into how manufacturing firms can adapt their organizational systems to support a process and open business model innovation approaches, and



experiment with diverse AMT techniques to promote green innovation. This will be done in cooperation with diverse regional actors encompassing quadruple helix ecosystem. Therefore, the main focus of the pilot will be development of a holistic concept for covering the whole chain from manufacturing over compiling the right product data to recycling - encompassing organizational design, business processes and product development. In this regard, FHV will provide a framework for CE Open Business Model Innovation for Advanced Manufacturing.

5.1.2 Main goal and specific objectives

Main goal	<i>To introduce the CE strategy in Vorarlberg, as a driver for regional innovation growth implemented in smart manufacturing system. To achieve the goal, FHV will test application of new technologies services, solutions and business models with a diverse group of stakeholders, covering the broad range of quadruple helix actors.</i>
SO 1	<ul style="list-style-type: none"> Analyze open business models and services in advanced manufacturing and green innovation field, its acceptance and potentials of quadruple helix collaboration for further stimulation of CE innovation potentials.
SO 2	<ul style="list-style-type: none"> Best practices: Research study and analysis on global CE strategies and its possible translation to innovative manufacturing in local context.
SO 3	<ul style="list-style-type: none"> CE Advanced Manufacturing Open Business Model Platform: Measurement of new solutions for the CE in urban contexts, combined with new stakeholder networks for innovative, green manufacturing settings.
SO 4	<ul style="list-style-type: none"> Lessons learned, recommendations and guidelines for implementing CE principles in advanced manufacturing field, studied in context of national & public, industrial, entrepreneurial & startup, as well as academic relevance.
SO 5	<ul style="list-style-type: none"> Promoting initiatives at policy and entrepreneurial level against the state-of-art, allowing them to be at the forefront of new findings and green solutions.
SO 6	<ul style="list-style-type: none"> Generating knowledge regarding current challenges and problems in connected green advanced manufacturing – ICT solutions.
SO 7	<ul style="list-style-type: none"> Setting up the foundation for territorial knowledge and its transferability to other European regions.

5.1.3 Stakeholders and external initiatives

FHV pilot will be implemented within the established cluster around Smart City Rheintal in Vorarlberg, focusing the adoption of CE business models in the field of advanced manufacturing, with quadruple helix innovation sector.



Stakeholder	
Citizens and association of citizens	<ul style="list-style-type: none"> ... interested in the green innovation and CE environments, as well as in digitization and their further inclusion in public life. Also, NGOs interested to support further integration of citizens in co-creating regional innovation ecosystem.
Local public authority – The City of Dornbirn, Smart City Dornbirn	<ul style="list-style-type: none"> ... offers attractive framework conditions to promote digital innovations in start-ups, companies and administration. By digitizing its services, Smart City Dornbirn enables direct contact with its citizens, going far beyond purely technical digitization with the main goal to improve the quality of life and societal welfare in the long term.
Regional public authority – State Government of Vorarlberg	<ul style="list-style-type: none"> State government of Vorarlberg supports the transition towards CE system through the implementation of the four main policy instruments: Energy Autonomy Vorarlberg, Waste management Vorarlberg, Building Codes Vorarlberg and Spatial Planning Vorarlberg.
Infrastructure and (public) service provider – illwerke vkw	<ul style="list-style-type: none"> Illwerke vkw is the largest energy service provider in the region, with four business areas - hydropower, supply and services, energy networks and tourism.
Higher education and research – V-Research	<ul style="list-style-type: none"> V-Research is a non-university center of excellence for applied research, development and innovation in the technological-industrial sector. The activities performed by the institute aim at meeting the complex challenges of the economy as well as at ensuring the contribution to the further development of society on a non-profit basis.
Business support organisations	<ul style="list-style-type: none"> Haimaten - The company is responsible for carrying out innovation research and provides services both in local and international context, with the main expertise in spatial planning systems. Postgarage - Provides services and environment that supports start-ups, initiatives, corporate partners and institutions focusing on digital innovations in mutual development of products and services. Wirtschaftskammer Vorarlberg - The Economic Chamber of Vorarlberg (WKV) is a self-governing body in the form of a professional body ("Chamber") in the province of Vorarlberg in Austria and, as a provincial chamber, is part of the Austrian Federal Economic Chamber. Startupland Vorarlberg - The platform for all startups in Vorarlberg, and the contact point for all startup topics and drivers of the Vorarlberg startup ecosystem.
SME	<ul style="list-style-type: none"> Carcoustics Austria GmbH - With a worldwide network of production facilities and wide-range of production technologies and raw materials, Carcoustics manages provision of any kind of acoustic and thermodynamic solution. Senseforce GmbH - The company employs its digital solutions to diverse industrial sectors, by supporting deployment of Industry 4.0 solutions in manufacturing processes of firms.



	<ul style="list-style-type: none"> ▪ Kaufmann Bausysteme GmbH - The company provides solutions that allow more productive manufacturing and implementation in built construction. ▪ Wirtschafts-Standort Vorarlberg (WISTO) - The Economic Chamber of Vorarlberg (WKV) is a self-governing body in the form of a professional body ("Chamber") in the province of Vorarlberg in Austria and, as a provincial chamber, is part of the Austrian Federal Economic Chamber. ▪ CARUSO Carsharing eGen - offers an alternative to the own car in Vorarlberg. With almost 50 locations in Vorarlberg CARUSO Carsharing offers solutions that can be perfectly combined with public transport, thus supporting transition to Mobility on Demand and introduction of more environmentally friendly solutions in everyday mobility.
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5.1.4 Pilot activities, milestones/ outputs

<i>Pilot activity</i>	<i>Description and milestones/ outputs</i>
1 - CE, Open Business Models and Advanced Manufacturing: State-of-the-Art	<p>Analysis of CE strategies applied in open business processes, with particular attention to advanced manufacturing. The study will consider impact of CE in financial, social and environmental context. In addition, the main focus will be on solutions that have potential in application to local context, and will be further examined as part of subsequent pilot activities.</p> <ul style="list-style-type: none"> ▪ <i>Best practices overview</i>
2 – Best Practice Analysis and Feasibility Study	<p>Analysis of collected practices and the feasibility study with particular attention to technical component and value creation opportunities that support open communities and collaborative business models.</p> <ul style="list-style-type: none"> ▪ <i>List of feasible solutions – feasibility study</i>
3 – CE Advanced Manufacturing Framework	<p>Framework for CE Advance Manufacturing will provide methods for adopting CE solutions in for delivering innovative manufacturing solutions. Both open business model processes and advance manufacturing techniques applied in line with CE principles will be contextualized in a framework. This framework will serve as a foundation further testing and evaluation of the model.</p> <ul style="list-style-type: none"> ▪ <i>Methodology for implementing CE design in advanced manufacturing environment.</i>
4 – CE Open Business Model for Advanced Manufacturing: Test Scenarios	<p>Activity will consist of a set of practices that will serve to test possible scenarios for extending the knowledge on optimizing opportunities in organizing business and process environment for promoting CE in particular smart specialization field. Test scenarios will encompass theoretical as well as practical applicability of particular scenarios, and further discussed with field experts in quadruple helix context.</p>



	<ul style="list-style-type: none"> ▪ <i>Study on the practical application of CE principles in different test scenarios, in innovative manufacturing and open business modelling.</i>
5 – CE Open Business Model for Advanced Manufacturing: Evaluation	<p>Earlier tested model will be further evaluated based on a set of standardized methodologies and will provide a basis for the advancement of CE measures already existing in national context.</p> <ul style="list-style-type: none"> ▪ <i>Evaluation report</i>
6 – CE Open Business Model for Advanced Manufacturing: Recommendations and Guidelines	<p>Recommendation and guidelines will build on previous results, and will be provided to support implementation of CE strategies in quadruple helix context. Discussion with representatives of all groups involved will uncover areas of its application suitable to all the actors.</p> <ul style="list-style-type: none"> ▪ <i>Set of recommendation and practices for implementing CE practices and open business models for advancing innovative manufacturing practices.</i>

5.2 References and Knowledge Base

5.2.1 References

Further readings – Dornbirn, Austria
<p>Circle Economy and ARA (2019) The Circularity Gap Report: Closing the Circularity Gap in Austria. https://publish.circle-economy.com/circularity-gap-report-austria</p>
<p>European Sustainable Business Federation (2019) Circular Economy Update: Overview of Circular Economy in Europe. https://circulareconomy.europa.eu/platform/sites/default/files/ecopreneur-circular-economy-update-report-2019.pdf</p>
<p>Schmidt, S., Pamminger, R., & Wimmer, W. (2019, March) Der Circular Economy Analyst. Ein Tool zur Quantifizierung des Umweltnutzens von Kreislaufstrategien. In: <i>Industrial Life Cycle Management</i> (pp. 145-153). Rainer Hampp Verlag.</p>
<p>Van Eygen, E., Laner, D., & Fellner, J. (2018) Circular economy of plastic packaging: Current practice and perspectives in Austria. In: <i>Waste Management</i>, 72, 55-64. https://www.sciencedirect.com/science/article/pii/S0956053X17308802</p>
<p>Su, D., Wu, Y., & Chai, Z. (2019, October) Advanced Integrated Manufacture by Application of Sustainable Technology through Product Lifecycle: a Circular Economy Approach.</p>



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Suzanne, E., Absi, N., & Borodin, V. (2020, November)

Towards Circular Economy in Production Planning: Challenges and Opportunities.

In: *European Journal of Operational Research*, 287, 168-190.

<https://www.sciencedirect.com/science/article/abs/pii/S0377221720303969>

Rahman, S. M., Perry, N., Müller, J. M., Kim, J., & Laratte, B. (2020)

End-of-Life in industry 4.0: Ignored as before?

In: *Resources, Conservation and Recycling*, 154, 104539.

https://www.researchgate.net/profile/S_M_Rahman/publication/336318913_End-of-Life_in_Industry_40_Ignored_as_before/links/5de5533aa6fdcc2837005842/End-of-Life-in-Industry-40-Ignored-as-before.pdf

Maurer, F., & Schumacher, J. (2019)

Evolving Towards a Smart Factory of the Future within Supply Chains: Selected Cases Out of the AlpineSpace. *Session 1: General Issues in Supply Chain Management*.

https://www.researchgate.net/profile/Santi_Setyaningsih/publication/339401715_THE_EFFECT_OF_SUPPLY_CHAIN_COOPERATION_ON_THE_STRATEGY_OF_SMES_IN_HUNGARY/links/5e4fb82792851c7f7f49bfff6/THE-EFFECT-OF-SUPPLY-CHAIN-COOPERATION-ON-THE-STRATEGY-OF-SMES-IN-HUNGARY.pdf#page=213

Benner, M. (2020)

Six additional questions about smart specialization: implications for regional innovation policy 4.0.

In: *European Planning Studies*, 1-18.

<https://www.tandfonline.com/doi/abs/10.1080/09654313.2020.1764506>

Further readings _ C (website search)

De Wit, M., Hoogzaad, J., Ramkumar, S., Friedl, H., & Douma, A. (2018)

The Circularity Gap Report 2018: An analysis of the circular state of the global economy.

Circle Economy: Amsterdam, The Netherlands.

<https://www.legacy.circularity-gap.world/2018-report>
<https://www.circularity-gap.world/>

Silvestri, F., Spigarelli, F., & Tassinari, M. (2020)

Regional development of Circular Economy in the European Union: A multidimensional analysis.

Journal of Cleaner Production, 255, 120218.

<https://www.sciencedirect.com/science/article/abs/pii/S0959652620302651>

Domenech, T., & Bahn-Walkowiak, B. (2019)

Transition Towards a Resource Efficient Circular Economy in Europe: Policy Lessons from the EU and the Member States. *Ecological Economics*, 155, 7-19.



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5.2.2 Knowledge Base – Advanced Manufacturing for Circular Economy

Knowledge Base

Advanced Manufacturing for Circular Economy

Sustainability of the manufacturing industry is at the centre of attention in recent debates as it is one of the major consumers of energy and raw materials, and therefore, a major producer of greenhouse gas emissions and waste. Less waste is inherently generated by a manufacturing, than is the case with the conventional manufacturing. Advanced manufacturing (AM) is a fast-developing collection of production techniques which aids in designing new manufacturing paradigms. In contrast to conventional production methods, based on the application of AM techniques products are manufactured through a digital and additive process. It is considered to be a tool for stimulating sustainable production because the additive and digital nature provides opportunities for resources' savings. Such advanced and digital nature enables, for instance, on demand production of spare parts or avoids losses of materials when compared to technologies subtractive in nature. When designing products for the CE, these advanced manufacturing aspects may uncover new opportunities for all actors of the regional ecosystem. The CE hub in Vorarlberg will aid theoretical and practical background for integrating the concept of CE into AM, and further support the international hub CE network by offering solutions resulting from experimental activities performed in a quadruple helix perspective.



VI. Circular Economy Maturity Index for cities

1. Introduction

1.1 Description of *Circular Economy Maturity Index for cities* according to application

Circular Economy Maturity Index for cities enabling a self-assessment and the identification of improvement potential. The maturity index shall be multi-dimensional and address economic, societal and environmental aspects.

1.2 Preparatory work in the Starter Kit – introduction to chapter on “Towards a Comprehensive CE strategy in your territory. Planning for circular economy.”

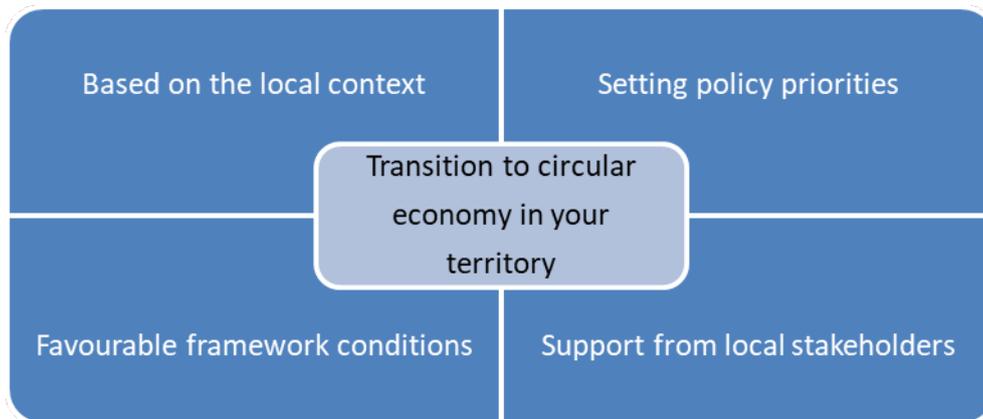
- **Starter kit _ reader’s guidance**

In [Chapter IV](#) of the Starter kit (pages 55 - 69) a methodology for developing a CE strategy in a territory has been introduced. It includes instructions on how to assess local context and potential and provides tips on analysing enabling conditions and hindering factors. The chapter finishes with defining a vision and priorities for the city in its transition to the CE.

- **Introduction to chapter**

The transition to a CE is place-specific. It depends on the structure of the regional and local economy, on the existing policy mix (national legislation and local incentives) as well as on cultural and behavioural factors. The transition to the CE is a complex process requiring multi-sector and multi-governance effort requiring the buy-in, the efforts and the backing of numerous stakeholders. The CE also requires changes in the current production and consumption system and as such it is conditioned by a number of policy interventions. This transition often has both winners and losers therefore when addressing the change on a local level different trade-offs are to be carefully explored and properly communicated.

Figure 3: Building blocks of the transition to a CE



The transition to the CE is often hampered by a number of lock-ins which should be addressed individually:

- Lack of systemic vision;
- Unfavourable policy framework;
- Vested interests;
- Risk-averse organisational models;
- Practices of producers and consumers

In the following sections we will present approaches and techniques for addressing the above lock-ins and obstacles.

The chapter follows this structure:



1.3 Procedure chosen for this chapter

After an intensive literature research and evaluation, we have decided not to reinvent the wheel, but will refer to a paper published under the framework of the *Urban Agenda for the EU* and the *Partnership on Circular Economy* beginning of May 2019:

Urban Agenda 2019

Urban Agenda Partnership on Circular Economy (2019): Indicators for circular economy (CE) transition in cities - Issues and mapping paper. Brussels: 03/05/2019; Version 4. <https://ec.europa.eu/futurium/en/circular-economy/issues-and-mapping-paper-indicators-circular-economy-transitions-cities>



The authors have developed a long list of indicators from “several existing frameworks of indicators, which are related to the Circular Economy.” (p 9) As it is an integration of existing frameworks of indicators with a special focus on cities is it exactly matching with the purpose of the CITYCIRCLE project. Finally, the “paper presents the final results of the mapping exercise and consolidates all input on CE indicators and issues highlighted by stakeholders (cities, academics, and networks) in the period September 2018 – April 2019.” (p 4)

This work will be presented in chapter 2:

Urban Agenda Partnership on Circular Economy - Indicators for a circular economy transition in cities

and serve as a basis for the next step. But - „Last, but not least, it should be noted that considering the limitations of the mapping process, the suggested indicators are only meant to support discussions and further work on CE indicators at city level.“ (p 24)

In their chapter on next steps and collaboration opportunities the OECD and their activities in the field on indicators in cities is mentioned. As the results of the activities are going to be published in September 2020 we are introducing the programme and the status in the 3rd chapter:

OECD – Programme on CE in Cities and Regions – working on CE indicators

based on the following publications:

OECD 2020

OECD (2020): The Circular Economy in Cities and Regions. Presentation.
<http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>;
<https://www.slideshare.net/OECD-regions/the-circular-economy-in-cities-and-regions-oecd>.

OECD 2019

OECD (2019): The Circular Economy in Cities and Regions. Brochure:
<http://www.oecd.org/cfe/regional-policy/Circular-economy-brochure.pdf>

and Website:

<http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>

Special remark:

In many places we will refrain from reformulations and choose the citation form and mark it accordingly.

We will always abbreviate Circular Economy as CE, even in quotations.

In chapter 4 we will suggest the next steps before and for developing the CITYCIRCLE maturity index.



2. Urban Agenda Partnership on Circular Economy - Indicators for a circular economy transition in cities

2.1 Basics – definitions, indicator needs, challenges and objectives

Definitions

In the paper the following definition for CE – based on an analysis of 114 definitions done by other authors – has been chosen:

„Circular economy is an economic system that replaces the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers.“ (p 7)

„The definition introduces the level of cities (macro level) as key players for the development of a CE framework. The role of cities is defined [by another author] (based on 6 case studies) as:“

„A circular city is a city that practices CE principles to close resource loops, in partnership with the city’s stakeholders (citizens, community, business and knowledge stakeholders), to realize its vision of a future-proof city.“ (p 7)

These definitions – so the proposal in the paper - could serve as basis for discussions within the *Urban Agenda Partnership on CE*.

Indicator needs

„Through the implementation of a CE approach, cities have experienced the need of indicators for monitoring and to report on their efforts and achievements. The Partnership on CE has identified the lack of such indicators as a bottleneck for cities in implementing a CE strategy.

Measuring the performance of cities in their shift towards a CE provides an opportunity for cities to self-assess their achievements, to identify barriers as well as opportunities and to adapt accordingly their development trajectory towards circularity. From these considerations emerges the need for a sound and realistic framework of indicators for a CE transition in cities.“ (p 5f)

A lot of needs (p 5) as well as challenges (p 6) concerning the CE indicators have been identified together with partners and stakeholders :



Needs – a selection

- Need for a shared view on CE indicators among authorities and policy-makers.
- Conceptual underpinning of an indicator framework, which addresses appropriateness and availability of data.
- Indicators on CE may be part of a self-assessment tool but also allow for a comparison across cities in Europe.
- Clarity about definitions – on CE at the city level cities, but also on more technical issues, e.g. municipal waste (including industry waste), packaging waste, jobs in the CE sector.
- Indicators should make the best possible use of existing data (even though some cities have resources for data gathering, e.g. surveys amongst companies).
- The cost to introduce indicators should be considered – indicators should be as simple, as possible.
- Awareness-raising and the importance of mainstreaming (bringing a large group of companies and citizens into the understanding of CE) is an important aspect that may be captured by indicators.
- Inventory of cities with roadmaps and indicators would be useful and there could be follow-up meetings between them and/or a pilot project on exchange of information on setting up CE indicator systems.

Challenges – a selection

- How to monitor progress on the CE and macro-level when the baseline is so limited.
- There is a substantial time lag – when to expect effects and communicate them.
- Measuring circularity at a city level requires both a city wide CE metrics and a municipality narrative (e.g. case studies on micro-initiatives).
- If data sources like surveys are identified for indicators, it should be considered that operationalising the concept of CE in surveys is very difficult.
- The value of comparisons between cities may be questionable due to their specificities and different available statistics. Since objectives and indicators should be linked, different objectives would make difficult comparisons between cities.
- It is challenging to have indicators that can be measured on an annual/regular basis at a city level.

Objectives of CE indicators

„In order to develop and implement a CE strategy in urban environments it is crucial to find a framework of indicators to monitor the progress and performance and, when necessary, adapt the ongoing processes. Based on the literature review, the following objectives of CE indicators can be identified:



- **Support performance assessment** – Indicators are the cornerstone of monitoring as they quantify and aggregate data that helps track various elements of the CE;
- **Support policy-making** – ensure evidence-based urban planning and management of the CE;
- **Support accountability and CE promotion** – provide information on the progress of cities towards the CE and its benefits, which can be communicated to citizens (accountability);
- **Support improvement** – indicators can help identify key success factors and good practices on the transition to CE.“ (p 7)

2.2 “Mapping and suggested indicators”

Chapter 2 of the *Urban Agenda Partnership* paper deals with an inventory of existing indicator frameworks related to CE. In the course of the explanations in this knowledge-base only the basic facts and procedures are given.

The starting point for the mapping is the „general monitoring framework for the CE .. provided by the European Commission (EC 2018) and identifies the following objectives: (1) to help understand how the various elements of the CE are developing over time; (2) help identify success factors in Member States; and (3) to assess whether sufficient action has been taken.

The general monitoring framework is composed of a set of key indicators, which capture the main elements of the CE. More specifically, it consists of 10 indicators (including subindicators).“ (p9)

Figure 4: CE monitoring framework

Circular economy monitoring framework

1 EU self-sufficiency for raw materials

The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

2 Green public procurement

The share of major public procurements in the EU that include environmental requirements

3a-c Waste generation

Generation of municipal waste per capita, total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

4 Food waste

Amount of food waste generated

7a-b Contribution of recycled materials to raw materials demand

Secondary raw materials' share of overall materials demand - for specific materials and for the whole economy

8 Trade in recyclable raw materials

Imports and exports of selected recyclable raw materials



5a-b Overall recycling rates

Recycling rate of municipal waste and of all waste except major mineral waste

6a-f Recycling rates for specific waste streams

Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

9a-c Private investments, jobs and gross value added

Private investments, number of persons employed and gross value added in the circular economy sectors

10 Patents

Number of patents related to waste management and recycling

Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A29%3AFIN>

„The framework and the above indicators offer a useful reference for cities to develop Circular Economy indicators.“ (p 10) After further consideration, additional indicators were introduced to fill the gaps.

In the paper the following general frameworks relevant to the work have been analyzed (p 12 – 19):

<i>Publisher</i>	<i>Report / project</i>	<i>Focus / special feature</i>
EC	In-depth report on Indicators for Sustainable Cities (2015/ revised 2018) Including the following case studies: Barcelona, Dublin	<ul style="list-style-type: none"> ▪ focus on cities ▪ focus on the environmental dimension of sustainability, not on CE



Ellen McArthur Foundation	Circularity Indicators Project	<ul style="list-style-type: none"> ▪ focus on companies ▪ provides a methodology and tools to assess how well a product or company performs in the context of a CE ▪ indicators are relevant to the CE, but might be difficult to apply at city level
OECD	Green Growth indicators framework (updated 2017)	<ul style="list-style-type: none"> ▪ 30 indicators which are meant to help countries assess and compare their progress towards 4 main objectives: <ul style="list-style-type: none"> ▪ establishing a low-carbon economy, ▪ resource-efficient economy, ▪ maintaining the natural asset base, ▪ improving people's quality of life; and implementing appropriate policy to realise the economic opportunities of green growth ▪ indicators are not dedicated to the CE
ESPON	CIRCTER project	<ul style="list-style-type: none"> ▪ aims to provide information on the territorial dimension of the CE transition and ▪ to provide evidence on local and regional patterns and flows of materials, including resources and waste. ▪ 13 indicators
HORIZON 2020	CITYkeys	<ul style="list-style-type: none"> ▪ developed and validated, with the aid of cities, key performance indicators and data collection procedures for the common and transparent monitoring ▪ as well as the comparability of smart city solutions across European cities ▪ 73 key performance indicators
HORIZON 2020	Synergic Circular Economy across European Regions (SCREEN) project	<ul style="list-style-type: none"> ▪ aims to develop a replicable systemic approach towards the transition to CE in EU regions within the context of their Smart Specialization Strategies ▪ 9 assessment criteria ▪ focus is on CE projects, but possibly some of the indicators can be adapted to cities
HORIZON 2020	CIRCULAR IMPACTS project	<ul style="list-style-type: none"> ▪ aims to develop an assessment based on data and indicators of the macro-economic, societal and environmental impacts of a successful transition to a CE
Flanders - Policy Research Centre CE	Project dedicated to develop a CE monitor for Flanders	<ul style="list-style-type: none"> ▪ inventory of CE indicators that are relevant to monitor the transition to a CE and to measure effects of new policy and trends ▪ set of indicators aims to describe the regional level, some of them could be adapted to the city level



Also existing CE frameworks on city level have been examined (p 20 – 22):

City	Report / project	Focus / special feature
London	London Waste and Recycling Board (LWARB)	<ul style="list-style-type: none"> ▪ study - development of metrics that could be used to measure London's future progress towards becoming a more circular city ▪ includes the following key thematic areas: <ul style="list-style-type: none"> ▪ resource productivity and consumption; ▪ waste generation and recycling; ▪ business and employment opportunities in the CE
Brussels	Government of the Brussels-Capital Region	<ul style="list-style-type: none"> ▪ developed a strategy toward CE transition ▪ a set of indicators ▪ process indicators ▪ competitiveness / investment ▪ jobs and GVA
Amsterdam	City Circle Scan	<ul style="list-style-type: none"> ▪ assessment based on three core indicators ▪ value preservation ▪ economic and ▪ ecological impact
Melbourne	Assessment of the city services and quality of life	<ul style="list-style-type: none"> ▪ some of the indicators can be used to address the CE

2.3 Long list of CE indicators

The following long list of indicators was derived from the previous sections in the paper of the *Urban Agenda Partnership*, see table 13 Original list of CE indicators and link to the thematic areas of the CE monitoring framework (Annex 1, p 32 – 37).

Table 1: Long list of CE indicators (without indication of the reference framework)

Thematic area	Theme 1: Production and consumption
Category	Indicators
Self-sufficiency for raw materials	<ul style="list-style-type: none"> ▪ Input of virgin materials per capita ▪ Water used for production processes ▪ Domestic Material Consumption (DMC) ▪ Material consumption per capita ▪ Use of the local natural endowment



	<ul style="list-style-type: none"> ▪ Development of resource consumption over time ▪ Use of renewable resources (percentage of imports - net and domestic - consisting of biomass compared to total imports) ▪ Share of green public procurement ▪ Green public procurement procedures and purchasing (strategies in place and awareness campaigns) ▪ CE procurement
<p>Waste generation</p>	<ul style="list-style-type: none"> ▪ Total waste generated per capita ▪ Different waste categories per capita ▪ Waste intensity per NACE activity ▪ Plastic uses prevention (including single-use) ▪ Number of water fountains (as a proxy for plastic waste prevention) ▪ Waste reduction policies ▪ Volume of solid waste generated ▪ Tonnes of (methane producing) organic waste diverted from landfill ▪ Diversion of landfill of biodegradable waste ▪ Annual amount of solid waste (domestic and commercial) ▪ Annual amount of solid waste (domestic and commercial) processed by landfill sites ▪ Annual amount of solid waste (domestic and commercial) processed by incinerators ▪ Annual amount of solid waste (domestic and commercial) given to other disposal units ▪ Municipal waste generated (domestic and commercial), total - 1000 t [urb_cenv] ▪ Tonnes of waste disposed of per inhabitant and per year (building and demolition waste, industrial waste, domestic waste, retail and service waste) ▪ Municipal waste, defined as household and similar waste collected by or on behalf of municipalities, and originated from household, offices and small businesses ▪ Municipal solid waste (t/cap/year) ▪ Landfill rates of municipal waste, defined as the amounts of municipal waste disposed at landfills as a percentage of amounts treated ▪ Landfill tax rates, the tax levied per tonne of municipal waste disposed in landfills ▪ Percentage of city population with regular solid waste collection (residential) ▪ Total collected municipal solid waste per capita ▪ Percentage of the city's solid waste that is disposed of in a sanitary landfill ▪ Percentage of the city's solid waste that is disposed of in an incinerator ▪ Percentage of the city's solid waste that is burned openly ▪ Percentage of the city's solid waste that is disposed of in an open dump ▪ Percentage of the city's solid waste that is disposed of by other means ▪ Hazardous Waste Generation per capita (tonnes) ▪ Percentage of the city's wastewater that has received no treatment ▪ Waste Electrical & Electronic Equipment (WEEE) management ▪ All waste for all industry sectors (tonnes of waste) ☑ London – CE indicator ▪ Management of local authority waste, share of waste to the following categories: landfill, incinerated, recycled, other



	<ul style="list-style-type: none"> Waste intensity per household (tonnes of waste per household)
Food waste	<ul style="list-style-type: none"> Initiatives/awareness campaigns at city level for food waste reduction Edible (avoidable) food waste per year (tons/year) Energy recovery from residue stream
Others	<ul style="list-style-type: none"> Consumption-based GHG emissions (consumption of goods and services produced in the cities) Resource footprint indicator based on Cumulative Energy Extracted from the Natural Environment (CEENE) (Energy) Recoverability Benefit rate Share of environmentally related tax revenue, expressed as a percentage of total tax revenue and compared to GDP and to labour tax revenue CO2 emissions Energy consumption of public buildings per year (kWh/m²) Circularity of household consumption (ratio of spending on services to spending on goods) Material intensity per unit of GVA (tonnes/per £million), sum of all materials The percentage of total energy derived from renewable sources, as a share of the city's total energy consumption Scope 3 emissions (consumption-based methodology), MtCO₂e
Thematic area	Theme 2: Waste management
Overall recycling rates	<ul style="list-style-type: none"> Recycling rate (Percentage diverted from waste stream) % of waste recycled Municipal waste processed according to differentiated refuse collection schemes (pay as you throw) Recycling rate (% per tonnes, percentage of the city's solid waste that is recycled) EOL-RIR (End of Life Recycling Input Rate) Recyclability benefit rate Indicators on separate collection Recycling or recovery rate of different waste streams Breakdown of waste streams by different treatment options Material recovery (includes recovery for recycling and composting)
Recycling rates for specific waste streams	<ul style="list-style-type: none"> Waste taken back by the industry for reuse/recycling Annual amount of solid waste (domestic and commercial) that is recycled Percentage of the city's solid waste that is recycled Percentage of the city's hazardous waste that is recycled
Water management	<ul style="list-style-type: none"> Percentage of city population served by wastewater collection Percentage of the city's wastewater receiving primary treatment Percentage of the city's wastewater receiving secondary treatment Percentage of the city's wastewater receiving tertiary treatment Grey and rain water use (% of houses, houses equipped to reuse grey and rain water)



	<ul style="list-style-type: none"> Share of the urban waste water load (in population equivalents) treated according to the applicable standard -% [urb_cenv]
Thematic area	Theme 3: Secondary raw materials
Contribution of recycled materials to raw materials demand	<ul style="list-style-type: none"> Reduction in imported secondary raw materials Share of secondary or recycled materials in the raw materials "Reused" public buildings and spaces (sq.m) Mass of waste resources recovered and re-introduced in a production cycle as secondary raw material (kg/year) Cyclical material use rate MSA – Material System Analysis
Trade in recyclable raw materials	<ul style="list-style-type: none"> Trade in recyclable raw materials within cities Trade in secondary raw materials
Thematic area	Theme 4: Competitiveness and innovation
Private investments, jobs and gross value added	<ul style="list-style-type: none"> Number of organisations with environmental certification Number of organisations with registered environmental management systems according to EMAS and/or ISO 14001 or other recognised environmental certification schemes EMAS and ISO 14001 certification of public authorities Number of environmental [CE] professionals Share of certified companies (% of companies) Share of companies based in the city holding an ISO 14001 certificate Public energy technology RD&D expenditures directed at "renewable energy" and "fossil fuel energy", expressed as percentages of total public energy RD&D Private investment, jobs and GVA: recycling sector, repair and reuse sector Number of enterprises receiving financial support in connection with the CE Amount of financial aid granted to companies in connection with the CE Number of economic operators supported/trained in CE Number of Circular services Direct jobs in CE (identify by 5-digit SIC-code) Indirect jobs in the CE (jobs dependent on CE, I/O method) Share of city's GVA from CE activity Number of business supported Employment and value added in selected environmental protection activities expressed as a percentage of total; sewerage, waste management and remediation
Patent	<ul style="list-style-type: none"> Actually applied patents fro CE at the city level Technology development: the number of inventions (simple patent families) developed by a country's inventors, independent of the jurisdictions where a patent application has been registered (i.e. all known patent families worldwide are considered) Number of new patents per 100 000 population per year



Thematic area	not included in the EC monitoring framework for the CE
Process indicators	<ul style="list-style-type: none"> ▪ Awareness raising campaigns for motivating stakeholders to take up CE measures ▪ Number of seminars organized on the CE under the PREC ▪ Number of pilot projects on the CE (e.g. on involving retailers) ▪ Citizens involvement ▪ Number of demonstration projects ▪ Number of CE courses PhDs/university courses, patent ▪ Number of schools that participate in environmental education projects ▪ Level of implementation of Agenda 21 processes ▪ Environmental education (% per school) ▪ Number of legislative and normative barriers identified and resolved ▪ Number of legislative and normative incentives created ▪ Number of people trained in CE trades ▪ Number of students trained in CE occupations ▪ Number of pilot cases set up via calls for projects / living lab ▪ Number of economic operators sensitized on CE ▪ Budget amount allocated to calls for projects / living lab made / implemented and number companies having benefited ▪ Budget amount and number of pilot public markets in CE developed in the city/province ▪ Number of new neighbourhoods incorporating the principles of the CE
Industrial symbiosis	<ul style="list-style-type: none"> ▪ Number of companies involved in industrial symbiosis ▪ Investment in symbiosis ▪ Number of Eco-industrial parks ▪ Cubic metres of water saved ▪ Collective annual savings across firms ▪ Tons per year in CO2 savings ▪ Million tonnes of landfill diversion ▪ Million tonnes of materials recovered and reused ▪ Billion in cost-savings ▪ Tonnes of virgin resources saved ▪ Tonnes of waste turned resources
Eco-design	<ul style="list-style-type: none"> ▪ Activities performed by cities that encourage the implementation of eco-design measures (e.g. promoting extended product lifetime, ability to re-use components or recycle materials from products at end-of-life, use of re-used components and/or recycled materials in products)
Collaborative economy	<ul style="list-style-type: none"> ▪ Use of Composite indicator representing the combined scores of the business and regulatory environment surrounding the collaborative economy ▪ Use of individual thematic indicators (on regulatory environment): accommodation, transport, finance, public administration and business support ▪ Qualitative indicators on single use plastics



<p>(Main source: Single market scoreboard)</p>	<ul style="list-style-type: none"> ▪ Actions by the city intended to encourage the procurement of articles that use secondary raw materials ▪ Availability of a roadmap for resource management ▪ Availability of innovative schemes for businesses at the city level, which are related to CE ▪ Awards for circular businesses (e.g. stamps, stickers) ▪ Cross-learning and exchanges between cities
<p>Additional indicators suggested by stakeholders as a part of the consultation process under the study</p>	<ul style="list-style-type: none"> ▪ Number of package free shops ▪ Number of supermarkets and restaurants partnering in a 'left-over give away-network' ▪ Does the city have a Circularity Officer, with staff and budget? ▪ Recruitment and reward plan for acquisition of circular companies by the city ▪ City preference for eco/modulation in procurement and subsidies ▪ Litter in public space pers citizen in kilo ▪ Illegal dumping in public space per citizen per kilo ▪ M2 reserved for eco/activity/CE in spatial plans or in agreement with commercial estate developer (CE activity is considered collecting, managing and production of materials)

2.4 Suggested indicators

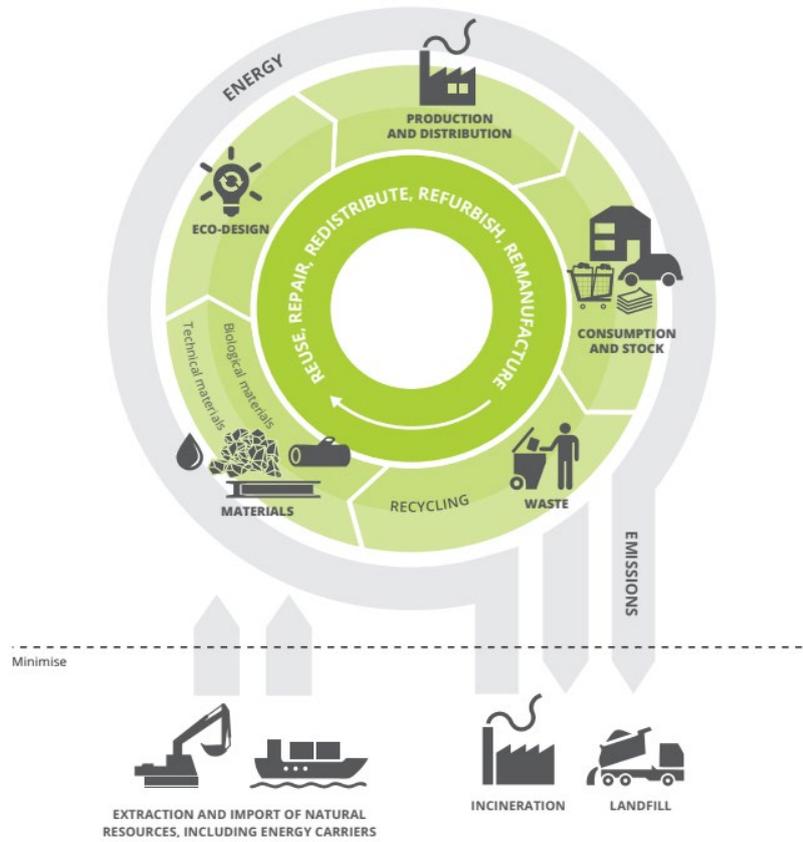
The long list of CE indicators has been discussed in a workshop in November 2018. Feedback and comments were also collected afterwards. Stakeholders assessed the indicators according to the following criteria:

- „**Core/additional indicator** (2 = core; 1 = additional, 0 = not relevant) Do you think the indicator is relevant for measuring CE in a city?
- **Data availability and quality at city level** (from 2 = high availability, to 0= no/scarse availability): Is information available (or could be available) at the city level?
- **Influence of local authority on the indicator** (from 2= high influence, to 0= no/very limited influence): To what extent can a local authority influence the activity measured by a specific indicator?“ (p 23)

„The results of the mapping and consultation exercises (See also the limitations in Text box 2) are presented in Table 12. It presents indicators in line with the EC monitoring framework for the CE (...). All of the indicators are linked to the extent possible to the simplified model of the circular economy for materials and energy (presented on the figure below), which was developed by the European Environment Agency.“ (p 24)



Figure 5: A simplified model of the CE for materials and energy



Source: EEA Report (2016), p 10



Table 2: List of suggested CE indicators (without indication of the reference framework)

Thematic area	Theme 1: Production and consumption			
Category	Indicators	Indicator type	Links to conceptual elements	Comments
Self-sufficiency for raw materials	Input of virgin materials per capita	Outcome	Production and distribution	Unit: Tons per capita Data: Very low / no data available
	Water used for production processes and domestic water consumption	Outcome	Production and distribution	Unit: Cubic meters Data: Low availability
	Organisations that have implemented an environmental management system (EMAS, Ökoprofit, QuB, ISO 14001 certification)	Outcome	Production and distribution / Eco-design	Unit: Number or share Data: Medium availability
Green Public procurement	Share of major procurement that includes environmental requirements	Process	Consumption and Stock	Unit: % Data: Medium availability
	CE/waste prevention criteria developed in guidelines for procurement	Process	Consumption and Stock	Unit: Qualitative (Yes/No) Data: High availability
Waste generation	Annual amount of solid waste (domestic and commercial)	Context	Waste	Unit: Tonnes of waste (per capita) Data: High availability
	All waste for all industry sectors	Outcome	Waste	Unit: Tonnes of waste Data: Medium availability



	Waste Electrical & Electronic Equipment (WEEE) Generation	Outcome	Waste	Unit: Tonnes of waste collected Data: Medium availability
	Hazardous Waste Generation per capita (tonnes)	Outcome	Waste	Unit: Tonnes of waste Data: Medium availability
	Level of public awareness for CE and waste prevention	Outcome	Waste / Consumption and Stock	Unit: % of people Data: Low availability (requires surveys)
	Communication measures (campaign, provision of information, events for the public/companies) on circular transformations and waste prevention	Process	Waste / Consumption and Stock	Unit: Number Data: Medium availability
Food waste generation	Generation of food waste	Outcome	Waste	Unit: total food waste generated (for households), or total food waste collected by separate collection, or share of food waste in residual waste Data: Very low / no data available
	Initiatives/awareness campaigns at city level for the areduction of food wste generation	Process	Waste	Unit: Number Data: Medium availability
Thematic area	Theme 2: Waste management			
Category	Indicators	Indicator type		Comments



Overall recycling rates	Recycling rate (% of the city's solid waste that is recycled)	Context	Recycling	Unit: % (of weight); If data allow it: % of waste upcycled and/or % of waste downcycled Data: High availability
Recycling rates for specific waste streams	Breakdown of waste streams by different treatment options	Outcome	Recycling	Unit: % (of weight) E.g.: % of construction and demolition mineral waste recycled; kg per capita recycled biowaste; tonnes of hazardous waste treated Data: Medium availability
	Waste electrical and electronic equipment (WEEE) by waste management operations	Outcome	Recycling (recovery, reuse)	Unit: Recovery (tonne/ percentage), Recycling and reuse (tonne/ percentage), Reuse (tonne/ percentage) Data: Medium availability – available from Eurostat, but not at city level
	Diversion of landfill of biodegradable waste	Outcome	Landfill minimisation	Unit: Tonnes of waste Data: Low availability
	Availability of a strategy for waste management	Process	Recycling	Unit: Qualitative (Y/N)



				Data: Medium availability
Thematic area	Theme 3: Secondary raw materials			
Category	Indicators	Indicator type		Comments
Contribution of recycled materials to raw materials demand	Contribution of recycled materials to raw materials demand - End-of-life recycling input rates	Context	Materials	Unit: % Data: Low availability
	Circular material use rate in local industrial/ economic processes	Outcome	Materials	Unit: % of total material use Data: Very low / no data
	Activities performed by cities that encourage the implementation of ecodesign measures	Process	Eco-design	Unit: Number of measures (e.g. promoting extended product lifetime, ability to re-use components or recycle materials from products at end-of-life, use of re-used components and/or recycled materials in products) Data: Medium availability
	Organisations that are implementing LCA schemes, EPR, Eco-label etc..	Outcome	Production and distribution / Eco-design	Unit: Number or share Data: Medium availability
Thematic area	Theme 4: Competitiveness and innovation			
Category	Indicators	Indicator type		Comments
Patents	Patents related to recycling and secondary raw materials	Context	Materials	Unit: Number Data: N/A



Private investments, jobs and gross value added in CE business	Direct jobs in CE (identify by 5-digit SIC-code)	Context	All sectors	Unit: Number / FTEs Data: Medium availability
	Number of CE businesses offered business support	Process	All sectors	Unit: Number Data: High availability
	Budget amount allocated to calls for projects on CE	Process	All sectors	Unit: Number Data: High availability
	Number of pilot projects on CE	Process	All sectors	Unit: Number Data: High availability
	Number of children and/or students trained in CE aspects and/or occupations	Process	All sectors	Unit: Number of children (school education) and/or students (higher education) Data: Medium availability
Thematic area	Theme: Overarching indicators			
Category	Indicators	Indicator type		Comments
	Greenhouse gases	Context	Emissions	Unit: thousand tonnes (E.g. in industrial processes and product use, waste management) Data: Low availability
	Availability of a CE strategy at city level	Process	All sectors	Unit: Qualitative (Yes/No)



				Data: High availability
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2.5 Suggested next steps

Possible follow-up actions

The *Urban Agenda Partnership* sees – besides collaboration with other initiatives - the following follow-up actions :

- development of a toolkit,
- empirical work on indicators between cities.

„To implement the set of suggested indicators a toolkit could be created. The toolkit could consider the work performed under this study and build on it by:

- *Considering differences between cities* - It's interesting to think about how the data across cities would be interpreted. One would imagine big differences between cities that have a large manufacturing base as compared to a city with a large service sector, a city with a lot of construction work going on compared to one where few buildings are being constructed. It makes setting targets across cities difficult. Tourism flows also affect cities differently – significant increases in tourism, particularly in smaller cities, may have noticeable effects on the consumption and waste management of cities;
- *Further considering accessibility of data* - the source and accessibility of the data is key and should be clearly identified: some of the data is in the hand of various municipal departments, others are in the hands of local utilities, both being public authorities, but other indicators come from the private sector (patents, etc.);
- *Preparing a Manual on indicators* - the manual could include further operationalisation of the indicators suggested in this paper, by adding definitions of indicators, other CE objectives linked to them, more indicators, providing examples of the application of the indicators by cities.

To create this toolkit, funding could be sought, and collaborations pursued.

Another option is to focus on several core indicators applicable across cities (as suggested during the study, for example 10 indicators from the indicators in Table 12) and to compare their current implementation, relevance, data availability, drivers, and challenges across cities taking part in the Urban Agenda Partnership on CE. Such a collaboration between cities would allow going beyond the theoretical side of indicators and the provision of case studies and best practices in the actual use of indicators. When (and if) common understanding about the application of the indicators is ensured between the participating cities, comparisons can be provided in order to derive lessons learned on which indicators have the highest value of measuring success in CE actions in cities.

Thus, a next step for the partnership could be to invite participants to a new workshop to establish a project/initiative to test out several of the different indicators proposed in this note. The workshop and a project should be carried out in cooperation with other organisations.“ (p 29)



Future collaborations

The *Urban Agenda Partnership* also proposes collaboration with other initiatives – e.g. with ESPON, KIC or OECD.

Let's pick up OECD in the next chapter. Following the *Urban Agenda Partnership* paper „the OECD [is] working on Cities CE indicators.“ (p 30)

3. OECD – Programme on CE in Cities and Regions – working on CE indicators

„Transitioning to a circular economy is key for a prosperous, inclusive and sustainable future.“

3.1 Some words about the programme _ content and timeline

Concerning the role of cities

„Cities and regions have a critical role to play in the circular transition. First, they hold core responsibilities in key sectors for the CE such as transport and solid waste. Second, they are laboratories for innovation and experimentation. Third, being responsible for 60% of public investment in OECD countries, sub-national governments can lean on critical long-term investment choices related to energy, transport and water. Hence, they can avoid linear lock-in for infrastructures. Cities can be promoters, facilitators and enablers of the CE.“ (brochure p 3)

What can the OECD offer?

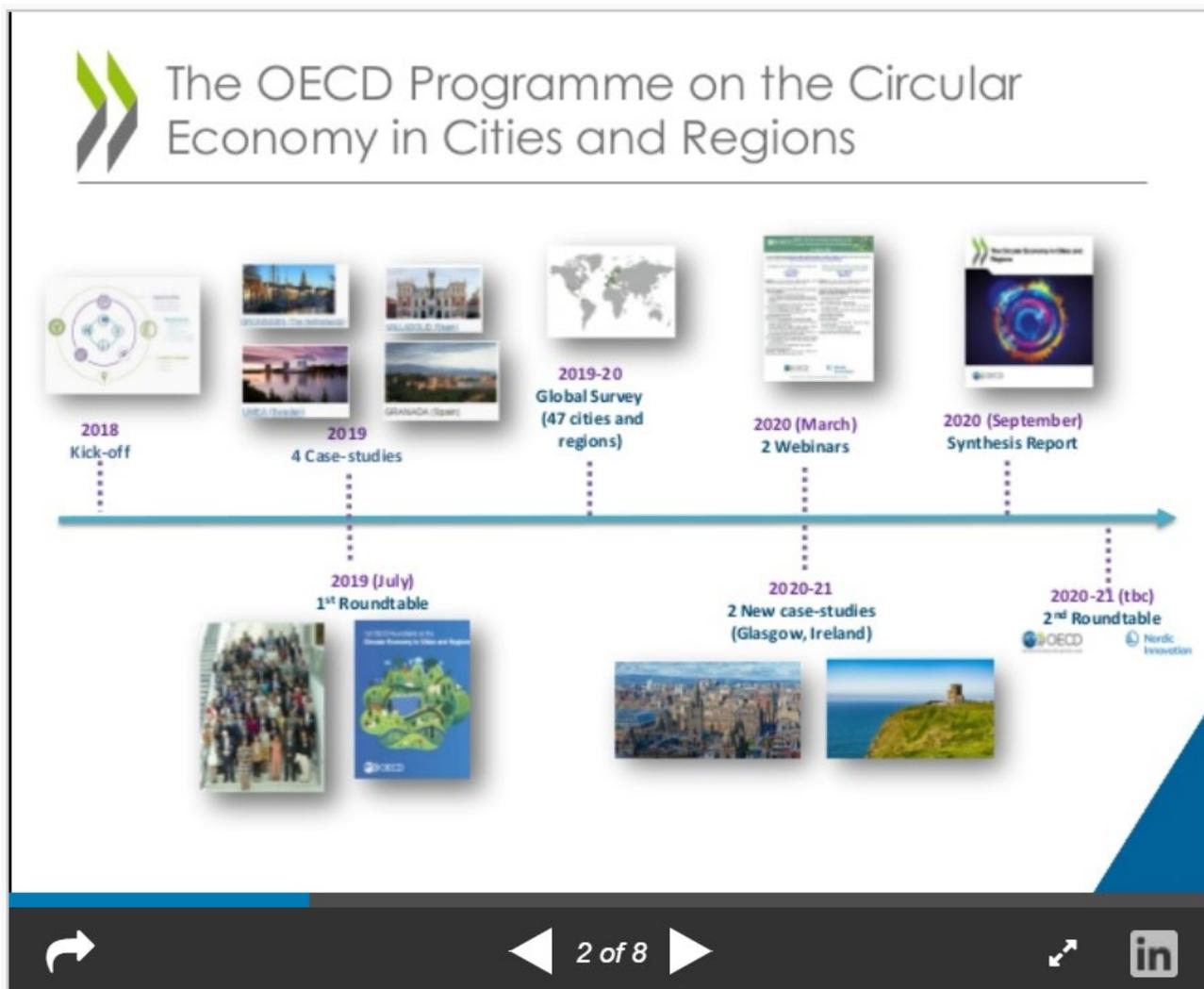
The OECD programme “supports cities and regions in their transition towards a circular economy, through:

- *Sharing*: favouring peer-to-peer learning, best practice and lessons from international experience
- *Learning*: engaging multi-level dialogues in cities and regions to identify challenges and opportunities
- *Measuring*: developing an indicator framework for decision making and evaluation of circular economy strategies”

(revers order; <http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>)

The content and timeline of the programme is shown in the next figure and afterwards explained in more detail:

Figure 6: The OECD Programme on the CE in Cities and Regions



Source: Presentation - <http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>

Thematic area	Theme 1: Production and consumption
6 case studies	<ul style="list-style-type: none"> ▪ Groningen, The Netherlands ▪ Umea, Sweden ▪ Glasgow, United Kingdom (not published until now) ▪ Valladolid, Spain ▪ Granada, Spain (not published until now) ▪ Ireland (not published until now)
First Roundtable	<p>... brought together key circular economy stakeholders from cities, regions, national government, business, academia and international organisations to share knowledge, experiences and best practices.</p> <p>http://www.oecd.org/cfe/regional-policy/roundtable-circular-economy.htm</p>



Global survey	(not published until now)
2 Webinars on 31.03.2020	<ol style="list-style-type: none"> 1. Spotlight on the CE in cities and regions 2. What's new on the CE in cities and regions and how to measure circularity ? <p>Central topics</p> <ul style="list-style-type: none"> ▪ Key Findings from the OECD Survey on the CE in Cities and Regions and the OECD framework to measure circularity at the local level (presentation : https://www.slideshare.net/OECDLEED/oriana-romano-oecd) ▪ Measuring the CE – 2 presentations <ul style="list-style-type: none"> ▪ EC/ Eurostat : Measuring the CE : European Union monitoring framework (https://www.slideshare.net/OECDLEED/arturo-de-la-fuente-european-commission) ▪ Ellen MacArthur Foundation : What is CIRCULTICS ? (https://www.slideshare.net/OECDLEED/ashima-sukhdev-ellen-macarthur-foundation)
Synthesis report September 2020	

3.2 Towards an OECD CE indicator framework

The following figure gives a brief introduction to the topic measuring circularity in cities and regions:

Figure 7: Measuring “circularity” in Cities and Regions



Measuring “circularity” in cities and regions



Why?

To identify whether governance and economic conditions are in place

How?

- ✓ 3 levels of assessment: newcomer, in progress, advanced
- ✓ Checklist
- ✓ Piloting by using Survey's results

What for?

- ✓ Assess gaps
- ✓ Improve policies and tools
- ✓ Build consensus
- ✓ Raise awareness



6 of 8



Source: Presentation - <http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>

„There is wide recognition amongst policy makers and scholars on the need for some metrics on the CE. According to the principle “One cannot improve what is not measured”, policymakers need robust data and information on which to base decisions and improve implementation. ... According to the OECD Inventory on CE Indicators (forthcoming), the following preliminary observations can be drawn:

- Environmental measurement prevails (e.g. energy usage, emissions, hazardous waste).
- Several sectors are taken into account (water, energy, agriculture, transport, built environment, industry, textiles, raw material extraction), but solid waste is predominant.
- Governance indicators specifically tailored to the CE appear to be lacking or are under development.



- The greatest gap in literature and databases concerns lack of data and indicators at the city level.
... .
- Resource consumption or waste recycling rates are typically used for measuring urban circularity.“ (brochure, p 10)

„OECD tools

The OECD is developing a set of tools towards a CE framework such as:

- **Key input, process and output indicators** regarding CE initiatives in place, with a focus on the economic and social aspects;
- **A scoreboard** for measuring how circular a city/ region is, based on key dimensions, such as innovation, system change, jobs and skills, economic and finance, a functional approach;
- **A self-assessment tool** to identify whether governance conditions are in place, work well or need to be improved. The potential of the CE can be exploited if the necessary governance and economic conditions are in place: legal and regulatory frameworks need to be updated; policies aligned, stakeholders informed and engaged; progress and results monitored and evaluated; clear and robust business cases created.“ (brochure, p 10)

The OECD's previous considerations can be supplemented as follows:

„They have collected more than 400 indicators used to measure CE. They have done a preliminary selection of quantitative indicators by sector (water, waste, energy, urban, material, air, demographics). Their aim is to create 2 tools to measure how circular cities are: a CE scoreboard and a self-assessment tool. The output of their project would be a synthesis report, ... and consensus based indicator framework and self-assessment tool. A collaboration between the OECD and the Urban Partnership could maximise synergies, and complement existing findings. Indeed, cities of the Urban Partnership could be used for case studies and both sets of indicators could complement each other.“ (p 29)



4. CITYCIRCLE – suggested next steps before and for developing the CE maturity index

The next step foreseen in the CITYCIRCLE application form concerning the **CE maturity index** is the following :

- **A2.5 Circular economy maturity index**

The knowledge collected will enable to develop a CE maturity index for urban ecosystems (comparable to smart cities index), which shall enable stakeholders to assess their innovation systems with respect to the CE.

Start date : 04.2021 ; End date : 03.2022

- **D.T2.5.1 Circular economy maturity index**

CE maturity index for cities enabling self-assessment and the identification of improvement potential. The maturity index shall be multi-dimensional and address economic, societal and environmental aspects. (online tool, files for printing)

Delivery month : 03.2022

From the CITYCIRCLE timeline point of view, there is an excellent fit between the further work on the maturity index and the publications of OECD, EC, possibly the Urban Agenda Partnership because then the newest results can be taken into account:

- As indicated above, the **OECD** will publish its *Synthesis Report* September 2020, so that the work on the indicators, the scoreboard and the self-assessment tool can be taken into account.
- Furthermore the **EC** plans to update its *monitoring framework* in 2021. If available in time, the results will be reviewed and included in the CITYCIRCLE maturity index.

The following slide from the OECD webinar held on 31.03.2020 presents the central points :

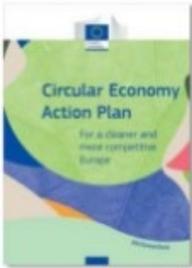
Figure 8: New CE action plan – updating the monitoring framework

Be the first to clip this slide

New Circular economy action plan Updating the monitoring framework

Action plan from March 2020
It calls to update monitoring framework by 2021 with more:

- material footprints
- focus sectors: construction, plastics, textiles, electronics,...
- design of sustainable products, value added chains,...
- interlinkages with climate neutrality and the zero pollution ambition



 European Commission

◀ 6 of 7 ▶

Source: <https://www.slideshare.net/OECDLEED/arturo-de-la-fuente-european-commission>

In more detail see *EC 2020* – especially chapter 8 on the monitoring progress.

We will also continue to monitor the activities of the **Urban Agenda Partnership** and contact them to see whether they are still addressing the issue of indicators.

5. References

Books, articles, papers

EC 2020

European Commission (2020): Circular Economy Action Plan – For a cleaner and more competitive Europe. Brussels. https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

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European Environment Agency (2016): Circular economy in Europe – Developing the knowledge base. Luxembourg: EEA Report I No 2/2016. <https://www.eea.europa.eu/publications/circular-economy-in-europe>



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<http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm>;
<https://www.slideshare.net/OECD-regions/the-circular-economy-in-cities-and-regions-oecd>.

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Urban Agenda 2019

Urban Agenda Partnership on Circular Economy (2019): Indicators for circular economy (CE) transition in cities - Issues and mapping paper. Brussels: 03/05/2019; Version 4.
<https://ec.europa.eu/futurium/en/circular-economy/issues-and-mapping-paper-indicators-circular-economy-transitions-cities>

Websites

<https://ec.europa.eu/futurium/en/circular-economy> (last accessed on 06/05/2020)

<http://www.oecd.org/cfe/regional-policy/circular-economy-cities.htm> (last accessed on 06/05/2020)

<https://www.slideshare.net/OECDLEED/arturo-de-la-fuente-european-commission> last accessed on 06/05/2020)

SPECIFIC TRAININGS FOR REGIONAL STAKEHOLDER GROUPS

SPECIFIC TRAININGS

09 2020





D.T2.2.4: Specific trainings for regional stakeholder groups

A.T2.2 Training/mentoring for regional stakeholder groups

Issued by: Partner Nr. 10 – BWCON
Reviewed by: Partner Nr. 1 – TUKE
Version date: 23.09.2020
Version. Revision 2.0
Circulation Restricted to Project Partners

Document History

Date	Version	Description of Change
23.04.2020	v. 1.0	Document issued by PP10
23.09.2020	V2.0	Document issued by PP10

This document reflects the author's view. The programme bodies are not liable for any use that may be made of the information contained therein. This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF.



1. Introduction

The objective of the activity A2.2 Training/mentoring for regional stakeholder groups is to ensure a wide common comprehension of Circular Economy among the regional stakeholders in the target regions of the CITY CIRCLE project. This shall be done through a combination of offline and online trainings. Those trainings shall support the strategy building process taking place in each region in the framework of WPT1.

2. Specific trainings for regional stakeholder groups

The training concept for regional stakeholder groups encompasses the planned training activities targeting, in each of the target region for the project, the stakeholders groups involved in the definition of a circular economy strategy in the framework of the CITY CIRCLE project. The following trainings are foreseen:

- **Joint training for all regional stakeholder groups**, focussing on the overall aspects of circular economy and its innovation potential.
- **Specific trainings for each of the regional stakeholder groups**, taking into account their specific needs and requirements.

Overview

The objective of the specific trainings is to provide each of the regional stakeholder groups with specific knowledge, according to needs identified on local level. Those trainings are also aimed at supporting the regional strategy development process and not to answer individual needs expressed by single stakeholders.

It was decided with the project partners representing the target regions to address the following topics in the context of specific trainings for the regional stakeholder groups:

- Active role of Regional Authority in implementing Circular Economy principles,
- Market places,
- Circular Economy Hubs - Examples, Structure and services, Economic sustainability,
- Business models for SMEs (technical and biological cycles).

Delivery

According to the options decided upon with the partners for the delivery of the specific trainings:

1. Preparation of the material (presentation) in English;
2. Option 1: Recording of the presentation (in English) and use of the records by the project partners during a workshop on regional level,
Option 2: no recording. Use of the material by the partners in the target region in order to prepare input for a regional workshop,

the specific trainings are being implemented as follows:



TOPIC	MATERIALS	WEBINAR	TARGET REGION
Active role of Regional Authority in implementing Circular Economy principles	Presentation (28.02.2020)	28.02.2020	Kranj Kosice
Market places	Detailed PowerPoint presentation proving an overview of existing market places (16.03.2020)	Not planned	UDINE
Circular Economy Hubs	Detailed PowerPoint presentation proving an overview of existing circular economy hubs (30.03.2020)	<ol style="list-style-type: none"> 1. Wcycle Maribor (09.04.2020) 2. Digipolis (15.04.2020) 3. <i>Circular Flanders</i> 06.05.2020 	Kranj, Varazdin, Kosice, Udine, Dornbirn Kranj, Varazdin, Kosice, Udine, Dornbirn Kranj, Varazdin, Kosice, Udine, Dornbirn
Business models for SMEs	Detailed PowerPoint presentation providing an overview of existing circular economy business models for SMEs (businesses in general) (23.07.2020)	<ol style="list-style-type: none"> 1. Webinar delivered during the project meeting on 23.09.2020 2. Webinar for regional stakeholders scheduled on 04.11.2020 	Varazdin, Udine, Dornbirn

Support documentation

The following documents are provided in the attachments:

Active role of Regional Authority in implementing Circular Economy principles

The webinar took place on 28 February 2020. The presentation given was based on the Starter Kit, with a focus on the role of cities. The webinar was included in the framework of a local stakeholder workshop in Kranj, Slovenia, and served as an introduction to the meeting. Stakeholders from the Kosice region did also take part.

Attachments: presentation, attendance lists. Recording available.

Market places

A detailed presentation was prepared for the partners in Udine. It is planned that they would use the content as input for a local workshop. Due to the COVID-19 situation it has not yet been possible to organise such a meeting.

Attachments: presentation.



Circular Economy Hubs

The topic is relevant for all target regions. Following the preparation of a detailed overview of existing circular economy hubs, a series of 3 webinars involving the managing organisations of selected hubs was organised. Two have been delivered by the end of April, the third one is scheduled for 6th May 2020.

Attachments:

- Detailed overview of existing circular economy hubs
- Webinar Wcycle Maribor: minutes including attendance list, presentation. Recording available.
- Webinar Digipolis: minutes including attendance list, presentation. Recording available.
- Webinar Circular Flanders: minutes including attendance list, presentation. Recording available.

Business models for SMEs

The materials prepared for the training are available as presentation. A presentation was given to the partnership at the occasion of the online project meeting on 23 September 2020.

Attachments: presentation.

Interreg



CENTRAL EUROPE

European Union
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Development Fund

CITYCIRCLE

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28 February 2020



The Role of Cities in Circular Economy

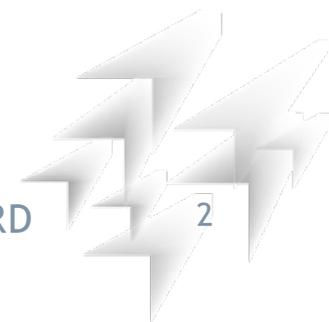


CONTENTS

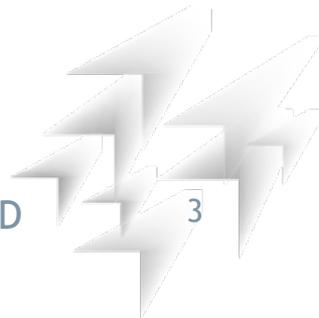
Part 1: EU policy
framework on
circular economy

Part 2: Starting
the transition to
circular economy

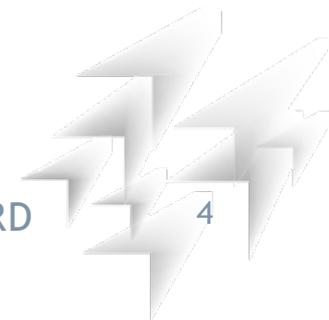
Part 3: Good practices on
circular economy from
European cities



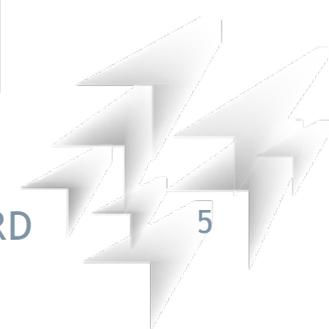
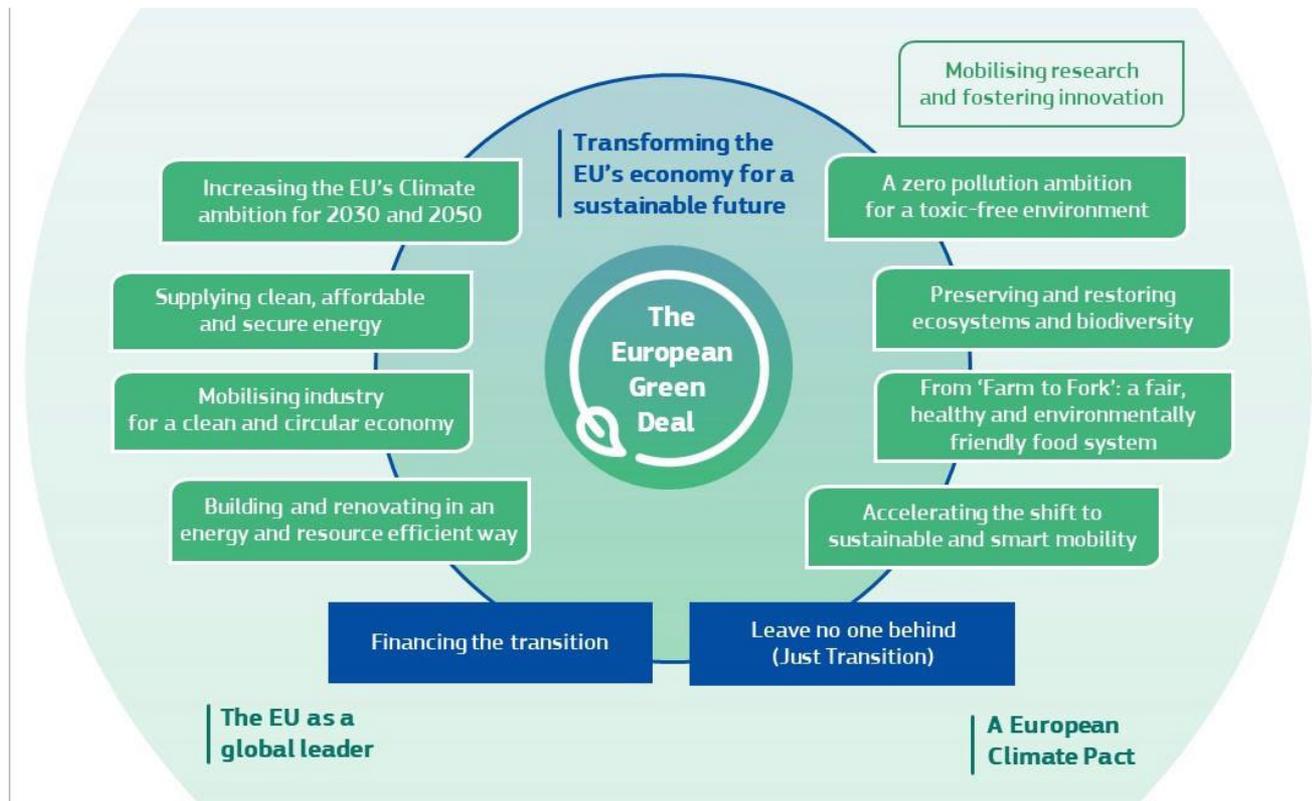
EU POLICY FRAMEWORK ON CIRCULAR ECONOMY: RECENT LEGISLATION



- EU GREEN DEAL
- Revised Waste Framework Directive (2018)
- Upcoming Circular Economy Action Plan (2020)-
plastics, food waste, critical raw materials,
construction and demolition, as well as biomass and
bio-based products
- European Strategy for Plastics in a Circular Economy
(2018)



THE EU GREEN DEAL



WASTE LEGISLATION: SHIFT TO WASTE AS A RESOURCE

- Revised Waste Framework Directive (2018)
 - Stimulate waste prevention;
 - Reduce use of resources and improve resource efficiency in this way supporting the transition to a circular economy.
 - Waste prevention measures can include: , smart design, SCP measures, encouragement of reuse, repairability, etc.

- Targets for preparing for reuse and recycling have been increased
 - by 2025- to a minimum of 55 % by weight;
 - by 2030 - minimum of 60 % by weight;
 - by 2035 - minimum of 65 % by weight.

- Cities can take steps with regards to:
 - Improving waste collection
 - Extended producer responsibility or transformation of waste into secondary raw materials
 - Separate collection of different types of waste.



NEW CIRCULAR ECONOMY ACTION PLAN

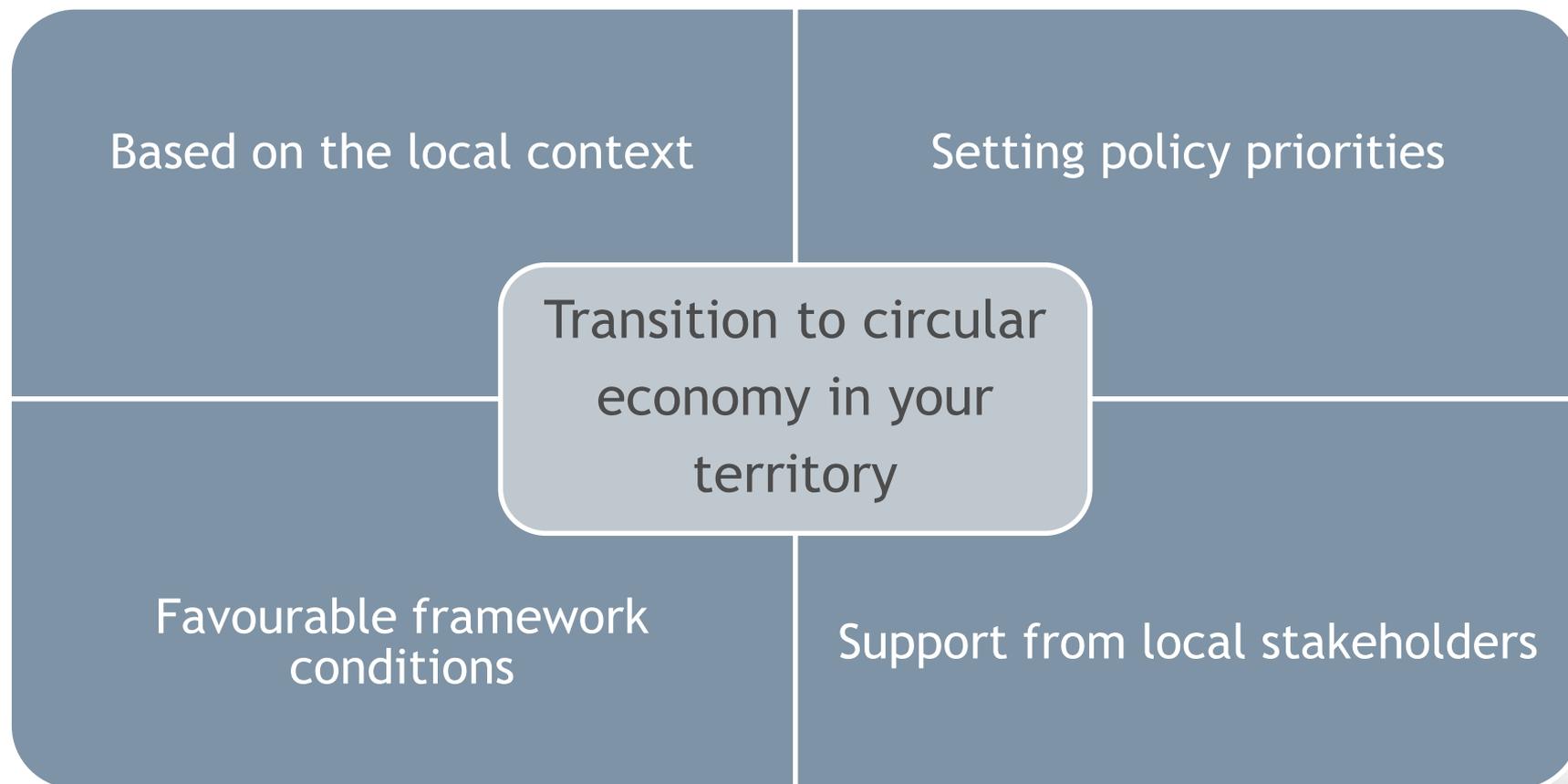
- Upcoming CEAP will build on the current one.
- Focus on Secondary Raw Materials and actions on products
- Will include a ‘sustainable products’ policy to support the circular design of all products
- Development of lead markets for climate neutral and circular products, in the EU and beyond.
- Main focus on resource-intensive sectors such as textiles, construction, electronics and plastics.



STARTING THE TRANSITION TO CIRCULAR ECONOMY

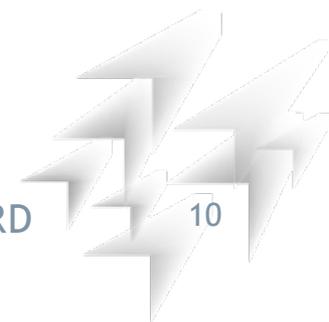


BUILDING BLOCS OF CIRCULAR ECONOMY



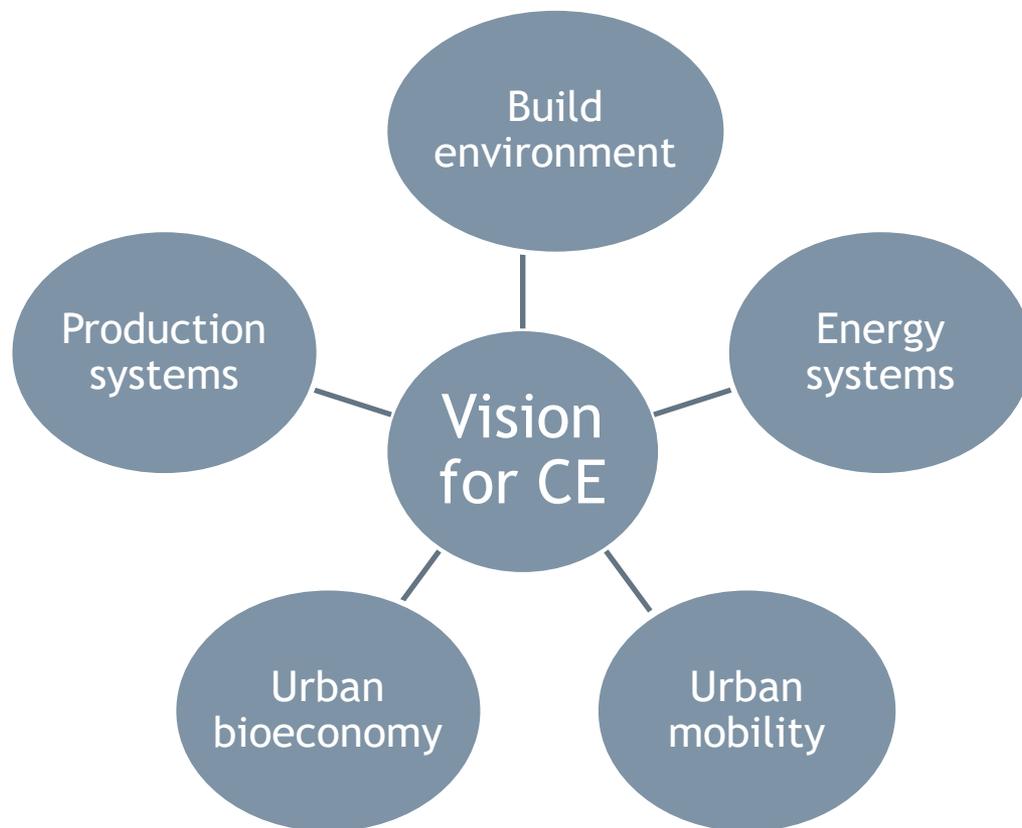
Assessment elements:

- Physical (land-base) endowment of the city
- City performance in terms of resource productivity and efficiency
- Business capabilities (e.g. EMAS certified companies, nr of companies with eco-innovations, etc.)
- Capabilities of knowledge organisations
- Industrial potential of different sectors for CE
- Accessibility
- ExplorTerritorial milieus
- Technological lock-ins
- Etc.



DEFINING VISION AND PRIORITIES

Example of a possible combination of sectors for the transition to circular economy

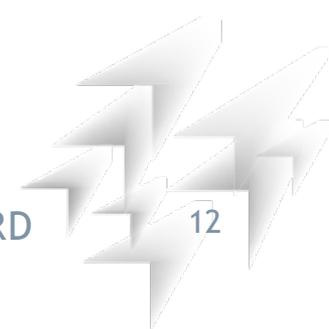


Source: Ellen MacArthur, *Cities in the Circular Economy: an Initial Exploration*



GOOD PRACTICE: AMSTERDAM ON THE WAY TO CIRCULAR ECONOMY (1)

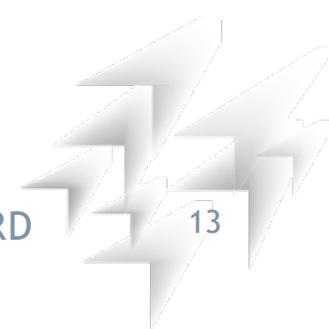
- A leader in the application of circular economy concepts to city governance
- Seven principles in its transition towards a CE
 - Closed loop
 - Reduced emissions
 - Value generation
 - Modular design
 - Innovative business models
 - Region-oriented reverse logistics
 - Natural systems upgradation



GOOD PRACTICE: AMSTERDAM ON THE WAY TO CIRCULAR ECONOMY (2)

Amsterdam Smart City initiative: a partnership between different stakeholders; focus on creating a sustainable urban model

- A facilitator and an open platform which is able to connect citizens, businesses, government and knowledge institutes.
- A living lab to test solutions
- One of the themes of the initiative is circular city
- Aims to redesign twenty product- or material chains.
- The implementation of material reuse strategies: to create a value of €85 million per year within the construction sector and €150 million per year with more efficient organic residual streams.



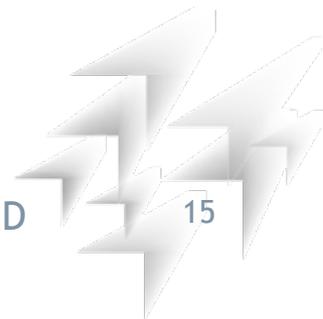
GOOD PRACTICES FROM EUROPEAN CITIES

LINKED TO TWO PRIORITY AREAS OF THE SLOVENIAN ROADMAP TO CIRCULAR ECONOMY:

- Manufacturing industry
- Food systems



- **An approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products**
- Can be implemented in any type of regions or area, depending of the types of resources transacted
- Depends on governance and policy factors
- Originates in two ways:
 - 📁 As self-organised activity (e.g. Kalundborg, DK)
 - 📁 As managed process; 2 types:
 - Facilitated networks
 - Planned networks



WHAT CAN CITIES DO TO STIMULATE INDUSTRIAL SYMBIOSIS?

Cities more advanced in IS need to:

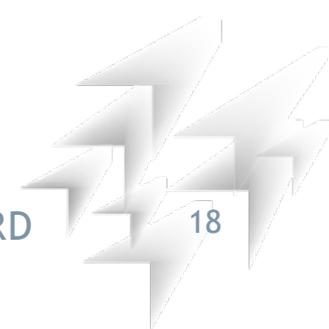
- Raise awareness of companies on the benefits of IS
- Further exchange on information on the experiences with closed database vs. open database

Cities at an early stage of IS need to:

- Organise campaigns
- Map the stakeholders and legislation
- Develop a simple waste exchange platform
- Start small with matchmaking and scale up gradually



- The food system is a major consumer of energy and water and a large emitter of GHG and air pollution.
- When food is lost or wasted, the resources (e.g. water, land, nutrients, labour and energy) used throughout its value chain are also lost
- Cities can set action plans for food waste prevention and reduction as part of their long-term visions and strategies for waste prevention and circular economy development



What can cities do?

1. An overview of the city, demographics, economy, and local food production.
2. Assess urban and peri-urban food production
3. Assess urban food consumption
4. Determine urban organic waste and food by-product streams: Including an overview of food waste, prevention, and redistribution options as well as organic waste flows and the potential to transform them into valuable inputs for agriculture and the wider bioeconomy.
5. Develop circular economy for food scenarios
6. Estimate the benefits of circular economy scenarios



URBAN AGRICULTURE

- Contributes to sustainability of the food chain “from farm to fork” (circular economy objectives)
- Offers possibilities for small-scale entrepreneurship
- Tackles (food) waste, reduction of energy consumption and the demand for more quality foods.

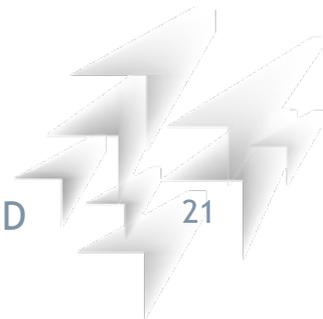
Urban agriculture in the city of Reggio Emilia (Italy)

- The Operational Group ‘Edible Park’ has set up an agroforestry-based farm that supplies fresh products to the citizens The farm spans about 1 ha of farmland, with 80 mulberry trees;
- Led by a social cooperative; inclusion of disadvantaged workers;
- Offers high quality products and explores new supply chain models.

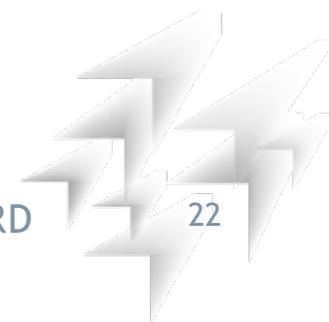


GOOD PRACTICE: LAST MINUTE MARKET INITIATIVE (ITALY)

- Reduce food wastage - spin-off from the University of Bologna, the activities of LMM expanded to other sectors.
- An entrepreneurial society on national level in Italy focused on developing local projects for recovery of unsold goods in favour of NGOs.
- LMM supports the creation of a solidarity network and facilitates the contact between NGOs and businesses.
- Services offered:
 - recovery of surpluses;
 - data analysis, loss and waste analysis,
 - estimating the environmental and social impacts;
 - training for schools, companies and institutions and communication,
 - marketing projects and content production.



- Cities have an important role in launching and accelerating the transition to circular economy
- Circular economy transition needs to be tailored to local context
- Circular economy may appear complex but even the longest journey starts with the first step



■ Sources of further information:

- ESPON, Interact, Interreg Europe and URBACT, [Pathways to a circular economy in regions and cities](#), Policy brief, 2016
- EEA, [Circular by design, Products in the circular economy](#), No 06/2017, 2017
- Policy Learning Platform, Policy brief on [food waste](#)
- Policy Learning Platform, Policy brief on [industrial symbiosis](#)
- Policy Learning Platform, [Policy brief on circular economy business models](#)
- [EMF Food initiative](#)
- [The Milan Urban Food Policy Pact](#)
- [Eurocities WG Food](#)



THANK YOU FOR YOUR ATTENTION!



Venelina Varbova
GreenEdge Consulting



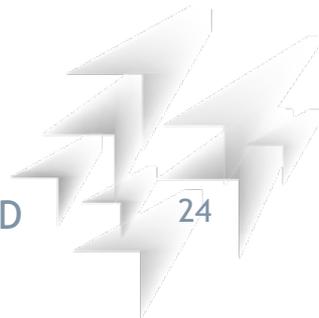
www.interreg-central.eu/acronym



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MESTNA OBČINA KRANJ



Slovenski trg 1, 4000 Kranj

**EKIPA SNOVALCEV RAZVOJA
KROŽNEGA GOSPODARSTVA
V KRANJU**

Sredi januarja 2020 je na Mestni občini Kranj v okviru projekta CITYCIRCLE potekala predstavitvena delavnica Razvoj krožnega gospodarstva v Kranju, kjer smo se zavestno odločili, da bomo aktivno pristopili k prehodu iz linearne v krožno gospodarstvo. Na podlagi vašega izkazanega interesa za sodelovanje v ekipi snovalcev razvoja krožnega gospodarstva, vas vabimo na naslednjo delavnico

NAČRTOVANJE STRATEGIJE KROŽNEGA GOSPODARSTVA V KRANJU,

ki bo **28. februarja 2020 ob 10. uri**
v prostorih Mestne Občine Kranj (pritličje, sejna soba 9), Slovenski trg 1, Kranj.

Na delavnici pričakujemo predstavnike iz gospodarstva, lokalnih agencij in zavodov ter občine.

Program:

1. Pozdravni nagovor predstavnika Mestne občine Kranj
2. Evropska in nacionalna politika na področju krožnega gospodarstva – Janja Kreitmayer, MOP
3. Primeri dobrih praks iz evropskih mest (on-line predstavitev) – Venelina Varbova, Green Edge Consulting Thematic Expert Environment and Resource Efficiency for the Interreg Europe Policy Learning Platform
4. Delavnica: Načrtovanje strategije KG v Kranju – Marija Ahačič Premrl, MOK
5. Zaključki in nadaljnje aktivnosti

V želji, da bi se dogodka zagotovo udeležili, vas prosimo za potrditev udeležbe na aleksandra.azman@kranj.si, kjer dobite tudi vse dodatne informacije.

Prijazno vabljeni.

Pripravila:
Aleksandra Ažman



Matjaž Rakovec
Župan

Janez Černe
PODŽUPAN

Opomba: Organizator dogodka si pridržuje pravice do spremembe programa in govorcev.



CIRCULAR ECONOMY STRATEGY KRANJ

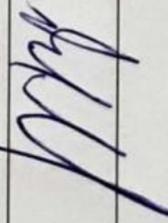
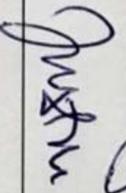
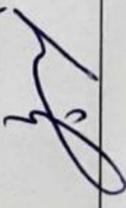
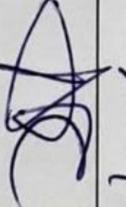
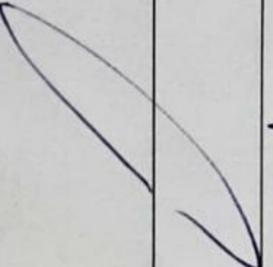
WORKSHOP I - ATTENDANCE SHEET MEETING
 VENUE: MESTNA OBČINA KRANJ, SLOVENSKI
 TRG 1, 4000 KRANJ; SEJNA SOBA 9 OB 10.00

28 02 2020

S podpisom dajete soglasje za uporabo vaših osebnih podatkov Mestni občini Kranj (partner projekta CITYCIRCLE) za dosego ciljev samega projekta v skladu z direktivo Evropskega parlamenta (EU) 2016/680 in Sveta z dne 27. aprila 2016 (Splošna uredba o varstvu podatkov, GDPR) v zvezi z varstvom posameznikov v zvezi z obdelavo osebnih podatkov in njihovim prostim pretokom, ki razveljavlja Direktivo 95/46 / ES.

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VARBOVA VENELINA	GREEN EDGE CONSULTING, THEMATIC EXPERT ENVIRONMENT AND RESOURCE EFFICIENCY FOR THE INTERREG EU POLICY LEARNING PLATFORM		
VONČINA SLAVEC SMILJANA	PAMETNO MESTO	<i>svjatoslav@pametnomesto.si</i>	<i>Smiljana</i>

ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: Specific training for regional stakeholder groups I.

Location: Košice

Date: February 28th, 2020

No.	Name and Surname	Organisation	E-mail	Signature
1.	ROBERT HANSEN	TUKE	ROBERT.HANSEN@TUKE.SK	
2.	PETER JÁPAK	TUKE		
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4.	BARBARA KOZÁČOVÁ	EGTC VIX COOPATIX	BARBARA.KOZACOVA@vix.sk	
5.	Milka Dujová	ASPIND	marka.dujova@gmail.com	
6.	František Janke	TUKE	frantisek.janke@tuke.sk	

Consent to the Processing of Personal Data

By signing the attendance list you grant consent to the Technical University of Kosice (hereinafter referred to as the TUKE), registered office at Letná 9, 040 01, Kosice, Business ID 00397610 (hereinafter referred to as "the Administrator") by means of the Regulation (EU) No 2016/679 of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data and repealing of Directive 95/46 / EC (General Regulation on the Protection of Personal Data) (hereinafter referred to as "the Regulation") to process the following personal data: name and surname; Organization name / abbreviation; email address and signature of the participant. This data can be processed by the Administrator based on your consent to document the event of the CITYCIRCLE project until the completion of the project implementation to the leading authority Interreg CENTRAL EUROPE.

Please note that you will be attending an event where photographs and/or audio-visual footage may be taken. By attending this event, you freely provide your agreement that you accept to be photographed, filmed or recorded. You also agree that the above-mentioned photos and video or sound recordings may be used, reproduced, distributed and communicated to the public for any other purposes by the Interreg CENTRAL EUROPE Programme on websites or other information tools, such as social media or electronic or printed publications.



TAKING
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FORWARD



Webinar | March 2020



WP T2 - CE Marketplaces - information package



Luc Schmerber | BWCON

CONTENT

1 Market Places

2 Industrial Symbioses

3 Smart Maps

4 Marketplace Startup Ideas



CE Marketplaces

Definition, examples

E - Marketplace

CE - Marketplace

One Definition ?

Different Understanding ?



E-MARKETPLACE . GENERAL DEFINITION

What is an e-marketplace?

The e-marketplace describes an electronic marketplace that enables the purchase and sale of goods and services on the Internet or another superordinate network. Digital marketplaces are based on an IT infrastructure and have a fixed mechanism for pricing. The advantages include spatial and temporal flexibility. Market participants can interact with each other regardless of location.

Definition and overview

The specialist literature has various approaches to the definition of the term e-marketplace. These can also be found under the synonyms digital marketplace, virtual marketplace or electronic market. What these approaches have in common is that e-marketplaces are to be regarded as IT-supported systems. In these, market players such as suppliers, demanders and intermediaries come into contact with each other. They trade goods and services on the basis of a fixed price coordination.

In summary, e-marketplaces are trading platforms that serve the market-based exchange in e-business. From the perspective of the companies, this concerns on the one hand e-commerce (electronic sales) and on the other hand e-procurement (electronic purchasing). E-marketplaces use information systems that accompany, automate or support different phases of a market transaction.



CE MARKETPLACE . GREENCYCLE PROJECT

This document aims to help define a common vision about the specific digital platform build by the GREENCYCLE project, the Circular Economy Marketplace, and the requirements and functionalities that is going to provide.

A marketplace is a site or an online platform (internet) that allows you to make purchases of products or services. It connects Producer and Consumers through the Internet and thereby fosters efficiency in an otherwise inefficient market. A Marketplace is an ecommerce platform that enables Individuals as well as Business to either list their items for sale or set up online storefronts on the marketplace platform and leverage the platform and its services [search, viewing product information, buying, payment, order management etc . It can be considered horizontal when they support the exchange of various types of products or services, or vertical, when the platform allows the exchange of only one type of product.

Marketplace also can act as a guarantor in the transaction between sellers and buyers, as long as the duration of the commercial operation. In particular, it pays attention to the registration of operators (sellers / buyers) by applying anti-fraud controls and rules.

GREENCYCLE project: Deliverable D.T4.2.2 - Definitions of functionalities of the platform



CE MARKETPLACE . DEFINITION ?

???

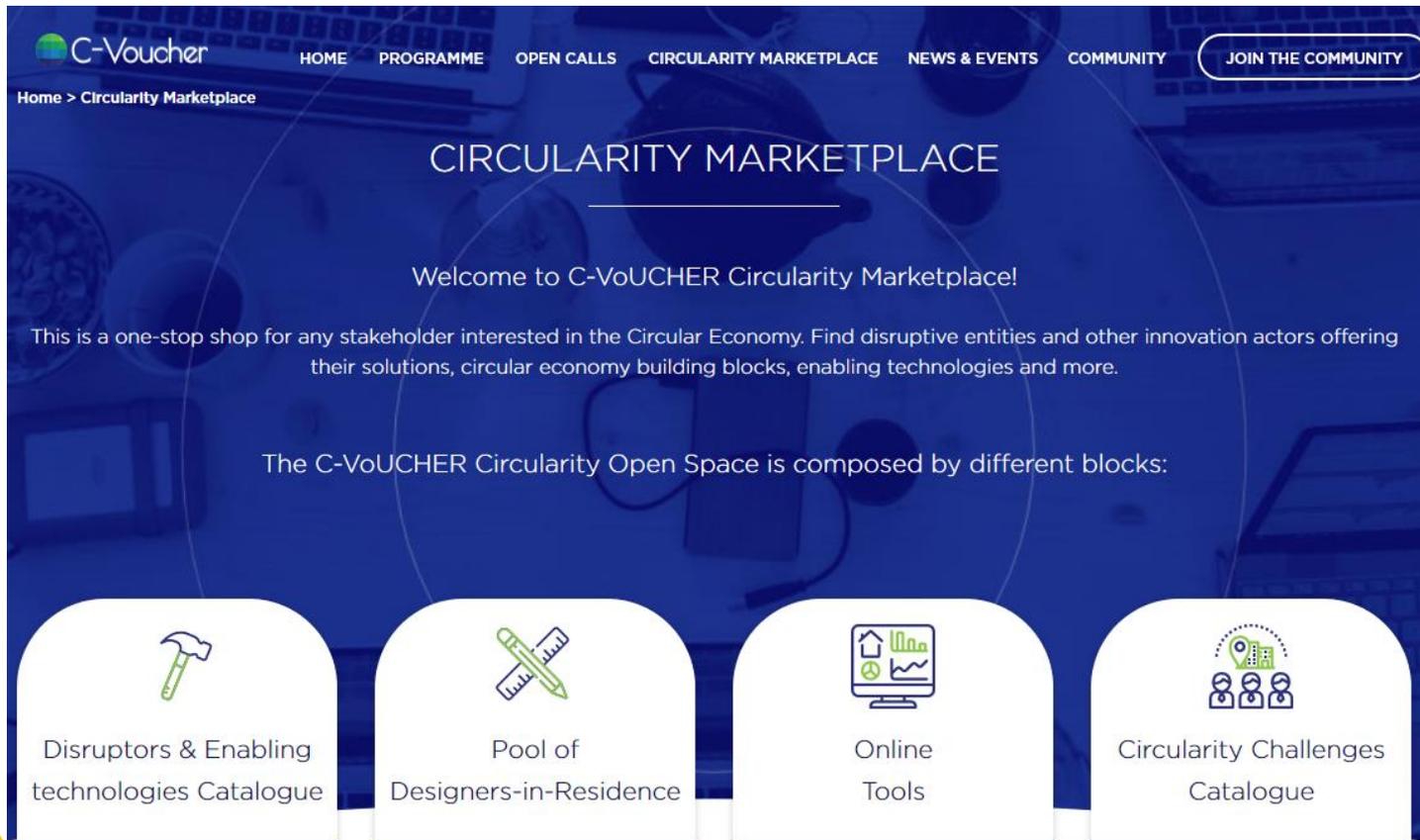
One definition ???

???

Different understanding - see e.g. next slide project C-VoUCHER



C-VOUCHER PROJECT - OVERVIEW



The screenshot shows the homepage of the C-Voucher Circularity Marketplace. The navigation bar includes links for HOME, PROGRAMME, OPEN CALLS, CIRCULARITY MARKETPLACE, NEWS & EVENTS, and COMMUNITY, along with a 'JOIN THE COMMUNITY' button. The main heading is 'CIRCULARITY MARKETPLACE' with a sub-heading 'Welcome to C-VoUCHER Circularity Marketplace!'. A descriptive paragraph states: 'This is a one-stop shop for any stakeholder interested in the Circular Economy. Find disruptive entities and other innovation actors offering their solutions, circular economy building blocks, enabling technologies and more.' Below this, it says 'The C-VoUCHER Circularity Open Space is composed by different blocks:' followed by four categories: 'Disruptors & Enabling technologies Catalogue' (with a hammer icon), 'Pool of Designers-in-Residence' (with a pencil and ruler icon), 'Online Tools' (with a computer monitor icon showing a house and graphs), and 'Circularity Challenges Catalogue' (with an icon of people and a gear).



C-VOUCHER PROJECT - OVERVIEW

Circularize ValUe CHains across European Regional Innovation Strategies

Project information

- HORIZON 2020
- Grant agreement ID: 777773
- Start date: 1 April 2018 - end date 31 March 2021

Objective

C-VoUCHER aims to develop new circular (cradle to cradle) value chains, disrupting traditional linear (cradle to waste) business models by means of cross-fertilization with Design Thinking experts and Circular Disruptors.

<https://cordis.europa.eu/project/id/777773>



CE Marketplaces

Definition, examples

Materials Marketplace - US BCSD, Austin

FLOOW2

Material Trader . com

Marketplace Hub

Plastship

Wastly



Join the Circular Economy

The Materials Marketplace is a facilitated transaction platform to connect businesses to new reuse and recycling market opportunities.

Sign up

Coming to this site for the first time? Please [click this link](#) to chat with someone on our team to learn more about how the Materials Marketplace works and next steps.





United States Business Council for Sustainable Development

“The **Materials Marketplace** is an award-winning **regional and national platform** that connects businesses and organizations to develop and scale new reuse and recycling market opportunities. Through our platform, traditional and non-traditional industrial waste streams are matched with new product and revenue opportunities, ultimately enabling the **culture shift** to a **circular**, closed-loop economy. In addition to diverting waste from landfills, these recovery activities generate significant **cost savings**, **energy savings**, and create **new jobs** and business opportunities.”

Users are

- recycling sector,
- manufacturing sector and
- entrepreneurs



MATERIALS MARKETPLACE - US BCSD

Regional marketplaces exist in:

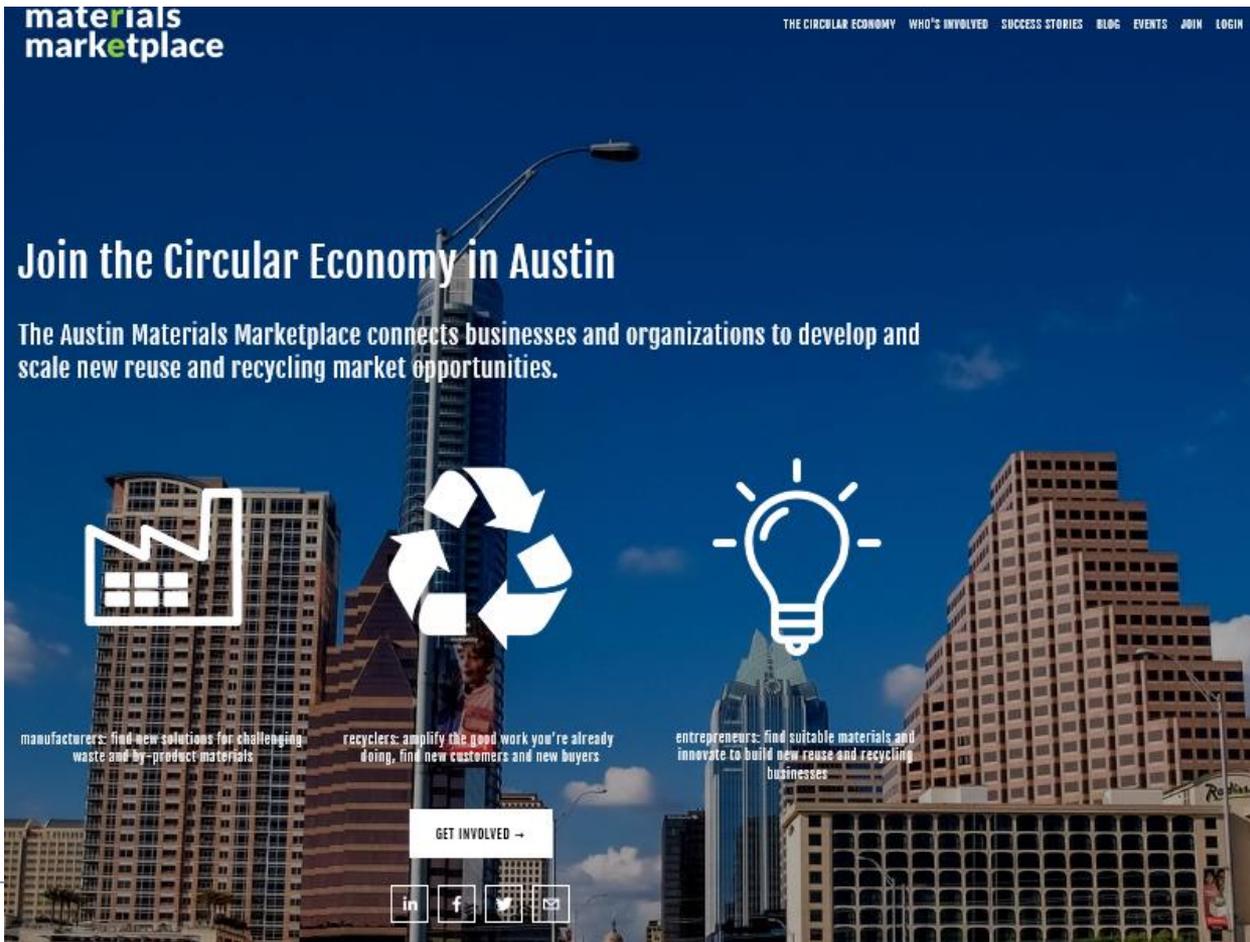
- Austin materials marketplace → will be presented in the next slides
- Tennessee materials marketplace
- Michigan materials marketplace
- Ohio materials marketplace

US BCSD is working with the

- National Association of Manufacturers to create linkages to the Manufacturers Marketplace



AUSTIN MATERIALS MARKETPLACE



materials marketplace

THE CIRCULAR ECONOMY WHO'S INVOLVED SUCCESS STORIES BLOG EVENTS JOIN LOGIN

Join the Circular Economy in Austin

The Austin Materials Marketplace connects businesses and organizations to develop and scale new reuse and recycling market opportunities.

factory icon
manufacturers: find new solutions for challenging waste and by-product materials

recycling icon
recyclers: amplify the good work you're already doing, find new customers and new buyers

lightbulb icon
entrepreneurs: find suitable materials and innovate to build new reuse and recycling businesses

GET INVOLVED →

in f t ig



How it Works and How to Join

The Materials Marketplace enables participating organizations and project staff to easily post materials available or desired, identify reuse opportunities, and exchange underutilized materials. Hundreds of companies - large and small - academic institutions, non-profits and entrepreneurs are using the Materials Marketplace around the world.

[WATCH A QUICK VIDEO ON HOW IT WORKS →](#)



AUSTIN MATERIALS MARKETPLACE

The Materials Marketplace has won awards from the World Economic Forum, Environmental Leader, and the International Economic Development Council.

The marketplace is

- business led
- technology enabled
- community driven

Since the launch of the program in 2014, the Austin Materials Marketplace has created some fantastic success stories and impressive impact metrics:



50k

Cubic Feet
Diverted from
Landfill



335

Active
Participants



\$465k

Cost Savings
and Value
Creation



842

MTCO2E
Avoided



527

Completed
Transactions



Business-to-business asset sharing

FLOW2 is the first business-to-business sharing marketplace that enables companies and institutions to share overcapacity of equipment, knowledge and skills of personnel. Users can register on the platform for free and participants pay a subscription to advertise their equipment on the platform, providing a revenue stream for FLOW2.

<https://www.ellenmacarthurfoundation.org/case-studies/business-to-business-asset-sharing>



The Sharing Marketplace solution for businesses and organizations

Optimize usage of equipment, materials, services, personnel and facilities. Share internal, local or global, via a sharing marketplace solution that fits your business or network.

[See our solutions](#)

[Discover the features](#)

[Go to FLOOW2 Healthcare](#)



FLOW2 - BENEFITS & RESULTS



Cost savings & Revenue

- 🌐 Increase your ROI
- 🌐 Realize additional turnover
- 🌐 Save company costs

Users collectively earned:
€90.145.029



Circularity & Sustainability

- 🌐 Use assets more efficiently
- 🌐 Save resources and CO₂
- 🌐 Re-use materials

Users collectively saved:
99.210.947 CO₂



Social connections

- 🌐 Improve social connections
- 🌐 Enhance collaboration
- 🌐 Create win-win situations

People connected:
399.325





Professional sharing marketplace



Custom made & Own management



Online payment system & Invoicing



Safe, Secure & Reliable



Analytics & Results



Optional (but very cool & useful!)

Professional sharing marketplace

- ✓ Both demand and supply driven
- ✓ All forms of sharing: lending, swapping, giving away, renting out, selling
- ✓ Uploading demand and supply is very easy and unlimited
- ✓ User friendly
- ✓ Advanced search function with filters: supply/demand, category, location, radius, date, time, etc.
- ✓ Location map
- ✓ Online messaging system
- ✓ Single login



Three solutions to start sharing assets

You would like to start sharing assets to become more circular? At FLOOW2 we offer three professional (sharing marketplace) solutions to fit your needs.

Start free SharingScan!



Global sharing marketplace

- 🌐 Start sharing assets on our global sharing marketplace
- 🌐 Share assets with other businesses and organizations
- 🌐 They are visible for all businesses around the world
- 🌐 Your possibilities are endless

Global sharing marketplace



Standard own sharing marketplace

- 🌐 Quickly create your own standard sharing marketplace
- 🌐 In just a few mouseclicks
- 🌐 Invite other businesses or colleagues
- 🌐 Start sharing assets within your own community

Standard own sharing marketplace

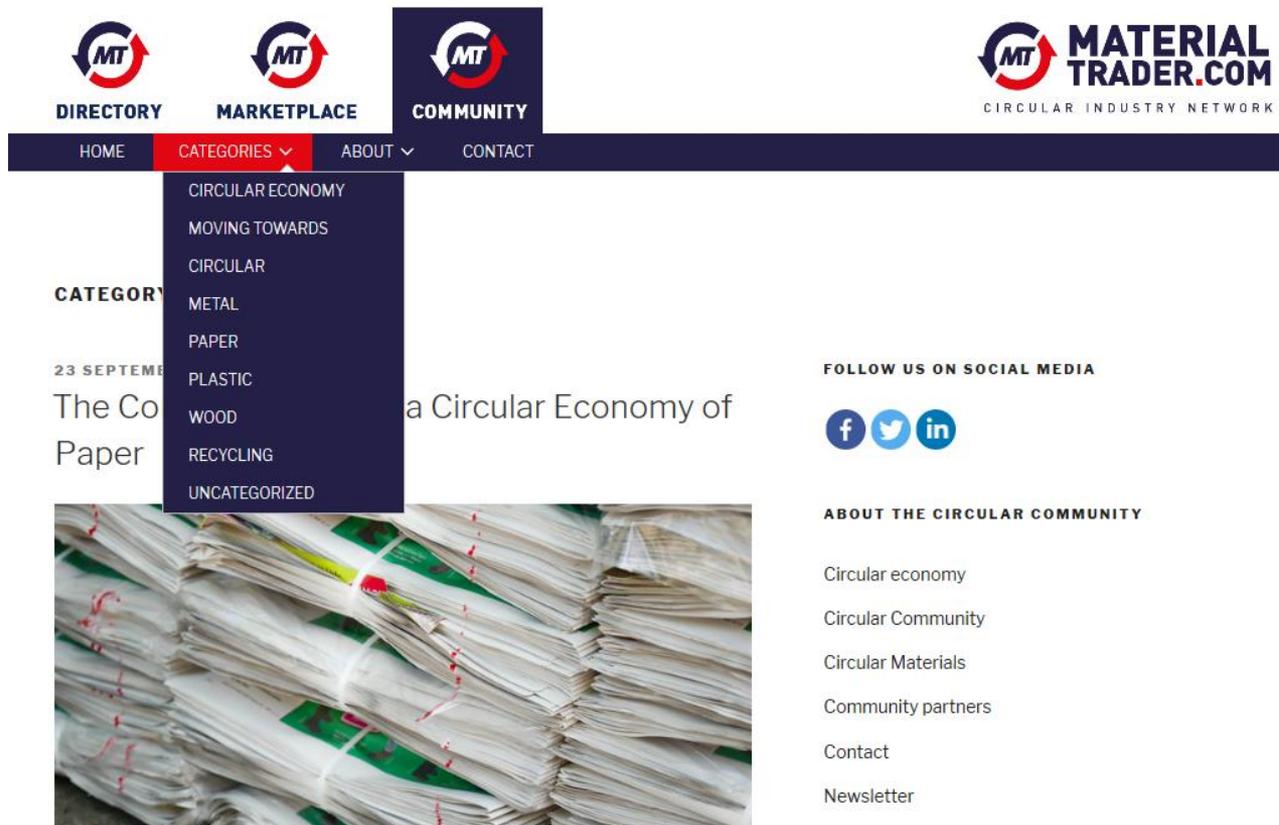


Custom made own sharing marketplace

- 🌐 A custom made sharing marketplace for your organization or network
- 🌐 Completely designed in your corporate identity
- 🌐 Unlimited possibilities and functionalities
- 🌐 You decide: open/closed, which features, how many users and sub-communities

Custom made own sharing marketplace





The screenshot displays the Material Trader website interface. At the top, there are three navigation buttons: 'DIRECTORY', 'MARKETPLACE', and 'COMMUNITY', each with the 'MT' logo. To the right is the 'MATERIAL TRADER.COM' logo with the tagline 'CIRCULAR INDUSTRY NETWORK'. Below these is a dark blue navigation bar with 'HOME', 'CATEGORIES', 'ABOUT', and 'CONTACT'. The 'CATEGORIES' dropdown menu is open, listing: 'CIRCULAR ECONOMY', 'MOVING TOWARDS', 'CIRCULAR', 'METAL', 'PAPER', 'PLASTIC', 'WOOD', 'RECYCLING', and 'UNCATEGORIZED'. On the left, a 'CATEGORY' section shows a date '23 SEPTEMBER' and a headline 'The Co... a Circular Economy of Paper'. Below this is a large image of stacked paper. On the right, there are sections for 'FOLLOW US ON SOCIAL MEDIA' with icons for Facebook, Twitter, and LinkedIn, and 'ABOUT THE CIRCULAR COMMUNITY' with a list of links: 'Circular economy', 'Circular Community', 'Circular Materials', 'Community partners', 'Contact', and 'Newsletter'.




MARKETPLACE


DIRECTORY


COMMUNITY


 EN NL DE

Register

Reset password

LOGIN



CREATE OFFER

SEARCH

- CATEGORIES**
-  ALL
 -  PLASTIC
 -  METAL
 -  ELECTRONIC WASTE
 -  **TIMBER**
 -  PAPER
 -  TEXTILE
 -  COMPOSITES
 -  BATTERIES
 -  MINERALS
 -  CHEMICALS
 - OTHER**
 - MACHINES
 - SERVICES

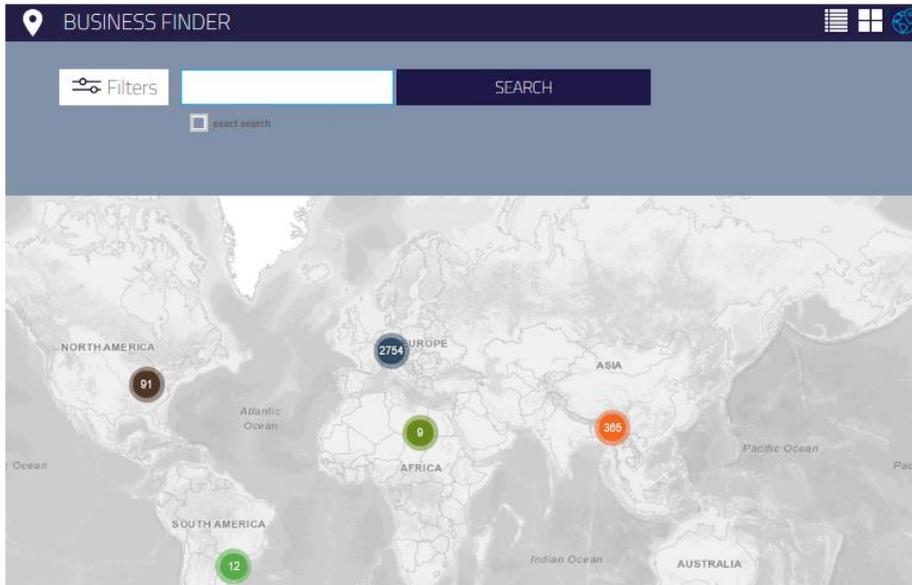
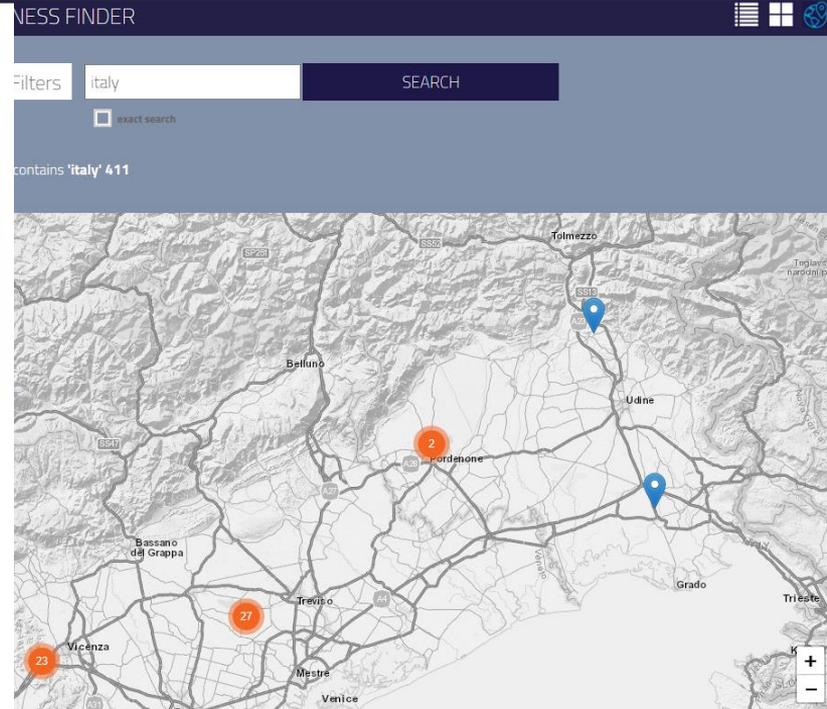
<h2>TIMBER</h2>	
SORT ON: DATE PRICE QUANTITY	
 <p>KOSSO, APALA, TEAK, MAHOGANY AND BAOBAB WOODS FORSALE</p> <p>For interested buyers of the above, Please contact with us as loads are awaiting lifting.</p>	<p> Timber</p> <p> Feb 18, 2020</p> <p> 500 ton p/month</p> <p> \$350.00 p/m3</p> <p> 203 Views</p> <p> United Arab Emirat</p>
 <p>USED OAK BARRELS</p> <p>We can supply USED OAK BARRELS. For more info on price and specifications, send an inquiry.</p>	<p> Timber</p> <p> Jan 3, 2020</p> <p> 8000 kg p/day</p> <p> €80.00 p/kg</p> <p> 67 Views</p> <p> Greece</p>
 <p>PLYWOOD</p> <p>Dear Sir/Madam, (HS 441231) We would like to offer: plywood. Made of tropical wood, including: b...</p>	<p> Timber</p> <p> Oct 27, 2019</p> <p> 50 m3 p/day</p> <p> \$2,200.00 p/m3</p> <p> 156 Views</p> <p> Indonesia</p>
 <p>750 USED BARRELS IN ALAVA, SPAIN</p> <p>This lot is still available, 220 barrels of 2011, 2012, recently empty, 75% French Oak, 25% Ameri...</p>	<p> Timber</p> <p> Oct 12, 2019</p> <p> 750 kg p/week</p> <p> €32.00 p/pcs.</p>



MATERIAL TRADER . COM



MaterialTrader.com | Business Finder:
Connect with thousands of industry partners in the Circular Industry Network



MARKETPLACE HUB - SEC. RAW MATERIALS

Marketplace Hub is an initiative of the World Business Council for Sustainable Development (WBCSD) to map secondary raw materials markets and industrial synergy networks worldwide. This initiative is centred around a website that enables interested businesses to easily search these markets and networks by location and particular materials.

The primary aim of the Hub is to overcome one of the major challenges facing businesses wishing to explore "circular economy" solutions: the lack of information on sourcing or selling their secondary raw materials.

Moreover, Marketplace Hub also aims to foster the further development of secondary raw material marketplaces and the circular economy model in general. This is why, in addition to its general listing of markets and synergies, the website features case studies of particularly successful marketplaces to showcase the potential of secondary raw material markets and to highlight good practices.

<https://circulareconomy.europa.eu/platform/en/good-practices/offer-and-demand-secondary-raw-materials-make-perfect-match-marketplacehub>





REGISTER NOW

plastship - Your network for recycled plastics

We link up the value chain for recycled plastics to increase the use of sustainable resources.

Sell recycled plastics



We find new customers and offer solutions for the distribution of recycled plastics for you. Increase the visibility of your standard grades or place spot volumes and recyclables.

Buy recycled plastics



Plastics converters find a broad offer of high quality recycled plastics here, whereas commodity identification and transaction processes are guided by digital assistances.

Recyclability assessment



We evaluate and certify the recyclability of your packaging following the minimum standard of the German ZSVR, and consult you in the use of recyclates in your products.



Plastship is a marketplace platform for buyers and sellers of regrinds, re-granulates and recyclates. The portal's services include independent assessment of the recyclability of plastics packaging and products for complete product ranges and of their impact on selected environmental factors.

Plastship also provides consultancy in optimizing product sustainability in terms of design for recycling and the use of recyclates.

Its goals are:

- establishing broader application areas for recycled plastics
- facilitating and accelerating the distribution of recycled plastics
- building up homogeneous quality and information standards for recycled plastics.

<https://circulareconomy.europa.eu/platform/en/good-practices/plastics-recyclates-plastship-offer-services-better-quality-and-marketability>



Main results:

- Since its May 2019 launch, the plastship platform has
- made more than 3550 t of recycled plastics available
- registered over 100 companies within three months
- categorised recycled material qualities
- established matching systems for material specifications (recycler) and product requirements (converter)
- developed a standardized information base for recycled plastics

<https://circulareconomy.europa.eu/platform/en/good-practices/plastics-recyclates-plastship-offer-services-better-quality-and-marketability>



Marketplace

The digital market of Secondary Raw Materials (SRMs)

Wastly's marketplace contributes to the creation of a dynamic market of Secondary Raw Materials (SRMs) encouraging the use of recycled materials in products and infrastructures. Thanks to our trading service, you will be able to either sell or purchase SRMs at the best possible price.



PANTONE 19-4003
black-onyx

R_PP_UNI 10667-3...

PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P

Successfully concluded 



PANTONE 19-4003
black-onyx

R_PP_UNI 10667-3...

PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P

Successfully concluded 



PANTONE 19-3909
black-bean

R_PP_UNI 10667-3...

PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P

Successfully concluded 



PANTONE 19-1101
after-dark

R_PP_UNI 10667-3...

PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P

Successfully concluded 



Wastly is a B2B online platform for the marketing of secondary raw materials (SRM) resulting from waste recovery and recycling. It favours the direct exchange between SRM producers and enterprises who want to introduce SRMs in their manufacturing processes.

It is a virtual meeting point for all circular economy stakeholders, such as enterprises that collect, transport, recover, process and recycle waste in a B2B perspective, and also municipalities.

Its objective is to identify all actors involved in the recycling process, but also to verify if waste recovery and treatment plants have the necessary certifications and are registered in the National Register of Environmental Managers.

<https://circulareconomy.europa.eu/platform/en/good-practices/wastly-facilitates-marketing-secondary-raw-materials-thanks-its-btob-online-platform>



CE Marketplaces

Definition, examples

There are more Marketplaces on the market:

Globechain - Globechain helps businesses reduce waste by providing a reuse marketplace for listing unneeded items. All items are free for collection by charities, SMEs and individuals.

BizBiz Share - Canada's largest business resource marketplace

For more marketplaces have a look at - CIRCULAR ECONOMY CLUB
Closed Marketplace on the CIRCULAR ECONOMY CLUB website: LOOP

There are more Marketplaces to come:

Planned in Australia for 2020



CE MARKETPLACE PLANNED IN AUSTRALIA

Australian Government announced 03 May 2019

“Planet Ark welcomes the announcement by the Federal Government of \$1.6M in funding for its development of a National CE Hub and Marketplace.

The leading environmental not-for-profit will create the B2B ‘eBay’ to help Australian businesses implement the CE.”

Marketplace: Coming soon - planned for 2020
→ no more information (definition) available for the moment

The Recycling Hub: [Recycling Near You](#)
[Business Recycling](#)
→ already working



CE MARKETPLACE PLANNED IN AUSTRALIA

National Circular Economy Hub

Full launch in 2020



CE MARKETPLACE PLANNED IN AUSTRALIA

CIRCULAR ECONOMY MARKETPLACE

A dynamic platform designed to meet the needs of the CE participants including:

- A system for matching buyers and sellers in waste resources. Provides an end-to-end solution including;
 - Material identification & specification
 - Transport and financial transaction.
 - trust rating for market participants and digital ledger to help ensure integrity.
- A CE procurement system for finished goods & services



ENABLER OF THE CE



B2B 'EBAY' OF THE CE

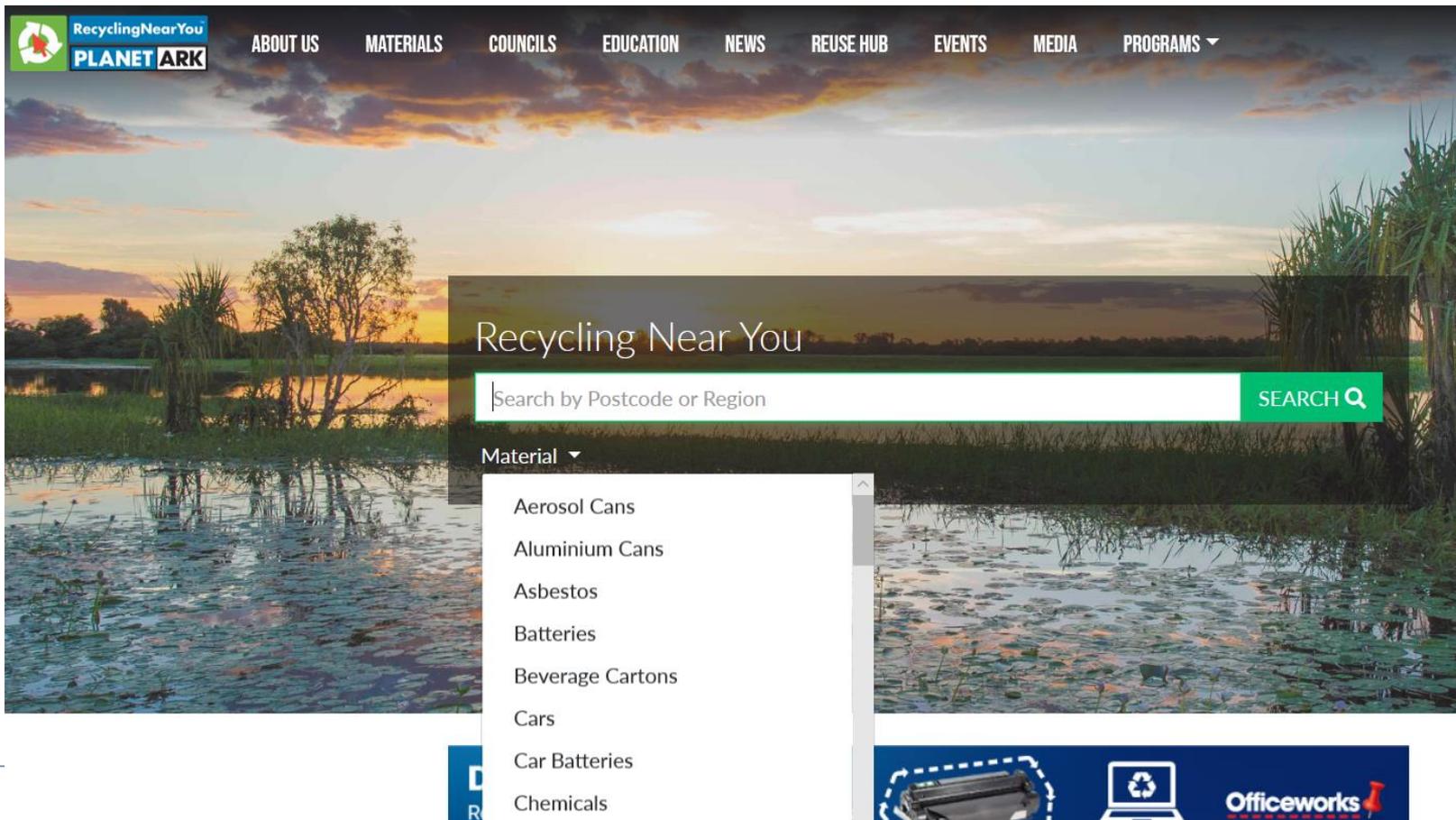


REPEAT VISITATION

*The National CE Hub-
introducing a new program
by Planet Ark*



CE MARKETPLACE - AUSTRALIA



RecyclingNearYou
PLANET ARK

ABOUT US MATERIALS COUNCILS EDUCATION NEWS REUSE HUB EVENTS MEDIA PROGRAMS ▾

Recycling Near You

Search by Postcode or Region **SEARCH** 🔍

Material ▾

- Aerosol Cans
- Aluminium Cans
- Asbestos
- Batteries
- Beverage Cartons
- Cars
- Car Batteries
- Chemicals

Officeworks





Search for Service

Location

Category

Material

SEARCH

Brought to you by



Foundation Partner



Small Scale Recycling Equipment

Search for equipment to make recycling easier and cheaper

Search for a Recycler or List a Service

This site makes recycling at work easy and lists recycling options for around 90 different materials. Use the 'Search for service' function to the left of this page to find recyclers near you. If you're a recycler you can list your services by filling out the online registration form.

Search for Recycling Equipment or List your Equipment

TAKING COOPERATION FORWARD



Industrial Symbiosis

Definition, just some examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



INDUSTRIAL SYMBIOSIS . DEFINITION

Industrial symbiosis is a form of brokering to bring companies together in innovative collaborations, finding ways to use the waste from one as raw materials for another.

The word “symbiosis” is usually associated with relationships in nature, where two or more species exchange materials, energy, or information in a mutually beneficial manner.

Local or wider co-operation in industrial symbiosis can reduce the need for virgin raw material and waste disposal, thereby closing the material loop - a fundamental feature of the circular economy and a driver for green growth and eco-innovative solutions. It can also reduce emissions and energy use and create new revenue streams.

However, in order to make industrial symbiosis a wide-spread commercial reality, more needs to be done to manage the flow of waste material from different sectors and industries, and there is still much to understand about:

- environmental and societal impacts
- harmonization of technologies, processes, policies
- civil society engagement to a circular economy at EU level
- waste resources information
- waste treatment technologies
- business models and coordination between value chain actors.



FISSAC PROJECT - OVERVIEW

Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain.



Project information

- HORIZON 2020
- Grant agreement ID: 642154
- Start date: 1 September 2015 - end date 29 February 2020



FISSAC PROJECT - THE CONCEPT

The FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology, and software platform to facilitate information exchange, that can support industrial symbiosis networks and replicate pilot schemes at local and regional levels.

The model will be based on three sustainability pillars:

- Environmental (with a life-cycle approach)
- Economic
- Social (taking into consideration stakeholder engagement and impact on society).

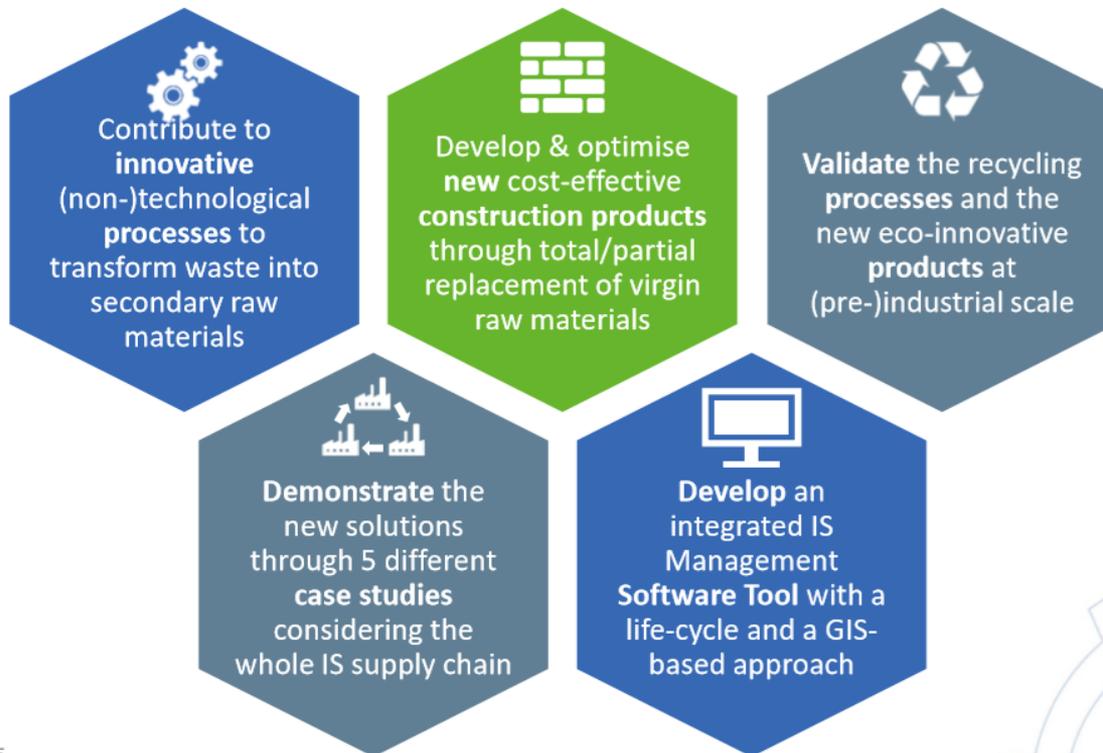
The ambition is that the model created can be replicated in other regions and other value chain scenarios.

FISSAC aims to demonstrate the effectiveness of the processes, services, and products at different levels.



FISSAC PROJECT - GOALS

FISSAC scientific & technical goals



http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-_Acciona.pdf



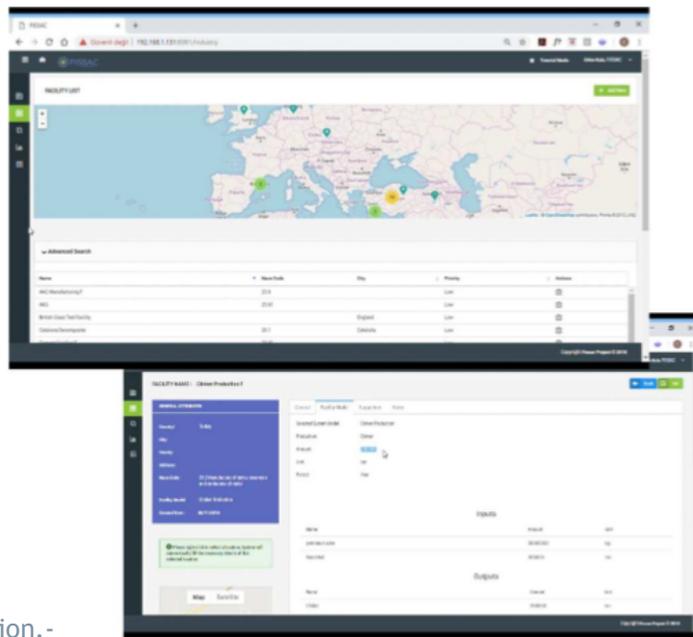
FISSAC PROJECT - SW PLATFORM

An important objective of the project is the introduction of a model for Industrial Symbiosis. For this, a specific tool is being developed and will be evaluated within the project: the **FISSAC Software Platform**.

It will feature amongst others a Life Cycle based Multiple Factor Analysis, network indicators and GIS based capabilities.

Capabilities

- Life-cycle assessment
- Life-cycle costing
- Material and energy flow analyses
- Multi-objective optimization
- Visualization & Diagrams
- Network analysis through industrial ecology metrics
- Graph and network topologies and industrial system modeling
- Innovative circular economy and industrial symbiosis indicator-based assessment



http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-_Acciona.pdf



FISSAC PROJECT - WEBINAR PLATFORM



4th Webinar
26 February 2020


FISSAC
IS Platform

Login

[Create Account](#) [I forgot my password](#)

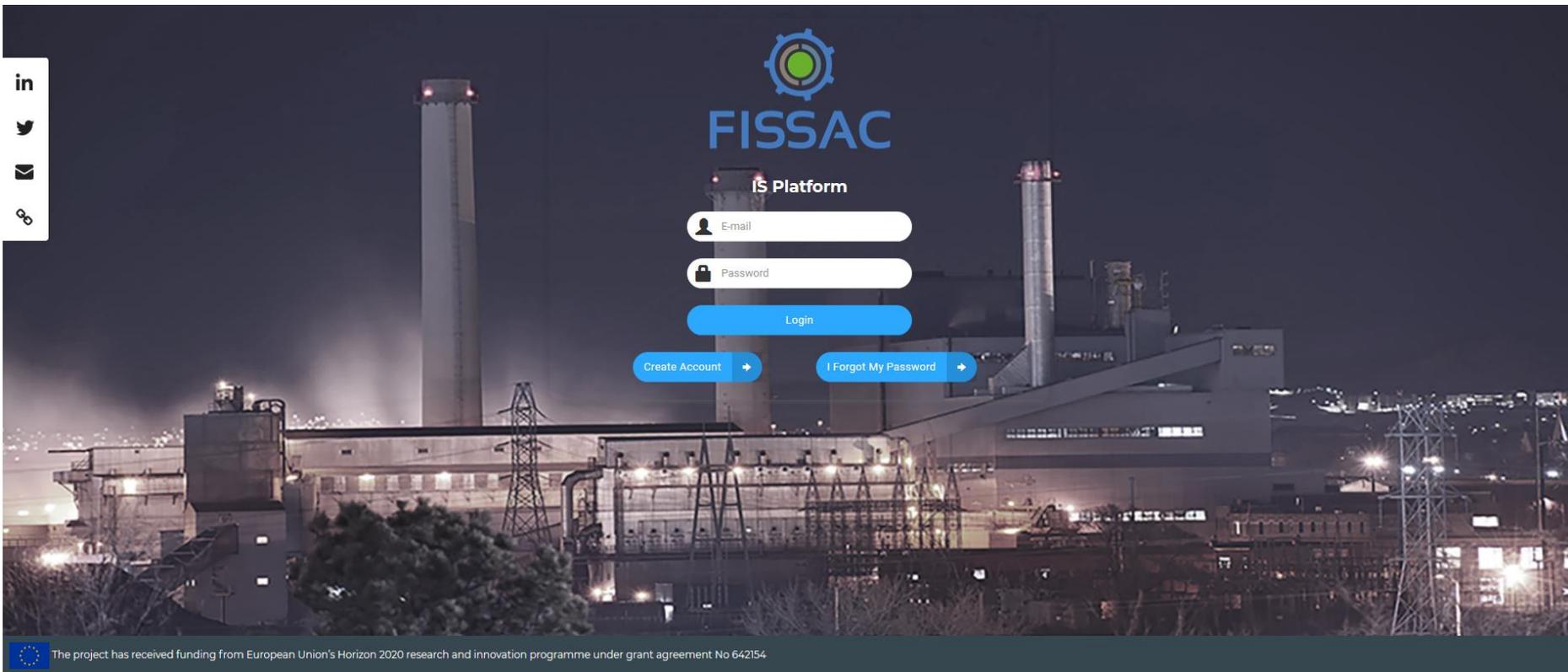
REGISTRATIONS ARE OPEN!

 The project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement No 642154

[View the recording !](#)



FISSAC PROJECT - IS PLATFORM



 The project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement No 642154

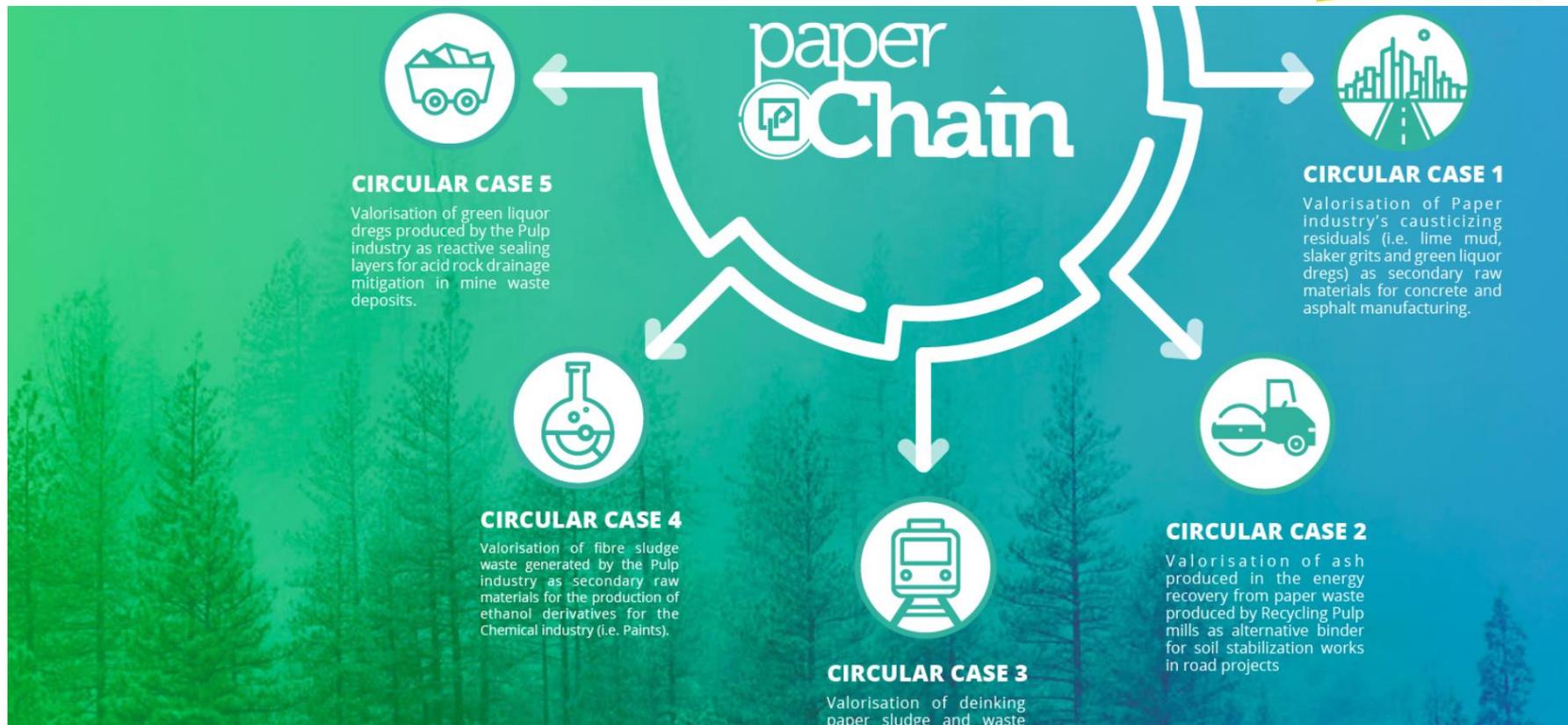


<http://is.fissacproject.eu/User/Login>





PAPERCHAIN PROJECT



Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

Overall objective

- PAPERCHAIN is to deploy five novel circular economy models centred in the valorisation of the waste streams generated by the PPI as secondary raw material for a number of resource intensive sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.

<https://cordis.europa.eu/project/id/730305>



Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

<https://cordis.europa.eu/project/id/730305>

Overall objective

- PAPERCHAIN project brings in an industrial symbiosis model centered in the use of different waste streams generated by the European Pulp and Paper Industry, as valuable feedstock for three resource hungry industrial sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.



KALUNDBORG SYMBIOSIS



Winner of

WIN-WIN GOTHENBURG SUSTAINABILITY AWARD 2018

TAKING COOPERATION FORWARD

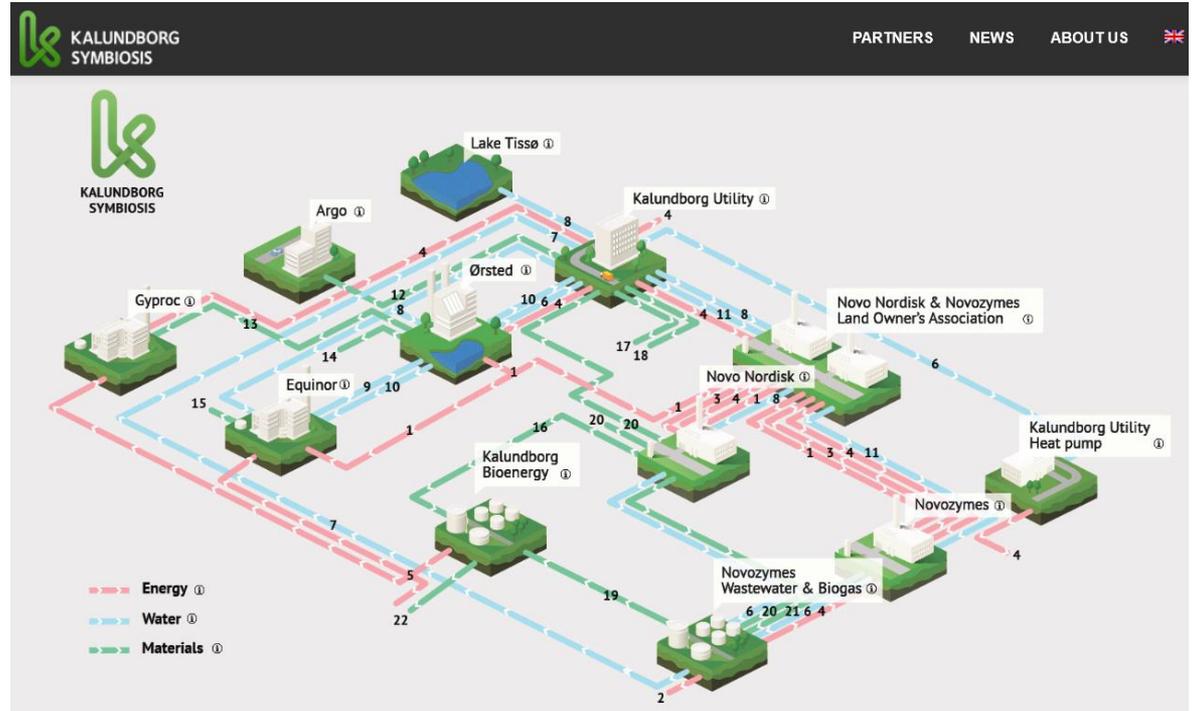


KALUNDBORG SYMBIOSIS

The Kalundborg Symbiosis is a partnership between nine public and private companies in Kalundborg.

Since 1972 Kalundborg has developed the World's first industrial symbiosis with a circular approach to production.

The main principle is, that a residue from one company becomes a resource at another, benefiting both the environment and the economy



KALUNDBORG SYMBIOSIS

 **KALUNDBORG SYMBIOSIS** Kalundborg Symbiosis – Vision and goals 2018
[Video about the Kalundborg Symbiosis, our vision and our foundation.](#)

[PARTNERS](#) [NEWS](#) [ABOUT US](#) 



[Watch the video !](#)



SMART MAPS

-

to find initiatives, events, projects, ... in cities

TRENNSTADT / -MAP BERLIN

Circular Berlin - Community

Gothenburg - Sharing Initiatives

#MOVETHEDATE - Sharing Initiative



TRENTTSTADT BERLIN



Trenntstadt Berlin

Aktuelles Information Die Kampagne Über uns

Startseite » Über uns

Über uns

Ein guter Trennt für die Hauptstadt

Wertstoffe

Glas

Papier & Pappe

Biogut

Hausmüll

Trenntstadt Berlin, an initiative of “Berliner Stadtreinigung” and its partners, aims to create a new awareness of the issues of waste avoidance, separation and recycling.



The screenshot shows the website for Trenntstadt Berlin. On the left is a vertical navigation bar with six categories: Wertstoffe (orange), Glas (green), Papier & Pappe (blue), Biogut (brown), and Hausmüll (black). The main content area has an orange header with navigation links: Aktuelles, Information, Die Kampagne, and Über uns. Below the header, there is a breadcrumb trail: Startseite » TrenntFestival. The main heading is 'TrenntFest' with a sub-heading 'TrenntKonzerte im Sommer'. A dropdown menu is open, listing various links: Abfalltrennung, Abfallvermeidung, Riesenobjekte, TrenntMagazin, TrenntRadio, TrenntMap, TrenntMöbel, TrenntMöbel-Wettbewerb, Richtig wegwerfen mit den Füchsen Berlin, TrenntFestival, and Der Weltrekord. The background of the main content area features a photograph of a crowd at an outdoor event, with several people wearing orange shirts.



TRENNTMAP BERLIN - PROJECT OF TRENNTSTADT

TrenntMap Ein Projekt von Trenntstadt Berlin

Alle Standorte
TrenntShopping
TrenntProjekte
Veranstaltungen
Archiv
RC Hof Recyclinghöfe
Information
Standort vorschlagen

Verantwortung nach Plan - die TrenntMap

Unsere Stadt ist in vielen Bereichen Vorreiter. Unter anderem auch bei Themen, die sich auf den ersten Blick vielleicht nicht besonders interessant anhören wie etwa Mülltrennung, Recycling und Abfallvermeidung. Wer sich jedoch etwas Zeit für einen zweiten Blick nimmt, kann sehr spannende und kreative Leute, Geschäfte, Initiativen, Veranstaltungen und Projekte kennen lernen.

Die erste und beste Adresse, um sich ein ganzes Bild der Szene zu machen, ist die TrenntMap. Mit dieser auf Google Maps© basierenden interaktiven Karte können Sie sich detailliert über Sortiments- bzw. Projektbeschreibungen, Adressen und Öffnungszeiten etc. informieren. Erkunden Sie auf Basis der Map doch einfach mal die Stadt und schau'n sich die interessantesten Orte vor Ort an.

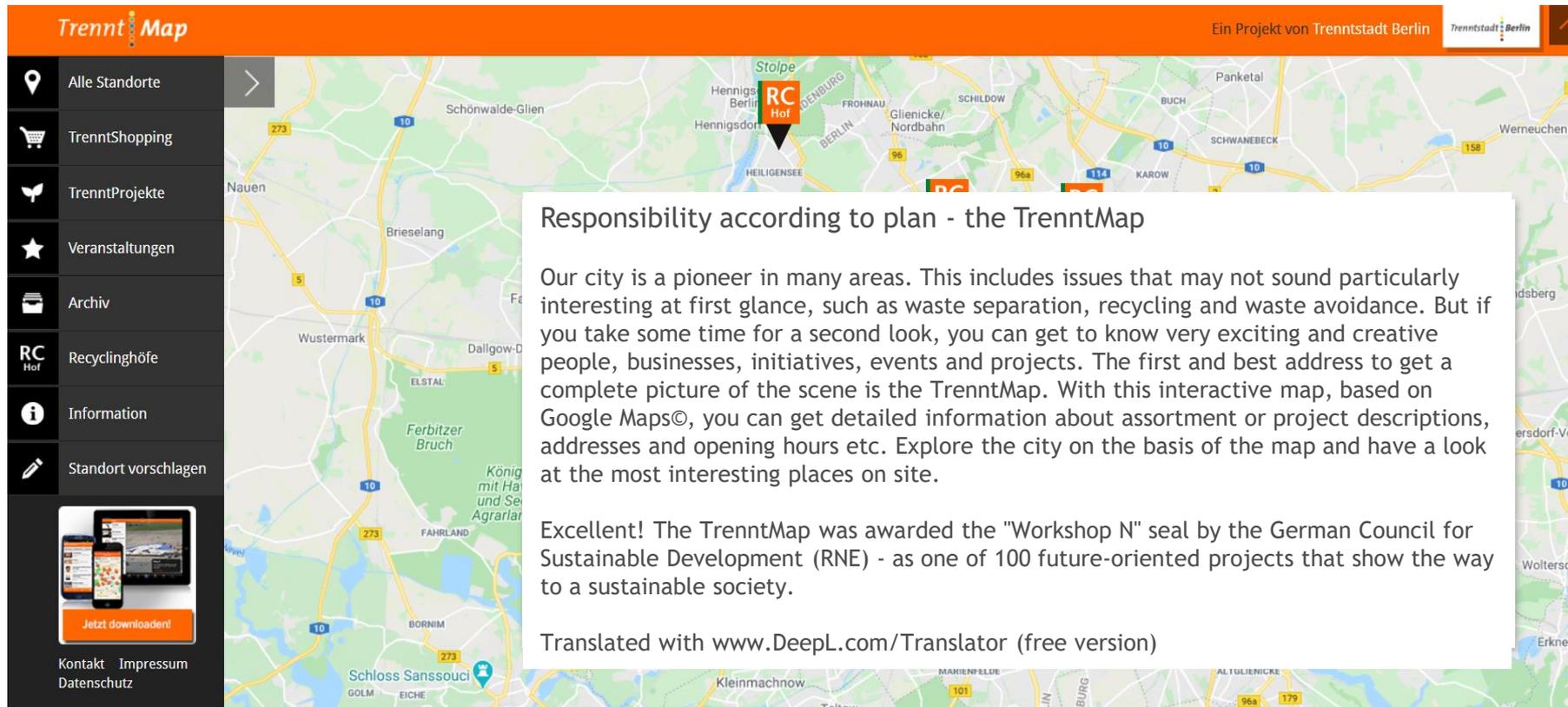
WERKSTATT N PROJEKT 2013

Ausgezeichnet! Die TrenntMap wurde vom Rat für Nachhaltige Entwicklung (RNE) mit dem Siegel „Werkstatt N“ prämiert – als eines von 100 zukunftsweisenden Projekten, die den Weg in eine nachhaltige Gesellschaft zeigen.

Kontakt Impressum
Datenschutz



TRENNTMAP BERLIN - PROJECT OF TRENNTSTADT



Responsibility according to plan - the TrenntMap

Our city is a pioneer in many areas. This includes issues that may not sound particularly interesting at first glance, such as waste separation, recycling and waste avoidance. But if you take some time for a second look, you can get to know very exciting and creative people, businesses, initiatives, events and projects. The first and best address to get a complete picture of the scene is the TrenntMap. With this interactive map, based on Google Maps©, you can get detailed information about assortment or project descriptions, addresses and opening hours etc. Explore the city on the basis of the map and have a look at the most interesting places on site.

Excellent! The TrenntMap was awarded the "Workshop N" seal by the German Council for Sustainable Development (RNE) - as one of 100 future-oriented projects that show the way to a sustainable society.

Translated with www.DeepL.com/Translator (free version)



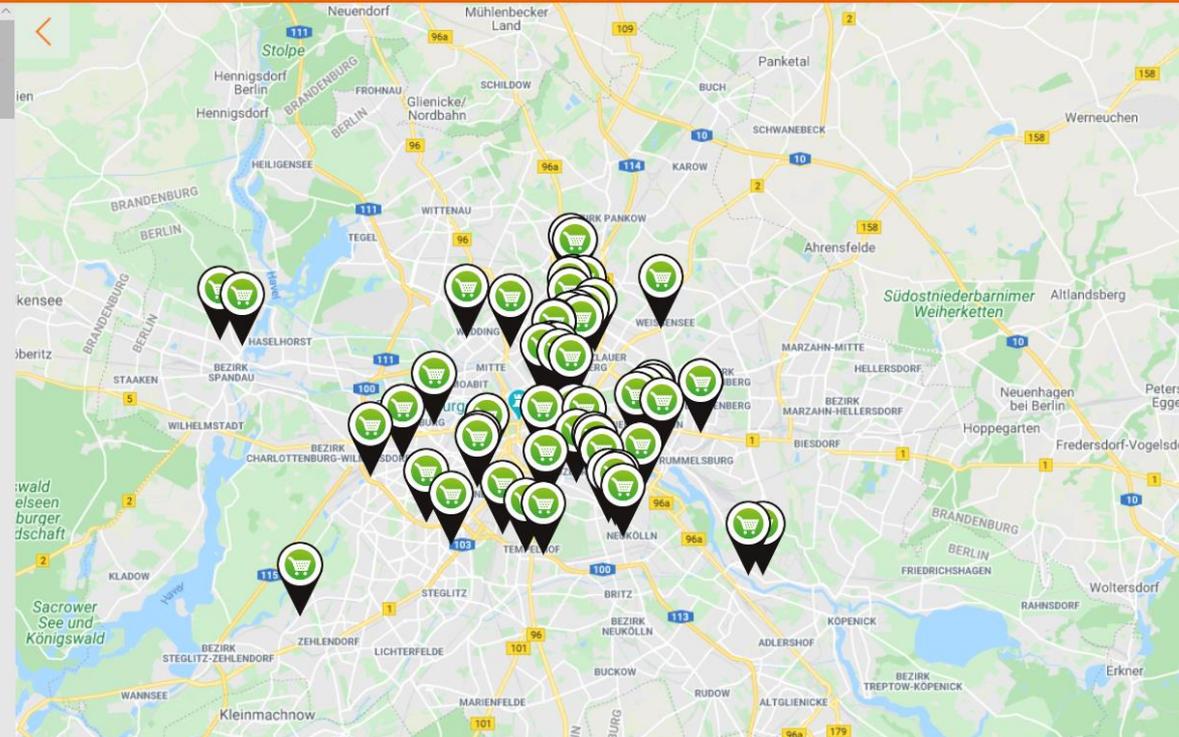
TRENNTMAP BERLIN - EX. TRENNTSHOPPING

TrenntMap Ein Projekt von Trenntstadt Berlin 

-  Alle Standorte
-  TrenntShopping
-  TrenntProjekte
-  Veranstaltungen
-  Archiv
-  Recyclinghöfe
-  Information
-  Standort vorschlagen

Sortierung: [Name](#) | [Kategorie](#) 

- **Ahoj! Souvenirmanufaktur** 
Karl-Marx-Str. 83
12043 Berlin
- **Atelier Karin Jordan** 
Anklamer Straße 38
10115 Berlin
- **avesu - a vegan shoe, Friedrichshain** 
Warschauer Str 33
10243 Berlin
- **avesu - a vegan shoe, Prenzlauer Berg** 
Schivelbeiner Straße 35
10439 Berlin
- **BATATA** 
Erich-Weinert-Straße 24
10439 Berlin
- **berlin-re-cycling** 
Kurfürstendamm 121a
10711 Berlin

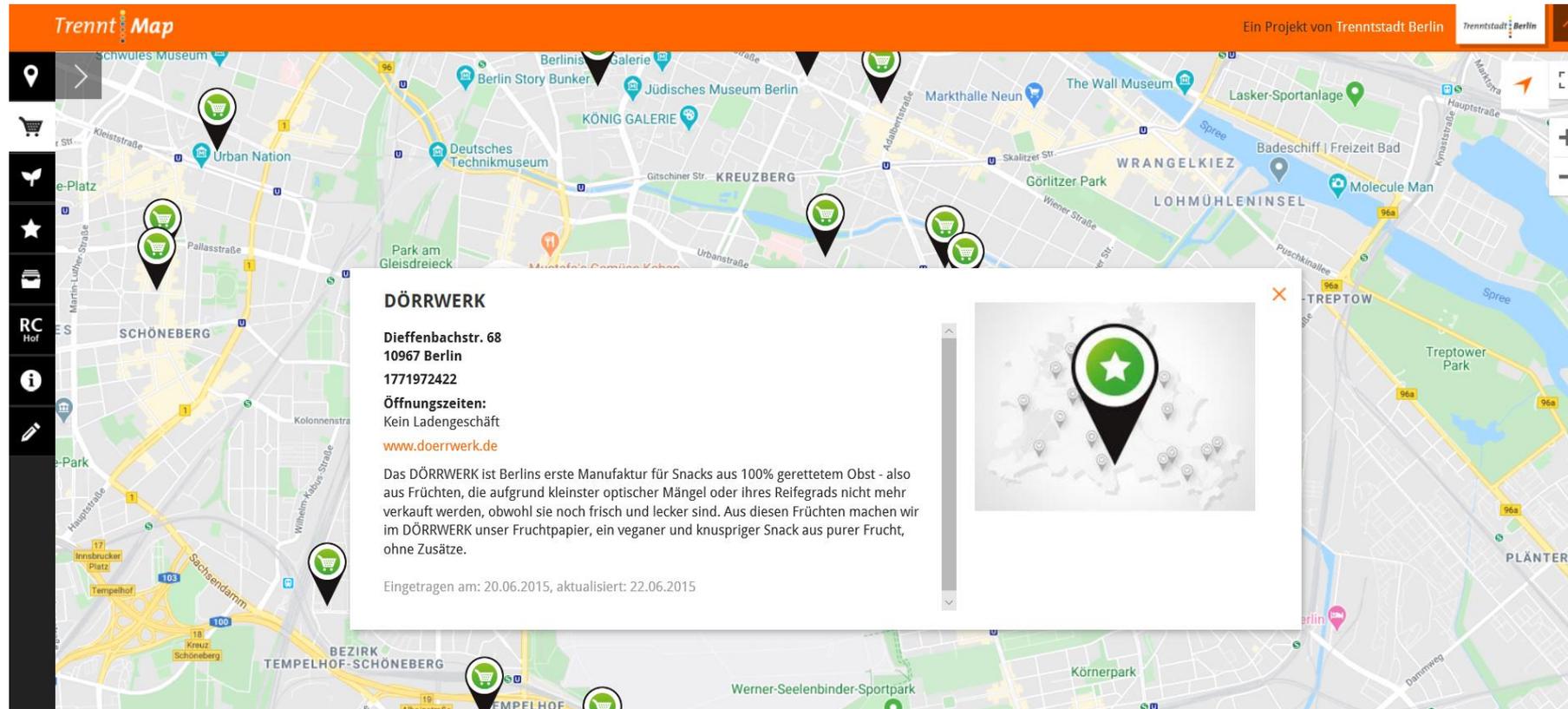


[Kontakt](#) [Impressum](#)
[Datenschutz](#)



TRENNTMAP BERLIN - EX. TRENNTSHOPPING

TrenntMap Ein Projekt von Trenntstadt Berlin Trenntstadt Berlin



DÖRRWERK

Dieffenbachstr. 68
10967 Berlin
1771972422

Öffnungszeiten:
Kein Ladengeschäft

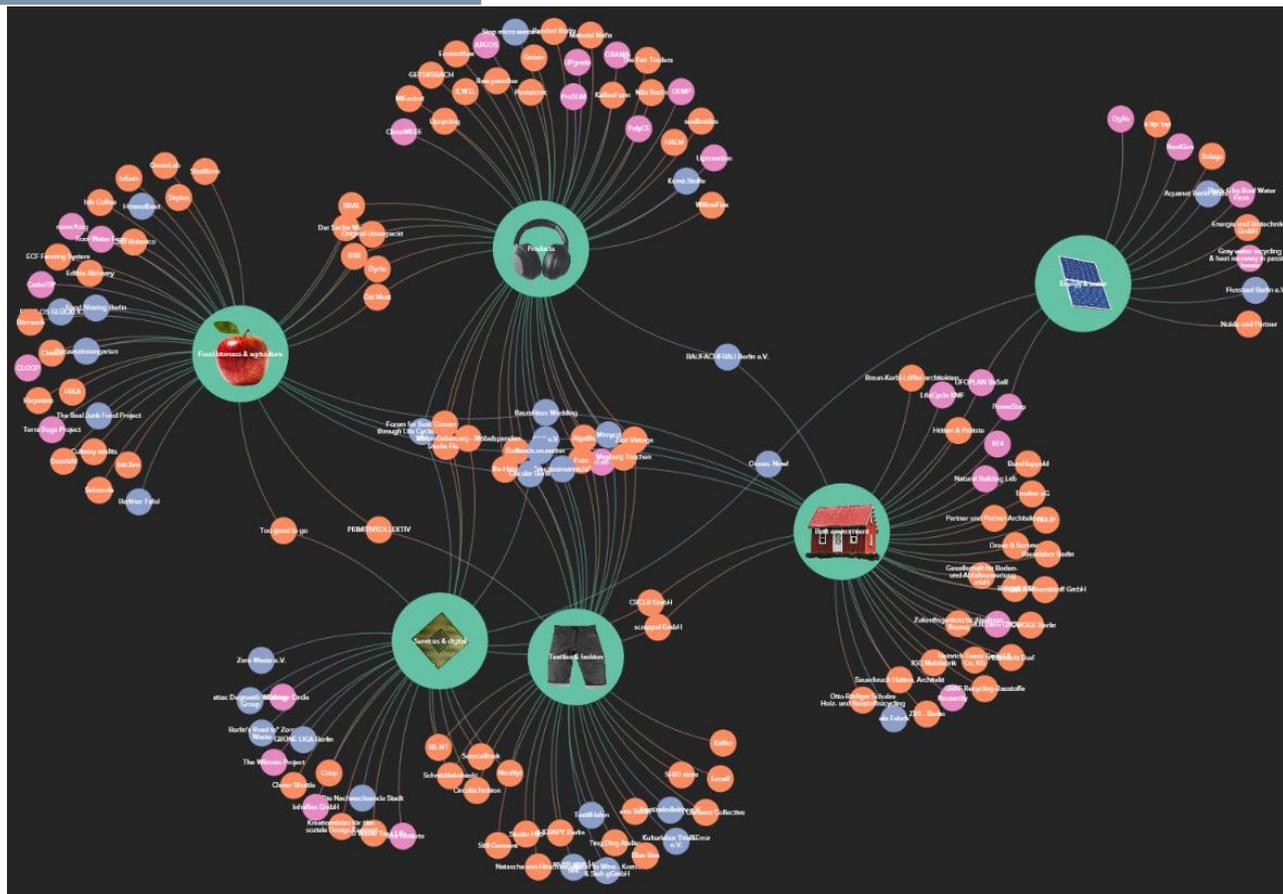
www.doerwerk.de

Das DÖRRWERK ist Berlins erste Manufaktur für Snacks aus 100% gerettetem Obst - also aus Früchten, die aufgrund kleinster optischer Mängel oder ihres Reifegrads nicht mehr verkauft werden, obwohl sie noch frisch und lecker sind. Aus diesen Früchten machen wir im DÖRRWERK unser Fruchtpapier, ein veganer und knuspriger Snack aus purer Frucht, ohne Zusätze.

Eingetragen am: 20.06.2015, aktualisiert: 22.06.2015



CIRCULAR BERLIN - COMMUNITY



150+ circular initiatives
in Berlin

Click the bubbles
to find out more,
zoom in,
search & filter by
circular strategies.



GOTHENBURG - SHARING INITIATIVES

Open now



+ Add initiative

+ Create event

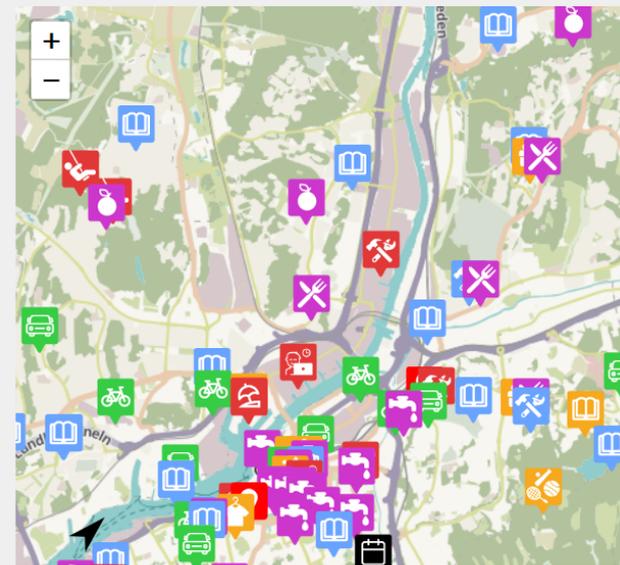
Find all the sharing initiatives!

Welcome to the sharing initiatives where you can rent, borrow, lend, share, give and get in Gothenburg. You can find bike kitchens, fruit orchards, the toy library, the leisure equipment banks and much more. Pick fruit so follow The Smart Map on social media and expand your interest in the sharing culture in our forum!

 Facebook  Instagram

[→ To Malmö's smart map](#)

Filter  Sort to



Further maps in [Malmö](#), [Karlstad](#) and [Sjuhärad](#)



#MOVE THE DATE

STORIES

MAP

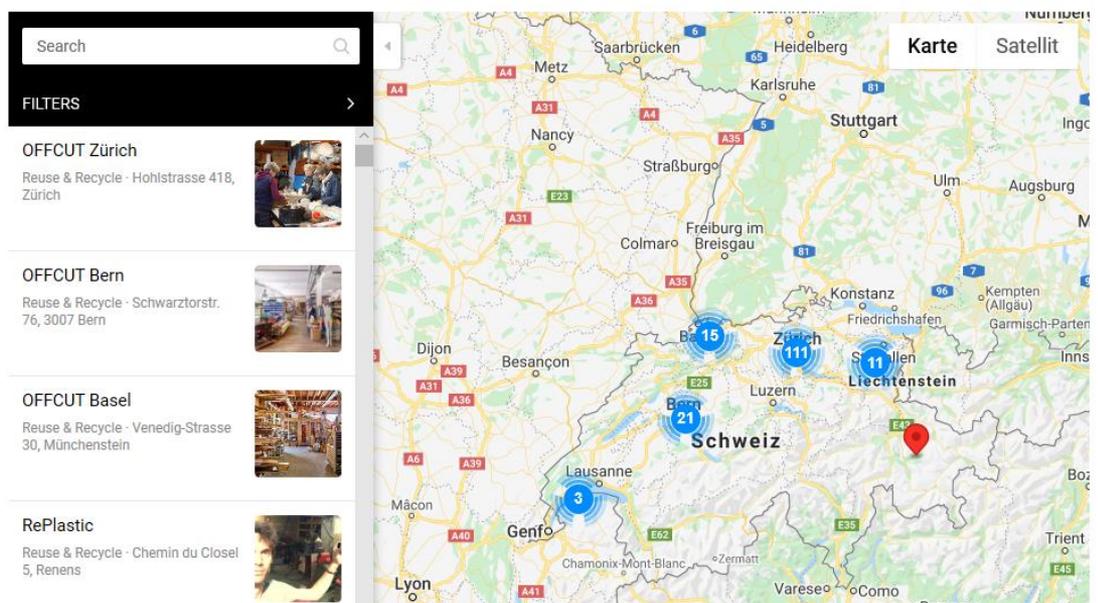
IDEE

ABOUT

MITMACHEN

DE FR

MOVER-MAP



Search

FILTERS

OFFCUT Zürich
Reuse & Recycle - Hohlstrasse 418, Zürich

OFFCUT Bern
Reuse & Recycle - Schwarztorstr. 76, 3007 Bern

OFFCUT Basel
Reuse & Recycle - Venedig-Strasse 30, Münchenstein

RePlastic
Reuse & Recycle - Chemin du Closel 5, Renens

Karte Satellit

Metz Saarbrücken Heidelberg Karlsruhe Stuttgart Ingolstadt Augsburg München Nürnberg
Nancy Straßburg Freiburg im Breisgau Konstanz Friedrichshafen Kempten (Allgäu) Garmisch-Partenkirchen Innsbruck
Dijon Besançon Lyon Lausanne Genève Luzern Zürich Schaffhausen Sion Aargau Graubünden
Schweiz Liechtenstein
Mâcon Maçon Genoa Varese Como Bergamo

MOVE WITH US.

Aim of the movement LET'S MOVE IT
is to postpone Overshoot Day.

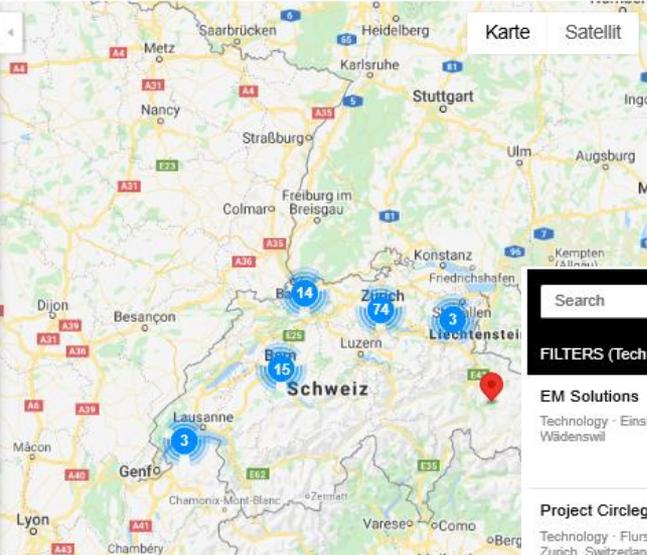


#MOVETHEDATE - SHARING INITIATIVE

← DONE

Karte Satellit

- All
- Beauty
- Experience
- Food and Drinks
- Fashion
- Living
- Mobility
- Nature
- Organizations
- Reuse & Recycle
- Technology



Search

FILTERS (Technology)

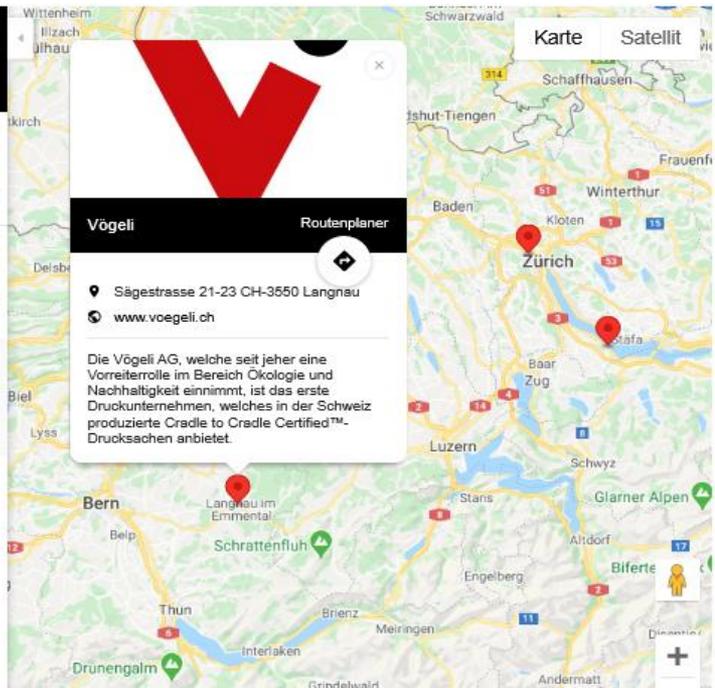
EM Solutions
Technology - Einsiedlerstrasse 33, Wädenswil

Project Circleg
Technology - Flurstrasse 93 8047 Zurich, Switzerland

Vögeli
Technology - Sägestrasse 21-23 CH-3550 Langnau



Karte Satellit



Vögeli Routenplaner

📍 Sägestrasse 21-23 CH-3550 Langnau
🌐 www.voegeli.ch

Die Vögeli AG, welche seit jeher eine Vorreiterrolle im Bereich Ökologie und Nachhaltigkeit einnimmt, ist das erste Druckunternehmen, welches in der Schweiz produzierte Cradle to Cradle Certified™-Druksachen anbietet.



Marketplace STARTUP IDEAS

-

in Switzerland



SWISS STARTUPS - EARLY STAGE PROJECTS

- [ecco.eco](#) is Switzerland's first and most inspiring online marketplace for everything upcycled.
- [Help'n'Trade](#) A digital platform facilitating exchange of goods and services locally.
- [CINE.EQUIPMENT](#) is a sharing marketplace where filmmakers and film production companies all over Switzerland can rent and hire filmequipment.
- [Swishy](#) Swiss online marketplace connecting offers with wishes in the local community, showing new ways to offer value and extend product lifecycles.
- [iCEEP](#) is a digital market place dedicated to the circular economy that stimulates and rewards societal circular behavior.



TAKING
COOPERATION
FORWARD



Webinar | March 30, 2020



WP T2 - CE Hubs - Examples, Structure & Services, Economic Sustainability



Luc Schmerber | BWCON

- 1 CE HUBs - Understanding and further focus
- 2 City governments and their role in enabling a CE transition
- 3 Special focus: Clusters in the CE transition

CE HUBs : overview on cases / examples

- 4 Focus on city governments and clusters
- 5 Industrial symbiosis
- 6 Focus on regional and two “smaller” national HUBs



CE HUBs

Understanding and further focus

- a) CE HUBs in the CITYCIRCLE application
 - understanding
- b) Classification of cities
 - further focus when examining
 - literature
 - different approaches



CE HUBs

Understanding and further focus

a) CE HUBs in the CITYCIRCLE application

- Objectives
- Project relevance & approach

→ Understanding of CE HUBs in
non-metropolitan cities of Central Europe



CE HUBs

Understanding and further focus

b) Classification of Cities

- Why is a classification needed ?
“Cities are different. So are solutions.”
- Different approaches
 - Ellen MacArthur Foundation
 - cscp | Bertelsmann
- ➔ Further focus when examining literature and examples



CE HUBs

“City governments and their role in enabling a CE transition”

a) **Ellen MacArthur**

Urban policy levers

b) **European Investment Bank (EIB)**

The 15 circular steps for cities

c) **Urban Agenda for the EU**

What can a local authority do ?



CE HUBs

Special focus: Clusters in the CE transition

Building partnerships for sustainable transition of SMEs

- Ambition of clusters
- Cluster support
- Study results from Denmark
- How clusters are powering the circular transition



CE HUBs _ cases / examples

Focus on city governments and clusters

a) Learning Centres of CE

Transforming Municipality Districts

Case Maribor, Slovenia

b) Learning Centres and Entrepreneurial Networks

IMPACT HUBS

c) A Network of Regional Innovation Hubs

C-VoUCHER

d) Clusters

Case Ostwestfalen-Lippe



CE HUBs _ cases / examples

Industrial Symbiosis

a) Definition

b) Examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



CE HUBs - cases / examples

Focus on regional and two smaller national HUBs

a) Regional Hubs

Circular Flanders is the HUB and the inspiration for the Flemish CE (+ webinar)

b) National Hubs

Switzerland - Movement for a CE

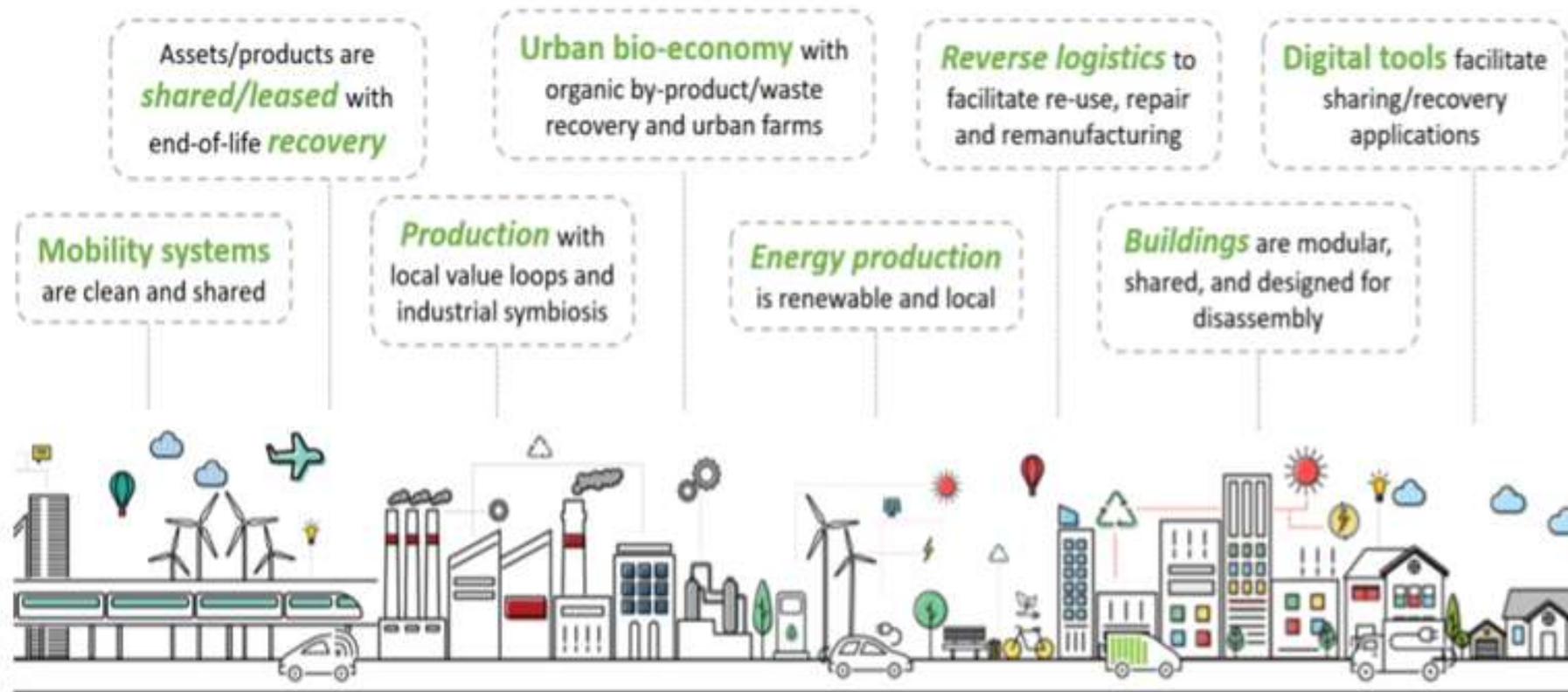
Australia - The National CE HUB

more examples (not further elaborated here)

- SITRA, Finland & Kemi Circular and Bioeconomy Center, Lapland (+ webinar)
- Zero Waste Scotland, Scotland



A circular city tomorrow



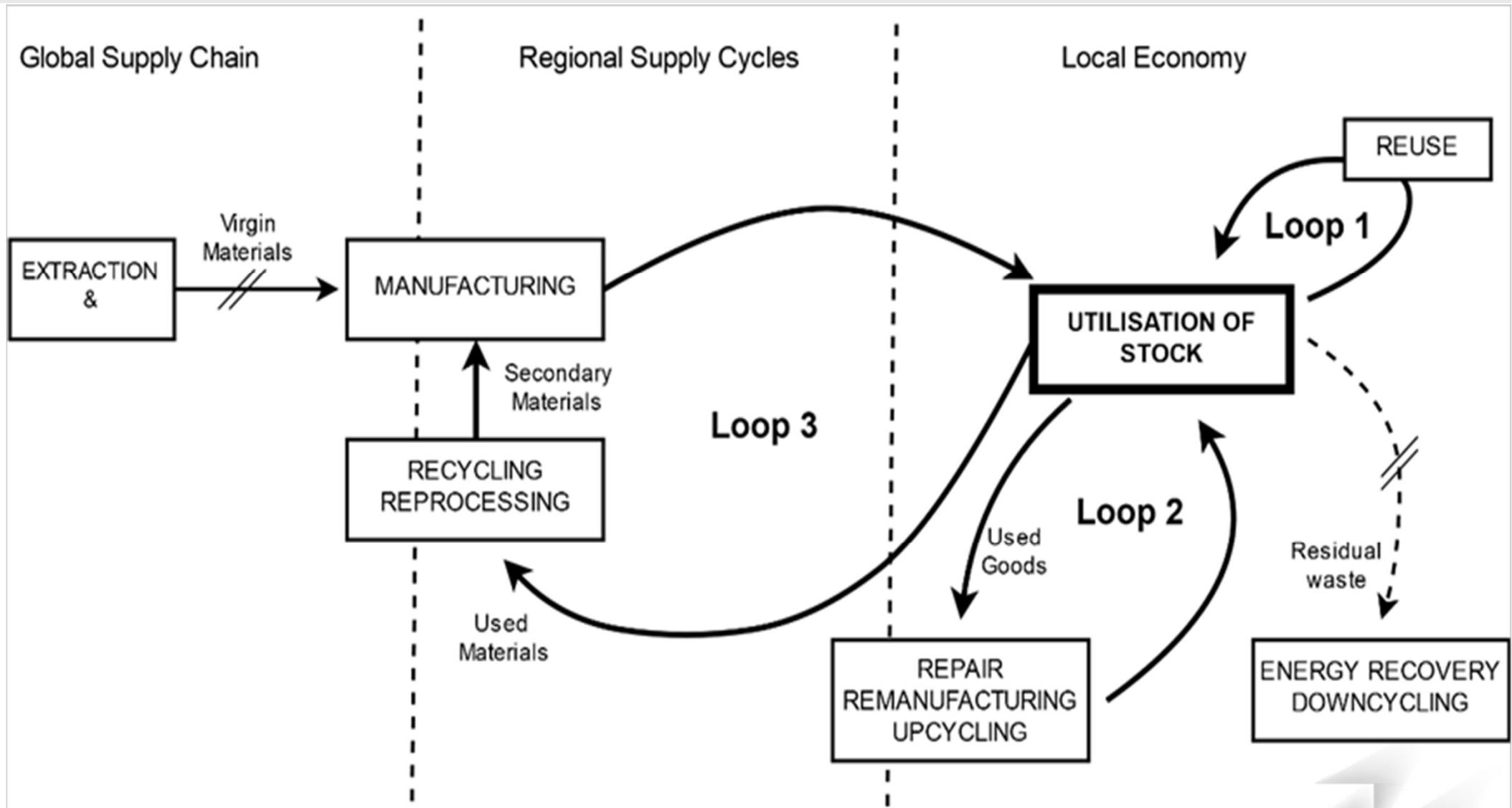
Challenges and benefits of cities

Challenges	Benefits
<ul style="list-style-type: none">▪ Structural waste and economic losses in cities	<ul style="list-style-type: none">▪ Increase disposable income
<ul style="list-style-type: none">▪ Ecosystem degradation and negative environmental impacts	<ul style="list-style-type: none">▪ Reduce carbon emissions
<ul style="list-style-type: none">▪ Consumer culture and lifestyles	<ul style="list-style-type: none">▪ Increase livability
<ul style="list-style-type: none">▪ Growing inequality within cities	<ul style="list-style-type: none">▪ Potential for positive impact on employment opportunities in the city
	<ul style="list-style-type: none">▪ Health benefits

[cscp | BertelsmannStiftung 2019: P21&32f.](#)



INTRO _ THE BASIC LOOPS OF CE



Source: modified from on Stahel and Clift (2016)



CE HUBs

Understanding and further focus

- a) CE HUBs in the CITYCIRCLE application
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 - different approaches



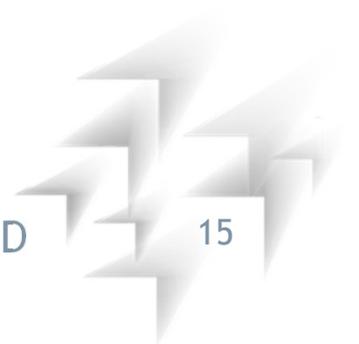
CE HUBs

Understanding and further focus

a) CE HUBs in the CITYCIRCLE application

- Objectives
- Project relevance & approach

→ Understanding of CE HUBs in
non-metropolitan cities of Central Europe



Application - objectives

1. Setting-up quadruple-helix CE hubs in partner cities - **non-metropolitan cities of Central Europe** in order to establish **linkages among key circular economy stakeholders** (companies, public administration, universities and citizens).

Specific objective

All partner cities are dedicated to improve their innovative capacities by interlinking key innovation actors (public administration, companies, public utilities, R&D institutions, end-users) into circular economy hubs.

These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field - material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). ...



Application - objectives

2. enabling and facilitating the innovation processes in CE cities by educating quadruple-helix stakeholders and providing tools for the management of efficient CE innovation processes and to deploy CE solutions.

Specific objective

Since the concept of CE is new to many stakeholders in partner cities, building a knowledge base in newly-established hubs is necessary to enable them to work in the field.

A set of tools will be provided to equip hubs with guidelines at the development of CE solutions. They will provide instructions and tips on how to design value-chains in CE and will also give RIS3 national strategy framework and showcases from all partner countries.



Application - project relevance & approach

By establishing CE **quadruple-helix hubs as local innovation networks** of private and public institutions in partner cities, CITYCIRCLE will provide innovation systems to facilitate innovation and transfer of technology, services and business models.

By providing hubs with tools and knowledge, the project will enable the hubs to generate innovative solutions in CE in their urban ecosystems in a long-run.

CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix circular economy hubs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level.

Thus, CITYCIRCLE is placing the cities and their administrations in a heart of CE ecosystems and is introducing cross-sectorial horizontal approach with quadruple-helix partnership management structure.



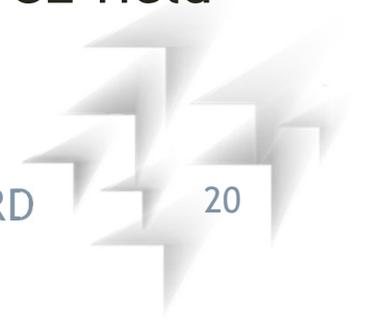
CITYCIRCLE - HUBS UNDERSTANDING

CE HUB _ Understanding	
<ul style="list-style-type: none"> Where ? 	<ul style="list-style-type: none"> Peripheral urban centres = non-metropolitan cities of Central Europe
<ul style="list-style-type: none"> Who ? 	<ul style="list-style-type: none"> quadruple-helix - establish linkages among key CE stakeholders → public administration, companies, public utilities, universities, R&D institutions, citizens
<ul style="list-style-type: none"> What ? 	<ul style="list-style-type: none"> improve innovative capacities cross-sectorial horizontal approach
<ul style="list-style-type: none"> By establishing CE quadruple-helix HUBs as local innovation networks of private and public institutions in partner cities. These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field – material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). 	
<ul style="list-style-type: none"> CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix CE HUBs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level. 	



CE quadruple-helix HUBs

- key innovation actors
 - public administration,
 - companies,
 - public utilities,
 - R&D institutions,
 - end-users
- circular economy hubs
 - new innovation networks or existing networks transformed
 - will provide a space for designing new solutions in the CE field



CITYCIRCLE - HUBS UNDERSTANDING



- Who can enable the transition to a circular city ?
- a collaborative effort across the value chain is needed,
 - involving individuals,
 - the private sector,
 - different levels of government,
 - civil society.



CE HUBs

Understanding and further focus

b) Classification of Cities

- Why is a classification needed ?
“Cities are different. So are solutions.”
- Different approaches
 - Ellen MacArthur
 - cscp | Bertelsmann
- ➔ Further focus when examining literature and examples



Ellen MacArthur Foundation

Publication: City Governments and their Role in Enabling a Circular Economy Transition - an Overview of Urban Policy Levers: March 2019.

Examples: “Over 100 cases from more than 70 cities around the world have been included to provide short, practical examples of the various policy steps ...” ([Ellen MacArthur 2019](#): P9.)

City levels: taken into consideration

- Capitals
- Major cities
- Smaller cities

Also mentioned: regional / national level



“Cities are different. So are solutions.”

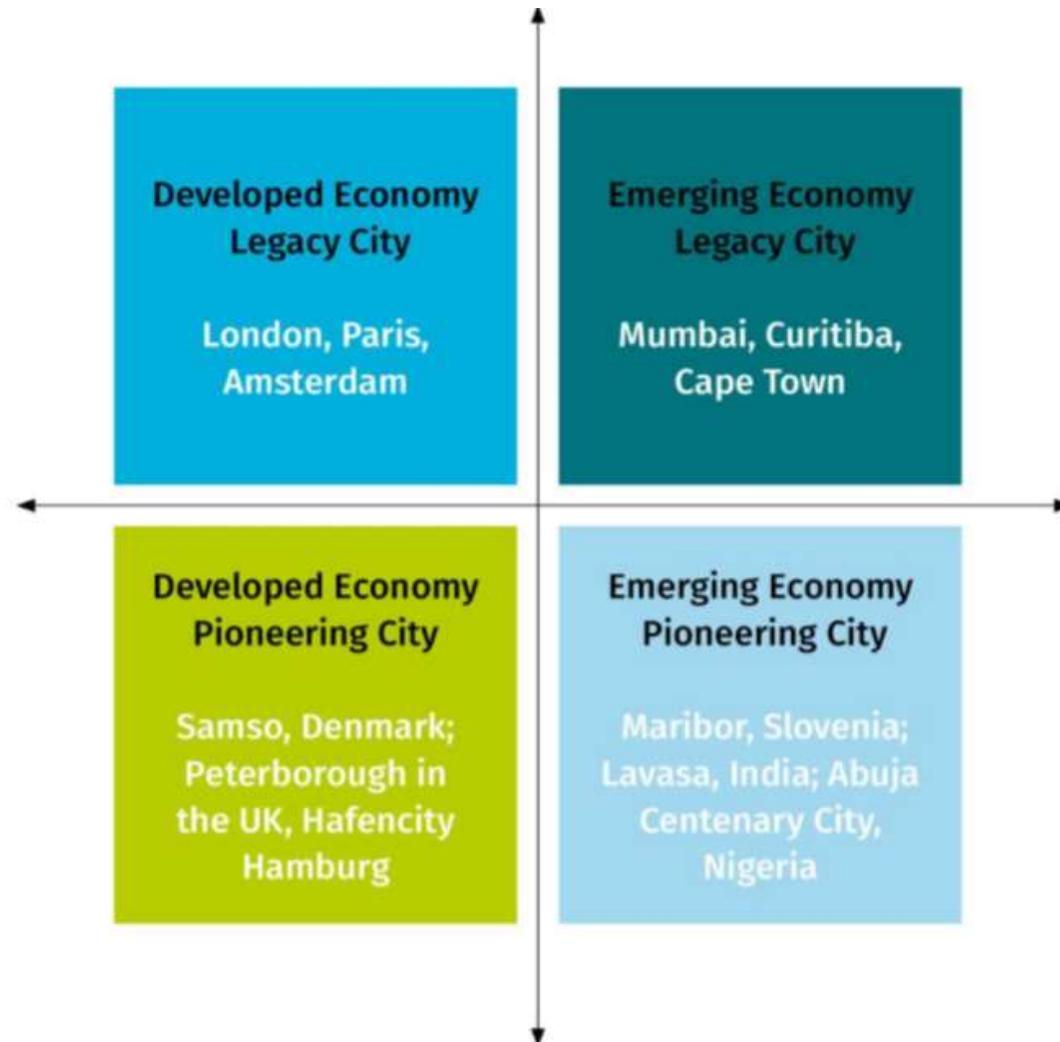
“The prospect of urban innovation excites the imagination. But dreaming up what a “Circular City” will look like in some gleaming future is, by its nature, a utopian exercise. The fact is that no two cities are same, what’s appealing for the young in Copenhagen certainly won’t help millions of workers in Dhaka or Lagos.”

[cscp | BertelsmannStiftung 2019: Monitor Sustainable Municipalities. Key topic Circular Economy. Report. P21.](#)



CITYCIRCLE - CITIES CLASSIFICATION

CE city framework - four quadrants



CITYCIRCLE - CITIES CLASSIFICATION

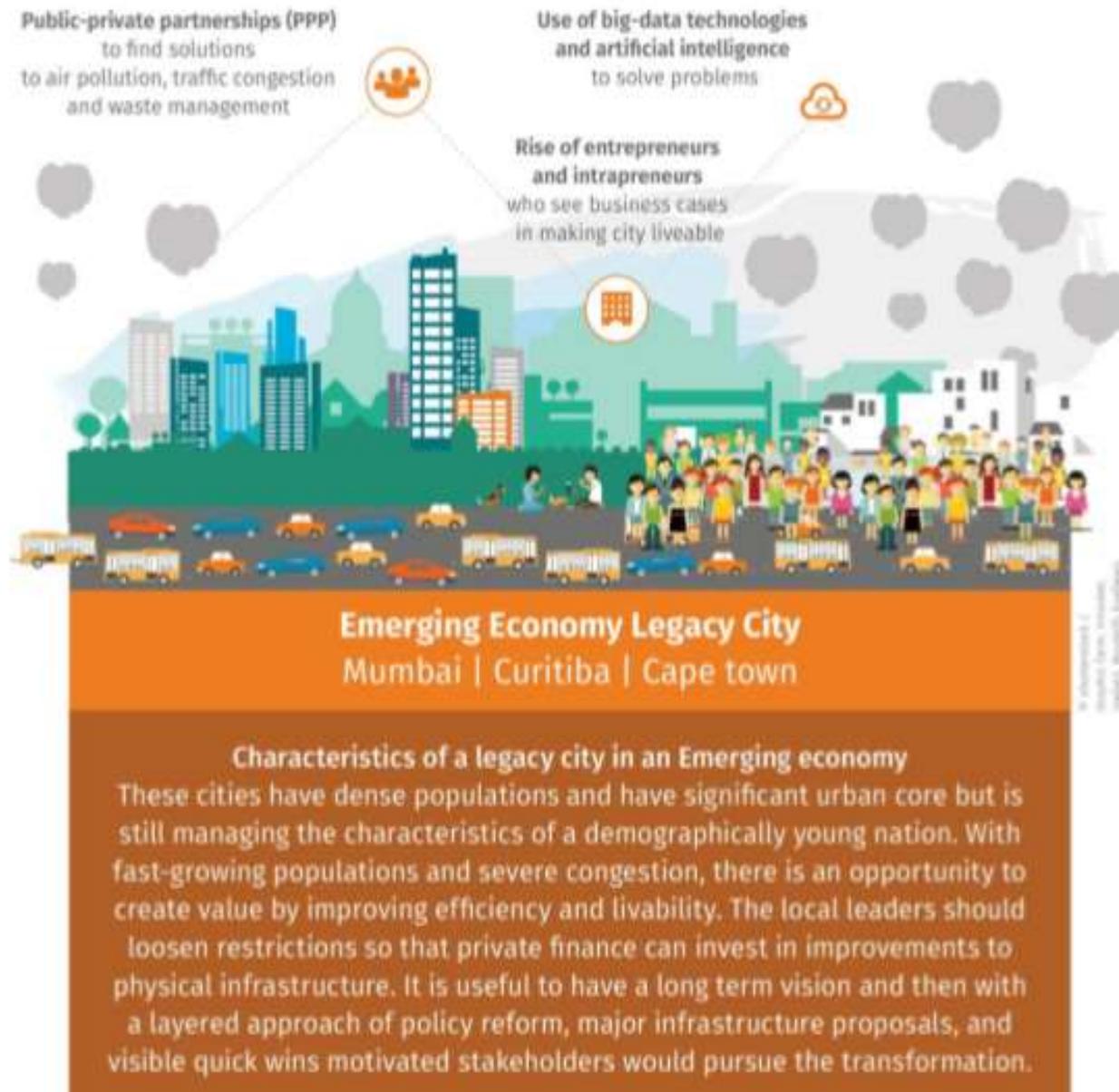


Initiatives - Emerging / pioneering

- The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.
- Lavasa, India, a hill city prone to monsoons, droughts, and threats of erosion, has been modelled after the ecosystem of the dense forest around it incorporating the principles of Biomimicry.
- UrbanWINS project which is funded by the Research and Innovation Program Horizon 2020 that studies how eight cities in Europe consume resources and products, and how they eliminate the waste produced, in order to develop and test innovative plans and solutions aimed at improving waste prevention and management.
- Abuja Centenary City is using biomimicry on a systems level. The city is being modelled on nature's systems in terms of its transportation, water and waste management, energy production.
- The historic city of Izmir, Turkey is using the urban metabolic approach to harness the output of one urban system, like solid waste management, to fuel another, like electricity generation.



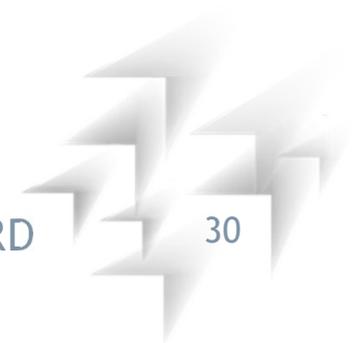
CITYCIRCLE - CITIES CLASSIFICATION



CITYCIRCLE - CITIES CLASSIFICATION



CITYCIRCLE - CITIES CLASSIFICATION



CE HUBs

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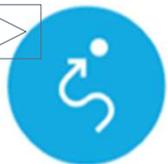
What can a local authority do ?



Urban policy levers



Interlinkages & relationships between policy levers



ROADMAPS AND STRATEGIES

- No single route for developing CE city roadmaps exists
- Making use of urban metabolism tools
- Taking a sector-based approach
- Co-developing city visions with a wide range of urban stakeholders
- Stimulating skill development
- Running capacity-building workshops and development guides
- Supporting physical community innovation and repair hubs
- Developing material marketplaces and skills for new material applications
- Developing tailored capacity building programmes for local businesses and entrepreneurs
- Using participation mechanisms to uncover CE opportunities
- Making information on CE city plans and initiatives easily accessible online
- Hosting and supporting awareness-raising events
- Using communication campaigns to encourage new habits
- Sharing information on local services and needs to support CE practices
- Developing projects that can inspire and showcase the potential of a CE



15 circular steps for cities

PLAN	1. Characterise and analyse local context and resource flows, and identify idle assets
	2. Conceptualise options and prioritise among sectors with circular potential
	3. Craft a circular vision and strategy with clear circular goals and targets
ACT	4. Close loops by connecting waste/residue/water/heat generators with off-takers
	5. Consider options for extending use and life of idle assets and products
	6. Construct and procure circular buildings, energy and mobility systems
	7. Conduct circular experimentation – address urban problems with circular solutions
	8. Catalyse circular developments through regulation, incentives and financing
	9. Create markets and demand for circular products and services – be a launching customer
	10. Capitalise on new ICT tools supporting circular business models
MOBILISE/ MONITOR	11. Coach and educate citizens, businesses, civil society and media
	12. Confront and challenge linear inertia, stressing linear risks/highlighting circular opportunities
	13. Connect and facilitate cooperation among circular stakeholders
	14. Contact and learn from circular pioneers and champions
	15. Communicate on circular progress based on monitoring



What can a local authority do?

REORGANISE YOUR CITY

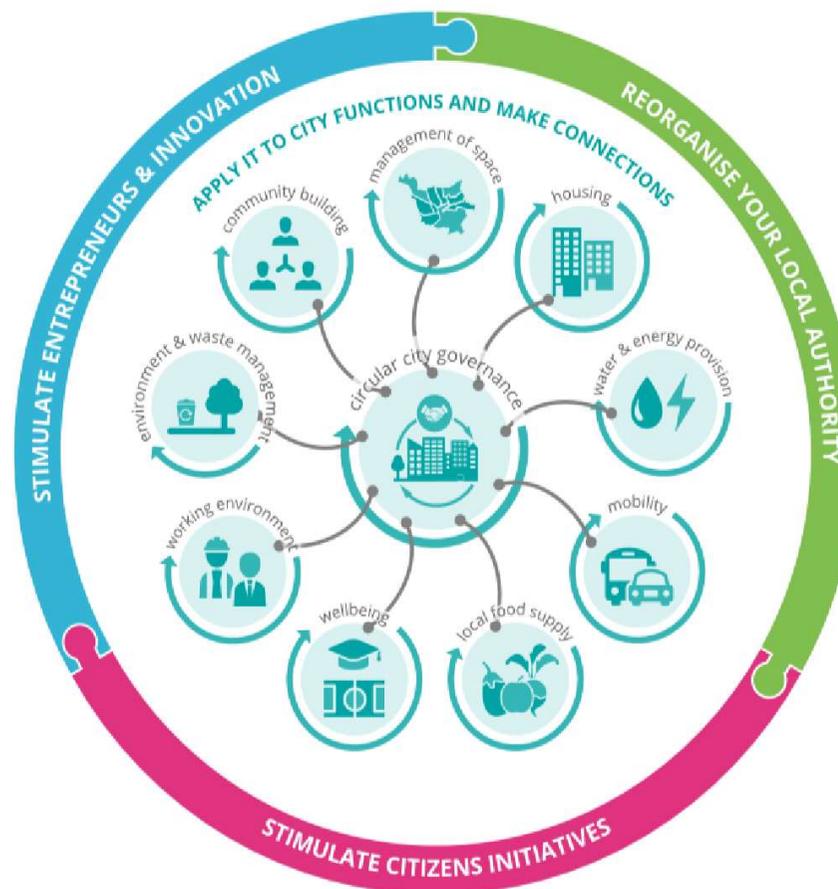
- 1 Create common long term ambition , with political support & use it in your branding
- 2 Set up cooperation between city departments and appoint a coordinator
- 3 Act circular (circular procurement, futureproof urban planning, sustainable building,...)
- 4 Get insights in your resources (waste, water, materials,...)

STIMULATE CITIZENS INITIATIVES

- 5 Promote sharing & functional economy
- 6 Raise awareness and coach citizens
- 7 Support bottom up initiatives through legislation, funding, cooperation, communication,...

STIMULATE ENTREPRENEURS & INNOVATION

- 8 Stimulate local symbioses through (business park) networks, smart technologies,...
- 9 Create incentives to attract circular business (offer space, taxes, subsidies,...)
- 10 Communicate success stories



Circular strategies to focus on

GENERAL AND TECHNICAL NUTRIENTS



BIOLOGICAL NUTRIENTS



CITY GOVERNMENTS - ROLE

1	Create a circular strategy if possible, but, it can also be equally effective to integrate circular principles and actions in an existing long-term climate strategy, or in a LT plan to reach the Sustainable Development Goals. Several examples of a circular vision can be found at #CEStakeholderEU .
2	A new method of collaborating - both between the city's various departments and its inhabitants and companies - is required to effectively implement a circular strategy. Through the infographic you can see how different functions in a city can lead to circular breakthroughs, e.g. sharing initiatives have a positive impact, both from a poverty prevention perspective and from an environmental department.
3	In their exemplary role, cities can have a huge impact on the implementation of a circular strategy. By using their purchasing power, they are able to grow the market for circular suppliers as well as lead by example. You can find some examples and context through The Urban Agenda on Public Procurement and the European ProCirc project with focus on circular procurement. The Urban Agenda CE Partnership and onLand Use Partnership created a handbook together on the reuse of buildings and spaces.
4	The lack of data and indicators for CE transition on a city level is an important barrier. Therefore, the Urban Agenda has listed 30 indicators to help cities with their strategy and in their use of data of resources for policy improvements. Collected data often end up in a drawer, but could be used as an input for circular actions.



CITY GOVERNMENTS - ROLE

5	A city can support sharing initiatives originated by citizens by providing a space or people to help in the organization, but they can also share their own assets as cars, tools, or buildings. In close partnership with ESPON, the partnership for CE has created a Collaborative Economy Knowledge Pack for cities.
6	Cities who invest in awareness-raising and training of citizens, see an increase of bottom-up initiatives and a wider acceptance of necessary actions. The Urban Resource Centres described in the Urban Agenda are testbeds for circular solutions and influence the behaviour of citizens. Examples of collaboration with schools and Higher Education can also be found on the #CEstakeholderEU .
7	When citizens organise events, repair cafes, and circular challenges, a city can help with the communication, promotion and with the exchange of knowledge and experiences. But, as a city you can also offer support with financial incentives. More information in the Circular City Funding Guide .
8	Cities play a crucial role in local symbioses because they have the overview of resources and stakeholders in their region. The Circular Resource Management Roadmap created within the Urban Agenda CE Partnership helps cities to create a step by step resource efficiency plan.
9	Cities can support businesses by simplifying legislation, or adjusting the city tax system in favour of circular business models. Examples on financial support can be found in the Circular City Funding Guide .
10	Startups or companies who invest in circular business models need extra marketing support to inform potential clients. Cities have a lot of communication tools to give those companies extra exposure, while a city also benefits from this publicity. Success stories can be posted and found on the #CEstakeholderEU .



Circular city governance: opportunities and challenges



OPPORTUNITIES

- 1 Develop and communicate a long-term, holistic vision about the circular ambitions of the city
- 2 Introduce cross-thematic coordination and promote a culture of cooperation and knowledge exchange and creation within the own municipal organisation.
- 3 Identify, address and include non-municipal stakeholders early on in the transition process (e.g. businesses, knowledge institutes, citizens) - in order to craft the process to come to circularity within an urban context, together.
- 4 Analyse the urban metabolism (material and energy streams, bio-sources and sinks) as a basis for developing a strategic plan for the CE transition with contextualised priority sectors.
- 5 Use circular public procurement to create demand for circular innovations.
- 6 Educate consumers (and other stakeholders) in civil society and more in particular cities based on an inclusive and participatory approach. In order for the CE to thrive in an urban context, co-creation from the start with citizens is crucial.
- 7 Identify external sources of funding/financing for CE initiatives and projects available at EU and/or national level to complement the cities' own budgetary sources and get acquainted with their rules and procedures.
- 8 Facilitate appropriate spaces and funding for experimentation, (private) innovation, knowledge transfers and match-making in the field of CE for businesses, research institutions and interested citizens.
- 9 Create forums with like-minded cities at the national (and possibly also at EU) level to lobby for necessary changes in EU and national legislation that currently block the transition to a CE.
- 10 Continuous monitoring and evaluation of implementation of circular projects and initiatives, with the aim to develop a solid knowledge base and provide feedback to guide/adjust the transition process.



CHALLENGES

- 1 Political support is key in creating a common long term vision on circular economy developments.
- 2 Confusion and a wide range of interpretations on what the circular economy is, what the transition to a circular economy requires, and why it is relevant.
- 3 The circular economy is often only regarded from a waste or environmental management perspective, instead of from a wider multi-sectoral economic development perspective.
- 4 Circular projects require new and far-reaching levels of cooperation and coordination amongst all stakeholders involved. This is difficult to organise and maintain.
- 5 Citizens awareness and participation is very low.
- 6 There are insufficient funds available to support circular projects and programmes.
- 7 Private innovation power for circular companies can be insufficient.
- 8 City development strategies are currently often made in silos.
- 9 The current tax system obstructs circular development.
- 10 Current (waste) legislation hinders innovative reuse and/ or recycling of products and materials.



CE HUBs

Special focus: Clusters in the CE transition

Building partnerships for sustainable transition of SMEs

- Ambition of clusters
- Cluster support
- Study results from Denmark
- How clusters are powering the circular transition



Clusters role

- Ambition of clusters must be to support companies - especially SME's -
 - to more efficiently tap into new knowledge and business opportunities in the CE,
 - to boost their specialization, possibilities for investments,
 - to internationalise and get access global value chains.
- Clusters support
 - changing mindsets,
 - developing new competences,
 - rethinking business models,
 - supplying living labs and
 - defining new costumers and green investors.

[“Clusters in the Circular Economy” is co-financed by Interreg Baltic Sea Region Project Circular PP and Cluster Excellence Denmark. Sept 2019. P3 & 5.](#)



Study results from Denmark

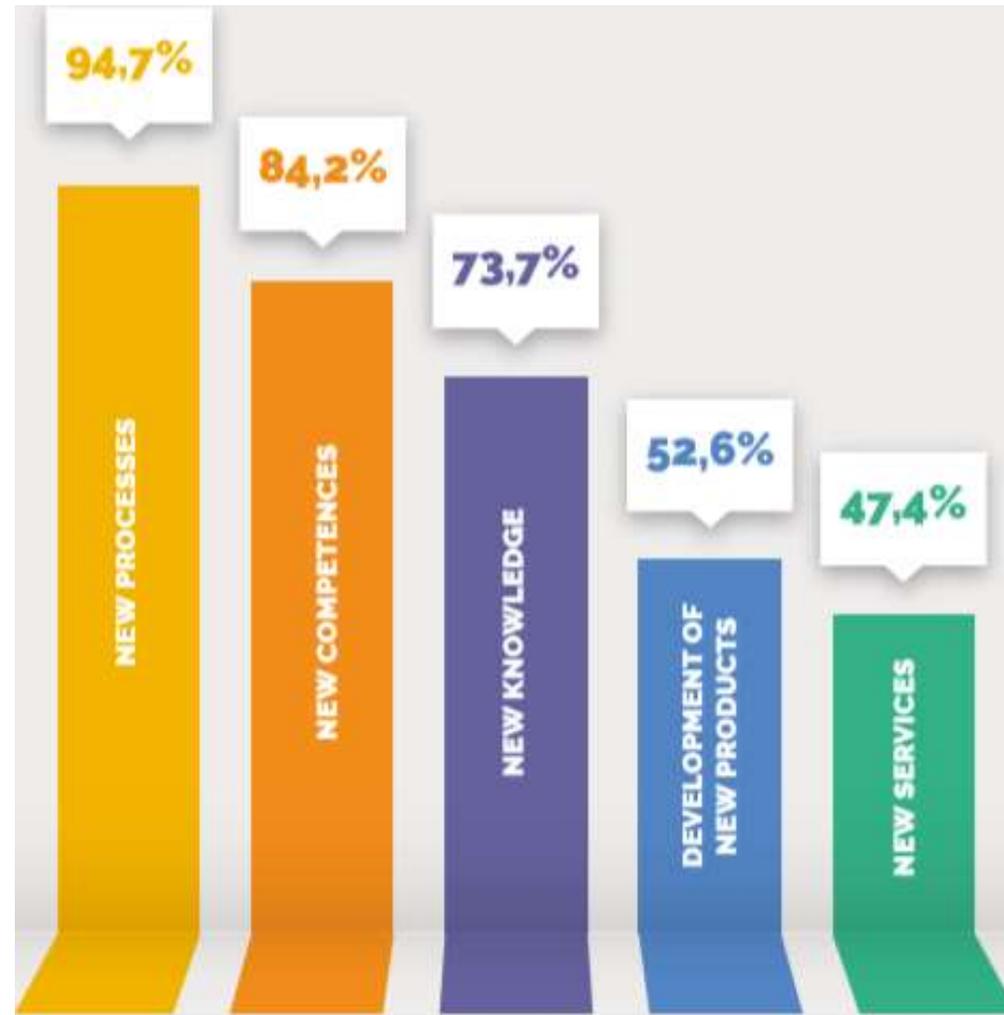
- roundabout 250 green clusters in Europe with a high potential for pushing the CE forward faster and more efficient
- 2/3 of the Danish clusters are involved in CE
- also clusters not directly related to the classical green sectors are working with CE in their sectors

[“Clusters in the Circular Economy”, 2019: P6.](#)



Study results from Denmark

- key impacts for companies are ...



“Clusters in the Circular Economy”,
2019: P6.



Study results from Denmark

- Variety of services developed ...



“Clusters in the Circular Economy”,
2019: P7.



How clusters are powering the circular transition

- Clusters building bridges to circular knowledge
- Clusters putting circular policy into action
- Access to circular funding for SME
- Clusters and sustainable development goals
- Circular public procurement supported by clusters

[“Clusters in the Circular Economy”, 2019: P8ff.](#)



CE HUBs _ cases / examples

Focus on city governments and clusters

a) Learning Centres of CE

Transforming Municipality Districts

Case Maribor, Slovenia

b) Learning Centres and Entrepreneurial Networks

IMPACT HUBS

c) A Network of Regional Innovation Hubs

C-VoUCHER

d) Clusters

Case Ostwestfalen-Lippe



CE at EIT Climate-KIC

- In the focus area CE “EIT Climate-KIC empowers entire regions, industries and communities to implement a bold transition towards circular economy. To us, this means combining tailored actions across **education**, **entrepreneurship** and **innovation** to change whole systems from linear to circular.”
- The Circular Cities project is investigating how a city district and areas can be a transforming agent and create smart and sustainable neighbourhoods.

[EIT Climate-KIC: Transforming Municipality Districts into Learning Centres of Circular Economy. In partnership with the EIT Climate-KIC Circular Cities Project. 2019: P4.](#)



Transforming Municipality Districts

“The aim of this publication is to showcase how different municipalities create innovation platforms where entrepreneurs, NGOs and community groups can turn different waste streams into new products, new design, new innovative ideas and how these efforts can generate work and at the same time minimise waste.”

[EIT Climate-KIC. 2019: P3.](#)



How municipal cases can work as drivers towards CE

- The report showcases 13 (14) examples of specific CE HUBs at a district and area level to explain how cities across Europe concrete circular economic concepts have been designed and executed, including a detailed explanation for the potential CE business cases and technologies which can cascade circular business opportunities.
- 2 pages per case with the following outline
 - Who was the team?
 - What was the vision/goals?
 - What is the local waste recycling context?
 - How did you do it? (your approach)
 - What was done? (activities)
 - What was achieved? (impact)
 - What were the challenges?
 - Next steps
 - City Contact Details
 - Summary
 - Time period
 - Information source



CE HUBS _ MUNICIPALITY DISTRICTS

CE topic	Where ?	What ?
Product reuse & remanufacture	<ul style="list-style-type: none"> Gothenburg, Sweden Berlin, Germany Hjorring, Denmark 	<ul style="list-style-type: none"> CURE Pathfinder project - Centres for Urban Remanufacture Repos project - People, preservation, purpose: Reuse of large household appliances
Sustainable living & construction	<ul style="list-style-type: none"> Trondheim, Norway Malmö, Sweden Maribor, Slovenia 	<ul style="list-style-type: none"> Experimental housing at Svarlamon Sege Park - Urban district for circular living CINDERELA - Resource efficient construction sector
Waste systems	<ul style="list-style-type: none"> Maribor, Slovenia Trento, Italy 	<ul style="list-style-type: none"> Sorting plant for mixed municipal waste Greencycle: introducing a Csystem to Alpine Space to achieve low carbon targets
Engagement hubs and urban labs	<ul style="list-style-type: none"> Trondheim, Norway Copenhagen, Denmark Helsinki, Finland Utrecht, Netherlands 	<ul style="list-style-type: none"> City libraries as platforms for repair, exchange and lend Circular South Harbour Smart Kalasatama Werkspookwartier: Creative circular manufacturing
Food and agriculture	<ul style="list-style-type: none"> Aarhus, Denmark Maribor, Slovenia 	<ul style="list-style-type: none"> From Grounds to Gourmet Urban soil 4 food



Findings

- City-led physical location where to learn and work with circular economy concept under the mantra "Reduce-Reuse-Recycle-Rethink" is an effective and low cost way to accelerating the transition to the CE and to scale out good ideas and test new innovative initiatives.
- Through engaging the general public, city administrations can expect to become more up-to-date with regards to the newest circular knowledge and ideas available.
- Most of the cases presented have created a social media outreach and created an ecosystem which thrives and accelerate to new ideas and create knowledge sharing.
- In the longer term, City-led CE learning centre can help facilitate a number of co-benefits including social engagement, profit, learning, inspiration and just make the circular transition an every-persons business.
- ➔ Through the provision of resources, material, data and professional feedback, cities can encourage and support individuals and start-ups whilst reaping the benefits of improved circular solutions tailor made for use in their situation.
- ➔ By reaching out to the community groups and entrepreneurs, the city administration can find itself more closely engaged with its public, promoting participation in city issues and increasing awareness of the climate and sustainability in general.
- ➔ Through adopting the Open Innovation concept and taking the lead in sustainable innovation processes, cities will be able to brand themselves as front-runners in the race to achieve their climate goals on the international stage.



Barriers to successful implement circular learning centre

- Implementing circular learning centres into the operations of a city isn't necessarily straightforward.
- Regulatory barriers should not hinder that community, entrepreneurs and the general public get actively involved in the circular transition and use available city districts as testbeds to fast track a circular city transition
- Barriers such as the fragmented administrative landscape within the city municipal boundary can also be difficult to overcome.
- Certain solution providers find that the time frames that administrative municipalities commonly work to can be problematic with their own.
- It is apparent that a large proportion of the barriers to create more circular economy learning centres arise due a city's lack of resource capacity and or mismatch in skill set.
- In many cases, it is useful for progressive and ambitious administrations to enlist the help of experienced facilitators who can assist with the planning and organisation of the learning centres.



Key learnings

Stakeholders need to be kept motivated.

- CE learning centres, by definition, involves large numbers of actors, stakeholders and collaborators.
- Circular district can be difficult to manage, particularly when motivation to engage with the process is driven by the desire to create differing forms of value.

A varied stakeholder group often produces the best results - “multi-actor” platform.

- CE learning centres is often more effective when it includes actors from different backgrounds - i.e. start-ups, SMEs, corporates, universities, the public sector etc.
- Access and exposure to the different knowledge, experiences and thoughts typically held by different types of individuals and organisations ensures that certain new, more alternative or up-to-date thinking, applicable to the desired solution(s) aren't missed.

Match-makers help, a lot.

- Successful implementation processes in the CE learning centres benefit from supporting actors who connect and match stakeholders together, build bridges between them and act as brokers between the different sub-divisions of the collaboration.
- These match-making nodes are essentially acting as civic accelerators, building bridges between players.
- Match-makers can become key in keeping the overall process in motion.



EIT Climate-KIC - another report

Municipality-led circular economy case studies

- Published in collaboration with C40, this first project publication provides a unique overview of concrete circular economy initiatives from cities through 40 examples from around the world. It showcases how cities today are viably putting the circular economy concept into practice to realise systemic change on a district and city level, which can then be scaled-up, not only regionally, but internationally as well.

EIT Climate-KIC: Municipality-led circular economy case studies. In partnership with the EIT Climate-KIC Circular Cities Project. 2018.



CE HUBS _ LEARNING CENTRES

City-wide circular strategy

Amsterdam, The Netherlands Amsterdam's circular economy roadmap and projects in the construction value chain	14
Brussels, Belgium Regional program for a circular economy: 'Be Circular'	18
Cape Town, South Africa Industrial symbiosis program	22
Copenhagen, Denmark Circular Copenhagen – resource and waste management plan	24
Glasgow, Scotland Inspiring businesses to innovate and become future-proof	26
Gothenburg, Sweden Circular Gothenburg	30
Helsinki, Finland The Kalasatama district's urban laboratory	32
Kristiansand, Norway Green business idea competition and growth support	36
Ljubljana, Slovenia A national roadmap leading to specific city-level actions	38
Maribor, Slovenia Circular economy strategy working closely with the public utility companies	40
Paris, France City-wide circular economy strategy	44

Phoenix, USA Redefining waste through a Resource Innovation Campus	46
Samsø, Denmark Circular economy for the whole island	50
Seoul, South Korea Sharing City Seoul, aiming to engage all 10 million citizens	54
Tel Aviv, Israel Commencing the journey for the City to reach 10 circular projects	58

Urban refurbishment

Houston, USA Re-use warehouse for construction materials	64
Paris, France 3D mapping project supporting policies for low carbon buildings	66
Sydney, Australia Co-creating industry guidelines for circular office refurbishments	68
Vienna, Austria Supporting dismantling services for large industrial buildings	72

Procurement

Berlin, Germany Ecological criteria embedded in the public procurement process	76
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Helsinki, Finland Coordinating the reuse of excavated land mass in construction projects across the city	78
Paris, France Transnational responsible procurement working group	80
Tokyo, Japan Circular initiatives within the Tokyo 2020 Olympic and Paralympic Games' Sustainability Plan	82
Toronto, Canada Journey towards circular economy procurement	86

Utilities

Aguascalientes, Mexico Water fund to support the City's water shortage	92
Arras, France Heat recovered from waste-water treatment for a public aquatics centre	94
Basel, Switzerland Gold award winner for Basel's progress towards a low-energy city	96
Helsinki, Finland The largest heat-pump plant in the world to produce heating and cooling	98
Lille, France Biointensive micro-farming in the Concorde district	100
Malmö, Sweden Industrial symbiosis in the harbour area	102

Pécs, Hungary One of the largest generators of energy from biomass in Europe	104
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Civic waste

Austin, USA Online marketplace for re-using materials	108
Eskilstuna, Sweden The world's first circular shopping centre	110
Kristiansand, Norway Citizen and business collaboration centre	112
Kristiansand, Norway Secondhand store led by the municipal waste company	114
New York, USA Donation online market place and supporting initiatives	116
Paris, France Local production, repair and re-use initiatives	118
Quezon, Philippines Regulations on the use of plastic bags to help curb ocean plastics	120
Stockholm, Sweden The world's first large-scale 'biochar' urban carbon sink	124
Vienna, Austria Initial government support helped to create Austria's largest independent repair and service centre for electrical goods	128



Further example

CRCLR - Hub for Circular Economy in Berlin

- The CRCLR House is a Berlin based center for CE practices.
- CRCLR is a Think- and Do Tank and stands for “circular”.
- The CRCLR mission is to catalyse the transition towards a CE.

“The CRCLR team has created a unique, open space to explore creative community-based solutions to systemic global problems. It’s the place to be for all things circular in Berlin.” Joe Iles, Ellen MacArthur Foundation.

<https://crclr.org/about/about-crclr>



Case MARIBOR, Slovenia

- Already mentioned in CITIES CLASSIFICATION _ emerging economy / pioneering city _ The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.
- 3 times mentioned in the EIT Climate-KIC report

CE topic	Where ?	What ?
Sustainable living & construction	▪ Maribor, Slovenia	▪ CINDERELA - Resource efficient construction sector
Waste systems	▪ Maribor, Slovenia	▪ Sorting plant for mixed municipal waste
Food and agriculture	▪ Maribor, Slovenia	▪ Urban soil 4 food



Webinar presentation

Further Reading:

[WCYCLE Institute Maribor: Strategy for the Transition to Circular Economy in the Municipality of Maribor. Maribor, July 2018.](#)

As well as on the next slides:

[WCYCLE Institute -](#)

Re-thinking the business model of Maribor

<https://www.circularcityfundingguide.eu/case-studies/wcycle-institute-re-thinking-the-business-model-of-maribor/>



WCYCLE Institute - Re-thinking the business model of Maribor

The City of Maribor recognized at an early stage the potential of the CE as an approach to regional development. However, the Slovenian city acknowledged that it did not have enough implementation capacity to fulfil its full circular potential and therefore established the WCYCLE Institute. The institute is established as a platform for the local utility companies to re-think their business models. The institute has become a good platform to discuss and initiate new CE projects for different stakeholders in the city and the region. The focus of the institute is long-term, in line with the city's well-developed strategy for the transition to a CE. Implementation of projects, however, is already well on its way.

WCYCLE

The WCYCLE Institute brings together the following five local utility companies:

- Snaga: public waste management company
- Energetika Maribor: public energy company
- Nigrad: public company for infrastructural works
- Mariborski vodovod: public water company
- Marprom: public company for urban transportation



WCYCLE Institute - Re-thinking the business model of Maribor

Together, the five companies are responsible for the management of a majority of local material streams. The institute has identified twenty projects to improve the circularity of these streams and the related business case. To foster collaboration between partner organisations, it was agreed that initiated projects have participation from and should benefit at least two of the five utility companies.

Implementation of projects

The preparatory phase of the institute, around 2016, coincided with the development and start of a project for the Interreg Alpine Space Programme called Greencycle. This project was initiated to define a strategy for the circular transition in Maribor, with the central idea that CE provides a holistic approach for the implementation of low-carbon strategies. In 2018, the Strategy for the Transition to CE was finalised and it now provides a strong basis for the implementation of new projects.



WCYCLE Institute - Re-thinking the business model of Maribor

The Institute identified, in this respect, the following initiatives to improve the circularity of local resource streams:

- **Automated waste sorting plant:** the construction of the plant started in 2017. The plant has a capacity to process almost 40.000 tonnes per year of mixed municipal waste. The ambition of the plant is to eventually extract 77% of the waste inputs as materials for recycling and 9% for energy recovery, leaving only a small share for landfill disposal.
- **Urban Soil 4 Food (Urban Innovative Actions):** in this project, organic waste is composted and mixed with soil from construction works in the city to create a soil that can be used for food production, in parks, and for construction.
- **Cinderela project (Horizon 2020):** in 2018, Maribor started collaborating with twelve partners from seven countries in this project that aims to create CE business models to achieve more sustainable urban infrastructure.
- **Winpol Interreg Europe:** in this project, the city collaborates with eight other European cities with a common focus to implement new waste innovation technologies. In the project, the City of Maribor optimised its waste collection transport routes and introduced a Re-use market.



WCYCLE Institute - Re-thinking the business model of Maribor

Lessons learned

Based on the achievements of WCYCLE and the City of Maribor, several lessons can be learned:

- Establishing a platform involving local actors can be an effective way to foster collaboration in your city or region. The WCYCLE Institute's experience shows that this collaborative approach can help implement projects aiming at closing material loops.
- When looking for ways to make a city more circular, it can be helpful to use the circular perspective to assess current costs with a view to identify inefficiencies and cost-saving solutions. In Maribor, the absence of a bio-waste treatment facility required waste to be transferred to an external facility for treatment, with associated high transport and treatment costs. By building a composting facility in the city, the bio-waste could be turned into compost locally at a lower cost, with a revenue stream from the sale of compost.
- Grants were used to fund the pilot activities of the City of Maribor and the WCYCLE Institute. Co-funding requirements and the short-term character of these funding mechanisms can often limit their applicability for scale-ups and larger projects.

IMPACT HUB

Entrepreneurial Networks as Drivers for Positive Change

«We are one of the world's largest networks focused on building entrepreneurial communities for impact at scale – home to the innovators, the dreamers and the entrepreneurs who are creating tangible solutions to the world's most pressing issues.»

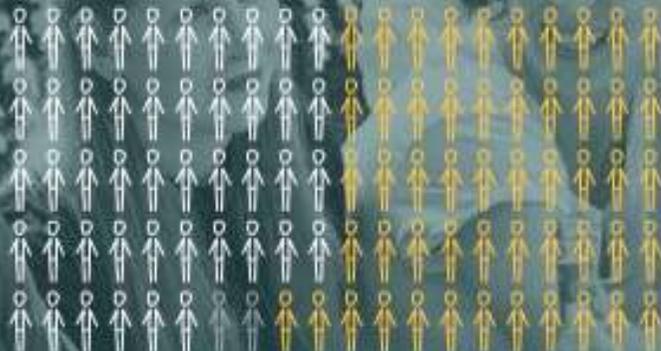
- IMPACT HUBs offer:
 - Community and Workspace
 - Startup Support
 - Programs and Events





16,500
members

More than half
of our members are
founders or co-founders



Female Other Male

Reach overall: **20MIL**
Reach customers and beneficiaries: **7MIL**

THE IMPACT of our Members in 2018

Community is at the core of any entrepreneurial network. Our Impact Hub community members fuel innovation, foster education and create employment opportunities through the vibrant solutions they start-up, grow, and scale.

1,800 new ventures created
10,000+ new ventures since 2012
6,000 net new jobs created
29,000+ since 2012

65%
of members achieved double digit revenue growth

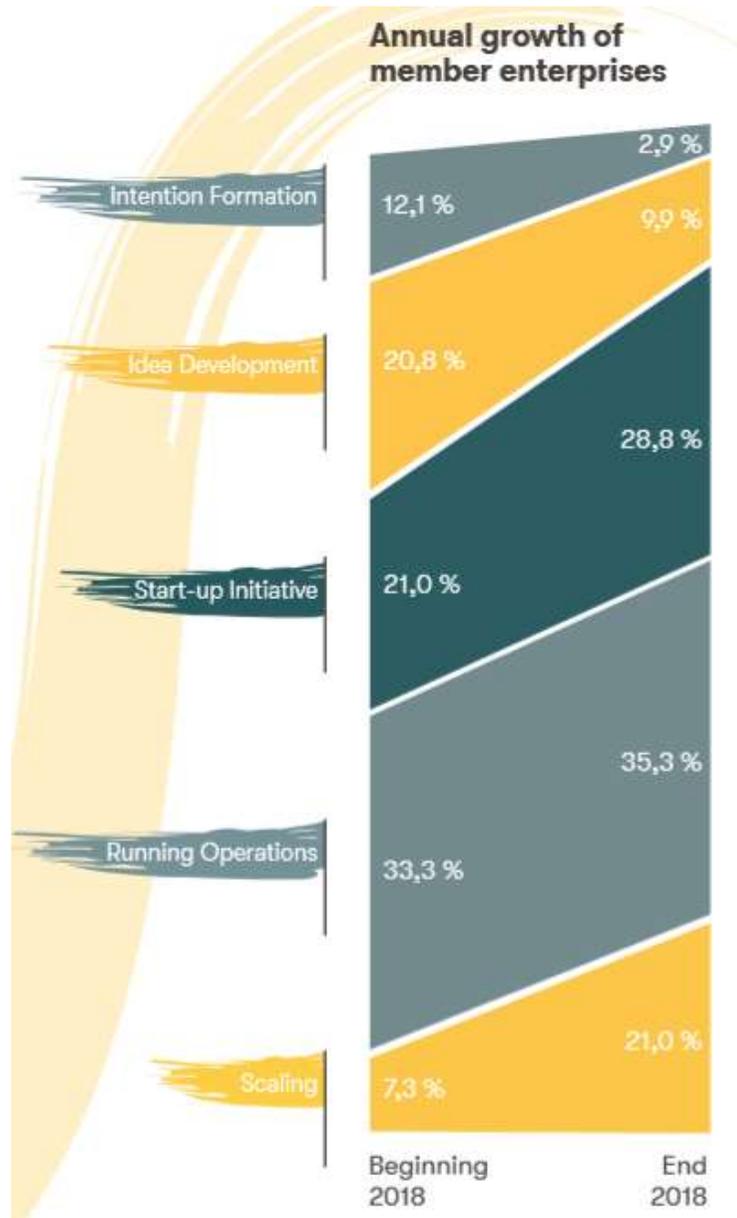
78%
of members increased the number of products and services offered

60%
of members are putting "impact-first"

Members attribute
30%
of their professional success to Impact Hub

Blended value orientation





Locally Rooted, Globally Connected.

A network of committed entrepreneurial communities can truly create positive change at scale. Diverse and inclusive, it fosters collaboration by bringing together different actors that would otherwise not meet and exchange. Our network is locally rooted to adapt to the regional context and globally connected to replicate and learn from one another, while creating a robust entrepreneurial support infrastructure.

Africa & Middle East	Europe	Munich	Metropolitan Area ²
Accra	Amsterdam	Odessa	Ottawa
Bamako	Athens	Ostrava	Pittsburgh ¹
Bujumbura	Barcelona ¹	Prague	Salt Lake City
Dakar	Bari	Reggio Emilia	San Francisco
Dar es Salaam ²	Basel	Rome	Seattle
Dubai	Belgrade	Ruhr	
Harare	Bergen	Stockholm	
Johannesburg	Berlin	Stuttgart ¹	Latin America & Caribbean
Khartoum	Bern	Syracuse	Antigua
Kigali	Bratislava	Trento	Belo Horizonte
Lagos	Brno	Turin	Bogotá
Lusaka	Bucharest	Vienna	Brasilia
	Budapest	Vigo	Buenos Aires ²
Asia Pacific	Donostia	Zagreb	Caracas
Almaty	Dresden	Zaragoza	Cunitiba
Jakarta	Florence	Zurich	Florianopolis
Kuala Lumpur	Geneva		Managua
Kyoto	Hamburg ¹	North America	Manaus
Manila	Inverness	Austin	Medellin
Phnom Penh	Islington	Baltimore	Mexico City
Shanghai	Istanbul	Boston	Monterrey
Taipei	King's Cross	Honolulu	Port-au-Prince
Taipei	Leipzig ²	Houston	Recife
Tokyo	Lisbon	Minneapolis	San José
Yangon	Madrid	Saint Paul	San Salvador
Yerevan	Málaga ²	Montreal	Sao Paulo
Waikato ²	Milan	New York	Tegucigalpa

IMPACT HUB Report 2019: P7.



TAILORED Support Programs

Our understanding of the different needs of social entrepreneurs throughout the various stages of their entrepreneurial journey, combined with our broad network of talent, tools, partners and infrastructure, ensures that we can tailor the support we offer. Subsequently, we ran **over 100** successful entrepreneurial support programs in 2018, focused on business and entrepreneurial skills as well as networking opportunities. The results speak for themselves, with **program participants attributing 40% of their professional success to Impact Hub** and feeling supported by us to:




100+
entrepreneurial support programs

100+
collaborative innovation programs focused on SDGs and ecosystem development



The environmental business, Ioniqa, attracted a €12 investment and a partnership with Unilever after taking part in the Plastics Free Ocean Accelerator run by Impact Hub Amsterdam and WWF Netherlands. Their platform technology upcycles coloured plastics back to virgin materials, for its reuse as food-safe packaging, and investment will go towards the launch of their upcycling process for the infinite use of PET plastic materials. They are also developing applications for other materials, such as textiles and carpets and aim for universal adoption of innovative technology via www.ioniqa.com



PARTNERING for Impact

There are ample opportunities to create and implement solutions to the world's most pressing issues. We are matching these opportunities with programs to achieve tangible progress towards the SDGs.

Join us to scale our collective impact and drive positive change!

Learning & Education

The global SDGs have provided a common language for the issues that demand our urgent attention and action. We need to increase awareness and share stories that inspire and engage more people in every corner of the world, especially focusing on the youth who will shape our future. We also need to explore and share lessons learned,



best practices and trends that can help lead to solutions driving systemic change.

Startup Support from Ideation to Scale

Startups have proven to be dynamic and powerful vehicles for solutions with truly transformative impact. Entrepreneurs need support throughout their challenging journeys; as ideas form and solutions develop, but also as they fail, pivot, and grow. Even the most effective startups with the best solutions need support to transform themselves into a scalable operation.



Access to market and financing are key to this transformation, particularly when considering vulnerable entrepreneurs in markets that demand a high level of resilience.

Corporate Innovation

Established institutions and corporations are facing an urgent need to innovate in a world that is faster and more interconnected than ever before. Entrepreneurs have become an important source of inspiration and learning for leading organizations, when it comes to how they can think in new ways, design solutions and products, and operate in constantly changing environments. Impact Hub immerses institutional partners in the entrepreneurial ecosystem,



giving them access to hundreds of high potential enterprises and leading edge innovations, as well as sustainability methods, tools, and experts.

Convening

Solving the world's most complex problems requires more than the brilliance of a few – it takes the collaboration of many. Our programs bring bottom-up innovators together with institutional players; invite new perspectives from scientists, artists, activists, and youth; and include those who are the most affected, but whose voices are often not heard. We use formats and methodologies



that get the best out of such diversity and drive meaningful action.

IMPACT AT SCALE

Ecosystem Development

Impact cannot happen in isolation; it takes shape



in interdependent, lively ecosystems comprised of diverse actors, inspiring interactions, enabling policies, and robust resources. Impact Hub provides collaborative environments where many of these elements come together. Even in some of the most challenged parts of the world, we provide a safe space for the foundation of ecosystems where minimal infrastructural support already exists.

Impact Hub is proud to have collaborated with leading organizations from a variety of sectors to amplify our impact. Here are some of our strategic partners:



IMPACT in Action

Here are a few examples taken from the 200+ programs Impact Hubs ran in the past year.

My life in my hands

Run by Impact Hub Caracas, 'My Life in My Hands' tackles early pregnancy, violence and drug use among youth: crucial topics in the country with the highest rate of teen pregnancy in Latin America. Through a holistic range of methodologies, it has improved the quality of life of 280 children in slums, providing 7,500+ meals, and teaching them how to lead a worthy life.

Startarium

Impact Hub Bucharest and ING Romania created Startarium, a program supporting entrepreneurs by using mentorship, online courses and networking in three areas: learning, testing and financing. With a total of 35,000+ community members, 60+ mentors, 400 learning materials and 3,500+ business ideas, Startarium is unique in combining the mechanisms of incubators and accelerators to assist entrepreneurs.

LatAM Scaling Program

With the support of the Argidius Foundation and EU's AL-INVEST program, Impact Hubs in Brazil, Colombia, Costa Rica and Mexico identified 60 enterprises with great potential to increase their social, environmental and economic impact. They were supported in preparing to scale their operations and given invaluable assistance in attracting investments as well as entering new international markets.

Socialchallenges.eu

EBN and Impact Hub created a pioneering social-challenges platform, which supported almost 50 cities and regions in defining social and environmental challenges, from sustainable food to urban mobility. Some 500 social innovators and SMEs (small and medium-sized enterprises) pitched their existing solutions. In addition, socialchallenges.eu gave the 80+ most promising entries 30,000€ each to test their solutions in the new markets.

Carrefour Impact

In an attempt to improve eating habits, Impact Hub Taipei and Carrefour Taiwan Foundation opened Carrefour Impact, the hypermarket's first healthy-living concept store. The store sells a range of purpose-driven goods, while also encouraging healthy eating and sustainable living through in-store education. It is also fast growing into an event space, inviting local companies and individuals to pitch their ideas for talks and workshops.

Circular Economy Transition

Circular Economy Transition is a pioneer initiative from all 5 Swiss Impact Hubs that aims to accelerate the transition of Switzerland to a circular economy by fostering collaboration along the value chain. Designed around four pillars of action to support and inspire different key actors and sectors, 30 Swiss corporate partners will be supported on their journey to circularity by 2021.

BEYOND (un)employment

Beyond (un)employment is a regional convening program supported by Robert Bosch Stiftung that developed and prototyped 20 citizen-led solutions to local unemployment challenges, ranging from skillbuilding for youth to advocacy for the elderly. 12 solutions, each developed by key actors in each market representing various sectors, were successfully implemented and will continue operations - solving issues from the bottom up, one step at a time.

MedUP!

MedUPI is a project funded by the European Commission and led by Oxfam Italy in consortium with Impact Hub, aiming to drive job creation and growth by promoting social entrepreneurship in the Middle East and Africa. MedUPI provides financial and technical support to 100 social enterprises, reinforces 60 social entrepreneurship support organizations through capacity building and networking activities, and promotes national and international policy and advocacy initiatives and dialogue.

Global Social Innovation Festival

Impact Hub Florianópolis hosted 1,000+ participants at the Global Social Innovation Festival, a day of knowledge exchange between impact entrepreneurs, social innovators and partners. The day celebrated diversity in Brazilian culture, with arts performances, 30+ workshops and 30+ speakers from public servants, indigenous leaders and even favela makers, each giving their unique perspective on addressing key global challenges.

Resilient Entrepreneurs Program

Impact Hub and Inter-American Development Bank partnered to strengthen the entrepreneurial ecosystem in Central America, choosing the challenging markets of El Salvador, Honduras and Nicaragua. The partnership created thriving communities and ran incubation programs in each country. With 100+ entrepreneurs supported, they are paving the way for multiple new communities and programs to promote and scale impact in the region.



CONNECT

- everybody can ...
 - join the network - Sharing the Knowledge & Community to connect with Like-Minded-Partners
 - become a member - Building the Infrastructure for Effective Trans-Local Entrepreneurial Support
 - partner with IMPACT HUB - Providing Robust Insights to Improve Impact Strategies in Business & Society

- You can also [open an Impact Hub](#) !!!



C-VoUCHER

Circularize ValUe CHains across European Regional Innovation Strategies

Project information

- HORIZON 2020
- Grant agreement ID: 777773
- Start date: 1 April 2018 - end date 31 March 2021

Objective

C-VoUCHER aims to develop new circular (cradle to cradle) value chains, disrupting traditional linear (cradle to waste) business models by means of cross-fertilization with Design Thinking experts and Circular Disruptors.

<https://cordis.europa.eu/project/id/777773>



Regional Innovation Hubs (RIHs)

Regional agencies specializing in innovation and support to SMEs and communities

6 RIHs plus a cluster and an RTO identified sectoral challenges, cross-sectoral challenges plus, to some degree, relations to the Regional Smart Specialization Strategies:

- The Swedish Agency for Economic and Regional Growth - Sweden
- Agencja Rozwoju Mazowska S.A. - Poland
- Vejle Kommune - Denmark
- Lifestyle and Design Cluster - Denmark
- Systematic - France
- Agentia de Dezvoltare Regionala Nord-Vest - Romania
- Axengia Galega de Innovación - Spain
- Force Technology - Denmark, RTO



Objective

C-VoUCHER aims at generating new cross-sectoral and cross-border value chains with a CE approach, by combining industrial value chains with enabling Technologies (Digital, Hybrid & Engineering), through design thinking concepts.



Circularity Open Space

Previous to those programs, C-VoUCHER will create an open space with:

- A Circularity Designers-in-Residence (DiRs) Pool to help SMEs design their new solutions.
- A Disruptors Catalogue with technologies ready to use.
- A network of Regional Innovation Hubs (Circularity RIHs).
- A Circularity Challenges Catalogue highlighting key topics for the open calls.

Circularity Program

This 9 months program will help Circularity SMEs reach "Circularity Solutions". It offers:

- Support services from a Designer-in-Residence (DiR) and business mentors to plan a Circular Solution Predefinition, and
- Innovation vouchers to interact with disruptors for the take up of "enabling technologies" in the frame of Circular Economy Building Blocks.

Up to 24 Classic SMEs will be selected through 2 Open Calls to take part in a previous Prototype-athon, and the best 12 best will be invited to the Circularity Program to create new solutions.

To see indicative dates go to the **Open Calls section**.

Circularity Value Replication Program

This 3 months program aims at Adopter SMEs willing to incorporate or get inspired by the Circularity Solutions developed. It offers designers in residence professional services to define their own road map and incorporate those solutions in their processes (Feasibility Plan).

42 adopter SMEs that will take part in the program will be selected through 2 Open Calls.



Community

Bring your CE ideas on!

«Under the frame of C-VoUCHER project, we have created a community that integrates C-VoUCHER Marketplace and gathers the main stakeholders of the European circular economy ecosystem:

- SMEs
- Design Thinking experts
- Disruptors
- Adopters SMEs
- Investors
- Policy Makers



C-Voucher

HOME PROGRAMME OPEN CALLS CIRCULARITY MARKETPLACE NEWS & EVENTS COMMUNITY JOIN THE COMMUNITY

Home > Circularity Marketplace

CIRCULARITY MARKETPLACE

Welcome to C-VoUCHER Circularity Marketplace!

This is a one-stop shop for any stakeholder interested in the Circular Economy. Find disruptive entities and other innovation actors offering their solutions, circular economy building blocks, enabling technologies and more.

The C-VoUCHER Circularity Open Space is composed by different blocks:

- Disruptors & Enabling technologies Catalogue
- Pool of Designers-in-Residence
- Online Tools
- Circularity Challenges Catalogue



Case Ostwestfalen-Lippe (OWL)



OWL is "at the very top of North Rhine-Westphalia“:

- 5 innovation networks
- more than 600 members from business, science, associations, chambers, business development agencies and representatives of civil society
- activities - range from the optimisation of business and technology processes, knowledge and technology transfer to the initiation and support of cooperations and the development of new, innovative topics and business areas



The innovation networks in OWL

5 innovation networks make a significant contribution to the future viability of the OWL region:

- Energie Impuls OWL,
- InnoZent OWL,
- Food Processing Initiative,
- OWL MASCHINENBAU and
- ZIG - Zentrum für Innovation in der Gesundheitswirtschaft OWL

The innovation networks

- combine their expertise for the benefit of the region and play an important role in making OWL "fit for the future".
- convinced in the ERDF competition 2019 with its regional development project **CirQuality OWL** which focusses on the potential of circular value creation and is dealing with a broad-based capacity building.



CirQuality OWL - a production site closes loops

- Project partners:
 - 5 innovation networks
 - VDI OWL (Association of German Engineers)
 - university of applied sciences Bielefeld
- Project focus:
 - on the potentials arising from circular value creation, i.e. products, buildings, components or materials are designed from the beginning to be used in a continuous cycle without ending up in landfills or downcycling
- Project goal:
 - to develop solutions which qualify the companies at the OWL production site and the necessary environment for the growing CE markets.
 - The entire innovation ecosystem OWL is to be used and optimized in order to design CE-based product ideas for the next product generations and to realize them with new business models.



CirQuality OWL - a production site closes loops

Roles of the project partners

- 5 innovation networks ensure targeted adaptation in specific economic sectors.
- University analyses and optimises internal company processes and systematises external factors for the purpose of integration into the respective CE development process
- VDI the entire spectrum of the engineering world is involved in the constructive discussion and the way is paved for the inclusion of important impulses in future standards as well as in engineering education



CirQuality OWL - fields of action



- Discover CE
- Regional capacity building
- Qualifying actors
- strengthening regional identity
- Providing strategic support to actors
- transfer results



CE HUBs _ cases / examples

Industrial Symbiosis

a) Definition

b) Examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



Definition

Industrial symbiosis is a form of brokering to bring companies together in innovative collaborations, finding ways to use the waste from one as raw materials for another. The word “symbiosis” is usually associated with relationships in nature, where two or more species exchange materials, energy, or information in a mutually beneficial manner.

Local or wider co-operation in industrial symbiosis can reduce the need for virgin raw material and waste disposal, thereby closing the material loop - a fundamental feature of the circular economy and a driver for green growth and eco-innovative solutions. It can also reduce emissions and energy use and create new revenue streams.

However, in order to make industrial symbiosis a wide-spread commercial reality, more needs to be done to manage the flow of waste material from different sectors and industries, and there is still much to understand about:

- environmental and societal impacts
- harmonization of technologies, processes, policies
- civil society engagement to a circular economy at EU level
- waste resources information
- waste treatment technologies
- business models and coordination between value chain actors



Definition and types

- An approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products.
- Can be implemented in any type of regions or area, depending of the types of resources transacted.
- Depends on governance and policy factors.
- Originates in two ways:
 - As self-organised activity (e.g. Kalundborg, DK)
 - As managed process; 2 types:
 - Facilitated networks
 - Planned networks



Overview

Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain.



Project information

- HORIZON 2020
- Grant agreement ID: 642154
- Start date: 1 September 2015 - end date 29 February 2020



Concept

FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology, and software platform to facilitate information exchange, that can support industrial symbiosis networks and replicate pilot schemes at local and regional levels.

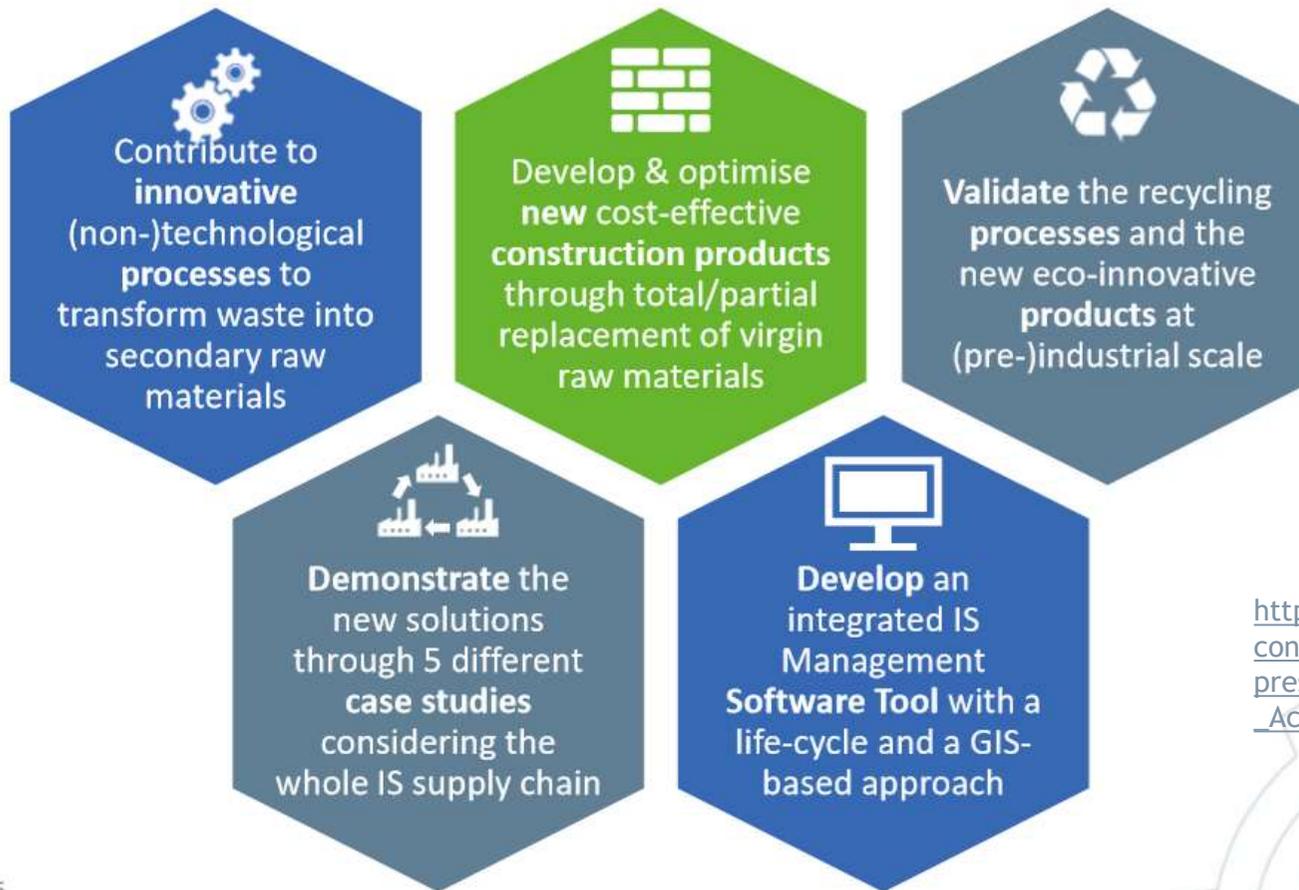
The model will be based on 3 sustainability pillars - environmental, economic, social (taking into consideration stakeholder engagement and impact on society).

The ambition is that the model created can be replicated in other regions and other value chain scenarios.

FISSAC aims to demonstrate the effectiveness of the processes, services, and products at different levels.



Scientific & technical goals



<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-Acciona.pdf>

SW platform

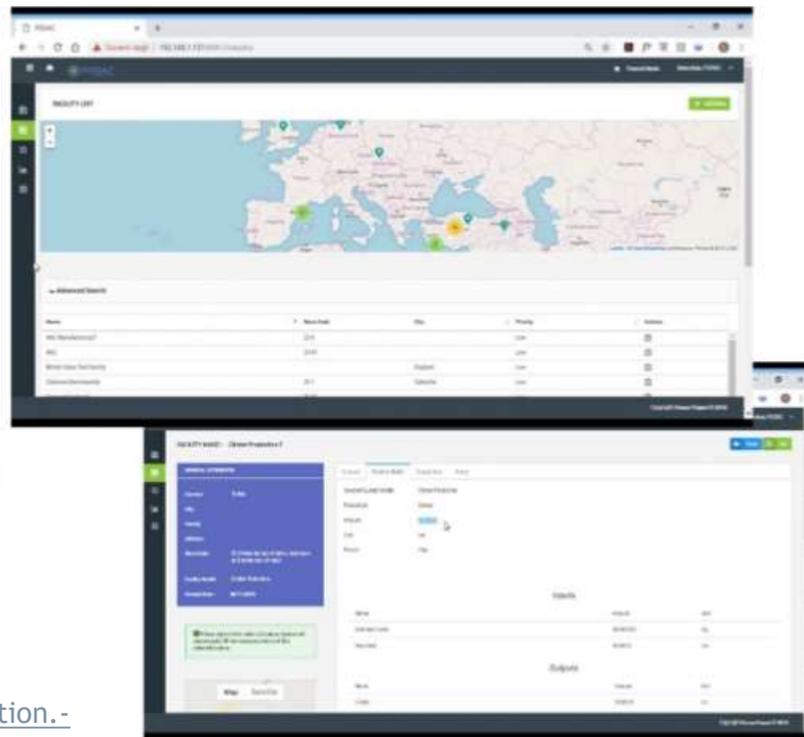
An important objective of the project is the introduction of a model for Industrial Symbiosis. For this, a specific tool is being developed and will be evaluated within the project: the **FISSAC Software Platform**.

It will feature amongst others a Life Cycle based Multiple Factor Analysis, network indicators and GIS based capabilities.

Capabilities

- Life-cycle assessment
- Life-cycle costing
- Material and energy flow analyses
- Multi-objective optimization
- Visualization & Diagrams
- Network analysis through industrial ecology metrics
- Graph and network topologies and industrial system modeling
- Innovative circular economy and industrial symbiosis indicator-based assessment

<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-Acciona.pdf>



Webinar platform

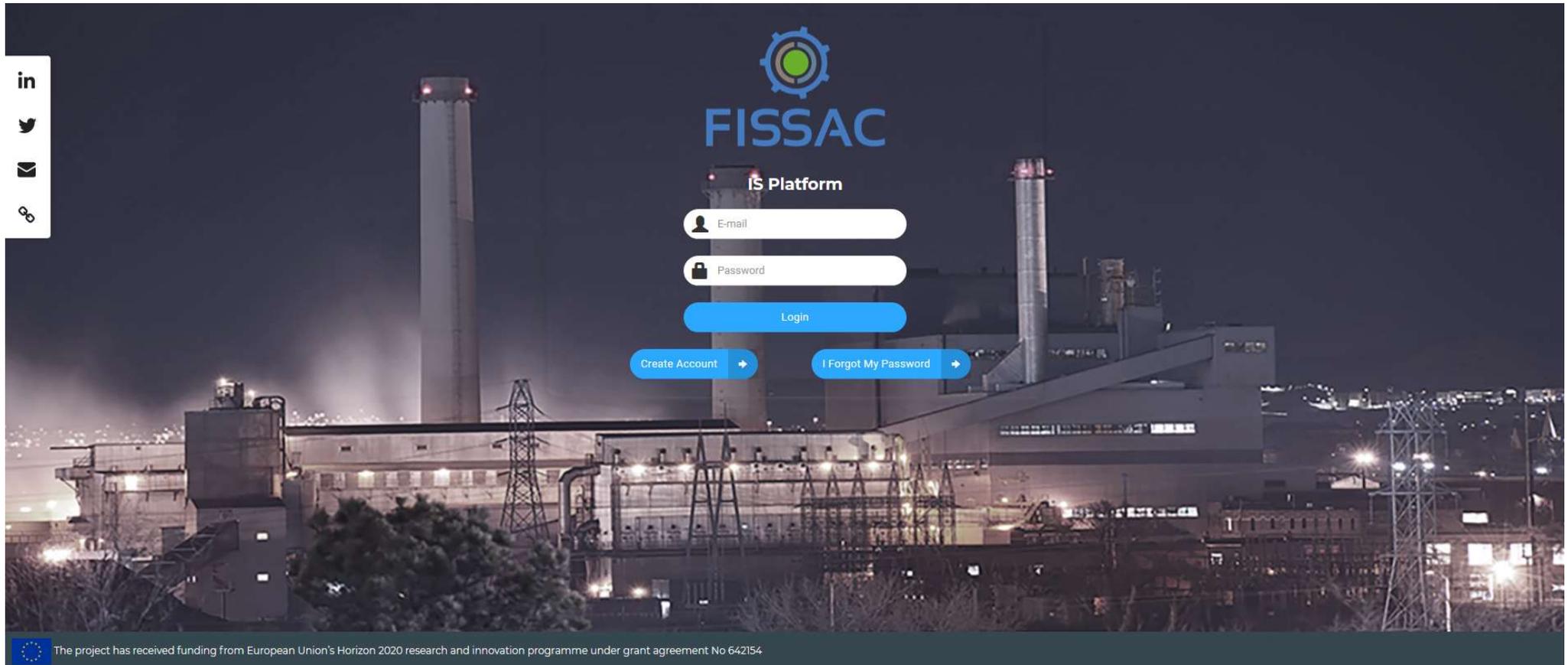


[View the recording !](#)

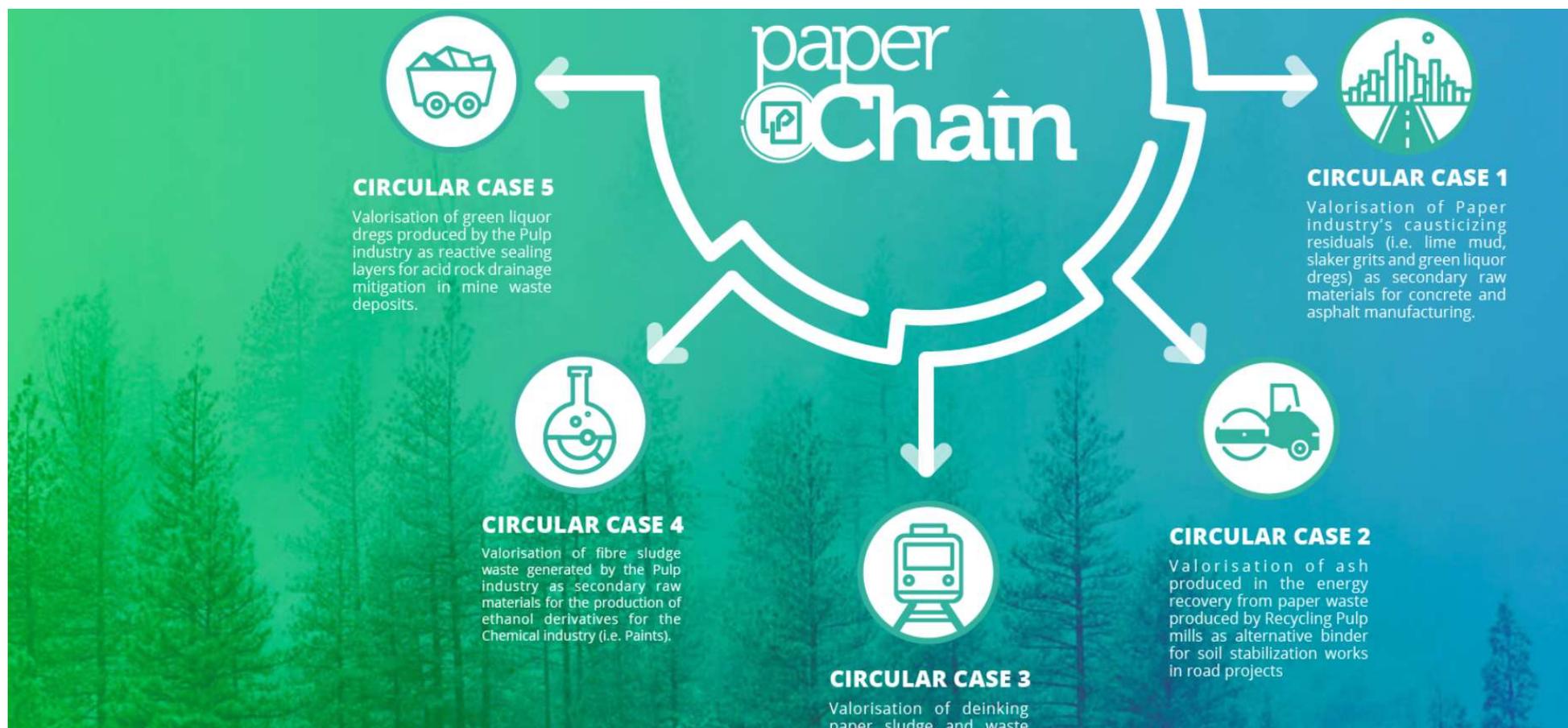


FISSAC PROJECT - IS PLATFORM

IS platform







Information & objective

Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

Overall objective

- PAPERCHAIN is to deploy five novel circular economy models centred in the valorisation of the waste streams generated by the PPI as secondary raw material for a number of resource intensive sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.



KALUNDBORG SYMBIOSIS



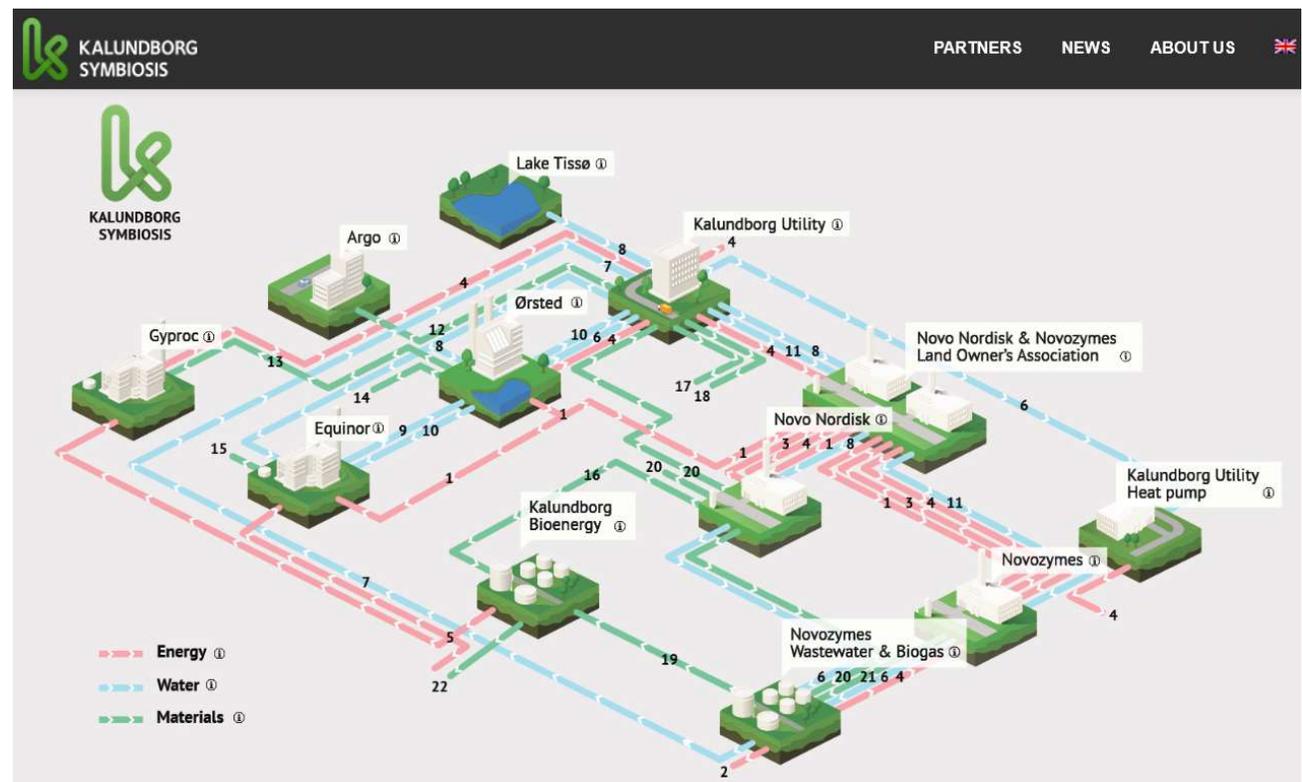
Winner of
WIN-WIN GOTHENBURG SUSTAINABILITY AWARD 2018



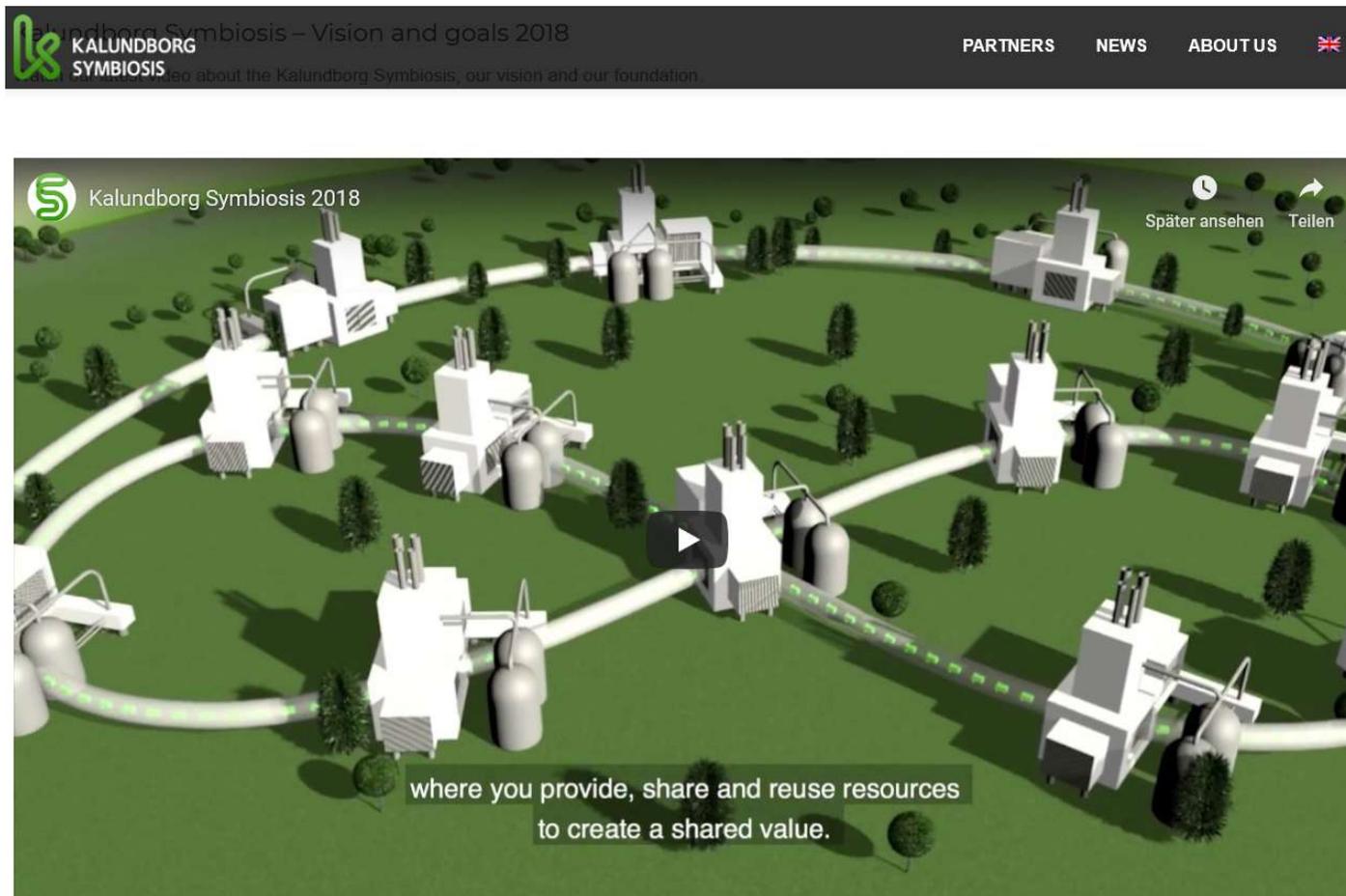
Partnership

The Kalundborg Symbiosis is a partnership between 11 public and private companies in Kalundborg.

Since 1972 Kalundborg has developed the World's first industrial symbiosis with a circular approach to production. The main principle is, that a residue from one company becomes a resource at another, benefiting both the environment and the economy



Watch the video !



CE HUBs - cases / examples

Focus on regional and two smaller national HUBs

a) Regional Hubs

Circular Flanders is the HUB and the inspiration for the Flemish CE (+ webinar)

b) National Hubs

Switzerland - Movement for a CE

Australia - The National CE HUB

more examples (not further elaborated here)

- SITRA, Finland & Kemi Circular and Bioeconomy Center, Lapland (+ webinar)
- Zero Waste Scotland, Scotland



Circular Flanders is the HUB and the inspiration for the Flemish CE

Vision 2050. A long -term strategy for Flanders.

The vision sees Flanders as an inclusive, open, resilient and internationally connected region that creates prosperity and wellbeing for its citizens in a smart, innovative and sustainable manner.

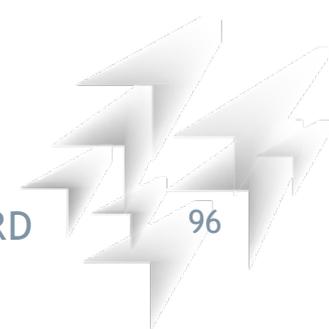
In order to facilitate the vision, the Government of Flanders selected 7 transition priorities:

1. CE
2. Smart living
3. Industry 4.0
4. Lifelong learning and a dynamic professional career
5. Caring and living together in 2050
6. Transport and mobility
7. Energy



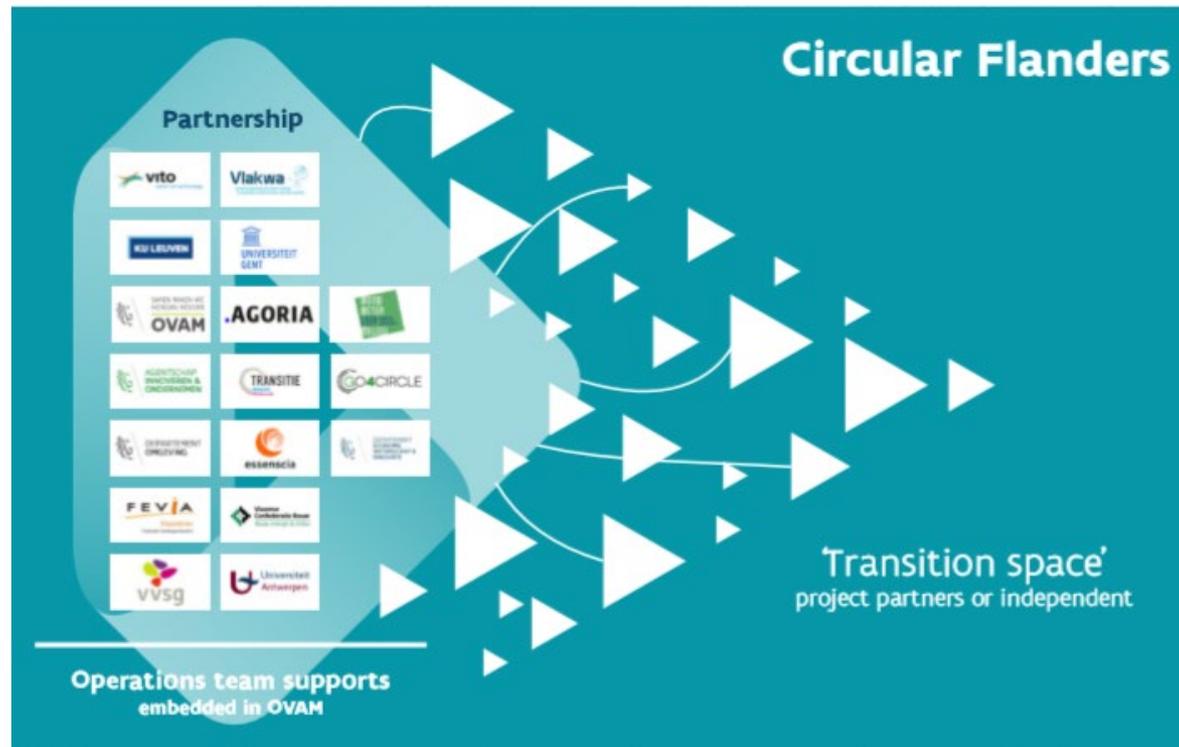
Circular Flanders - issues addresses

- **Demographical trends:** population growth, ageing and rejuvenation of the population, migration.
- **Scientific and technological trends:** the emergence of disruptive and exponential technologies, driven by science and innovation.
- **Ecological trends:** climate change and the burden on natural resources.
- **Economic trends:** disruptions due to technological breakthroughs, shift of the world's economic centre to the East, industrial transformations, new relationships between producers and consumers.
- **Political and administrative trends:** changing geopolitical relationships, transformation of governments and institutions.
- **Social trends:** individualisation and diversity.



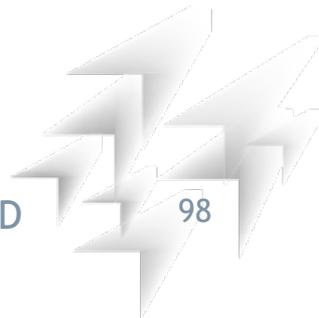
Circular Flanders - a true circular partnership

Partnership of governments, companies, civil society, and the knowledge community that will take action together. 17 organisations build the core - each one has committed to carrying out a specific action:



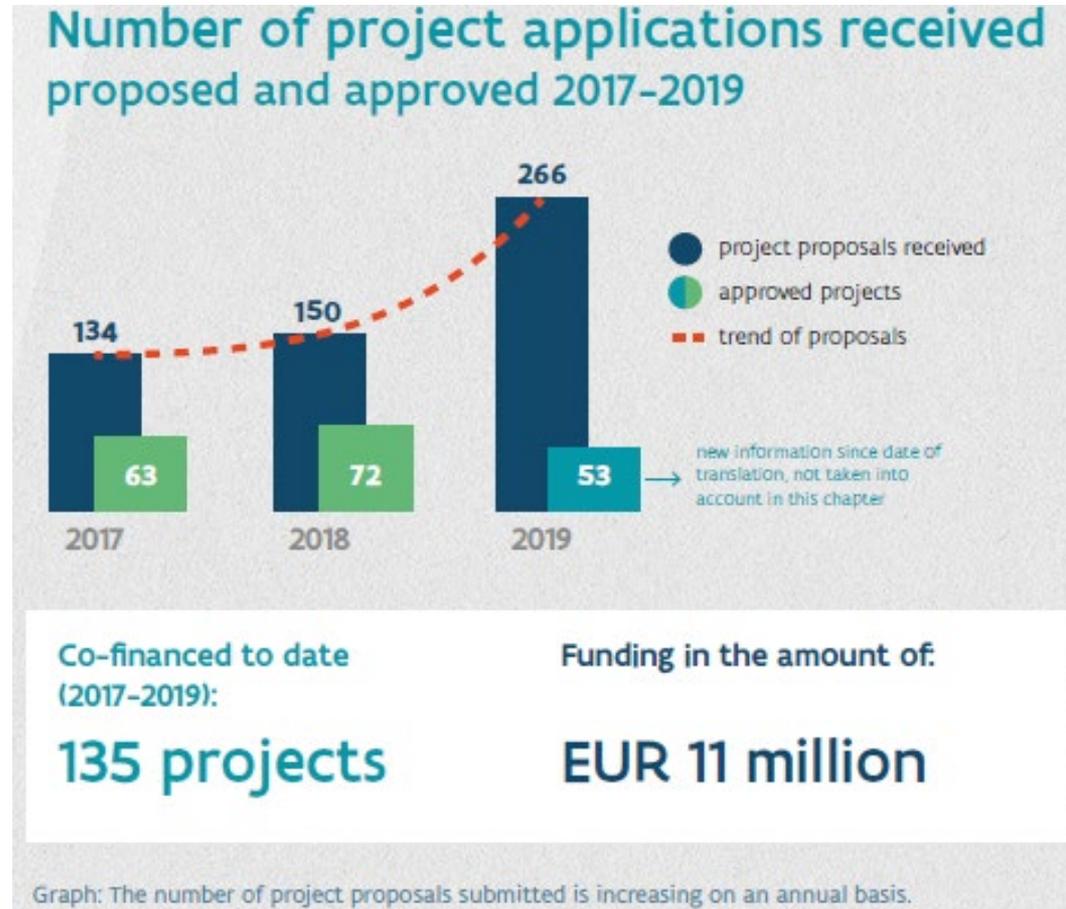
Circular Flanders - 6 core activities

1. **Network & Community** > We connect and co-create.
2. **Knowledge & Education** > We build and share our knowledge.
3. **Innovation** > We enable.
4. **Catalyst** > We make it happen.
5. **Policy** > We support.
6. **Embedding** > We make it grow.

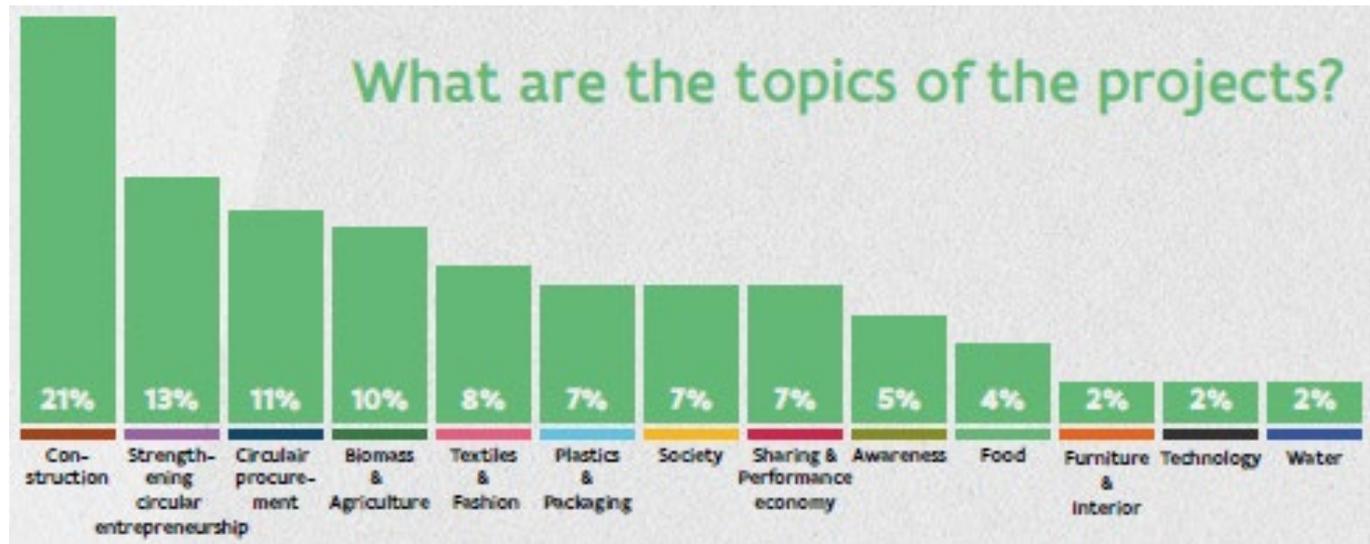
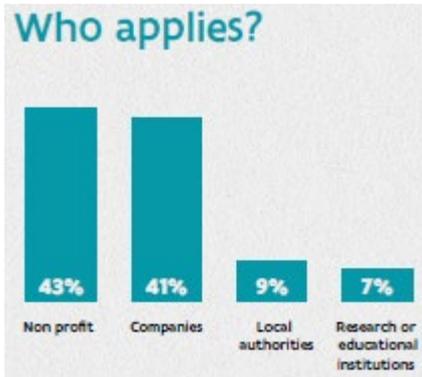


Circular Flanders - Open call - experiments

Financial support
to CE projects
via Open Call



Circular Flanders - Open call - topics



Open Call - high number & wide range of thematic projects



Circular Flanders - Open call - budget

3 categories of projects

1. 'city and entrepreneurship' projects;
 2. 'circular procurement' projects;
 3. revamped '2017 city and entrepreneurship' projects.
- average grant amount is EUR 89,000 (with a max of EUR 100,000)
 - for an average project budget of EUR 136,000.

What's the budget?

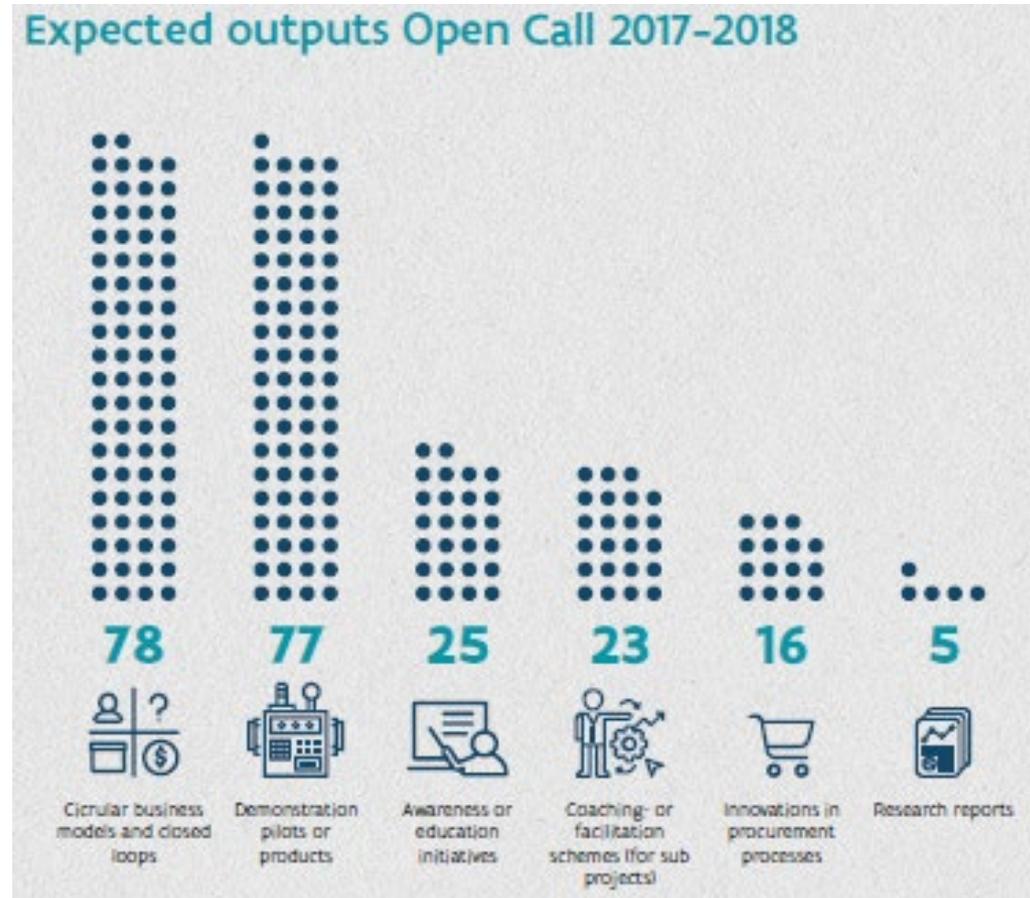
		# projects	budget
2017	city and entrepreneurship	52	4.588.249,31 €
	procurement	11	209.110,00 €
2018	revamped 2017	15	1.455.365,56 €
	city and entrepreneurship	53	4.656.044,38 €
	procurement	4	65.255,00 €
		135	10.974.024,25 €



Circular Flanders - Open call - output

Open Call -
typology of output types:

- circular business models and closed chains
- demonstration plants or products
- awareness-raising or education initiatives
- coaching or facilitation processes
- innovations in the procurement process
- research reports



Circular Flanders - Lessons learned

- Broad societal support helps in identifying relevant circular topics and eventually good projects. Moreover, it increases the likelihood that project results are implemented as planned.
- To improve the quality and diversity of projects, it is important, as a funder, to reflect on previous calls for projects and see how these can be improved. In the case of Circular Flanders, asking more specific and clear questions helped to improve the instrument and the turnout of the calls.
- Letting go of the expectation that all projects have to be successful could lead to more interesting and innovative project proposals being submitted. It should be recognised that also less successful projects can provide important lessons and inspiration.
- Providing subsidies also leads to the optimisation of policy and laws, as they allow for the noticing of practical bottlenecks that would not have been discovered if the subsidies had not been granted.



Webinar presentation

References

Vision 2050. A long-term strategy for Flanders.

- Jan 2019 - <https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders-0> (long version - 104 pages)
- Dec 2019 - <https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders> (short version - 36 pages)
- 2016 - http://financeflanders.be/sites/default/files/atoms/files/Vision_2050_eng.pdf (short version - 24 pages)

Retrospective Report 2017 - 2019

- [*Circular Flanders - Retrospective Report 2017 - 2019; an overview of our activities for the CE in Flanders - first period.*](#)



CE HUBS _ FLANDERS, BELGIUM

Circular Flanders - Retrospective Report 2017 - 2019; an overview of our activities for the CE in Flanders - first period.

The Circular Flanders Report is an interactive PDF.

On 104 pages an overview of the work carried out during 2017 - 2019 is given.

1 / ABOUT US	5 / OPEN CALL
A. A partnership B. Our approach C. Our partners D. Three pillars	A. CE experiments B. A broad support network C. Funding D. Output(s)
2 / CIRCULAR PROCUREMENT	6 / MARKETING & COMMUNICATION
A. The deal in detail B. The GDCP projects C. Allies D. Timeline E. Tools F. The next step: Procirc	A. Products & channels B. Service point C. In the press
3 / CIRCULAR BUSINESS	7 / INTERNATIONAL
A. Green Deal on Circular Construction B. Developing levers C. Jobs and skills D. Ecodesign	8 / THE CE CENTER
4 / THE CIRCULAR CITY	A. Research and expertise B. 8 research paths C. Publications
A. Public activities B. Urban Agenda C. Smart circular cities D. Circular spaces E. Circular metabolism F. Productive circular cities	9 / OUR TEAM



Switzerland - Movement for a CE

“In recent years various projects in the field of CE have emerged in Switzerland. A variety of private companies and public organizations pursue the goal of making the Swiss economy more circular with creative solutions and innovative initiatives. It is now important to bring together these numerous activities and actors, to exploit synergies and to give a new boost to the CE in Switzerland.”

Kick-off 04. Feb 2019



Circular Economy Switzerland

A core team of 10 dedicated organizations has joined forces:

- Supported by the MAVA Foundation and the Migros Engagement Fund, the network will act as a catalyst for a new Swiss-wide CE movement with various projects and events.
- Circular Economy Switzerland sees itself as a coordination and exchange platform and is open to further initiatives in the field of circular economy.



The CE Switzerland Charter

- **Character** The Charter is a self-declaration. Those signing show their intention to commit themselves to the CE in Switzerland and are committed to the principles set out in the Charter.
- **Vision** **Switzerland has completed the transition from a linear economy to a circular economy. In this way, the country is contributing to global sustainable development and is strengthening its own position as a location for business.**
- **Mission** Our mission is to promote the CE in Switzerland at all levels. Our movement is the driving force behind the efforts to create a market for CE products and services and to raise awareness of the concept of the CE in the business world and among the general public.

CE Switzerland brings together enthusiastic proponents of the CE from the private sector, civil society, politics and administration and promotes cooperation and knowledge sharing across all industries and fields.



The CE Switzerland Charter

- **general** In a CE, resource consumption, waste, emissions and energy losses are minimised by closing, slowing and narrowing material and energy loops. This is achieved through long-lasting and regenerative design, maintenance, repair, reuse, refurbishing, recycling and cascade utilisation and through specially designed business models which focus on use rather than ownership.
- **4 principles**
 1. Understanding of the CE
 2. General/governance
 3. Cooperation
 4. Knowledge sharing
- **Who can sign** companies, organisations, NGOs, associations, research and educational institutions, philanthropists, politicians, administrative bodies and private individuals



CE Switzerland - projects

- **general** The core team of CE Switzerland already implements 6 innovative projects and acts as a catalyst for a new Swiss-wide movement in the CE.

- **Projects** Circular Cities Switzerland
[CE Transition](#) → see next
[Make Furniture Circular](#)
[Circular Hub](#)
[SHIFT Switzerland](#)
[CE² - CE Entrepreneurs](#)
[#MoveTheDate Switzerland](#)



CE transition

- **General** CET is a pioneer initiative that aims at accelerating the transition of Switzerland to a CE.
The initiative will help drive the new paradigm for the future of business, politics and society.

For the moment it takes place in the Impact Hub cities - Basel, Berne, Geneva, Lausanne and Zurich.
- **Collaboration** Implementing partners: Impact Hub Switzerland, sanua durabilities
Funding partner: MAVA Foundation
Supporters: UBS, movetia
- **Activites** CE Incubator
Business Lab
Community Events



CE incubator

- **Program** **Swiss-wide program for early-stage Startups in the CE**
- **Call for projects**

The Incubator enables teams and startups to prototype and solutions contributing to accelerate the transition towards CE. These teams and startups can apply in a call for projects. Per call a maximum of 25 places will be available for early-stage projects from all over Switzerland with circular business models.
- **Activities**

CE Incubator
Business Lab
Community Events



CE incubator _ timeline

Timeline from call for projects until closing ceremony



CE incubator _ program for selected entrepreneurs

- **Program** 12 weeks
- **Activities** with the support from advisors, experts and the network of impact investors the selected entrepreneurs work on developing their minimum viable product and validating their business model,.
- **Support** main pillars of support
 - Community and space
 - Startup support
 - Events and connections
 - Swiss-wide visibility

The entire support provided accounts for CHF 15.000 per team.
The CE Incubator has a zero equity and fees policy.



Australia - The National CE Hub

- Australia is behind world leading countries in implementing CE policy, new policies that are either specific to the CE or strongly influenced by CE principles are beginning to emerge.
- Australia has a strong need for a platform that inspires and facilitates the collaboration and networking necessary for the transition to a CE.
- Planet Ark is taking the lead on creating the National CE Hub and Marketplace, which will be Australia's leading platform to accelerate the transition to a CE.
- The activities started in May 2019.



Planet Ark - The leading environmental not-for-profit will create the B2B ‘eBay’ to help Australian businesses implement the CE.”

Planet Ark ...

- is national, independent and non-political
- is a well known and trusted environmental not-for-profit with a long history in recycling education and product stewardship
- has a wealth of knowledge and experience in creating and growing database-driven digital platforms such as Recycling Near You and Business Recycling
- has a strong history of effective collaboration with the most recent examples being the Australasian Recycling Label and PREP with APCO and PREP Design





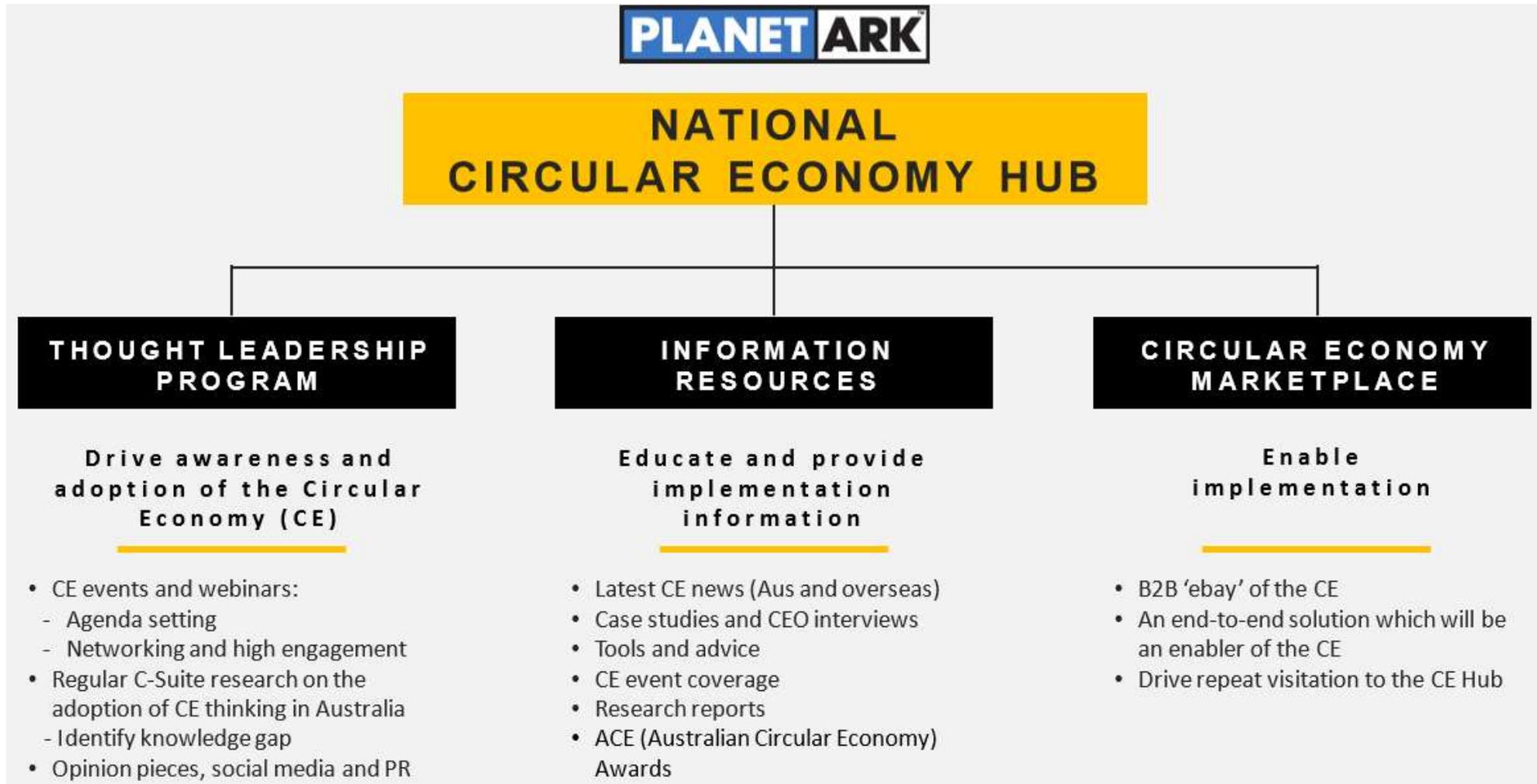
PLANET ARK About News Resources Product Stewardship Marketplace
COMING SOON The Recycling Hub ▾

- RecyclingNearYou
- Business Recycling

National Circular Economy Hub

Full launch in 2020





CIRCULAR ECONOMY MARKETPLACE

A dynamic platform designed to meet the needs of the CE participants including:

- A system for matching buyers and sellers in waste resources. Provides an end-to-end solution including;
 - Material identification & specification
 - Transport and financial transaction.
 - trust rating for market participants and digital ledger to help ensure integrity.
- A CE procurement system for finished goods & services



ENABLER OF THE CE



B2B 'EBAY' OF THE CE



REPEAT VISITATION



SITRA, Finland

- **SITRA** is an active fund for the future who studies, researches and brings together partners from different sectors in open-minded trials and reforms
- **Vision** Finland as a pioneer of sustainable well-being.
Sustainable well-being means a good life that is lived within our planet's boundaries - here, now and in the future.
- **6 principles**
 1. Addressing well-being in a holistic way
 2. Adjusting to planetary boundaries
 3. Empowering individuals and communities
 4. Moving to a regenerative and collaborative economy
 5. Building competencies for a complex world
 6. Developing inclusive and adaptive governance



SITRA _ Kemi-Tornio economic region in Lapland → The Circular and Bioeconomy Center

The Centre for CE originated from nationwide need

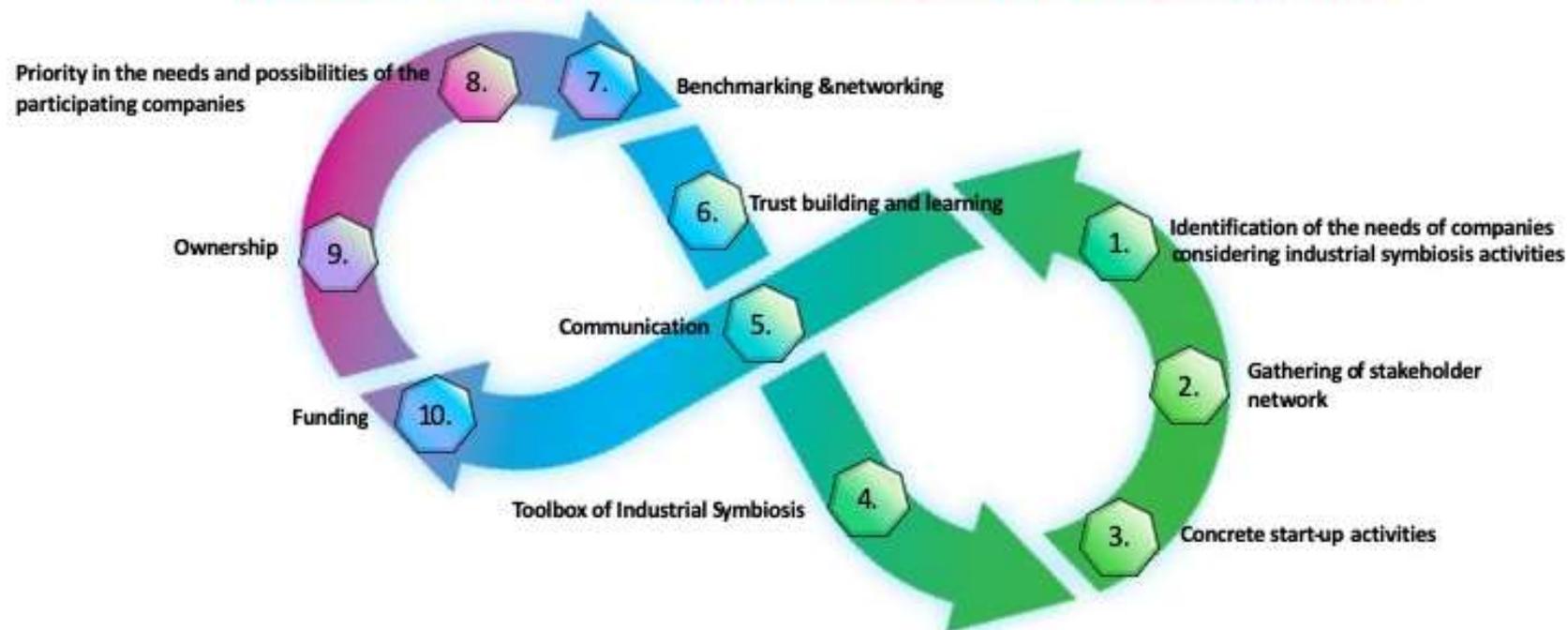
- Kemi - Preparation of an ecosystem for industrial circular economy 2012-2017.
- SITRA compiled 2016 world's first national road map for promoting CE with a goal of creating a shared ambition to advance CE in the society and determining the most efficient methods for that.
- SITRA named the Industrial CE Innovation Platform, led by Kemin Digipolis Oy, as one of the key projects of the road map.
- The next step was a project where the Competence and Training Centre for Industrial Symbiosis in Kemi-Tornio was established. Founding members of and key operators at the Centre for Circular and Bio Economy are Digipolis, the City of Kemi and the Lapland University of Applied Sciences (strategic focus area - development of circular and bio economy).
- Establishing the CE Center a logical continuation of Digipolis's work on promoting CE.



The Circular and Bioeconomy Center

Goal - to develop a more competitive business environment for companies involved in the CE

DESCRIPTION OF OPERATIONAL MODEL: TEN PILLARS



Webinar presentation

References

Websites: The Circular and Bioeconomy Centre: <https://www.digipolis.fi/en/teollinenkiertotalous>

Digipolis - Kemi Technology Park: <https://www.digipolis.fi/en/front-page>

SITRA: <https://www.sitra.fi/en/>



Zero Waste Scotland, Scotland

- **Zero Waste** has been established in 2014, since then a lot has been achieved

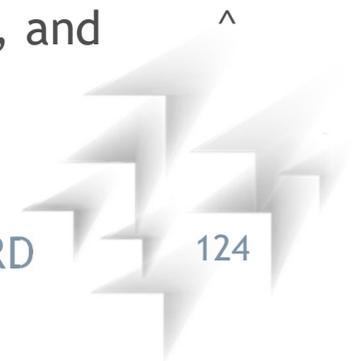
- **Next plan** **Zero Waste Scotland's Corporate Plan 2019-2023**

- **The strategy** The purpose:

“To lead Scotland to use products and resources responsibly.”

The way:

“We will direct with evidence, inspire by demonstration, and influence through partnerships and promotion.”



The strategy

Start with evidence

- Work with our key partners to gather and assess information on the problems we currently face.
- Learn from international best practice to adapt successful approaches in Scotland.
- Analyse complex systems to identify opportunities.
- Focus efforts towards interventions with the highest impact.

Test and demonstrate

- Work in partnership with our customers to co-create projects that demonstrate potential solutions.
- Pose the challenges we need solutions for.
- Embrace a culture where ideas are tested and thoroughly assessed.
- Learn from our work and develop compelling calls to action.
- Use all available channels, advocates and partners to promote our work and stimulate change.

Form valuable partnerships

- Be more intentional about forming strategic partnerships - using a variety of approaches and skills.
- Develop propositions which are shaped by customers.
- Use cutting-edge behaviour science to rethink how we can be influential.
- Be flexible and open to new ideas.
- Deliver interventions (such as funding or consultancy services) on a partnership basis.



References

- Website: <https://www.zerowastescotland.org.uk/>
- Brochure: [Zero Waste Scotland: Corporate Plan 2019 - 23. 2019.](#)
- Good Practice: [Good practice: Zero Waste Scotland. Interreg Europe.](#)





CITYCIRCLE

Training for regional stakeholder groups

Circular economy hubs

Example of Wcycle, Maribor, Slovenia

Online meeting

April 10th, 2020 – 15:00-16:00 CEST

Hosted by BWCON GmbH



MINUTES

Greetings & Intro

Luc Schmerber, BWCON

KEY NOTES:

1. Introduction to the context of the webinar, as part of D.T2.2.4 Specific trainings for each of the regional stakeholder groups (2 trainings per region)
Topic: Circular economy hubs
2. Introduction of the speaker:
Igor Kos
Inštitut Wcycle Maribor / Wcycle Institute Maribor
Inštitut za krožno gospodarstvo / Institute for Circular Economy
Jadranska 28, 2000 Maribor, Slovenija

PRESENTATION

Igor Kos, Wcycle Institute Maribor

KEY NOTES:

1. Presentation of the Circular Economy strategy of the city of Maribor, with a focus on the Wcycle Maribor initiative, www.wcycle.com.
2. Q&A with the audience

SUPPORTING DOCUMENTS

1. Presentation (Annex)
2. List of participants (Annex)
3. Recording of the webinar (available upon request)



ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: CITY CIRCLE Webinar

Location: online

Date: 09.04.2020, from 15:00-16:00 CEST

No.	Name and Surname	Organisation	E-mail	Signature
1.	Luc Schmerber	BWCON	schmerber@bwcon.de	n.a.
2.	Nadia Vedova	Municipality of Udine	nadia.vedova@gmail.com	n.a.
3.	Giampaolo Tarpignati	Unione Territoriale Intercomunale (UTI) del Friuli Centrale	giampaolo.tarpignati@friulicentrale.utifvg.it	n.a.
4.	Stefano Treu	APE FVG	stefano.treu@ape.fvg.it	n.a.
5.	Robert Hanzen	TUKE	robert.hanzen@tuke.sk	n.a.

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6.	Peter Tapak	TUKE	peter.tapak57@gmail.com	n.a.
7.	František Janke	TUKE	frantisek.janke@tuke.sk	n.a.
8.	Barbora Kovacova	EGTC Via Carpatia	Barbara.kovacova@vucke.sk	n.a.
9.	Petra Schusterova	EGTC Via Carpatia	Petra.schusterova@vucke.sk	n.a.
10.	Marija Ahacic-Premrl	City of Kranj	Marija.Ahacic-Premrl@kranj.si	n.a.
11.	Tomaž Lanišek	City of Kranj	Tomaz.Lanisek@kranj.si	n.a.
12.	Robert Nograšek	City of Kranj	Robert.Nograsek@kranj.si	n.a.
13.	Ziherl Janez	City of Kranj	Ziherl.janez@kranj.si	n.a.
14.	Črtomir Kurnik	Local Energy Agency of Gorenjska	crtomir.kurnik@leag.si	n.a.
15.	Branka Balantič	SCKR	branka.balantic@sckr.si	n.a.
16.	Nina Taylor	eZavod	nina@ezavod.si	n.a.
17.	Rea Poljak	City of Varazdin	rea.poljak@varazdin.hr	n.a.

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18.	Gregor Drago Zupančič	Croteh d.o.o. - Centre for development of sustainable technology ltd. Zagreb, Croatia	gregor.zupancic@croteh.eu	n.a.
19.	Nikolina Zigmund	DAN	nikolina.zigmund@dan.hr	n.a.
20.	Filip Biscevic	DAN	Filip.bisevic@dan.hr	n.a.
21.	Ivan Šimić	Regional energy Agency - REA Koprivnica, Croatia	ivan.simic@rea-sjever.hr	n.a.
22.	Emil Tkalec	Local Action Group - Lepoglava, Croatia	Emil Tkalec <etkalec@gmail.com>	n.a.
23.	Martin Dobler	Fachhochschule Vorarlberg	Marv.attin.dobler@fh	n.a.
24.	Bojana Suzic	Fachhochschule Vorarlberg	Bojana.SUZIC@fhv.at	n.a.

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Teilnehmer (25)

Finden Sie einen Teilnehmer

- | | |
|-------------------------------------|--|
| LS Luc Schmerber (Host, ich) | LC LEAG Crtomir Kurnik |
| I Igor | MA Marija Ahačič Premrl |
| PĚ Peter Ěapak | MD Martin Dobler (FHV) |
| FJ Frantisek Janke | NV Nadia Vedova |
| BK Barbora Kovacova | N nikolina |
| BS Bojana Suzic FHV | NI Nina's iPhone |
| BB Branka B | P PC |
| ET Emil Tkalec | PS Petra Schusterova |
| FB Filip Bišćević | R Rea Poljak |
| G Giampaolo | RH Robert Hanzen |
| I ivan.šimic | TS Treu Stefano |
| K Klaudija |  Gregor D. Zupančič |
| L Lanisek | |

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TAKING
COOPERATION
FORWARD

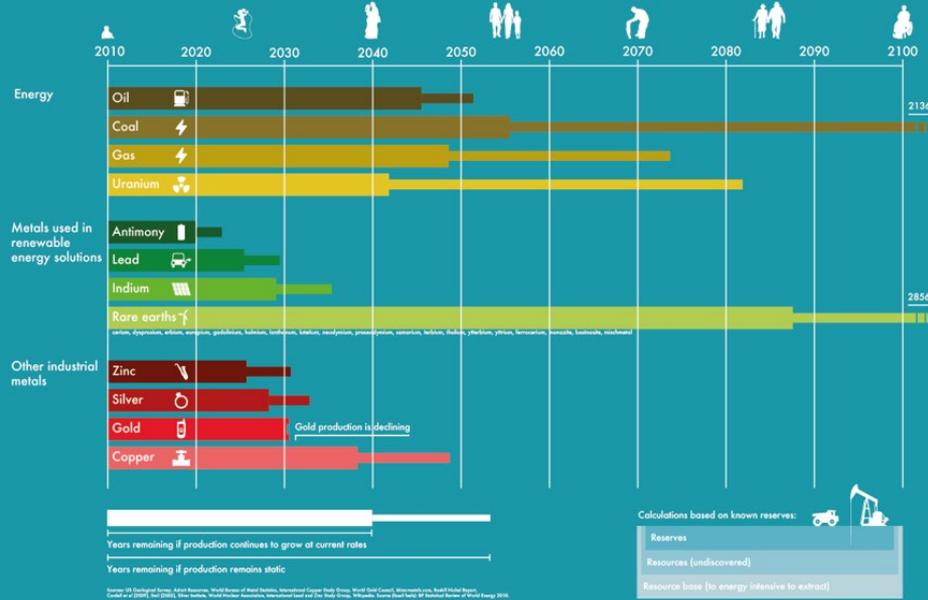
 09.04.2020

 **Circular economy in Maribor, Slovenia**

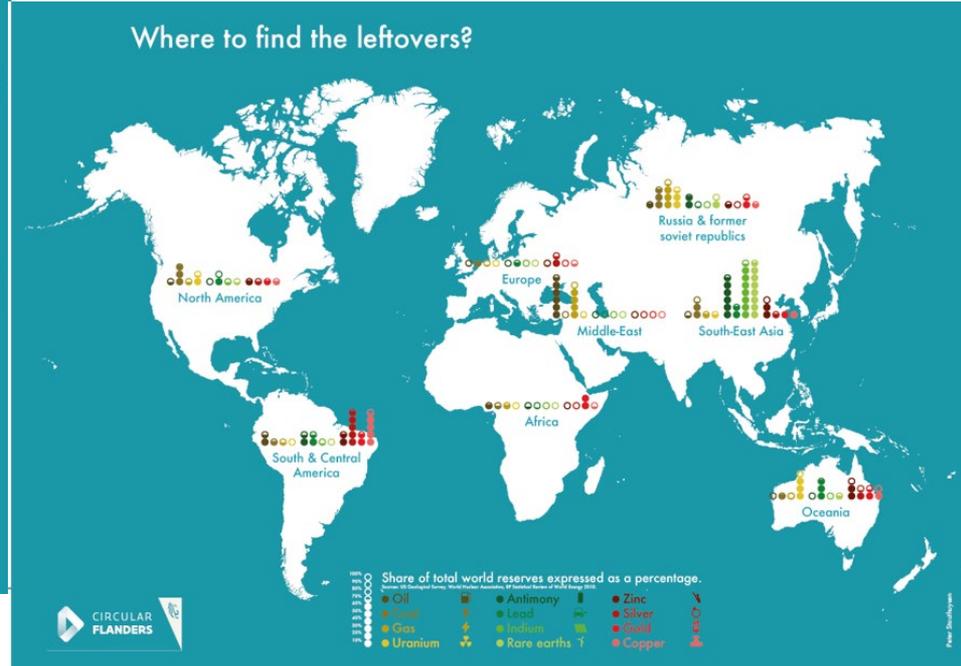
 Igor Kos, WCYCLE Institute Maribor igor.kos@wcycle.com

WHY CIRCULAR ECONOMY??

Born in 2010: How much is left for me?



Where to find the leftovers?



- **Maribor** is the capital of the province of Styria and the second largest city in the country with 115.000 inhabitants
- It is a pleasant small 850 year old university town set in the beautiful surroundings of Pohorje hills on one side and the wine hills on the other, divided by the river Drava
- It is the economic and cultural center of northeastern Slovenia with rich industrial history
- It offers a diverse and high-quality tourist services, a clean environment and the highest quality of natural water





Energetika Maribor d.o.o. – District Heating



Snaga d.o.o.- Waste management



Mariborski vodovod d.d. – Water supply



Nigrad d.d. – Construction



Marprom d.o.o. – Public transport



ESTABLISHED APRIL 2017

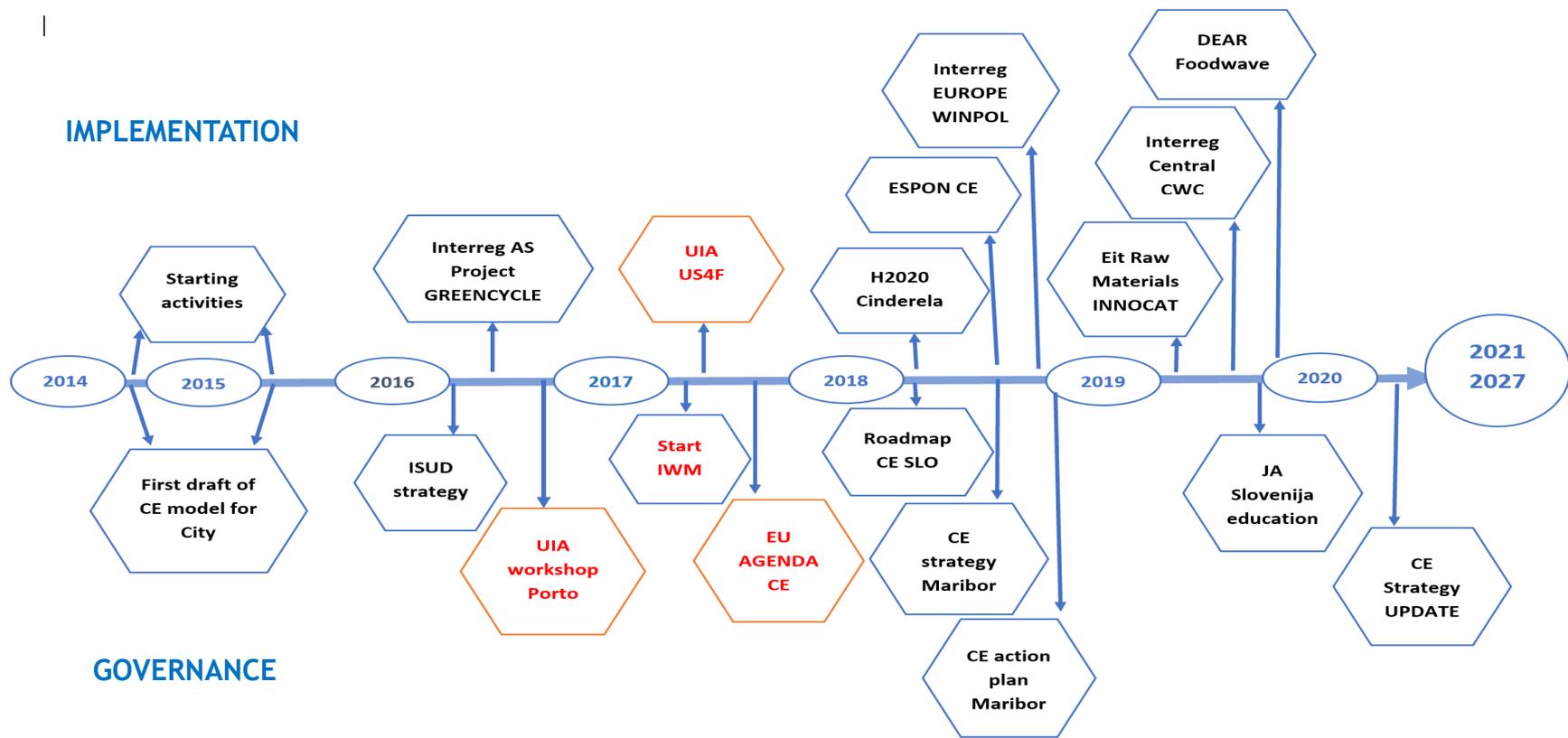
5 EMPLOYES

**FROM EACH COMPANY THAT
ESTABLISHED INSTITUT
EMPLOYES FROM R&D
DEPARTMENT ARE INVOLVED**

**WORKING GROPU HAS 12
MEMBERS**



TIMELINE OF CIRCULAR ECONOMY DEVELOPMENT IN MARIBOR



STRATEGY FOR THE TRANSITION TO CIRCULAR ECONOMY IN THE MUNICIPALITY OF MARIBOR

Prepared by: **Wcycle Institute Maribor**
Maribor, July 2018



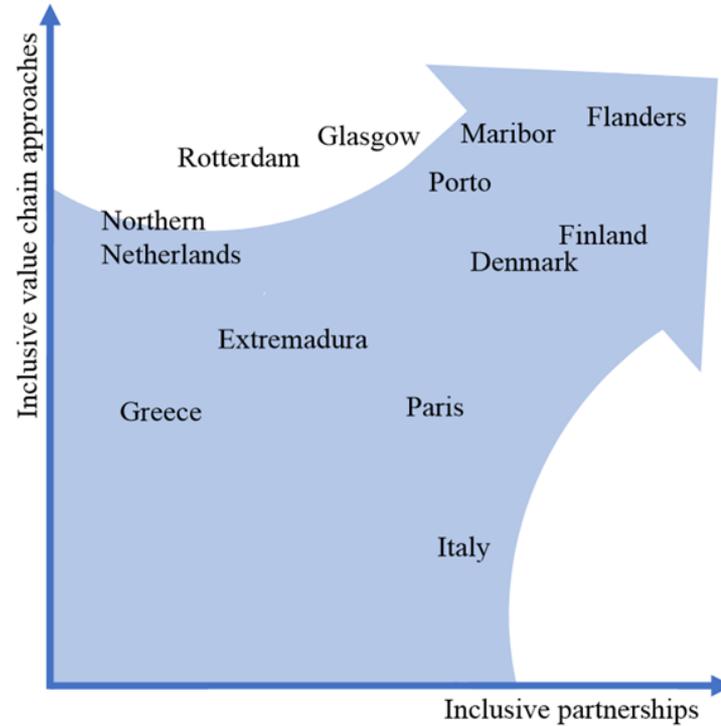
Interreg
Alpine Space
GREENCYCLE



https://circulareconomy.europa.eu/platform/sites/default/files/strategy_wcycle_final.pdf



Figure 3.4 *Inclusiveness of circular economy strategies*



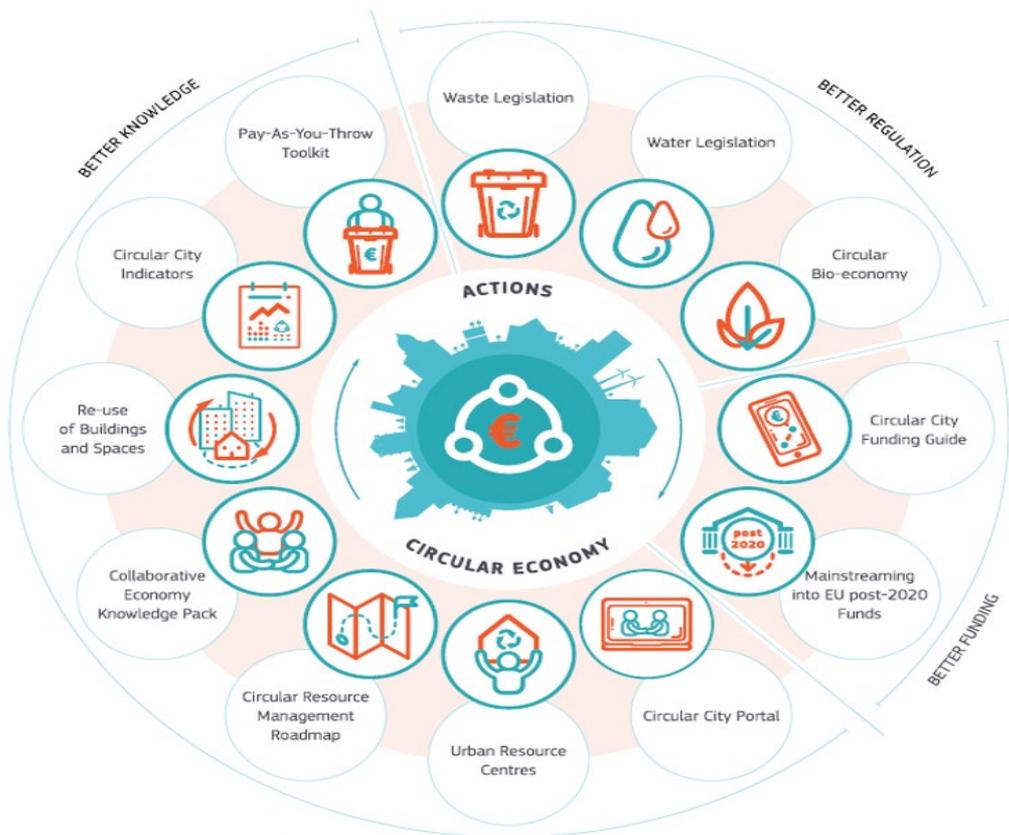
Source: *Spatial Foresight, 2019*





https://circulareconomy.europa.eu/platform/sites/default/files/roadmap_towards_the_circular_economy_in_slovenia.pdf



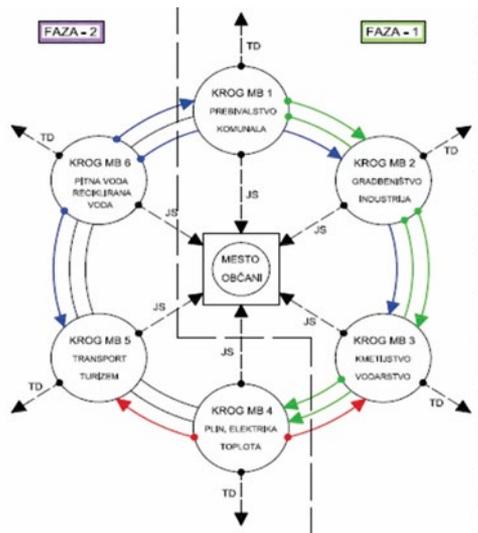


**EU AGENDA PARTNERSHIP
FOR CIRCULAR ECONOMY**
[HTTPS://EC.EUROPA.EU/FU
TURIU/EN/CIRCULAR-
ECONOMY](https://ec.europa.eu/futurium/en/circular-economy)

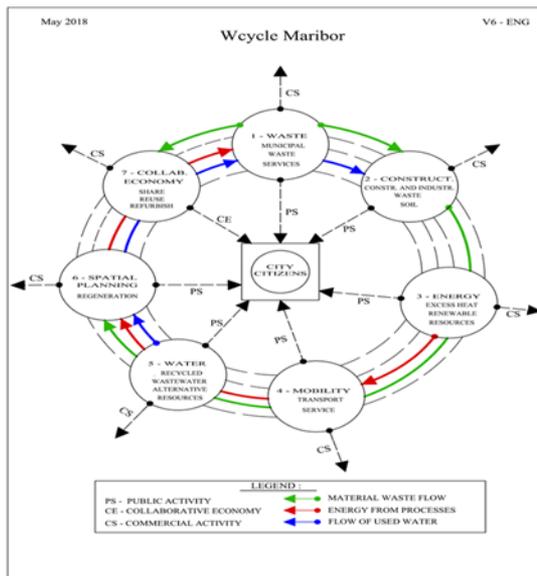


DEVELOPMENT OF CE MODEL IN MARIBOR

SUD 2016

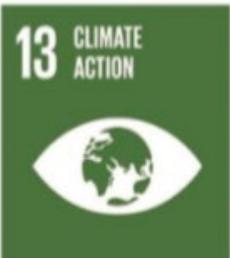
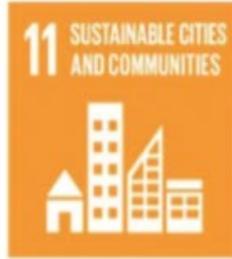
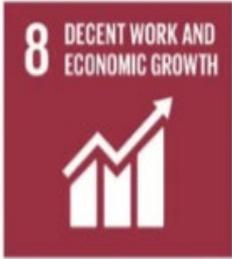


SKG 2018



Update SKG 2020





PROJECT GREENCYCLE

Interreg
Alpine Space
GREENCYCLE
EUROPEAN REGIONAL DEVELOPMENT FUND



The aim of the GREENCYCLE project was to introduce a circular economy system as an integrated approach to support the implementation of low carbon strategies and to provide an additional 2-4% reduction in greenhouse gas emissions in partner cities.

<https://www.alpine-space.eu/projects/greencycle/en/home>





Establishing innovative economic circles in the urban environment to increase local food self-sufficiency and reduce the environmental footprint.



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



The CINDERELA project aims to untap potential of construction and demolition waste by developing and demonstrating a new business model (CinderCEBM) to assist companies in setting up successful circular economy business cases based on waste-to-resource opportunities.

<https://www.cinderela.eu/The-project>





The CWC project aims to help municipalities to reform outdated urban water infrastructure systems via applying a circular economy approach, which offers many economic and environmental benefits. This will be achieved by the project by promoting a water saving culture, including the use of non-conventional water resources and by taking the lead in adopting urban rainwater harvesting and utilisation as well as greywater recovery measures on city level.

<https://www.interreg-central.eu/Content.Node/CWC.html>





Improving policies for waste management so that they increasingly foster and promote the use of intelligent equipment and planning derived of it, significantly contributing to waste minimisation in European cities and regions, through improved management procedures and awareness campaigns.

<https://www.interregeurope.eu/winpol/>





working together is essential part of
Circular economy
so that $1+1+1 > 3$
thank you for your attention





CITYCIRCLE

Training for regional stakeholder groups

Circular economy hubs

Example of Digipolis, Finland

Online meeting

April 15th, 2020 – 10:00-11:00 CEST

Hosted by BWCON GmbH



MINUTES

Greetings & Intro

Luc Schmerber, BWCON

KEY NOTES:

1. Introduction to the context of the webinar, as part of D.T2.2.4 Specific trainings for each of the regional stakeholder groups (2 trainings per region)
Topic: Circular economy hubs
2. Introduction of the speaker:
Tuomas Pussila, Mr.
Cluster Manager, M.Sc. (Tech.)
Arctic Industry and Circular Economy
Digipolis - Kemi Technology Park
Tietokatu 6, FI-94600, Kemi
www.digipolis.fi

PRESENTATION

Tuomas Pussila, Digipolis - Kemi Technology Park

KEY NOTES:

1. Presentation of the Circular Economy in Finland and industrial symbiosis as a regional driver,
www.digipolis.fi
2. Q&A with the audience

SUPPORTING DOCUMENTS

1. Presentation (Annex)
2. List of participants (Annex)
3. Recording of the webinar (available upon request)



ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: CITY CIRCLE Webinar

Location: online

Date: 15.04.2020, from 10:00-11:00 CEST

No.	Name and Surname	Organisation	E-mail	Signature
1.	Luc Schmerber	BWCON	schmerber@bwcon.de	n.a.
2.	Nadia Vedova	Municipality of Udine	nadia.vedova@gmail.com	n.a.
3.	Agnese Pressoto	Municipality of Udine	agnese.presotto@comune.udine.it	n.a.
4.	Stefano Treu	APE FVG	stefano.treu@ape.fvg.it	n.a.
5.	Robert Hanzen	TUKE	robert.hanzen@tuke.sk	n.a.

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8.	Marija Ahacic-Premrl	City of Kranj	Marija.Ahacic-Premrl@kranj.si	n.a.
9.	Tomaž Lanišek	City of Kranj	Tomaz.Lanisek@kranj.si	n.a.
10.	Eva Romih	City of Kranj	Eva.romih@kranj.si	n.a.
11.	Ziherl Janez	City of Kranj	Ziherl.janez@kranj.si	n.a.
12.	Aleksandra Ažman	City of Kranj	Aleksandra.Azman@kranj.si	n.a.
13.	Smiljana Slavec	City of Kranj	Smiljana.slavec@kranj.si	n.a.
14.	Črtomir Kurnik	Local Energy Agency of Gorenjska	crtomir.kurnik@leag.si	n.a.
15.	Branka Balantič	SCKR	branka.balantic@sckr.si	n.a.
16.	Nina Taylor	eZavod	nina@ezavod.si	n.a.
17.	Matjaz Gerl	eZavod	matjaz@ezavod.si	n.a.
18.	Rea Poljak	City of Varazdin	rea.poljak@varazdin.hr	n.a.

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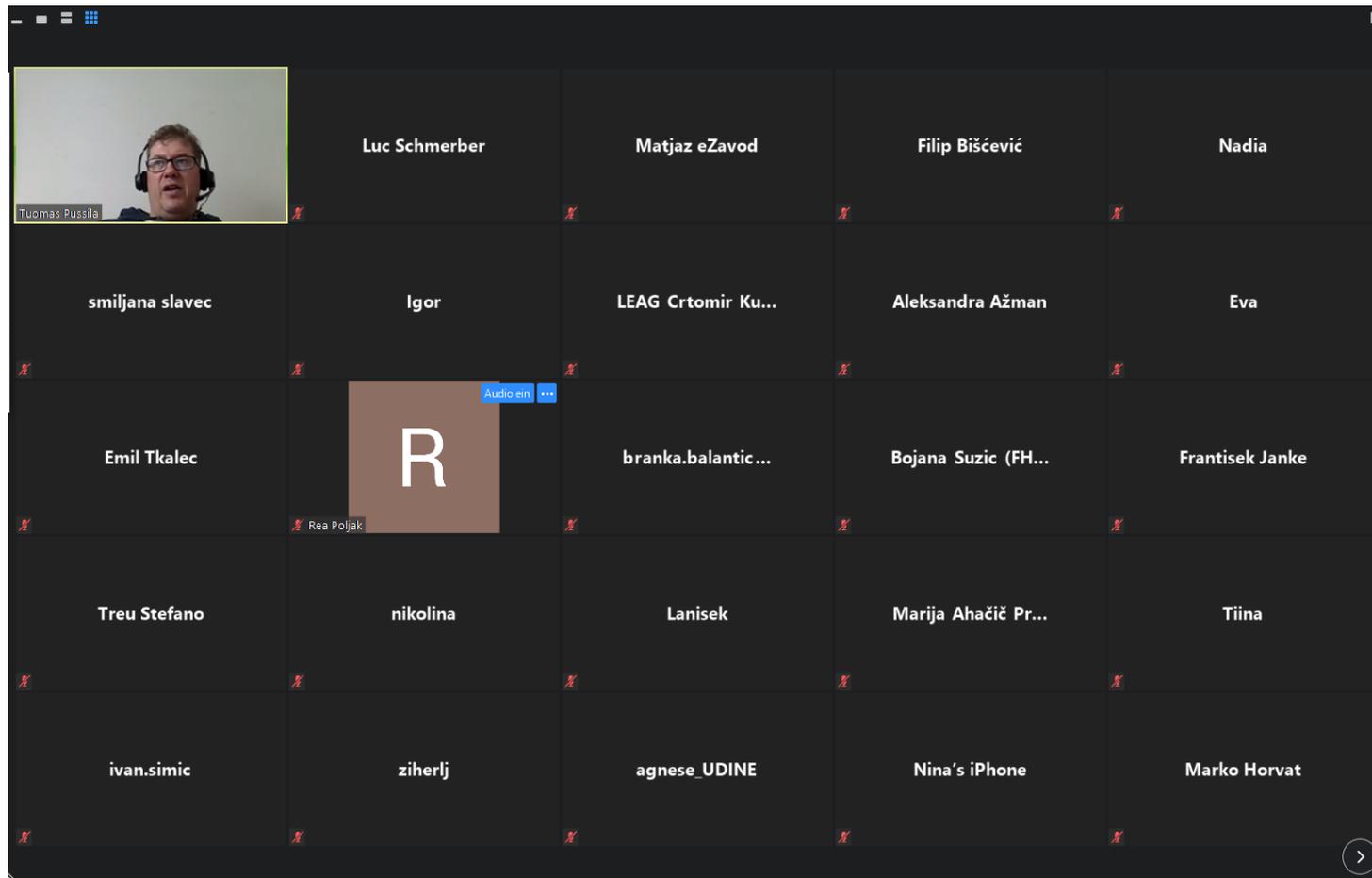


19.	Gregor Drago Zupančič	Croteh d.o.o. - Centre for development of sustainable technology ltd. Zagreb, Croatia	gregor.zupancic@croteh.eu	n.a.
20.	Nikolina Zigmund	DAN	nikolina.zigmund@dan.hr	n.a.
21.	Filip Biscevic	DAN	Filip.biscevic@dan.hr	n.a.
22.	Ivan Šimić	Regional energy Agency - REA Koprivnica, Croatia	ivan.simic@rea-sjever.hr	n.a.
23.	Emil Tkalec	Local Action Group - Lepoglava, Croatia	Emil Tkalec <etkalec@gmail.com>	n.a.
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25.	Bojana Suzic	Fachhochschule Vorarlberg	Bojana.SUZIC@fhv.at	n.a.
26.	Igor Kos	Wcycle Maribor	igor.kos@wcycle.com	n.a.
27.	Tiina Puotinen	Digipolis Kemi Finland	Tiina.puotinen@digipolis.fi	n.a.
28.	Tuomas Pussila	Digipolis Kemi Finland	tuomas.pussila@digipolis.fi	n.a.

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LS Luc Schmerber (Host, ich) Audio ein Mehr >	
TP Tuomas Pussila 🔊 📺	
A agnese_UDINE 🔇 📺	
AA Aleksandra Ažman 🔇 📺	
BS Bojana Suzic (FHV) 🔇 📺	
B branka.balantic@sckr.si 🔇 📺	
ET Emil Tkalec 🔇 📺	
E Eva 🔇 📺	
FB Filip Bišćević 🔇 📺	
FJ Frantisek Janke 🔇 📺	
GD Gregor D. Zupančič 🔇 📺	
I Igor 🔇 📺	
I ivan.simic 🔇 📺	
L Lanisek 🔇 📺	
LC LEAG Crtomir Kurnik 🔇 📺	
MA Marija Ahačič Premrl 🔇 📺	
ME Matjaz eZavod 🔇 📺	
N Nadia 🔇 📺	
N nikolina 🔇 📺	
R Rea Poljak 🔇 📺	
SS smijana slavec 🔇 📺	
T Tina Audio ein Mehr >	
TS Treu Stefano 🔇 📺	
Z ziherlj 🔇 📺	
MD Martin Dobler (FHV) 🔇 📺	
BK Barbora Kovacova 🔇 📺	

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CENTRE FOR CIRCULAR ECONOMY

Circular Economy in Finland and industrial symbiosis as a regional driver

Digipolis – Kemi Technology Park

Circular Economy presentation

Tuomas Pussila, Program Manager, Circular Economy

Finland becomes a world leader in the circular economy by 2025

Roadmap's ambition:



Increased exports and growth for companies from scalable and comprehensive circular economy solutions.



Functional **domestic market**.



Circular economy into the mainstream through **actions** and **concrete pilots**.

Economy, environment & society:



Circular economy as a new cornerstone for the Finnish economy.



Finland as a model country for the challenge of scarcity.



From adapter to pioneer.

ECOSYSTEM OF ARCTIC INDUSTRY

Kemi-Tornio`s circular economy innovation platform

- World's northernmost hub of bio-, mining -, metal industry and services
- 1,7 Mt of by-products and residues (excluding waste rock)
- Responsible for 80% of Lapland's industrial production, with over 5 billion EUR of exports annually (7-8 % of the total export value of Finland)
- Industrial symbiosis estimated at 700 million EUR annually



MAIN INDUSTRY SITES IN KEMI-TORNIO REGION

Metsä Board and Metsä Fibre Kemi mills

- World's northernmost linerboard production site
- World's northernmost pulp mill (re-build coming)



Outokumpu Chrome Kemi mine

- Europe's biggest chromium mine



Outokumpu Tornio stainless steel mill and ferrochrome smelter

- Outokumpu's site in Tornio is the most integrated stainless steel mill in the world combining chromium mine, ferrochrome works and stainless steel mill
- Europe's biggest user of recycled steel

Stora Enso Veitsiluoto Mill in Kemi

- World's 2nd northernmost **pulp mill**
- World's northernmost paper producer with **three paper machines**, and 4th biggest paper production integrate in Europe
- Oldest **sawmill** in production in Northern Finland



Manga LNG liquid natural gas terminal in Tornio 2018

ETC...





FURTHERING THE CIRCULAR ECONOMY AND BIOECONOMY IN LAPLAND IN 2012–2016

Industry byproducts utilised

Where did it all begin?

11/2012

The key players of Kemi–Tornio industries and industrial services were interviewed in the side-stream evaluation of needs.

Lapland EU's model region

7/2014 

European Commission's selection: Lapland EU's model region in sustainable processing of natural resources

The FISS model

10/2014

FISS workshops, Finland benchmarking, business potential

Recognition for work

21 September 2016

Work carried out by the Kemi–Tornio region & Lapland and Digipolis and partners: Key project of Sitra's Finnish circular economy action plan

Development of operations

2014

Side-stream recognition tool development together with industries across sectoral boundaries. Development of measures furthering the systematic process and taking the matter forward

27 side-stream recognition, total volume:

1.4 million tonnes annually

=  **Over 100 trucks daily**

Prioritisation of development tasks

4/2013

Prioritisation of development tasks with key players of industries and industrial services

Expansion of operations

2015-2016

Entire Lapland's big industries involved in development. Synergies between mines and the processing industry, and entry of new service businesses. Expanding the process to northern Finland, northern Sweden and northern Norway.

2017 

Implementation of Sitra's action plan

THE FUTURE OF THE CIRCULAR AND BIOECONOMY IN LAPLAND

DIGIPOLIS



4,000

The Kemi-Tornio industries currently employ 4,000 people in the region. With future investments in the bio- and circular economy (such as Boreal Bioref, Kaidi), the employment effects in northern Finland are estimated at 2,000 persons.



1.7 million

Annually the Kemi-Tornio industries produce tonnes of industrial byproducts

Utilisation categories include neutralisation, circulation of nutrients, excavation, landscaping, soil enrichment, building products, water treatment.

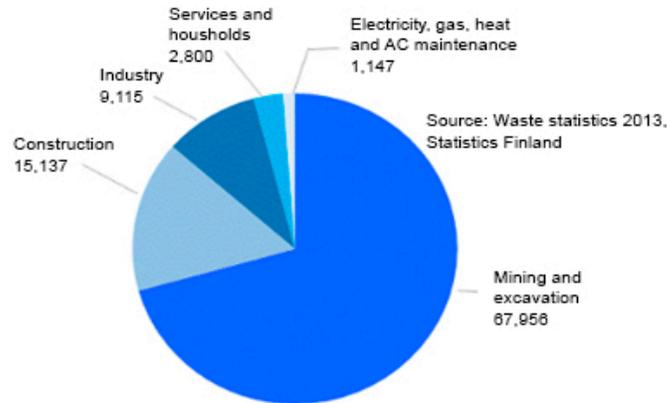


Industry byproducts utilised

From waste into profitable business



Finland has great potential to utilise industrial side streams (94 million t/a), which are currently classified as waste.



Source: Waste statistics 2013, Statistics Finland

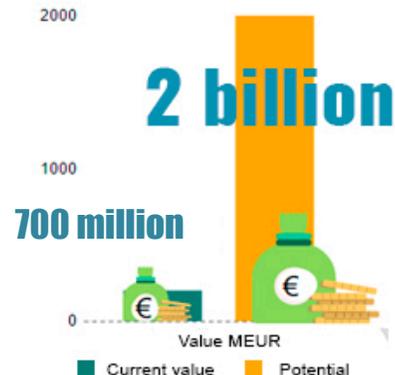
96% of waste is non-household generated.

VISION

Lapland world's leading arctic bio- and circular economy region

Business potential

The current value of Lapland's industrial symbiosis and the potential of the bio- and circular economy



CE-approved recycled materials from industrial side streams:

The annual use of ferrochromium slag in road construction (400,000 tonnes) saves 600,000 tonnes of virgin gravel and rock aggregate and reduces road construction carbon dioxide emissions by 200,000 tonnes.

Source: Outokumpu plant in Tornio

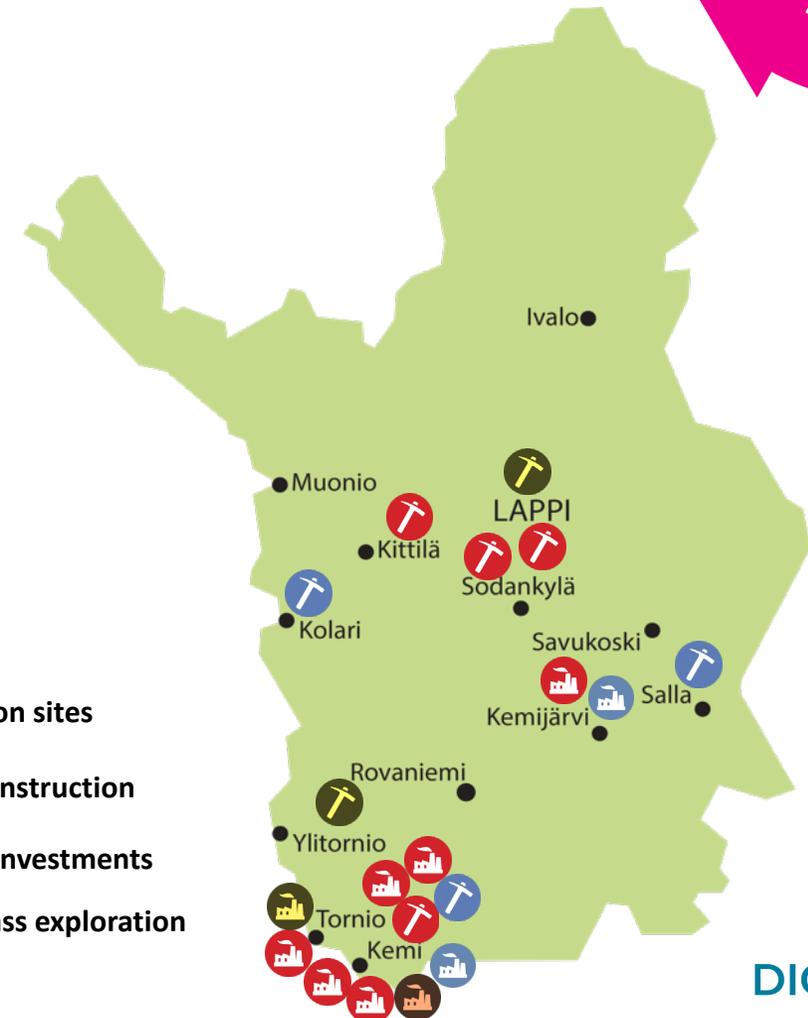
Kemi-Tornio circular economy Ecosystem



Utilisation of the arctic natural resources – Lapland's Arctic Industry

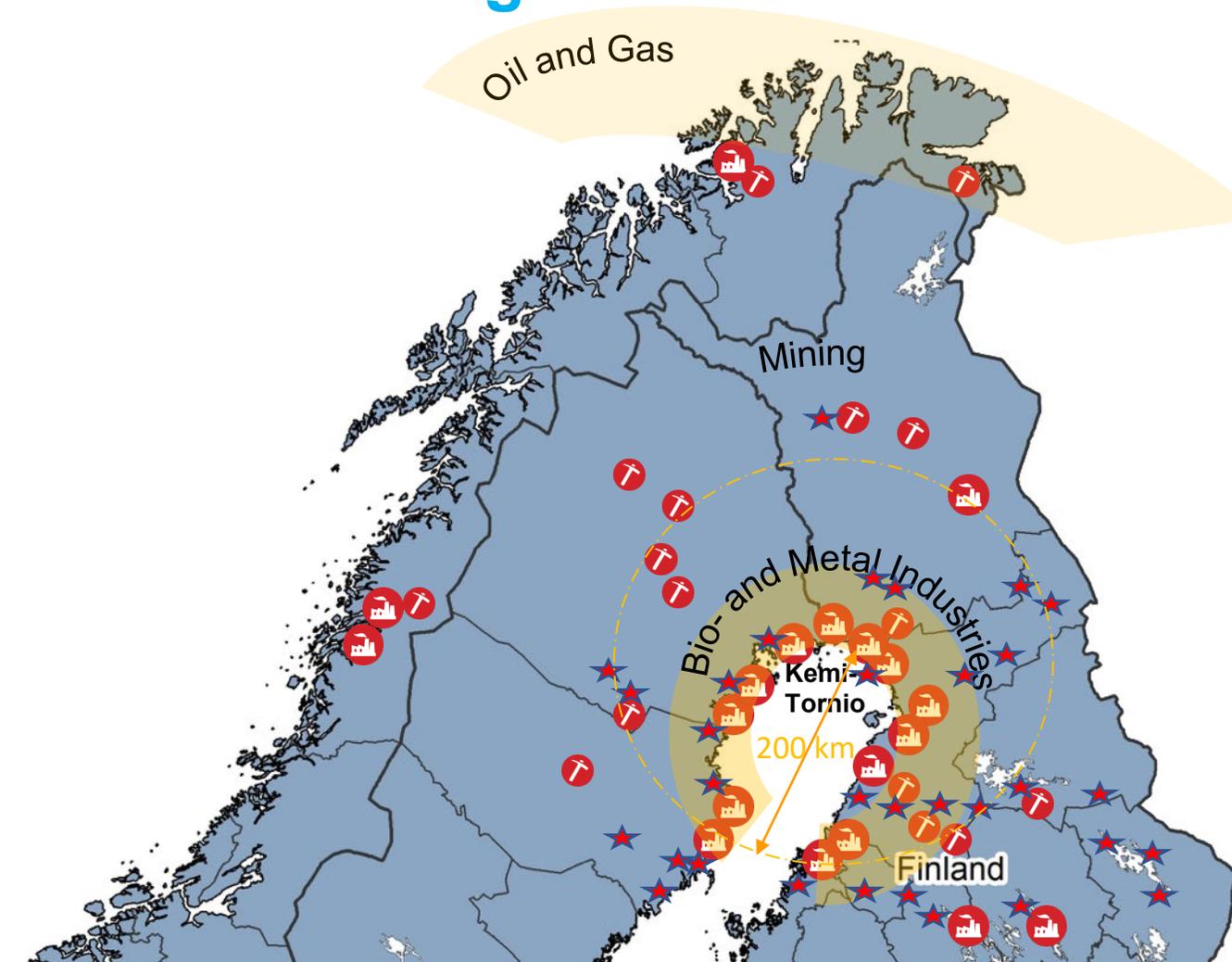
- Arctic Spring, Investment boom in Arctic regions
- Industrial- and mining service companies receive orders worth of hundreds of millions.
- International-industry standards, HSEQ
- Cleantech – growing need of sustainable solutions
- Enhancing Circular Economy
- Internationalization in home market, glocalization
- Internationalization in the surrounding countries
- Own products and services

-  **Production sites**
-  **Under construction**
-  **Planned investments**
-  **World class exploration projects**



Nordic Industries Story of Natural Resources Refining

- Global Markets
- Good Connections
- Arctic Solutions
- Cleantech Solutions
- 5 Bio Refineries
- 32 Sawmills
- 16 Mines
- 5 Metal Refineries
- 2 Aluminium Smelters
- 1 LNG Refinery
- 2 Chemical Plants



Opportunities and plans

Potential utilisation sites in Northern Finland area

Infrastructure Projects (incl. landfills and recovery sites)

- Mining Projects
- Other industrial projects
- Other projects

Mine projects in Northern Finland

- The cooperation has started with mines that are different stages of the life cycle
- Applications examples: construction, landfills, mine fillings, neutralization etc.

Investment potential and job creation in Kemi-Tornio and Lapland

- 16 different IS investment projects
- Biggest ones:
 - Metsä (in Kemi) and
 - Boreal Bioref (in Kemijärvi) biorefineries are CE and IS cases,
 - Total Investments Apr. 2 billion €
- Over 2000 new employees in potentially circular value chains - ecosystems

Digipolis key actor in Finland's Circular Economy roadmap



THIS IS HOW WE BUILD CIRCULAR ECONOMY IN FINLAND

Technical loops

Competitive advantage from the decreased use of virgin raw materials and long lifecycle of materials and products.

Key projects:

- **The Arctic industries ecosystem and Kemi-Tornio circular economy innovation platform. (Digipolis Oy)**
- Circular economy demo plant for waste electrical and electronic equipment. (Technology Industries of Finland)

Plans

- Making pilots, scale-ups and investments to happen, process of cluster funding
- Tighter cooperation and benchmarking through Scandic & European networks
- More resources through strategic alliance with Lapland UAS and growing capacity
- Modern cluster approach and cooperation
- Efficient development/funding tools
- Establishment of Centre for industrial circular economy
- Lapland UAS: CE curricula starts on 2018
- EU Alliance

Finnish industrial circular economy centre to be established in Kemi

- Focus is in the circular economy and the bioeconomy
- In partnership with the Finnish Innovation Fund Sitra, City of Kemi, Digipolis – Kemi Technology Park and Lapland University of Applied Sciences
- First industrial circular economy centre in Finland with national level mandate
- Virtual network of industry, university and development experts
- **Aims of the centre:**
 - National level
 - To promote education and competence in the industrial circular economy across the whole of Finland
 - To spread operating models of the Kemi region's industrial circular economy throughout Finland
 - To boost the successful circular economy development work that Digipolis – Kemi Technology Park has carried out and to generate vitality for the city of Kemi and for the whole of Finland
 - City of Kemi and Lapland level
 - To create new investments and jobs – Industry modernization
 - Help investments to be more sustainable and efficient
 - Lapland is Europe's model region for the sustainability: modern cluster development in the sustainable refinement of natural resources
 - Establishing common systematic operational culture → Activation and cooperation of authorities, municipalities, industry, industrial services etc.

Kemi CE Centre Advisory Board

1. Martti Sassi, Senior Vice President – Head of Operations, Outokumpu Tornio Works
2. Juha Mäkimattila, Mill Director, Stora Enso Veitsiluoto Mill
3. Kari Ala-Kaila, Vice President – Technology , Metsä Fibre
4. Mikko Korteniemi, General Manager, Agnico Eagle Finland Kittilä Mine
5. Jukka Jokela, General Manager/Project Manager, Anglo American - Finland AA Sakatti Mining
6. Jari Hietala, National Division Leader, Eurofins Environment Testing
7. Juha Koskinen, R&D Manager, Tapojärvi Oy/ Hannukainen Mining Oy
8. Tuula Sivonen, Regional Manager, The Federation of Finnish Technology Industries
9. Kimmo Heikka, Managing Director, Kemin Digipolis Oy
10. Heino Vasara, Sector Manager, Centre for Economic Development, Transport and the Environment
11. Eija Virtasalo, Head of Financial Unit, Centre for Economic Development, Transport and the Environment
12. Eira Luokkanen, Head of Unit – Environmental Protection, Centre for Economic Development, Transport and the Environment
13. Jyri Seppälä, Director – Centre for Sustainable Consumption and Production, Finnish Environment Institute (SYKE)
14. Eero Yrjö-Koskinen, Secretary General, Finnish Network for Sustainable Mining and Director, Green Budget Europe
15. Riikka Aaltonen, Senior Adviser – Mineral Policy, Enterprise and Innovation Department, Ministry of Economic Affairs and Employment
16. Kari Herlevi, Project Manager – Circular Economy, Sitra
17. Nani Pajunen, Leading Specialist – Circular Economy, Sitra
18. Olli Dahl, Professor, Aalto University, Clean technologies research group
19. Riitta Rissanen, Managing Director, Lapland University of Applied Sciences
20. Tero Nissinen, Chair, Mayor, City of Kemi

Arctic Industry & Circular Economy Cluster

ANDRITZ Valmet
BOLIDEN metso AngloAmerican
SPINVERSE Manga Lng KAIDI
EIGENOR
Etteplan sma mineral AGNICO EAGLE FINLAND storäenso
REPOLAR Caverion ASES KEMIN SATAMA MetsäFibre outokumpu
Korkkälä Kemi Shipping Hannukainen Mining
NORR HYDRO akkoy TAPOJÄRVI KEITELE group
SAVATERRA SAVA GROUP BOREAL BIOREF BIOJALOSTAMO
aromtech PALSATECH
SANGEN NTH service AHMA KEMIJOKI KEMIJÄRVI Agria Lappi
Forest of Lapland STYRUD HAVATORGO eventum DEKRA
KAIVOSVASTUU SITRA Motiva Teknologiateollisuus

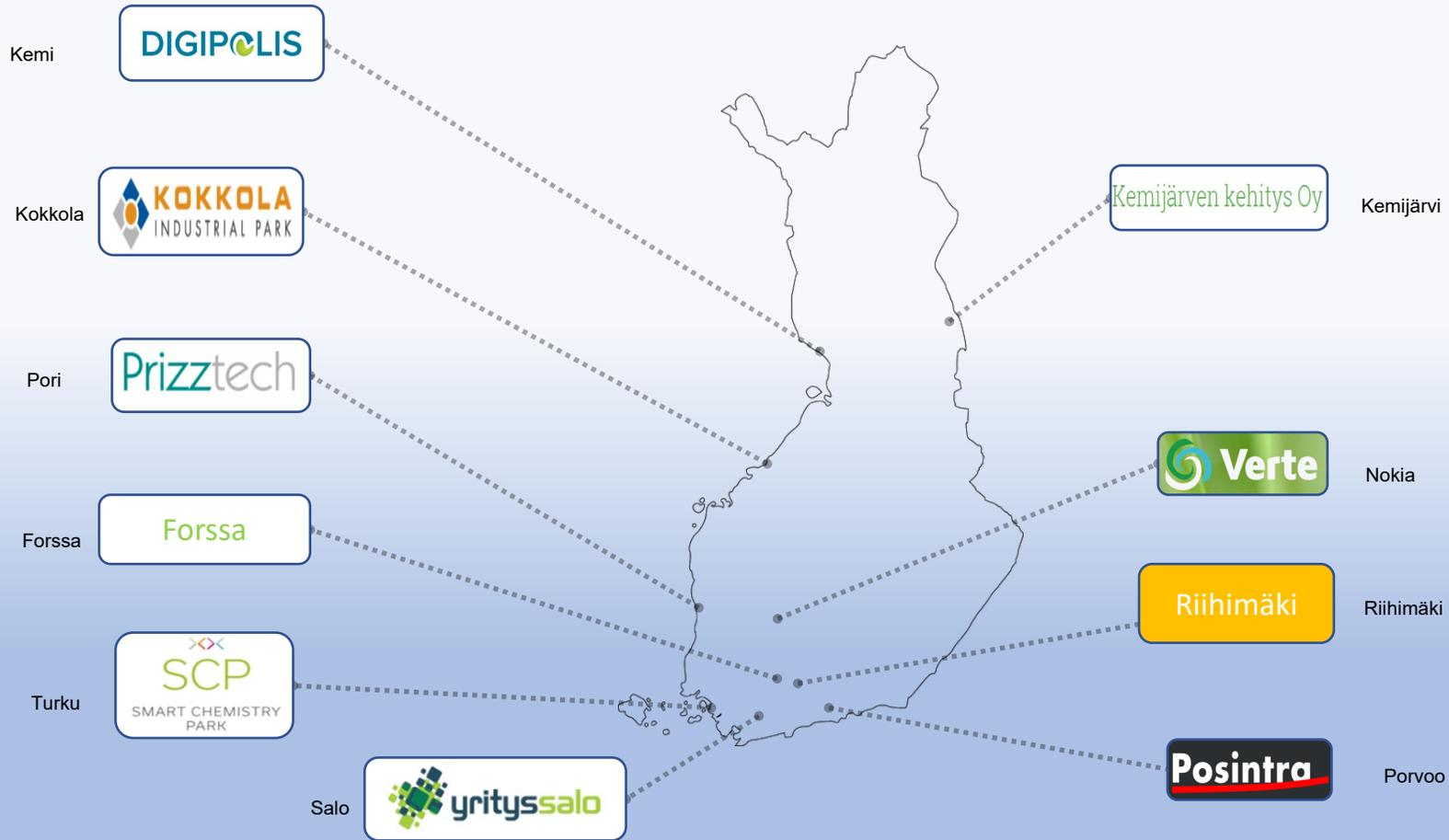
NORDREGIO Nordic Centre for Spatial Development
SINTEF IUC NORRBOTTEN AB
GKZ Freiberg MONTAN UNIVERSITÄT
European Committee of the Regions European Commission
Ministry of Industry and Trade
Lapin AMK LAPPIA
DIGIPOLIS KEMI TEAM BOTNIA OY
Rovaniemen Kehitys REGIONAL COUNCIL OF LAPLAND
Tervola Kittilä YLITORNIO
LAPLAND CHANGING

LAPLAND Above Ordinary

SILVER
Cluster Management Excellence
DEDICATED TO CLUSTER EXCELLENCE

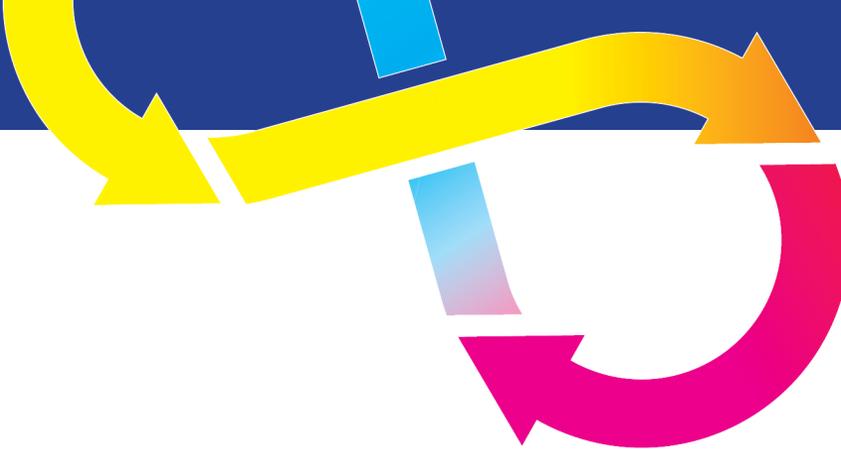
Sustainable exploitation of arctic natural resources

The Finnish Network of Eco-Industrial Parks



Biofuelrefinery project in Kemi





CENTRE FOR CIRCULAR ECONOMY

LAPLAND

Above Ordinary



Saari / Stora Enso



Outokumpu



Lappeen Group

Thank You!

Interested in to do co-operation?

Please contact:

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SILVER



Cluster
Management
Excellence

DEDICATED TO CLUSTER EXCELLENCE

DIGIPOLIS

Leverage from
the EU
2014-2020



European Union
European Regional
Development Fund

TAKING
COOPERATION
FORWARD



Information package | July 2020



WP T2 - Circular business models for SMEs



Luc Schmerber | BWCON

CONTENT

1 Objective of the document

2 Rationale for the circular transformation of businesses

3 Typology of existing circular business models for businesses

upcoming

4 Examples from the industry

5 Supporting materials - tools



OBJECTIVE OF THE DOCUMENT

- Provide an overview of most popular approaches to circular business models for businesses
- Provide real examples of industrial circular business models
- Provide tools supporting the application of the models in practice



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (0)

- The content of the following slides does NOT address the rationale for the circular transition of the economy in general.
- It presents an overview of arguments making it potentially **economically rationale and sensible for each single business** to engage into its own circular transition.



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (1)

- Reduce dependance on scarce / non-renewable resources
 - > Resources costs volatility
 - > Supply unsure
 - > High price fluctuation for scarce resources

- Contribution to mitigate climate change

- Increase of business resilience against external shocks



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (2)

- Preempt regulatory pressures down the line

- Improved customer interaction and loyalty
 - > Turn consumers into users
 - > Improved personalization, customization and retention

- Increase the attractiveness of the brand
 - > Customer's expectations are rising
 - > Investment criteria are changing



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (3)

- Less product complexity and more manageable life cycles
 - Accelerate digital transformation
- Increase in productivity



TYPOLGY OF EXISTING CIRCULAR BUSINESS MODELS FOR SMES

Circular business models

Definitions

Approach 1. Ellen Mac Arthur Foundation

Approach 2. Accenture

Approach 3. PwC

Approach 4. PBL



CIRCULAR BUSINESS MODELS - DEFINITION

Business model:

- “A business model describes the rationale of how an organisation **creates, delivers and captures value.**” (A. Osterwalder, Y. Pigneur, Business Model Generation, 2009)

Circular business model / circular economy business model

- A circular business model is first a business model
- A circular business model aims at decoupling economic activity from the consumption of finite resources.

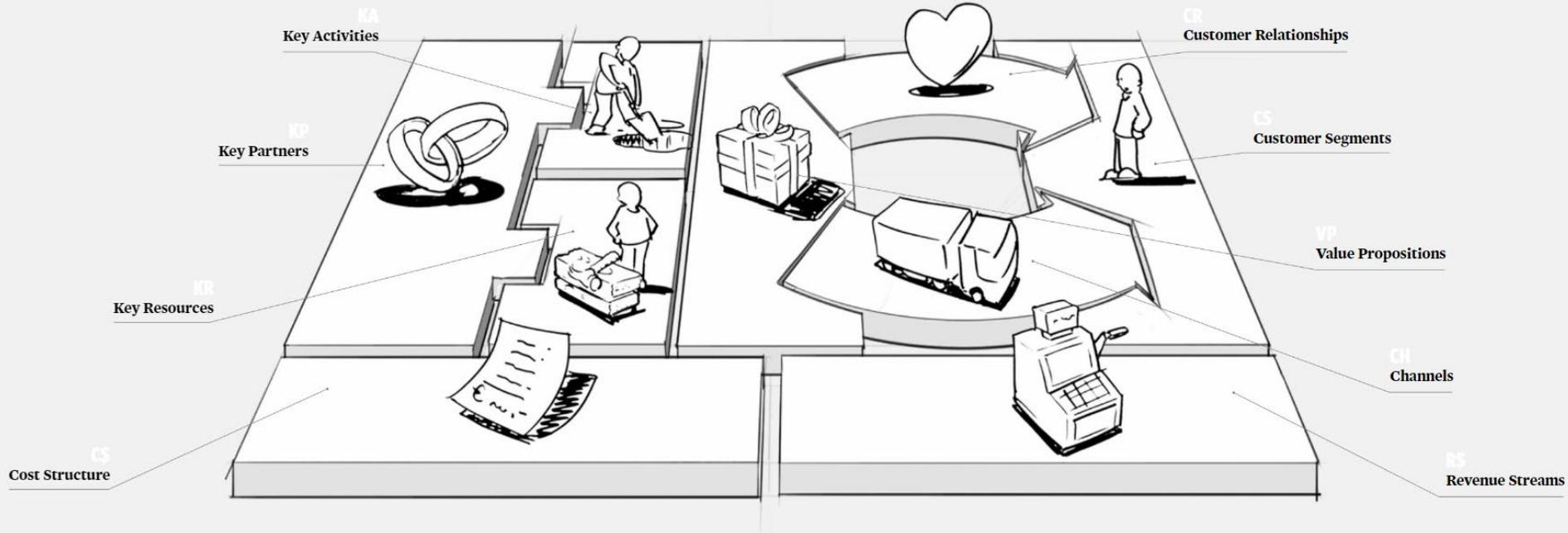


Business model canvas

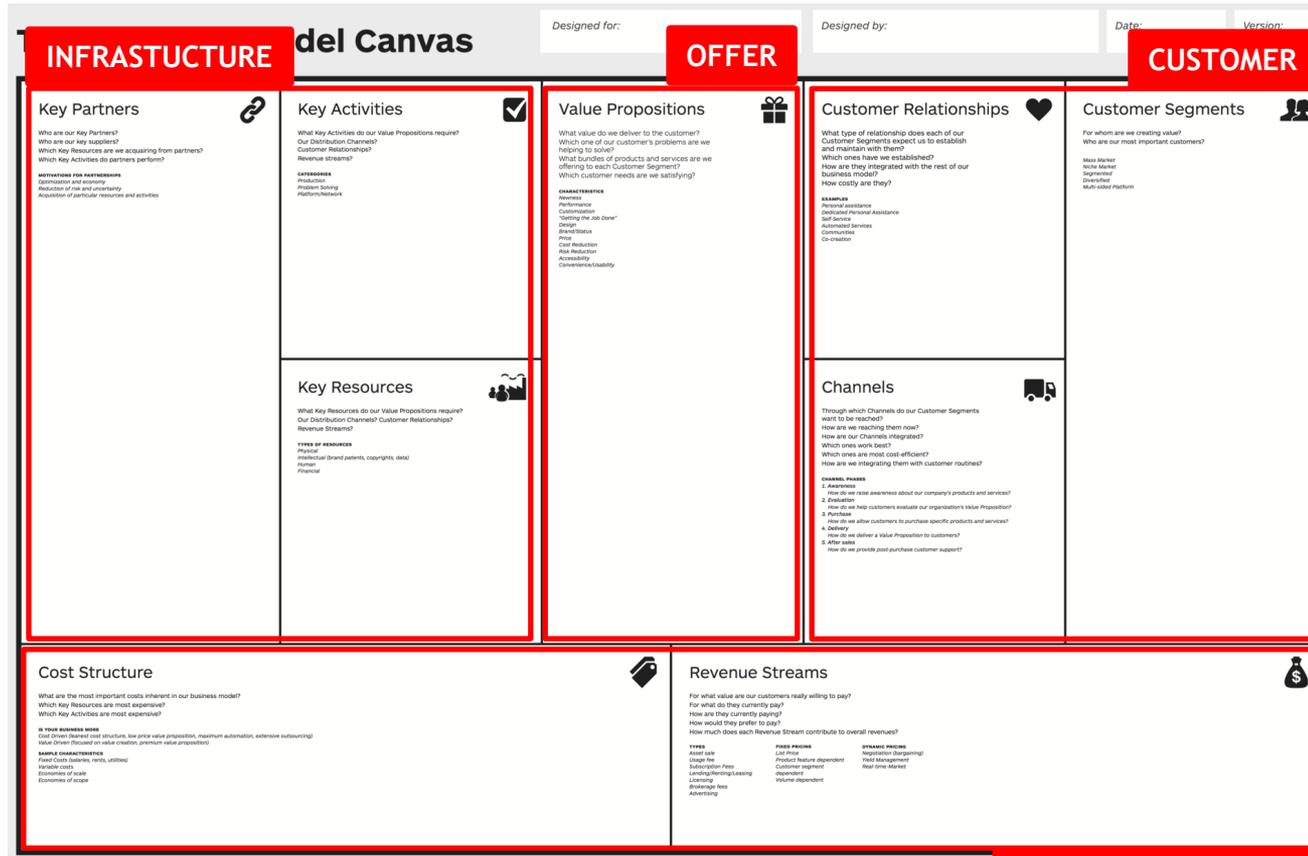
- Concept developed by Alex Osterwalder & Yves Pigneur in their book Business Model Generation which allows to describe and think through the business model of any business.
- It builds on the assumption that a business model can best be described through **nine basic building blocks** that show the logic of how a company intends to make money.
- The nine blocks cover the four main areas of a business model:
 - > Customer
 - > Offer
 - > Infrastructure
 - > Financial viability



BUSINESS MODEL CANVAS



BUSINESS MODEL CANVAS



FINANCIAL VIABILITY



ADDITIONAL RESOURCES

Business model canvas

- Business Model Generation. Available at: <https://www.strategyzer.com/books>
- Business Model Canvas Template. Available at: <https://www.strategyzer.com/canvas>



APPROACH 1. ELLEN MACARTHUR FOUNDATION PRINCIPLES FOR THE CIRCULAR ECONOMY

- Design out waste
- Build resilience through diversity
- Rely on energy from renewable sources
- Think in systems
- Waste is food



APPROACH 1. ELLEN MACARTHUR FOUNDATION PRINCIPLES FOR THE CIRCULAR ECONOMY

- Design out waste
- Build resilience through diversity
- Rely on energy from renewable sources
- Think in systems
- Waste is food



APPROACH 1. ELLEN MACARTHUR FOUNDATION

4 SOURCES OF VALUE

- The **‘power of the inner circle’**:
 - > minimising comparative material usage vis-à-vis the linear production system
 - > the less a product has to be changed in reuse, refurbishment and remanufacturing and the faster it returns to use, the higher the potential savings on the shares of material, labour, energy, and capital embedded in the product

- The **‘power of circling longer’**:
 - > maximising the number of consecutive cycles (be it reuse, remanufacturing, or recycling) and/or
 - > maximising the time in each cycle.



APPROACH 1. ELLEN MACARTHUR FOUNDATION

SOURCES OF VALUE

- The **‘power of cascaded use’**:
 - > diversifying reuse across the value chain, as when cotton clothing is reused first as second-hand apparel, then crosses to the furniture industry as fibre-fill in upholstery, and the fibre-fill is later reused in stone wool insulation for construction—in each case substituting for an inflow of virgin materials into the economy—before the cotton fibres are safely returned to the biosphere.

- The **‘power of pure circles’**:
 - > uncontaminated material streams increase collection and redistribution efficiency while maintaining quality, particularly of technical materials,
 - > which, in turn, extends product longevity and thus increases material productivity.



APPROACH 1. ELLEN MACARTHUR FOUNDATION RESOURCES

- Ellen McArthur Foundation, 2013. Towards the Circular Economy: Economic and business rationale for an accelerated transition. Available at: <https://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-1-an-economic-and-business-rationale-for-an-accelerated-transition>
- Ellen McArthur Foundation. WHAT CAN I DO WITHIN MY BUSINESS? Available: <https://www.ellenmacarthurfoundation.org/explore/what-can-i-do-within-my-business>



APPROACH 2. ACCENTURE

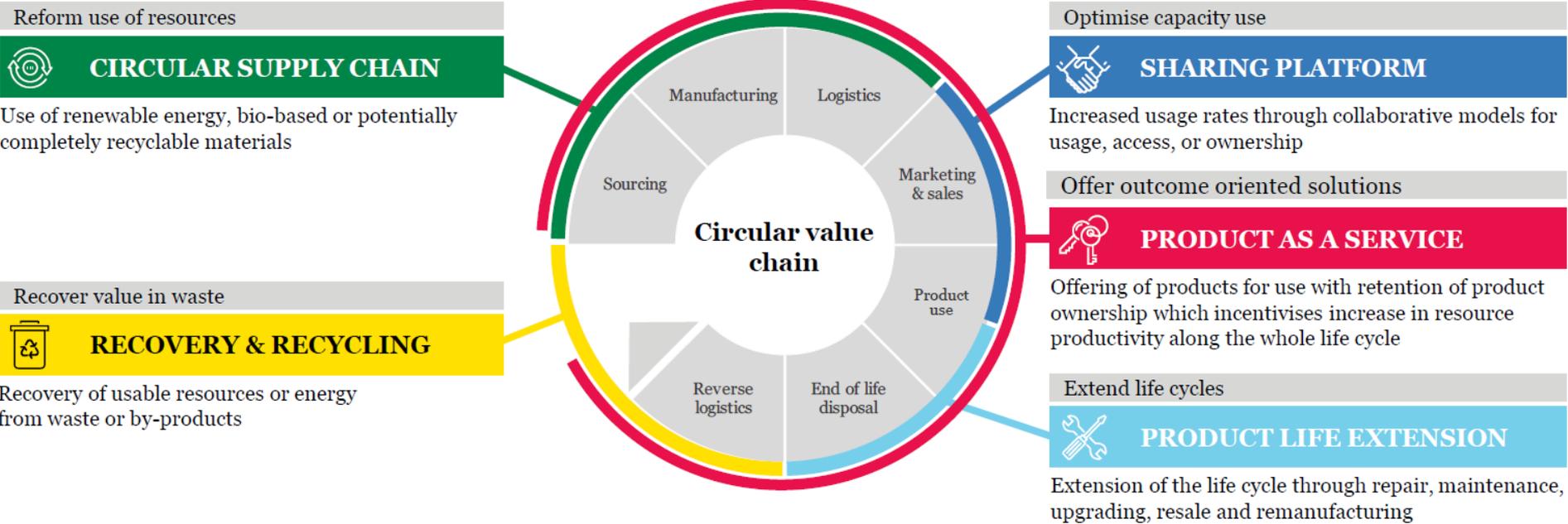
SOURCES OF VALUE

- ❑ **Wasted resources** are materials and energy that cannot be continually regenerated, but instead, are consumed and forever gone when used.
- ❑ Products with **wasted lifecycles** have artificially short working lives or are disposed of even if there is still demand for them from other users.
- ❑ Products with **wasted capability** sit idle unnecessarily; for instance, cars typically sit unused for 90 per cent of their lives.
- ❑ **Wasted embedded values** are components, materials, and energy that are not recovered from disposed of products and put back into use.



APPROACH 2. ACCENTURE

FIVE MAIN CIRCULAR BUSINESS MODELS



Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE

FIVE BUSINESS MODELS - SUB-MODELS

Companies can explore the sub-models individually or as powerful combinations

Business model	Sub-model	Description
 Circular Supply Chain	 Build to last	Design products that are durable and easy to repair (e.g. modular).
	 Circular supplies	Use recyclable materials in production, e.g. renewable and bio-based materials, chemicals & energy to increase recovery rates.
 Sharing Platform	 Share	Develop solutions that enable increased use of capacity.
 Product as a service	 Product as a service	Offer customers to use a product against a subscription fee or usage based charges instead of owning it.
	 Performance as a service	Offer customers to buy a pre-defined service and quality level and commit to guaranteeing a specific result.
 Product Life-extension	 Repair & Maintain	Deliver repair and maintenance services to extend the life of existing products in the market.
	 Upgrade	Improve product performance by upgrading existing components with newer ones.
	 Resell	Resell products that have reached their useful life to second and third hand markets.
	 Remanufacture	Take back and perform industry-like restoration or improvement of original functionality of products and remarket them with lower price.
 Recovery & Recycling	 Recycle / upcycle	Collect and recover materials of end-of-life products and reuse them in own production.
	 Return	Return wasted parts and materials to the source (e.g. waste and by-products from own production).

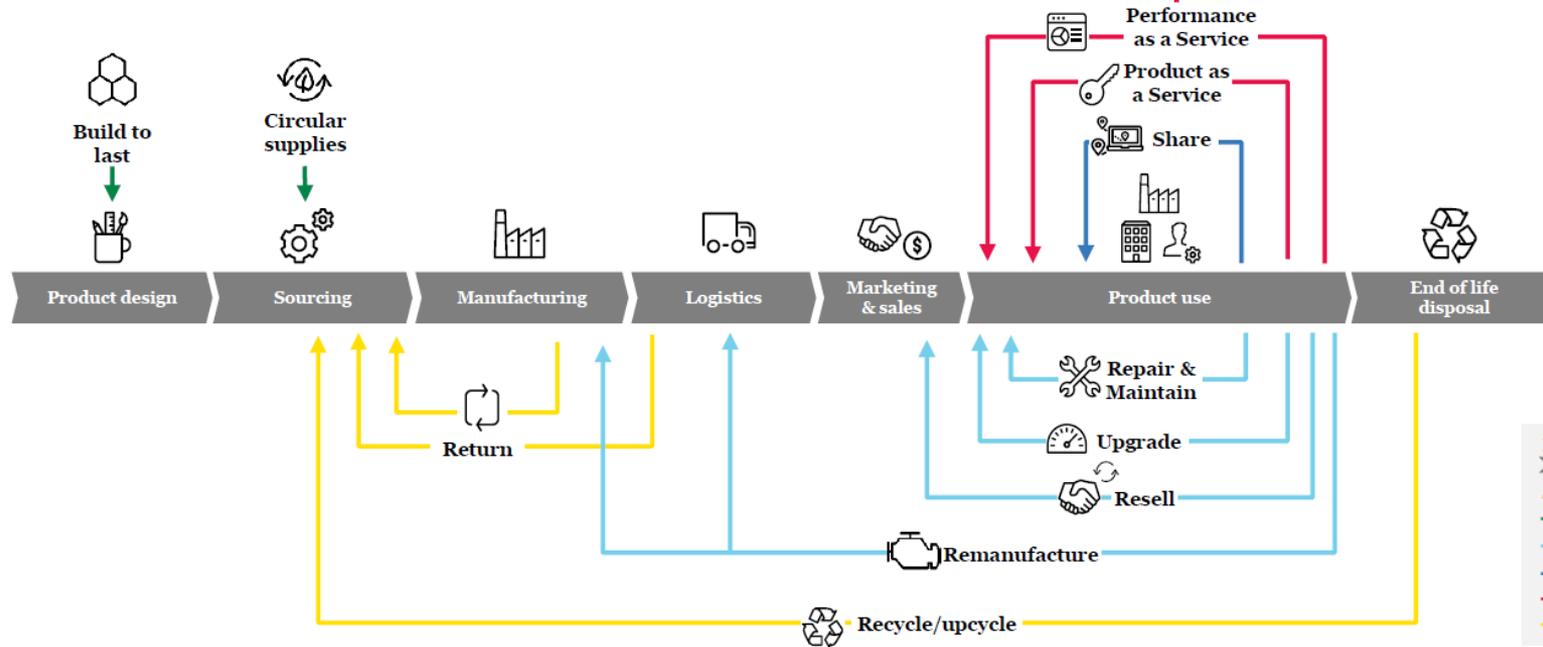
Example synergy:
Modular product design enables enhanced reparability and upgradeability



Source: Circular economy business models for the manufacturing industry

APPROACH 2. ACCENTURE FIVE BUSINESS MODELS - ILLUSTRATION

As a service models are mostly concerned with the product use phase, but address inefficiencies across the value chain



Additional circular business models

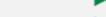
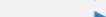
- ### Circular supply chain
- Recycled direct materials
 - Sustainable indirect materials

- ### Sharing platform
- Virtual sharing platform
 - Physical sharing platform

- ### Recovery & Recycling
- Recover
 - Downcycle

- ### Product life extension
- Restore
 - Repurpose
 - Refresh

LEGEND

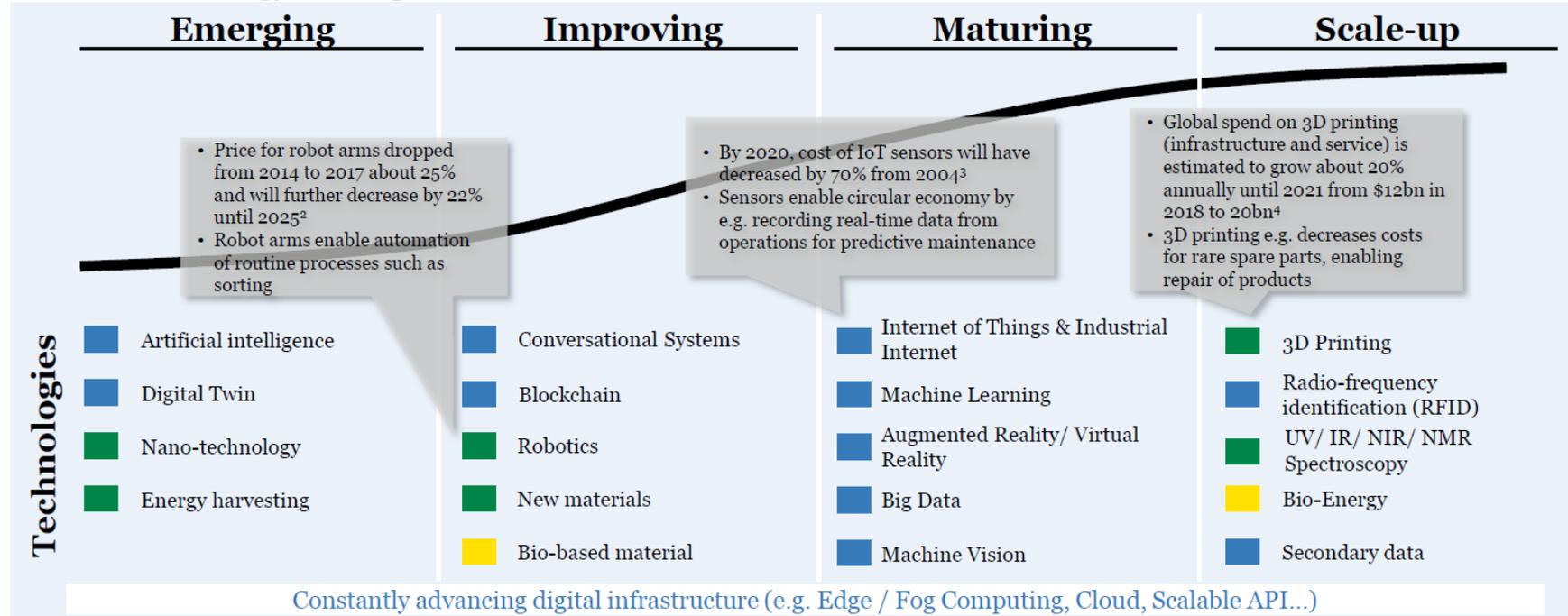
-  Linear value chain
-  Circular Economy Value Chain
-  Circular Supply Chain
-  Product Life Extension
-  Sharing platform
-  Product as a service
-  Recovery & Recycling

Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE TECHNOLOGIES FOR THE CIRCULAR ECONOMY

Level of technology development¹



• Price for robot arms dropped from 2014 to 2017 about 25% and will further decrease by 22% until 2025²
• Robot arms enable automation of routine processes such as sorting

• By 2020, cost of IoT sensors will have decreased by 70% from 2004³
• Sensors enable circular economy by e.g. recording real-time data from operations for predictive maintenance

• Global spend on 3D printing (infrastructure and service) is estimated to grow about 20% annually until 2021 from \$12bn in 2018 to 20bn⁴
• 3D printing e.g. decreases costs for rare spare parts, enabling repair of products

Sources: 1: Accenture, Appendix 2 for more details, 2: IEEE Engineering360; 3: Bank of America, Merrill Lynch; 4: International Data Corporation (IDC)

Legend: Type of technology ■ Digital ■ Physical ■ Biological

Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE RESOURCES

- Lacy, P., et al., 2015. Circular Advantage: Innovative Business Models and Technologies to Create Value in a World Without Limits to Growth. Available at: https://www.accenture.com/t20150523T053139_w_/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Strategy_6/Accenture-Circular-Advantage-Innovative-Business-Models-Technologies-Value-Growth.pdf
- Circular economy business models for the manufacturing industry - Circular Economy Playbook for Finnish SMEs. Available at: <https://www.sitra.fi/en/publications/circular-economy-business-models-manufacturing-industry/>
- Waste to Wealth - Executive Summary. Available at: <https://thecirculars.org/content/resources/Accenture-Waste-Wealth-Exec-Sum-FINAL.pdf>



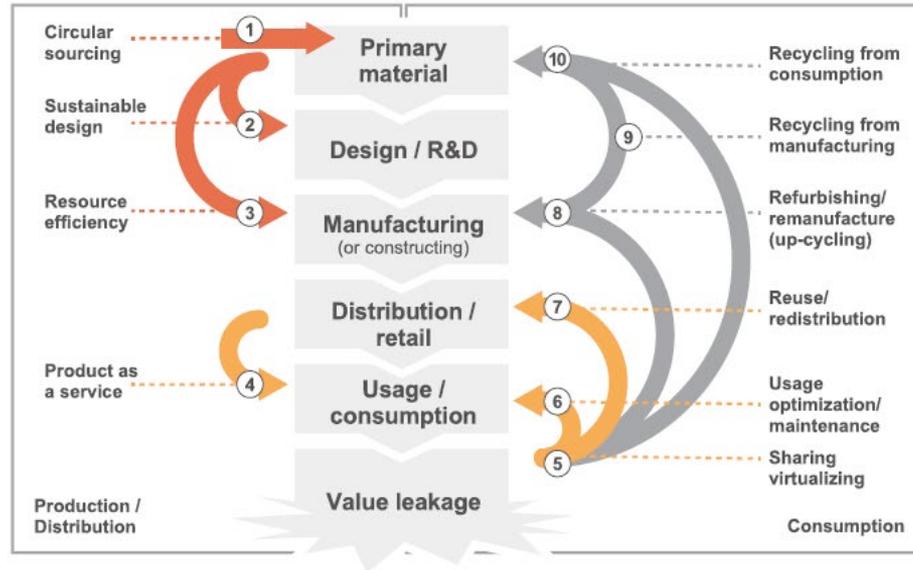
APPROACH 3. PWC

3 PRINCIPLES - 10 STRATEGIES

3 Principles



& 10 Corresponding Strategies



Source: PwC (2019) The road to Circularity



APPROACH 3. PWC

3 PRINCIPLES - 10 STRATEGIES (2)

CE initiatives		Definitions
Prioritise renewable inputs	① Circular sourcing	Replace finite resources / materials with renewable, bio-based, or recycled materials in the production process
	② Sustainable design	Design products - and select raw materials - such that they can be effectively disassembled, reused, repaired and up-cycled
	③ Resource efficiency	Optimise usage of raw materials / resources – minimise waste – in the production process
Maximise product use	④ Product as a service	Provide a service in areas that were traditionally sold as products; increases the product lifecycle through repurposing at the end of usage
	⑤ Sharing/ virtualising	Share durable assets such as cars, rooms, appliances, and digitise products to increase their lifetime (e.g., books, music, shopping, autonomous vehicles etc.)
	⑥ Usage optimisation/ maintenance	Increase performance / efficiency of a product and prolong life through maintenance
	⑦ Reuse/ redistribution	Purchase and sell second-hand and previously owned products to increase product lifecycle
Recover by-products and waste	⑧ Refurbishing/ remanufacture	Remanufacture products or components for a new usage, instead of down-recycling
	⑨ Industrial symbiosis Recycling from manufacturing	Waste or by-products from manufacturing become the inputs for another product
	⑩ Recycling from consumption	Recycle discarded materials after the end of consumption

Source: PwC (2019) The road to Circularity



APPROACH 3. PWC ESSENTIAL TECHNOLOGIES



Artificial Intelligence (AI)

Technology: software algorithms that are automating complex decision-making tasks to mimic human thought processes and senses

Benefits: able to learn, understand, reason, plan and act when fed with data



Internet of Things (IoT)

Technology: ecosystem of sensors, embedded computers, and “smart” devices

Benefits: able to communicate among themselves and with private/public cloud services in order to collect, analyse and present data about the physical world



Additive Manufacturing/3-D Printing

Technology: creating three-dimensional objects based on digital models by “printing” successive layers of material

Benefits: various materials can be used, e.g. wood, glass, living cell for bio-printing; minimise waste



Robotics

Technology: machines with enhanced sensing, control and intelligence used to automate, augment or assist human activities

Benefits: increase efficiency and productivity



Blockchain

Technology: digital ledger that uses software algorithms to record and confirm transactions with reliability and anonymity

Benefits: increase traceability, transparency, efficiency, enhance security



Drones

Technology: unmanned aerial vehicles

Benefits: extremely versatile due to great variation in their capacity, size, abilities and functions



Virtual Reality (VR)

Technology: implies a complete immersion experience, which is 100% computer-generated

Benefits: innovations can be presented without actually producing them



Augmented Reality (AR)

Technology: offers a real world experience with computer-generated overlays

Benefits: mixture of real and computer world



Source: PwC (2019) The road to Circularity

APPROACH 3. PWC TECHNOLOGIES & STRATEGIES

CE initiatives									
Prioritise renewable inputs	① Circular sourcing	✓				✓			
	② Sustainable design	✓		✓				✓	
	③ Resource efficiency	✓		✓	✓	✓	✓		
Maximise product use	④ Product as a service		✓						
	⑤ Sharing/virtualising		✓					✓	✓
	⑥ Usage optimisation/maintenance		✓	✓			✓	✓	✓
	⑦ Reuse/redistribution	✓							
Recover by-products and waste	⑧ Refurbishing/remanufacture	✓	✓	✓	✓	✓			
	⑨ Industrial symbiosis Recycling from manufacturing					✓			
	⑩ Recycling from consumption	✓	✓		✓	✓			

Source: PwC (2019) The road to Circularity



APPROACH 3. PWC RESOURCES

- PwC (2019), The road to Circularity. Available at <https://www.pwc.nl/en/assets/documents/pwc-the-road-to-circularity-en.pdf>
- PwC (2019), The Essential Eight: your guide to the merging technologies revolutionising business now. Available at: <https://www.pwc.com/gx/en/issues/technology/essential-eight-technologies.html>



APPROACH 4. PBL (NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY)

3 TYPES OF CE TRANSITIONS

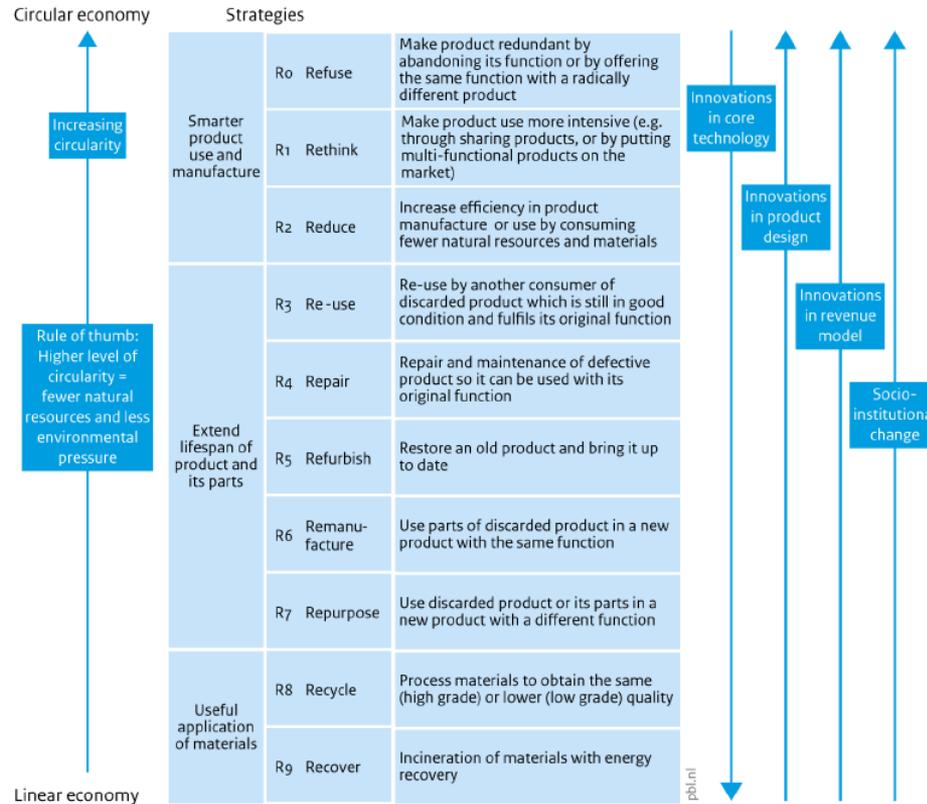
Three types of CE transitions may be distinguished with regard to the use of technology in product chains:

- CE transitions in which the emergence of **specific, radically new technology is central and shapes the transition**. This means radical innovation in core technology, i.e. the specific technology around which a product is centred. Socio-institutional change is needed to give the new technology a place in society. A typical example is the recent emergence of bioplastic which has already secured its place.
- CE transitions in which **socio-institutional change is central** and where technological innovation plays a secondary role (incremental innovation in core technology). A good, perhaps somewhat extreme example is that of packaging-free shops.
- CE transitions in which **socio-institutional change is central**, but are **facilitated by enabling technology**. An example is the transition to what has become known as the sharing economy. This transition from owning a product to purchasing its services primarily involves socio-institutional change, but this is not possible without information technology to link service providers and users.



APPROACH 4. PBL

CIRCULAR STRATEGIES IN PRODUCTION CHAIN



TAKING COOPERATION FORWARD



APPROACH 4. PBL RESOURCES

- Potting, J., et al., 2017. Circular Economy: Measuring Innovation in the Product Chain. Available at: <http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2016-circular-economy-measuring-innovation-in-product-chains-2544.pdf>



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CENTRAL EUROPE

European Union
European Regional
Development Fund

CITYCIRCLE

TAKING
COOPERATION
FORWARD



28 February 2020



The Role of Cities in Circular Economy

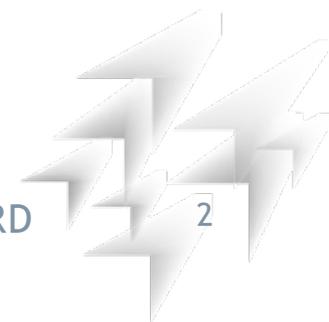


CONTENTS

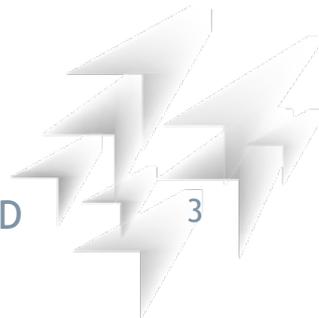
Part 1: EU policy
framework on
circular economy

Part 2: Starting
the transition to
circular economy

Part 3: Good practices on
circular economy from
European cities



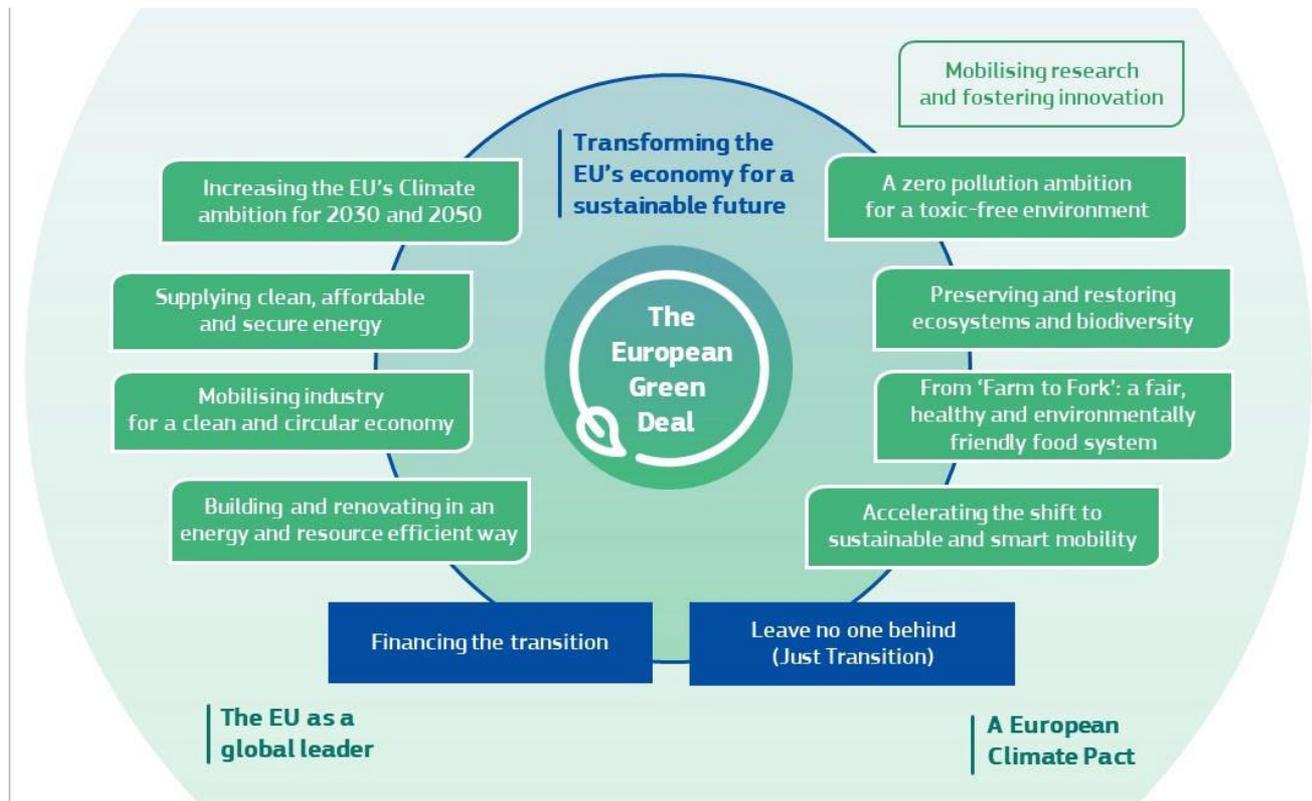
EU POLICY FRAMEWORK ON CIRCULAR ECONOMY: RECENT LEGISLATION



- EU GREEN DEAL
- Revised Waste Framework Directive (2018)
- Upcoming Circular Economy Action Plan (2020)-
plastics, food waste, critical raw materials,
construction and demolition, as well as biomass and
bio-based products
- European Strategy for Plastics in a Circular Economy
(2018)



THE EU GREEN DEAL



- Revised Waste Framework Directive (2018)
 - Stimulate waste prevention;
 - Reduce use of resources and improve resource efficiency in this way supporting the transition to a circular economy.
 - Waste prevention measures can include: , smart design, SCP measures, encouragement of reuse, repairability, etc.

- Targets for preparing for reuse and recycling have been increased
 - by 2025- to a minimum of 55 % by weight;
 - by 2030 - minimum of 60 % by weight;
 - by 2035 - minimum of 65 % by weight.

- Cities can take steps with regards to:
 - Improving waste collection
 - Extended producer responsibility or transformation of waste into secondary raw materials
 - Separate collection of different types of waste.



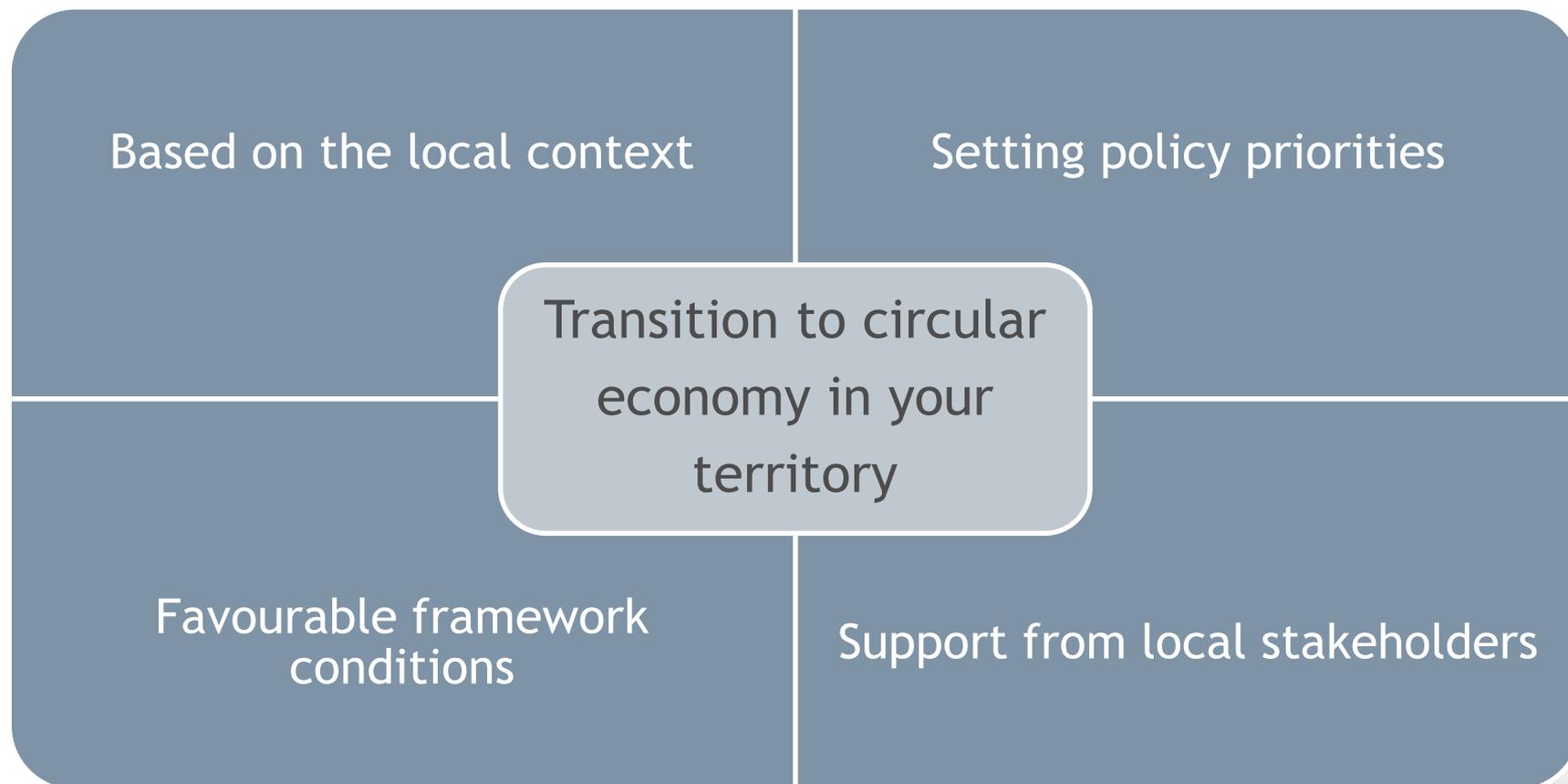
NEW CIRCULAR ECONOMY ACTION PLAN

- Upcoming CEAP will build on the current one.
- Focus on Secondary Raw Materials and actions on products
- Will include a ‘sustainable products’ policy to support the circular design of all products
- Development of lead markets for climate neutral and circular products, in the EU and beyond.
- Main focus on resource-intensive sectors such as textiles, construction, electronics and plastics.



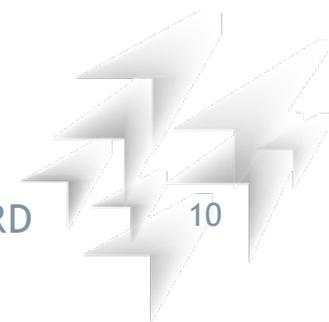
STARTING THE TRANSITION TO CIRCULAR ECONOMY





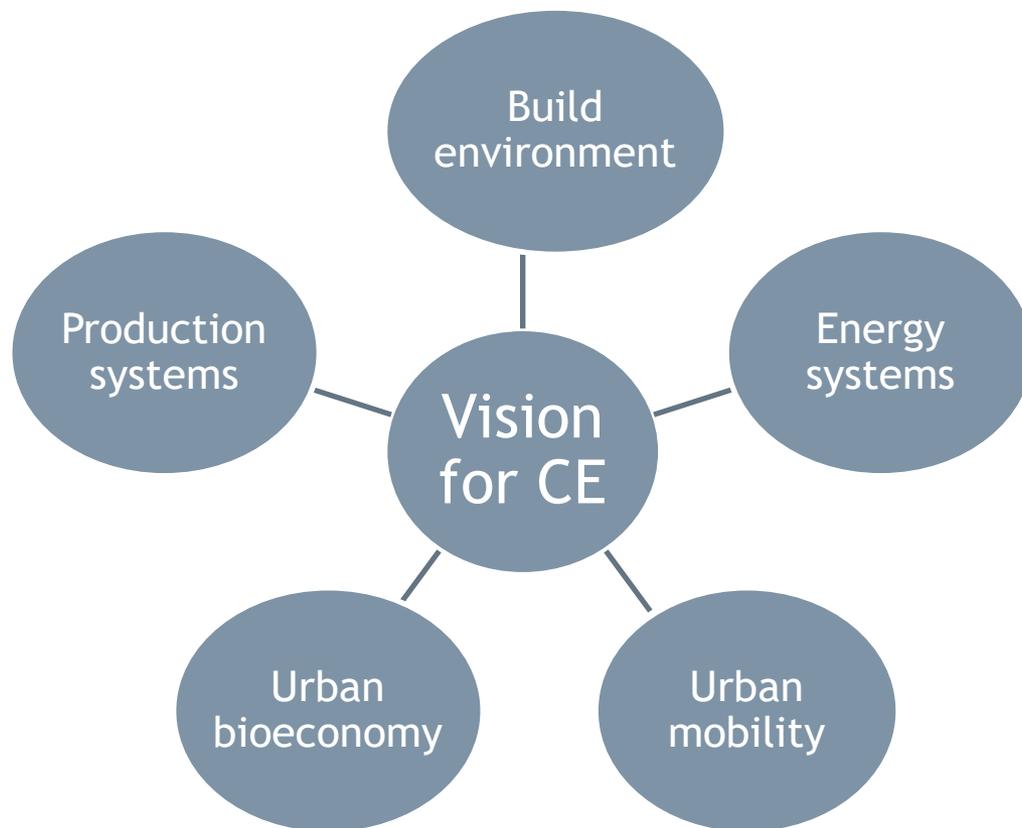
Assessment elements:

- Physical (land-base) endowment of the city
- City performance in terms of resource productivity and efficiency
- Business capabilities (e.g. EMAS certified companies, nr of companies with eco-innovations, etc.)
- Capabilities of knowledge organisations
- Industrial potential of different sectors for CE
- Accessibility
- ExplorTerritorial milieus
- Technological lock-ins
- Etc.



DEFINING VISION AND PRIORITIES

Example of a possible combination of sectors for the transition to circular economy

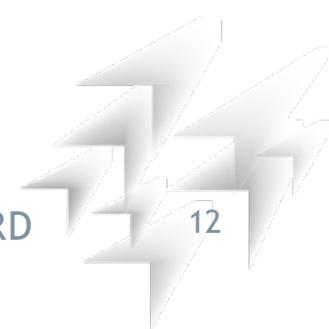


Source: Ellen MacArthur, *Cities in the Circular Economy: an Initial Exploration*



GOOD PRACTICE: AMSTERDAM ON THE WAY TO CIRCULAR ECONOMY (1)

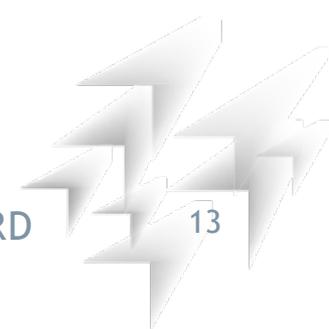
- A leader in the application of circular economy concepts to city governance
- Seven principles in its transition towards a CE
 - Closed loop
 - Reduced emissions
 - Value generation
 - Modular design
 - Innovative business models
 - Region-oriented reverse logistics
 - Natural systems upgradation



GOOD PRACTICE: AMSTERDAM ON THE WAY TO CIRCULAR ECONOMY (2)

Amsterdam Smart City initiative: a partnership between different stakeholders; focus on creating a sustainable urban model

- A facilitator and an open platform which is able to connect citizens, businesses, government and knowledge institutes.
- A living lab to test solutions
- One of the themes of the initiative is circular city
- Aims to redesign twenty product- or material chains.
- The implementation of material reuse strategies: to create a value of €85 million per year within the construction sector and €150 million per year with more efficient organic residual streams.



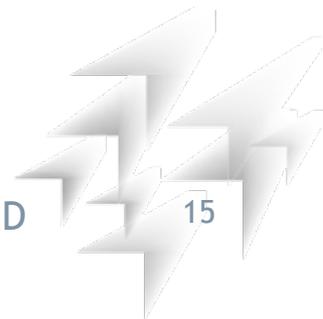
GOOD PRACTICES FROM EUROPEAN CITIES

LINKED TO TWO PRIORITY AREAS OF THE SLOVENIAN ROADMAP TO CIRCULAR ECONOMY:

- Manufacturing industry
- Food systems

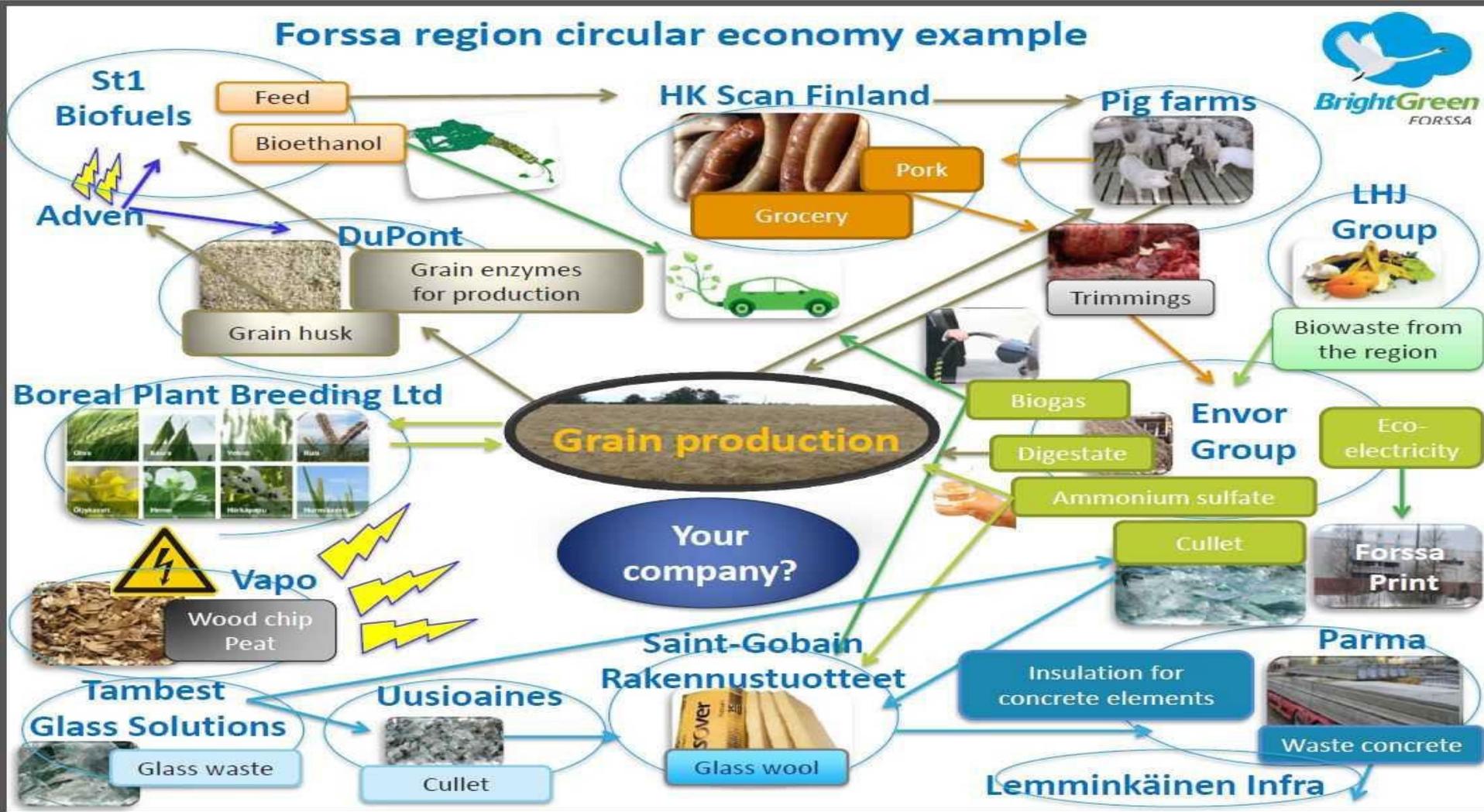


- **An approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products**
- Can be implemented in any type of regions or area, depending of the types of resources transacted
- Depends on governance and policy factors
- Originates in two ways:
 - 📁 As self-organised activity (e.g. Kalundborg, DK)
 - 📁 As managed process; 2 types:
 - Facilitated networks
 - Planned networks



GOOD EXAMPLE: INDUSTRIAL SYMBIOSIS IN FORSSA (FINLAND)

Forssa region circular economy example



WHAT CAN CITIES DO TO STIMULATE INDUSTRIAL SYMBIOSIS?

Cities more advanced in IS need to:

- Raise awareness of companies on the benefits of IS
- Further exchange on information on the experiences with closed database vs. open database

Cities at an early stage of IS need to:

- Organise campaigns
- Map the stakeholders and legislation
- Develop a simple waste exchange platform
- Start small with matchmaking and scale up gradually



- The food system is a major consumer of energy and water and a large emitter of GHG and air pollution.
- When food is lost or wasted, the resources (e.g. water, land, nutrients, labour and energy) used throughout its value chain are also lost
- Cities can set action plans for food waste prevention and reduction as part of their long-term visions and strategies for waste prevention and circular economy development



What can cities do?

1. An overview of the city, demographics, economy, and local food production.
2. Assess urban and peri-urban food production
3. Assess urban food consumption
4. Determine urban organic waste and food by-product streams: Including an overview of food waste, prevention, and redistribution options as well as organic waste flows and the potential to transform them into valuable inputs for agriculture and the wider bioeconomy.
5. Develop circular economy for food scenarios
6. Estimate the benefits of circular economy scenarios



URBAN AGRICULTURE

- Contributes to sustainability of the food chain “from farm to fork” (circular economy objectives)
- Offers possibilities for small-scale entrepreneurship
- Tackles (food) waste, reduction of energy consumption and the demand for more quality foods.

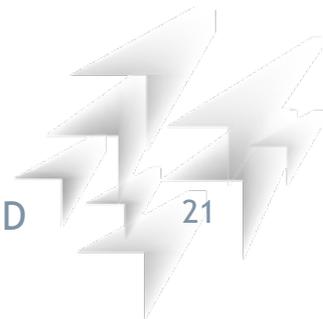
Urban agriculture in the city of Reggio Emilia (Italy)

- The Operational Group ‘Edible Park’ has set up an agroforestry-based farm that supplies fresh products to the citizens The farm spans about 1 ha of farmland, with 80 mulberry trees;
- Led by a social cooperative; inclusion of disadvantaged workers;
- Offers high quality products and explores new supply chain models.

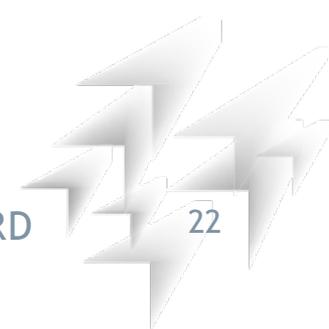


GOOD PRACTICE: LAST MINUTE MARKET INITIATIVE (ITALY)

- Reduce food wastage - spin-off from the University of Bologna, the activities of LMM expanded to other sectors.
- An entrepreneurial society on national level in Italy focused on developing local projects for recovery of unsold goods in favour of NGOs.
- LMM supports the creation of a solidarity network and facilitates the contact between NGOs and businesses.
- Services offered:
 - recovery of surpluses;
 - data analysis, loss and waste analysis,
 - estimating the environmental and social impacts;
 - training for schools, companies and institutions and communication,
 - marketing projects and content production.



- Cities have an important role in launching and accelerating the transition to circular economy
- Circular economy transition needs to be tailored to local context
- Circular economy may appear complex but even the longest journey starts with the first step



■ Sources of further information:

- ESPON, Interact, Interreg Europe and URBACT, [Pathways to a circular economy in regions and cities](#), Policy brief, 2016
- EEA, [Circular by design, Products in the circular economy](#), No 06/2017, 2017
- Policy Learning Platform, Policy brief on [food waste](#)
- Policy Learning Platform, Policy brief on [industrial symbiosis](#)
- Policy Learning Platform, [Policy brief on circular economy business models](#)
- [EMF Food initiative](#)
- [The Milan Urban Food Policy Pact](#)
- [Eurocities WG Food](#)



THANK YOU FOR YOUR ATTENTION!



Venelina Varbova
GreenEdge Consulting



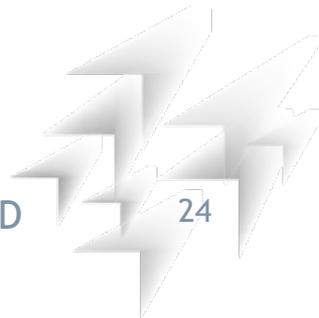
www.interreg-central.eu/acronym



venelina.varbova@gmail.com



+00359 886348130





MESTNA OBČINA KRANJ



Slovenski trg 1, 4000 Kranj

**EKIPA SNOVALCEV RAZVOJA
KROŽNEGA GOSPODARSTVA
V KRANJU**

Sredi januarja 2020 je na Mestni občini Kranj v okviru projekta CITYCIRCLE potekala predstavitvena delavnica Razvoj krožnega gospodarstva v Kranju, kjer smo se zavestno odločili, da bomo aktivno pristopili k prehodu iz linearne v krožno gospodarstvo. Na podlagi vašega izkazanega interesa za sodelovanje v ekipi snovalcev razvoja krožnega gospodarstva, vas vabimo na naslednjo delavnico

NAČRTOVANJE STRATEGIJE KROŽNEGA GOSPODARSTVA V KRANJU,

ki bo **28. februarja 2020 ob 10. uri**
v prostorih Mestne Občine Kranj (pritličje, sejna soba 9), Slovenski trg 1, Kranj.

Na delavnici pričakujemo predstavnike iz gospodarstva, lokalnih agencij in zavodov ter občine.

Program:

1. Pozdravni nagovor predstavnika Mestne občine Kranj
2. Evropska in nacionalna politika na področju krožnega gospodarstva – Janja Kreitmayer, MOP
3. Primeri dobrih praks iz evropskih mest (on-line predstavitev) – Venelina Varbova, Green Edge Consulting Thematic Expert Environment and Resource Efficiency for the Interreg Europe Policy Learning Platform
4. Delavnica: Načrtovanje strategije KG v Kranju – Marija Ahačič Premrl, MOK
5. Zaključki in nadaljnje aktivnosti

V želji, da bi se dogodka zagotovo udeležili, vas prosimo za potrditev udeležbe na aleksandra.azman@kranj.si, kjer dobite tudi vse dodatne informacije.

Prijazno vabljeni.

Pripravila:
Aleksandra Ažman



Matjaž Rakovec
Župan

Janez Černe
PODŽUPAN

Opomba: Organizator dogodka si pridržuje pravice do spremembe programa in govorcev.



CIRCULAR ECONOMY STRATEGY KRANJ

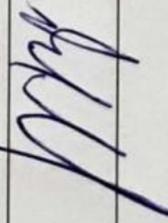
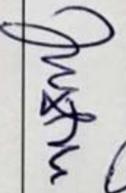
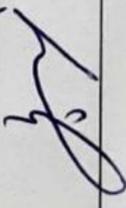
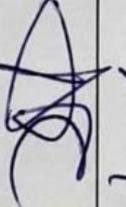
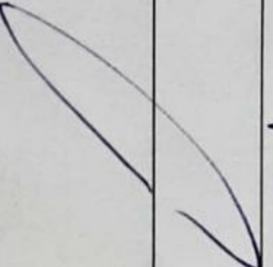
WORKSHOP I - ATTENDANCE SHEET MEETING
 VENUE: MESTNA OBČINA KRANJ, SLOVENSKI
 TRG 1, 4000 KRANJ; SEJNA SOBA 9 OB 10.00

28 02 2020

S podpisom dajete soglasje za uporabo vaših osebnih podatkov Mestni občini Kranj (partner projekta CITYCIRCLE) za dosego ciljev samega projekta v skladu z direktivo Evropskega parlamenta (EU) 2016/680 in Sveta z dne 27. aprila 2016 (Splošna uredba o varstvu podatkov, GDPR) v zvezi z varstvom posameznikov v zvezi z obdelavo osebnih podatkov in njihovim prostim pretokom, ki razveljavlja Direktivo 95/46 / ES.

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ŽVAB GREGOR	PAMETNO PROJEKTIRANJE		

ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: Specific training for regional stakeholder groups I.

Location: Košice

Date: February 28th, 2020

No.	Name and Surname	Organisation	E-mail	Signature
1.	ROBERT HANSEN	TUKE	ROBERT.HANSEN@TUKE.SK	
2.	PETER JÁPAK	TUKE		
3.	JOZEF BILKOVÁ	EGTC VC	JOZEF.BILKOVÁ@VOCHESA	
4.	BARBARA KOVÁČIKOVÁ	EGTC VIX COOPATIA	BARBARA.KOVACIKOVA@vix.sk	
5.	Milka Dujová	ASPIND	marka.dujova@gmail.com	
6.	František Janke	TUKE	frantisek.janke@tuke.sk	

Consent to the Processing of Personal Data

By signing the attendance list you grant consent to the Technical University of Kosice (hereinafter referred to as the TUKE), registered office at Letná 9, 040 01, Kosice, Business ID 00397610 (hereinafter referred to as "the Administrator") by means of the Regulation (EU) No 2016/679 of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data and repealing of Directive 95/46 / EC (General Regulation on the Protection of Personal Data) (hereinafter referred to as "the Regulation") to process the following personal data: name and surname; Organization name / abbreviation; email address and signature of the participant. This data can be processed by the Administrator based on your consent to document the event of the CITYCIRCLE project until the completion of the project implementation to the leading authority Interreg CENTRAL EUROPE.

Please note that you will be attending an event where photographs and/or audio-visual footage may be taken. By attending this event, you freely provide your agreement that you accept to be photographed, filmed or recorded. You also agree that the above-mentioned photos and video or sound recordings may be used, reproduced, distributed and communicated to the public for any other purposes by the Interreg CENTRAL EUROPE Programme on websites or other information tools, such as social media or electronic or printed publications.



TAKING
COOPERATION
FORWARD



Webinar | March 2020



WP T2 - CE Marketplaces - information package



Luc Schmerber | BWCON

CONTENT

1 Market Places

2 Industrial Symbioses

3 Smart Maps

4 Marketplace Startup Ideas



CE Marketplaces

Definition, examples

E - Marketplace

CE - Marketplace

One Definition ?

Different Understanding ?



E-MARKETPLACE . GENERAL DEFINITION

What is an e-marketplace?

The e-marketplace describes an electronic marketplace that enables the purchase and sale of goods and services on the Internet or another superordinate network. Digital marketplaces are based on an IT infrastructure and have a fixed mechanism for pricing. The advantages include spatial and temporal flexibility. Market participants can interact with each other regardless of location.

Definition and overview

The specialist literature has various approaches to the definition of the term e-marketplace. These can also be found under the synonyms digital marketplace, virtual marketplace or electronic market. What these approaches have in common is that e-marketplaces are to be regarded as IT-supported systems. In these, market players such as suppliers, demanders and intermediaries come into contact with each other. They trade goods and services on the basis of a fixed price coordination.

In summary, e-marketplaces are trading platforms that serve the market-based exchange in e-business. From the perspective of the companies, this concerns on the one hand e-commerce (electronic sales) and on the other hand e-procurement (electronic purchasing). E-marketplaces use information systems that accompany, automate or support different phases of a market transaction.



CE MARKETPLACE . GREENCYCLE PROJECT

This document aims to help define a common vision about the specific digital platform build by the GREENCYCLE project, the Circular Economy Marketplace, and the requirements and functionalities that is going to provide.

A marketplace is a site or an online platform (internet) that allows you to make purchases of products or services. It connects Producer and Consumers through the Internet and thereby fosters efficiency in an otherwise inefficient market. A Marketplace is an ecommerce platform that enables Individuals as well as Business to either list their items for sale or set up online storefronts on the marketplace platform and leverage the platform and its services [search, viewing product information, buying, payment, order management etc . It can be considered horizontal when they support the exchange of various types of products or services, or vertical, when the platform allows the exchange of only one type of product.

Marketplace also can act as a guarantor in the transaction between sellers and buyers, as long as the duration of the commercial operation. In particular, it pays attention to the registration of operators (sellers / buyers) by applying anti-fraud controls and rules.

GREENCYCLE project: Deliverable D.T4.2.2 - Definitions of functionalities of the platform



CE MARKETPLACE . DEFINITION ?

???

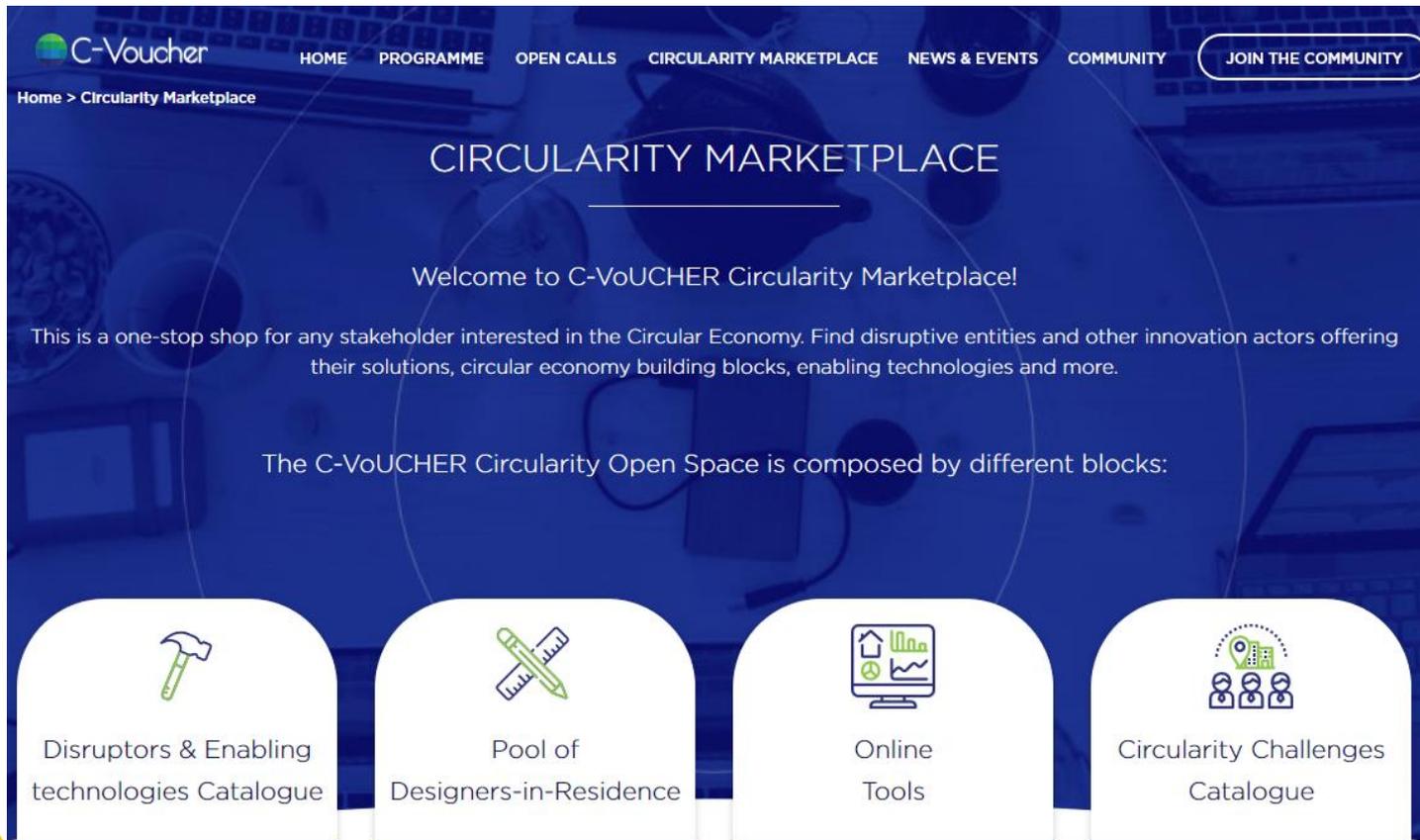
One definition ???

???

Different understanding - see e.g. next slide project C-VoUCHER



C-VOUCHER PROJECT - OVERVIEW



The screenshot shows the homepage of the C-Voucher Circularity Marketplace. The navigation bar includes links for HOME, PROGRAMME, OPEN CALLS, CIRCULARITY MARKETPLACE, NEWS & EVENTS, and COMMUNITY, along with a 'JOIN THE COMMUNITY' button. The main heading is 'CIRCULARITY MARKETPLACE', followed by a welcome message and a description of the platform as a one-stop shop for stakeholders in the circular economy. Below this, it lists four key components of the C-Voucher Circularity Open Space: Disruptors & Enabling technologies Catalogue, Pool of Designers-in-Residence, Online Tools, and Circularity Challenges Catalogue. Each component is represented by an icon and a text box.

C-Voucher

HOME PROGRAMME OPEN CALLS CIRCULARITY MARKETPLACE NEWS & EVENTS COMMUNITY JOIN THE COMMUNITY

Home > Circularity Marketplace

CIRCULARITY MARKETPLACE

Welcome to C-VoUCHER Circularity Marketplace!

This is a one-stop shop for any stakeholder interested in the Circular Economy. Find disruptive entities and other innovation actors offering their solutions, circular economy building blocks, enabling technologies and more.

The C-VoUCHER Circularity Open Space is composed by different blocks:

- Disruptors & Enabling technologies Catalogue
- Pool of Designers-in-Residence
- Online Tools
- Circularity Challenges Catalogue



C-VOUCHER PROJECT - OVERVIEW

Circularize ValUe CHains across European Regional Innovation Strategies

Project information

- HORIZON 2020
- Grant agreement ID: 777773
- Start date: 1 April 2018 - end date 31 March 2021

Objective

C-VoUCHER aims to develop new circular (cradle to cradle) value chains, disrupting traditional linear (cradle to waste) business models by means of cross-fertilization with Design Thinking experts and Circular Disruptors.

<https://cordis.europa.eu/project/id/777773>



CE Marketplaces

Definition, examples

Materials Marketplace - US BCSD, Austin

FLOOW2

Material Trader . com

Marketplace Hub

Plastship

Wastly



Join the Circular Economy

The Materials Marketplace is a facilitated transaction platform to connect businesses to new reuse and recycling market opportunities.

Sign up

Coming to this site for the first time? Please [click this link](#) to chat with someone on our team to learn more about how the Materials Marketplace works and next steps.





United States Business Council for Sustainable Development

“The **Materials Marketplace** is an award-winning **regional and national platform** that connects businesses and organizations to develop and scale new reuse and recycling market opportunities. Through our platform, traditional and non-traditional industrial waste streams are matched with new product and revenue opportunities, ultimately enabling the **culture shift** to a **circular**, closed-loop economy. In addition to diverting waste from landfills, these recovery activities generate significant **cost savings**, **energy savings**, and create **new jobs** and business opportunities.”

Users are

- recycling sector,
- manufacturing sector and
- entrepreneurs



MATERIALS MARKETPLACE - US BCSD

Regional marketplaces exist in:

- Austin materials marketplace → will be presented in the next slides
- Tennessee materials marketplace
- Michigan materials marketplace
- Ohio materials marketplace

US BCSD is working with the

- National Association of Manufacturers to create linkages to the Manufacturers Marketplace



AUSTIN MATERIALS MARKETPLACE

materials marketplace

THE CIRCULAR ECONOMY WHO'S INVOLVED SUCCESS STORIES BLOG EVENTS JOIN LOGIN

Join the Circular Economy in Austin

The Austin Materials Marketplace connects businesses and organizations to develop and scale new reuse and recycling market opportunities.

manufacturers: find new solutions for challenging waste and by-product materials

recyclers: amplify the good work you're already doing, find new customers and new buyers

entrepreneurs: find suitable materials and innovate to build new reuse and recycling businesses

GET INVOLVED ->

in f t ig



How it Works and How to Join

The Materials Marketplace enables participating organizations and project staff to easily post materials available or desired, identify reuse opportunities, and exchange underutilized materials. Hundreds of companies - large and small - academic institutions, non-profits and entrepreneurs are using the Materials Marketplace around the world.

[WATCH A QUICK VIDEO ON HOW IT WORKS →](#)



AUSTIN MATERIALS MARKETPLACE

The Materials Marketplace has won awards from the World Economic Forum, Environmental Leader, and the International Economic Development Council.

The marketplace is

- business led
- technology enabled
- community driven

Since the launch of the program in 2014, the Austin Materials Marketplace has created some fantastic success stories and impressive impact metrics:



50k

Cubic Feet
Diverted from
Landfill



335

Active
Participants



\$465k

Cost Savings
and Value
Creation



842

MTCO₂E
Avoided



527

Completed
Transactions



Business-to-business asset sharing

FLOW2 is the first business-to-business sharing marketplace that enables companies and institutions to share overcapacity of equipment, knowledge and skills of personnel. Users can register on the platform for free and participants pay a subscription to advertise their equipment on the platform, providing a revenue stream for FLOW2.

<https://www.ellenmacarthurfoundation.org/case-studies/business-to-business-asset-sharing>



The Sharing Marketplace solution for businesses and organizations

Optimize usage of equipment, materials, services, personnel and facilities. Share internal, local or global, via a sharing marketplace solution that fits your business or network.

[See our solutions](#)[Discover the features](#)[Go to FLOOW2 Healthcare](#)

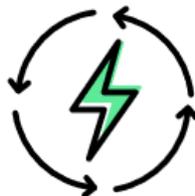
FLOW2 - BENEFITS & RESULTS



Cost savings & Revenue

- 🌐 Increase your ROI
- 🌐 Realize additional turnover
- 🌐 Save company costs

Users collectively earned:
€90.145.029



Circularity & Sustainability

- 🌐 Use assets more efficiently
- 🌐 Save resources and CO₂
- 🌐 Re-use materials

Users collectively saved:
99.210.947 CO₂



Social connections

- 🌐 Improve social connections
- 🌐 Enhance collaboration
- 🌐 Create win-win situations

People connected:
399.325





Professional sharing marketplace



Custom made & Own management



Online payment system & Invoicing



Safe, Secure & Reliable



Analytics & Results



Optional (but very cool & useful!)

Professional sharing marketplace

- ✓ Both demand and supply driven
- ✓ All forms of sharing: lending, swapping, giving away, renting out, selling
- ✓ Uploading demand and supply is very easy and unlimited
- ✓ User friendly
- ✓ Advanced search function with filters: supply/demand, category, location, radius, date, time, etc.
- ✓ Location map
- ✓ Online messaging system
- ✓ Single login



Three solutions to start sharing assets

You would like to start sharing assets to become more circular? At FLOOW2 we offer three professional (sharing marketplace) solutions to fit your needs.

[Start free SharingScan!](#)



Global sharing marketplace

- 🌐 Start sharing assets on our global sharing marketplace
- 🌐 Share assets with other businesses and organizations
- 🌐 They are visible for all businesses around the world
- 🌐 Your possibilities are endless

[Global sharing marketplace](#)



Standard own sharing marketplace

- 🌐 Quickly create your own standard sharing marketplace
- 🌐 In just a few mouseclicks
- 🌐 Invite other businesses or colleagues
- 🌐 Start sharing assets within your own community

[Standard own sharing marketplace](#)

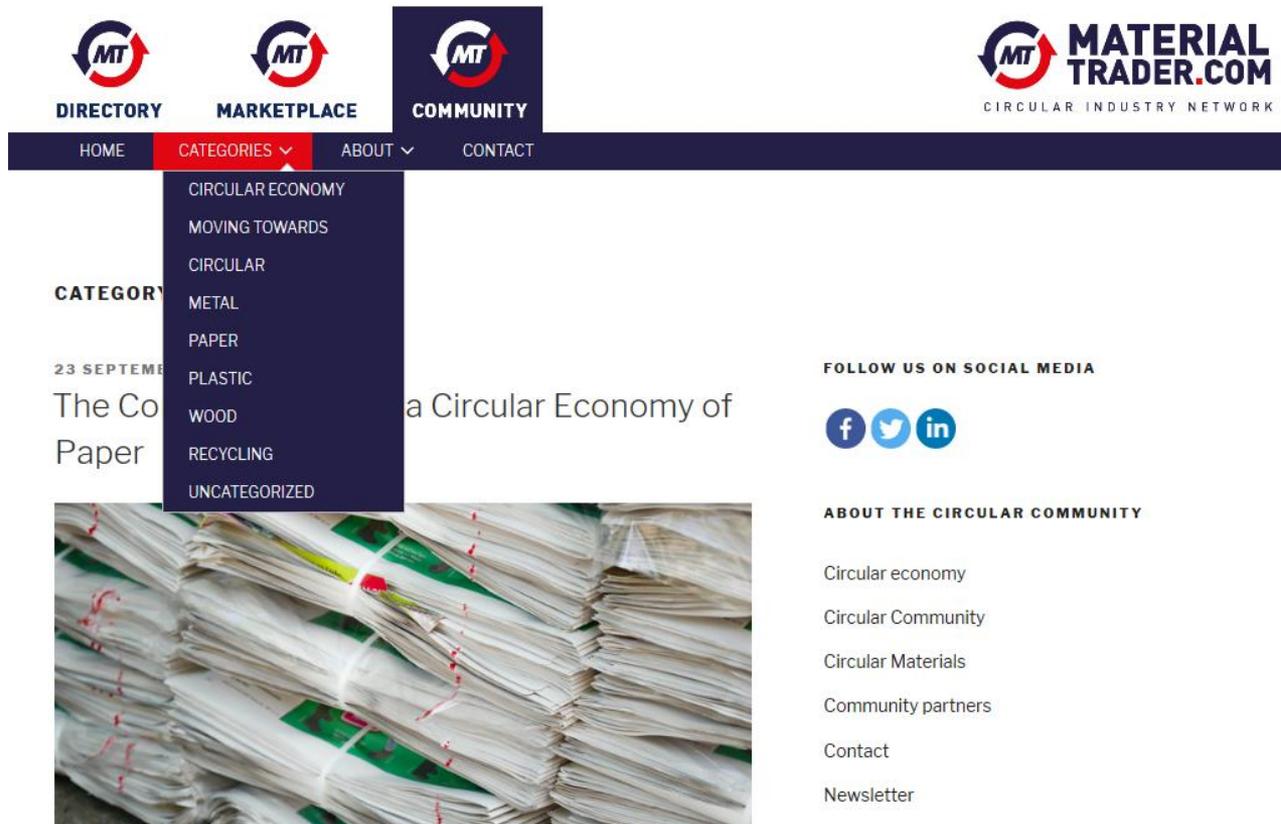


Custom made own sharing marketplace

- 🌐 A custom made sharing marketplace for your organization or network
- 🌐 Completely designed in your corporate identity
- 🌐 Unlimited possibilities and functionalities
- 🌐 You decide: open/closed, which features, how many users and sub-communities

[Custom made own sharing marketplace](#)





The screenshot displays the Material Trader website interface. At the top, there are three navigation buttons: 'DIRECTORY', 'MARKETPLACE', and 'COMMUNITY', each with the 'MT' logo. To the right is the 'MATERIAL TRADER.COM' logo with the tagline 'CIRCULAR INDUSTRY NETWORK'. Below these is a dark blue navigation bar with 'HOME', 'CATEGORIES', 'ABOUT', and 'CONTACT'. The 'CATEGORIES' dropdown menu is open, listing: 'CIRCULAR ECONOMY', 'MOVING TOWARDS', 'CIRCULAR', 'METAL', 'PAPER', 'PLASTIC', 'WOOD', 'RECYCLING', and 'UNCATEGORIZED'. On the left, a 'CATEGORY' section shows a date '23 SEPTEMBER' and a headline 'The Co... a Circular Economy of Paper'. Below this is a large image of stacked paper. On the right, there are sections for 'FOLLOW US ON SOCIAL MEDIA' with icons for Facebook, Twitter, and LinkedIn, and 'ABOUT THE CIRCULAR COMMUNITY' with a list of links: 'Circular economy', 'Circular Community', 'Circular Materials', 'Community partners', 'Contact', and 'Newsletter'.




MARKETPLACE


DIRECTORY


COMMUNITY

 EN
  NL
  DE

Register
 Reset password





- CATEGORIES**
-  ALL
 -  PLASTIC
 -  METAL
 -  ELECTRONIC WASTE
 -  **TIMBER**
 -  PAPER
 -  TEXTILE
 -  COMPOSITES
 -  BATTERIES
 -  MINERALS
 -  CHEMICALS
 - OTHER
 - MACHINES
 - SERVICES

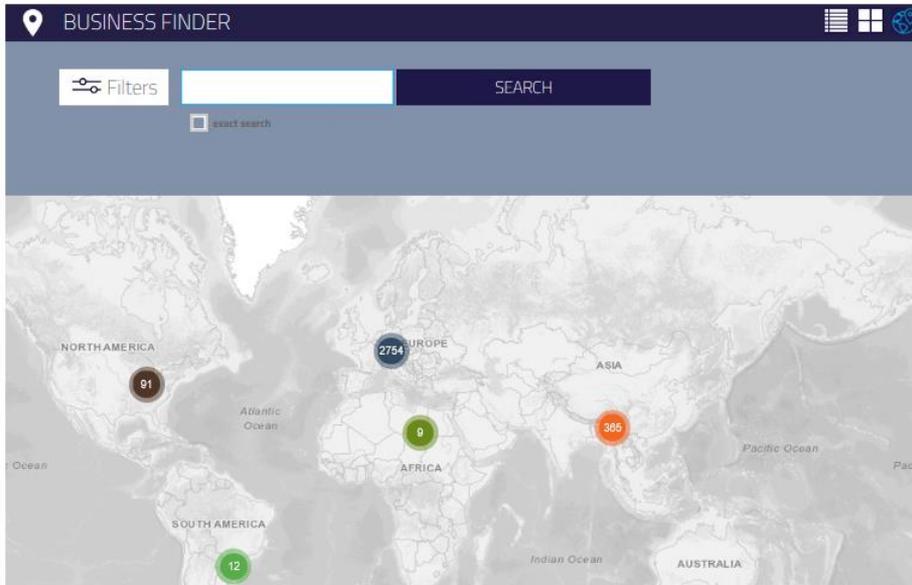
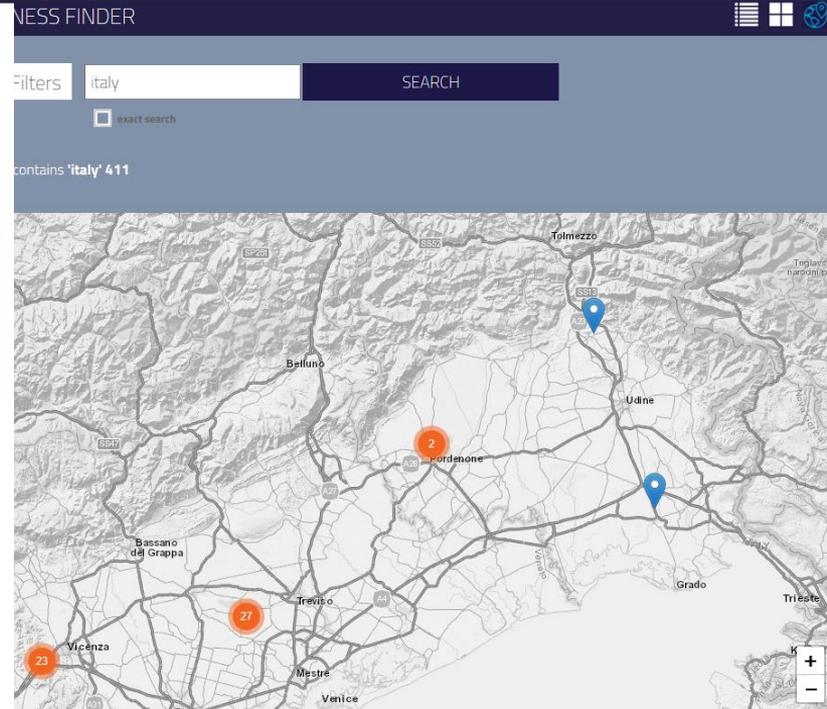
<h2>TIMBER</h2>	
SORT ON: DATE PRICE QUANTITY	
 <p>KOSSO, APALA, TEAK, MAHOGANY AND BAOBAB WOODS FORSALE</p> <p>For interested buyers of the above, Please contact with us as loads are awaiting lifting.</p>	<p> Timber</p> <p> Feb 18, 2020</p> <p> 500 ton p/month</p> <p> \$350.00 p/m3</p> <p> 203 Views</p> <p> United Arab Emirat</p>
 <p>USED OAK BARRELS</p> <p>We can supply USED OAK BARRELS. For more info on price and specifications, send an inquiry.</p>	<p> Timber</p> <p> Jan 3, 2020</p> <p> 8000 kg p/day</p> <p> €80.00 p/kg</p> <p> 67 Views</p> <p> Greece</p>
 <p>PLYWOOD</p> <p>Dear Sir/Madam, (HS 441231) We would like to offer: plywood. Made of tropical wood, including: b...</p>	<p> Timber</p> <p> Oct 27, 2019</p> <p> 50 m3 p/day</p> <p> \$2,200.00 p/m3</p> <p> 156 Views</p> <p> Indonesia</p>
 <p>750 USED BARRELS IN ALAVA, SPAIN</p> <p>This lot is still available, 220 barrels of 2011, 2012, recently empty, 75% French Oak, 25% Ameri...</p>	<p> Timber</p> <p> Oct 12, 2019</p> <p> 750 kg p/week</p> <p> €32.00 p/pcs.</p>



MATERIAL TRADER . COM



MaterialTrader.com | Business Finder:
Connect with thousands of industry partners in the Circular Industry Network



MARKETPLACE HUB - SEC. RAW MATERIALS

Marketplace Hub is an initiative of the World Business Council for Sustainable Development (WBCSD) to map secondary raw materials markets and industrial synergy networks worldwide. This initiative is centred around a website that enables interested businesses to easily search these markets and networks by location and particular materials.

The primary aim of the Hub is to overcome one of the major challenges facing businesses wishing to explore "circular economy" solutions: the lack of information on sourcing or selling their secondary raw materials.

Moreover, Marketplace Hub also aims to foster the further development of secondary raw material marketplaces and the circular economy model in general. This is why, in addition to its general listing of markets and synergies, the website features case studies of particularly successful marketplaces to showcase the potential of secondary raw material markets and to highlight good practices.

<https://circulareconomy.europa.eu/platform/en/good-practices/offer-and-demand-secondary-raw-materials-make-perfect-match-marketplacehub>



REGISTER NOW

plastship - Your network for recycled plastics

We link up the value chain for recycled plastics to increase the use of sustainable resources.

Sell recycled plastics



We find new customers and offer solutions for the distribution of recycled plastics for you. Increase the visibility of your standard grades or place spot volumes and recyclables.

Buy recycled plastics



Plastics converters find a broad offer of high quality recycled plastics here, whereas commodity identification and transaction processes are guided by digital assistances.

Recyclability assessment



We evaluate and certify the recyclability of your packaging following the minimum standard of the German ZSVR, and consult you in the use of recyclates in your products.



Plastship is a marketplace platform for buyers and sellers of regrinds, re-granulates and recyclates. The portal's services include independent assessment of the recyclability of plastics packaging and products for complete product ranges and of their impact on selected environmental factors.

Plastship also provides consultancy in optimizing product sustainability in terms of design for recycling and the use of recyclates.

Its goals are:

- establishing broader application areas for recycled plastics
- facilitating and accelerating the distribution of recycled plastics
- building up homogeneous quality and information standards for recycled plastics.

<https://circulareconomy.europa.eu/platform/en/good-practices/plastics-recyclates-plastship-offer-services-better-quality-and-marketability>



Main results:

- Since its May 2019 launch, the plastship platform has
- made more than 3550 t of recycled plastics available
- registered over 100 companies within three months
- categorised recycled material qualities
- established matching systems for material specifications (recycler) and product requirements (converter)
- developed a standardized information base for recycled plastics

<https://circulareconomy.europa.eu/platform/en/good-practices/plastics-recyclates-plastship-offer-services-better-quality-and-marketability>



Marketplace

The digital market of Secondary Raw Materials (SRMs)

Wastly's marketplace contributes to the creation of a dynamic market of Secondary Raw Materials (SRMs) encouraging the use of recycled materials in products and infrastructures. Thanks to our trading service, you will be able to either sell or purchase SRMs at the best possible price.

 <p>PANTONE 19-4003 black-onyx</p>	 <p>PANTONE 19-4003 black-onyx</p>	 <p>PANTONE 19-3909 black-bean</p>	 <p>PANTONE 19-1101 after-dark</p>
<p>R_PP_UNI 10667-3...</p> <p>PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P</p>	<p>R_PP_UNI 10667-3...</p> <p>PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P</p>	<p>R_PP_UNI 10667-3...</p> <p>PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P</p>	<p>R_PP_UNI 10667-3...</p> <p>PP - Polipropilene destinato ad impieghi diversi. Macinato di cassette PP - Circuito C.O.N.I.P</p>
<p>Successfully concluded ✓</p>	<p>Successfully concluded ✓</p>	<p>Successfully concluded ✓</p>	<p>Successfully concluded ✓</p>



Wastly is a B2B online platform for the marketing of secondary raw materials (SRM) resulting from waste recovery and recycling. It favours the direct exchange between SRM producers and enterprises who want to introduce SRMs in their manufacturing processes.

It is a virtual meeting point for all circular economy stakeholders, such as enterprises that collect, transport, recover, process and recycle waste in a B2B perspective, and also municipalities.

Its objective is to identify all actors involved in the recycling process, but also to verify if waste recovery and treatment plants have the necessary certifications and are registered in the National Register of Environmental Managers.

<https://circulareconomy.europa.eu/platform/en/good-practices/wastly-facilitates-marketing-secondary-raw-materials-thanks-its-btob-online-platform>



CE Marketplaces

Definition, examples

There are more Marketplaces on the market:

Globechain - Globechain helps businesses reduce waste by providing a reuse marketplace for listing unneeded items. All items are free for collection by charities, SMEs and individuals.

BizBiz Share - Canada's largest business resource marketplace

For more marketplaces have a look at - CIRCULAR ECONOMY CLUB
Closed Marketplace on the CIRCULAR ECONOMY CLUB website: LOOP

There are more Marketplaces to come:

Planned in Australia for 2020



CE MARKETPLACE PLANNED IN AUSTRALIA

Australian Government announced 03 May 2019

“Planet Ark welcomes the announcement by the Federal Government of \$1.6M in funding for its development of a National CE Hub and Marketplace.

The leading environmental not-for-profit will create the B2B ‘eBay’ to help Australian businesses implement the CE.”

Marketplace: Coming soon - planned for 2020
→ no more information (definition) available for the moment

The Recycling Hub: [Recycling Near You](#)
[Business Recycling](#)
→ already working



CE MARKETPLACE PLANNED IN AUSTRALIA

National Circular Economy Hub

Full launch in 2020



CE MARKETPLACE PLANNED IN AUSTRALIA

CIRCULAR ECONOMY MARKETPLACE

A dynamic platform designed to meet the needs of the CE participants including:

- A system for matching buyers and sellers in waste resources. Provides an end-to-end solution including;
 - Material identification & specification
 - Transport and financial transaction.
 - trust rating for market participants and digital ledger to help ensure integrity.
- A CE procurement system for finished goods & services



ENABLER OF THE CE



B2B 'EBAY' OF THE CE

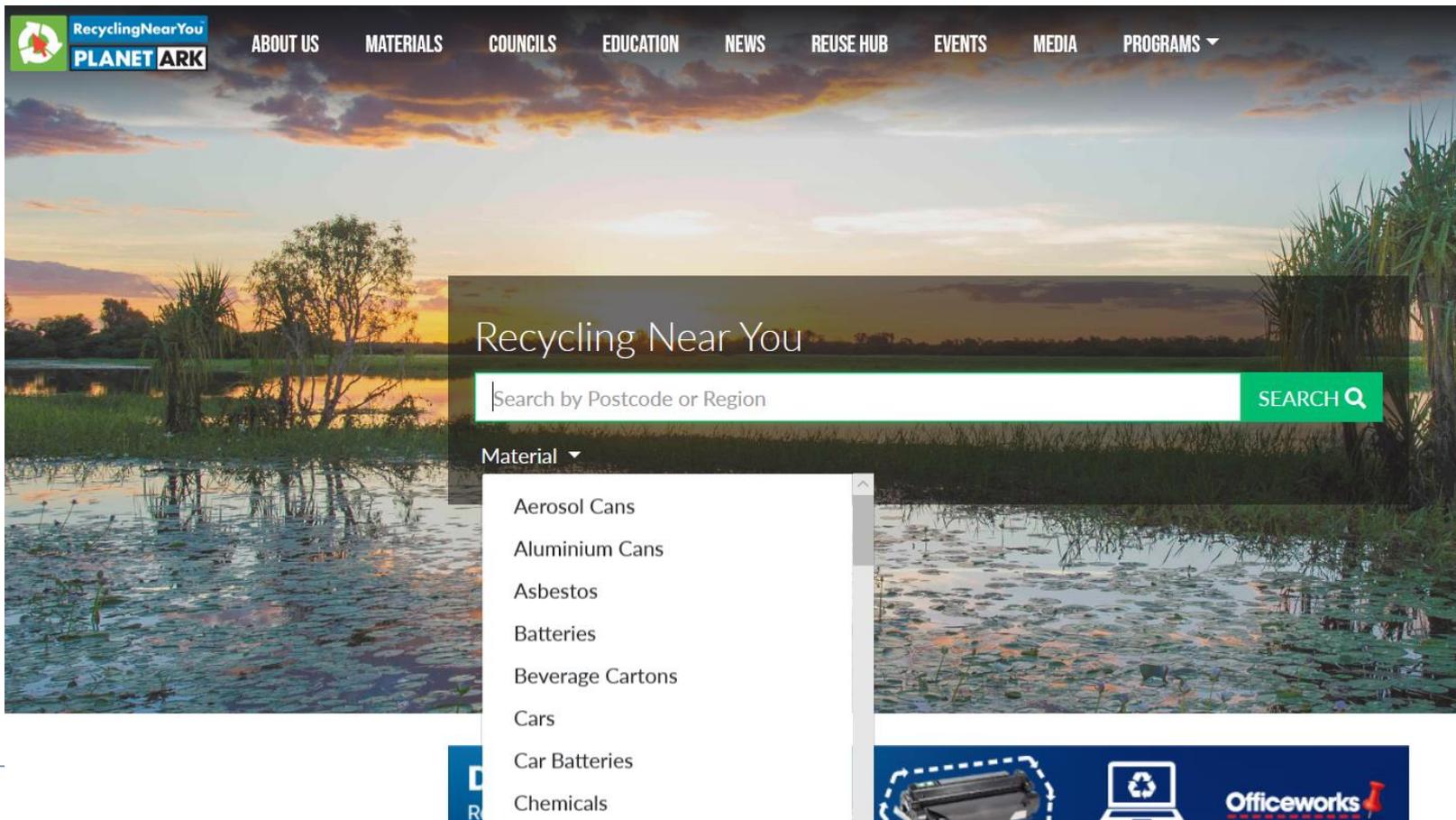


REPEAT VISITATION

*The National CE Hub-
introducing a new program
by Planet Ark*



CE MARKETPLACE - AUSTRALIA



RecyclingNearYou
PLANET ARK

ABOUT US MATERIALS COUNCILS EDUCATION NEWS REUSE HUB EVENTS MEDIA PROGRAMS ▾

Recycling Near You

Search by Postcode or Region **SEARCH** 🔍

Material ▾

- Aerosol Cans
- Aluminium Cans
- Asbestos
- Batteries
- Beverage Cartons
- Cars
- Car Batteries
- Chemicals

Officeworks





Search for Service

Location

Category

Material

SEARCH

Brought to you by



Foundation Partner



Small Scale Recycling Equipment

Search for equipment to make recycling easier and cheaper

Search for a Recycler or List a Service

This site makes recycling at work easy and lists recycling options for around 90 different materials. Use the 'Search for service' function to the left of this page to find recyclers near you. If you're a recycler you can list your services by filling out the online registration form.

Search for Recycling Equipment or List your Equipment

TAKING COOPERATION FORWARD



Industrial Symbiosis

Definition, just some examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



INDUSTRIAL SYMBIOSIS . DEFINITION

Industrial symbiosis is a form of brokering to bring companies together in innovative collaborations, finding ways to use the waste from one as raw materials for another.

The word “symbiosis” is usually associated with relationships in nature, where two or more species exchange materials, energy, or information in a mutually beneficial manner.

Local or wider co-operation in industrial symbiosis can reduce the need for virgin raw material and waste disposal, thereby closing the material loop - a fundamental feature of the circular economy and a driver for green growth and eco-innovative solutions. It can also reduce emissions and energy use and create new revenue streams.

However, in order to make industrial symbiosis a wide-spread commercial reality, more needs to be done to manage the flow of waste material from different sectors and industries, and there is still much to understand about:

- environmental and societal impacts
- harmonization of technologies, processes, policies
- civil society engagement to a circular economy at EU level
- waste resources information
- waste treatment technologies
- business models and coordination between value chain actors.



FISSAC PROJECT - OVERVIEW

Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain.



Project information

- HORIZON 2020
- Grant agreement ID: 642154
- Start date: 1 September 2015 - end date 29 February 2020



FISSAC PROJECT - THE CONCEPT

The FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology, and software platform to facilitate information exchange, that can support industrial symbiosis networks and replicate pilot schemes at local and regional levels.

The model will be based on three sustainability pillars:

- Environmental (with a life-cycle approach)
- Economic
- Social (taking into consideration stakeholder engagement and impact on society).

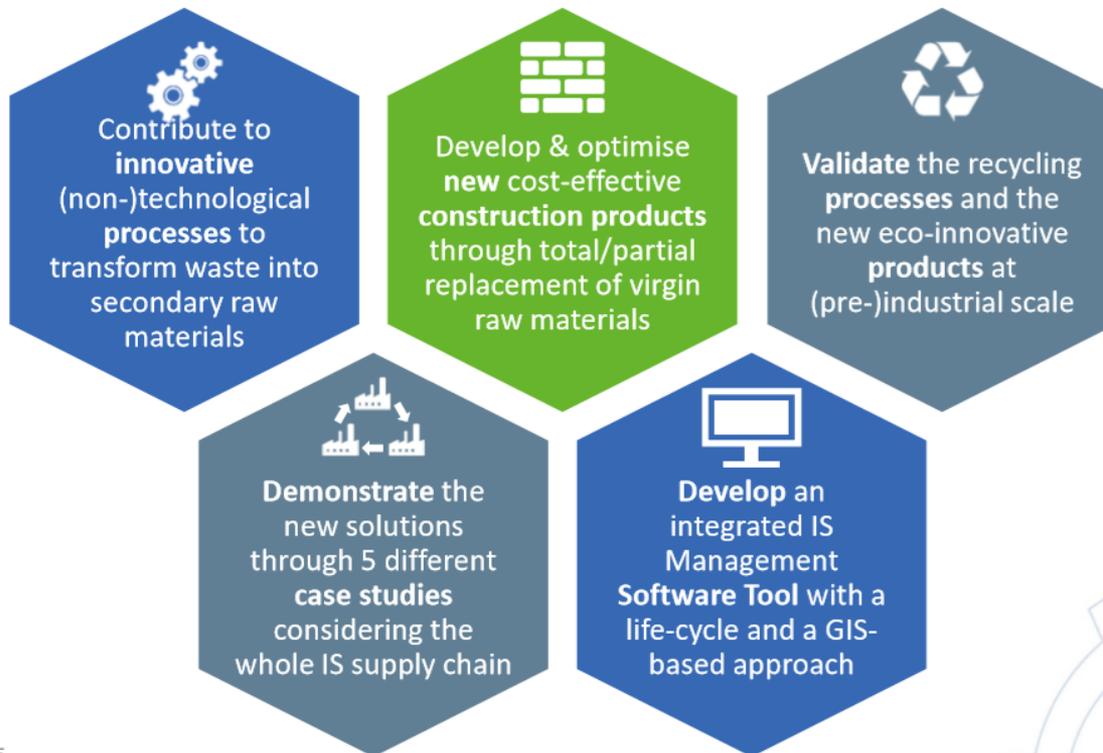
The ambition is that the model created can be replicated in other regions and other value chain scenarios.

FISSAC aims to demonstrate the effectiveness of the processes, services, and products at different levels.



FISSAC PROJECT - GOALS

FISSAC scientific & technical goals



<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-Acciona.pdf>



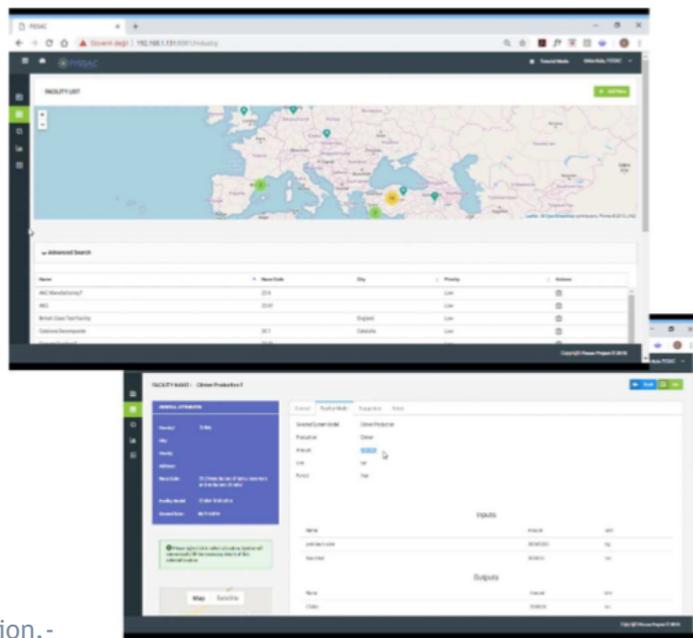
FISSAC PROJECT - SW PLATFORM

An important objective of the project is the introduction of a model for Industrial Symbiosis. For this, a specific tool is being developed and will be evaluated within the project: the **FISSAC Software Platform**.

It will feature amongst others a Life Cycle based Multiple Factor Analysis, network indicators and GIS based capabilities.

Capabilities

- Life-cycle assessment
- Life-cycle costing
- Material and energy flow analyses
- Multi-objective optimization
- Visualization & Diagrams
- Network analysis through industrial ecology metrics
- Graph and network topologies and industrial system modeling
- Innovative circular economy and industrial symbiosis indicator-based assessment



http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-_Acciona.pdf



FISSAC PROJECT - WEBINAR PLATFORM



4th Webinar
26 February 2020


FISSAC
IS Platform

Login

[Create Account](#) [I forgot my password](#)

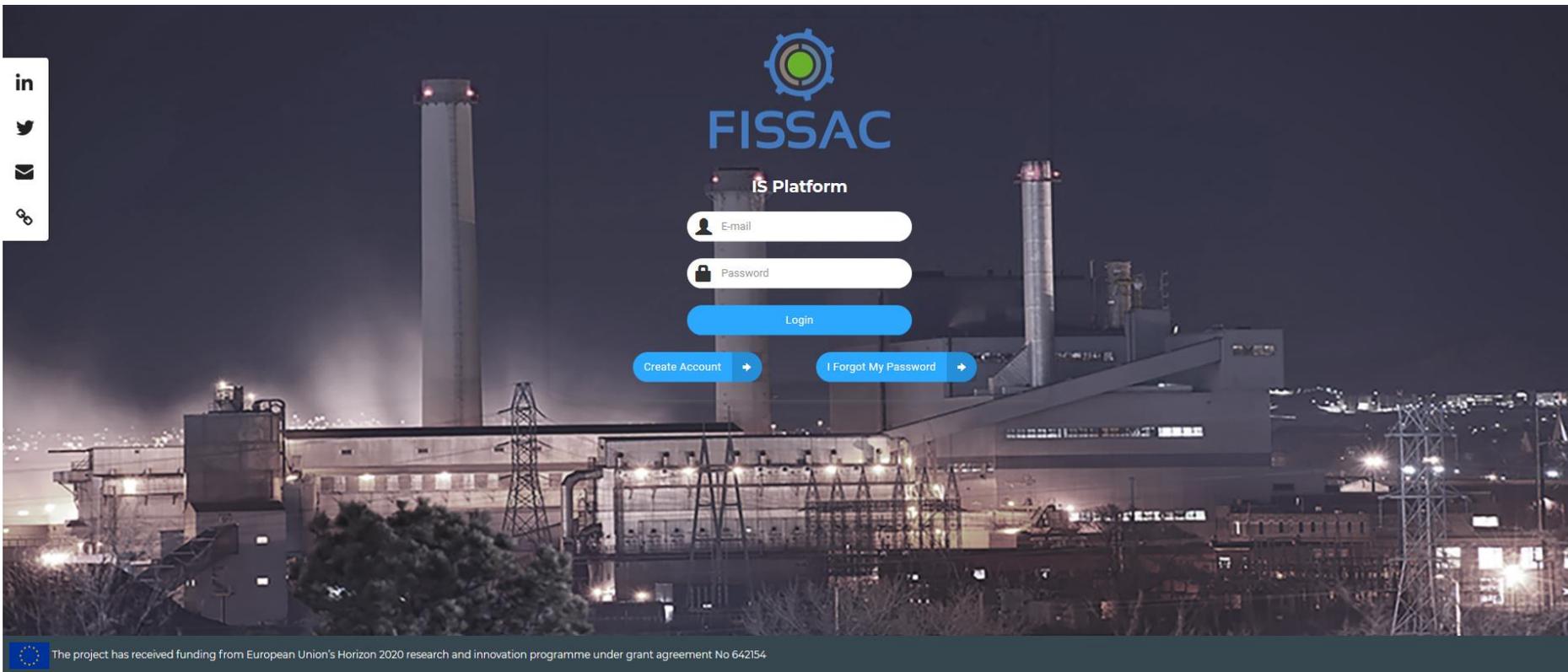
REGISTRATIONS ARE OPEN!

 The project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement No 642154

[View the recording !](#)



FISSAC PROJECT - IS PLATFORM



 The project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement No 642154



<http://is.fissacproject.eu/User/Login>



PAPERCHAIN PROJECT



PAPERCHAIN PROJECT



PAPERCHAIN PROJECT

Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

Overall objective

- PAPERCHAIN is to deploy five novel circular economy models centred in the valorisation of the waste streams generated by the PPI as secondary raw material for a number of resource intensive sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.

<https://cordis.europa.eu/project/id/730305>



Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

<https://cordis.europa.eu/project/id/730305>

Overall objective

- PAPERCHAIN project brings in an industrial symbiosis model centered in the use of different waste streams generated by the European Pulp and Paper Industry, as valuable feedstock for three resource hungry industrial sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.



KALUNDBORG SYMBIOSIS



Winner of

WIN-WIN GOTHENBURG SUSTAINABILITY AWARD 2018

TAKING COOPERATION FORWARD

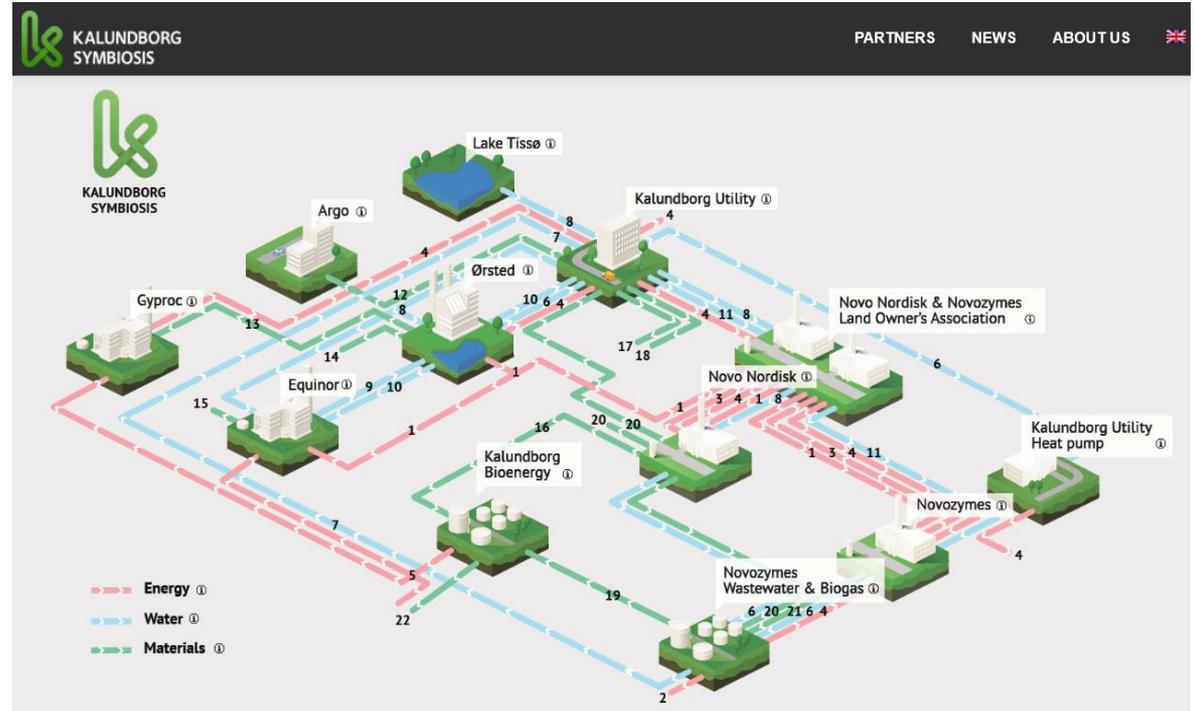


KALUNDBORG SYMBIOSIS

The Kalundborg Symbiosis is a partnership between nine public and private companies in Kalundborg.

Since 1972 Kalundborg has developed the World's first industrial symbiosis with a circular approach to production.

The main principle is, that a residue from one company becomes a resource at another, benefiting both the environment and the economy



KALUNDBORG SYMBIOSIS

 **KALUNDBORG SYMBIOSIS** Kalundborg Symbiosis – Vision and goals 2018
Video about the Kalundborg Symbiosis, our vision and our foundation.

PARTNERS NEWS ABOUT US 



[Watch the video !](#)



SMART MAPS

-

to find initiatives, events, projects, ... in cities

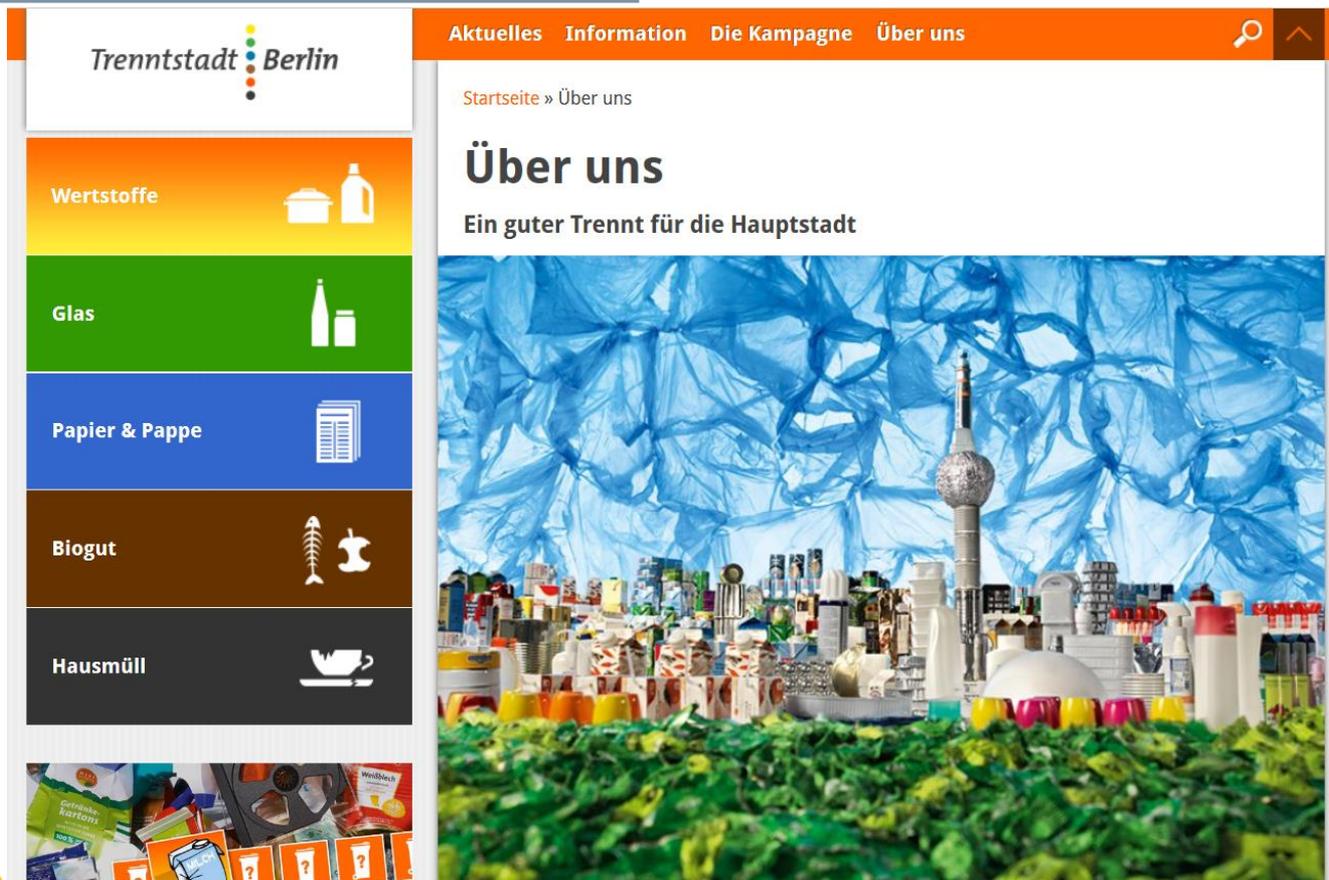
TRENNSTADT / -MAP BERLIN

Circular Berlin - Community

Gothenburg - Sharing Initiatives

#MOVETHEDATE - Sharing Initiative





The screenshot shows the website interface for 'Trenntstadt Berlin'. On the left is a vertical navigation menu with five categories: 'Wertstoffe' (orange), 'Glas' (green), 'Papier & Pappe' (blue), 'Biogut' (brown), and 'Hausmüll' (dark grey). Each category has an icon representing its waste type. Below the menu is a small image of various waste items. The main content area has an orange header with navigation links: 'Aktuelles', 'Information', 'Die Kampagne', and 'Über uns'. Below the header, there is a breadcrumb trail 'Startseite » Über uns', followed by the title 'Über uns' and the subtitle 'Ein guter Trennt für die Hauptstadt'. The main image shows a cityscape with the Berlin TV Tower, where the buildings are made of various waste items and the sky is covered in blue plastic bags.

Trenntstadt Berlin, an initiative of “Berliner Stadtreinigung” and its partners, aims to create a new awareness of the issues of waste avoidance, separation and recycling.

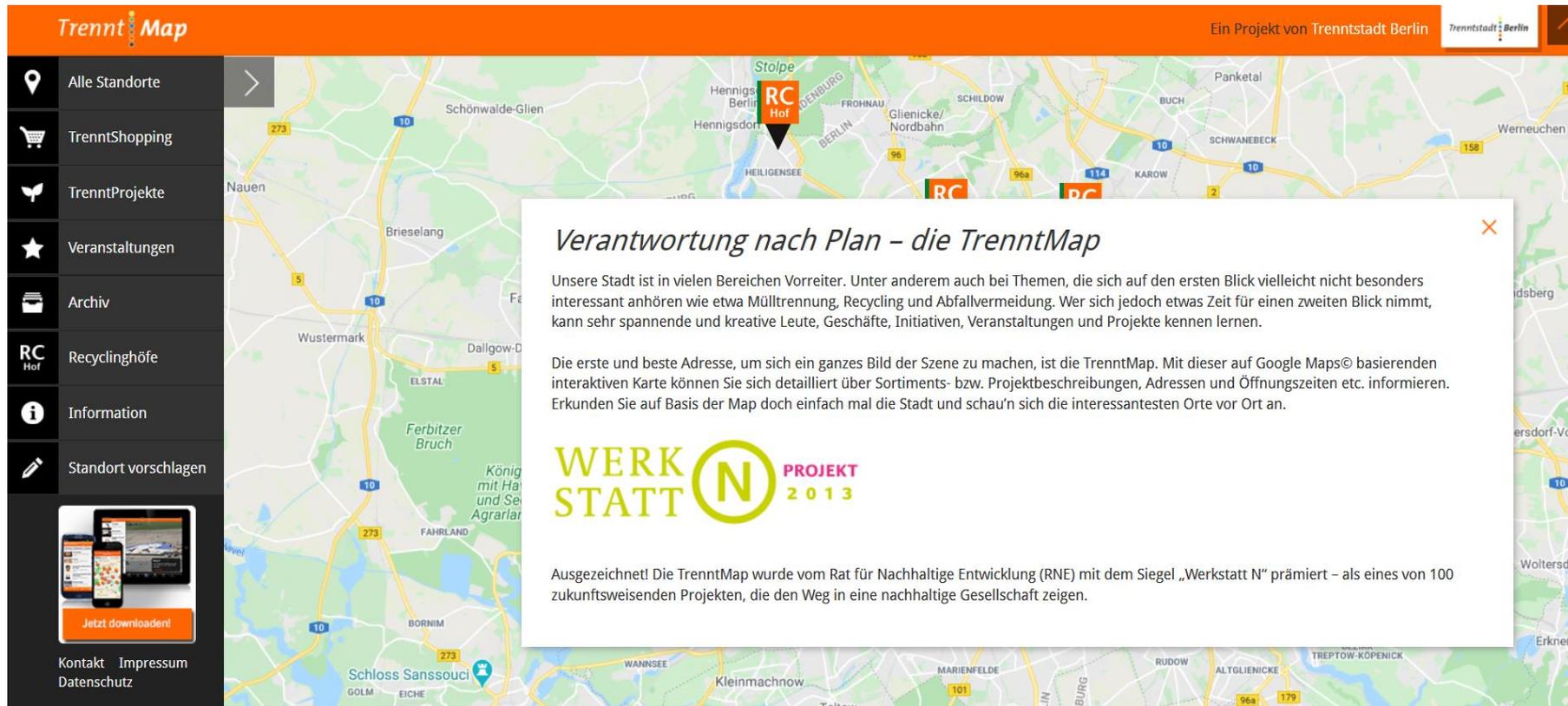




The screenshot shows the website for Trenntstadt Berlin. On the left is a vertical sidebar with six categories: Wertstoffe (orange), Glas (green), Papier & Pappe (blue), Biogut (brown), and Hausmüll (black). Each category has a white icon representing the waste type. The main content area has an orange header with navigation links: Aktuelles, Information, Die Kampagne, and Über uns. Below the header, there's a breadcrumb trail: Startseite » TrenntFestival. The main heading is 'TrenntFest' with a sub-heading 'TrenntKonzerte im Sommer'. A large orange dropdown menu is open, listing various links: Abfalltrennung, Abfallvermeidung, Riesenobjekte, TrenntMagazin, TrenntRadio, TrenntMap, TrenntMöbel, TrenntMöbel-Wettbewerb, Richtig wegwerfen mit den Füchsen Berlin, TrenntFestival, and Der Weltrekord. The background of the main content area features a photograph of a crowd at an outdoor event, with several people wearing orange 'TrenntFestival' t-shirts.



TRENNTMAP BERLIN - PROJECT OF TRENNTSTADT



TrenntMap Ein Projekt von Trenntstadt Berlin

Alle Standorte
TrenntShopping
TrenntProjekte
Veranstaltungen
Archiv
RC Hof Recyclinghöfe
Information
Standort vorschlagen

Jetzt downloaden!

Kontakt Impressum
Datenschutz

Verantwortung nach Plan – die TrenntMap

Unsere Stadt ist in vielen Bereichen Vorreiter. Unter anderem auch bei Themen, die sich auf den ersten Blick vielleicht nicht besonders interessant anhören wie etwa Mülltrennung, Recycling und Abfallvermeidung. Wer sich jedoch etwas Zeit für einen zweiten Blick nimmt, kann sehr spannende und kreative Leute, Geschäfte, Initiativen, Veranstaltungen und Projekte kennen lernen.

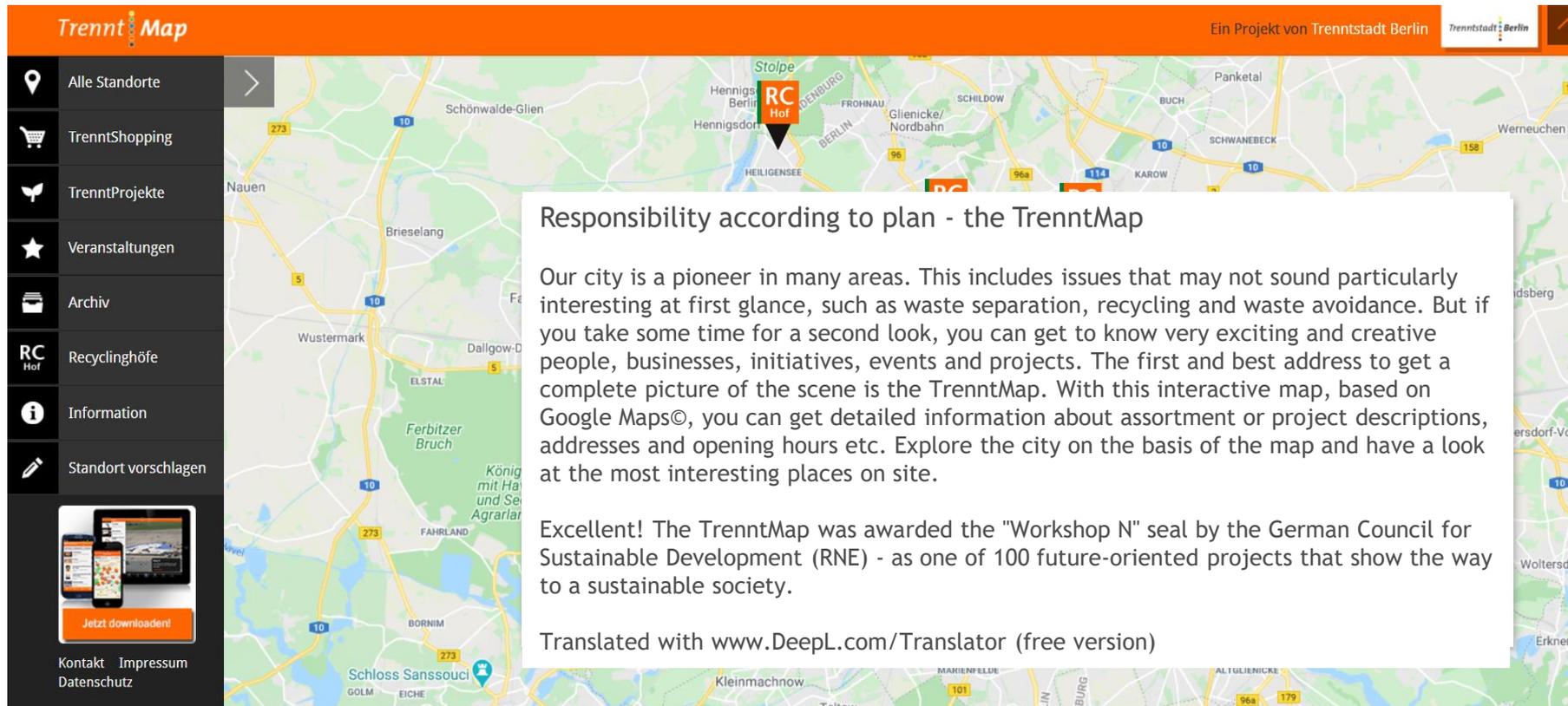
Die erste und beste Adresse, um sich ein ganzes Bild der Szene zu machen, ist die TrenntMap. Mit dieser auf Google Maps© basierenden interaktiven Karte können Sie sich detailliert über Sortiments- bzw. Projektbeschreibungen, Adressen und Öffnungszeiten etc. informieren. Erkunden Sie auf Basis der Map doch einfach mal die Stadt und schau'n sich die interessantesten Orte vor Ort an.

WERKSTATT N PROJEKT 2013

Ausgezeichnet! Die TrenntMap wurde vom Rat für Nachhaltige Entwicklung (RNE) mit dem Siegel „Werkstatt N“ prämiert – als eines von 100 zukunftsweisenden Projekten, die den Weg in eine nachhaltige Gesellschaft zeigen.



TRENNTMAP BERLIN - PROJECT OF TRENNTSTADT



TrenntMap Ein Projekt von Trenntstadt Berlin

Responsibility according to plan - the TrenntMap

Our city is a pioneer in many areas. This includes issues that may not sound particularly interesting at first glance, such as waste separation, recycling and waste avoidance. But if you take some time for a second look, you can get to know very exciting and creative people, businesses, initiatives, events and projects. The first and best address to get a complete picture of the scene is the TrenntMap. With this interactive map, based on Google Maps©, you can get detailed information about assortment or project descriptions, addresses and opening hours etc. Explore the city on the basis of the map and have a look at the most interesting places on site.

Excellent! The TrenntMap was awarded the "Workshop N" seal by the German Council for Sustainable Development (RNE) - as one of 100 future-oriented projects that show the way to a sustainable society.

Translated with www.DeepL.com/Translator (free version)



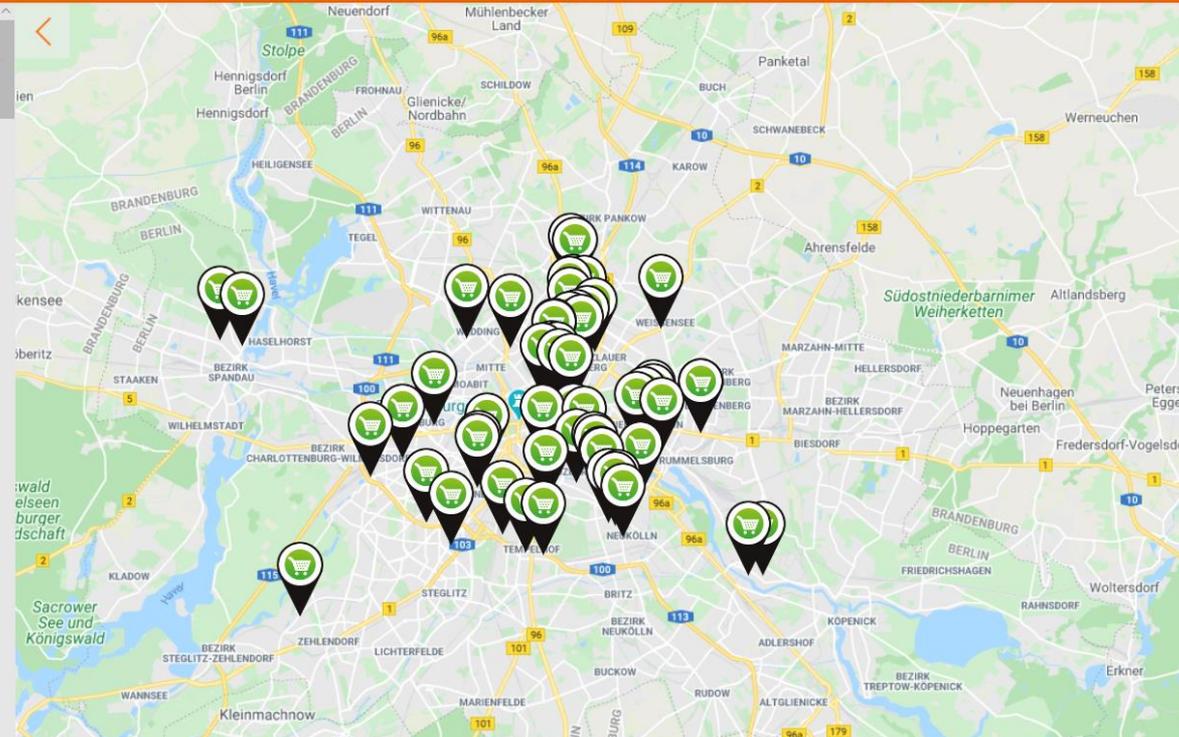
TRENNTMAP BERLIN - EX. TRENNTSHOPPING

TrenntMap Ein Projekt von Trenntstadt Berlin 

-  Alle Standorte
-  TrenntShopping
-  TrenntProjekte
-  Veranstaltungen
-  Archiv
-  Recyclinghöfe
-  Information
-  Standort vorschlagen

Sortierung: [Name](#) | [Kategorie](#) 

- **Ahoj! Souvenirmanufaktur** 
Karl-Marx-Str. 83
12043 Berlin
- **Atelier Karin Jordan** 
Anklamer Straße 38
10115 Berlin
- **avesu - a vegan shoe, Friedrichshain** 
Warschauer Str 33
10243 Berlin
- **avesu - a vegan shoe, Prenzlauer Berg** 
Schivelbeiner Straße 35
10439 Berlin
- **BATATA** 
Erich-Weinert-Straße 24
10439 Berlin
- **berlin-re-cycling** 
Kurfürstendamm 121a
10711 Berlin

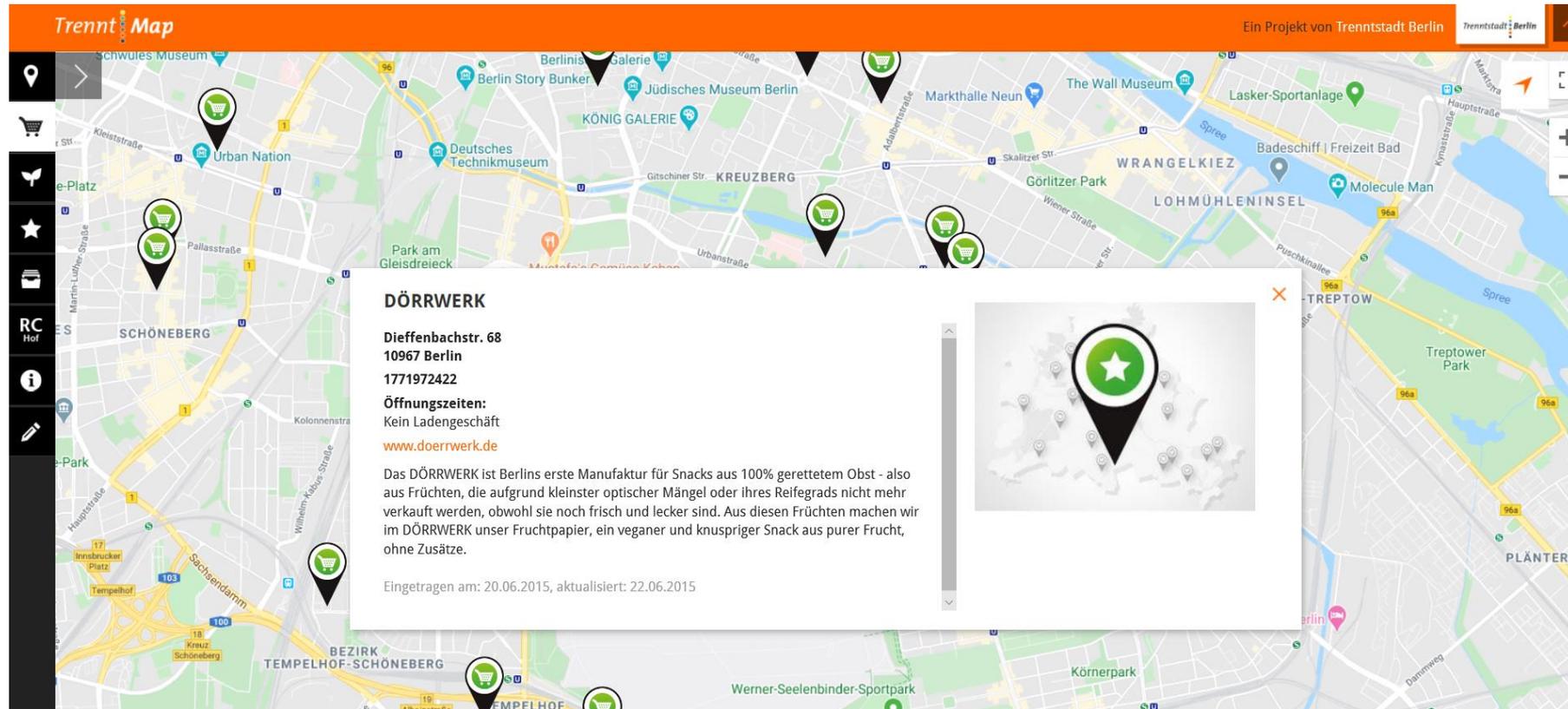


[Kontakt](#) [Impressum](#) [Datenschutz](#)



TRENNTMAP BERLIN - EX. TRENNTSHOPPING

TrenntMap Ein Projekt von Trenntstadt Berlin 



DÖRRWERK

Dieffenbachstr. 68
10967 Berlin
1771972422

Öffnungszeiten:
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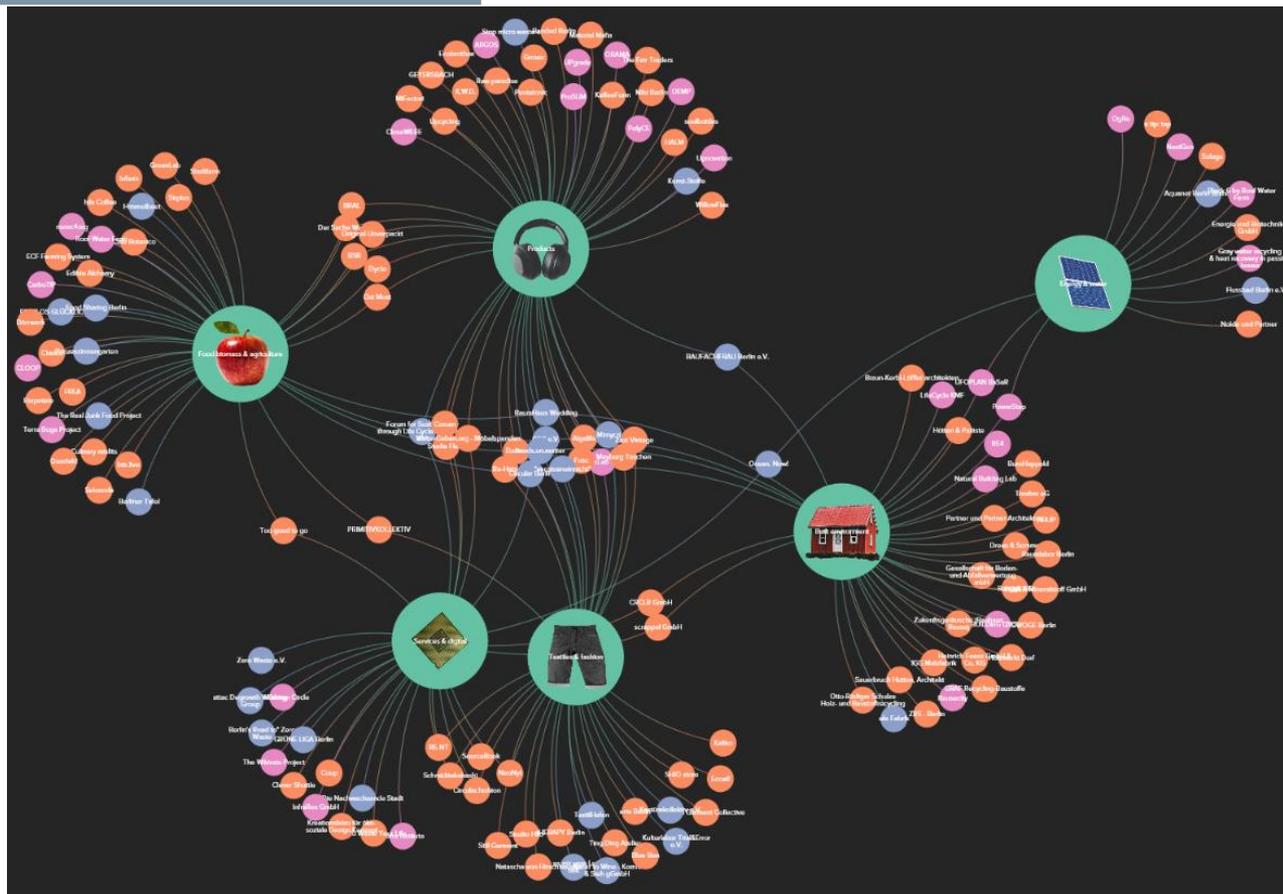
www.doerwerk.de

Das DÖRRWERK ist Berlins erste Manufaktur für Snacks aus 100% gerettetem Obst - also aus Früchten, die aufgrund kleinster optischer Mängel oder ihres Reifegrads nicht mehr verkauft werden, obwohl sie noch frisch und lecker sind. Aus diesen Früchten machen wir im DÖRRWERK unser Fruchtpapier, ein veganer und knuspriger Snack aus purer Frucht, ohne Zusätze.

Eingetragen am: 20.06.2015, aktualisiert: 22.06.2015



CIRCULAR BERLIN - COMMUNITY



150+ circular initiatives
in Berlin

Click the bubbles
to find out more,
zoom in,
search & filter by
circular strategies.



GOTHENBURG - SHARING INITIATIVES

Open now



+ Add initiative

+ Create event

Find all the sharing initiatives!

Welcome to the sharing initiatives where you can rent, borrow, lend, share, give and get in Gothenburg. You can find bike kitchens, fruit orchards, the toy library, the leisure equipment banks and much more. Pick fruit so follow The Smart Map on social media and expand your interest in the sharing culture in our forum!



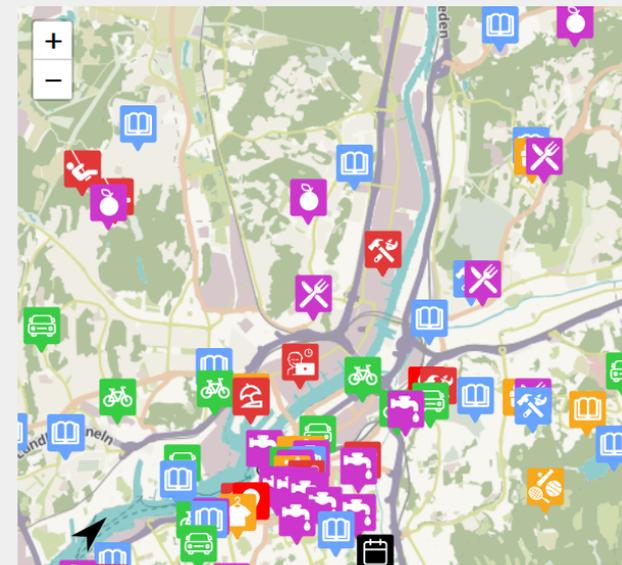
Facebook



Instagram

[→ To Malmö's smart map](#)

Filter  Sort to



Further maps in [Malmö](#), [Karlstad](#) and [Sjuhärad](#)



#MOVE THE DATE

STORIES

MAP

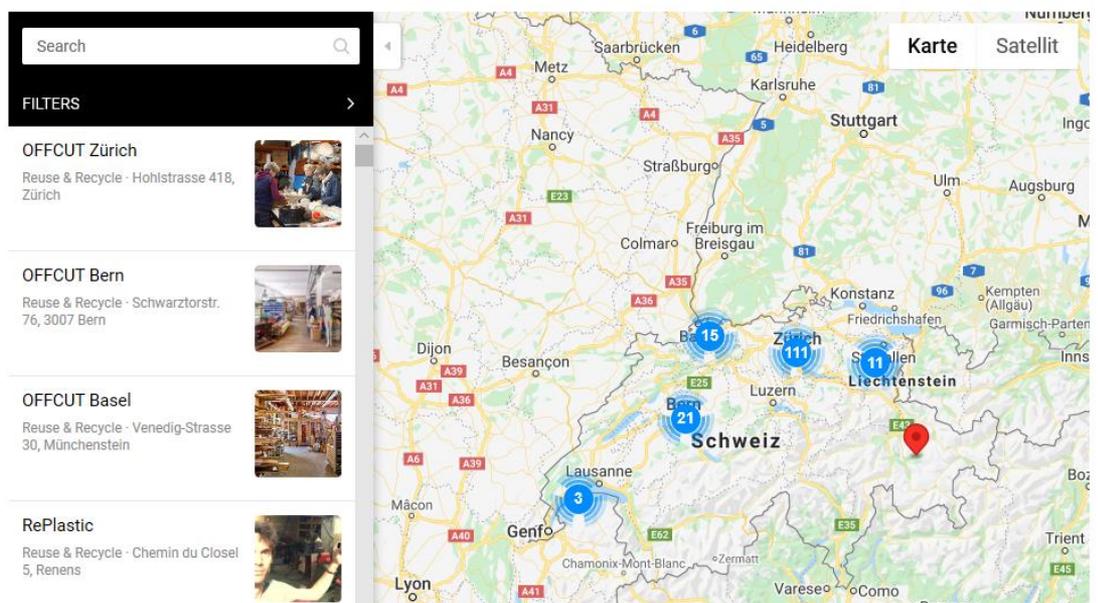
IDEE

ABOUT

MITMACHEN

DE FR

MOVER-MAP

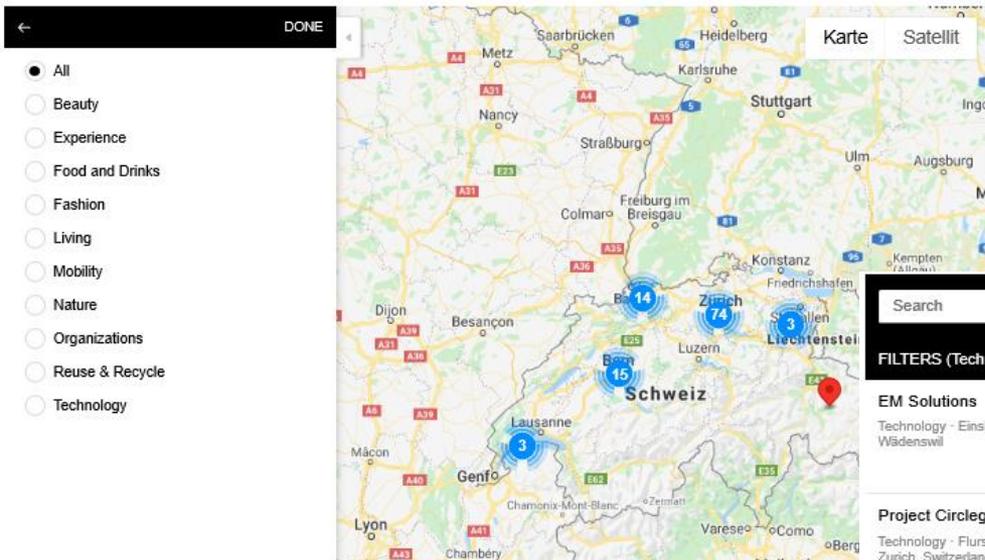


MOVE WITH US.

Aim of the movement LET'S MOVE IT
is to postpone Overshoot Day.

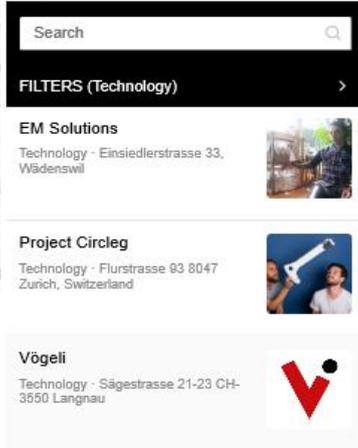


#MOVETHEDATE - SHARING INITIATIVE



Map showing Central Europe with search filters overlay. The filters are:

- All
- Beauty
- Experience
- Food and Drinks
- Fashion
- Living
- Mobility
- Nature
- Organizations
- Reuse & Recycle
- Technology



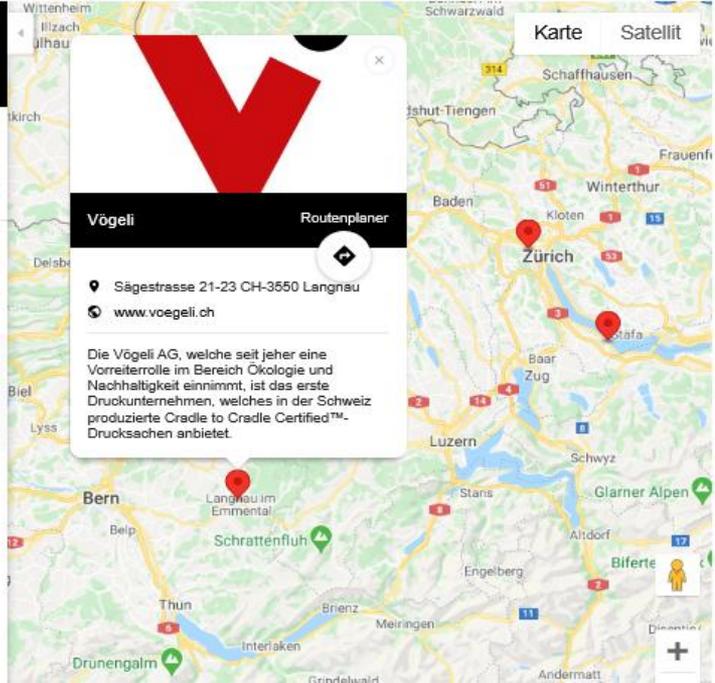
Search

FILTERS (Technology)

EM Solutions
Technology - Einsiedlerstrasse 33, Wädenswil

Project Circleg
Technology - Flurstrasse 93 8047 Zurich, Switzerland

Vögeli
Technology - Sägestrasse 21-23 CH-3550 Langnau



Map showing Switzerland with a location overlay for Vögeli AG. The overlay includes:

- Vögeli** (Route Planner)
- Address: Sägestrasse 21-23 CH-3550 Langnau
- Website: www.voegeli.ch
- Description: Die Vögeli AG, welche seit jeher eine Vorreiterrolle im Bereich Ökologie und Nachhaltigkeit einnimmt, ist das erste Druckunternehmen, welches in der Schweiz produzierte Cradle to Cradle Certified™-Druksachen anbietet.



Marketplace STARTUP IDEAS

-

in Switzerland



SWISS STARTUPS - EARLY STAGE PROJECTS

- [ecco.eco](#) is Switzerland's first and most inspiring online marketplace for everything upcycled.
- [Help'n'Trade](#) A digital platform facilitating exchange of goods and services locally.
- [CINE.EQUIPMENT](#) is a sharing marketplace where filmmakers and film production companies all over Switzerland can rent and hire filmequipment.
- [Swishy](#) Swiss online marketplace connecting offers with wishes in the local community, showing new ways to offer value and extend product lifecycles.
- [iCEEP](#) is a digital market place dedicated to the circular economy that stimulates and rewards societal circular behavior.



TAKING
COOPERATION
FORWARD



Webinar | March 30, 2020



WP T2 - CE Hubs - Examples, Structure & Services, Economic Sustainability



Luc Schmerber | BWCON

- 1 CE HUBs - Understanding and further focus
- 2 City governments and their role in enabling a CE transition
- 3 Special focus: Clusters in the CE transition

CE HUBs : overview on cases / examples

- 4 Focus on city governments and clusters
- 5 Industrial symbiosis
- 6 Focus on regional and two “smaller” national HUBs



CE HUBs

Understanding and further focus

- a) CE HUBs in the CITYCIRCLE application
 - understanding
- b) Classification of cities
 - further focus when examining
 - literature
 - different approaches



CE HUBs

Understanding and further focus

a) CE HUBs in the CITYCIRCLE application

- Objectives
- Project relevance & approach

→ Understanding of CE HUBs in
non-metropolitan cities of Central Europe



CE HUBs

Understanding and further focus

b) Classification of Cities

- Why is a classification needed ?
“Cities are different. So are solutions.”
- Different approaches
 - Ellen MacArthur Foundation
 - cscp | Bertelsmann
- ➔ Further focus when examining literature and examples



CE HUBs

“City governments and their role in enabling a CE transition”

a) **Ellen MacArthur**

Urban policy levers

b) **European Investment Bank (EIB)**

The 15 circular steps for cities

c) **Urban Agenda for the EU**

What can a local authority do ?



CE HUBs

Special focus: Clusters in the CE transition

Building partnerships for sustainable transition of SMEs

- Ambition of clusters
- Cluster support
- Study results from Denmark
- How clusters are powering the circular transition



CE HUBs _ cases / examples

Focus on city governments and clusters

a) **Learning Centres of CE**

Transforming Municipality Districts

Case Maribor, Slovenia

b) **Learning Centres and Entrepreneurial Networks**

IMPACT HUBS

c) **A Network of Regional Innovation Hubs**

C-VoUCHER

d) **Clusters**

Case Ostwestfalen-Lippe



CE HUBs _ cases / examples

Industrial Symbiosis

a) Definition

b) Examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



CE HUBs - cases / examples

Focus on regional and two smaller national HUBs

a) Regional Hubs

Circular Flanders is the HUB and the inspiration for the Flemish CE (+ webinar)

b) National Hubs

Switzerland - Movement for a CE

Australia - The National CE HUB

more examples (not further elaborated here)

- SITRA, Finland & Kemi Circular and Bioeconomy Center, Lapland (+ webinar)
- Zero Waste Scotland, Scotland



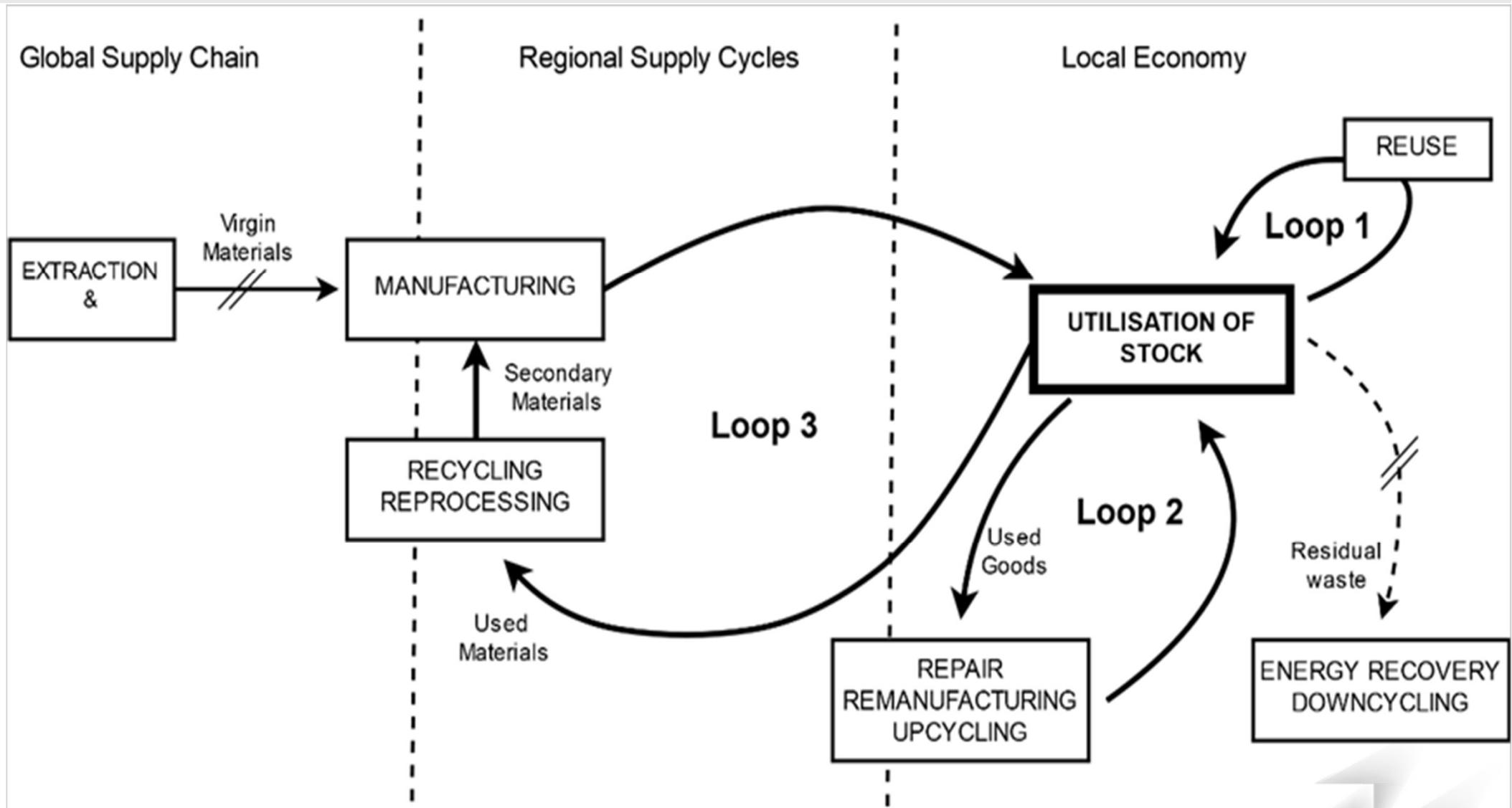
Challenges and benefits of cities

Challenges	Benefits
<ul style="list-style-type: none">▪ Structural waste and economic losses in cities	<ul style="list-style-type: none">▪ Increase disposable income
<ul style="list-style-type: none">▪ Ecosystem degradation and negative environmental impacts	<ul style="list-style-type: none">▪ Reduce carbon emissions
<ul style="list-style-type: none">▪ Consumer culture and lifestyles	<ul style="list-style-type: none">▪ Increase livability
<ul style="list-style-type: none">▪ Growing inequality within cities	<ul style="list-style-type: none">▪ Potential for positive impact on employment opportunities in the city
	<ul style="list-style-type: none">▪ Health benefits

[cscp | BertelsmannStiftung 2019: P21&32f.](#)



INTRO _ THE BASIC LOOPS OF CE



Source: modified from on Stahel and Clift (2016)



CE HUBs

Understanding and further focus

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 - different approaches



CE HUBs

Understanding and further focus

a) CE HUBs in the CITYCIRCLE application

- Objectives
- Project relevance & approach

→ Understanding of CE HUBs in
non-metropolitan cities of Central Europe



Application - objectives

1. Setting-up quadruple-helix CE hubs in partner cities - **non-metropolitan cities of Central Europe** in order to establish **linkages among key circular economy stakeholders** (companies, public administration, universities and citizens).

Specific objective

All partner cities are dedicated to improve their innovative capacities by interlinking key innovation actors (public administration, companies, public utilities, R&D institutions, end-users) into circular economy hubs.

These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field - material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). ...



Application - objectives

2. enabling and facilitating the innovation processes in CE cities by educating quadruple-helix stakeholders and providing tools for the management of efficient CE innovation processes and to deploy CE solutions.

Specific objective

Since the concept of CE is new to many stakeholders in partner cities, building a knowledge base in newly-established hubs is necessary to enable them to work in the field.

A set of tools will be provided to equip hubs with guidelines at the development of CE solutions. They will provide instructions and tips on how to design value-chains in CE and will also give RIS3 national strategy framework and showcases from all partner countries.



Application - project relevance & approach

By establishing CE **quadruple-helix hubs** as **local innovation networks** of private and public institutions in partner cities, CITYCIRCLE will provide innovation systems to facilitate innovation and transfer of technology, services and business models.

By providing hubs with tools and knowledge, the project will enable the hubs to generate innovative solutions in CE in their urban ecosystems in a long-run.

CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix circular economy hubs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level.

Thus, CITYCIRCLE is placing the cities and their administrations in a heart of CE ecosystems and is introducing cross-sectorial horizontal approach with quadruple-helix partnership management structure.



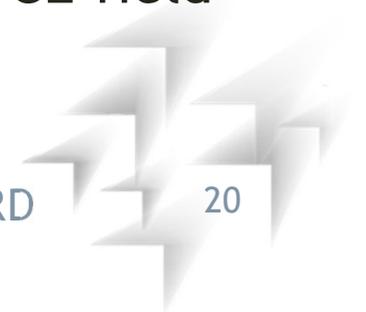
CITYCIRCLE - HUBS UNDERSTANDING

CE HUB _ Understanding	
<ul style="list-style-type: none"> Where ? 	<ul style="list-style-type: none"> Peripheral urban centres = non-metropolitan cities of Central Europe
<ul style="list-style-type: none"> Who ? 	<ul style="list-style-type: none"> quadruple-helix - establish linkages among key CE stakeholders → public administration, companies, public utilities, universities, R&D institutions, citizens
<ul style="list-style-type: none"> What ? 	<ul style="list-style-type: none"> improve innovative capacities cross-sectorial horizontal approach
<ul style="list-style-type: none"> By establishing CE quadruple-helix HUBs as local innovation networks of private and public institutions in partner cities. These new innovation networks (or existing networks transformed) will provide a space for designing new solutions in the CE field – material, waste, water, energy, soil, food circles supported by business models (PPPs, new value-chains, new services, policy solutions...). 	
<ul style="list-style-type: none"> CITYCIRCLE will provide cities with organizational infrastructure (quadruple-helix CE HUBs), knowledge and tools (implementation kit, trainings) and assistance with design of local CE solutions - a bottom-up support to their RIS3 and their physical implementation on a project level. 	



CE quadruple-helix HUBs

- key innovation actors
 - public administration,
 - companies,
 - public utilities,
 - R&D institutions,
 - end-users
- circular economy hubs
 - new innovation networks or existing networks transformed
 - will provide a space for designing new solutions in the CE field



CITYCIRCLE - HUBS UNDERSTANDING



- Who can enable the transition to a circular city ?
- a collaborative effort across the value chain is needed,
 - involving individuals,
 - the private sector,
 - different levels of government,
 - civil society.



CE HUBs

Understanding and further focus

b) Classification of Cities

- Why is a classification needed ?
 - “Cities are different. So are solutions.”
- Different approaches
 - Ellen MacArthur
 - cscp | Bertelsmann
- ➔ Further focus when examining literature and examples



Ellen MacArthur Foundation

Publication: City Governments and their Role in Enabling a Circular Economy Transition - an Overview of Urban Policy Levers: March 2019.

Examples: “Over 100 cases from more than 70 cities around the world have been included to provide short, practical examples of the various policy steps ...” ([Ellen MacArthur 2019](#): P9.)

City levels: taken into consideration

- Capitals
- Major cities
- Smaller cities

Also mentioned: regional / national level



“Cities are different. So are solutions.”

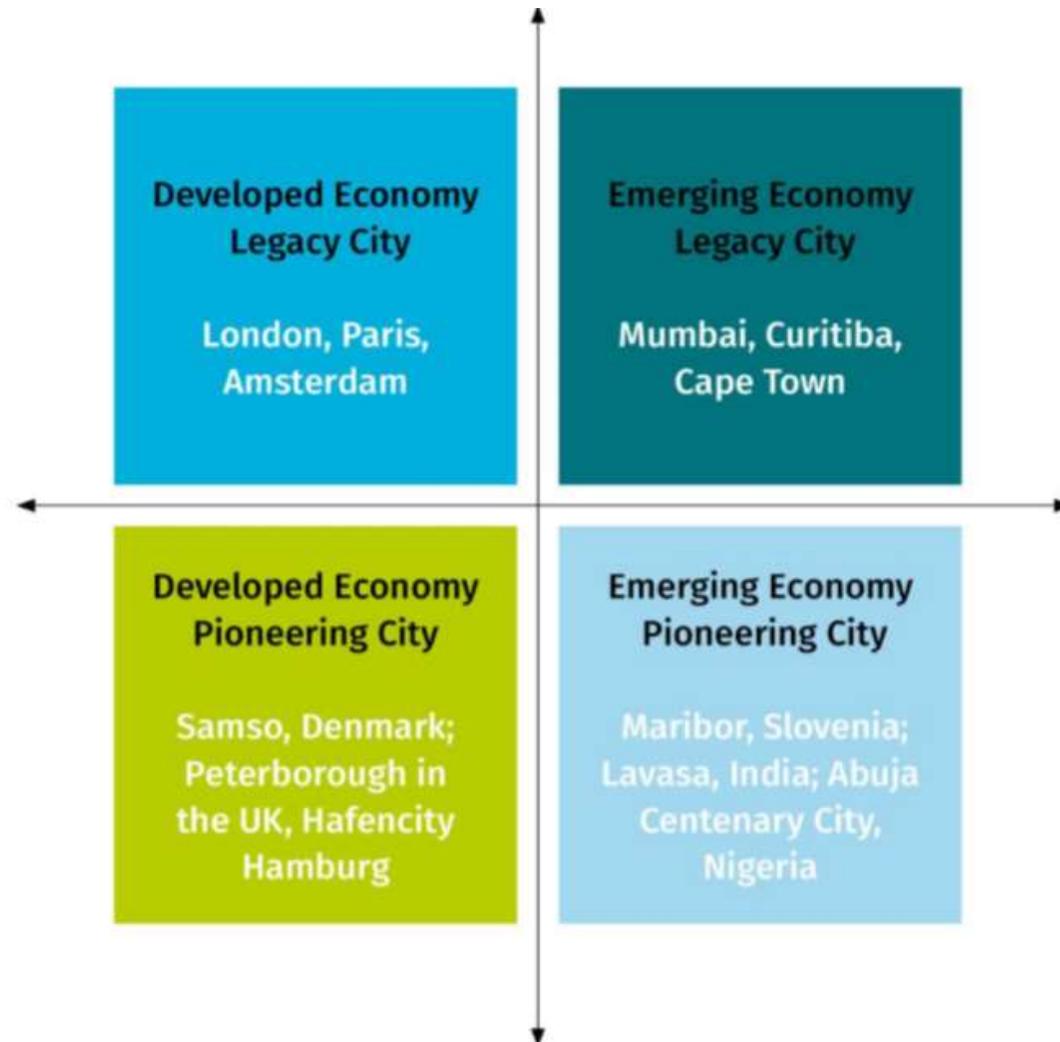
“The prospect of urban innovation excites the imagination. But dreaming up what a “Circular City” will look like in some gleaming future is, by its nature, a utopian exercise. The fact is that no two cities are same, what’s appealing for the young in Copenhagen certainly won’t help millions of workers in Dhaka or Lagos.”

[cscp | BertelsmannStiftung 2019: Monitor Sustainable Municipalities. Key topic Circular Economy. Report. P21.](#)



CITYCIRCLE - CITIES CLASSIFICATION

CE city framework - four quadrants



CITYCIRCLE - CITIES CLASSIFICATION

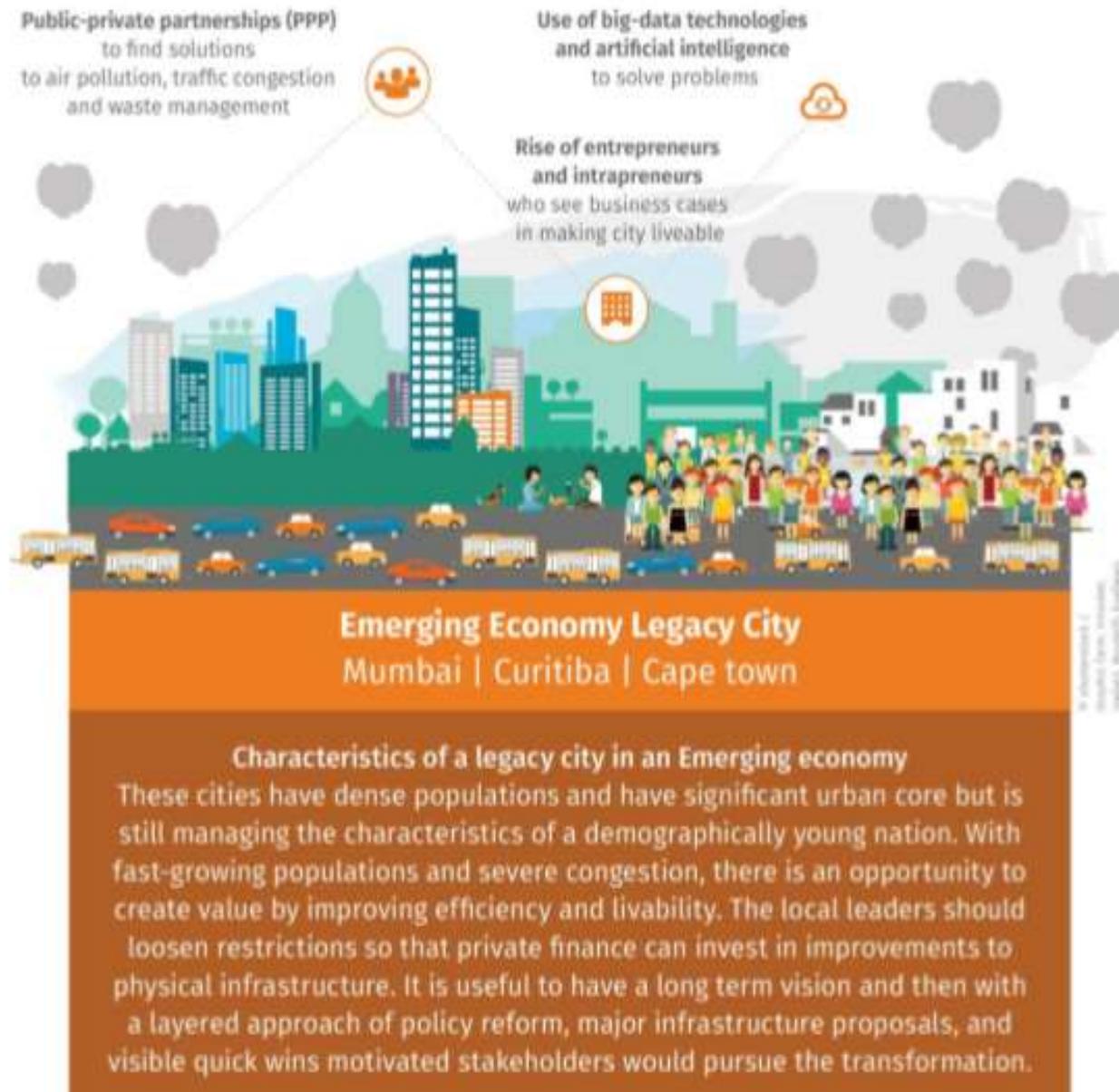


Initiatives - Emerging / pioneering

- The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.
- Lavasa, India, a hill city prone to monsoons, droughts, and threats of erosion, has been modelled after the ecosystem of the dense forest around it incorporating the principles of Biomimicry.
- UrbanWINS project which is funded by the Research and Innovation Program Horizon 2020 that studies how eight cities in Europe consume resources and products, and how they eliminate the waste produced, in order to develop and test innovative plans and solutions aimed at improving waste prevention and management.
- Abuja Centenary City is using biomimicry on a systems level. The city is being modelled on nature's systems in terms of its transportation, water and waste management, energy production.
- The historic city of Izmir, Turkey is using the urban metabolic approach to harness the output of one urban system, like solid waste management, to fuel another, like electricity generation.



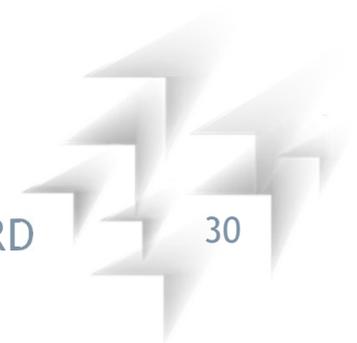
CITYCIRCLE - CITIES CLASSIFICATION



CITYCIRCLE - CITIES CLASSIFICATION



CITYCIRCLE - CITIES CLASSIFICATION



CE HUBs

“City governments and their role in enabling a CE transition”

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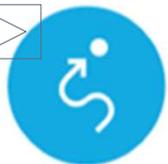
What can a local authority do ?



Urban policy levers

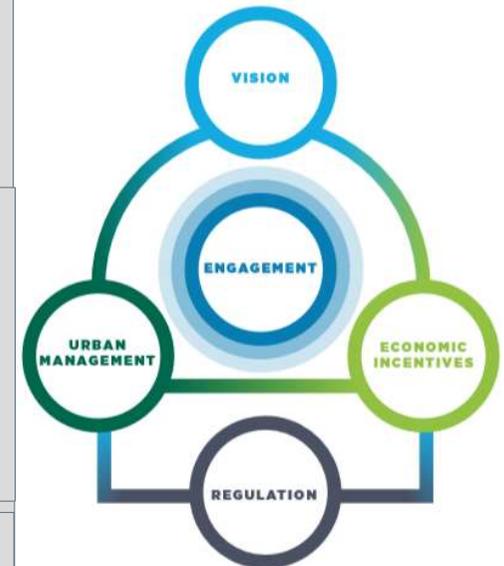


Interlinkages & relationships between policy levers



ROADMAPS AND STRATEGIES

- No single route for developing CE city roadmaps exists
- Making use of urban metabolism tools
- Taking a sector-based approach
- Co-developing city visions with a wide range of urban stakeholders
- Stimulating skill development
- Running capacity-building workshops and development guides
- Supporting physical community innovation and repair hubs
- Developing material marketplaces and skills for new material applications
- Developing tailored capacity building programmes for local businesses and entrepreneurs
- Using participation mechanisms to uncover CE opportunities
- Making information on CE city plans and initiatives easily accessible online
- Hosting and supporting awareness-raising events
- Using communication campaigns to encourage new habits
- Sharing information on local services and needs to support CE practices
- Developing projects that can inspire and showcase the potential of a CE



15 circular steps for cities

PLAN	1. Characterise and analyse local context and resource flows, and identify idle assets
	2. Conceptualise options and prioritise among sectors with circular potential
	3. Craft a circular vision and strategy with clear circular goals and targets
ACT	4. Close loops by connecting waste/residue/water/heat generators with off-takers
	5. Consider options for extending use and life of idle assets and products
	6. Construct and procure circular buildings, energy and mobility systems
	7. Conduct circular experimentation – address urban problems with circular solutions
	8. Catalyse circular developments through regulation, incentives and financing
	9. Create markets and demand for circular products and services – be a launching customer
	10. Capitalise on new ICT tools supporting circular business models
MOBILISE/ MONITOR	11. Coach and educate citizens, businesses, civil society and media
	12. Confront and challenge linear inertia, stressing linear risks/highlighting circular opportunities
	13. Connect and facilitate cooperation among circular stakeholders
	14. Contact and learn from circular pioneers and champions
	15. Communicate on circular progress based on monitoring



What can a local authority do?

REORGANISE YOUR CITY

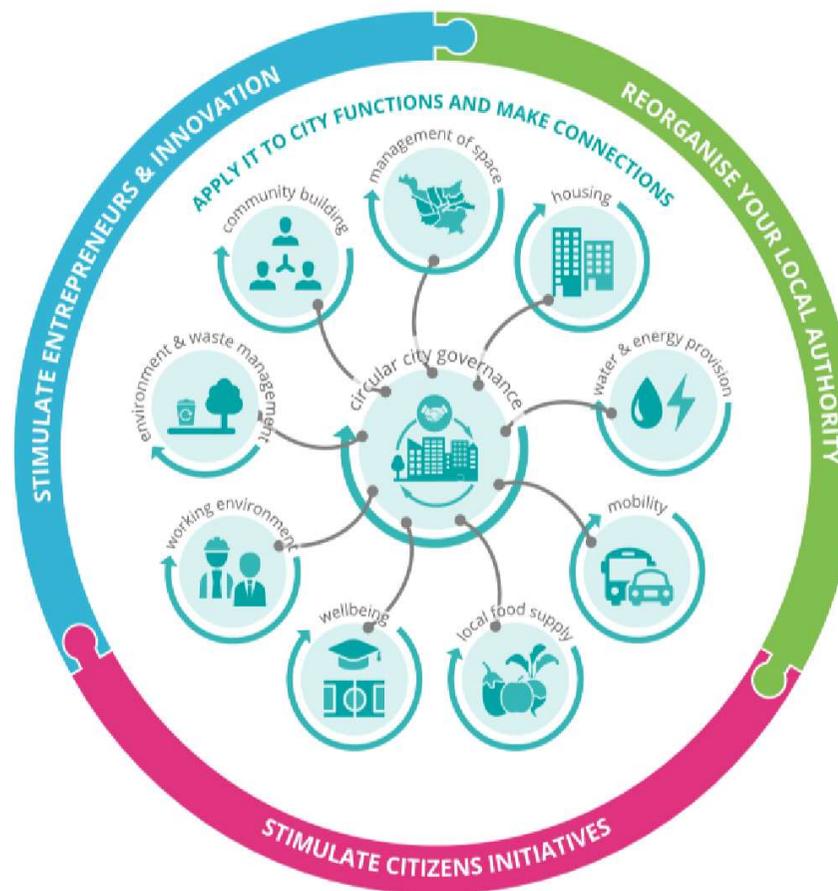
- 1 Create common long term ambition , with political support & use it in your branding
- 2 Set up cooperation between city departments and appoint a coordinator
- 3 Act circular (circular procurement, futureproof urban planning, sustainable building,...)
- 4 Get insights in your resources (waste, water, materials,...)

STIMULATE CITIZENS INITIATIVES

- 5 Promote sharing & functional economy
- 6 Raise awareness and coach citizens
- 7 Support bottom up initiatives through legislation, funding, cooperation, communication,...

STIMULATE ENTREPRENEURS & INNOVATION

- 8 Stimulate local symbioses through (business park) networks, smart technologies,...
- 9 Create incentives to attract circular business (offer space, taxes, subsidies,...)
- 10 Communicate success stories



Circular strategies to focus on

GENERAL AND TECHNICAL NUTRIENTS



BIOLOGICAL NUTRIENTS



CITY GOVERNMENTS - ROLE

1	Create a circular strategy if possible, but, it can also be equally effective to integrate circular principles and actions in an existing long-term climate strategy, or in a LT plan to reach the Sustainable Development Goals. Several examples of a circular vision can be found at #CEStakeholderEU .
2	A new method of collaborating - both between the city's various departments and its inhabitants and companies - is required to effectively implement a circular strategy. Through the infographic you can see how different functions in a city can lead to circular breakthroughs, e.g. sharing initiatives have a positive impact, both from a poverty prevention perspective and from an environmental department.
3	In their exemplary role, cities can have a huge impact on the implementation of a circular strategy. By using their purchasing power, they are able to grow the market for circular suppliers as well as lead by example. You can find some examples and context through The Urban Agenda on Public Procurement and the European ProCirc project with focus on circular procurement. The Urban Agenda CE Partnership and onLand Use Partnership created a handbook together on the reuse of buildings and spaces.
4	The lack of data and indicators for CE transition on a city level is an important barrier. Therefore, the Urban Agenda has listed 30 indicators to help cities with their strategy and in their use of data of resources for policy improvements. Collected data often end up in a drawer, but could be used as an input for circular actions.



CITY GOVERNMENTS - ROLE

5	A city can support sharing initiatives originated by citizens by providing a space or people to help in the organization, but they can also share their own assets as cars, tools, or buildings. In close partnership with ESPON, the partnership for CE has created a Collaborative Economy Knowledge Pack for cities.
6	Cities who invest in awareness-raising and training of citizens, see an increase of bottom-up initiatives and a wider acceptance of necessary actions. The Urban Resource Centres described in the Urban Agenda are testbeds for circular solutions and influence the behaviour of citizens. Examples of collaboration with schools and Higher Education can also be found on the #CEstakeholderEU .
7	When citizens organise events, repair cafes, and circular challenges, a city can help with the communication, promotion and with the exchange of knowledge and experiences. But, as a city you can also offer support with financial incentives. More information in the Circular City Funding Guide .
8	Cities play a crucial role in local symbioses because they have the overview of resources and stakeholders in their region. The Circular Resource Management Roadmap created within the Urban Agenda CE Partnership helps cities to create a step by step resource efficiency plan.
9	Cities can support businesses by simplifying legislation, or adjusting the city tax system in favour of circular business models. Examples on financial support can be found in the Circular City Funding Guide .
10	Startups or companies who invest in circular business models need extra marketing support to inform potential clients. Cities have a lot of communication tools to give those companies extra exposure, while a city also benefits from this publicity. Success stories can be posted and found on the #CEstakeholderEU .



Circular city governance: opportunities and challenges



OPPORTUNITIES

- 1 Develop and communicate a long-term, holistic vision about the circular ambitions of the city
- 2 Introduce cross-thematic coordination and promote a culture of cooperation and knowledge exchange and creation within the own municipal organisation.
- 3 Identify, address and include non-municipal stakeholders early on in the transition process (e.g. businesses, knowledge institutes, citizens) - in order to craft the process to come to circularity within an urban context, together.
- 4 Analyse the urban metabolism (material and energy streams, bio-sources and sinks) as a basis for developing a strategic plan for the CE transition with contextualised priority sectors.
- 5 Use circular public procurement to create demand for circular innovations.
- 6 Educate consumers (and other stakeholders) in civil society and more in particular cities based on an inclusive and participatory approach. In order for the CE to thrive in an urban context, co-creation from the start with citizens is crucial.
- 7 Identify external sources of funding/financing for CE initiatives and projects available at EU and/or national level to complement the cities' own budgetary sources and get acquainted with their rules and procedures.
- 8 Facilitate appropriate spaces and funding for experimentation, (private) innovation, knowledge transfers and match-making in the field of CE for businesses, research institutions and interested citizens.
- 9 Create forums with like-minded cities at the national (and possibly also at EU) level to lobby for necessary changes in EU and national legislation that currently block the transition to a CE.
- 10 Continuous monitoring and evaluation of implementation of circular projects and initiatives, with the aim to develop a solid knowledge base and provide feedback to guide/adjust the transition process.



CHALLENGES

- 1 Political support is key in creating a common long term vision on circular economy developments.
- 2 Confusion and a wide range of interpretations on what the circular economy is, what the transition to a circular economy requires, and why it is relevant.
- 3 The circular economy is often only regarded from a waste or environmental management perspective, instead of from a wider multi-sectoral economic development perspective.
- 4 Circular projects require new and far-reaching levels of cooperation and coordination amongst all stakeholders involved. This is difficult to organise and maintain.
- 5 Citizens awareness and participation is very low.
- 6 There are insufficient funds available to support circular projects and programmes.
- 7 Private innovation power for circular companies can be insufficient.
- 8 City development strategies are currently often made in silos.
- 9 The current tax system obstructs circular development.
- 10 Current (waste) legislation hinders innovative reuse and/ or recycling of products and materials.



CE HUBs

Special focus: Clusters in the CE transition

Building partnerships for sustainable transition of SMEs

- Ambition of clusters
- Cluster support
- Study results from Denmark
- How clusters are powering the circular transition



Clusters role

- Ambition of clusters must be to support companies - especially SME's -
 - to more efficiently tap into new knowledge and business opportunities in the CE,
 - to boost their specialization, possibilities for investments,
 - to internationalise and get access global value chains.
- Clusters support
 - changing mindsets,
 - developing new competences,
 - rethinking business models,
 - supplying living labs and
 - defining new costumers and green investors.

[“Clusters in the Circular Economy” is co-financed by Interreg Baltic Sea Region Project Circular PP and Cluster Excellence Denmark. Sept 2019. P3 & 5.](#)



Study results from Denmark

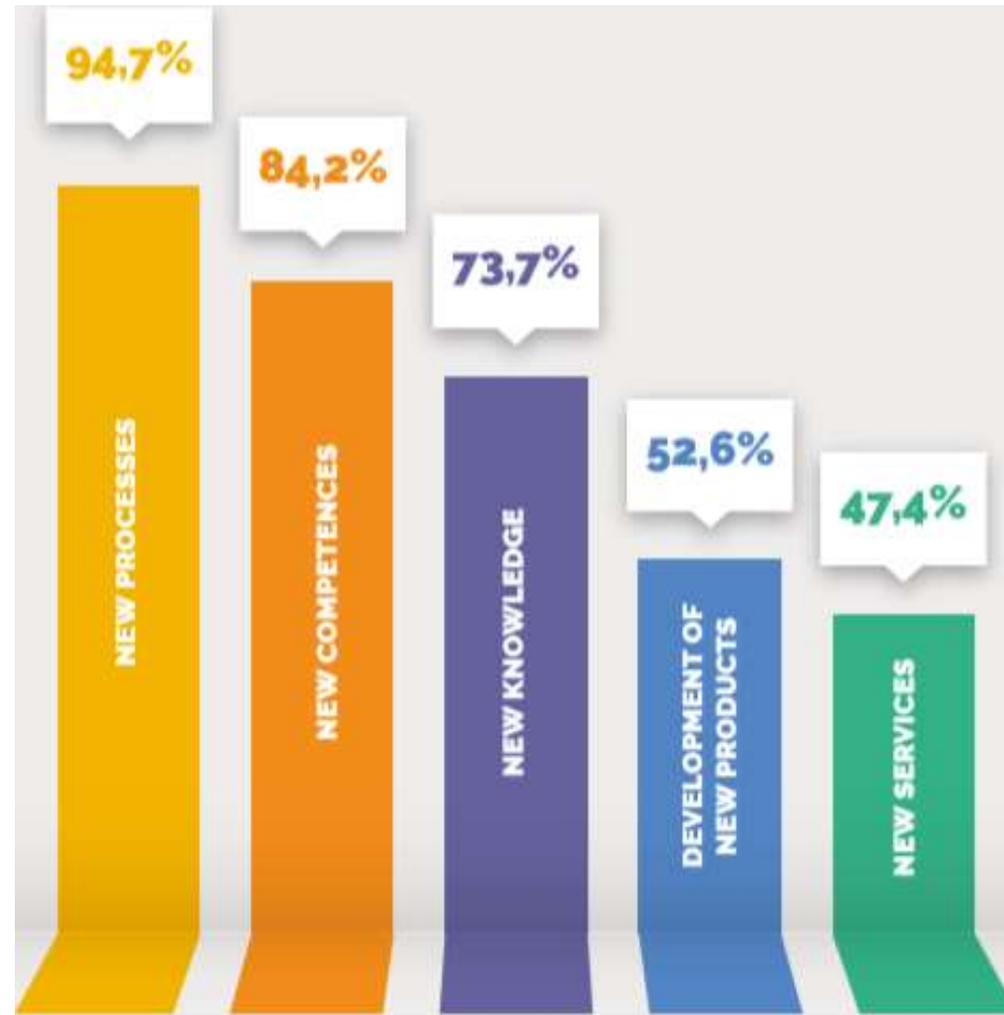
- roundabout 250 green clusters in Europe with a high potential for pushing the CE forward faster and more efficient
- 2/3 of the Danish clusters are involved in CE
- also clusters not directly related to the classical green sectors are working with CE in their sectors

[“Clusters in the Circular Economy”, 2019: P6.](#)



Study results from Denmark

- key impacts for companies are ...



“Clusters in the Circular Economy”,
2019: P6.



Study results from Denmark

- Variety of services developed ...



“Clusters in the Circular Economy”,
2019: P7.



How clusters are powering the circular transition

- Clusters building bridges to circular knowledge
- Clusters putting circular policy into action
- Access to circular funding for SME
- Clusters and sustainable development goals
- Circular public procurement supported by clusters

[“Clusters in the Circular Economy”, 2019: P8ff.](#)



CE HUBs _ cases / examples

Focus on city governments and clusters

a) Learning Centres of CE

Transforming Municipality Districts

Case Maribor, Slovenia

b) Learning Centres and Entrepreneurial Networks

IMPACT HUBS

c) A Network of Regional Innovation Hubs

C-VoUCHER

d) Clusters

Case Ostwestfalen-Lippe



CE at EIT Climate-KIC

- In the focus area CE “EIT Climate-KIC empowers entire regions, industries and communities to implement a bold transition towards circular economy. To us, this means combining tailored actions across **education**, **entrepreneurship** and **innovation** to change whole systems from linear to circular.”
- The Circular Cities project is investigating how a city district and areas can be a transforming agent and create smart and sustainable neighbourhoods.

[EIT Climate-KIC: Transforming Municipality Districts into Learning Centres of Circular Economy. In partnership with the EIT Climate-KIC Circular Cities Project. 2019: P4.](#)



Transforming Municipality Districts

“The aim of this publication is to showcase how different municipalities create innovation platforms where entrepreneurs, NGOs and community groups can turn different waste streams into new products, new design, new innovative ideas and how these efforts can generate work and at the same time minimise waste.”

[EIT Climate-KIC. 2019: P3.](#)



How municipal cases can work as drivers towards CE

- The report showcases 13 (14) examples of specific CE HUBs at a district and area level to explain how cities across Europe concrete circular economic concepts have been designed and executed, including a detailed explanation for the potential CE business cases and technologies which can cascade circular business opportunities.
- 2 pages per case with the following outline
 - Who was the team?
 - What was the vision/goals?
 - What is the local waste recycling context?
 - How did you do it? (your approach)
 - What was done? (activities)
 - What was achieved? (impact)
 - What were the challenges?
 - Next steps
 - City Contact Details
 - Summary
 - Time period
 - Information source



CE HUBS _ MUNICIPALITY DISTRICTS

CE topic	Where ?	What ?
Product reuse & remanufacture	<ul style="list-style-type: none"> Gothenburg, Sweden Berlin, Germany Hjorring, Denmark 	<ul style="list-style-type: none"> CURE Pathfinder project - Centres for Urban Remanufacture Repos project - People, preservation, purpose: Reuse of large household appliances
Sustainable living & construction	<ul style="list-style-type: none"> Trondheim, Norway Malmö, Sweden Maribor, Slovenia 	<ul style="list-style-type: none"> Experimental housing at Svarlamon Sege Park - Urban district for circular living CINDERELA - Resource efficient construction sector
Waste systems	<ul style="list-style-type: none"> Maribor, Slovenia Trento, Italy 	<ul style="list-style-type: none"> Sorting plant for mixed municipal waste Greencycle: introducing a Csystem to Alpine Space to achieve low carbon targets
Engagement hubs and urban labs	<ul style="list-style-type: none"> Trondheim, Norway Copenhagen, Denmark Helsinki, Finland Utrecht, Netherlands 	<ul style="list-style-type: none"> City libraries as platforms for repair, exchange and lend Circular South Harbour Smart Kalasatama Werkspoorkwartier: Creative circular manufacturing
Food and agriculture	<ul style="list-style-type: none"> Aarhus, Denmark Maribor, Slovenia 	<ul style="list-style-type: none"> From Grounds to Gourmet Urban soil 4 food



Findings

- City-led physical location where to learn and work with circular economy concept under the mantra "Reduce-Reuse-Recycle-Rethink" is an effective and low cost way to accelerating the transition to the CE and to scale out good ideas and test new innovative initiatives.
- Through engaging the general public, city administrations can expect to become more up-to-date with regards to the newest circular knowledge and ideas available.
- Most of the cases presented have created a social media outreach and created an ecosystem which thrives and accelerate to new ideas and create knowledge sharing.
- In the longer term, City-led CE learning centre can help facilitate a number of co-benefits including social engagement, profit, learning, inspiration and just make the circular transition an every-persons business.
- ➔ Through the provision of resources, material, data and professional feedback, cities can encourage and support individuals and start-ups whilst reaping the benefits of improved circular solutions tailor made for use in their situation.
- ➔ By reaching out to the community groups and entrepreneurs, the city administration can find itself more closely engaged with its public, promoting participation in city issues and increasing awareness of the climate and sustainability in general.
- ➔ Through adopting the Open Innovation concept and taking the lead in sustainable innovation processes, cities will be able to brand themselves as front-runners in the race to achieve their climate goals on the international stage.



Barriers to successful implement circular learning centre

- Implementing circular learning centres into the operations of a city isn't necessarily straightforward.
- Regulatory barriers should not hinder that community, entrepreneurs and the general public get actively involved in the circular transition and use available city districts as testbeds to fast track a circular city transition
- Barriers such as the fragmented administrative landscape within the city municipal boundary can also be difficult to overcome.
- Certain solution providers find that the time frames that administrative municipalities commonly work to can be problematic with their own.
- It is apparent that a large proportion of the barriers to create more circular economy learning centres arise due a city's lack of resource capacity and or mismatch in skill set.
- In many cases, it is useful for progressive and ambitious administrations to enlist the help of experienced facilitators who can assist with the planning and organisation of the learning centres.



Key learnings

Stakeholders need to be kept motivated.

- CE learning centres, by definition, involves large numbers of actors, stakeholders and collaborators.
- Circular district can be difficult to manage, particularly when motivation to engage with the process is driven by the desire to create differing forms of value.

A varied stakeholder group often produces the best results - “multi-actor” platform.

- CE learning centres is often more effective when it includes actors from different backgrounds - i.e. start-ups, SMEs, corporates, universities, the public sector etc.
- Access and exposure to the different knowledge, experiences and thoughts typically held by different types of individuals and organisations ensures that certain new, more alternative or up-to-date thinking, applicable to the desired solution(s) aren't missed.

Match-makers help, a lot.

- Successful implementation processes in the CE learning centres benefit from supporting actors who connect and match stakeholders together, build bridges between them and act as brokers between the different sub-divisions of the collaboration.
- These match-making nodes are essentially acting as civic accelerators, building bridges between players.
- Match-makers can become key in keeping the overall process in motion.



EIT Climate-KIC - another report

Municipality-led circular economy case studies

- Published in collaboration with C40, this first project publication provides a unique overview of concrete circular economy initiatives from cities through 40 examples from around the world. It showcases how cities today are viably putting the circular economy concept into practice to realise systemic change on a district and city level, which can then be scaled-up, not only regionally, but internationally as well.

EIT Climate-KIC: Municipality-led circular economy case studies. In partnership with the EIT Climate-KIC Circular Cities Project. 2018.



CE HUBS _ LEARNING CENTRES

City-wide circular strategy

Amsterdam, The Netherlands Amsterdam's circular economy roadmap and projects in the construction value chain	14
Brussels, Belgium Regional program for a circular economy: 'Be Circular'	18
Cape Town, South Africa Industrial symbiosis program	22
Copenhagen, Denmark Circular Copenhagen – resource and waste management plan	24
Glasgow, Scotland Inspiring businesses to innovate and become future-proof	26
Gothenburg, Sweden Circular Gothenburg	30
Helsinki, Finland The Kalasatama district's urban laboratory	32
Kristiansand, Norway Green business idea competition and growth support	36
Ljubljana, Slovenia A national roadmap leading to specific city-level actions	38
Maribor, Slovenia Circular economy strategy working closely with the public utility companies	40
Paris, France City-wide circular economy strategy	44

Phoenix, USA Redefining waste through a Resource Innovation Campus	46
Samsø, Denmark Circular economy for the whole island	50
Seoul, South Korea Sharing City Seoul, aiming to engage all 10 million citizens	54
Tel Aviv, Israel Commencing the journey for the City to reach 10 circular projects	58

Urban refurbishment

Houston, USA Re-use warehouse for construction materials	64
Paris, France 3D mapping project supporting policies for low carbon buildings	66
Sydney, Australia Co-creating industry guidelines for circular office refurbishments	68
Vienna, Austria Supporting dismantling services for large industrial buildings	72

Procurement

Berlin, Germany Ecological criteria embedded in the public procurement process	76
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Helsinki, Finland Coordinating the reuse of excavated land mass in construction projects across the city	78
Paris, France Transnational responsible procurement working group	80
Tokyo, Japan Circular initiatives within the Tokyo 2020 Olympic and Paralympic Games' Sustainability Plan	82
Toronto, Canada Journey towards circular economy procurement	86

Utilities

Aguascalientes, Mexico Water fund to support the City's water shortage	92
Arras, France Heat recovered from waste-water treatment for a public aquatics centre	94
Basel, Switzerland Gold award winner for Basel's progress towards a low-energy city	96
Helsinki, Finland The largest heat-pump plant in the world to produce heating and cooling	98
Lille, France Biointensive micro-farming in the Concorde district	100
Malmö, Sweden Industrial symbiosis in the harbour area	102

Pécs, Hungary One of the largest generators of energy from biomass in Europe	104
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Civic waste

Austin, USA Online marketplace for re-using materials	108
Eskilstuna, Sweden The world's first circular shopping centre	110
Kristiansand, Norway Citizen and business collaboration centre	112
Kristiansand, Norway Secondhand store led by the municipal waste company	114
New York, USA Donation online market place and supporting initiatives	116
Paris, France Local production, repair and re-use initiatives	118
Quezon, Philippines Regulations on the use of plastic bags to help curb ocean plastics	120
Stockholm, Sweden The world's first large-scale 'biochar' urban carbon sink	124
Vienna, Austria Initial government support helped to create Austria's largest independent repair and service centre for electrical goods	128



Further example

CRCLR - Hub for Circular Economy in Berlin

- The CRCLR House is a Berlin based center for CE practices.
- CRCLR is a Think- and Do Tank and stands for “circular”.
- The CRCLR mission is to catalyse the transition towards a CE.

“The CRCLR team has created a unique, open space to explore creative community-based solutions to systemic global problems. It’s the place to be for all things circular in Berlin.” Joe Iles, Ellen MacArthur Foundation.

<https://crclr.org/about/about-crclr>



Case MARIBOR, Slovenia

- Already mentioned in CITIES CLASSIFICATION _ emerging economy / pioneering city _ The city of Maribor in Slovenia is redirecting its operations, the performance of its businesses and citizens, toward the efficient resource management model.
- 3 times mentioned in the EIT Climate-KIC report

CE topic	Where ?	What ?
Sustainable living & construction	▪ Maribor, Slovenia	▪ CINDERELA - Resource efficient construction sector
Waste systems	▪ Maribor, Slovenia	▪ Sorting plant for mixed municipal waste
Food and agriculture	▪ Maribor, Slovenia	▪ Urban soil 4 food



Webinar presentation

Further Reading:

[WCYCLE Institute Maribor: Strategy for the Transition to Circular Economy in the Municipality of Maribor. Maribor, July 2018.](#)

As well as on the next slides:

[WCYCLE Institute -](#)

Re-thinking the business model of Maribor

<https://www.circularcityfundingguide.eu/case-studies/wcycle-institute-re-thinking-the-business-model-of-maribor/>



WCYCLE Institute - Re-thinking the business model of Maribor

The City of Maribor recognized at an early stage the potential of the CE as an approach to regional development. However, the Slovenian city acknowledged that it did not have enough implementation capacity to fulfil its full circular potential and therefore established the WCYCLE Institute. The institute is established as a platform for the local utility companies to re-think their business models. The institute has become a good platform to discuss and initiate new CE projects for different stakeholders in the city and the region. The focus of the institute is long-term, in line with the city's well-developed strategy for the transition to a CE. Implementation of projects, however, is already well on its way.

WCYCLE

The WCYCLE Institute brings together the following five local utility companies:

- Snaga: public waste management company
- Energetika Maribor: public energy company
- Nigrad: public company for infrastructural works
- Mariborski vodovod: public water company
- Marprom: public company for urban transportation

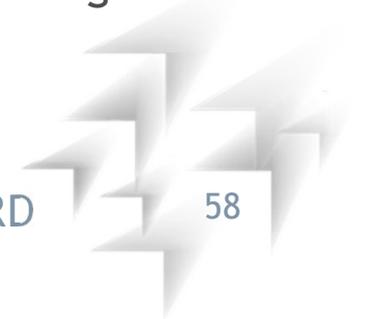


WCYCLE Institute - Re-thinking the business model of Maribor

Together, the five companies are responsible for the management of a majority of local material streams. The institute has identified twenty projects to improve the circularity of these streams and the related business case. To foster collaboration between partner organisations, it was agreed that initiated projects have participation from and should benefit at least two of the five utility companies.

Implementation of projects

The preparatory phase of the institute, around 2016, coincided with the development and start of a project for the Interreg Alpine Space Programme called Greencycle . This project was initiated to define a strategy for the circular transition in Maribor, with the central idea that CE provides a holistic approach for the implementation of low-carbon strategies. In 2018, the Strategy for the Transition to CE was finalised and it now provides a strong basis for the implementation of new projects.



WCYCLE Institute - Re-thinking the business model of Maribor

The Institute identified, in this respect, the following initiatives to improve the circularity of local resource streams:

- **Automated waste sorting plant:** the construction of the plant started in 2017. The plant has a capacity to process almost 40.000 tonnes per year of mixed municipal waste. The ambition of the plant is to eventually extract 77% of the waste inputs as materials for recycling and 9% for energy recovery, leaving only a small share for landfill disposal.
- **Urban Soil 4 Food (Urban Innovative Actions):** in this project, organic waste is composted and mixed with soil from construction works in the city to create a soil that can be used for food production, in parks, and for construction.
- **Cinderela project (Horizon 2020):** in 2018, Maribor started collaborating with twelve partners from seven countries in this project that aims to create CE business models to achieve more sustainable urban infrastructure.
- **Winpol Interreg Europe:** in this project, the city collaborates with eight other European cities with a common focus to implement new waste innovation technologies. In the project, the City of Maribor optimised its waste collection transport routes and introduced a Re-use market.



WCYCLE Institute - Re-thinking the business model of Maribor

Lessons learned

Based on the achievements of WCYCLE and the City of Maribor, several lessons can be learned:

- Establishing a platform involving local actors can be an effective way to foster collaboration in your city or region. The WCYCLE Institute's experience shows that this collaborative approach can help implement projects aiming at closing material loops.
- When looking for ways to make a city more circular, it can be helpful to use the circular perspective to assess current costs with a view to identify inefficiencies and cost-saving solutions. In Maribor, the absence of a bio-waste treatment facility required waste to be transferred to an external facility for treatment, with associated high transport and treatment costs. By building a composting facility in the city, the bio-waste could be turned into compost locally at a lower cost, with a revenue stream from the sale of compost.
- Grants were used to fund the pilot activities of the City of Maribor and the WCYCLE Institute. Co-funding requirements and the short-term character of these funding mechanisms can often limit their applicability for scale-ups and larger projects.

IMPACT HUB

Entrepreneurial Networks as Drivers for Positive Change

«We are one of the world's largest networks focused on building entrepreneurial communities for impact at scale – home to the innovators, the dreamers and the entrepreneurs who are creating tangible solutions to the world's most pressing issues.»

- IMPACT HUBs offer:
 - Community and Workspace
 - Startup Support
 - Programs and Events





16,500 members

More than half of our members are founders or co-founders

Female Other Male

Reach overall: **20MIL**
Reach customers and beneficiaries: **7MIL**

THE IMPACT of our Members in 2018

Community is at the core of any entrepreneurial network. Our Impact Hub community members fuel innovation, foster education and create employment opportunities through the vibrant solutions they start-up, grow, and scale.

1,800 new ventures created
10,000+ new ventures since 2012
6,000 net new jobs created
29,000+ since 2012

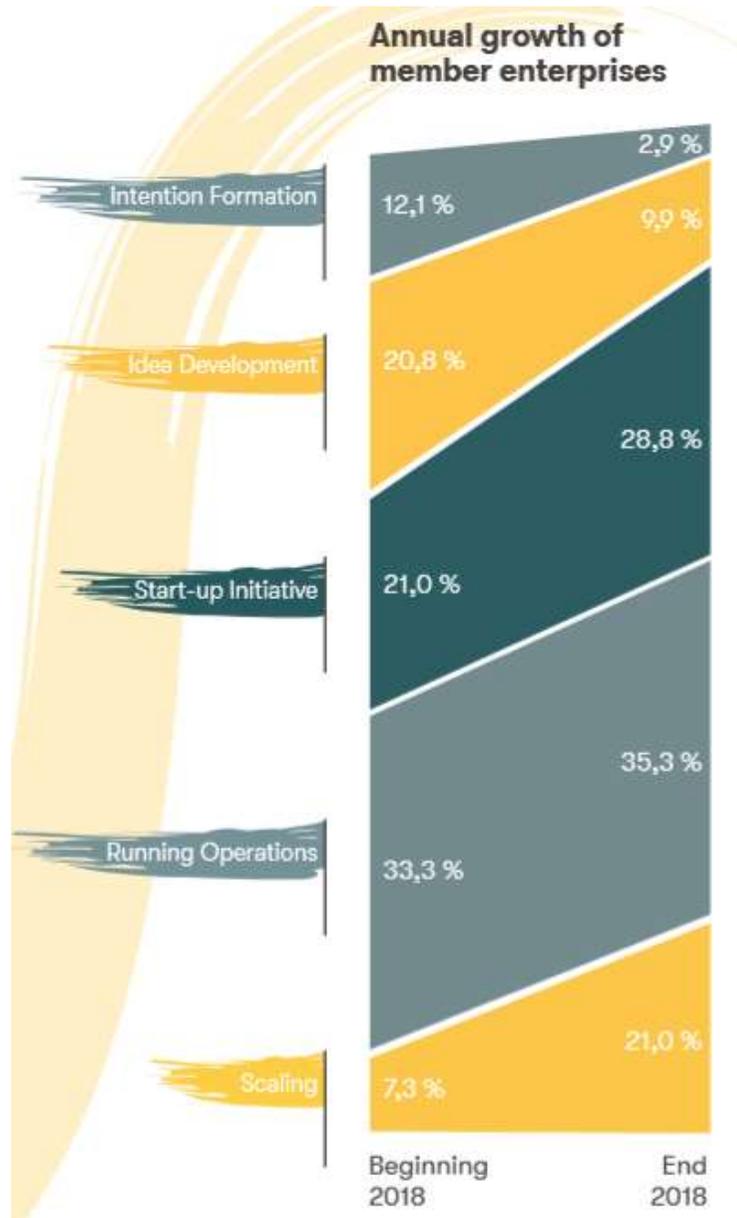
65% of members achieved double digit revenue growth
78% of members increased the number of products and services offered

60% of members are putting "impact-first"

Members attribute **30%** of their professional success to Impact Hub

Blended value orientation





Locally Rooted, Globally Connected.

A network of committed entrepreneurial communities can truly create positive change at scale. Diverse and inclusive, it fosters collaboration by bringing together different actors that would otherwise not meet and exchange. Our network is locally rooted to adapt to the regional context and globally connected to replicate and learn from one another, while creating a robust entrepreneurial support infrastructure.

Africa & Middle East	Europe	Munich	Metropolitan Area ²
Accra	Amsterdam	Odessa	Ottawa
Bamako	Athens	Ostrava	Pittsburgh ¹
Bujumbura	Barcelona ¹	Prague	Salt Lake City
Dakar	Bari	Reggio Emilia	San Francisco
Dar es Salaam ²	Basel	Rome	Seattle
Dubai	Belgrade	Ruhr	
Harare	Bergen	Stockholm	
Johannesburg	Berlin	Stuttgart ¹	Latin America & Caribbean
Khartoum	Bern	Syracuse	Antigua
Kigali	Bratislava	Trento	Belo Horizonte
Lagos	Brno	Turin	Bogotá
Lusaka	Bucharest	Vienna	Brasilia
	Budapest	Vigo	Buenos Aires ²
Asia Pacific	Donostia	Zagreb	Caracas
Almaty	Dresden	Zaragoza	Cunibita
Jakarta	Florence	Zurich	Florianopolis
Kuala Lumpur	Geneva		Managua
Kyoto	Hamburg ¹	North America	Manaus
Manila	Inverness	Austin	Medellin
Phnom Penh	Islington	Baltimore	Mexico City
Shanghai	Istanbul	Boston	Monterrey
Taipei	King's Cross	Honolulu	Port-au-Prince
Taipei	Leipzig ²	Houston	Recife
Tokyo	Lisbon	Minneapolis	San José
Yangon	Madrid	Saint Paul	San Salvador
Yerevan	Málaga ²	Montreal	Sao Paulo
Waikato ²	Milan	New York	Tegucigalpa

IMPACT HUB Report 2019: P7.



TAILORED Support Programs

Our understanding of the different needs of social entrepreneurs throughout the various stages of their entrepreneurial journey, combined with our broad network of talent, tools, partners and infrastructure, ensures that we can tailor the support we offer. Subsequently, we ran **over 100** successful entrepreneurial support programs in 2018, focused on business and entrepreneurial skills as well as networking opportunities. The results speak for themselves, with **program participants attributing 40% of their professional success to Impact Hub** and feeling supported by us to:




100+
entrepreneurial support programs

100+
collaborative innovation programs focused on SDGs and ecosystem development



The environmental business, Ioniqa, attracted a €12 investment and a partnership with Unilever after taking part in the Plastics Free Ocean Accelerator run by Impact Hub Amsterdam and WWF Netherlands. Their platform technology upcycles coloured plastics back to virgin materials, for its reuse as food-safe packaging, and investment will go towards the launch of their upcycling process for the infinite use of PET plastic materials. They are also developing applications for other materials, such as textiles and carpets and aim for universal adoption of innovative technology via www.ioniqa.com



PARTNERING for Impact

There are ample opportunities to create and implement solutions to the world's most pressing issues. We are matching these opportunities with programs to achieve tangible progress towards the SDGs.

Join us to scale our collective impact and drive positive change!

Learning & Education

The global SDGs have provided a common language for the issues that demand our urgent attention and action. We need to increase awareness and share stories that inspire and engage more people in every corner of the world, especially focusing on the youth who will shape our future. We also need to explore and share lessons learned,



best practices and trends that can help lead to solutions driving systemic change.

Startup Support from Ideation to Scale

Startups have proven to be dynamic and powerful vehicles for solutions with truly transformative impact. Entrepreneurs need support throughout their challenging journeys; as ideas form and solutions develop, but also as they fail, pivot, and grow. Even the most effective startups with the best solutions need support to transform themselves into a scalable operation.



Access to market and financing are key to this transformation, particularly when considering vulnerable entrepreneurs in markets that demand a high level of resilience.

Corporate Innovation

Established institutions and corporations are facing an urgent need to innovate in a world that is faster and more interconnected than ever before. Entrepreneurs have become an important source of inspiration and learning for leading organizations, when it comes to how they can think in new ways, design solutions and products, and operate in constantly changing environments. Impact Hub immerses institutional partners in the entrepreneurial ecosystem,



giving them access to hundreds of high potential enterprises and leading edge innovations, as well as sustainability methods, tools, and experts.

Convening

Solving the world's most complex problems requires more than the brilliance of a few – it takes the collaboration of many. Our programs bring bottom-up innovators together with institutional players; invite new perspectives from scientists, artists, activists, and youth; and include those who are the most affected, but whose voices are often not heard. We use formats and methodologies



that get the best out of such diversity and drive meaningful action.

IMPACT AT SCALE

Ecosystem Development

Impact cannot happen in isolation; it takes shape



in interdependent, lively ecosystems comprised of diverse actors, inspiring interactions, enabling policies, and robust resources. Impact Hub provides collaborative environments where many of these elements come together. Even in some of the most challenged parts of the world, we provide a safe space for the foundation of ecosystems where minimal infrastructural support already exists.

Impact Hub is proud to have collaborated with leading organizations from a variety of sectors to amplify our impact. Here are some of our strategic partners:



IMPACT in Action

Here are a few examples taken from the 200+ programs Impact Hubs ran in the past year.

My life in my hands

Run by Impact Hub Caracas, 'My Life in My Hands' tackles early pregnancy, violence and drug use among youth: crucial topics in the country with the highest rate of teen pregnancy in Latin America. Through a holistic range of methodologies, it has improved the quality of life of 280 children in slums, providing 7,500+ meals, and teaching them how to lead a worthy life.

Startarium

Impact Hub Bucharest and ING Romania created Startarium, a program supporting entrepreneurs by using mentorship, online courses and networking in three areas: learning, testing and financing. With a total of 35,000+ community members, 60+ mentors, 400 learning materials and 3,500+ business ideas, Startarium is unique in combining the mechanisms of incubators and accelerators to assist entrepreneurs.

LatAM Scaling Program

With the support of the Argidius Foundation and EU's AL-INVEST program, Impact Hubs in Brazil, Colombia, Costa Rica and Mexico identified 60 enterprises with great potential to increase their social, environmental and economic impact. They were supported in preparing to scale their operations and given invaluable assistance in attracting investments as well as entering new international markets.

Socialchallenges.eu

EBN and Impact Hub created a pioneering social-challenges platform, which supported almost 50 cities and regions in defining social and environmental challenges, from sustainable food to urban mobility. Some 500 social innovators and SMEs (small and medium-sized enterprises) pitched their existing solutions. In addition, socialchallenges.eu gave the 80+ most promising entries 30,000€ each to test their solutions in the new markets.

Carrefour Impact

In an attempt to improve eating habits, Impact Hub Taipei and Carrefour Taiwan Foundation opened Carrefour Impact, the hypermarket's first healthy-living concept store. The store sells a range of purpose-driven goods, while also encouraging healthy eating and sustainable living through in-store education. It is also fast growing into an event space, inviting local companies and individuals to pitch their ideas for talks and workshops.

Circular Economy Transition

Circular Economy Transition is a pioneer initiative from all 5 Swiss Impact Hubs that aims to accelerate the transition of Switzerland to a circular economy by fostering collaboration along the value chain. Designed around four pillars of action to support and inspire different key actors and sectors, 30 Swiss corporate partners will be supported on their journey to circularity by 2021.

BEYOND (un)employment

Beyond (un)employment is a regional convening program supported by Robert Bosch Stiftung that developed and prototyped 20 citizen-led solutions to local unemployment challenges, ranging from skillbuilding for youth to advocacy for the elderly. 12 solutions, each developed by key actors in each market representing various sectors, were successfully implemented and will continue operations - solving issues from the bottom up, one step at a time.

MedUP!

MedUPI is a project funded by the European Commission and led by Oxfam Italy in consortium with Impact Hub, aiming to drive job creation and growth by promoting social entrepreneurship in the Middle East and Africa. MedUPI provides financial and technical support to 100 social enterprises, reinforces 60 social entrepreneurship support organizations through capacity building and networking activities, and promotes national and international policy and advocacy initiatives and dialogue.

Global Social Innovation Festival

Impact Hub Florianópolis hosted 1,000+ participants at the Global Social Innovation Festival, a day of knowledge exchange between impact entrepreneurs, social innovators and partners. The day celebrated diversity in Brazilian culture, with arts performances, 30+ workshops and 30+ speakers from public servants, indigenous leaders and even favela makers, each giving their unique perspective on addressing key global challenges.

Resilient Entrepreneurs Program

Impact Hub and Inter-American Development Bank partnered to strengthen the entrepreneurial ecosystem in Central America, choosing the challenging markets of El Salvador, Honduras and Nicaragua. The partnership created thriving communities and ran incubation programs in each country. With 100+ entrepreneurs supported, they are paving the way for multiple new communities and programs to promote and scale impact in the region.



CONNECT

- everybody can ...
 - join the network - Sharing the Knowledge & Community to connect with Like-Minded-Partners
 - become a member - Building the Infrastructure for Effective Trans-Local Entrepreneurial Support
 - partner with IMPACT HUB - Providing Robust Insights to Improve Impact Strategies in Business & Society

- You can also [open an Impact Hub](#) !!!



C-VoUCHER

Circularize ValUe CHains across European Regional Innovation Strategies

Project information

- HORIZON 2020
- Grant agreement ID: 777773
- Start date: 1 April 2018 - end date 31 March 2021

Objective

C-VoUCHER aims to develop new circular (cradle to cradle) value chains, disrupting traditional linear (cradle to waste) business models by means of cross-fertilization with Design Thinking experts and Circular Disruptors.

<https://cordis.europa.eu/project/id/777773>



Regional Innovation Hubs (RIHs)

Regional agencies specializing in innovation and support to SMEs and communities

6 RIHs plus a cluster and an RTO identified sectoral challenges, cross-sectoral challenges plus, to some degree, relations to the Regional Smart Specialization Strategies:

- The Swedish Agency for Economic and Regional Growth - Sweden
- Agencja Rozwoju Mazowska S.A. - Poland
- Vejle Kommune - Denmark
- Lifestyle and Design Cluster - Denmark
- Systematic - France
- Agentia de Dezvoltare Regionala Nord-Vest - Romania
- Axengia Galega de Innovación - Spain
- Force Technology - Denmark, RTO



Objective

C-VoUCHER aims at generating new cross-sectoral and cross-border value chains with a CE approach, by combining industrial value chains with enabling Technologies (Digital, Hybrid & Engineering), through design thinking concepts.



Circularity Open Space

Previous to those programs, C-VoUCHER will create an open space with:

- A Circularity Designers-in-Residence (DiRs) Pool to help SMEs design their new solutions.
- A Disruptors Catalogue with technologies ready to use.
- A network of Regional Innovation Hubs (Circularity RIHs).
- A Circularity Challenges Catalogue highlighting key topics for the open calls.

Circularity Program

This 9 months program will help Circularity SMEs reach "Circularity Solutions". It offers:

- Support services from a Designer-in-Residence (DiR) and business mentors to plan a Circular Solution Predefinition, and
- Innovation vouchers to interact with disruptors for the take up of "enabling technologies" in the frame of Circular Economy Building Blocks.

Up to 24 Classic SMEs will be selected through 2 Open Calls to take part in a previous Prototype-athon, and the best 12 best will be invited to the Circularity Program to create new solutions.

To see indicative dates go to the **Open Calls section**.

Circularity Value Replication Program

This 3 months program aims at Adopter SMEs willing to incorporate or get inspired by the Circularity Solutions developed. It offers designers in residence professional services to define their own road map and incorporate those solutions in their processes (Feasibility Plan).

42 adopter SMEs that will take part in the program will be selected through 2 Open Calls.



Community

Bring your CE ideas on!

«Under the frame of C-VoUCHER project, we have created a community that integrates C-VoUCHER Marketplace and gathers the main stakeholders of the European circular economy ecosystem:

- SMEs
- Design Thinking experts
- Disruptors
- Adopters SMEs
- Investors
- Policy Makers



C-Voucher

HOME PROGRAMME OPEN CALLS CIRCULARITY MARKETPLACE NEWS & EVENTS COMMUNITY JOIN THE COMMUNITY

Home > Circularity Marketplace

CIRCULARITY MARKETPLACE

Welcome to C-VoUCHER Circularity Marketplace!

This is a one-stop shop for any stakeholder interested in the Circular Economy. Find disruptive entities and other innovation actors offering their solutions, circular economy building blocks, enabling technologies and more.

The C-VoUCHER Circularity Open Space is composed by different blocks:

- Disruptors & Enabling technologies Catalogue
- Pool of Designers-in-Residence
- Online Tools
- Circularity Challenges Catalogue



Case Ostwestfalen-Lippe (OWL)



OWL is "at the very top of North Rhine-Westphalia“:

- 5 innovation networks
- more than 600 members from business, science, associations, chambers, business development agencies and representatives of civil society
- activities - range from the optimisation of business and technology processes, knowledge and technology transfer to the initiation and support of cooperations and the development of new, innovative topics and business areas



The innovation networks in OWL

5 innovation networks make a significant contribution to the future viability of the OWL region:

- Energie Impuls OWL,
- InnoZent OWL,
- Food Processing Initiative,
- OWL MASCHINENBAU and
- ZIG - Zentrum für Innovation in der Gesundheitswirtschaft OWL

The innovation networks

- combine their expertise for the benefit of the region and play an important role in making OWL "fit for the future".
- convinced in the ERDF competition 2019 with its regional development project **CirQuality OWL** which focusses on the potential of circular value creation and is dealing with a broad-based capacity building.



CirQuality OWL - a production site closes loops

- Project partners:
 - 5 innovation networks
 - VDI OWL (Association of German Engineers)
 - university of applied sciences Bielefeld
- Project focus:
 - on the potentials arising from circular value creation, i.e. products, buildings, components or materials are designed from the beginning to be used in a continuous cycle without ending up in landfills or downcycling
- Project goal:
 - to develop solutions which qualify the companies at the OWL production site and the necessary environment for the growing CE markets.
 - The entire innovation ecosystem OWL is to be used and optimized in order to design CE-based product ideas for the next product generations and to realize them with new business models.



CirQuality OWL - a production site closes loops

Roles of the project partners

- 5 innovation networks ensure targeted adaptation in specific economic sectors.
- University analyses and optimises internal company processes and systematises external factors for the purpose of integration into the respective CE development process
- VDI the entire spectrum of the engineering world is involved in the constructive discussion and the way is paved for the inclusion of important impulses in future standards as well as in engineering education



CirQuality OWL - fields of action



- Discover CE
- Regional capacity building
- Qualifying actors
- strengthening regional identity
- Providing strategic support to actors
- transfer results



CE HUBs _ cases / examples

Industrial Symbiosis

a) Definition

b) Examples

FISSAC Project

Paperchain Project

Kalundborg Symbiosis



Definition

Industrial symbiosis is a form of brokering to bring companies together in innovative collaborations, finding ways to use the waste from one as raw materials for another. The word “symbiosis” is usually associated with relationships in nature, where two or more species exchange materials, energy, or information in a mutually beneficial manner.

Local or wider co-operation in industrial symbiosis can reduce the need for virgin raw material and waste disposal, thereby closing the material loop - a fundamental feature of the circular economy and a driver for green growth and eco-innovative solutions. It can also reduce emissions and energy use and create new revenue streams.

However, in order to make industrial symbiosis a wide-spread commercial reality, more needs to be done to manage the flow of waste material from different sectors and industries, and there is still much to understand about:

- environmental and societal impacts
- harmonization of technologies, processes, policies
- civil society engagement to a circular economy at EU level
- waste resources information
- waste treatment technologies
- business models and coordination between value chain actors



Definition and types

- An approach that engages several organisations across different fields in a process of developing mutually beneficial transactions to reuse waste and by-products.
- Can be implemented in any type of regions or area, depending of the types of resources transacted.
- Depends on governance and policy factors.
- Originates in two ways:
 - As self-organised activity (e.g. Kalundborg, DK)
 - As managed process; 2 types:
 - Facilitated networks
 - Planned networks



Overview

Fostering Industrial Symbiosis for a Sustainable Resource Intensive Industry across the extended Construction Value Chain.



Project information

- HORIZON 2020
- Grant agreement ID: 642154
- Start date: 1 September 2015 - end date 29 February 2020



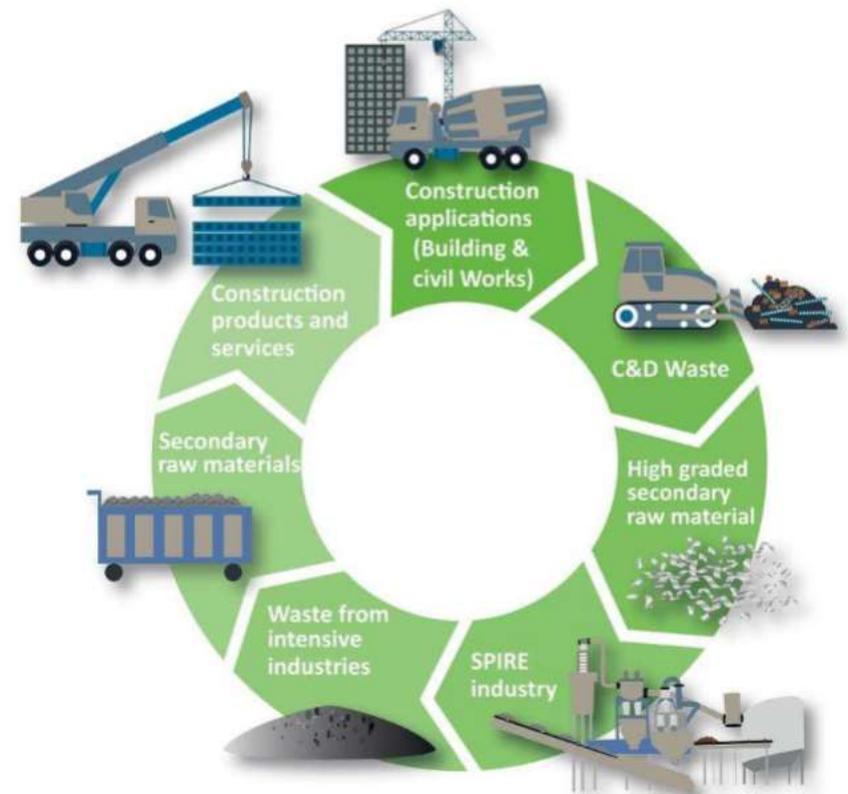
Concept

FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology, and software platform to facilitate information exchange, that can support industrial symbiosis networks and replicate pilot schemes at local and regional levels.

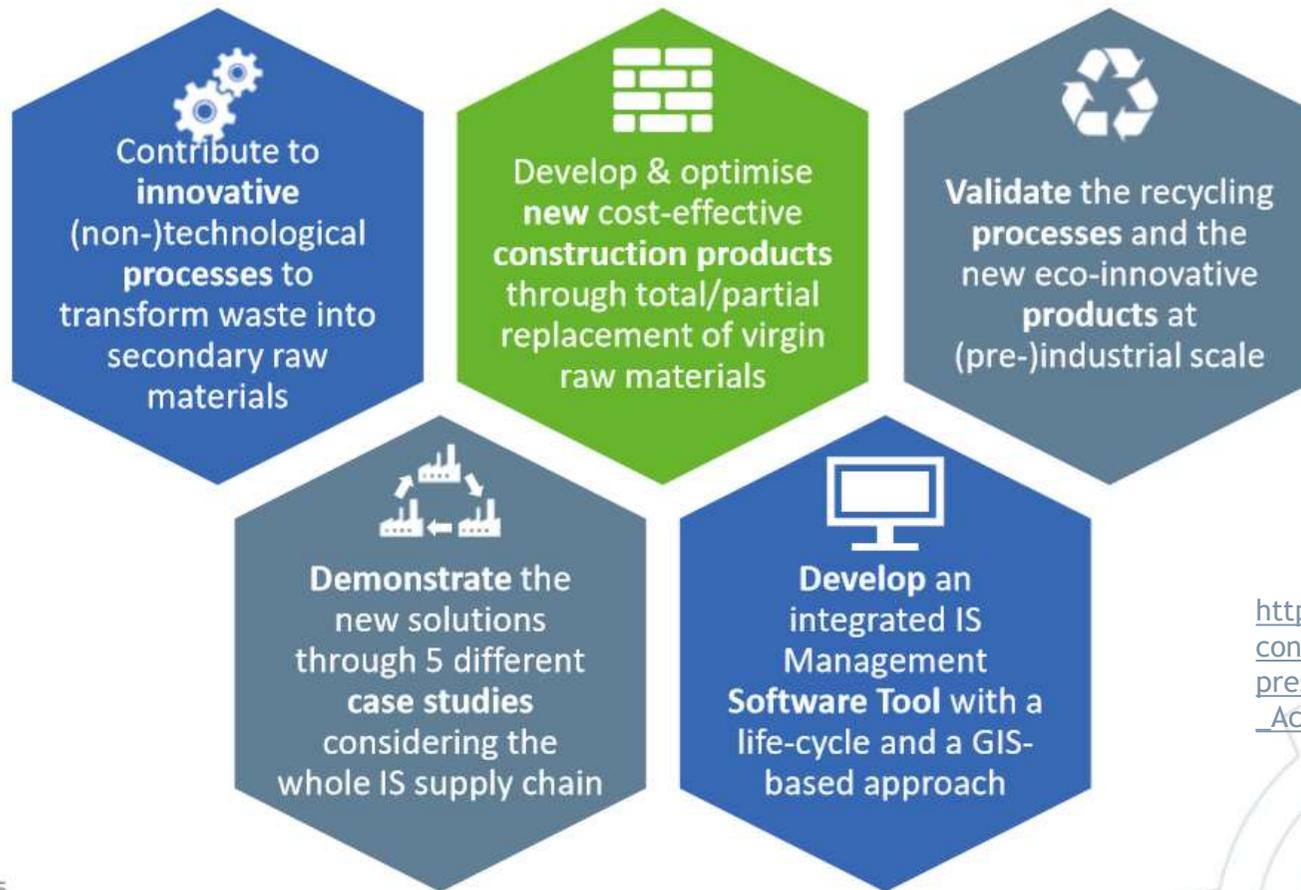
The model will be based on 3 sustainability pillars - environmental, economic, social (taking into consideration stakeholder engagement and impact on society).

The ambition is that the model created can be replicated in other regions and other value chain scenarios.

FISSAC aims to demonstrate the effectiveness of the processes, services, and products at different levels.



Scientific & technical goals



<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-Acciona.pdf>



SW platform

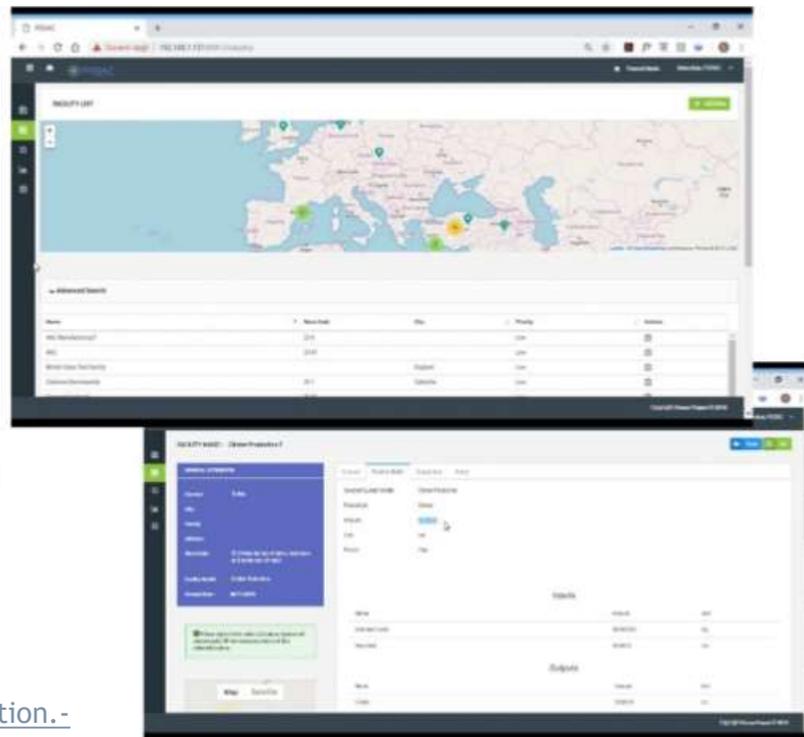
An important objective of the project is the introduction of a model for Industrial Symbiosis. For this, a specific tool is being developed and will be evaluated within the project: the **FISSAC Software Platform**.

It will feature amongst others a Life Cycle based Multiple Factor Analysis, network indicators and GIS based capabilities.

Capabilities

- Life-cycle assessment
- Life-cycle costing
- Material and energy flow analyses
- Multi-objective optimization
- Visualization & Diagrams
- Network analysis through industrial ecology metrics
- Graph and network topologies and industrial system modeling
- Innovative circular economy and industrial symbiosis indicator-based assessment

<http://fissacproject.eu/wp-content/uploads/2020/01/FISSAC-General-presentation.-Final-Conference-2020-Acciona.pdf>



Webinar platform

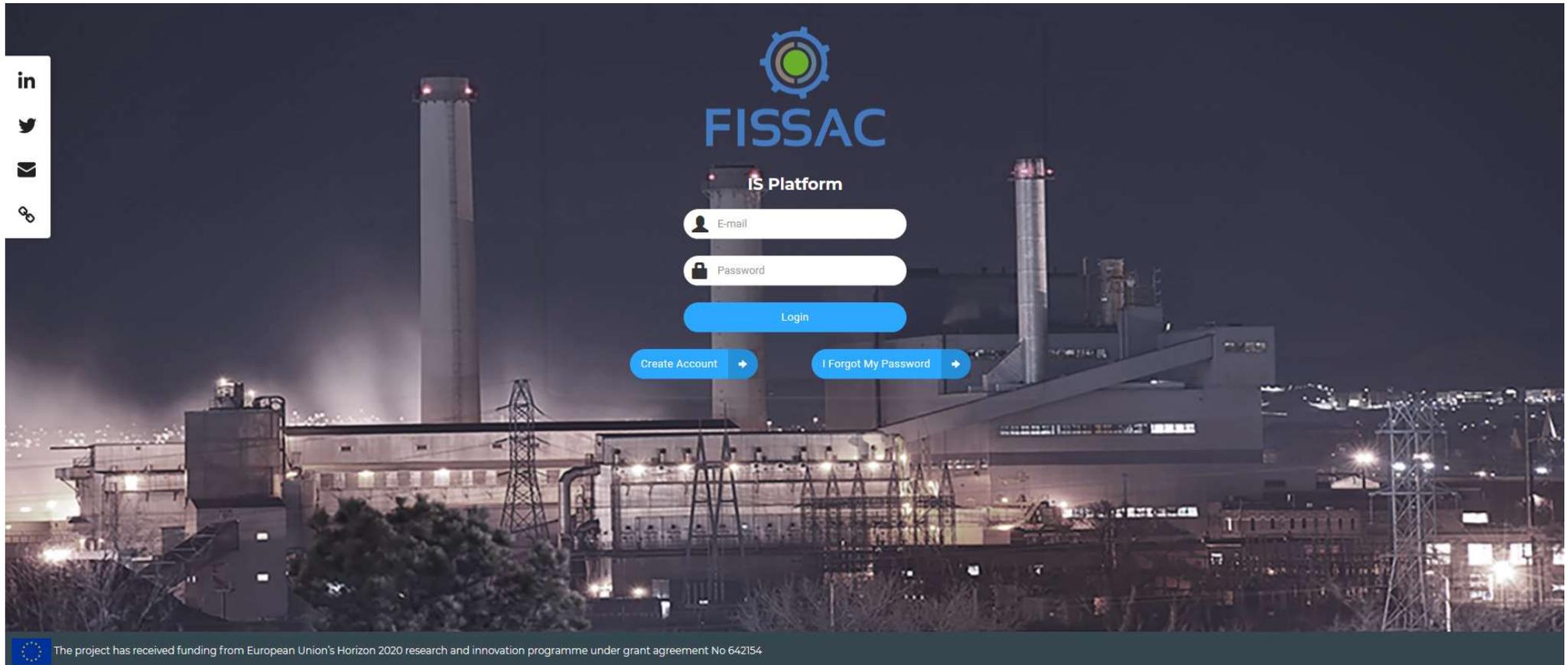


[View the recording !](#)



FISSAC PROJECT - IS PLATFORM

IS platform







Information & objective

Project information

- HORIZON 2020
- Grant agreement ID: 730305
- Start date: 1 June 2017 - end date 31 May 2021

Overall objective

- PAPERCHAIN is to deploy five novel circular economy models centred in the valorisation of the waste streams generated by the PPI as secondary raw material for a number of resource intensive sectors:
 - construction sector,
 - mining sector and
 - chemical industry.
- PAPERCHAIN aims to unlock the potential of a resource efficient model based on industrial symbiosis which will demonstrate the potential of the major non-hazardous waste streams generated by the PPI as valuable secondary raw material.



KALUNDBORG SYMBIOSIS



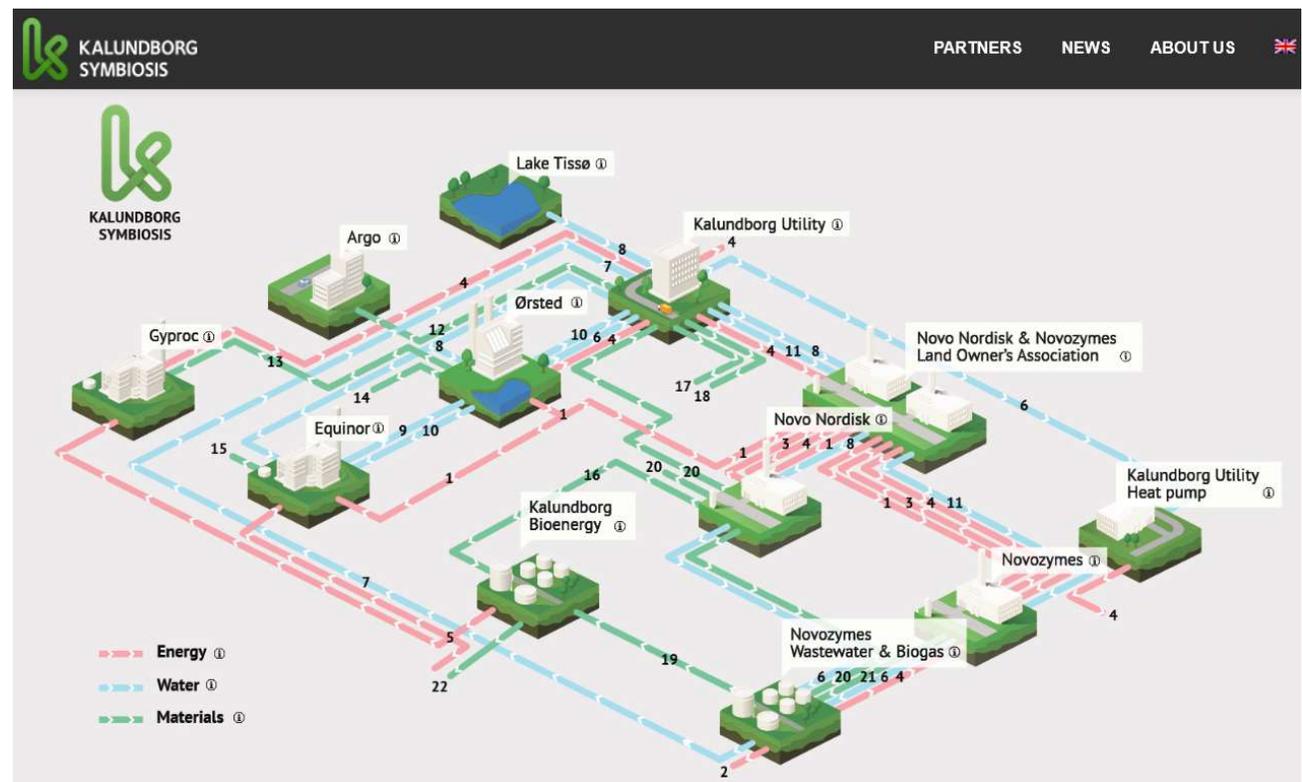
Winner of
WIN-WIN GOTHENBURG SUSTAINABILITY AWARD 2018



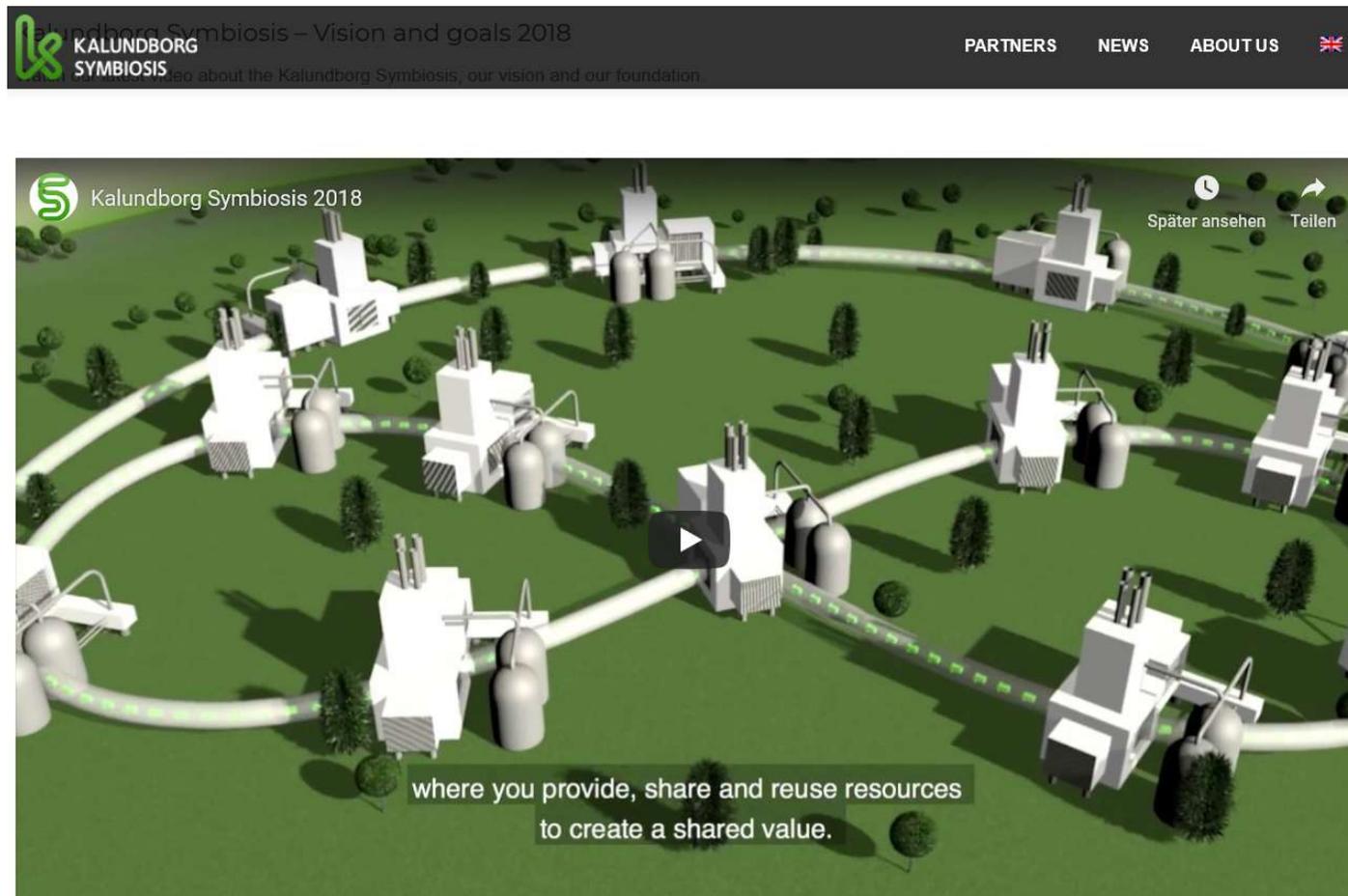
Partnership

The Kalundborg Symbiosis is a partnership between 11 public and private companies in Kalundborg.

Since 1972 Kalundborg has developed the World's first industrial symbiosis with a circular approach to production. The main principle is, that a residue from one company becomes a resource at another, benefiting both the environment and the economy



Watch the video !



CE HUBs - cases / examples

Focus on regional and two smaller national HUBs

a) Regional Hubs

Circular Flanders is the HUB and the inspiration for the Flemish CE (+ webinar)

b) National Hubs

Switzerland - Movement for a CE

Australia - The National CE HUB

more examples (not further elaborated here)

- SITRA, Finland & Kemi Circular and Bioeconomy Center, Lapland (+ webinar)
- Zero Waste Scotland, Scotland



Circular Flanders is the HUB and the inspiration for the Flemish CE

Vision 2050. A long -term strategy for Flanders.

The vision sees Flanders as an inclusive, open, resilient and internationally connected region that creates prosperity and wellbeing for its citizens in a smart, innovative and sustainable manner.

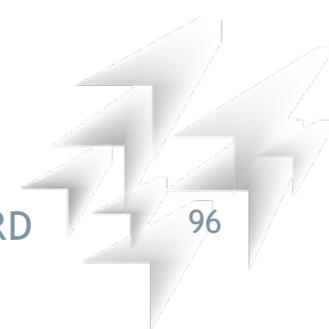
In order to facilitate the vision, the Government of Flanders selected 7 transition priorities:

1. CE
2. Smart living
3. Industry 4.0
4. Lifelong learning and a dynamic professional career
5. Caring and living together in 2050
6. Transport and mobility
7. Energy



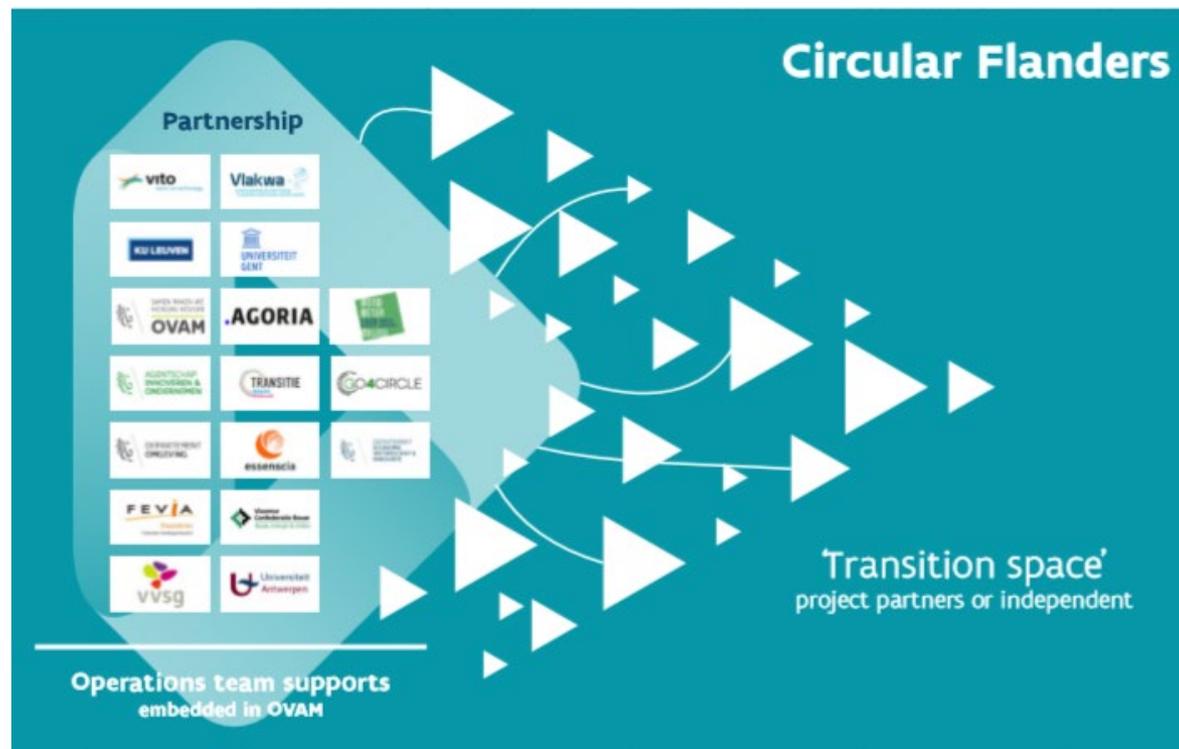
Circular Flanders - issues addresses

- **Demographical trends:** population growth, ageing and rejuvenation of the population, migration.
- **Scientific and technological trends:** the emergence of disruptive and exponential technologies, driven by science and innovation.
- **Ecological trends:** climate change and the burden on natural resources.
- **Economic trends:** disruptions due to technological breakthroughs, shift of the world's economic centre to the East, industrial transformations, new relationships between producers and consumers.
- **Political and administrative trends:** changing geopolitical relationships, transformation of governments and institutions.
- **Social trends:** individualisation and diversity.



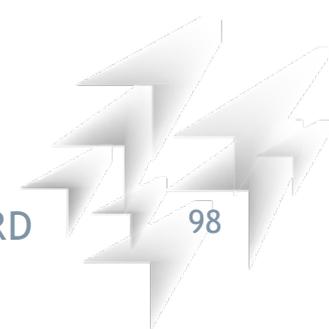
Circular Flanders - a true circular partnership

Partnership of governments, companies, civil society, and the knowledge community that will take action together. 17 organisations build the core - each one has committed to carrying out a specific action:



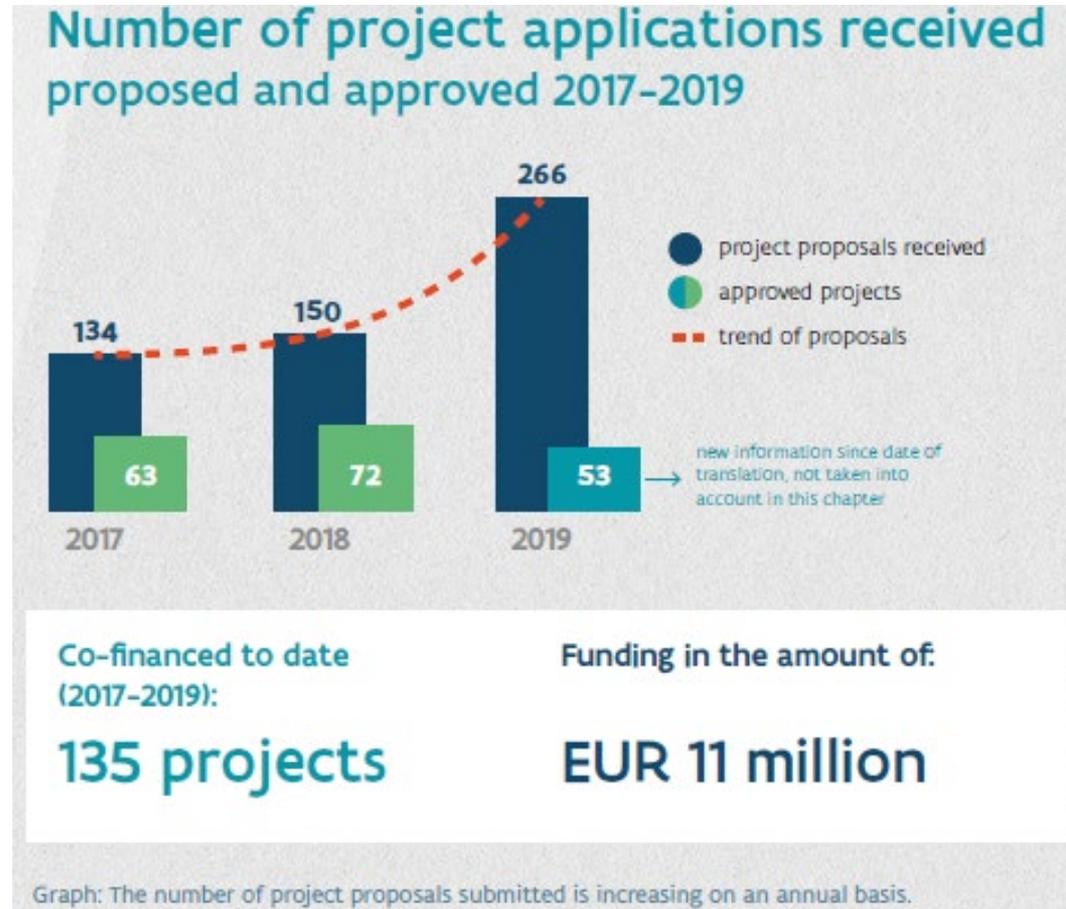
Circular Flanders - 6 core activities

1. **Network & Community** > We connect and co-create.
2. **Knowledge & Education** > We build and share our knowledge.
3. **Innovation** > We enable.
4. **Catalyst** > We make it happen.
5. **Policy** > We support.
6. **Embedding** > We make it grow.

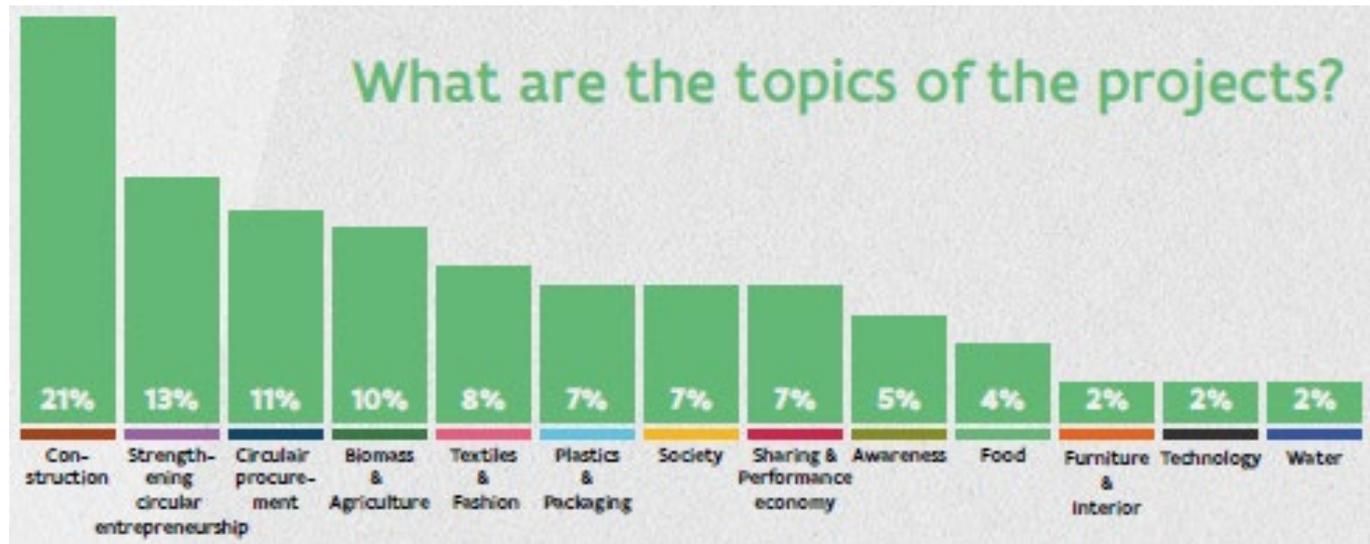
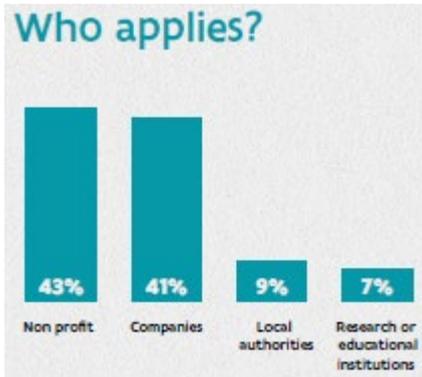


Circular Flanders - Open call - experiments

Financial support
to CE projects
via Open Call



Circular Flanders - Open call - topics



Open Call -
high number &
wide range of
thematic projects



Circular Flanders - Open call - budget

3 categories of projects

1. 'city and entrepreneurship' projects;
 2. 'circular procurement' projects;
 3. revamped '2017 city and entrepreneurship' projects.
- average grant amount is EUR 89,000 (with a max of EUR 100,000)
 - for an average project budget of EUR 136,000.

What's the budget?

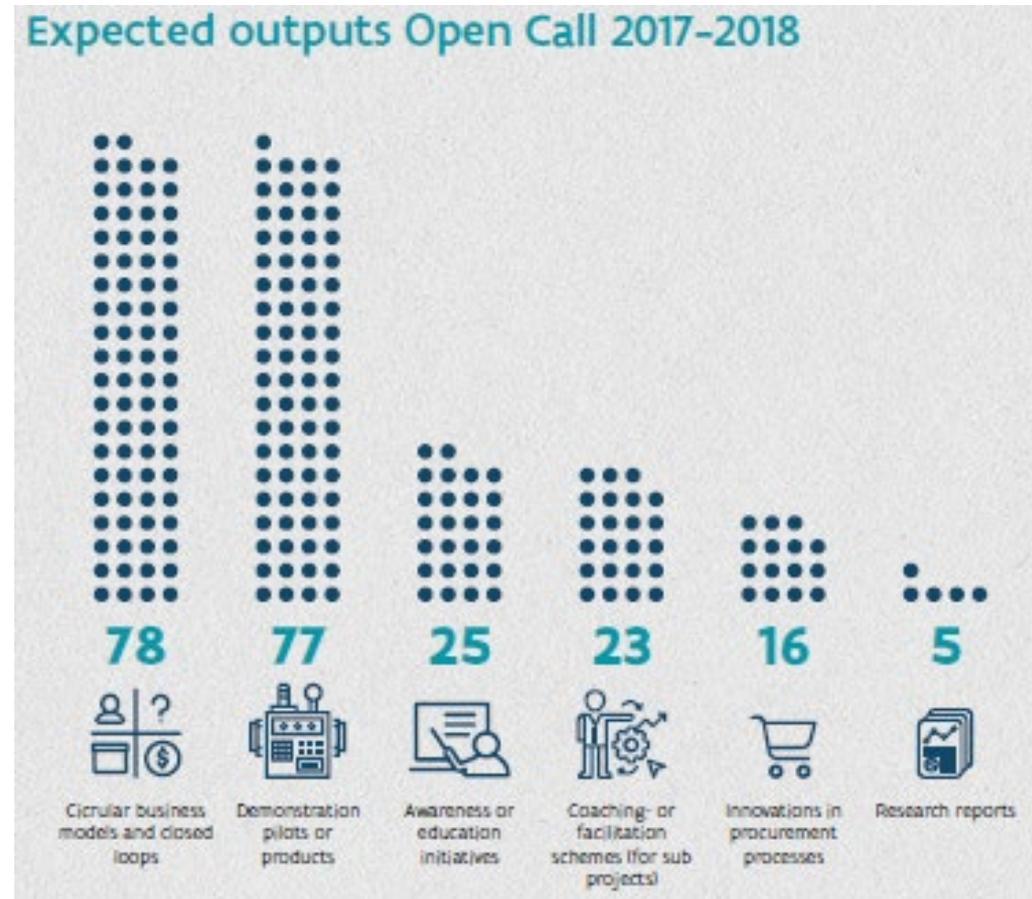
		# projects	budget
2017	city and entrepreneurship	52	4.588.249,31 €
	procurement	11	209.110,00 €
2018	revamped 2017	15	1.455.365,56 €
	city and entrepreneurship	53	4.656.044,38 €
	procurement	4	65.255,00 €
		135	10.974.024,25 €



Circular Flanders - Open call - output

Open Call -
typology of output types:

- circular business models and closed chains
- demonstration plants or products
- awareness-raising or education initiatives
- coaching or facilitation processes
- innovations in the procurement process
- research reports



Circular Flanders - Lessons learned

- Broad societal support helps in identifying relevant circular topics and eventually good projects. Moreover, it increases the likelihood that project results are implemented as planned.
- To improve the quality and diversity of projects, it is important, as a funder, to reflect on previous calls for projects and see how these can be improved. In the case of Circular Flanders, asking more specific and clear questions helped to improve the instrument and the turnout of the calls.
- Letting go of the expectation that all projects have to be successful could lead to more interesting and innovative project proposals being submitted. It should be recognised that also less successful projects can provide important lessons and inspiration.
- Providing subsidies also leads to the optimisation of policy and laws, as they allow for the noticing of practical bottlenecks that would not have been discovered if the subsidies had not been granted.



Webinar presentation

References

Vision 2050. A long-term strategy for Flanders.

- Jan 2019 - <https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders-0> (long version - 104 pages)
- Dec 2019 - <https://www.vlaanderen.be/publicaties/vision-2050-a-long-term-strategy-for-flanders> (short version - 36 pages)
- 2016 - http://financeflanders.be/sites/default/files/atoms/files/Vision_2050_eng.pdf (short version - 24 pages)

Retrospective Report 2017 - 2019

- [Circular Flanders - Retrospective Report 2017 - 2019; an overview of our activities for the CE in Flanders - first period.](#)



CE HUBS _ FLANDERS, BELGIUM

Circular Flanders - Retrospective Report 2017 - 2019; an overview of our activities for the CE in Flanders - first period.

The Circular Flanders Report is an interactive PDF.

On 104 pages an overview of the work carried out during 2017 - 2019 is given.

1 / ABOUT US	5 / OPEN CALL
A. A partnership B. Our approach C. Our partners D. Three pillars	A. CE experiments B. A broad support network C. Funding D. Output(s)
2 / CIRCULAR PROCUREMENT	6 / MARKETING & COMMUNICATION
A. The deal in detail B. The GDCP projects C. Allies D. Timeline E. Tools F. The next step: Procirc	A. Products & channels B. Service point C. In the press
3 / CIRCULAR BUSINESS	7 / INTERNATIONAL
A. Green Deal on Circular Construction B. Developing levers C. Jobs and skills D. Ecodesign	8 / THE CE CENTER
4 / THE CIRCULAR CITY	A. Research and expertise B. 8 research paths C. Publications
A. Public activities B. Urban Agenda C. Smart circular cities D. Circular space(s) E. Circular metabolism F. Productive circular cities	9 / OUR TEAM



Switzerland - Movement for a CE

“In recent years various projects in the field of CE have emerged in Switzerland. A variety of private companies and public organizations pursue the goal of making the Swiss economy more circular with creative solutions and innovative initiatives. It is now important to bring together these numerous activities and actors, to exploit synergies and to give a new boost to the CE in Switzerland.”

Kick-off 04. Feb 2019



Circular Economy Switzerland

A core team of 10 dedicated organizations has joined forces:

- Supported by the MAVA Foundation and the Migros Engagement Fund, the network will act as a catalyst for a new Swiss-wide CE movement with various projects and events.
- Circular Economy Switzerland sees itself as a coordination and exchange platform and is open to further initiatives in the field of circular economy.



The CE Switzerland Charter

- **Character** The Charter is a self-declaration. Those signing show their intention to commit themselves to the CE in Switzerland and are committed to the principles set out in the Charter.
- **Vision** **Switzerland has completed the transition from a linear economy to a circular economy. In this way, the country is contributing to global sustainable development and is strengthening its own position as a location for business.**
- **Mission** Our mission is to promote the CE in Switzerland at all levels. Our movement is the driving force behind the efforts to create a market for CE products and services and to raise awareness of the concept of the CE in the business world and among the general public.

CE Switzerland brings together enthusiastic proponents of the CE from the private sector, civil society, politics and administration and promotes cooperation and knowledge sharing across all industries and fields.



The CE Switzerland Charter

- **general** In a CE, resource consumption, waste, emissions and energy losses are minimised by closing, slowing and narrowing material and energy loops. This is achieved through long-lasting and regenerative design, maintenance, repair, reuse, refurbishing, recycling and cascade utilisation and through specially designed business models which focus on use rather than ownership.
- **4 principles**
 1. Understanding of the CE
 2. General/governance
 3. Cooperation
 4. Knowledge sharing
- **Who can sign** companies, organisations, NGOs, associations, research and educational institutions, philanthropists, politicians, administrative bodies and private individuals



CE Switzerland - projects

- **general** The core team of CE Switzerland already implements 6 innovative projects and acts as a catalyst for a new Swiss-wide movement in the CE.
- **Projects** Circular Cities Switzerland
CE Transition → see next
Make Furniture Circular
Circular Hub
SHIFT Switzerland
CE² - CE Entrepreneurs
#MoveTheDate Switzerland



CE transition

- **General** CET is a pioneer initiative that aims at accelerating the transition of Switzerland to a CE.
The initiative will help drive the new paradigm for the future of business, politics and society.

For the moment it takes place in the Impact Hub cities - Basel, Berne, Geneva, Lausanne and Zurich.
- **Collaboration** Implementing partners: Impact Hub Switzerland, sanua durabilities
Funding partner: MAVA Foundation
Supporters: UBS, movetia
- **Activites** CE Incubator
Business Lab
Community Events



CE incubator

- **Program** **Swiss-wide program for early-stage Startups in the CE**
- **Call for projects**

The Incubator enables teams and startups to prototype and solutions contributing to accelerate the transition towards CE. These teams and startups can apply in a call for projects. Per call a maximum of 25 places will be available for early-stage projects from all over Switzerland with circular business models.
- **Activities**

CE Incubator
Business Lab
Community Events



CE incubator _ timeline

Timeline from call for projects until closing ceremony



CE incubator _ program for selected entrepreneurs

- **Program** 12 weeks
- **Activities** with the support from advisors, experts and the network of impact investors the selected entrepreneurs work on developing their minimum viable product and validating their business model,.
- **Support** main pillars of support
 - Community and space
 - Startup support
 - Events and connections
 - Swiss-wide visibility

The entire support provided accounts for CHF 15.000 per team.
The CE Incubator has a zero equity and fees policy.



Australia - The National CE Hub

- Australia is behind world leading countries in implementing CE policy, new policies that are either specific to the CE or strongly influenced by CE principles are beginning to emerge.
- Australia has a strong need for a platform that inspires and facilitates the collaboration and networking necessary for the transition to a CE.
- Planet Ark is taking the lead on creating the National CE Hub and Marketplace, which will be Australia's leading platform to accelerate the transition to a CE.
- The activities started in May 2019.



Planet Ark - The leading environmental not-for-profit will create the B2B ‘eBay’ to help Australian businesses implement the CE.”

Planet Ark ...

- is national, independent and non-political
- is a well known and trusted environmental not-for-profit with a long history in recycling education and product stewardship
- has a wealth of knowledge and experience in creating and growing database-driven digital platforms such as Recycling Near You and Business Recycling
- has a strong history of effective collaboration with the most recent examples being the Australasian Recycling Label and PREP with APCO and PREP Design





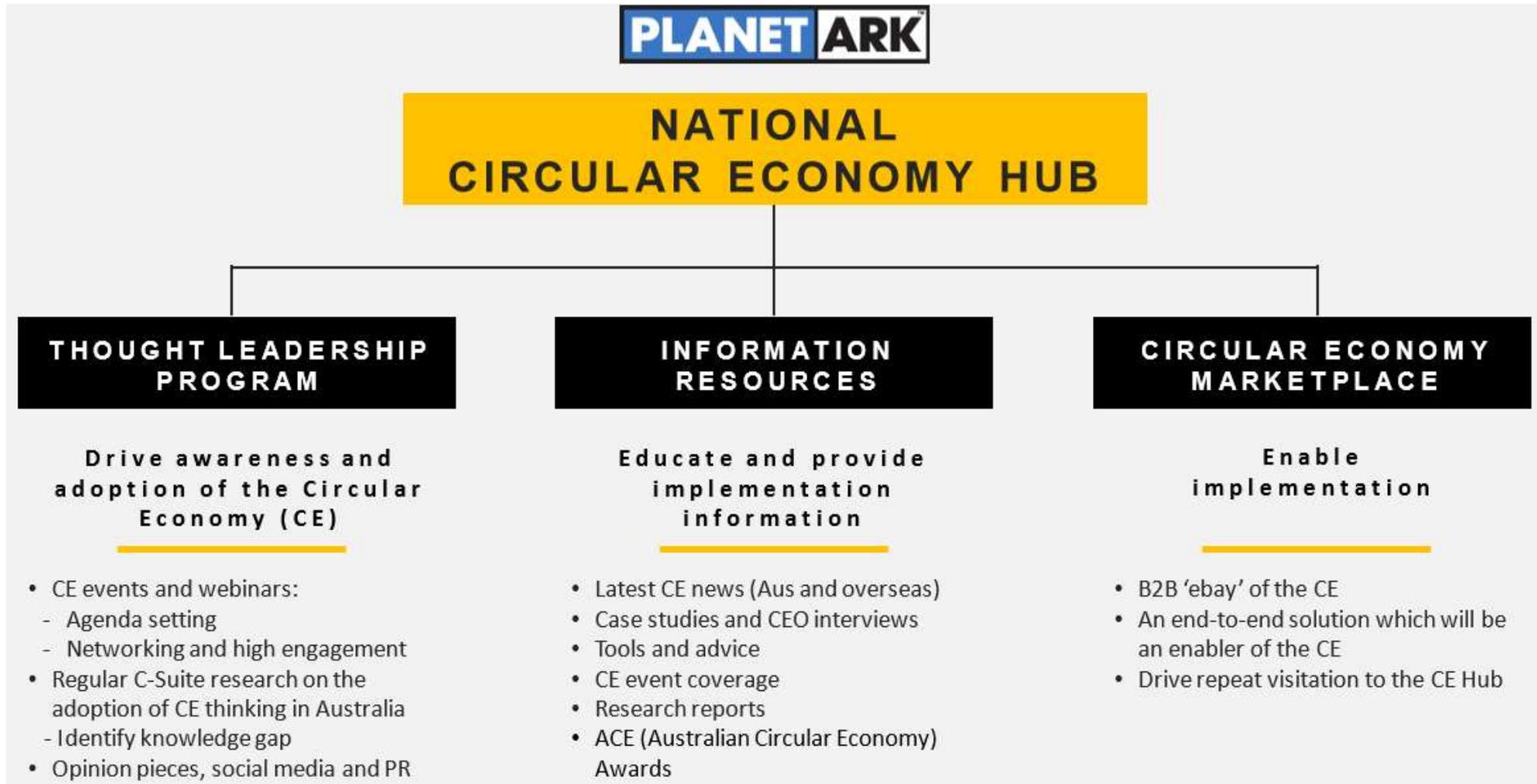
PLANET ARK About News Resources Product Stewardship Marketplace
COMING SOON The Recycling Hub ▾

- RecyclingNearYou
- Business Recycling

National Circular Economy Hub

Full launch in 2020





CIRCULAR ECONOMY MARKETPLACE

A dynamic platform designed to meet the needs of the CE participants including:

- A system for matching buyers and sellers in waste resources. Provides an end-to-end solution including;
 - Material identification & specification
 - Transport and financial transaction.
 - trust rating for market participants and digital ledger to help ensure integrity.
- A CE procurement system for finished goods & services



ENABLER OF THE CE



B2B 'EBAY' OF THE CE

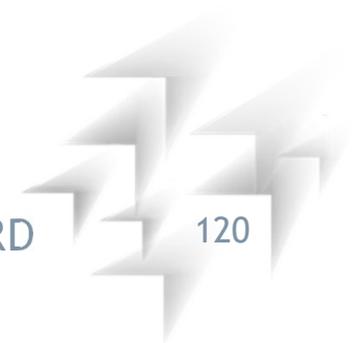


REPEAT VISITATION



SITRA, Finland

- **SITRA** is an active fund for the future who studies, researches and brings together partners from different sectors in open-minded trials and reforms
- **Vision** Finland as a pioneer of sustainable well-being.
Sustainable well-being means a good life that is lived within our planet's boundaries - here, now and in the future.
- **6 principles**
 1. Addressing well-being in a holistic way
 2. Adjusting to planetary boundaries
 3. Empowering individuals and communities
 4. Moving to a regenerative and collaborative economy
 5. Building competencies for a complex world
 6. Developing inclusive and adaptive governance



SITRA _ Kemi-Tornio economic region in Lapland → The Circular and Bioeconomy Center

The Centre for CE originated from nationwide need

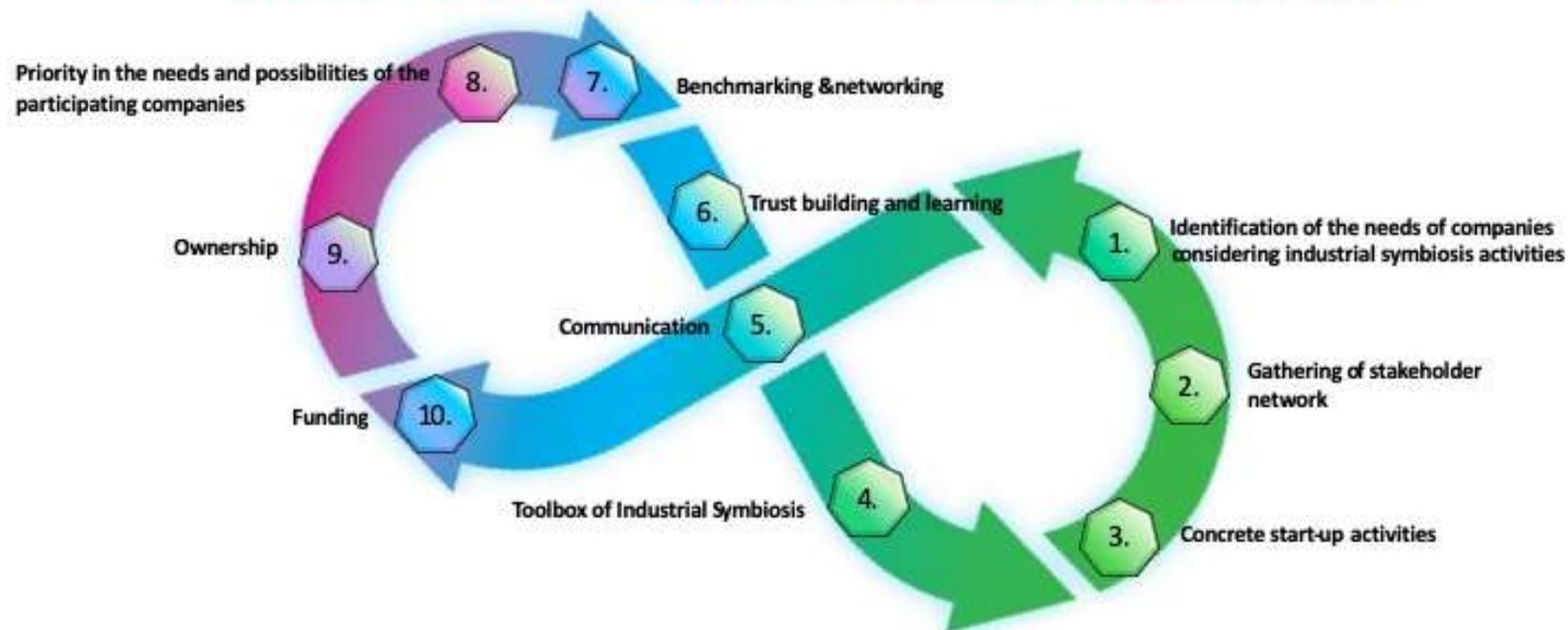
- Kemi - Preparation of an ecosystem for industrial circular economy 2012-2017.
- SITRA compiled 2016 world's first national road map for promoting CE with a goal of creating a shared ambition to advance CE in the society and determining the most efficient methods for that.
- SITRA named the Industrial CE Innovation Platform, led by Kemin Digipolis Oy, as one of the key projects of the road map.
- The next step was a project where the Competence and Training Centre for Industrial Symbiosis in Kemi-Tornio was established. Founding members of and key operators at the Centre for Circular and Bio Economy are Digipolis, the City of Kemi and the Lapland University of Applied Sciences (strategic focus area - development of circular and bio economy).
- Establishing the CE Center a logical continuation of Digipolis's work on promoting CE.



The Circular and Bioeconomy Center

Goal - to develop a more competitive business environment for companies involved in the CE

DESCRIPTION OF OPERATIONAL MODEL: TEN PILLARS



Webinar presentation

References

Websites: The Circular and Bioeconomy Centre: <https://www.digipolis.fi/en/teollinenkiertotalous>

Digipolis - Kemi Technology Park: <https://www.digipolis.fi/en/front-page>

SITRA: <https://www.sitra.fi/en/>



Zero Waste Scotland, Scotland

- **Zero Waste** has been established in 2014, since then a lot has been achieved

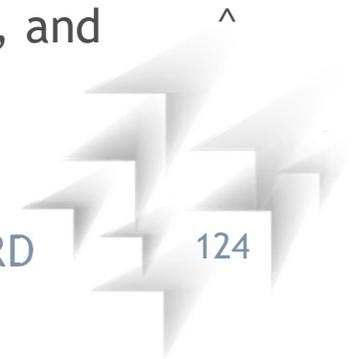
- **Next plan** **Zero Waste Scotland's Corporate Plan 2019-2023**

- **The strategy** The purpose:

“To lead Scotland to use products and resources responsibly.”

The way:

“We will direct with evidence, inspire by demonstration, and influence through partnerships and promotion.”



The strategy

Start with evidence

- Work with our key partners to gather and assess information on the problems we currently face.
- Learn from international best practice to adapt successful approaches in Scotland.
- Analyse complex systems to identify opportunities.
- Focus efforts towards interventions with the highest impact.

Test and demonstrate

- Work in partnership with our customers to co-create projects that demonstrate potential solutions.
- Pose the challenges we need solutions for.
- Embrace a culture where ideas are tested and thoroughly assessed.
- Learn from our work and develop compelling calls to action.
- Use all available channels, advocates and partners to promote our work and stimulate change.

Form valuable partnerships

- Be more intentional about forming strategic partnerships - using a variety of approaches and skills.
- Develop propositions which are shaped by customers.
- Use cutting-edge behaviour science to rethink how we can be influential.
- Be flexible and open to new ideas.
- Deliver interventions (such as funding or consultancy services) on a partnership basis.



References

- Website: <https://www.zerowastescotland.org.uk/>
- Brochure: [Zero Waste Scotland: Corporate Plan 2019 - 23. 2019.](#)
- Good Practice: [Good practice: Zero Waste Scotland. Interreg Europe.](#)





CITYCIRCLE

Training for regional stakeholder groups

Circular economy hubs

Example of Wcycle, Maribor, Slovenia

Online meeting

April 10th, 2020 – 15:00-16:00 CEST

Hosted by BWCON GmbH



MINUTES

Greetings & Intro

Luc Schmerber, BWCON

KEY NOTES:

1. Introduction to the context of the webinar, as part of D.T2.2.4 Specific trainings for each of the regional stakeholder groups (2 trainings per region)
Topic: Circular economy hubs
2. Introduction of the speaker:
Igor Kos
Inštitut Wcycle Maribor / Wcycle Institute Maribor
Inštitut za krožno gospodarstvo / Institute for Circular Economy
Jadranska 28, 2000 Maribor, Slovenija

PRESENTATION

Igor Kos, Wcycle Institute Maribor

KEY NOTES:

1. Presentation of the Circular Economy strategy of the city of Maribor, with a focus on the Wcycle Maribor initiative, www.wcycle.com.
2. Q&A with the audience

SUPPORTING DOCUMENTS

1. Presentation (Annex)
2. List of participants (Annex)
3. Recording of the webinar (available upon request)



ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: CITY CIRCLE Webinar

Location: online

Date: 09.04.2020, from 15:00-16:00 CEST

No.	Name and Surname	Organisation	E-mail	Signature
1.	Luc Schmerber	BWCON	schmerber@bwcon.de	n.a.
2.	Nadia Vedova	Municipality of Udine	nadia.vedova@gmail.com	n.a.
3.	Giampaolo Tarpignati	Unione Territoriale Intercomunale (UTI) del Friuli Centrale	giampaolo.tarpignati@friulicentrale.utifvg.it	n.a.
4.	Stefano Treu	APE FVG	stefano.treu@ape.fvg.it	n.a.
5.	Robert Hanzen	TUKE	robert.hanzen@tuke.sk	n.a.

Consent to the Processing of Personal Data

By signing the attendance list you grant consent to the Technical University of Kosice (hereinafter referred to as the *TUKE*), registered office at Letna 9, 040 01, Kosice, Business ID 00397610 (hereinafter referred to as “the Administrator”) by means of the Regulation (EU) No 2016/679 of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data and repealing of Directive 95/46 / EC (General Regulation on the Protection of Personal Data) (hereinafter referred to as "the Regulation") to process the following personal data: name and surname; Organization name / abbreviation, email address and signature of the participant. This data can be processed by the Administrator based on your consent to document the event of the CITYCIRCLE project until the completion of the project implementation to the leading authority Interreg CENTRAL EUROPE.

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19.	Nikolina Zigmund	DAN	nikolina.zigmund@dan.hr	n.a.
20.	Filip Biscevic	DAN	Filip.bisevic@dan.hr	n.a.
21.	Ivan Šimić	Regional energy Agency - REA Koprivnica, Croatia	ivan.simic@rea-sjever.hr	n.a.
22.	Emil Tkalec	Local Action Group - Lepoglava, Croatia	Emil Tkalec <etkalec@gmail.com>	n.a.
23.	Martin Dobler	Fachhochschule Vorarlberg	Marv.attin.dobler@fh	n.a.
24.	Bojana Suzic	Fachhochschule Vorarlberg	Bojana.SUZIC@fhv.at	n.a.

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Teilnehmer (25)

Finden Sie einen Teilnehmer

- | | |
|-------------------------------------|--|
| LS Luc Schmerber (Host, ich) | LC LEAG Crtomir Kurnik |
| I Igor | MA Marija Ahačič Premrl |
| PĚ Peter Ěapak | MD Martin Dobler (FHV) |
| FJ Frantisek Janke | NV Nadia Vedova |
| BK Barbora Kovacova | N nikolina |
| BS Bojana Suzic FHV | NI Nina's iPhone |
| BB Branka B | P PC |
| ET Emil Tkalec | PS Petra Schusterova |
| FB Filip Bišćević | R Rea Poljak |
| G Giampaolo | RH Robert Hanzen |
| I ivan.šimic | TS Treu Stefano |
| K Klaudija |  Gregor D. Zupančič |
| L Lanisek | |

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TAKING
COOPERATION
FORWARD

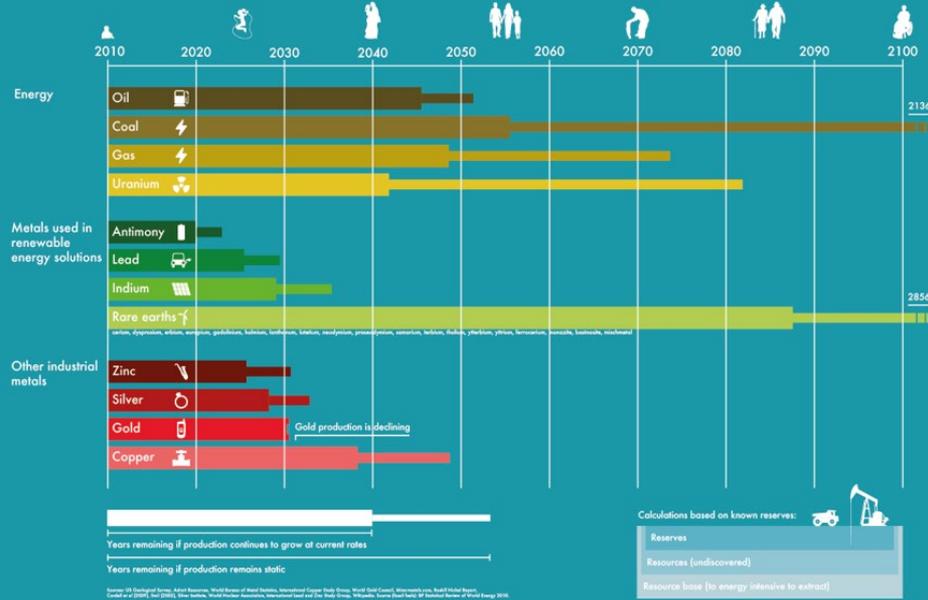
 09.04.2020

 **Circular economy in Maribor, Slovenia**

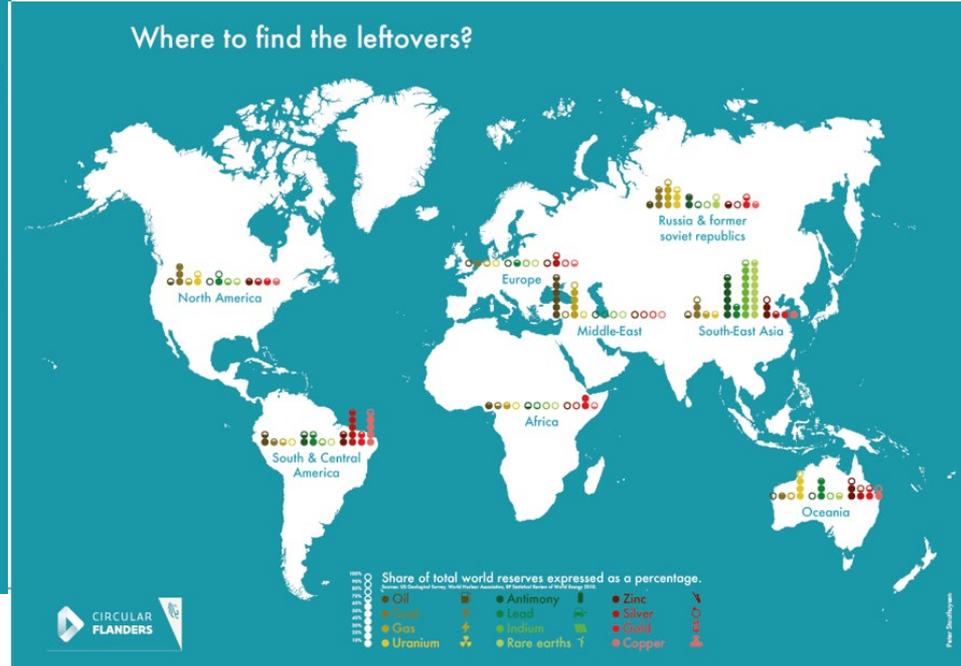
 Igor Kos, WCYCLE Institute Maribor igor.kos@wcycle.com

WHY CIRCULAR ECONOMY??

Born in 2010: How much is left for me?



Where to find the leftovers?



- **Maribor** is the capital of the province of Styria and the second largest city in the country with 115.000 inhabitants
- It is a pleasant small 850 year old university town set in the beautiful surroundings of Pohorje hills on one side and the wine hills on the other, divided by the river Drava
- It is the economic and cultural center of northeastern Slovenia with rich industrial history
- It offers a diverse and high-quality tourist services, a clean environment and the highest quality of natural water





Energetika Maribor d.o.o. – District Heating



Snaga d.o.o.- Waste management



Mariborski vodovod d.d. – Water supply



Nigrad d.d. – Construction



Marprom d.o.o. – Public transport



ESTABLISHED APRIL 2017

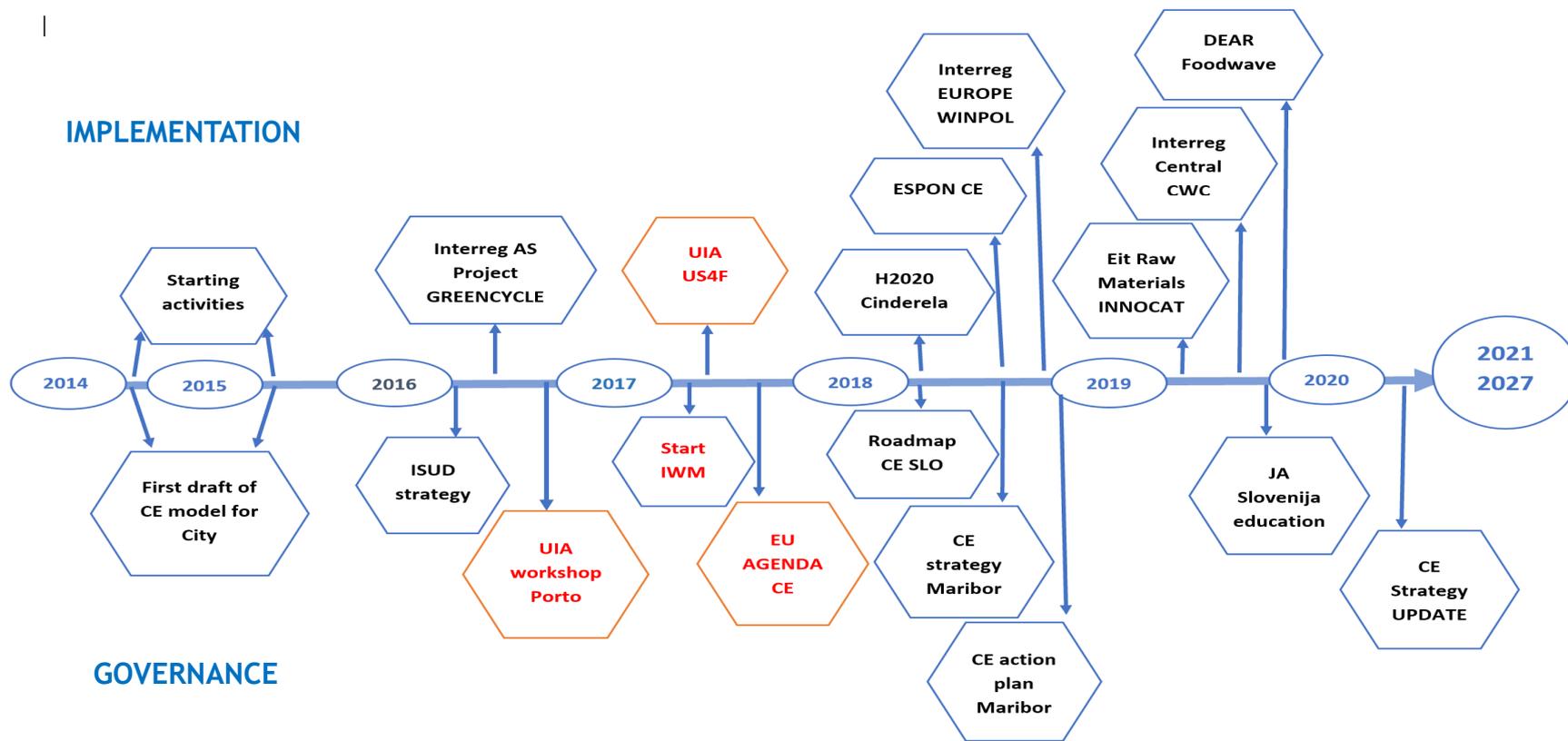
5 EMPLOYES

**FROM EACH COMPANY THAT
ESTABLISHED INSTITUT
EMPLOYES FROM R&D
DEPARTMENT ARE INVOLVED**

**WORKING GROPU HAS 12
MEMBERS**



TIMELINE OF CIRCULAR ECONOMY DEVELOPMENT IN MARIBOR

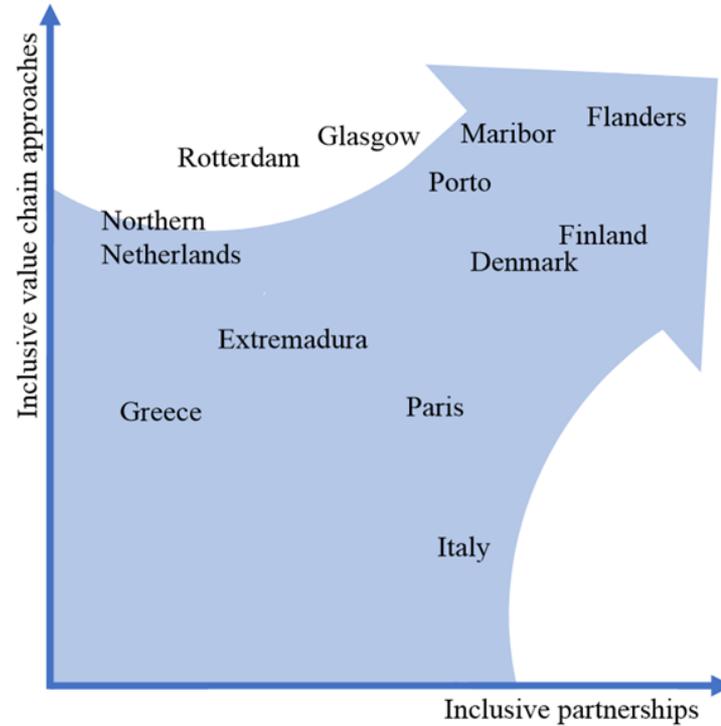


STRATEGY FOR THE TRANSITION TO CIRCULAR ECONOMY IN THE MUNICIPALITY OF MARIBOR

Prepared by: **Wcycle Institute Maribor**
Maribor, July 2018



Figure 3.4 *Inclusiveness of circular economy strategies*



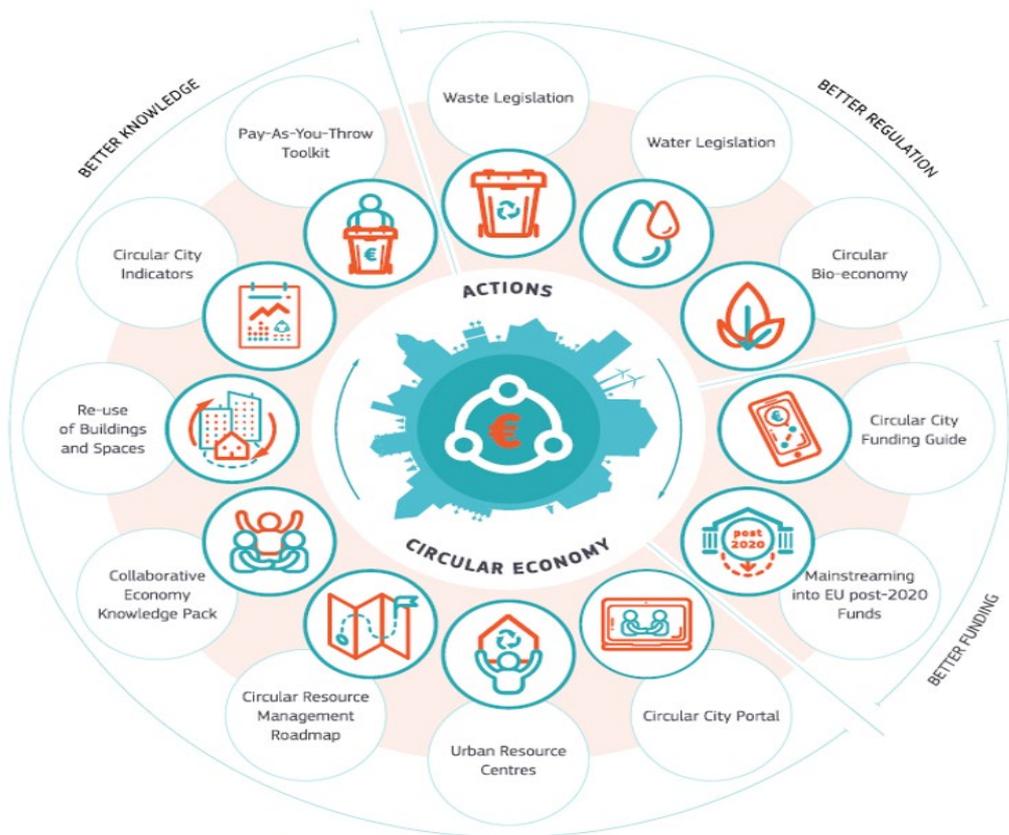
Source: *Spatial Foresight, 2019*





https://circulareconomy.europa.eu/platform/sites/default/files/roadmap_towards_the_circular_economy_in_slovenia.pdf



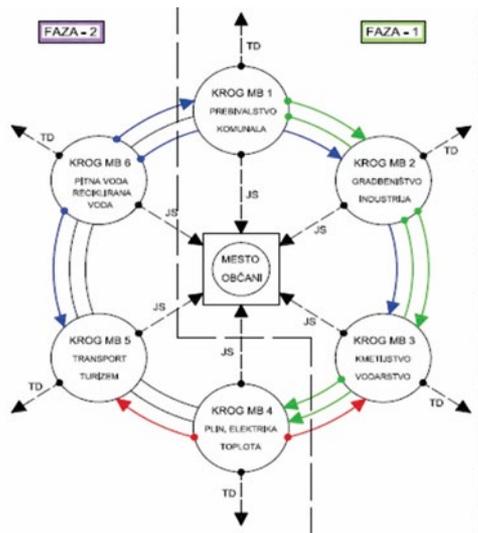


**EU AGENDA PARTNERSHIP
FOR CIRCULAR ECONOMY**
[HTTPS://EC.EUROPA.EU/FU
TURIU/EN/CIRCULAR-
ECONOMY](https://ec.europa.eu/futurium/en/circular-economy)

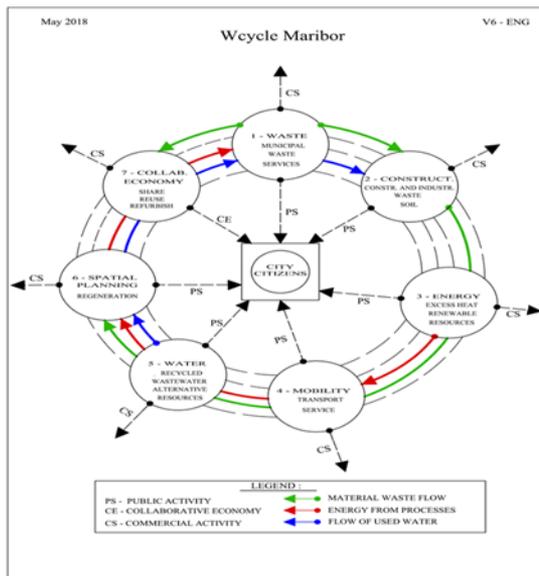


DEVELOPMENT OF CE MODEL IN MARIBOR

SUD 2016

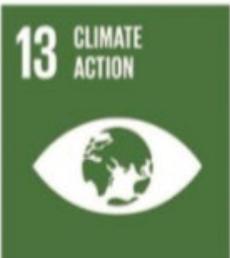
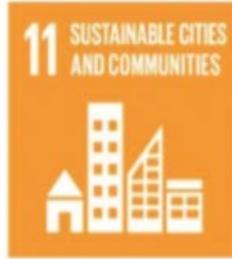
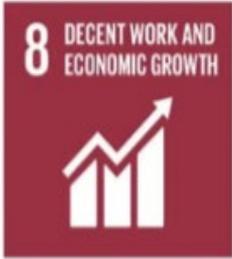


SKG 2018



Update SKG 2020





PROJECT GREENCYCLE

Interreg
Alpine Space
GREENCYCLE
EUROPEAN REGIONAL DEVELOPMENT FUND



The aim of the GREENCYCLE project was to introduce a circular economy system as an integrated approach to support the implementation of low carbon strategies and to provide an additional 2-4% reduction in greenhouse gas emissions in partner cities.

<https://www.alpine-space.eu/projects/greencycle/en/home>





**Urban
soil
4 food**

Establishing innovative economic circles in the urban environment to increase local food self-sufficiency and reduce the environmental footprint.

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



The CINDERELA project aims to untap potential of construction and demolition waste by developing and demonstrating a new business model (CinderCEBM) to assist companies in setting up successful circular economy business cases based on waste-to-resource opportunities.

<https://www.cinderela.eu/The-project>





The CWC project aims to help municipalities to reform outdated urban water infrastructure systems via applying a circular economy approach, which offers many economic and environmental benefits. This will be achieved by the project by promoting a water saving culture, including the use of non-conventional water resources and by taking the lead in adopting urban rainwater harvesting and utilisation as well as greywater recovery measures on city level.

<https://www.interreg-central.eu/Content.Node/CWC.html>





Improving policies for waste management so that they increasingly foster and promote the use of intelligent equipment and planning derived of it, significantly contributing to waste minimisation in European cities and regions, through improved management procedures and awareness campaigns.

<https://www.interregeurope.eu/winpol/>





working together is essential part of
Circular economy
so that $1+1+1 > 3$
thank you for your attention





CITYCIRCLE

Training for regional stakeholder groups

Circular economy hubs

Example of Digipolis, Finland

Online meeting

April 15th, 2020 – 10:00-11:00 CEST

Hosted by BWCON GmbH



MINUTES

Greetings & Intro

Luc Schmerber, BWCON

KEY NOTES:

1. Introduction to the context of the webinar, as part of D.T2.2.4 Specific trainings for each of the regional stakeholder groups (2 trainings per region)
Topic: Circular economy hubs
2. Introduction of the speaker:
Tuomas Pussila, Mr.
Cluster Manager, M.Sc. (Tech.)
Arctic Industry and Circular Economy
Digipolis - Kemi Technology Park
Tietokatu 6, FI-94600, Kemi
www.digipolis.fi

PRESENTATION

Tuomas Pussila, Digipolis - Kemi Technology Park

KEY NOTES:

1. Presentation of the Circular Economy in Finland and industrial symbiosis as a regional driver,
www.digipolis.fi
2. Q&A with the audience

SUPPORTING DOCUMENTS

1. Presentation (Annex)
2. List of participants (Annex)
3. Recording of the webinar (available upon request)



ATTENDANCE LIST

CE1515 CITYCIRCLE

Event Name: CITY CIRCLE Webinar

Location: online

Date: 15.04.2020, from 10:00-11:00 CEST

No.	Name and Surname	Organisation	E-mail	Signature
1.	Luc Schmerber	BWCON	schmerber@bwcon.de	n.a.
2.	Nadia Vedova	Municipality of Udine	nadia.vedova@gmail.com	n.a.
3.	Agnese Pressoto	Municipality of Udine	agnese.presotto@comune.udine.it	n.a.
4.	Stefano Treu	APE FVG	stefano.treu@ape.fvg.it	n.a.
5.	Robert Hanzen	TUKE	robert.hanzen@tuke.sk	n.a.

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8.	Marija Ahacic-Premrl	City of Kranj	Marija.Ahacic-Premrl@kranj.si	n.a.
9.	Tomaž Lanišek	City of Kranj	Tomaz.Lanisek@kranj.si	n.a.
10.	Eva Romih	City of Kranj	Eva.romih@kranj.si	n.a.
11.	Ziherl Janez	City of Kranj	Ziherl.janez@kranj.si	n.a.
12.	Aleksandra Ažman	City of Kranj	Aleksandra.Azman@kranj.si	n.a.
13.	Smiljana Slavec	City of Kranj	Smiljana.slavec@kranj.si	n.a.
14.	Črtomir Kurnik	Local Energy Agency of Gorenjska	crtomir.kurnik@leag.si	n.a.
15.	Branka Balantič	SCKR	branka.balantic@sckr.si	n.a.
16.	Nina Taylor	eZavod	nina@ezavod.si	n.a.
17.	Matjaz Gerl	eZavod	matjaz@ezavod.si	n.a.
18.	Rea Poljak	City of Varazdin	rea.poljak@varazdin.hr	n.a.

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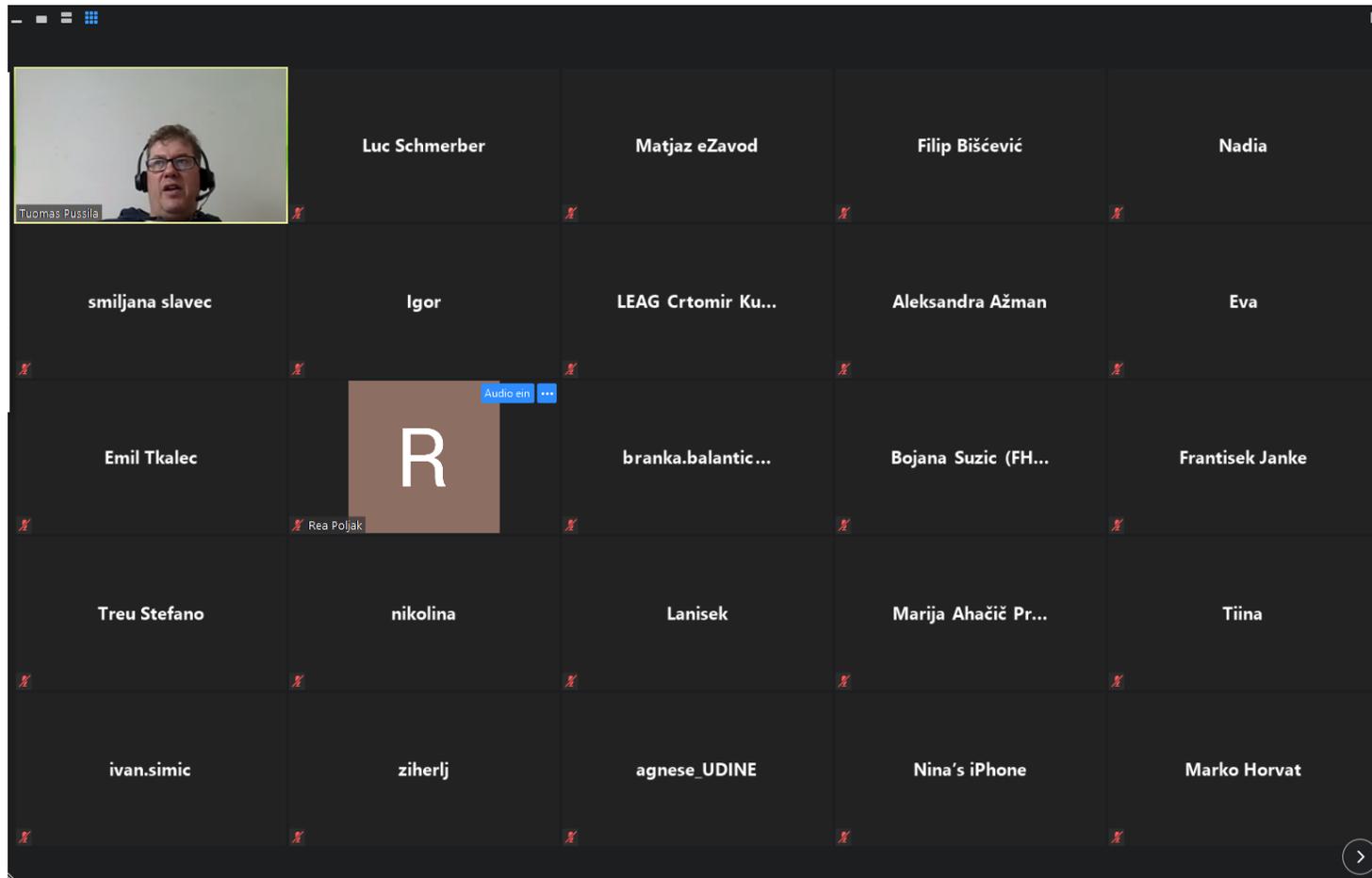


19.	Gregor Drago Zupančič	Croteh d.o.o. - Centre for development of sustainable technology ltd. Zagreb, Croatia	gregor.zupancic@croteh.eu	n.a.
20.	Nikolina Zigmund	DAN	nikolina.zigmund@dan.hr	n.a.
21.	Filip Biscevic	DAN	Filip.biscevic@dan.hr	n.a.
22.	Ivan Šimić	Regional energy Agency - REA Koprivnica, Croatia	ivan.simic@rea-sjever.hr	n.a.
23.	Emil Tkalec	Local Action Group - Lepoglava, Croatia	Emil Tkalec <etkalec@gmail.com>	n.a.
24.	Martin Dobler	Fachhochschule Vorarlberg	Marv.attin.dobler@fh	n.a.
25.	Bojana Suzic	Fachhochschule Vorarlberg	Bojana.SUZIC@fhv.at	n.a.
26.	Igor Kos	Wcycle Maribor	igor.kos@wcycle.com	n.a.
27.	Tiina Puotinen	Digipolis Kemi Finland	Tiina.puotinen@digipolis.fi	n.a.
28.	Tuomas Pussila	Digipolis Kemi Finland	tuomas.pussila@digipolis.fi	n.a.

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A agnese_UDINE  	
AA Aleksandra Ažman  	
BS Bojana Suzic (FHV)  	
B branka.balantic@sckr.si  	
ET Emil Tkalec  	
E Eva  	
FB Filip Bišćević  	
FJ Frantisek Janke  	
GD Gregor D. Zupančič  	
I Igor  	
I ivan.simic  	
L Lanisek  	
LC LEAG Crtomir Kurnik  	
MA Marija Ahačič Premrl  	
ME Matjaz eZavod  	
N Nadia  	
N nikolina  	
R Rea Poljak  	
SS smijana slavec  	
T Tina Audio ein Mehr >	
TS Treu Stefano  	
Z ziherlj  	
MD Martin Dobler (FHV)  	
BK Barbora Kovacova  	

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CENTRE FOR CIRCULAR ECONOMY

Circular Economy in Finland and industrial symbiosis as a regional driver

Digipolis – Kemi Technology Park

Circular Economy presentation

Tuomas Pussila, Program Manager, Circular Economy

Finland becomes a world leader in the circular economy by 2025

Roadmap's ambition:



Increased exports and growth for companies from scalable and comprehensive circular economy solutions.



Functional **domestic market**.



Circular economy into the mainstream through **actions** and **concrete pilots**.

Economy, environment & society:



Circular economy as a new cornerstone for the Finnish economy.



Finland as a model country for the challenge of scarcity.



From adapter to pioneer.

ECOSYSTEM OF ARCTIC INDUSTRY

Kemi-Tornio`s circular economy innovation platform

- World's northernmost hub of bio-, mining -, metal industry and services
- 1,7 Mt of by-products and residues (excluding waste rock)
- Responsible for 80% of Lapland's industrial production, with over 5 billion EUR of exports annually (7-8 % of the total export value of Finland)
- Industrial symbiosis estimated at 700 million EUR annually



MAIN INDUSTRY SITES IN KEMI-TORNIO REGION

Metsä Board and Metsä Fibre Kemi mills

- World's northernmost linerboard production site
- World's northernmost pulp mill (re-build coming)



Outokumpu Chrome Kemi mine

- Europe's biggest chromium mine



Outokumpu Tornio stainless steel mill and ferrochrome smelter

- Outokumpu's site in Tornio is the most integrated stainless steel mill in the world combining chromium mine, ferrochrome works and stainless steel mill
- Europe's biggest user of recycled steel

Stora Enso Veitsiluoto Mill in Kemi

- World's 2nd northernmost **pulp mill**
- World's northernmost paper producer with **three paper machines**, and 4th biggest paper production integrate in Europe
- Oldest **sawmill** in production in Northern Finland



Manga LNG liquid natural gas terminal in Tornio 2018

ETC...





FURTHERING THE CIRCULAR ECONOMY AND BIOECONOMY IN LAPLAND IN 2012–2016

Industry byproducts utilised

Where did it all begin?

11/2012

The key players of Kemi–Tornio industries and industrial services were interviewed in the side-stream evaluation of needs.

Lapland EU's model region

7/2014 

European Commission's selection: Lapland EU's model region in sustainable processing of natural resources

The FISS model

10/2014

FISS workshops, Finland benchmarking, business potential

Recognition for work

21 September 2016

Work carried out by the Kemi–Tornio region & Lapland and Digipolis and partners: Key project of Sitra's Finnish circular economy action plan

Development of operations

2014

Side-stream recognition tool development together with industries across sectoral boundaries. Development of measures furthering the systematic process and taking the matter forward

27 side-stream recognition, total volume:

1.4 million tonnes annually =  Over 100 trucks daily

Prioritisation of development tasks

4/2013

Prioritisation of development tasks with key players of industries and industrial services

Expansion of operations

2015-2016

Entire Lapland's big industries involved in development. Synergies between mines and the processing industry, and entry of new service businesses. Expanding the process to northern Finland, northern Sweden and northern Norway.

2017 

Implementation of Sitra's action plan

THE FUTURE OF THE CIRCULAR AND BIOECONOMY IN LAPLAND

DIGIPOLIS



4,000

The Kemi-Tornio industries currently employ 4,000 people in the region. With future investments in the bio- and circular economy (such as Boreal Bioref, Kaidi), the employment effects in northern Finland are estimated at 2,000 persons.



1.7 million

Annually the Kemi-Tornio industries produce tonnes of industrial byproducts

Utilisation categories include neutralisation, circulation of nutrients, excavation, landscaping, soil enrichment, building products, water treatment.

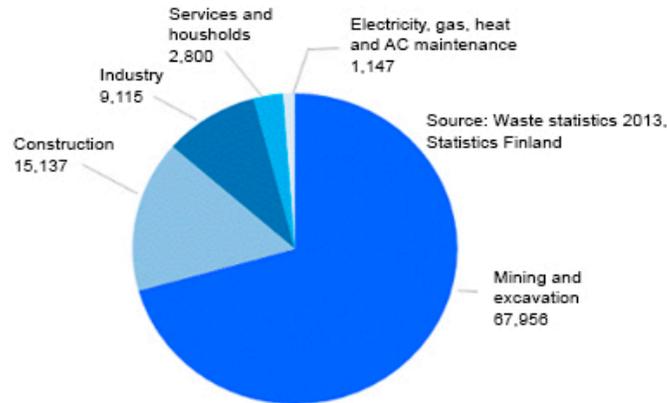


Industry byproducts utilised

From waste into profitable business



Finland has great potential to utilise industrial side streams (94 million t/a), which are currently classified as waste.



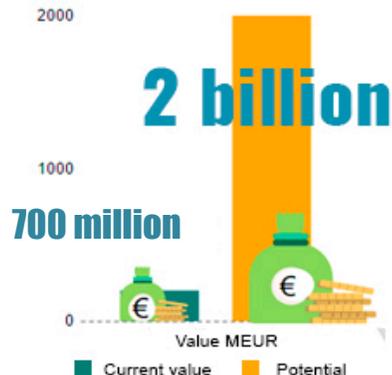
96% of waste is non-household generated.

VISION

Lapland world's leading arctic bio- and circular economy region

Business potential

The current value of Lapland's industrial symbiosis and the potential of the bio- and circular economy



CE-approved recycled materials from industrial side streams:

The annual use of ferrochromium slag in road construction (400,000 tonnes) saves 600,000 tonnes of virgin gravel and rock aggregate and reduces road construction carbon dioxide emissions by 200,000 tonnes.

Source: Outokumpu plant in Tornio

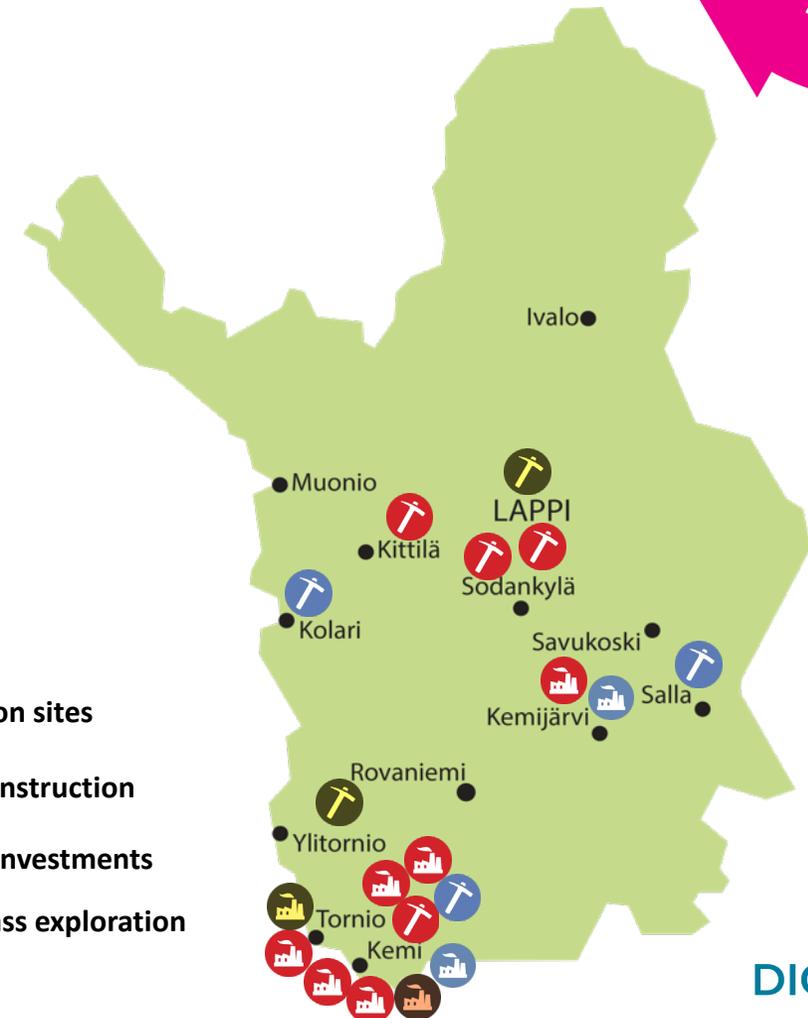
Kemi-Tornio circular economy Ecosystem



Utilisation of the arctic natural resources – Lapland's Arctic Industry

- Arctic Spring, Investment boom in Arctic regions
- Industrial- and mining service companies receive orders worth of hundreds of millions.
- International-industry standards, HSEQ
- Cleantech – growing need of sustainable solutions
- Enhancing Circular Economy
- Internationalization in home market, glocalization
- Internationalization in the surrounding countries
- Own products and services

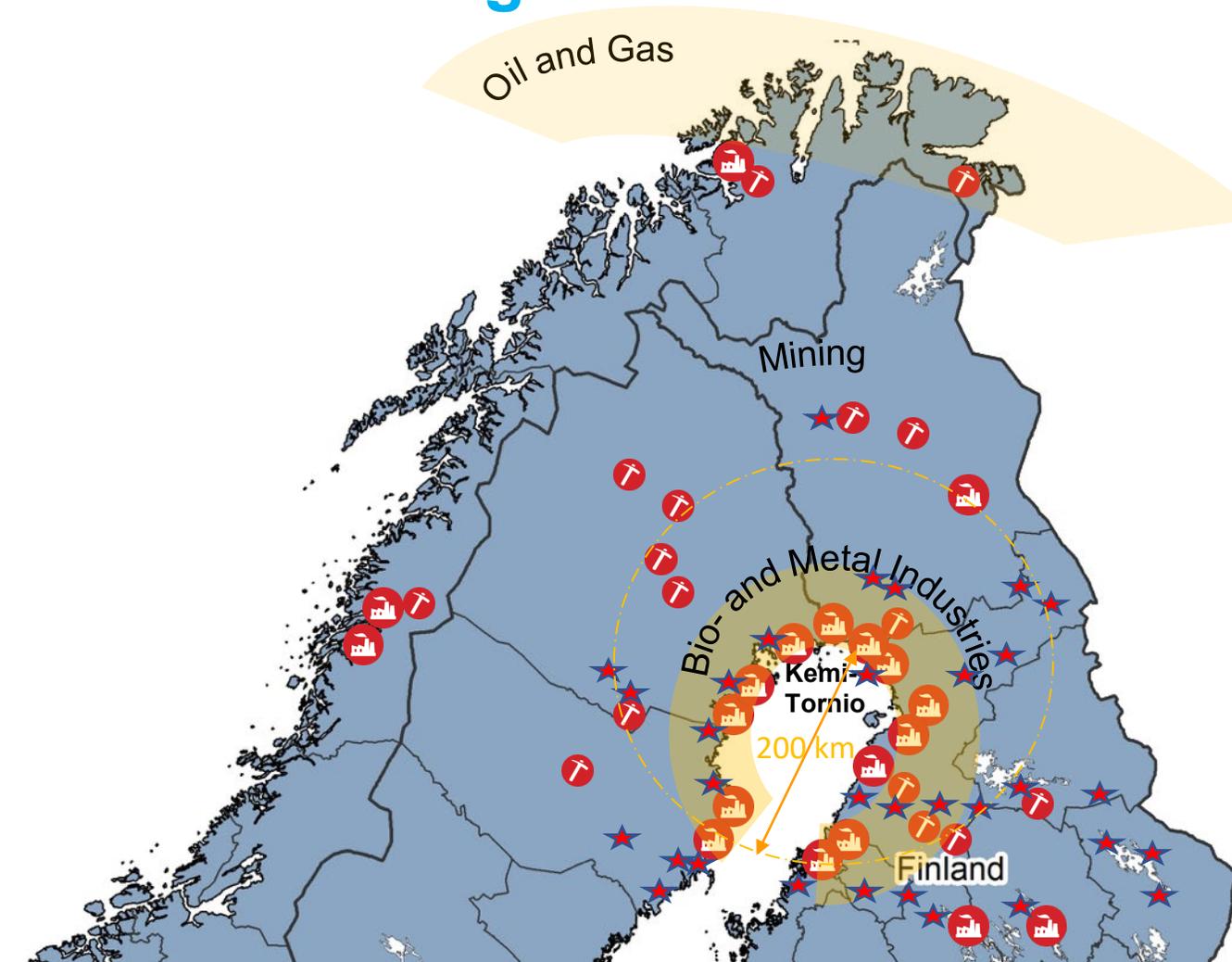
-   Production sites
-   Under construction
-   Planned investments
-  World class exploration projects



Nordic Industries

Story of Natural Resources Refining

- Global Markets
- Good Connections
- Arctic Solutions
- Cleantech Solutions
- 5 Bio Refineries
- 32 Sawmills
- 16 Mines
- 5 Metal Refineries
- 2 Aluminium Smelters
- 1 LNG Refinery
- 2 Chemical Plants



Opportunities and plans

Potential utilisation sites in Northern Finland area

Infrastructure Projects (incl. landfills and recovery sites)

- Mining Projects
- Other industrial projects
- Other projects

Mine projects in Northern Finland

- The cooperation has started with mines that are different stages of the life cycle
- Applications examples: construction, landfills, mine fillings, neutralization etc.

Investment potential and job creation in Kemi-Tornio and Lapland

- 16 different IS investment projects
- Biggest ones:
 - Metsä (in Kemi) and
 - Boreal Bioref (in Kemijärvi) biorefineries are CE and IS cases,
 - Total Investments Apr. 2 billion €
- Over 2000 new employees in potentially circular value chains - ecosystems

Digipolis key actor in Finland's Circular Economy roadmap



THIS IS HOW WE BUILD CIRCULAR ECONOMY IN FINLAND

Technical loops

Competitive advantage from the decreased use of virgin raw materials and long lifecycle of materials and products.

Key projects:

- **The Arctic industries ecosystem and Kemi-Tornio circular economy innovation platform. (Digipolis Oy)**
- Circular economy demo plant for waste electrical and electronic equipment. (Technology Industries of Finland)

Plans

- Making pilots, scale-ups and investments to happen, process of cluster funding
- Tighter cooperation and benchmarking through Scandic & European networks
- More resources through strategic alliance with Lapland UAS and growing capacity
- Modern cluster approach and cooperation
- Efficient development/funding tools
- Establishment of Centre for industrial circular economy
- Lapland UAS: CE curricula starts on 2018
- EU Alliance

Finnish industrial circular economy centre to be established in Kemi

- Focus is in the circular economy and the bioeconomy
- In partnership with the Finnish Innovation Fund Sitra, City of Kemi, Digipolis – Kemi Technology Park and Lapland University of Applied Sciences
- First industrial circular economy centre in Finland with national level mandate
- Virtual network of industry, university and development experts
- **Aims of the centre:**
 - National level
 - To promote education and competence in the industrial circular economy across the whole of Finland
 - To spread operating models of the Kemi region's industrial circular economy throughout Finland
 - To boost the successful circular economy development work that Digipolis – Kemi Technology Park has carried out and to generate vitality for the city of Kemi and for the whole of Finland
 - City of Kemi and Lapland level
 - To create new investments and jobs – Industry modernization
 - Help investments to be more sustainable and efficient
 - Lapland is Europe's model region for the sustainability: modern cluster development in the sustainable refinement of natural resources
 - Establishing common systematic operational culture → Activation and cooperation of authorities, municipalities, industry, industrial services etc.

Kemi CE Centre Advisory Board

1. Martti Sassi, Senior Vice President – Head of Operations, Outokumpu Tornio Works
2. Juha Mäkimattila, Mill Director, Stora Enso Veitsiluoto Mill
3. Kari Ala-Kaila, Vice President – Technology , Metsä Fibre
4. Mikko Korteniemi, General Manager, Agnico Eagle Finland Kittilä Mine
5. Jukka Jokela, General Manager/Project Manager, Anglo American - Finland AA Sakatti Mining
6. Jari Hietala, National Division Leader, Eurofins Environment Testing
7. Juha Koskinen, R&D Manager, Tapojärvi Oy/ Hannukainen Mining Oy
8. Tuula Sivonen, Regional Manager, The Federation of Finnish Technology Industries
9. Kimmo Heikka, Managing Director, Kemin Digipolis Oy
10. Heino Vasara, Sector Manager, Centre for Economic Development, Transport and the Environment
11. Eija Virtasalo, Head of Financial Unit, Centre for Economic Development, Transport and the Environment
12. Eira Luokkanen, Head of Unit – Environmental Protection, Centre for Economic Development, Transport and the Environment
13. Jyri Seppälä, Director – Centre for Sustainable Consumption and Production, Finnish Environment Institute (SYKE)
14. Eero Yrjö-Koskinen, Secretary General, Finnish Network for Sustainable Mining and Director, Green Budget Europe
15. Riikka Aaltonen, Senior Adviser – Mineral Policy, Enterprise and Innovation Department, Ministry of Economic Affairs and Employment
16. Kari Herlevi, Project Manager – Circular Economy, Sitra
17. Nani Pajunen, Leading Specialist – Circular Economy, Sitra
18. Olli Dahl, Professor, Aalto University, Clean technologies research group
19. Riitta Rissanen, Managing Director, Lapland University of Applied Sciences
20. Tero Nissinen, Chair, Mayor, City of Kemi

Arctic Industry & Circular Economy Cluster

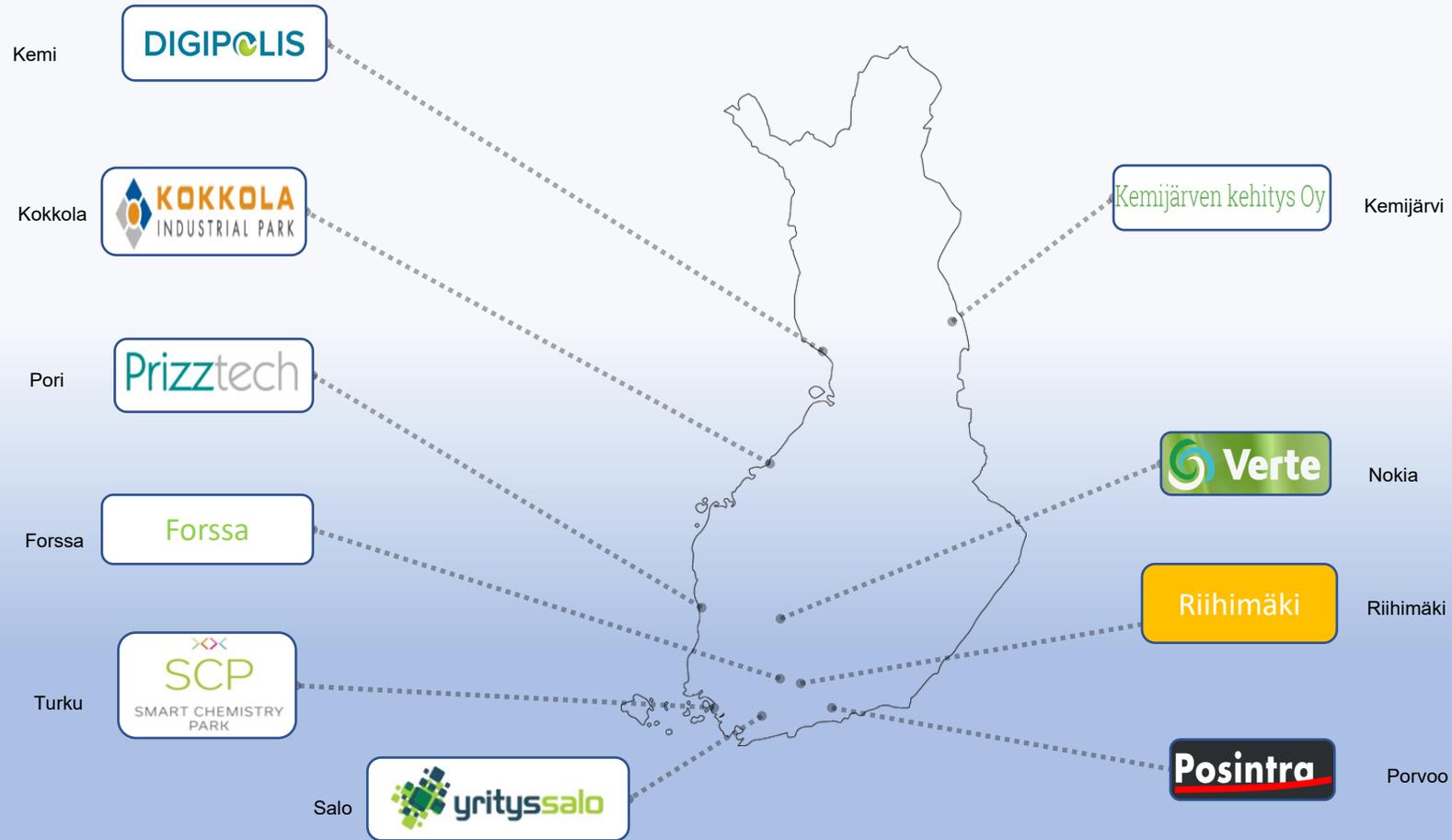
ANDRITZ Valmet
BOLIDEN metso AngloAmerican
SPINVERSE Manga Lng KAIDI
EIGENOR
Etteplan sma mineral AGNICO EAGLE FINLAND storäenso
REPOLAR Caverion ASES KEMIN SATAMA MetsäFibre outokumpu
Korkkälä Kemi Shipping Hannukainen Mining
NORR HYDRO akkoy TAPOJÄRVI KEITELE group
SAVATERRA SAVA GROUP BOREAL BIOREF BIOJALOSTAMO
aromtech PALSATECH SANGEN NTH service AHMA
KEMIJOKI KEMIJÄRVI Agria Lappi
Forest of Lapland STYRUD HAVATORGO
eventum DEKRA KAIVOSVASTUU SITRA Motiva Teknologiateollisuus

NORDREGIO Nordic Centre for Spatial Development
SINTEF IUC NORRBOTTEN AB
GKZ Freiberg MONTAN UNIVERSITÄT
European Committee of the Regions European Commission
Ministry of Industry and Trade
Lapin AMK LAPPIA
DIGIPOLIS KEMI TEAM BOTNIA OY
Rovaniemen Kehitys REGIONAL COUNCIL OF LAPLAND
Tervola Kittilä YLITORNIO
LAPLAND CHANGING

Sustainable exploitation of arctic natural resources

SILVER
Cluster Management Excellence
DEDICATED TO CLUSTER EXCELLENCE

The Finnish Network of Eco-Industrial Parks





EUROPE'S FIRST INTELLIGENT BICYCLE AND WALK PATH USING INDUSTRIAL RESIDUES



Alueelliset Innovaatiot ja kokeilut



Biofuelrefinery project in Kemi





CENTRE FOR CIRCULAR ECONOMY

LAPLAND
Above Ordinary



Saari / Stora Enso



Outokumpu



Lappeen Group

Thank You!

Interested in to do co-operation?

Please contact:

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Cluster Manager, M.Sc. (Tech.)
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Digipolis - Kemi Technology Park
Tietokatu 6, FI-94600, Kemi
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European Regional
Development Fund



TAKING
COOPERATION
FORWARD



Information package | July 2020



WP T2 - Circular business models for SMEs



Luc Schmerber | BWCON

CONTENT

1 Objective of the document

2 Rationale for the circular transformation of businesses

3 Typology of existing circular business models for businesses

upcoming

4 Examples from the industry

5 Supporting materials - tools



OBJECTIVE OF THE DOCUMENT

- Provide an overview of most popular approaches to circular business models for businesses
- Provide real examples of industrial circular business models
- Provide tools supporting the application of the models in practice



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (0)

- The content of the following slides does NOT address the rationale for the circular transition of the economy in general.
- It presents an overview of arguments making it potentially **economically rationale and sensible for each single business** to engage into its own circular transition.



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (1)

- Reduce dependance on scarce / non-renewable resources
 - > Resources costs volatility
 - > Supply unsure
 - > High price fluctuation for scarce resources

- Contribution to mitigate climate change

- Increase of business resilience against external shocks



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (2)

- Preempt regulatory pressures down the line

- Improved customer interaction and loyalty
 - > Turn consumers into users
 - > Improved personalization, customization and retention

- Increase the attractiveness of the brand
 - > Customer's expectations are rising
 - > Investment criteria are changing



RATIONALE FOR THE CIRCULAR TRANSFORMATION OF BUSINESSES (3)

- Less product complexity and more manageable life cycles
 - Accelerate digital transformation
- Increase in productivity



TYPOLGY OF EXISTING CIRCULAR BUSINESS MODELS FOR SMES

Circular business models

Definitions

Approach 1. Ellen Mac Arthur Foundation

Approach 2. Accenture

Approach 3. PwC

Approach 4. PBL



CIRCULAR BUSINESS MODELS - DEFINITION

Business model:

- “A business model describes the rationale of how an organisation **creates, delivers and captures value.**” (A. Osterwalder, Y. Pigneur, Business Model Generation, 2009)

Circular business model / circular economy business model

- A circular business model is first a business model
- A circular business model aims at decoupling economic activity from the consumption of finite resources.

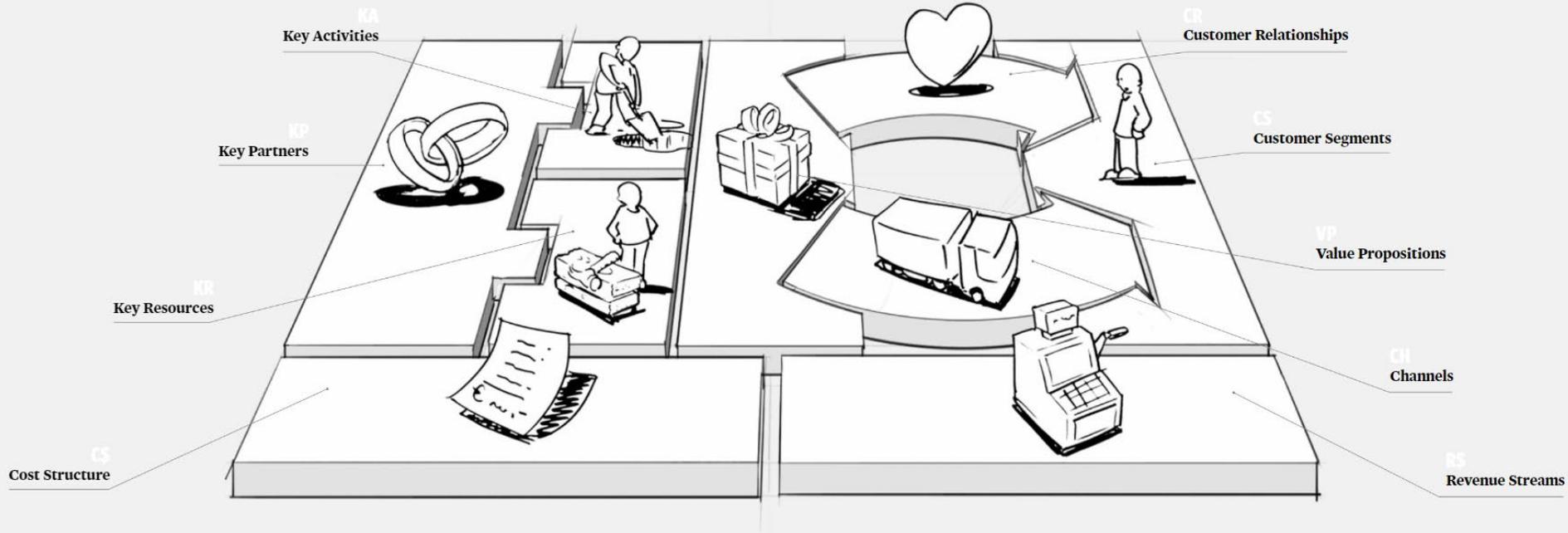


Business model canvas

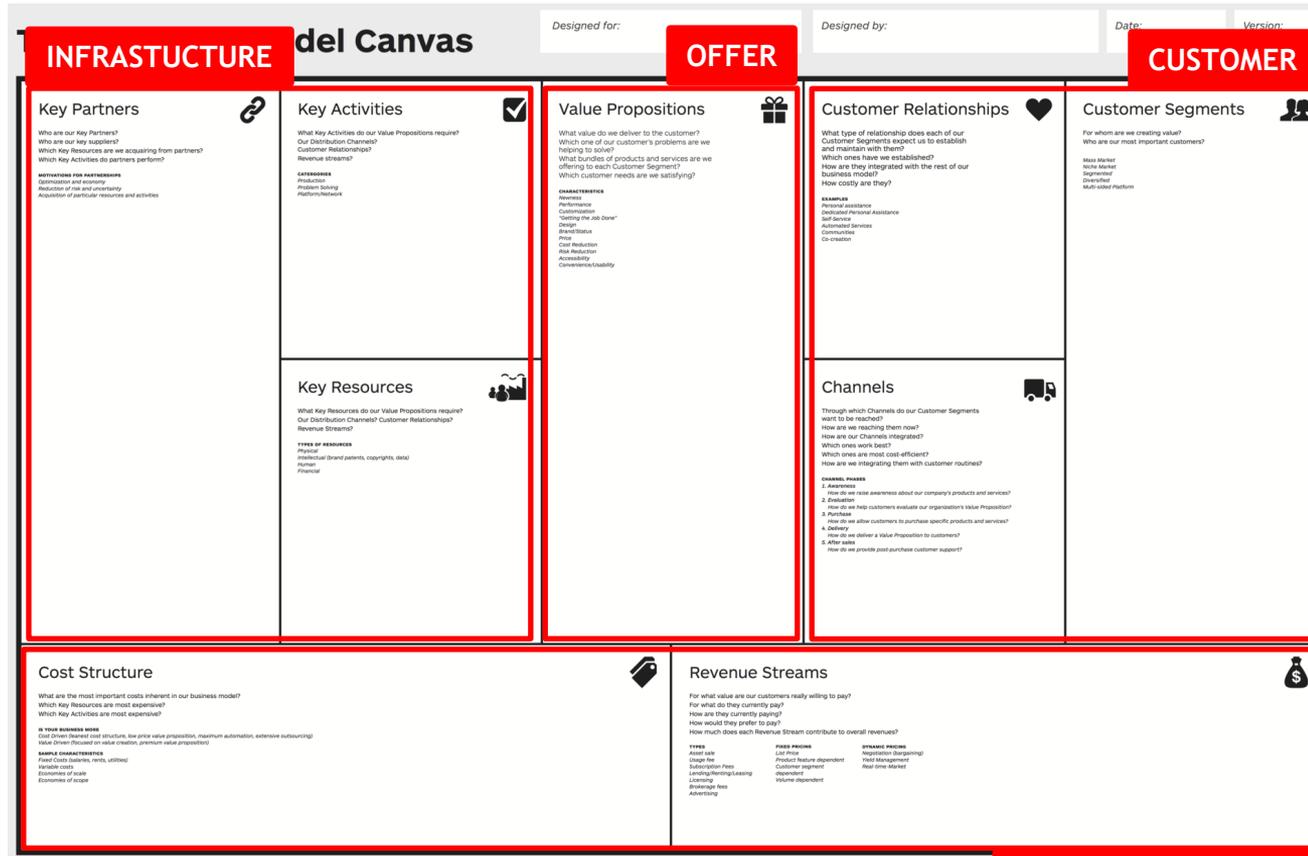
- Concept developed by Alex Osterwalder & Yves Pigneur in their book Business Model Generation which allows to describe and think through the business model of any business.
- It builds on the assumption that a business model can best be described through **nine basic building blocks** that show the logic of how a company intends to make money.
- The nine blocks cover the four main areas of a business model:
 - > Customer
 - > Offer
 - > Infrastructure
 - > Financial viability



BUSINESS MODEL CANVAS



BUSINESS MODEL CANVAS



FINANCIAL VIABILITY



ADDITIONAL RESOURCES

Business model canvas

- Business Model Generation. Available at: <https://www.strategyzer.com/books>
- Business Model Canvas Template. Available at: <https://www.strategyzer.com/canvas>



APPROACH 1. ELLEN MACARTHUR FOUNDATION PRINCIPLES FOR THE CIRCULAR ECONOMY

- Design out waste
- Build resilience through diversity
- Rely on energy from renewable sources
- Think in systems
- Waste is food

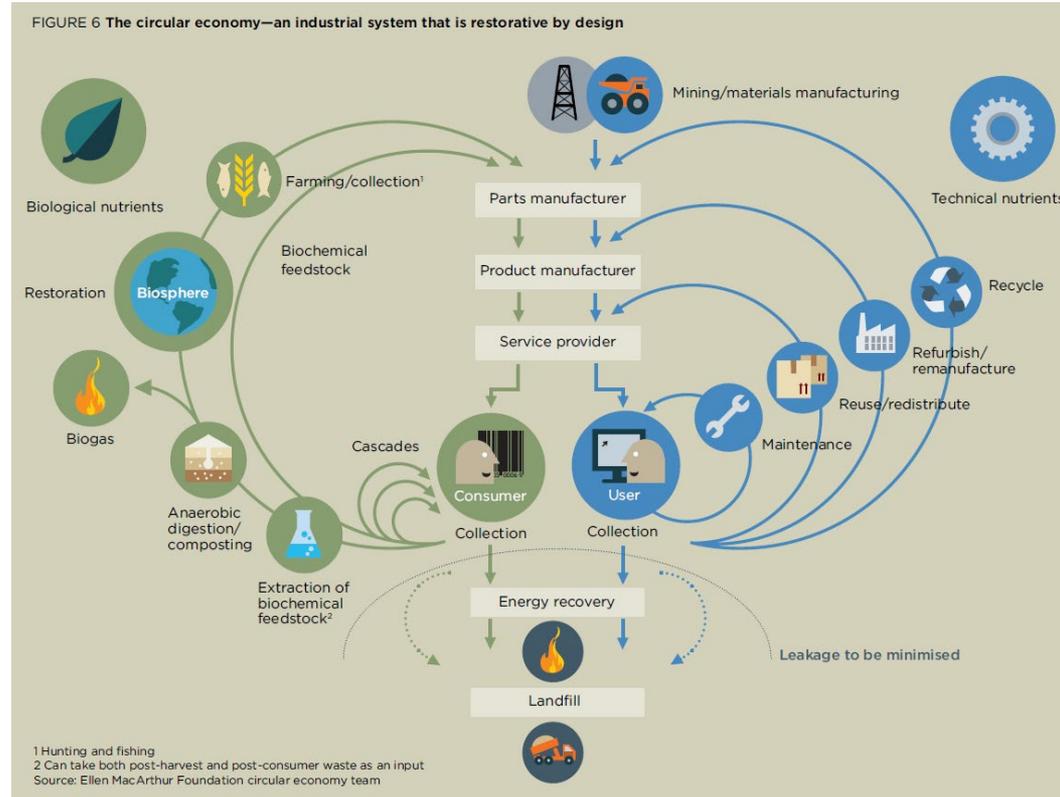


APPROACH 1. ELLEN MACARTHUR FOUNDATION PRINCIPLES FOR THE CIRCULAR ECONOMY

- Design out waste
- Build resilience through diversity
- Rely on energy from renewable sources
- Think in systems
- Waste is food



APPROACH 1. ELLEN MACARTHUR FOUNDATION RESTORATIVE INDUSTRIAL SYSTEM



APPROACH 1. ELLEN MACARTHUR FOUNDATION

4 SOURCES OF VALUE

- The **‘power of the inner circle’**:
 - > minimising comparative material usage vis-à-vis the linear production system
 - > the less a product has to be changed in reuse, refurbishment and remanufacturing and the faster it returns to use, the higher the potential savings on the shares of material, labour, energy, and capital embedded in the product

- The **‘power of circling longer’**:
 - > maximising the number of consecutive cycles (be it reuse, remanufacturing, or recycling) and/or
 - > maximising the time in each cycle.



APPROACH 1. ELLEN MACARTHUR FOUNDATION

SOURCES OF VALUE

- The **‘power of cascaded use’**:
 - > diversifying reuse across the value chain, as when cotton clothing is reused first as second-hand apparel, then crosses to the furniture industry as fibre-fill in upholstery, and the fibre-fill is later reused in stone wool insulation for construction—in each case substituting for an inflow of virgin materials into the economy—before the cotton fibres are safely returned to the biosphere.

- The **‘power of pure circles’**:
 - > uncontaminated material streams increase collection and redistribution efficiency while maintaining quality, particularly of technical materials,
 - > which, in turn, extends product longevity and thus increases material productivity.



APPROACH 1. ELLEN MACARTHUR FOUNDATION RESOURCES

- Ellen McArthur Foundation, 2013. Towards the Circular Economy: Economic and business rationale for an accelerated transition. Available at: <https://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-1-an-economic-and-business-rationale-for-an-accelerated-transition>
- Ellen McArthur Foundation. WHAT CAN I DO WITHIN MY BUSINESS? Available: <https://www.ellenmacarthurfoundation.org/explore/what-can-i-do-within-my-business>



APPROACH 2. ACCENTURE

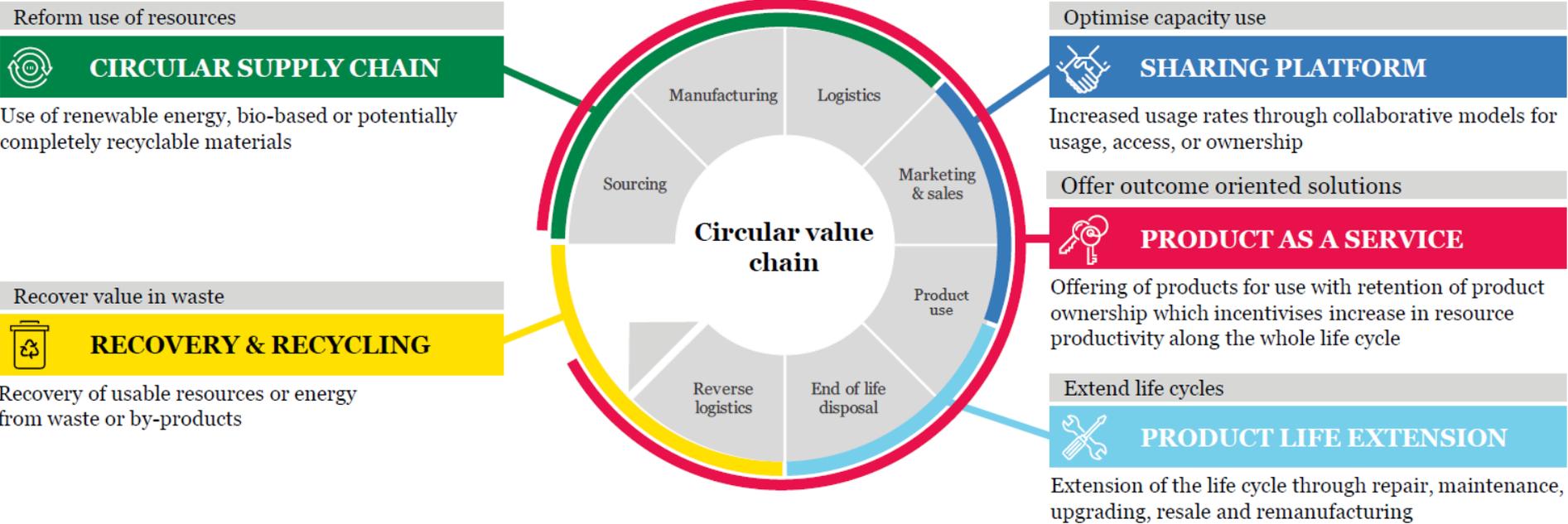
SOURCES OF VALUE

- ❑ **Wasted resources** are materials and energy that cannot be continually regenerated, but instead, are consumed and forever gone when used.
- ❑ Products with **wasted lifecycles** have artificially short working lives or are disposed of even if there is still demand for them from other users.
- ❑ Products with **wasted capability** sit idle unnecessarily; for instance, cars typically sit unused for 90 per cent of their lives.
- ❑ **Wasted embedded values** are components, materials, and energy that are not recovered from disposed of products and put back into use.



APPROACH 2. ACCENTURE

FIVE MAIN CIRCULAR BUSINESS MODELS



Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE

FIVE BUSINESS MODELS - SUB-MODELS

Companies can explore the sub-models individually or as powerful combinations

Business model	Sub-model	Description
 Circular Supply Chain	 Build to last	Design products that are durable and easy to repair (e.g. modular).
	 Circular supplies	Use recyclable materials in production, e.g. renewable and bio-based materials, chemicals & energy to increase recovery rates.
 Sharing Platform	 Share	Develop solutions that enable increased use of capacity.
 Product as a service	 Product as a service	Offer customers to use a product against a subscription fee or usage based charges instead of owning it.
	 Performance as a service	Offer customers to buy a pre-defined service and quality level and commit to guaranteeing a specific result.
 Product Life-extension	 Repair & Maintain	Deliver repair and maintenance services to extend the life of existing products in the market.
	 Upgrade	Improve product performance by upgrading existing components with newer ones.
	 Resell	Resell products that have reached their useful life to second and third hand markets.
	 Remanufacture	Take back and perform industry-like restoration or improvement of original functionality of products and remarket them with lower price.
 Recovery & Recycling	 Recycle / upcycle	Collect and recover materials of end-of-life products and reuse them in own production.
	 Return	Return wasted parts and materials to the source (e.g. waste and by-products from own production).

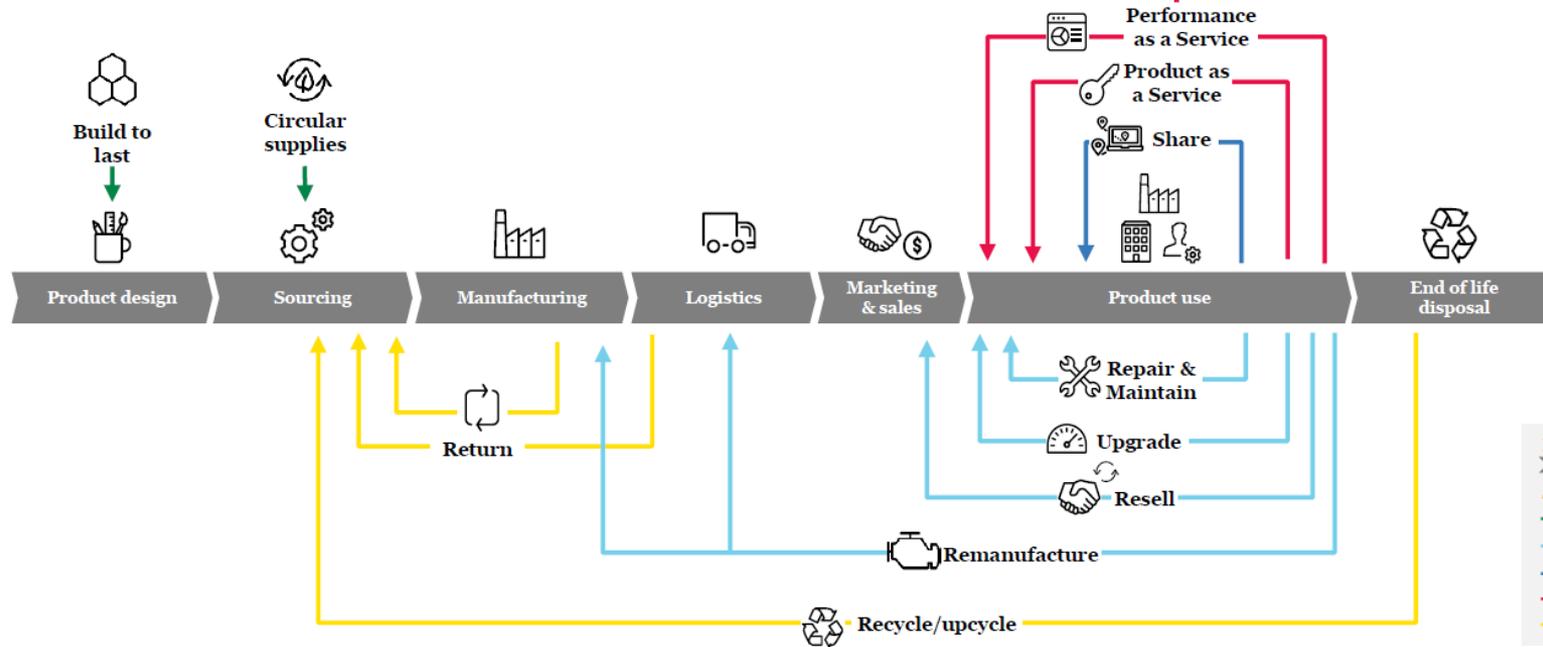
Example synergy:
Modular product design enables enhanced reparability and upgradeability



Source: Circular economy business models for the manufacturing industry

APPROACH 2. ACCENTURE FIVE BUSINESS MODELS - ILLUSTRATION

As a service models are mostly concerned with the product use phase, but address inefficiencies across the value chain



Additional circular business models

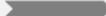
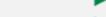
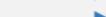
- ### Circular supply chain
- Recycled direct materials
 - Sustainable indirect materials

- ### Sharing platform
- Virtual sharing platform
 - Physical sharing platform

- ### Recovery & Recycling
- Recover
 - Downcycle

- ### Product life extension
- Restore
 - Repurpose
 - Refresh

LEGEND

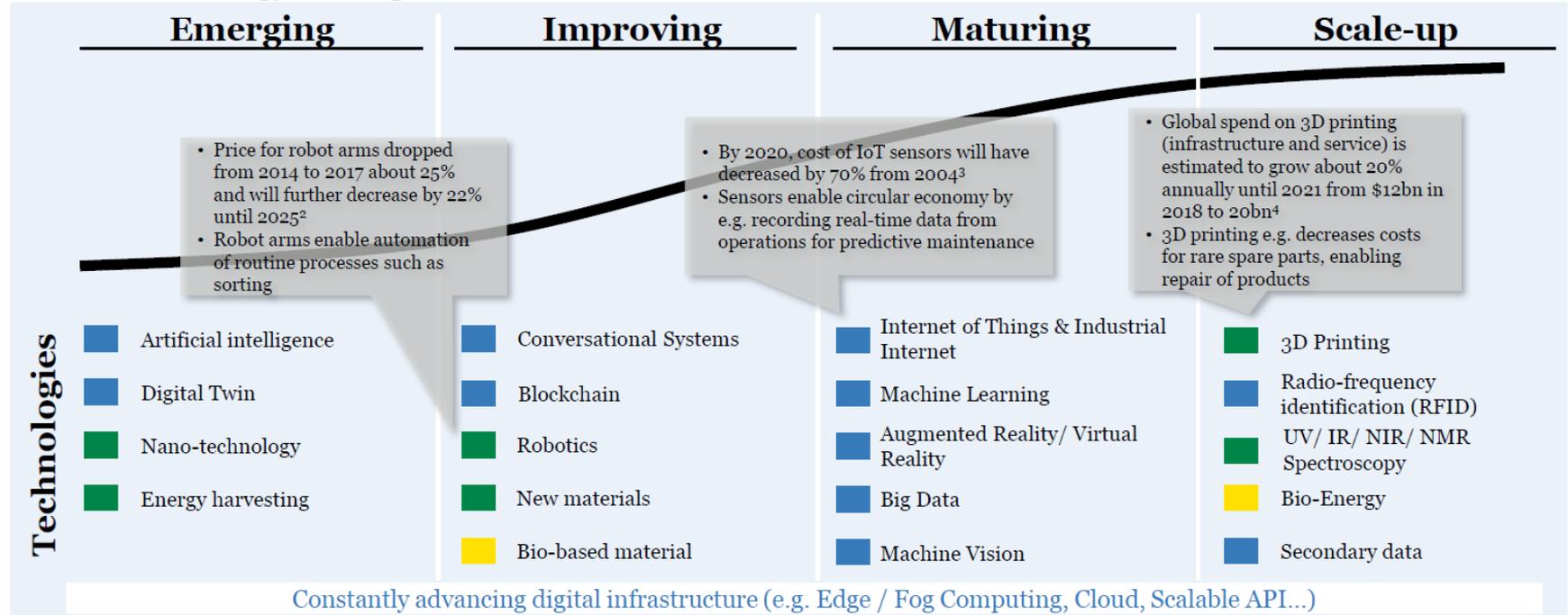
-  Linear value chain
-  Circular Supply Chain
-  Product Life Extension
-  Sharing platform
-  Product as a service
-  Recovery & Recycling

Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE TECHNOLOGIES FOR THE CIRCULAR ECONOMY

Level of technology development¹



Sources: 1: Accenture, Appendix 2 for more details, 2: IEEE Engineering360; 3: Bank of America, Merrill Lynch; 4: International Data Corporation (IDC)

Legend: Type of technology ■ Digital ■ Physical ■ Biological

Source: Circular economy business models for the manufacturing industry



APPROACH 2. ACCENTURE RESOURCES

- Lacy, P., et al., 2015. Circular Advantage: Innovative Business Models and Technologies to Create Value in a World Without Limits to Growth. Available at: https://www.accenture.com/t20150523T053139_w_/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Strategy_6/Accenture-Circular-Advantage-Innovative-Business-Models-Technologies-Value-Growth.pdf
- Circular economy business models for the manufacturing industry - Circular Economy Playbook for Finnish SMEs. Available at: <https://www.sitra.fi/en/publications/circular-economy-business-models-manufacturing-industry/>
- Waste to Wealth - Executive Summary. Available at: <https://thecirculars.org/content/resources/Accenture-Waste-Wealth-Exec-Sum-FINAL.pdf>



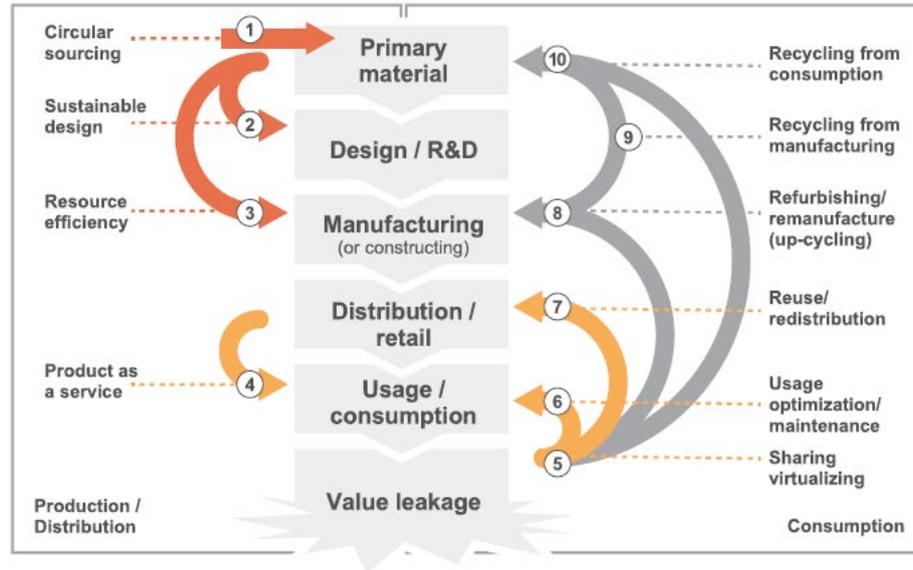
APPROACH 3. PWC

3 PRINCIPLES - 10 STRATEGIES

3 Principles



& 10 Corresponding Strategies



Source: PwC (2019) The road to Circularity



APPROACH 3. PWC

3 PRINCIPLES - 10 STRATEGIES (2)

CE initiatives		Definitions
Prioritise renewable inputs	① Circular sourcing	Replace finite resources / materials with renewable, bio-based, or recycled materials in the production process
	② Sustainable design	Design products - and select raw materials - such that they can be effectively disassembled, reused, repaired and up-cycled
	③ Resource efficiency	Optimise usage of raw materials / resources – minimise waste – in the production process
Maximise product use	④ Product as a service	Provide a service in areas that were traditionally sold as products; increases the product lifecycle through repurposing at the end of usage
	⑤ Sharing/ virtualising	Share durable assets such as cars, rooms, appliances, and digitise products to increase their lifetime (e.g., books, music, shopping, autonomous vehicles etc.)
	⑥ Usage optimisation/ maintenance	Increase performance / efficiency of a product and prolong life through maintenance
	⑦ Reuse/ redistribution	Purchase and sell second-hand and previously owned products to increase product lifecycle
Recover by-products and waste	⑧ Refurbishing/ remanufacture	Remanufacture products or components for a new usage, instead of down-recycling
	⑨ Industrial symbiosis Recycling from manufacturing	Waste or by-products from manufacturing become the inputs for another product
	⑩ Recycling from consumption	Recycle discarded materials after the end of consumption

Source: PwC (2019) The road to Circularity



APPROACH 3. PWC

ESSENTIAL TECHNOLOGIES



Artificial Intelligence (AI)

Technology: software algorithms that are automating complex decision-making tasks to mimic human thought processes and senses

Benefits: able to learn, understand, reason, plan and act when fed with data



Internet of Things (IoT)

Technology: ecosystem of sensors, embedded computers, and “smart” devices

Benefits: able to communicate among themselves and with private/public cloud services in order to collect, analyse and present data about the physical world



Additive Manufacturing/3-D Printing

Technology: creating three-dimensional objects based on digital models by “printing” successive layers of material

Benefits: various materials can be used, e.g. wood, glass, living cell for bio-printing; minimise waste



Robotics

Technology: machines with enhanced sensing, control and intelligence used to automate, augment or assist human activities

Benefits: increase efficiency and productivity



Blockchain

Technology: digital ledger that uses software algorithms to record and confirm transactions with reliability and anonymity

Benefits: increase traceability, transparency, efficiency, enhance security



Drones

Technology: unmanned aerial vehicles

Benefits: extremely versatile due to great variation in their capacity, size, abilities and functions



Virtual Reality (VR)

Technology: implies a complete immersion experience, which is 100% computer-generated

Benefits: innovations can be presented without actually producing them



Augmented Reality (AR)

Technology: offers a real world experience with computer-generated overlays

Benefits: mixture of real and computer world



Source: PwC (2019) The road to Circularity



APPROACH 3. PWC TECHNOLOGIES & STRATEGIES

CE initiatives									
Prioritise renewable inputs	① Circular sourcing	✓				✓			
	② Sustainable design	✓		✓				✓	
	③ Resource efficiency	✓		✓	✓	✓	✓		
Maximise product use	④ Product as a service		✓						
	⑤ Sharing/virtualising		✓					✓	✓
	⑥ Usage optimisation/maintenance		✓	✓			✓	✓	✓
	⑦ Reuse/redistribution	✓							
Recover by-products and waste	⑧ Refurbishing/remanufacture	✓	✓	✓	✓	✓			
	⑨ Industrial symbiosis Recycling from manufacturing					✓			
	⑩ Recycling from consumption	✓	✓		✓	✓			

Source: PwC (2019) The road to Circularity



APPROACH 3. PWC RESOURCES

- PwC (2019), The road to Circularity. Available at <https://www.pwc.nl/en/assets/documents/pwc-the-road-to-circularity-en.pdf>
- PwC (2019), The Essential Eight: your guide to the merging technologies revolutionising business now. Available at: <https://www.pwc.com/gx/en/issues/technology/essential-eight-technologies.html>



APPROACH 4. PBL (NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY)

3 TYPES OF CE TRANSITIONS

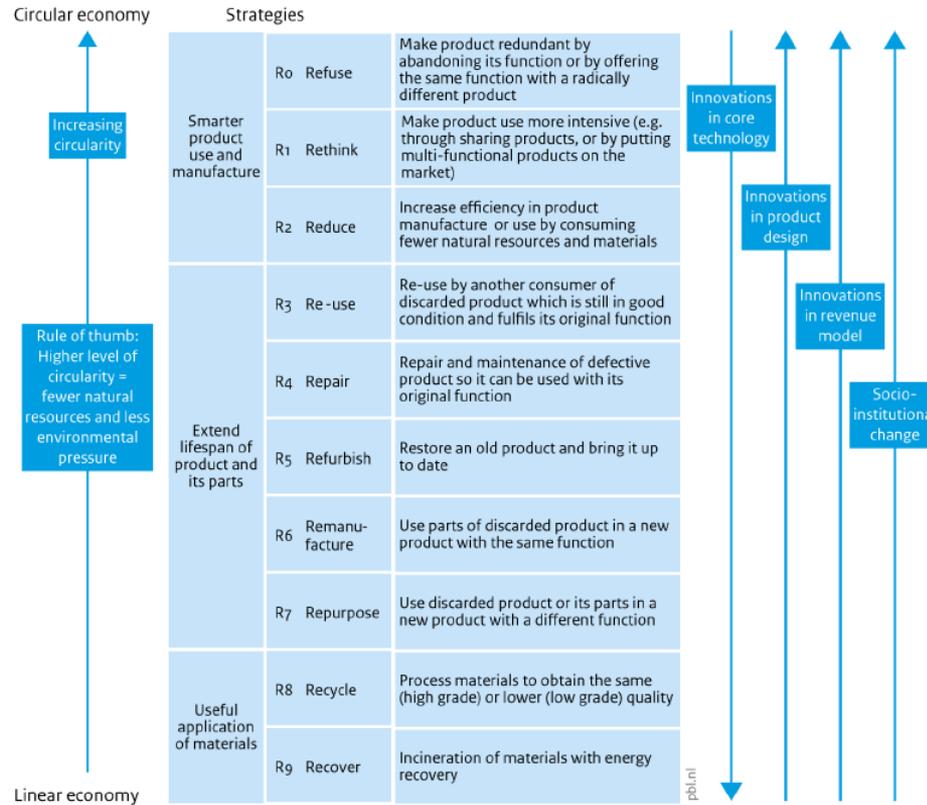
Three types of CE transitions may be distinguished with regard to the use of technology in product chains:

- CE transitions in which the emergence of **specific, radically new technology is central and shapes the transition**. This means radical innovation in core technology, i.e. the specific technology around which a product is centred. Socio-institutional change is needed to give the new technology a place in society. A typical example is the recent emergence of bioplastic which has already secured its place.
- CE transitions in which **socio-institutional change is central** and where technological innovation plays a secondary role (incremental innovation in core technology). A good, perhaps somewhat extreme example is that of packaging-free shops.
- CE transitions in which **socio-institutional change is central**, but are **facilitated by enabling technology**. An example is the transition to what has become known as the sharing economy. This transition from owning a product to purchasing its services primarily involves socio-institutional change, but this is not possible without information technology to link service providers and users.



APPROACH 4. PBL

CIRCULAR STRATEGIES IN PRODUCTION CHAIN



TAKING COOPERATION FORWARD



APPROACH 4. PBL RESOURCES

- Potting, J., et al., 2017. Circular Economy: Measuring Innovation in the Product Chain. Available at: <http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2016-circular-economy-measuring-innovation-in-product-chains-2544.pdf>

