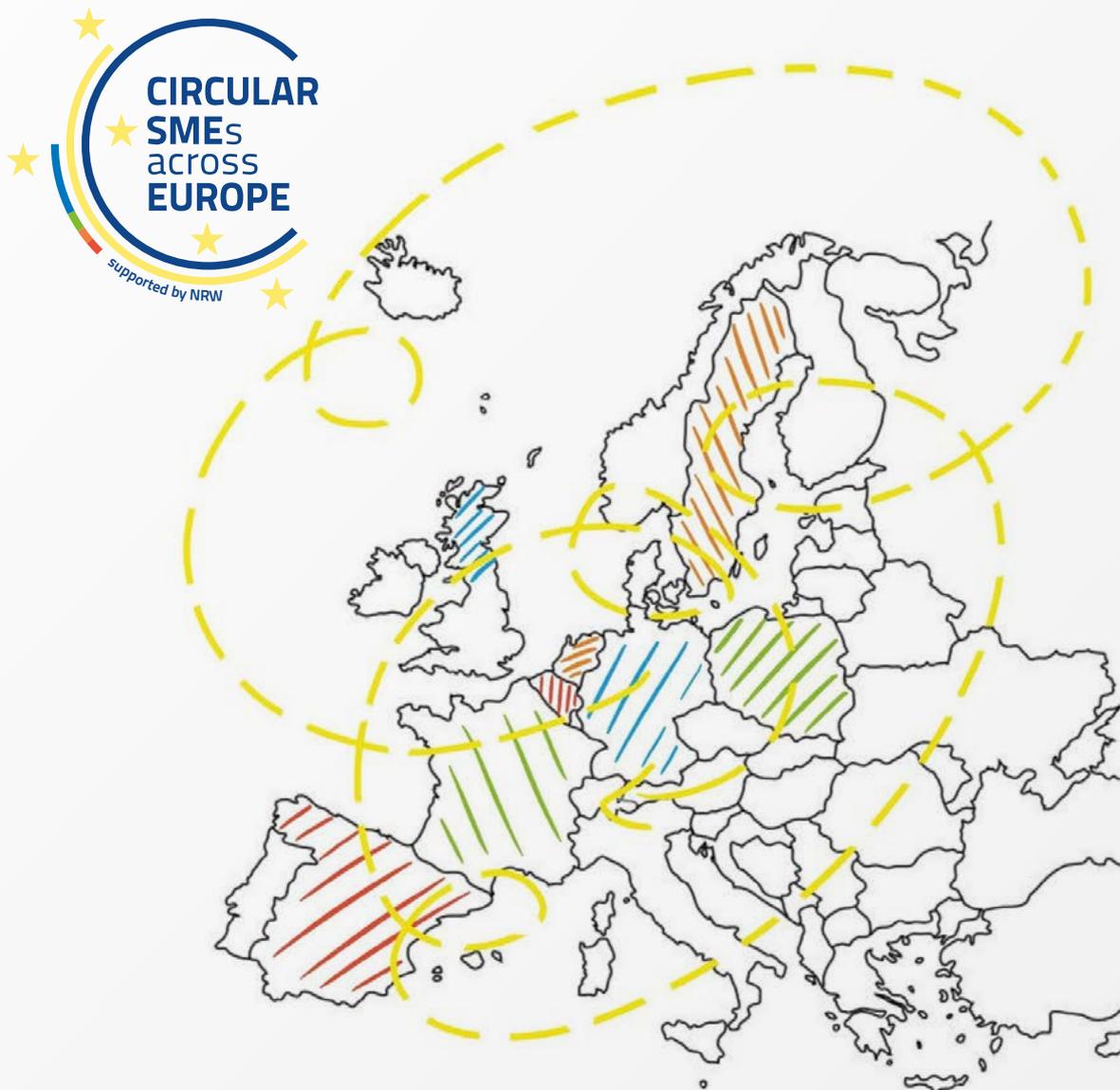


Virtual Tour

# CIRCULAR ECONOMY SMEs

across Europe

Good Practices from Barcelona to Bottrop





# The virtual Circular Economy Tour

The EU Action Plan for a Circular Economy has set ambitious targets. Most sectors will have to shift to completely different, circular business models in the coming years. While this will be a challenge for some, there are companies across the continent that are ahead of the game. These pioneers have already converted their business models to circular or have set out with a circular approach.

In 2021 and 2022, a network of European partners toured virtually across Europe to discover, explore, and promote best practices of SMEs with circular business models. The common goal was to pave the way for a more circular economy and inspire others around Europe to get started. We organised 9 tour stops in different locations and sectors, giving space for companies to showcase their work and for the audience to question their own business practices, learn from each other and connect through our large networking platform (<https://circular-economy-smes-across-europe.b2match.io/>).

## Tour Itinerary 2021 & 2022

### 2021

23 April	Kick-Off	NRW
27 May	<b>Plastics</b>	Catalonia
4 June	<b>Construction</b>	Flanders
1 July	<b>Textiles</b>	Netherlands and NRW
9 September	<b>Packaging</b>	NRW
11 October	<b>Water</b>	France and NRW
21 October	<b>Vehicles &amp; Batteries</b>	Sweden
15 - 18 November	<b>Circular Economy Hotspot</b>	Catalonia

### 2022

18 Feb	<b>Mechanical Engineering</b>	NRW
24 May	<b>ICT &amp; Electronics</b>	Flanders
30 May - 3 June	<i>IFAT Trade Fair in Munich</i>	Germany
13 July	<b>Food &amp; Nutrients</b>	Poland and NRW
12 - 14 September	<b>Circular Economy Hotspot</b>	Bottrop (NRW)

With this document, you can get to know European pioneers in the Circular Economy from all 9 sectors that we have visited over the past two years. In addition, the networking platform is still open and there is a video for each tour stop that can be watched on YouTube at any time. The QR codes for our networking platform and YouTube playlist can be found below.

**Tour with us and become part of the community!**



# The Green Economy Network North Rhine-Westphalia

The Green Economy Network NRW (KNUW.NRW) supports the development of the green economy in the German federal state of North Rhine-Westphalia (NRW). It offers networking opportunities and information, and supports research and development, internationalization, and market development. The network is funded by the Ministry of the Environment of the State of North Rhine-Westphalia.

As part of its international strategy, KNUW has initiated and managed the virtual Circular Economy Tour across Europe since 2019.

Further information are available here:



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# The partner network

The Circular Economy Tour would not have been possible without the strong network of Circular Economy professionals across Europe. The virtual journey was supported, hosted and powered by members of the Circular Economy family from Germany, the Netherlands, Belgium, France, Spain, Poland, Sweden and Scotland. Below you will find a list of all partners involved. Please use the QR codes to learn more about their work.



## Green Economy Network NRW

The Green Economy Network NRW is the initiator of the Circular Economy Tour. The network is an initiative of the Ministry for Environment of the German federal state of North-Rhine Westphalia with the aim to support the Green Economy, including the Circular Economy, within and beyond North-Rhine Westphalia. During the virtual Circular Economy Tour, the Green Economy Network NRW built and managed the partner network, coordinated all events including the video productions and supported the partners in hosting their travel stops.



## Enterprise Europe Network

The activities were supported by the Enterprise Europe Network. The Enterprise Europe Network helps businesses to become more sustainable, digital and resilient and to innovate and grow on an international scale. It is the world's largest support network for small and medium-sized enterprises (SMEs) with international ambitions. Different partners listed here are regional points of contacts of the EEN, such as ZENIT and Flanders Investment & Trade.



## ZENIT GmbH

The Centre for Innovation and Technology in North Rhine-Westphalia, or ZENIT for short, supports small and medium-sized technology-oriented companies as well as universities and research institutions in their innovation and internationalization activities on behalf of the EU, the federal government, and the state, and brings together potential partners from business and science. As NRW.Europa, ZENIT represents the Enterprise Europe Network in North Rhine-Westphalia and played a central role for the Tour by managing the b2match platform, the website where all information goes together. In addition, Zenit was organising and hosting the events on *water* and *food & nutrients*.





Zirkuläre Wertschöpfung. Denken. Handeln.

### Prosperkolleg e.V.

Prosperkolleg e.V. is an alliance between academic, economic development and public institutions in Bottrop and Emscher-Lippe-Region supported by the Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia with the aim is to pave the way for product developments and innovative business models of circular value creation together with companies in the region. Prosperkolleg e.V. hosted the virtual Circular Economy Tour's stop on *mechanical engineering* for circularity.



## bottrop.

### The city of Bottrop

Located in the heart of North Rhine-Westphalia, Bottrop is a former mining town and now InnovationCity. Supported by the Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia Bottrop hosts the *6th Circular Economy Hotspot* in September 2022 – final stop of the virtual Circular Economy Tour.



### Effizienz-Agentur NRW

The Effizienz-Agentur NRW is the centre of competence for resource efficiency of the North Rhine-Westphalian Ministry of the Environment. Its range of services encompasses consultation on resource efficiency, financing activities and putting on events and training courses for companies in North Rhine-Westphalia. The Effizienz-Agentur NRW hosted the tour stop on sustainable *packaging*.



### Holland Circular Hotspot

Holland Circular Hotspot is a private-public platform in which companies, knowledge institutes and (local) authorities collaborate to promote and support international collaboration and knowledge exchange on Dutch Circular Economy. Within the virtual Circular Economy Tour, Holland Circular Hotspot, hosted a tour stop on circularity in the *textile industry* and facilitated the contact to businesses and organisations.





### Flanders Investment and Trade

Flanders Investment and Trade is the key point of contact for international business in Flanders. The organisation plays a central role in the internationalization of the economy of Flanders, thus supporting the ambitions of Flanders-based and international companies and organisations. Flanders Investment and Trade hosted the virtual Circular Economy Tour's stop on *ICT & electronics* and facilitated the contact into the Circular Economy movement of Flanders.



### Circular Flanders

Flanders Circular is the hub and the source of inspiration for the Circular Economy in Flanders. It is a partnership of governments, companies, civil society, and the knowledge world that act together. The network hosted the virtual Circular Economy Tour's stop on *construction* and facilitated the contact to Circular Economy actors in Flanders.



### Circular Economy Hotspot Catalonia

Catalunya Circular Hub is an innovation hub and a meeting point of companies and institutions to share circular solutions and strategies. This is a ministerial-joint action initiative of the Government of Catalonia that involves the collaboration of more than 30 social and economic umbrella-associations. The aim of the Hub is to encourage partnerships that implement systemic solutions territorially and effectively apply circularity beyond traditional resource recovery and participatory community-based innovation schemes.

The Government of Catalonia hosted 5th edition of the Circular Economy Hotspot in Barcelona in November 2021. In May 2021, Circular Economy Hotspot Catalonia hosted the first stop and starting point to the virtual Circular Economy Tour on the topic of *circular plastics & chemistry*.



### RISE Research Institutes of Sweden

RISE are Sweden's research institutes and innovation partners. Through their international collaboration programmes with industry, academia and the public sector, they ensure the growth of the Swedish business community and contribute to a sustainable society. Within the virtual Circular Economy Tour, the partners from RISE hosted the event on *batteries & vehicles* and supported with contacts to the Swedish circular business community.





### Polish Circular Hotspot / INNOWO

The Polish Circular Hotspot works to promote circular concepts more widely. They combine the potential and resources of various stakeholder groups – state administration, local governments, businesses, science – under one name. Together, these actors work to support innovative, comprehensive, practical, and scalable solutions in all sectors of the economy. The Institute of Innovation and Responsible Development INNOWO is initiator of the Polish Circular Hotspot

Within the virtual Circular Economy Tour, the Polish Circular Hotspot hosted the event on *food & nutrients* and provided access to the Polish circular community.



### Zero Waste Scotland

Zero Waste Scotland is a not-for-profit environmental organisation, funded by the Scottish Government and European Regional Development Fund that exists to lead Scotland to use products and resources responsibly, focusing on where the greatest impact on climate change can be found. Within the virtual Circular Economy Tour Zero Waste Scotland supported the network with contacts to circular businesses in Scotland.



### Pollutec trade show

Zero Waste Scotland is a not-for-profit environmental organisation, funded by the Scottish Government and European Regional Development Fund that exists to lead Scotland to use products and resources responsibly, focusing on where the greatest impact on climate change can be found. Within the virtual Circular Economy Tour Zero Waste Scotland supported the network with contacts to circular businesses in Scotland.



### World Circular Economy Forum (WCEF)

The WCEF is a yearly event organised by the Finnish Innovation Fund Sitra. It brings together business leaders, policymakers and experts to present the world's best circular economy solutions.

All events of the virtual Circular Economy Tour were registered side events and promoted online.



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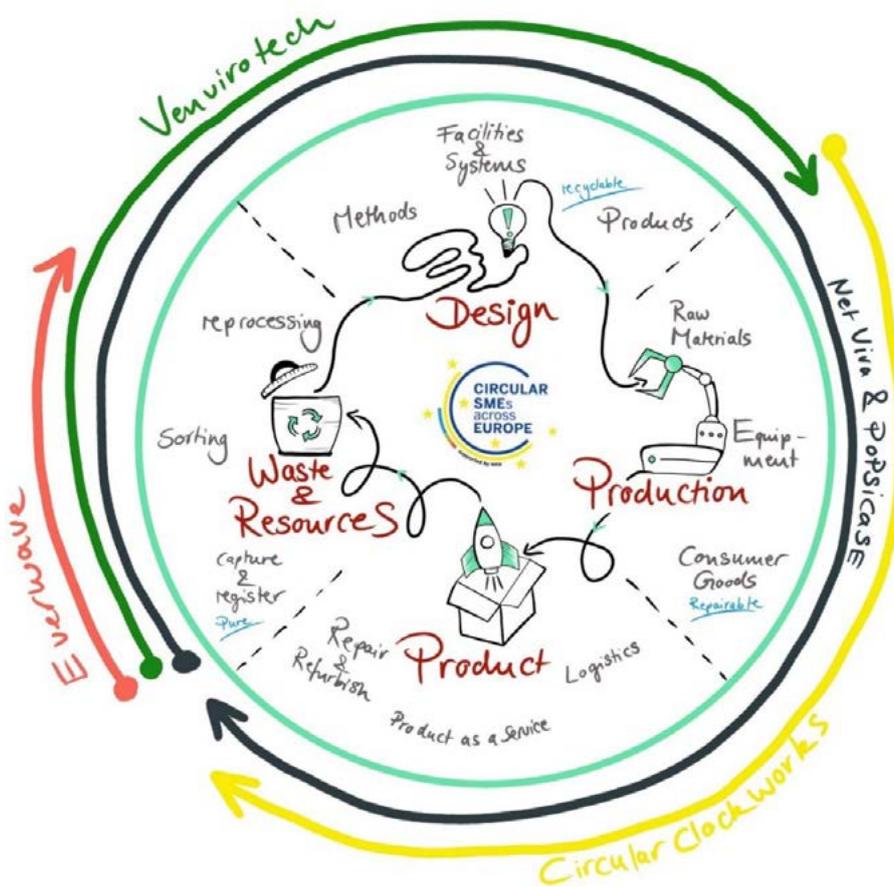
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# Plastics in a Circular Economy

To create a fossil-free world that lives within the limits of the planet, we need to reshape our relationship with plastics. Plastic is an incredibly useful material, but the way we currently use it causes a lot of waste and harm to the environment. Today plastics mostly are made from fossil raw material, often only used once before being thrown away, littered, and not recycled to full potential.

There are several approaches to change our harmful relationship with plastics: we can avoid unnecessary plastics, we can develop products that are reusable, recyclable or compostable, and finally, we can circulate the plastic we use to ensure it stays in the loop and is treated as the valuable material that it is.

In May 2021, the Circular Economy Tour stopped in Catalonia, Spain, to explore the world of circular plastics. Hosted by the Government of Catalonia, Department of Territory and Sustainability, four companies from three countries presented their circular business models, covering different aspects of the circular value chain of plastics. The following graphic locates the companies within the cycle that includes design, production, product management and waste and resource management.



## Plastics

## Phone Cases from Fishing Nets (Popsicase &amp; NetViva)



**POPSICASE** developed **iPhone cases made from fishing nets**. Every POPSICASE is made with 50 g of discarded fishing nets and 20 g of scrap aluminum. The phone cover can also be recycled in a circular process.

The product was developed in a collaboration with **Net Viva**, who created a **Circular Economy model for used fishing nets**. The company collects, cleans, and shreds fishing nets. Net Viva then partners up with companies that want to create a product from recycled fishing nets. Both organisations are located in Barcelona, Spain and we review the collaboration between Net Viva and POPSICASE as one business case.



## Plastics from biowaste (Venvirotech)



**Venvirotech** is a biotechnological start up from Barcelona, Spain dedicated to the transformation of **organic waste into Polyhydroxyalkanoate (PHA)** bioplastics that are characterized by being produced **by bacteria**, biodegradable in the environment and compatible with the human body.

Venvirotech achieves this thanks to its own technology that allows the PHA bioplastic to be **obtained in a 24-hour** process. The technology is installed where the waste is generated and therefore makes the transport of heavy biowaste unnecessary to produce bioplastics. The process is therefore a **local** biowaste management approach that allows companies to save on waste disposal costs and to add a new resources stream.



Clean Rivers with smart Technology (Everwave)



Everwave is a company from North-Rhine Westphalia, Germany committed to prevent plastic from entering the oceans. Their work starts at the main entry routes of plastic: the rivers. They use active and passive clean-up technologies to efficiently collect garbage and return it to a sustainable cycle.



One example for an active technology is the garbage collection boat CollectiX, which can collect around 20 tons of garbage per day and is supported by drones, AI, and sensor technology to locate and analyse the collected materials.



Watches from recycled materials (Circular Clockworks)



Circular Clockworks

Circular Clockworks is a start-up from the Netherlands dedicated to change the perception of recycled materials. The company created a watch that is produced from recycled materials and has a modular design which allows for repair and recycling. The watch is made from recycled plastics, leather residuals, natural latex, and a Swiss timepiece.



©Circular Clockworks

The founders say about themselves: "We want to show the world that recycled materials are not a waste of time. With this watch we show that these materials do not have to be hidden from society but can be used in high-quality products that people want to show."



Construction

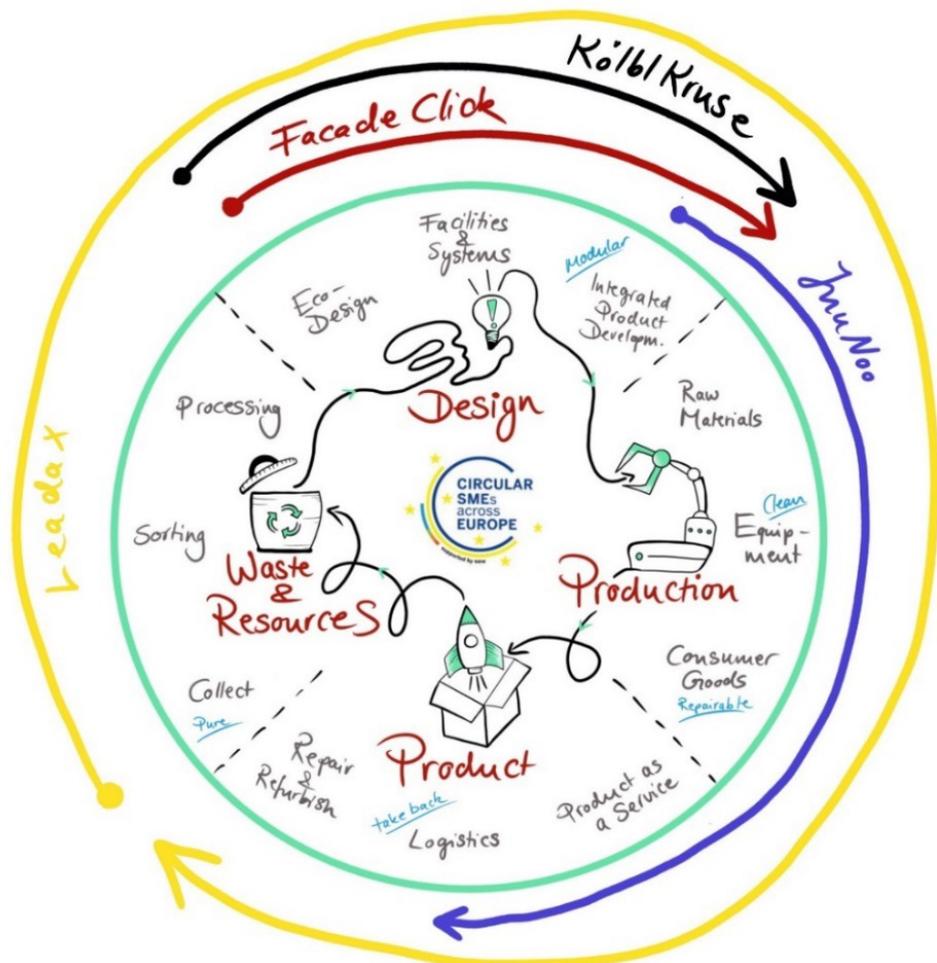
# Circular construction



Since 2007, most of the global human population has been living in urban environments and it is estimated that by 2050, more than two-thirds of us will live in cities. While cities are vibrant centres of growth and innovation, they are also built environments that require large amounts of resources. About half of the world's natural resources are used in buildings and construction and on the global scale the construction sector accounts for about 35% of the greenhouse gas emissions and 30% of waste. Additionally, the land use and raw material supply chains related to construction have major impacts on both the natural environment and the climate.

To be able to sustain the need for living space in and beyond cities, we need to redesign the way we build. The Circular Economy offers a wide range of possibilities to reuse and recycle materials and to rethink production processes and use cases.

In June 2021, the Circular Economy Tour stopped in Flanders, Belgium, to learn about companies working on circular construction. Hosted by Circular Flanders four companies from three countries presented their circular business models. The following graphic locates the companies within the circular value chain that includes design, production, product management and waste and resource management.



### Reusable walls (JUUNOO)

## JUUNOO

**JUUNOO** from Flanders, Belgium developed a **circular business model for walls**. A JUUNOO wall installs 7 times **faster** than a classic wall and can be **placed and repositioned endlessly**. The walls come in a classic shape or even in glass and can be **assembled and re-assembled** in various forms.

Especially popular are the office partitions, conference boxes or well isolated phone booths that are **durable, and versatile in use, as well as economically interesting**. JUUNOO also gives users the option to **buy the partitions back** if they are no longer needed to bring them **back into the cycle**.



### Brick walls without adhesives (Facadeclick)

## Facadeclick

**Facadeclick** from Belgium has developed a system that makes it possible to build **brick walls without water, mortar or glue**. Thanks to the simple design of the entire system, it is possible to **click** the facing bricks onto each other row by row as if you were building a LEGO wall. Not only is this simple, but the innovative form of the insert also virtually **eliminates mistakes** during construction.

Walls built with Facadeclick bricks can also be **dismantled and reused** to build another wall in any shape imaginable. All parts of the system are made of **single-variety materials**: the bricks are available in different colours and materials, the click system is made of high-density polyethylene and the hooks are made of stainless steel.



## Construction

A "Cradle to Cradle" building (Kölbl Kruse) 

## KÖLBL KRUSE

The **Kölbl Kruse** team from NRW, Germany plans buildings from the inside out – **from the needs of the users to the actual architecture**. Following this principle, the company built the new administration building of the RAG Foundation and RAG in Essen **according to "Cradle to Cradle" measures**.

Already in the selection of the building site on a formerly intensively industrially used area, priority was given to **land recycling**. In addition, materials and components were selected not only according to **health and ecological aspects**, but also according to their **recyclability**, so that the building **retains its raw material qualities** after its useful life and serves as a **depot for recyclable materials**.

Membranes from waste (Leadax) 

**Leadax**, a company from the Netherlands, manufactures **waterproofing membranes from non-recyclable waste**. Their product range consists of different types of covers and flat roofs that are **sustainable alternatives to the use of lead in construction**.

The raw material for their products is **recycled polyvinyl butyral (PVB)**, which was formerly used for safety glass, e.g. for car windows. All membranes produced are **durable and reusable**. When they reach the end of their life – more than 30 years – they can easily be **reused as raw material for new membranes**.



# Textiles and eco-fashion

## Textiles

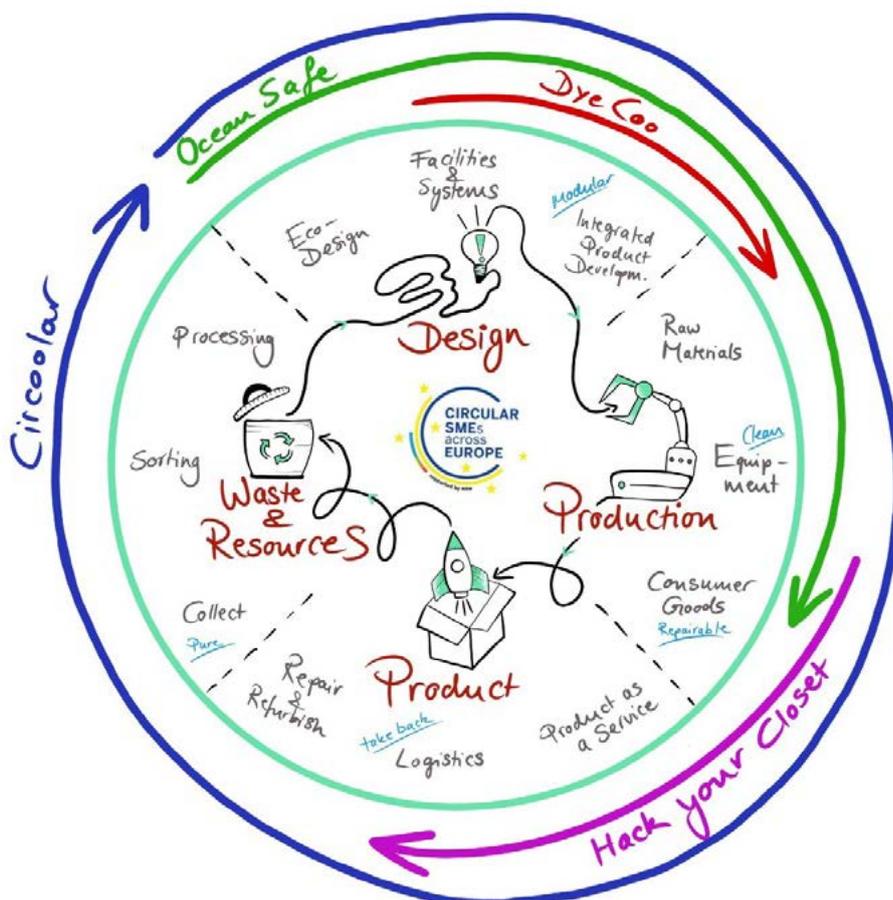
Textiles and clothing are an essential part of our daily lives. However, products are often made from non-sustainable raw materials and pollute the environment through toxins used in dyeing and coating processes. The textile industry is the world’s second largest polluter due to its large use of resources, high CO<sub>2</sub> emissions, and water pollution. More than 30% of ocean microplastics can be traced back to the textile industry. In addition, the ever-growing fast-fashion movement has disrupted our understanding of value in textiles and fashion. Production of clothing has doubled in the last 15 years, while the average time a piece of clothing is worn has declined by almost 40%. This phenomenon has not only a negative effect on our planet in terms of resources use and waste production but also threatens people and communities through wage dumping.

To transform the textile and fashion economy in a way that serves consumers while also respecting the boundaries of our planet, the Circular Economy concept offers space to explore new business models. Their focus can be on sourcing safe and renewable raw materials, ways to recycle used textiles, but also extending the use-phase of items by new ways of use and reuse.

In July 2021, the Circular Economy Journey stopped in the Netherlands, hosted by Holland Circular Hotspot, to meet companies involved in circular fashion. Four companies from four countries were presented with their circular business models, all covering different aspects of the circular value chain in fashion. The following illustration shows the circular value chain and locates the companies within the entire cycle, which includes design, production, product management and waste and resource management.



sector video



## Textiles

## Water- and chemical-free dyeing (DyeCoo)



**DyeCoo**, a company from the Netherlands, has developed the first **water- and chemical-free dyeing process** for polyester fibers. The technology uses **recovered CO<sub>2</sub>** as a dyeing medium in a **closed-loop process**. When pressurized, CO<sub>2</sub> becomes supercritical (SC-CO<sub>2</sub>). In this state, CO<sub>2</sub> has a **very high dissolving power** so that the dye can be easily dissolved.

With CO<sub>2</sub> dyeing, **no additional process chemicals are required** to dissolve the dyes. DyeCoo uses 100% pure dyes, no process chemicals, and no water. This is also possible thanks to the company's **specially developed and highly effective machine** – the DyeOx.



## Circularity for fibers and yarns (OceanSafe)



**OceanSafe**, a company from NRW, Germany, is a **textile technology company** for **circular, recyclable, biodegradable, and pollutant-free textiles**. The company specializes in helping brands and retailers develop and produce **fully circular and biodegradable textiles**.

OceanSafe works with different approaches: Its **quality standard** is one of the strictest in the world and **certifies truly circular finished products**.

However, their core products are various synthetic textile fibers and yarns. These materials combine the **benefits of traditional natural and synthetic fibers** and could **replace cotton and traditional polyester with circular, biodegradable, and toxin-free alternatives**.



### Fashion as a service (Hack your Closet)



#### HACK YOUR CLOSET

**Hack Your Closet**, is a company from Sweden that combines the **love for fashion and changing styles with sustainability**. They collaborate with fashion brands and send their customers **personalized second-hand fashion packets**, which are returned and replaced after an agreed time.

The company **turns fashion into a service concept** and is available for monthly subscriptions as well as for occasional users in Sweden and France.



### Circular workwear (Circoolar)



**Circoolar**, a company from Catalonia, Spain, produces shirts, aprons, vests, pants, overalls, smocks, uniforms, tablecloths, napkins, ... And any other workwear you need. **Always conceived, designed and manufactured according to the principles of Circular Economy.**

The company bases its work on three questions: What **material** is it made of? **Who** is behind the production? and What happens at the **end of the product's life**? Based on these questions, Circoolar produces **sustainable and fair** clothing and **collects the material** at the end of its life to recycle it further.



Packaging

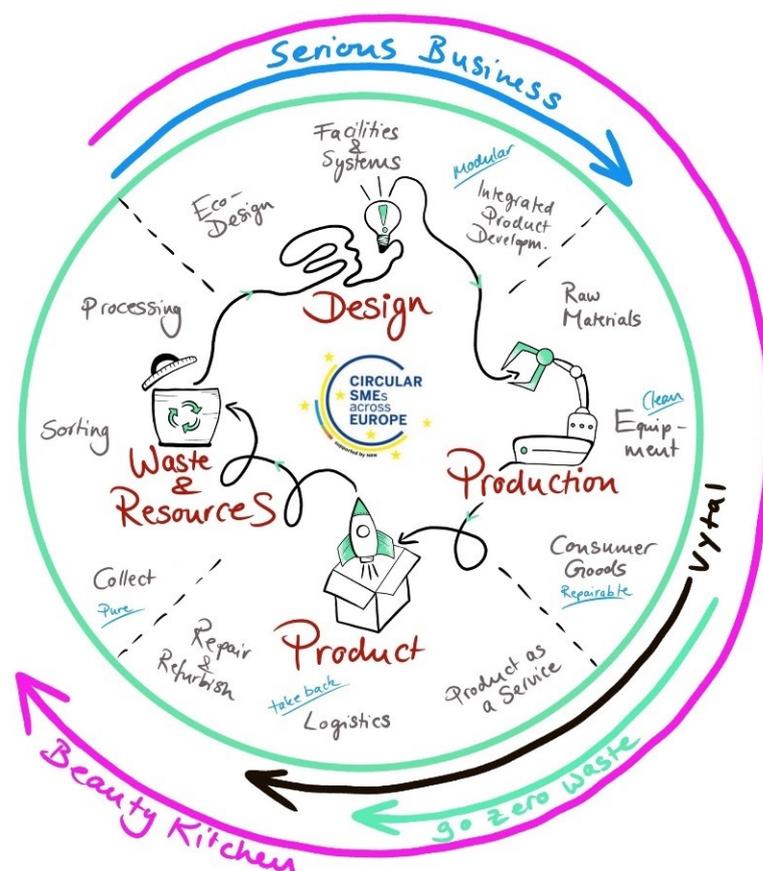
# Sustainable packaging



Packaging plays a crucial role in protecting products, making them transportable and preserving food and other goods. The global packaging industry is set to become a \$1 trillion market by 2024, due to factors such as rapid urbanisation, the rise of e-commerce and the growing middle class in developing countries. A lot of packaging is made from plastics, thus from fossil materials and often not perceived as a valuable item – designed to be used and disposed of in a linear process, resulting in huge amounts of waste and pollution. While single-use packaging may be convenient for manufacturers, retailers and consumers, it is highly inefficient in terms of resource consumption and places an extreme burden on the planet.

To transform the packaging industry, we need to review the value chain of packaging, but also of the products to be packaged – to redesign the whole system as a closed loop system. There are increasing calls from environmentally conscious consumers as well as policy makers and industry to rethink the system and create more sustainable packaging. The EU Strategy for Plastics in a Circular Economy aims for 100% recyclable, reusable or compostable packaging by 2030. The approaches to achieve this goal include eliminating packaging altogether, using alternative materials and improving take-back schemes.

In September 2021, the Circular Economy Journey stopped in North Rhine Westphalia to meet companies involved in circular packaging. Hosted by Effizienz-Agentur NRW four companies from four countries presented their circular business models. The following illustration locates the companies within the circular value chain that includes design, production, product management and waste and resource management.



Reusable food containers (Vytal) 

# Vytal

**Vytal**, a company from NRW, has developed a **reusable food packaging system** with the aim of eliminating disposable packaging of convenience food. The company offers **various forms of reusable food containers**, from coffee cups to compartment boxes that can be borrowed from **numerous partner restaurants**.

The company uses an **app and a unique QR code** for each item to track its movements and **avoid the need for a deposit**. Registered users can keep the reusable food packaging for **up to 14 days** until it needs to be returned to a partner restaurant or café. A fee will only be charged if the item is not returned within this time frame.



Design for healthy oceans (Serious Business) 



**Serious Business** is a company from the Netherlands that specialises in **helping companies design packaging solutions** that are suitable for a **Circular Economy** and are focused on **reusable and recyclable** solutions or **plastic-free alternatives**. The company's goal is to **prevent plastic pollution of rivers and oceans worldwide**.

Serious Business has worked with several major companies to support their **process of rethinking packaging**, including Unilever and Jumbo. They also work with **non-governmental organisations and research projects** to increase global impact.



## Packaging

An app against waste (Go Zero Waste) 


**Go Zero Waste**, a company from Catalonia, Spain, has developed an app to help you find **your way to zero waste**. The Go Zero Waste app offers **technological solutions and environmental education** to overcome the obstacles on the road to zero waste. The company seeks alliances with people, groups, brands, businesses and public administrations to promote a **paradigm shift** and walk together on the path to zero waste living.

The app offers users a) **information** about such local partners in the fight for a life without waste, b) **practical tips** on how to avoid waste, c) a **return system** for bags and containers and d) the **opportunity to network** with like-minded people.

Refill systems for cosmetics (Beauty Kitchen) 


**Beauty Kitchen**, a company based in Scotland in the UK, is dedicated to providing the **most effective, natural and sustainable beauty products** in the world. These products must be made from **natural ingredients**, be sustainable inside and out and, of course, work really well.

With over 95% of cosmetic packaging in the UK being thrown away after a single use, Beauty Kitchen has developed a **RETURN - REFILL - REPEAT** programme where cosmetic product packaging is **washed and reused**. This concept has a much better effect than recycling any disposable packaging.



# Circular water solutions

Water is the most important asset of life on earth and circulates as a finite resource in a system that is connected to all sectors of society and industry. Demand for the world's most important resource continues to increase – from water use in industrial processes and agriculture to the intensity of urban demand. At the same time, water is becoming increasingly scarce due to interruptions in the natural water cycle and affected by climate change due to the greater unpredictability of seasonal variations. According to the United Nations, global water demand is expected to exceed supply by 40% by 2030, and about half of the world's population will suffer from water stress.

The world needs to move away from a systematic 'take-make-consume-dispose' behaviour – also regarding water resources. Water can no longer be seen as an endless and abundant resource but must be managed carefully as demand is constantly increasing. This paradigm shift must lead to reduced and well-planned use of water resources, including defined rights, and recycling of polluted resources, as recycled water is the only water resource that can grow with increasing demand. By considering circular principles and technological innovation, it is possible to conserve natural capital, optimise resource use and system efficiency and thereby increase sustainability and create a new market dynamic throughout the water cycle.

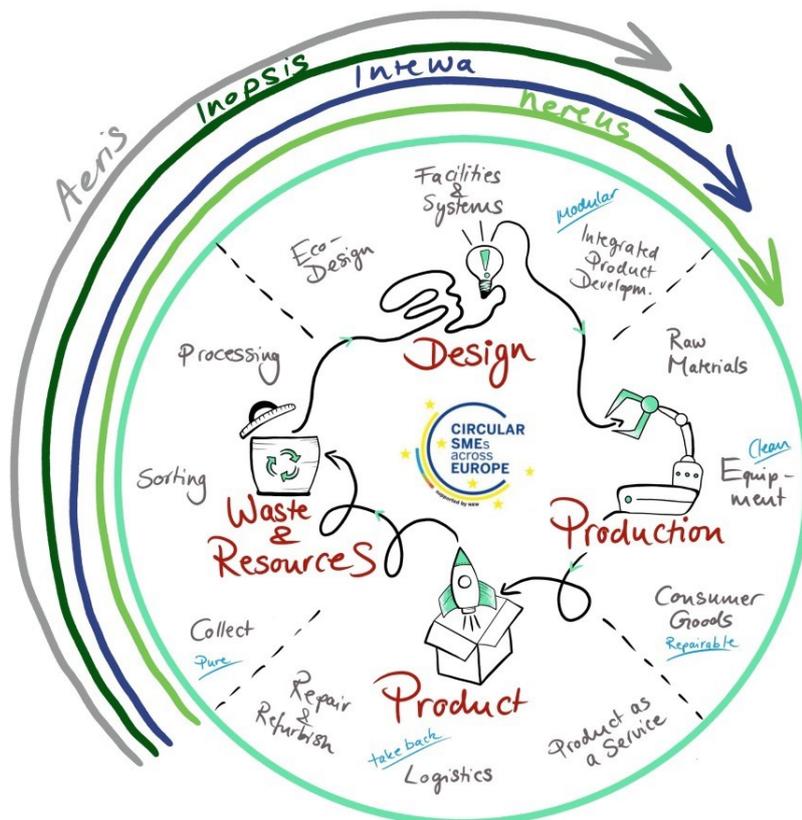
In October 2021, the Circular Economy Journey stopped in France and North Rhine Westphalia to meet companies working with circular water solutions. Four companies from four countries were presented with their circular business models. They all tackle the subject from a recycling perspective – however, with a focus on different industries and approaches within the water cycle and the value chain. The graphic locates the companies within the circular value chain that includes design, production, product management and waste and resource management.



sector video



Business Support on Your Doorstep  
NRW.Europa



## Water

## Recycled water and energy (Nereus)



**Nereus**, a company from France, focuses on **recycling concepts for wastewater**. As **water and energy** resources are often linked, for example through the high energy demand for pumping and recycling water, **NEREUS incorporates energy** into its work and ultimately focuses on the **recovery and recycling of these two essential commodities**.

The NEREUS system enables water users, such as farmers or industrial users, to **recycle and circulate** their water within their own production system **multiple times** before releasing it. In addition, the system uses liquid waste produced in the recycling process **to generate energy**.



## Decentralized water recycling (Intewa)



**INTEWA**, a company from NRW, Germany, offers a wide **range of water management solutions** related to the Circular Economy. The offer ranges from **rainwater harvesting systems and greywater recycling kits** with special membranes to **digitalised rainwater management solutions** that strengthen the natural water cycle.

The company's focus is on **decentralised and semi-decentralised systems** for all climatic conditions. Their systems can **usually save over 50%**, and in some cases even up to 100%, of the original water consumption and thus water costs. INTEWA **showcases this in their own building** where they linked various systems to have a **completely circular water management**.



### Recycling chemicals from water (Inopsys)



**Inopsys**, a company from Flanders, Belgium provides **on-site mobile & modular side stream solutions** for the chemical and pharmaceutical industry, to **purify water** or solvents and **recover valuable components**. The company develops systems that make sure that side streams in production are no **longer considered waste** but as a **product that can be reused**.

Inopsys' main focus is the **recuperation of valuable compounds** such as metals (Palladium, Platinum, Zinc, Vanadium, ...), solvents, and of course clean water. In addition, their work **reduces the impact of pharmaceutical** leakage in the environment.



inopsys.eu

### Treatment of contaminated resources (Aeris)



**AERIS**, a company based in Catalonia, Spain, is an **engineering firm** composed of **experts from the GENOCOV research group** at the Autonomous University of Barcelona. The company focuses on the **development of systems for the effective and cycle-oriented treatment of contaminated wastewater**.

All systems can be **tailored to the specific needs** of customers and aim to **recycle as many resources as possible**, including **energy** that can be **recovered from waste products**. In addition to its pioneering role in water management, the company also develops solutions for gas treatment and biogas production.



aeris.es

## Vehicles & Batteries

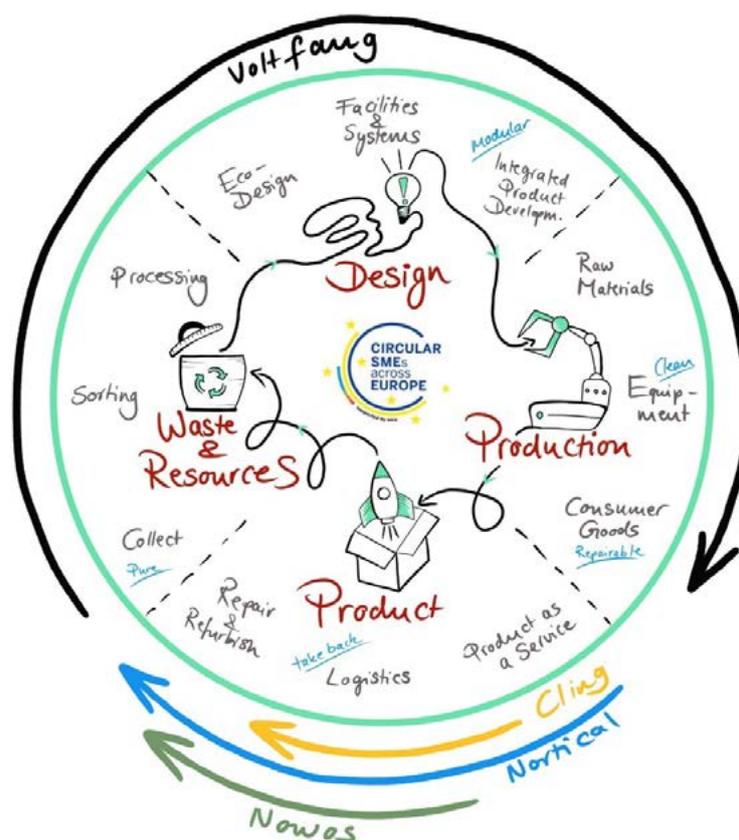
# Circular concepts for vehicles & batteries



The ongoing mobility transition from fossil fuel powered transportation towards more environmentally friendly concepts such as e-mobility is necessary and overdue. However, the wide adoption of lithium-ion batteries used in electric vehicles will require increased natural resources from finite sources for the related industries. If the production of new vehicles follows the currently applied linear business model, the demand will inevitably lead to the depletion of these resources. Already today, the rapidly increasing demand results in shortages of supply. In addition, the extraction of scarce metals like lithium is associated with serious ecological impacts which should be considered when designing the upper part of the value chain.

To strengthen the resilience and sustainability of mobility supply chains and reduce primary resource requirements, circular strategies are needed. Such strategies can focus on the extension of battery lives for e-mobility, find new power sources for mobility altogether or start with the development of systems for secondary resources that recycle valuable materials from used batteries or other power systems which have reached their end-of-life.

In October 2021, the Circular Economy Journey stopped in Sweden to meet companies working with circular solutions for vehicles and batteries. Hosted by RISE, four companies from three countries presented their circular business models. They all have their individual approaches to tackle the system and focus on different points of the value chains. The following graphic locates the companies within the circular value chain that includes design, production, product management and waste and resource management.



Creating circular before linear fails (Cling) 



**Cling**, a start-up from Sweden, is developing the **smart trading platform** that connects the **battery ecosystem** to ensure that batteries are **reused, recycled and repurposed**. The company focuses on **connecting players** to create the system needed for a **circular approach to future mobility**. They know that the scarcity of finite resources needed for battery production will soon become an existential problem as mobility changes. They have decided to **pave the way to circular mobility management before the problem can stop the transition**.

Their first product is a **B2B market platform** that connects business actors around the lithium-ion battery value chain.



Extended life for batteries (Nortical) 



**Nortical**, a company from Sweden, **improves battery efficiency** by combining AI-powered data analytics with battery expertise. They help their customers **understand their specific battery usage** and combine data on performance and degradation for **tailored battery usage management**.

With its tools, Nortical can **predict how batteries will degrade or perform** in the future and assess the value of batteries at any point in their life. This can significantly **reduce the premature disposal** of batteries and **encourage the use of batteries during their second life**. The company aims to ensure that batteries are **used as optimally as possible** before they are recycled.



## Vehicles & Batteries

### A second life for batteries (Volfang)



**Volfang**, a young company from NRW, Germany, gives batteries from **electric vehicles a second life as industrial electricity storage systems**. Batteries from e-cars are often replaced after 5 years because they tend to lose power. However, **discarded batteries usually still have a residual capacity of over 80%** and recycling them would be a waste of **energy and materials**.

Volfang has developed a system to **manage these batteries** so that the company can give a 10-year guarantee on the **storage capacity**.

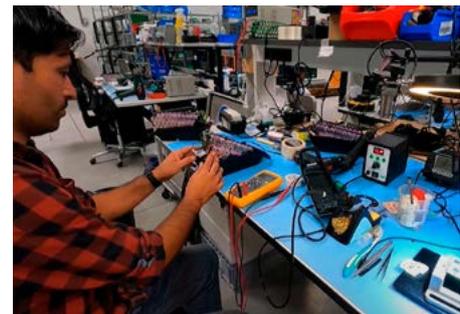


### Consulting towards repair and logistics (Nowos)



**Nowos**, a company based in the Netherlands and France, supports companies in their **social, environmental and economic transformation** by developing its **concept for the end-of-life of lithium batteries**. The goal is to **extend the life of batteries** and ultimately **recycle and reuse** all materials as much as possible.

Nowos' service includes four aspects: **battery repair** service, **battery management advice** tailored to customers' needs, **training** in lithium-ion battery handling, and **battery logistics** including collection points for batteries at various locations in Europe.

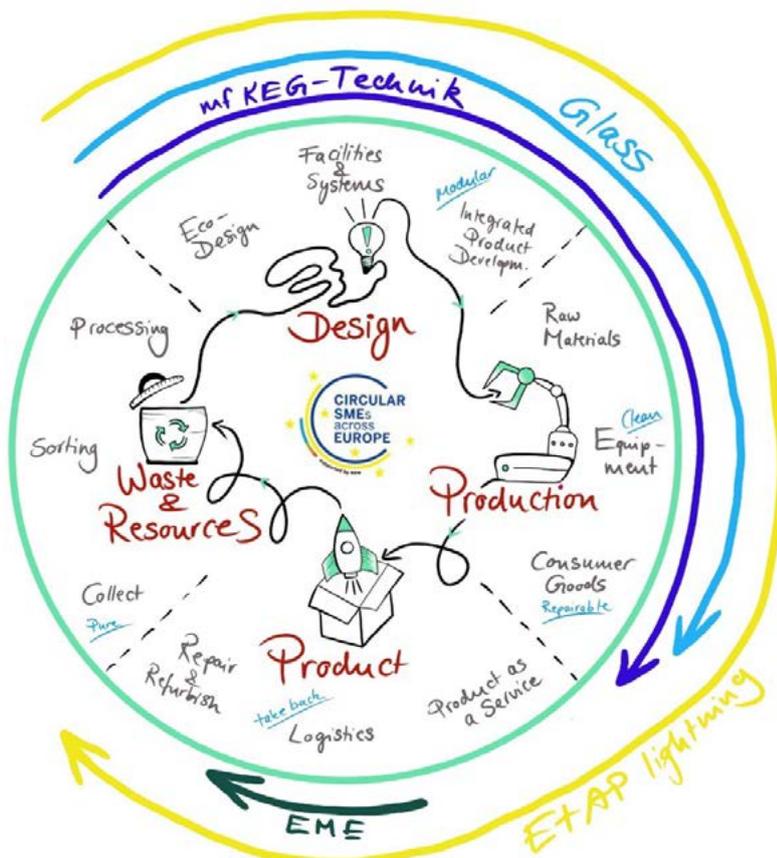


# Mechanical engineering for circularity

Clearly, the time has come for a shift from linear to circular business models. People worldwide agree that it's time to rethink how we design, make, and use the things we need, from the food we eat to the clothes we wear. This transition however requires not only innovative minds and brave frontrunners but also new value chains, interlinked systems and infrastructure that enable us to produce, repair, refurbish or recycle within a Circular Economy.

Mechanical engineering plays a crucial role in the transition of our economy system – at least from three angles we need the sector on board for the development of a Circular Economy. Firstly, new product designs need new production processes and thus machines that can support, for example the construction of click systems for brick walls. Secondly, machines and systems are required for the repair, refurbishment and recycling of products. Lastly, machines themselves are products and must be designed in such a way that they can be repaired, refurbished, and recycled to achieve a service life of decades.

In February 2022, the Circular Economy Journey stopped in North Rhine-Westphalia to meet companies working with circular approaches to mechanical engineering. Hosted by Prosperkolleg e.V. four companies from three countries presented their circular business models. The following graphic locates these companies within the circular value chain, a cycle that includes design, production, product management and waste and resource management.



## Mechanical Engineering

### Durable machines from Bottrop (m+f KEG Technik)



**m+f KEG-Technik**, a company based in North Rhine-Westphalia, produces specialized, durable filling machinery for food and beverage industry. KEGs are safe, returnable stainless-steel containers carrying a concentric fitting sealing a liquid product from the ambient.

Since the pandemic m+f KEG-Technik developed, produced, and marketed a **sustainable solution for mass hand disinfection** based on a 20l stainless steel KEG replacing millions of tons of plastic waste. Each disinfection post supplied by m+f KEG-Technik can do up to 26,600 disinfection runs prior to getting a replacing KEG. m+f disinfection posts measure wrist temperature while processing hand disinfection and have SMS modules to transmit status of unit including sabotage alarms. This new spin-off product has been sold to the private and public sectors. The machines are manufactured in Bottrop from stainless steel and are **designed for durability**. The idea of longevity is evident both in the design of the machines and the choice of materials, which make them **reusable and ultimately easily recyclable** and usable as a **resource bank** at the end of their service live.



mfkegtechnik.com

### Circular machines for the food industry (Glass)



**Glass**, a company from North Rhine-Westphalia, Germany, **produces stainless steel machines** for the food industry. The third-generation family business produces its machines with **durability in mind** and works with **state-of-the-art technology** to produce **tailor-made solutions** for each customer.

Glass' machines are made of a **single material** – stainless steel – and do not use any kind of **adhesive joints that contaminate the steel**. They **reuse and recycle** their products and materials as much as possible. The company also **supplies spare parts** for the lifetime of each machine and ships its spare parts in **plastic-free packaging**.



glass-maschinen.de

Matchmaking for a second life (Excess Materials Exchange) 



**Excess Materials Exchange**, a young and innovative technology company from the Netherlands, has developed a **digital matchmaking platform** that finds new **high-quality reuse options** for materials or (waste) products. By **matching supply and demand**, the company can promote the circular ambitions of companies and enable functioning circular value chains.

The platform applies a **combination of AI and blockchain technology** to find the **best circular connections** between supply and demand, including aspects such as the **highest reuse of materials**, the **lowest transport effort** and **profitability** for the respective companies.



Lights for the future (ETAP lightning) 



**ETAP lightning** is a company from Flanders, Belgium, that has **changed its concept for light to a circular business model**. The company **manufactures** lighting modules and emergency luminaires for private and public spaces and designs customised lighting systems.

ETAP Lightning offers **light as a service**. The company produces lighting modules that consume **significantly less energy**, are made of **sustainable materials** and are **designed to be reused, refurbished and recycled**. ETAP Lightning's lighting concepts are optimised so that as **few light modules as possible are needed**, and if necessary, the service team comes to **repair and replace** them.



ICT & Electronics

# ICT & electronics



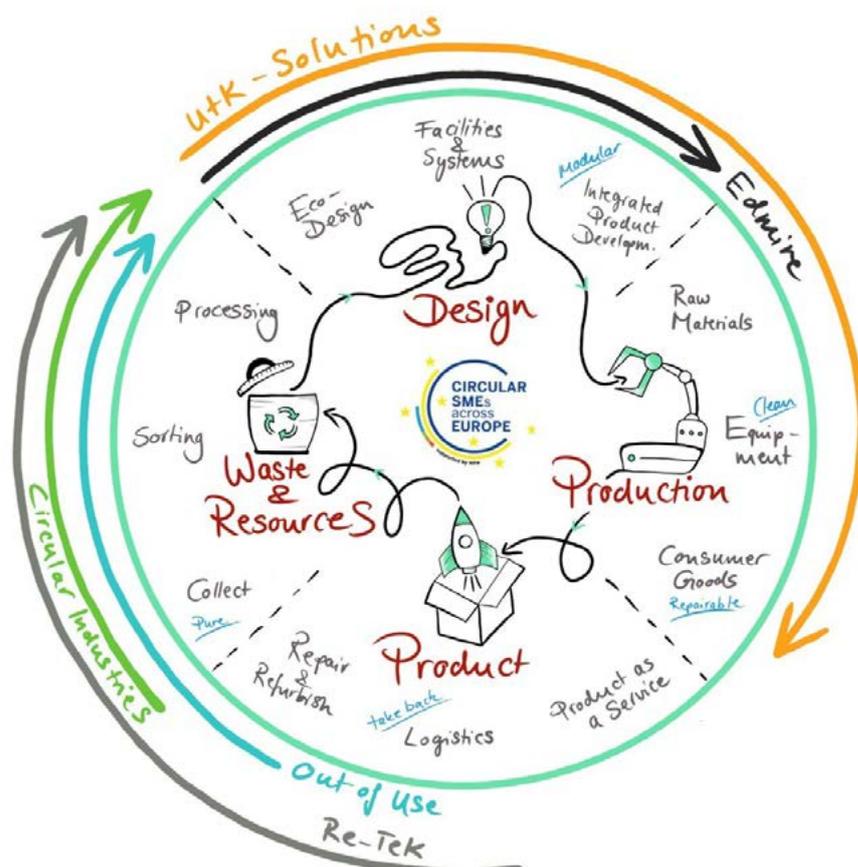
FLANDERS INVESTMENT & TRADE



We are increasingly surrounded by complex electronic products that we interact with in many, if not most, of our daily activities. We use smartphones and computers, kitchen aids and washing machines, specialized medical devices and even wearables like battery-powered shoes. These devices have become an essential part of our lives, and because we take them for granted, we sometimes forget how valuable the resources they contain are. Our digitalized world, at least today, is highly dependent on finite resources such as rare-earth elements. Some of them only occur in regions associated with armed conflicts and political instability. Producing and using ICT and electronics more circular is crucial to be able to benefit from them also in the future.

Circular approaches for ICT and electronics can significantly reduce global pressure on rare natural resources. Changing the perception of e-waste to be a high-value resource, at the same time, can prevent pollution and mitigate climate change. The global shift towards circularity in the ICT and electronics industry requires creativity and innovation in areas such as design, business models and reverse logistics.

In May 2022, the Circular Economy Journey stopped in Flanders, Belgium to meet companies working with circular approaches to ICT & electronics. Hosted by Flanders Investment and Trade five companies from four countries presented their circular business models. They all have their individual approaches to tackle the system and focus on different points of the value chains. The following graphic locates these companies within the circular value chain, a cycle that includes design, production, product management and waste and resource management.



### Designing the Circular Economy (Edmire)



**Edmire** is a company from Flanders, Belgium, that specialises in **product design for a Circular Economy**. The purpose-driven company takes on the challenge of designing the most **environmentally friendly** and **circular products** that are economically possible.

The team applies a **full life cycle approach** to product development. The goal is to consider the entire life of a product and create goods that have a **cyclical metabolism**, where **materials maintain their status as a resource in any form**. Edmire believes that by creating such products, a **healthy relationship** can be created between the **ecological and economic systems**.



### Refurbishment of devices (Out of Use)



**Out of Use**, a company based in Flanders, Belgium, that **collects, tests and refurbishes ICT and electronic equipment** to **maximise reuse and recycling** of all electrical equipment.

The company **collects** old equipment from its customers, which are usually larger users of electronics, such as companies renewing their infrastructure. At the facility, all equipment is **inspected and sorted according to its reuse potential**. Reusable products go through a **process of data wiping and refurbishment**, including necessary updates and cleaning. Non-reusable equipment is **professionally recycled** and reused in another form as secondary material.



ICT &  
Electronics

## Circular design for medical instruments (UTK Solutions)



**UTK Solutions**, a company based in North-Rhine Westphalia, develops **circular solutions for the medical industry**. The company sees itself as a service provider for all phases of the **development, production and distribution** of medical products.

One of their key products is the **BlueLavage system**. With the flushing and suction system, UTK Solution GmbH has succeeded **in adapting a proven surgical technology to modern hospital processes**. At the core of the innovation is the **reusable charging and energy unit**, which **completely eliminates electrical waste** and whose **optimised energy transfer** ensures smoother and quieter handling.



## Urban mining from circuit boards (Circular Industries)



**Circular Industries** is a Netherlands-based company that takes **molecular urban mining** to a new level. It specialises in **recycling printed circuit boards** and has developed its capabilities to recover **up to 60 elements** from the periodic table.

Printed circuits contain the **largest number of elements used in a single product**. Despite this, recovery rates for these elements remain low. This is mainly because these materials only occur in very small quantities and **require defined processes** for their recovery. Circular Industries wants to change this and **recovers circuit boards from waste** electrical and electronic equipment to give the valuable materials a **second life**.



## Lifecycle services for IT (Re-Tek)



**Re-Tek** is a company based in Scotland UK that offers **full and integrated lifecycle management for IT products**. Its services include **configuration** of its customers' equipment, **data erasure**, **resale** of used equipment and **recycling** of items that are no longer reusable. These **lifecycle services** make IT use more sustainable.

ReTek goes even further by **providing training** for communities, working with local authorities and participating in **charity and research projects**. All this with the aim of making IT use more **sustainable and circular**.



Food & Nutrients

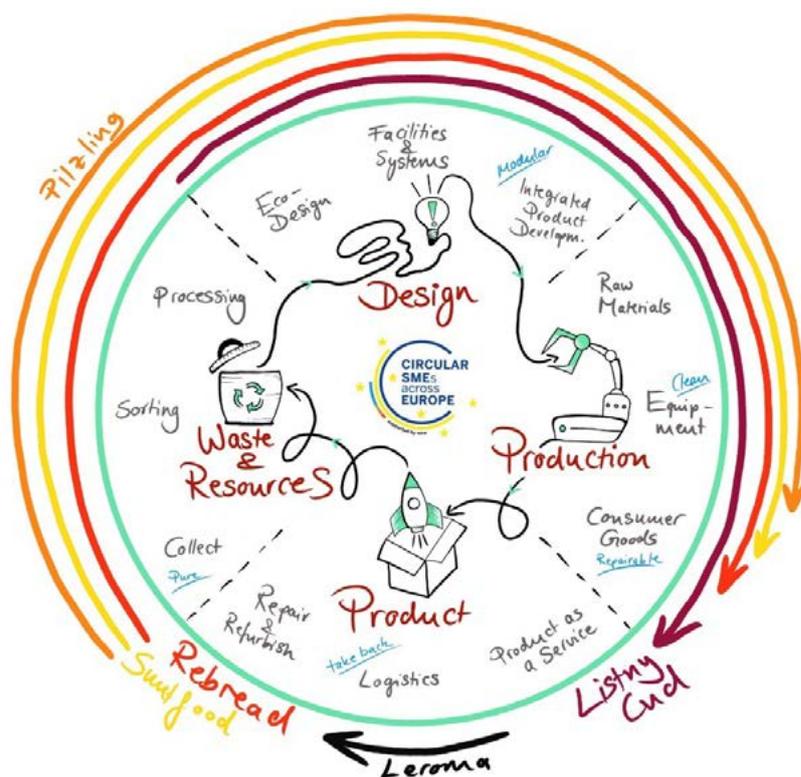
# Food & nutrients for a circular bioeconomy



Shifting our food system to one in which waste does not exist as such, but serves as raw material for another production cycle, is one of the most powerful changes we can make to mitigate and adapt to climate change while achieving prosperity for the ecosystem and global society. The current food system follows a linear approach where waste occurs along the entire value chain. If not sold on a highly competitive market, we dispose incredibly large amounts – even of edible food. Globally, almost a third of the food produced is wasted, while more and more people go hungry. This unequal distribution is not the only issue: large scale monocultures and the use of chemical fertilizers lead to soil exploitation, over-fertilization, and massive water consumption. This has led to an environment where agriculture is a major source of pollution and a driver of climate change.

It is becoming increasingly clear that a shift to a circular approach to food and nutrient management is needed, where food mimics natural regenerative systems in which waste serves as raw material for another cycle. Redesigning our food system requires innovative thinking, ranging from sustainable food production, smart logistics and mindful management of waste cascades to innovative approaches to urban refineries that create entirely new products from leftover or inedible food.

In July 2022, the Circular Economy Journey stopped in Poland and NRW to meet companies working with circular approaches in the field of food and nutrients. Co-hosted by INNOWO, representing the Polish Circular Hotspot, and Zenit five companies from four countries presented their circular business models. The following graphic shows the circular value chain and locates the companies within the cycle, which includes design, production, product management and waste and resource management



Microgreens – local, fresh & organic (Listny Cud)



**Listny Cud** is a company from Poland that grows **microgreens in a vertical urban farm** – all year round **without pesticides and artificial fertilisers**. Listny Cud had enough of climate pollution and plastic packaging of greens in supermarkets and **created a different system** in the heart of Warsaw.

The plants are produced **without disposable plastic and pesticides** – the farm is a **certified organic** producer and offers **locally grown** greens all year round. In addition, Listny Cud has **developed reusable home growing kits** for microgreens and **supports other local farmers** in building functional and circular urban growing systems.



New products from old bread (Rebread)

# REBREAD



**Rebread**, a company from Poland, took advantage of a **need triggered by the pandemic** and set out to **solve the problem of wasted bread**, which is at the top of the list of wasted products. Their first product was an **artisanal alcohol made from stale bread**. Its success piqued the team's curiosity, and **they continued to explore** possibilities for products that use stale bread.

Today, their products include **various drinks, fresh bread, scrubs, compostable food containers and even material for 3D printing**. The source of all these innovative, waste-based products is **unsold bread** from their own artisan bakery as well as **leftovers** from other artisan bakeries in Krakow.



Food &  
Nutrients

## A second life for saved bananas (Sunt Food)



**SUNT Food** is a young company from the Netherlands that aims to **change the banana food system**. **Bananas are the most wasted fruit in the world:** of the 100 million tons of bananas grown, around 50 billion kilos are wasted.

Today, SUNT Food has the **world's first banana factory** to tackle banana waste close to home. At the banana factory, the company processes **otherwise wasted bananas** from European ports **into waste-free banana puree** for its own and third-party products. The product list includes **banana bread, smoothies, ice cream, and various granolas**.



## Urban mushrooms from a circular system (Pilzling)



**Pilzling** is a start-up company from North Rhine-Westphalia that **grows mushrooms in an urban farm** in the heart of Cologne. As a **nutrient base** for their mushrooms, they **turn by-products of urban life such as coffee grounds, wood chips and used spent grains from breweries into high-quality protein sources**.

To produce mushrooms and grow their business, Pilzling **partners with other urban businesses**. These collaborations **create a network for circular value chains** and increase positive social, environmental and economic **benefits for all involved**.

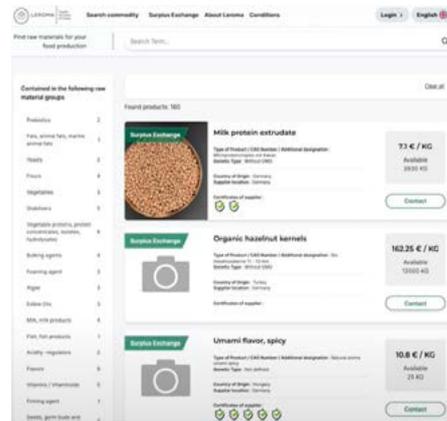


## Exchange of secondary materials (Leroma)



Leroma, a company based in North Rhine-Westphalia, has developed a **digital platform for B2B material exchange in the food industry**. The platform creates a **trading place for surplus, side or waste streams** and enables companies to **reduce their losses** while giving products that would otherwise be wasted a **second chance**.

But Leroma goes further and is constantly **researching new applications** for the traded products. With this knowledge, the company **helps its customers connect** with other businesses, even if their products no longer meet food standards.



# Meet you at the Circular Economy Hotspot in Bottrop, North Rhine-Westphalia!

12 – 14 September 2022



The Circular Economy Hotspot is a seminal and international event format with world-renowned experts and delegates from business, politics, science and public initiatives.

Visit innovative companies, initiatives and institutions in the hosting region and gain insights through impressive practical examples and discussions with experts on how to accomplish the transformation to a circular economy. Always with the goal of learning from one another how to eventually produce in a more resource-conscious way while saving costs and at the same time supporting sustainability and climate targets.

The 6th edition will be held in the former mining town of Bottrop in North Rhine-Westphalia by the City of Bottrop, in cooperation with the project “Prosperkolleg – Circular Economy” and supported by the regional Ministry of Economic Affairs, Industry, Climate Action and Energy NRW.

<https://www.circularhotspot.nrw/>

## Become part of the Hotspot family and express your interest in hosting the event in 2024

For the first time in the history of the Circular Economy Hotspot, the 2023 edition will have multiple hosts and go beyond Europe: Dublin (Ireland), Lagos (Nigeria), Santiago de Chile (Chile)

This should also be the direction for 2024, so there is an open call for applications for one of the host spots.



Do you want to present yourself or know other good solutions?

We will continue to collect good practices in 2023!

### Tell your story for circularity in a promotion video.

Do you have a story to tell about your company's approach to circularity, your challenges and achievements? We would like to turn a short video with you.

The clips will be uploaded to the B2match platform as well as our [Youtube Playlist](#). Of course, they will also be sent to you for your own use.

### More videos to come!



### Exchange with other pioneers.

We will keep you informed on **follow up meetings** to learn from each other for sector specific questions and cross-industry topics of interest.

On our matchmaking platform, you can also meet the growing number of over **800 participants for B2B meetings** and present you product at the market place.

**Register at the platform now** and stay up to date!

<https://circular-economy-smes-across-europe.b2match.io/>





# Imprint

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## The Green Economy Network North Rhine-Westphalia

The Green Economy Network NRW (KNUW), which is funded by the North Rhine-Westphalian Ministry of the Environment, supports the development of the green economy in NRW by providing opportunities for networking, information, research and development, internationalisation and market development. The Green Economy Network organises the annual Summit Umweltwirtschaft.NRW as the industry meeting place for North Rhine-Westphalia's green economy. The aim is to stimulate cooperation and networking, to promote the transfer of knowledge and market-ready technological solutions.

### **Further information and registration for the newsletter**

[www.knuw.nrw](http://www.knuw.nrw)

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