



Case study report – Whitecroft Lighting Limited.

*Good practice of circular economy business
models*

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As part of the TRANSFORM-CE project, several case studies are done to benchmark existing circular economy business models. This document covers the results of the case study conducted at Whitecroft Lighting Limited, based in Ashton Under Lyne, Greater Manchester, UK. A total of 20 case studies will be done, with five cases per country (The Netherlands, Germany, Belgium, and the United Kingdom).

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Deliverable WPT3 D2.1 Benchmarking existing circular economy (CE) business models



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1. Introduction and method

1.1 Goal of case study

TRANSFORM-CE is an international research project which researches amongst others (successful applications of) circular business models, barriers, enablers and needs for circularity, and offers in-depth support for the uptake of recycled feedstock by businesses. A core part of the project is to provide advice to businesses on their way to transition towards a circular economy (CE).

In order to help businesses with developing circular business models (CBM's), it is first important to benchmark existing CBM's of companies. This is done by conducting case study projects with 20 selected businesses throughout North-West Europe. The aim is to provide participating businesses with an in-depth analysis of their current situation and business model, to identify opportunities and provide recommendations for facilitating the transition towards a CBM for these and other companies. The case studies also present an unique opportunity to study barriers, enablers and needs for circularity (and recycling) in more detail.

1.2 Company background

Whitecroft Vitality (an initiative by Whitecroft Lighting Limited) is a circular economy solution that offers to work in partnership with manufacturing partners and customers to create circular lighting solutions for the built environment. Whitecroft Vitality was one of the first manufacturer within the electronics sector to achieve the prestigious “Cradle-to-Cradle Certified Product” Standard. Its achievement was due to the efforts made by the company to work with its own supply chain to facilitate a truly circular product. A short overview of Whitecroft Lighting Limited is given in table 1.

Table 1: Overview of company

Topic	Information
Company name	Whitecroft Lighting Limited
Website	https://www.whitecroftlighting.com/
Country	UK
Size of company (0-10, 10-200, 200-500, 500+ employees)	200-500
Mission/vision	To deliver accessible circular lighting solutions for the built environment, working in partnership with its customers to achieve circularity.
Product category	Provision of lighting solutions
Production/operational process	Injection moulding, metal forming, product assembly, SMT Line
Used materials	Recycled materials (steel, polycarbonate)

1.3 Case study process

The case studies are being carried out between September 2020 and December 2022. The case study process is structured in four steps¹, with an iterative approach at the end of each step. The first step (circularity of the business model) aims at creating a general overview of the company, the context and its (circular) business model, to capture how the company creates and delivers value. The second step (circularity in the value chain) involves a circularity assessment of the company and its activities in the value chain. The third step (circularity of operational activities) is focussed on the circularity of the company's operational activities. The last step involves a wrap-up of the results and concludes with the case company's strengths in regard to circularity, an overview of the barriers and enablers for circularity, and opportunities for further enabling circularity. The final result is a case study description, covering the previously established information.

An overview of the case study analysis process is shown in figure 1 on the next page. In order to obtain the results, each of the three steps is divided into four sub steps: 1) desk research and preparation; 2) interview; 3) reporting results; 4) iteration of results. More information about the process and the steps needed for receiving the results can be found in a separate document ('case study methodology') explaining the case study process in more detail. Three interviews are conducted for this case study, with one interview per step and the interviewed persons each having a different function and responsibility within the company. Table 2 gives an overview of the interviewed persons for Whitecroft Lighting Limited.

Table 2: Overview of interviewed people

	Interviewed person	Function
Interview 1: Circularity of business model	Matt Paskin	Marketing and Product Director
Interview 2: Circularity in the value chain	Matt Paskin	Marketing and Product Director
Interview 3: Circularity of operational activities	Matt Paskin	Marketing and Product Director

¹ We make grateful use of insights and methods derived from previous research, in particular the case study method of R2π (2017, 2019), the work of Circulab (2020) and the Ellen MacArthur Foundation (2017, 2019).

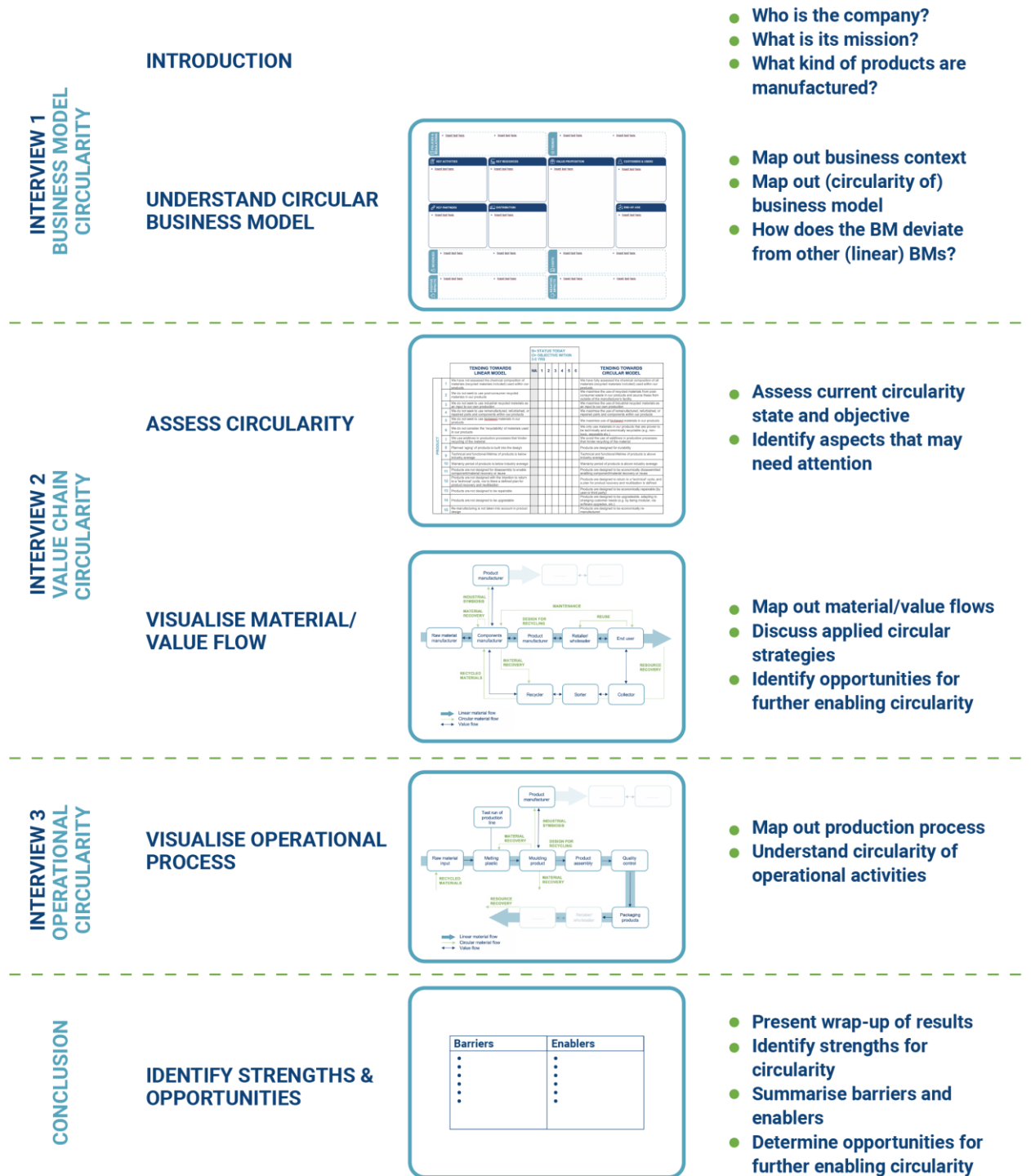


Figure 1: Overview of case study process

2. Circularity of business model

The first step aims at creating an overview of the company's business model and the context in which it operates, to capture how the company creates and delivers value (for circularity).

2.1 Circular business model canvas

The circularity of the business model is investigated by using a circular business model canvas (CBMC). This model is created for the purpose of this study and shows how the company creates, delivers, and captures value, highlighting circularity aspects of the business. The CBMC of Whitecroft Lighting Limited is visible in figure 2 and a description of each element is given below.



Figure 2: CBMC of Whitecroft Lighting Limited

Value proposition

Whitecroft Lighting Limited is one of the UK's largest manufacturers of commercial lighting, and through the Whitecroft Vitality initiative offer a comprehensive service that provides circular lighting solutions to their customers.

The "Whitecroft Vitality" initiative works in partnership with manufacturing partners and customers to create circular lighting solutions for the built environment. Under the Vitality initiative, the company are able to keep their products at the highest utility through their lifetime through repair and maintenance schemes. At end of life, the products can be refurbished or re-purposed and then re-sold. Ultimately the luminaries are then recovered, and the electronics / casing are recycled through appropriate channels.

An accompanying initiative "Vitality Relight" supports the regeneration of existing buildings by considering a space in its current form and determining the most appropriate solutions that will offer the greatest decarbonisation potential, reduce waste, and reuse assets (rather than maintaining a default position of disposing/replacing old lighting systems).



Figure 3: Vitality Relight initiative.

Across the entire business portfolio, the company aims to operate sustainably by creating lighting solutions that are best adapted to customer requirements but also produce the least possible impacts to the environment (including the consumption of natural resources). Whitecroft Lighting Limited also offer a design consultancy service, where bespoke lighting products and solutions are developed to fit the clients' requirements. This is known as 'Custom Made'.

Whitecroft Lighting Limited currently offer a 5-year warranty for any manufacturing defect on their products as standard but would like to extend this to a 10-year warranty as a minimum and to also offer re-warrantee within the field (a concept that this novel in this sector). managed through life project and product support.

Customers & users

Whitecroft Lighting Limited work with a range of commercial sectors. This includes primary education, where the company has completed projects in classrooms, sports halls, and social spaces. In higher education, the company has completed projects in lecture theatres, study areas, libraries, and office spaces. In the commercial sector the company has provided lighting to several multi-story offices developments within the core office space and amenity spaces. In the healthcare sector, projects have been delivered in ward areas, theatre and recovery rooms, and consultation, examination, and treatment rooms, as well as for spaces adopted for mental health services. Finally, in industrial and other workspaces, projects have been delivered in open plan and cellular offices, areas of distinction, loading bays, manufacturing floors, and logistics spaces. And in all these sectors, Whitecroft Lighting Limited has completed projects in outdoor spaces, entrances, and atria, as well as circulation areas.

The company seeks to develop long term sustainable partnerships with their customers and supply chain partners. They do this by tailoring the service they provide to the requirements of the customer, promoting innovative and circular solutions, maintaining a proactive relationship with their customers in terms of maintenance and upgrade plans and by offering 2xCPD courses (affiliated by Chartered Institution of Building Services Engineers) on the circular economy.

Whitecroft Lighting Limited maintain that the public sector is a key driver of circular solutions through public procurement and social value. In 2018, BAM FM, the facilities managers of the Cheshire Police Authority (CPA) headquarters, recognised a need to update the building's 15-year-old internal lighting system as a significant number of the old light fittings were starting to need replacing, and the lighting's control system could only be maintained by rewiring each fitting. Whitecroft worked with them on a lighting upgrade, reusing the existing fittings, to deliver increased functionality, efficiency, and a healthier work environment. In doing so, savings equivalent to two tonnes of raw materials and 1.5 tonnes of packaging waste was realised. In addition, the retrofitted lights realised cost-savings of £30 per unit (when manufacture was compared to the equivalent new product) and energy savings of 23 watts per unit.

Since then, over 25 similar projects have been carried out including for other public sector organisations including Manchester City Council, schools, and hospitals. Where for example, a school using a new design for a Regenerative Cartridge will facilitate a 67% reduction in plastic usage when compared to a traditional flat panel solution. For a school using 600 of these, the reduction in plastic use is the equivalent of saving 47,500 plastic bottles.

Whitecroft Lighting Limited have also noted an increase in the growth of high-street retailers and supermarkets as a client base. In these instances, the service provided by the company aims to minimise downtime, make financial and environmental savings on LEDs and to install lighting systems in spaces with difficult to reach ceilings.

Key activities

Whitecroft Lighting Limited offer a comprehensive in-house service, where all processes including product design, manufacturing, packaging, sales, maintenance, and support are provided by the company. In terms of manufacturing Whitecroft Lighting Limited has the capacity to produce over 600,000 luminaires per year.

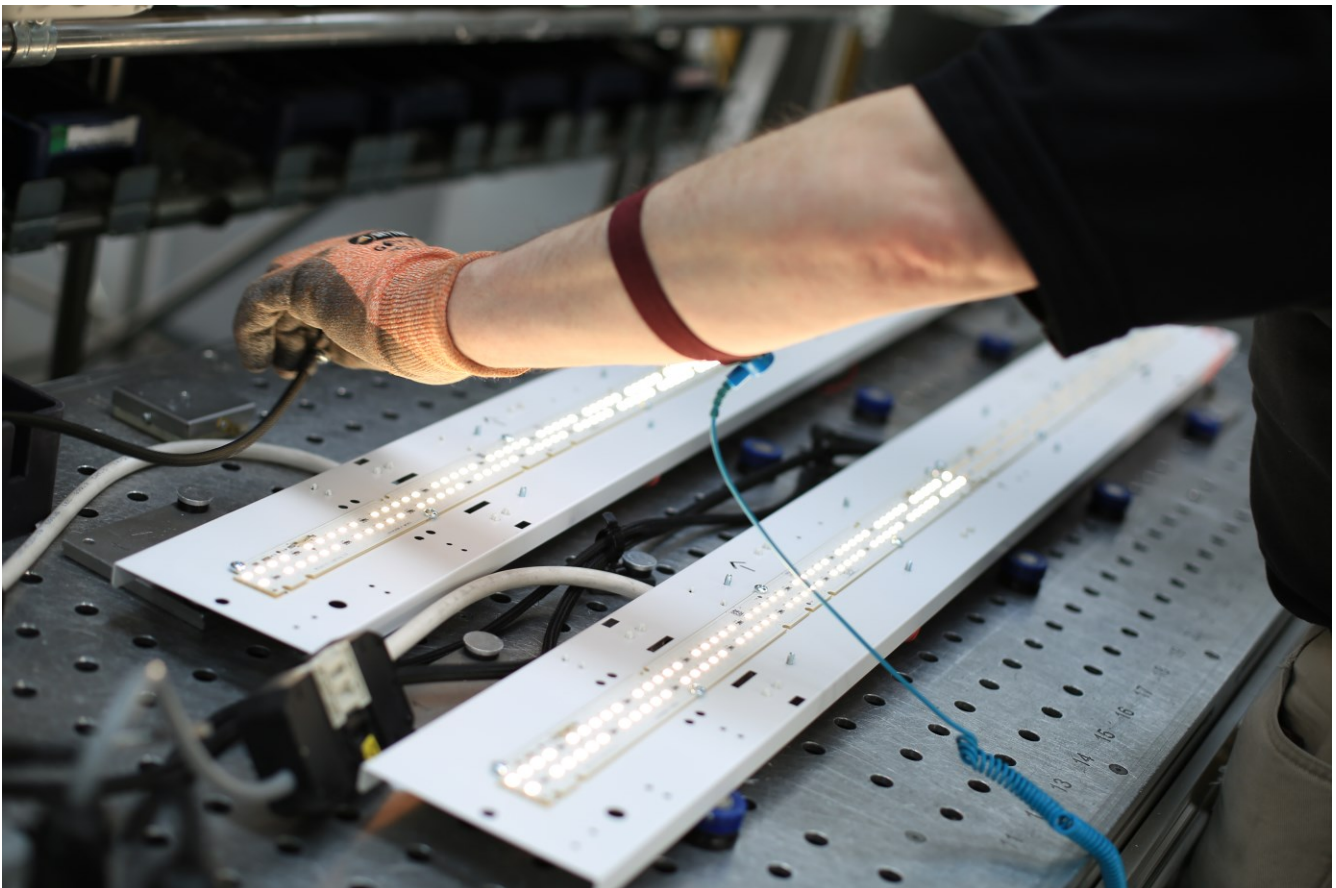


Figure 4: Manufacturing at Whitecroft Lighting limited,

The company considers that maximising the use of remanufactured, refurbished, or repaired parts and components within products is a key aspect of their business model. Furthermore, products are designed for durability to ensure an above industry-standard lifespan of 50+years and designed to be economically disassembled (by using interchangeable parts and no glues) thus enabling component/material recovery or reuse.

Whitecroft Lighting Limited also offer a CPD course (affiliated by Chartered Institution of Building Services Engineers) on the circular economy. By offering a full CPD on Knowledge Transfer for circularity, the company is actively engaging and educating supply chain partners about circularity aspects. This CPD is also used in-house as internal training to maximise internal communication of their circular strategy and implementation plan.

Key resources

Whitecroft Lighting Limited believe that their employees are their most important asset. As such they believe that in-depth training and development for all member of staff is integral for the company to achieve their goals. They also ensure to provide a quality working environment for all.

The raw materials used by Whitecroft Lighting Limited across their product lines includes aluminium, steel, electronics, and plastics. Maximising the use of recycled materials is a current priority for the company. As such, the company is making efforts to increase the use of recycled content within aluminium, steel and plastics which is sourced from the UK. With respect to plastics, Whitecroft Lighting Limited acknowledge the challenge in finding sources of recycled plastic in the UK, this availability from pre- and post-consumer sources is growing.

Whitecroft Lighting Limited is looking to replace the use of FR4 with bio-based, lower carbon materials and more effective demounting end of life technology. FR4 is a glass-reinforced epoxy laminate material that is commonly used in the production of printed circuit boards. The company is also exploring the use of bio-derived shrink wrap made from renewable materials in the packaging of their products.

Addressing environmental objectives and targets that were developed in light of a carbon footprint analysis in 2005, Whitecroft Lighting Limited have replaced their transport fleet, which has enabled them to increase their capacity by 25% without increasing their energy consumption. The company is continually investing in new plant equipment, which increases the energy efficiency of their activities. To add additional flexibility in the service they provide, they have also brought LED manufacturing in-house after undertaking an investment cycle in the latest technology.

Whitecroft Lighting Limited also has a socially responsible purchasing policy where raw materials are procured from ethical sources. Furthermore, all materials used in manufacture are RoHS compliant and the companies is in the process of determining and increasing (where possible) the recycled content of all raw materials used.

Key partners

Whitecroft Lighting Limited actively engage with their suppliers to increase the circular sourcing of products, components, and materials. They do this by trying to source components and manufacture their products within the UK wherever possible. Furthermore, they incorporate their values and policies into the supply chain and procurement, actively distancing themselves away from suppliers who do not share the same values or strategic direction. The company also works across the supply chain to help them understand the benefits as suppliers in becoming Cradle to Cradle Certified®.

The company also collaborate with universities and research technology organisations in research and development activities. They have also received support (Marketing/Promotion/Advice) from public funding bodies such as Innovate UK.

For the components that Whitecroft Lighting Limited cannot reuse, refurbish or re-purpose in-house, recycling services are employed through a 3rd party company. Similarly, to ensure compliance with WEEE regulations, any electronic waste is safely and sustainably disposed of and recycled through a compliance scheme operated by ElectroLink.

Distribution

Whitecroft Lighting Limited typically distribute products through a B2B arrangement for direct supply for new and regeneration building projects.

Packaging used during delivery is almost entirely cardboard, with the company exploring the opportunity to use biodegradable shrink-wrap and sourced from renewable materials.

At the moment, product takeback and refurbishment are not currently a focus. While the company acknowledges that it can be done with the current infrastructure, the lack of sufficient scale isn't there to justify the process is not present, mainly due to lack of wider industry infrastructure, and education in adopting a more effective waste hierarchy mindset within the built environment.

End-of-use

The products made by Whitecroft Lighting Limited are made with a long lifespan (40-50 years), with durability and modularity in mind. This is supported by electronics and LED upgrades every ten years, and an in-house maintenance and repair service. At end of use, components are reused, refurbished, or re-purposed in-house wherever possible. For the components that Whitecroft Lighting Limited cannot reuse, refurbish or re-purpose in-house, recycling services are employed through a 3rd party company.

Electronic waste is taken back from the client via a 3rd party WEEE waste management company. Whitecroft Lighting Limited adheres with UK WEEE regulations through a compliance scheme operated by ElectroLink (see more info in Policies & Regulations)

At the moment, product takeback and refurbishment are not currently a focus. While the company acknowledges that it can be done with the current infrastructure, the lack of sufficient scale isn't there to justify the process is not present, mainly due to that fact that most products would still be covered under warranty.

Costs & revenues

Whitecroft Lighting Limited design and produce several lines of indoor, outdoor, and emergency lighting solutions, including both the lighting fittings and luminaires as well as different options for lighting controls (wireless, wired, networked, etc.). The products offered by the company are at the forefront of the latest developments in both lighting and lighting controls, which have been supported by an extensive research and development team who are dedicated to LED innovation and product design. Additionally, products within the Whitecroft Vitality range are produced with circularity in mind, where they are designed to maintain utility over a long lifespan, and to enable refurbishment, re-purposing, re-distribution and/or re-sell at the end of life.



Figure 5: Product range of lighting fittings and luminaires available from Whitecroft Lighting limited.

As well as offering a wide range of products, Whitecroft Lighting Limited also provide total project services which includes design, scheduling, fitting, and technical support. For scenarios where the customers specification goes beyond that provided by the standard product solutions, the company also offers a bespoke consultancy service where custom products are designed, manufactured, and fitted to meet the specific requirements of the space and client requirements.

Servicing, maintenance, and repair is a key element of Whitecroft Lighting Limited's business, which is delivered through Whitecroft Response. They employ in-house mechanisms to undertake servicing and maintenance, using parts that they have readily available within the business. Response engineers provide after sales and technical support directly to customers, offering flexible levels of support and reducing the opportunity for project schedule disruption. The company is also keen to explore the use of additive manufacture, acknowledging that it could help assist the repair of their products by being reactive to immediate needs whilst reducing the amount of storage required to hold replacement parts for the lifetime of the product.

In the future, Whitecroft Lighting Limited are keen to explore new revenue streams such as how product take-back could be implemented within their existing business model and implementation of "lighting as a service". For example, acknowledging the long lifespan of their products, the company has considered linking product take-back with service plans.

Policies & regulations

Where appropriate, the products designed and supplied by Whitecroft Lighting Limited adhere with relevant standards such as EN 12464-1:2021 which specifies the lighting requirements for humans in indoor workplaces to meet the needs for visual comfort and performance of people having normal or corrected-to-normal ophthalmic (visual) capacity.

Whitecroft Lighting Limited have been certified to show that they operate a Quality Management System which complies with the requirements of ISO 9001:2015. In pursuit of excellence in this scheme, Whitecroft Lighting Limited recognise the need for continual improvement across their supply chain.

Whitecroft Lighting Limited have been certified to show that they operate an Environmental Management System which complies with the requirements of ISO 14001:2015. The company aims to reduce their environmental impact (for example by recycling waste and utilising recycled materials in their product systems) and complies with all applicable environmental legislation. To adhere with current waste legislation concerning WEEE, Whitecroft Lighting Limited joined a registered Compliance Scheme operated by ElectroLink (a division of Wastepack) who are a leading operator in waste management with established infrastructure for recycling WEEE.

The Whitecroft Vitality product range is Cradle to Cradle Certified® which ensures products are made with careful consideration of the materials used in construction, their effect on people and

the environment and how they can be re-used and later recycled at the end of life. Whitecroft Lighting Limited is also working with their suppliers to help them achieve C2C accreditation.

Made in Britain® have accredited Whitecroft Lighting Limited, who have met the minimum requirements of the scheme by making sure that 100% of the human resource making the final product is carried out in Great Britain. Made in Britain® membership promotes proximity, transparency, responsibility and high quality in the manufacturing and marketing of products.

Trends

Environmental movements and increased consumer awareness of environmental issues promote products and services that are less environmentally damaging and also provide a societal good. Whitecroft Lighting Limited are keen to underpin their products and services with circularity principles, where product maintenance and repair is a key element of the business. Another example of where the company can align with circularity principles is their focus on local production (Made in Britain), which also helps to justify the social value of the company within the UK. The company is also exploring the emerging shift from ownership to convenience service-based business models within the lighting sector.

Whitecroft Lighting Limited are utilizing new material developments (e.g., for natural light), and technical innovations such as the use of digitalisation and additive manufacturing in product design and repair. These technical and material innovations assist the company in providing a completely customisable services to their customers. Having this level of customisation available, helps Whitecroft Lighting Limited to differentiate from other companies in the sector, and to base their service provision on something other than price (i.e., creating added value for their products and services).

Positive and negative impacts

Positives

By providing tailored lighting solutions to businesses, education, and workspaces, Whitecroft Lighting Limited contribute positively to society in two main ways. First, the lighting installed can be adapted to ensure adherence with occupational health and wellbeing criteria. The UK Health and Safety Executive notes that the places in which we work and learn can have a wide range of impacts on a person's performance, including effects that damage health, reduce an individual's ability to perform a task, or cause dissatisfaction, resistance to change and uncooperative attitudes. With respect to lighting, different types and levels of lighting are required in different situations, for example, close, accurate work will require higher light levels than walking down a corridor. Furthermore, directional sources of light can bounce off reflective surfaces such as display screens and cause glare. Using blinds, correcting the angle of the source of light and using glare filters can help control this (HSE, 2023). By providing a bespoke service, Whitecroft Lighting Limited can ensure that all these factors are addressed in a way that is tailored both to the building and to its user profile.



Figure 6: Lighting solution designed by Whitecroft Lighting limited within a higher education setting.

Second, the installed lighting can also improve the security and safety of premises and those that use/visit the premises. For example, the company offers products that can improve pedestrian and vehicle safety in higher traffic areas, create more secure perimeters, buildings, and carparks with integrated face recognition, minimise light intrusion / light pollution for residential areas from organisation that may operate after normal working hours (evening, weekends, 24-hour), and differentiate between footpaths and vehicle areas with floor level lighting.

Whitecroft Lighting Limited note that the best way in which they as a company can contribute towards an ecologically sustainable society is through the manufacture of energy and resource efficient light fittings. Their design and production systems are articulated in way that will conserve resources and reduce waste and pollution. This is operationalised through design that extends the functional life of products (design for durability, modularity, and repair, 40–50-year lifespan) and enables repair and maintenance, disassembly, and recycling, all of which is provided by in-house services.

Negatives

While Whitecroft Lighting Limited have endeavoured to reduce energy and resource consumption across their product lines, inevitably there will be waste created at the end of life, alongside the unavoidable energy and resource consumption through normal business activities. That being said, the company have addressed this issue by first establishing their carbon footprint (report commissioned by The Carbon Trust in October 2005) and then by developing company-wide environmental objectives and targets. Over five years, carbon outputs were reduced by 25%, despite an increase in production of over 10%.



Figure 7: Whitecroft Lighting limited warehouse

3. Circularity in the value chain

After analysing the company's current (circular) business model, a more detailed circularity assessment of the company and its activities in the value chain is made. The material and value flow map is presented, together with its adopted circular strategies.

3.1 Material and value flow map

The ultimate goal of a CE is for resources to flow in circles, with limited leakage out of the system. To evaluate this, it is important to map and visualise the current flow of materials and value within the company's value chain. The material and value flow map of Whitecroft Lighting Limited is presented in Figure 3. The value flows (blue) indicate that value is being exchanged between actors and enables an analysis of the relationships amongst key partners. The circular material flows (green) show where the material comes from, where it goes and how it may return into the cycle.

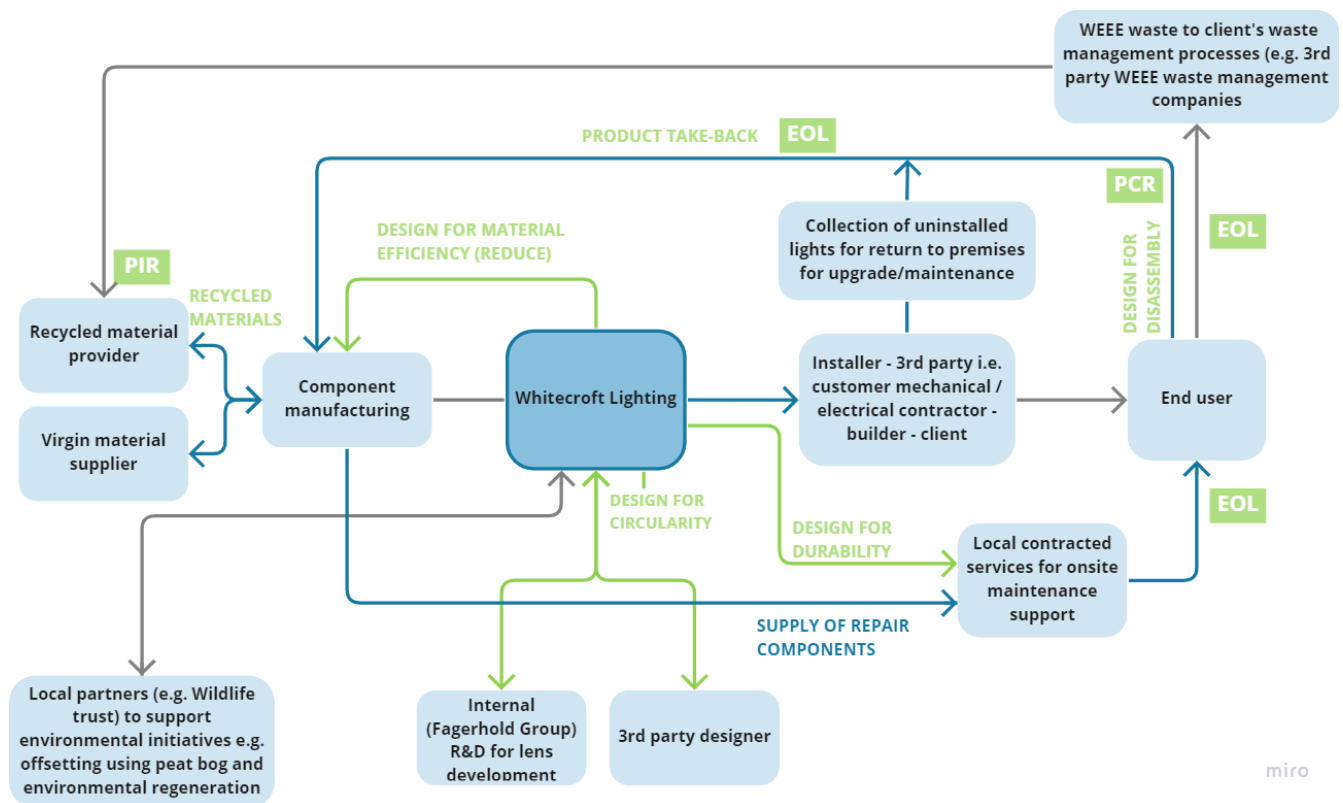


Figure 8: Material/value flow map of Whitecroft lighting Limited (with PCR: post-consumer resin, PIR: post-industrial resin and EOL: end-of-life materials)

3.2 Circular strategies

As shown in figure 3, Whitecroft Lighting Limited applies multiple circular strategies: recycled materials, maintenance, and refurbish.

Each of the strategies is further explained below.

Recycled materials

The raw materials used by Whitecroft Lighting Limited across their product lines includes aluminium, steel, electronics, and plastics. Maximising the use of recycled materials is a current priority for the company. As such, the company is making efforts to increase the use of recycled content within aluminium, steel and plastics which is sourced from the UK. With respect to plastics, Whitecroft Lighting Limited acknowledge the challenge in finding sources of recycled plastic in the UK, this availability from pre- and post-consumer sources is growing.

Maintenance

The “Whitecroft Vitality” initiative works in partnership with manufacturing partners and customers to create circular lighting solutions for the built environment. Under the Vitality initiative, the company are able to keep their products at the highest utility through their lifetime through repair and maintenance schemes.

Servicing, maintenance, and repair is a key element of Whitecroft Lighting Limited’s business, which is delivered through Whitecroft Response. They employ in-house mechanisms to undertake servicing and maintenance, using parts that they have readily available within the business. Response engineers provide after sales and technical support directly to customers, offering flexible levels of support and reducing the opportunity for project schedule disruption. The company is also keen to explore the use of additive manufacture, acknowledging that it could help assist the repair of their products by being reactive to immediate needs whilst reducing the amount of storage required to hold replacement parts for the lifetime of the product.

Refurbish

Products within the Whitecroft Vitality range are produced with circularity in mind, where they are designed to maintain utility over a long lifespan, and to enable refurbishment, re-purposing, re-distribution and/or re-sell at the end of life. At end of life, the products can be refurbished or re-purposed and then re-sold. Ultimately the luminaries are then recovered, and the electronics / casing are recycled through appropriate channels.

Another initiative promoted by Whitecroft Lighting Limited is “Vitality Relight” which supports the regeneration of existing buildings by considering a space in its current form and determining the most appropriate solutions that will offer the greatest decarbonisation potential, reduce waste, and reuse assets (rather than maintaining a default position of disposing/replacing old lighting systems).

Design for circularity

Design for circularity by Whitecroft Lighting Limited manifests itself in three ways: *design for recycling* and *disassembly* and *design for durability and performance*.

Design for recycling and disassembly.

Their design and production systems used within Whitecroft Lighting Limited are articulated in way that will conserve resources and reduce waste and pollution. This is operationalised through

design that extends the functional life of products (design for durability, modularity, and repair) and enables repair and maintenance, disassembly, and recycling, all of which is provided by in-house services.

Design for durability and performance

The products made by Whitecroft Lighting Limited are made with a long lifespan (40-50years), with durability and modularity in mind. This is supported by electronics and LED upgrades every ten years, and an in-house maintenance and repair service. Under the Vitality initiative, the company are able to keep their products at the highest utility through their lifetime through repair and maintenance schemes.

4. Circularity of operational activities

After assessing the circularity of the company's activities within its value chain, a more detailed assessment of the circularity of the company's operational activities is done. A visualisation of the operational process is presented, together with its adopted circular strategies.

4.1 Operational process map

To get a better understanding of how the company's operational activities are affected, an overview of the process is made, see figure 4. This includes circular sourcing of materials, the production process and quality assurance of products. Each of the steps will be further explained below.

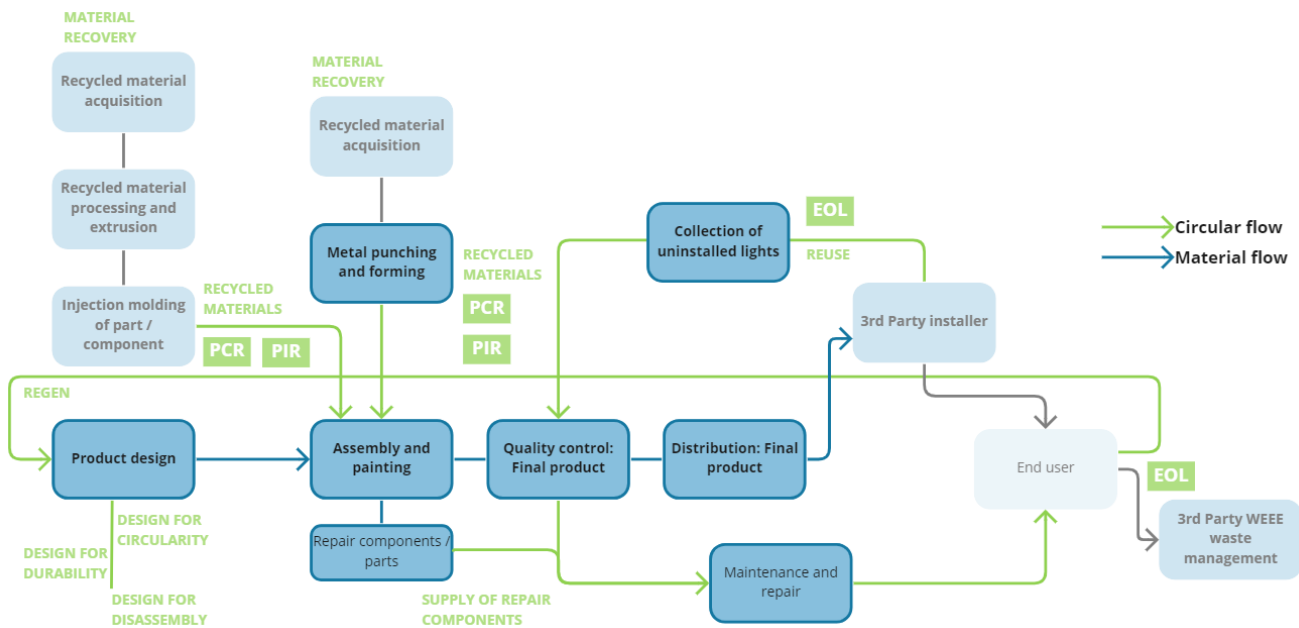


Figure 9: Operational process map of Whitecroft Lighting Limited (with PCR: post-consumer resin, PIR: post-industrial resin and EOL: end-of-life materials)

4.2 Circular sourcing and design

Circular design

Whitecroft lighting Limited also offer a design consultancy service, where bespoke lighting products and solutions are developed to fit the clients' requirements. Not only are the products designed to maximise the use of remanufactured, refurbished, or repaired parts and components, the products are designed with durability and modularity/disassembly in mind. For example, products within the Whitecroft Vitality range are produced with circularity in mind, where they are designed to maintain utility over a long lifespan, and to enable refurbishment, re-purposing, re-distribution and/or re-sell at the end of life.

Sustainable material sourcing

Whitecroft Lighting Limited actively engage with their suppliers to increase the circular sourcing of products, components, and materials. They do this by trying to source components and manufacture their products within the UK wherever possible.

4.3 Production process

External processes – plastic extrusion, injection moulding

As well as sourcing recycled materials for Whitecroft Lighting Limited, third-party companies also undertake some of the production steps required to manufacture the products offered by Whitecroft Lighting Limited. This includes the processing and extrusion of recycled materials and the production of components through injection moulding. Systems are in place to ensure that the recycled plastics meet the performance requirements to reduce the energy consumption, but also to ensure that functionality is not affected.

Internal processes – metal forming, product assembly, painting

In-house, Whitecroft Lighting Limited also carry out some primary manufacturing steps such as the punching and forming of metal parts and components. They also assemble the final products from the components made in-house and externally, and ensure the products meets any appropriate design specifications regarding appearance (e.g., painting).

4.4 Quality assurance and product sale

Extended lifespan and warranty

Products are design for durability to ensure an above industry-standard lifespan of 50+years and they are also designed to be economically disassembled by using interchangeable parts and no glues. Whitecroft Lighting Limited currently offer a 5-year warranty for any manufacturing defect on their products as standard but would like/aspire to extend this to a 10-year warranty as a minimum and to also offer re-warrantee within the field (a concept that this novel in this sector).

Project management and bespoke services

As well as offering a wide range of products, Whitecroft Lighting Limited also provide total project services which includes design, scheduling, fitting, and technical support. For scenarios where the customers specification goes beyond that provided by the standard product solutions, the company also offers a bespoke consultancy service where custom products are designed, manufactured, and fitted to meet the specific requirements of the space and client requirements. The company also package and distribute the required products to the end user, where the final lighting system is installed through 3rd party companies.

5. Conclusion and recommendations

Based on the outputs derived from all three interviews with Whitecroft Lightening Limited, strengths of the business model and operational process in regard to circularity are identified, barriers and enablers for circularity are summarised, and opportunities for circularity are described.

5.1 Strengths for circularity

Business model

The business model that Whitecroft Lighting limited employs incorporates numerous several circular economy strategies. For example, under the Vitality initiative, the company are able to keep their products at the highest utility through their lifetime through repair and maintenance schemes. At end of life, the products can be refurbished or re-purposed and then re-sold. Ultimately the luminaries are then recovered, and the electronics / casing are recycled through appropriate channels. An accompanying initiative “Vitality Relight” supports the regeneration of existing buildings by considering a space in its current form and determining the most appropriate solutions that will offer the greatest decarbonisation potential, reduce waste, and reuse assets. This is in contrast to the default industry position of disposing of, and replacing, all of the lighting within an existing (and often fit for purpose) system.

Regen in situ means that the recycled product is bespoke to space - rather than waiting for someone to need that type of fitting again second hand.

– M. Paskin, Whitecroft Lighting Limited

Circular strategies in the value chain

Whitecroft Lighting Limited actively engage with their suppliers to increase the circular sourcing of products, components, and materials. They do this by trying to source components and manufacture their products within the UK wherever possible. Furthermore, they incorporate their values and policies into the supply chain and procurement, actively distancing themselves away from suppliers who do not share the same values or strategic direction. The company also works across the supply chain to help their suppliers achieve Cradle to Cradle Certified® accreditation.

Operational process

Operationally, Whitecroft Lighting limited provides a design and product manufacture/fulfilment service. End users, often through 3rd party installers (e.g., architects, developers, etc.), enlist Whitecroft Lighting Limited to design, and provide the products needed to install, a lighting system that is suitable the both the space in question and the user profile. Whitecroft Lighting limited undertake some primary production activities (namely, metal forming) as well as undertaking the assembly and product fulfilment. Whitecroft Lighting limited delivers the products and associated parts to the end user, where installation is carried out by the 3rd party companies. To extend the

lifespan of their products, Whitecroft Lighting limited also provide a maintenance and repair service, which is supplied in-house with components/parts.

5.2 Barriers and enablers for circularity

To ensure circularity for Whitecroft Lighting Limited and its value chain, several barriers and enablers can be pointed out. The biggest barrier for Whitecroft Lighting Limited is overcoming the lack of understanding with respects to what a circular economy is, and how businesses and potential clients / end-users can apply it. This also extends to the limited inclusion of circular economy specification with tender and procurement documents and is exacerbated by the current focus on net zero carbon (rather than a more holistic circular thinking) and the continued prominence of cost/price influencing decision making across architects and clients / end-users.

Going circular uncovers a lot of challenges as you move forward - but these need to be methodically worked through.

– M. Paskin, Whitecroft Lighting Limited

The biggest enabler and the key to much of the success of the projects carried out by Whitecroft Lighting Limited (especially the Vitality initiative) is the growing relationship with public sector procurement and tenders, which has led to the opportunity to influence public procurement to include more circular aspects, aiding the transition of circular principles into similar project in other areas.

Other barriers and enablers have been mentioned and explained before and are summarised in table 3 below.

Table 3: Barriers and enablers for enabling circularity at Whitecroft Lighting Limited

Barriers	Enablers
<ul style="list-style-type: none"> • Competing on costs / price with traditional lighting systems • Limited understanding, knowledge, and experience regarding circularity. • Getting clients to buy into the circularity ethos. • Potential clients not placing enough value on circular principles. • Current focus on zero carbon, rather than broader circular economy principles. • Current B2B practices/contracts • Current business models resulting in disconnect between end client and Whitecroft 	<ul style="list-style-type: none"> • Relationships with public procurement and tender systems • Growing awareness of environmental issues • Growing demand for recycled and renewable materials. • Increased acceptance (and even desirability) of plastic materials that are recycled and/or renewable. • Ongoing relationships with different 3rd party companies and suppliers.

<ul style="list-style-type: none"> • Education and benefits of CE • Construction industry cultural habits to function on a business-as-usual approach and lack of willing to adopt transformative change 	
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5.3 Opportunities for circularity

Whitecroft Lighting limited has successfully incorporated the concept of circularity across its entire business model. This is most evident through their “Whitecroft Vitality” and “Vitality Relight” initiatives, and in the company gaining Bronze Cradle 2 Cradle Certified® accreditation. Furthermore, Whitecroft Lighting limited actively engage with their suppliers to increase the circular sourcing of products, components, and materials, and work across the supply chain to help their suppliers also achieve Cradle to Cradle Certified® accreditation.

To further improve circularity of the wider sector, Whitecroft Lighting limited acknowledge that a greater understanding of the Circular Economy is needed. This includes increased awareness of general terms and concepts related to circularity as well as improved recognition for the long-term business case potential, whereby businesses and other organisations may be able to make energy and financial savings as well as reach carbon targets over a number of years.

In the future, Whitecroft Lighting limited would like to explore the prospect of introducing “Light as a service”. Servitisation is where customers pay for a service, such as lighting, rather than buying the equipment themselves. By employing this model, companies can contribute to improved systemic efficiency and overall decarbonisation (WEF, 2020). At the moment, Whitecroft Lighting limited are waiting for the technology to prove itself within the market but have highlighted this strategy as a potential future direction.

References

- Circulab. (2020). *Circular Canvas: The tool to design regenerative business models*. Retrieved from: <https://circulab.com/toolbox-circular-economy/circular-canvas-regenerative-business-models/>
- Ellen MacArthur Foundation. (2017). *The circular economy in detail*. Retrieved from: <https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail>
- Ellen MacArthur Foundation. (2019). *Circulytics – measuring circularity*. Retrieved from: <https://www.ellenmacarthurfoundation.org/resources/apply/circulytics-measuring-circularity>
- Health and Safety Executive [HSE]. (2023) *Human factors: Lighting, thermal comfort, working space, noise and vibration*. Retrieved from: <https://www.hse.gov.uk/humanfactors/topics/lighting.htm#lighting>
- R2π. (2017). *Circular Economy Business Model Case Studies: Introduction and Methodology*. Retrieved from http://www.r2piproject.eu/wp-content/uploads/2018/08/R2Pi-D3-35775-63432.2a-Case-Study-Methodology_v1.0.pdf
- R2π. (2019). *Methods and tools*. Retrieved from <http://r2piproject.eu/circularguidelines/methods-tools/>
- World Economic Forum [WEF]. (2020) *What is servitization, and how can it help save the planet?* Retrieved from: <https://www.weforum.org/agenda/2020/11/what-is-servitization-and-how-can-it-help-save-the-planet/>

About the project

The problems associated with plastic waste and in particular its adverse impacts on the environment are gaining importance and attention in politics, economics, science and the media. Although plastic is widely used and millions of plastic products are manufactured each year, only 30% of total plastic waste is collected for recycling. Since demand for plastic is expected to increase in the coming years, whilst resources are further depleted, it is important to utilise plastic waste in a resourceful way.

TRANSFORM-CE aims to convert single-use plastic waste into valuable new products. The project intends to divert an estimated 2,580 tonnes of plastic between 2020 and 2023. Two innovative technologies – intrusion-extrusion moulding (IEM) and additive manufacturing (AM) – will be used to turn plastic waste into recycled feedstock and new products. To support this, an R&D Centre (UK) and Prototyping Unit (BE) have been set up to develop and scale the production of recycled filaments for AM, whilst an Intrusion-Extrusion Moulding Facility, the Green Plastic Factory, has been established in the NL to expand the range of products manufactured using IEM.

Moreover, the project will help to increase the adoption of technology and uptake of recycled feedstock by businesses. This will be promoted through research into the current and future supply of single-use plastic waste from municipal sources, technical information on the materials and recycling processes, and circular business models. In-depth support will also be provided to a range of businesses across North-West Europe, whilst the insights generated through TRANSFORM-CE will be consolidated into an EU Plastic Circular Economy Roadmap to provide wider businesses with the 'know-how' necessary to replicate and up-scale the developed solutions.

Lead partner organisation

Manchester Metropolitan University

Partner organisations

Materia Nova
Social Environmental and Economic Solutions (SOENECS) Ltd
Gemeente Almere
Save Plastics
Technische Universiteit Delft
Hogeschool Utrecht
Hochschule Trier Umwelt-Campus Birkenfeld
Institut für angewandtes Stoffstrommanagement (IfaS)
bCircular GmbH

Countries

UK | BE | NL | DE

Timeline

2019-2023