

# Study Report 1: Product Life Extension

REDUCES – Rethinking Sustainable Development in  
European Regions by Using Circular Economy  
Business Models



**REDUCES**  
Interreg Europe



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This report has been reviewed and validated by the Valencia Regional Stakeholder group created within the REDUCES project framework.



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# 1 Focus of the report

The report presents the first study report for Interreg Europe project REDUCES dealing with the circular business model on “Product life extension”, from the concept we adopted to the activities and results obtained for the project Good Practices (GP).

This introduction develops the conceptual foundation for the root economic value of “Product life extension” which applied to the built environment has translated into Life Cycle Evaluation within the cradle-to-cradle principles by William McDonough and Michael Braungart [1]. This supports the focus of the second REDUCES interregional meeting around the application of “Product life extension” to the built environment.

Circular economy (CE) can mean many different things for the different actors from the different fields. Common denominators are designing out waste and pollution (waste reduction), keeping products and materials in use (upscaling and keeping the value), regenerate natural systems (loops, transition) and social aspect like creating well-being. [2] This broad context requires the focus on specific business models which were introduced and developed during the first REDUCES interregional meeting.

“Product life extension” is a concept developed as one of the multifaceted solutions to create a circular economy. The basic concept describes how long a product or item can be used for, with the ultimate goal of maximizing any given product’s “utilization” rate and duration. Every time we throw away a product, we essentially also are losing all of the energy and resources that went into its production. Although recycling a product is sometimes an option, reuse and repair rank much higher than recycling in terms of stronger environmental impact.



REDUCES brings together six European regions.



## 2 Description of the business model

### 2.1 Regional background from policy instruments

As a relevant information for the “Product life extension” definition within the REDUCES project the policy instruments selected by each of the regions must be considered for finding a compatible definition within the project context. REDUCES five European regions have selected the following policy instruments:

- Southwest Finland: Sustainable growth and jobs 2014–2020 - Finland’s structural funds programme.
- Utrecht, Netherlands: Chances for West 2: Operational Programme ERDF West-Netherlands.
- Greater Manchester, UK: Greater Manchester European Structural and Investment Funds Strategy 2014–2020.
- Valencia, Spain: DC09 Regulations on Habitability in Housing.
- Bulgaria: Operational Programme “Environment” 2014–2020.
- Maramures, Romania: Regional Development Plan of North West Region 2014–2020.

The overall common objective of the policy instruments is to adopt more environmentally sustainable ways of production, reducing the negative

environmental impacts of economic development. The “Product Life Extension” circular business model should concentrate on the amount of consumed resources reduction, for achieving higher environmental protection ensuring supply with less waste, through the implementation of the Good Practice, while ensuring economic development and employment.

### 2.2 Business model definition

During the first Interregional meeting we concentrated on Sitra’s conceptual definition of the different business models from Circular Economy which were selected for the REDUCES project. The “Product Life Extension” business model definition was:

*Products are used according to their original purpose for as long as possible or repaired and refurbished for multiple reuses, thus reducing the need for purchasing and manufacturing new products.*

Bearing in mind the policy instruments context in Reduces, it is relevant to consider the analysis of the structure and values of the European Commission’s Circular Economy Package [3] as proposed by W.S. Stahel in [4] for ensuring a reduction of consumed resources. Value generation

on this approach starts from the key objective of a 'value-preserving stock management' to structure the circular economy. Therefore, we should extend the "use" of all products as long as possible developing the "R" values: responsibility for reuse, repair, remanufacture and reprogram goods.

Within the Product Life Extension model value should be preserved for as long as possible. This business model should concentrate not only on the "R" values, but also on the value generation opportunities from the end-of-life exploring the new era of "D" skills (namely de-alloy, de-composite, de-laminate, de-polymerise, de-construct...). The

challenge to transform end-of-life into "as-good-as-new resources" reduces waste generating value. This business model should explore research topics, novel policies and (reversed) incentives from manufactured goods (the tech-cycle).

Within REDUCES the "Product life extension" business model should read:

*Value generation, through all related steps, developed by the reuse, repair, remanufacture or readaption of any given good including its recycling along the different downgrading steps reducing the need for purchasing and manufacturing new goods.*

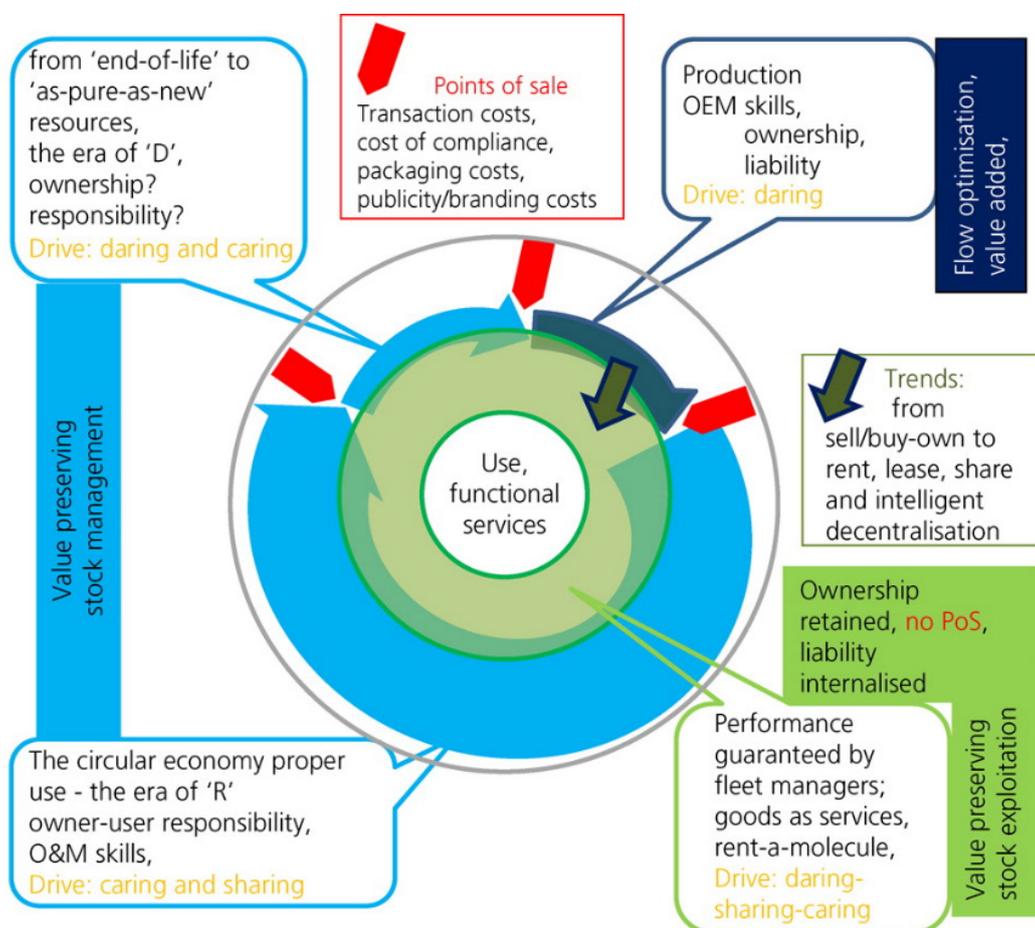


Diagram 1: The circular economy by Stahel

Explanations/drivers: drive

Era of 'R': Responsibility, reuse, repair, remanufacture, reprogram, operation and maintenance

Era of 'D': De-alloy, de-composite, de-laminate, de-polymerise, de-construct, de-vulcanise,

Trends: Sharing economy, sharing society, virtual and digital economy (no PoS. costs).

EU CE Package, introduct. to comments Stahel p1

Figure 1. Stahel's proposed map for product life within the Circular Economy context (from <http://www.product-life.org/es/3ecos/part2-Stahels-proposed-map-of-the-Circular-Economy>)

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### 3 Interregional meeting and study visit highlights



The 2nd REDUCES interregional meeting (10th-11th of March 2020) program brought together the Valencia region stakeholders, project regions and interested individuals on the analysis of the “Product life extension” business model to the built environment. The policy instrument selected by the Valencia region incorporates a key element for value creation through regulations. All stakeholders discussed during the event the main elements and lessons from the proposed presentations and cases.

The guiding principle of the presented cases and study visits dealt with the application of the business model to the the built environment. When applied to the building sector, the definition of the business model includes:

- A core of circular strategies is the extension of the useful life of products, in the case of buildings e.g. through renovation and retrofitting.
- However, for the construction sector to transition towards a circular economy requires systemic innovation throughout the value chain. Resources recovered at the end-of-life (components or materials) need to be reintegrated into the value chain.
- A higher emphasis into standardisation of components in terms of size or material. In the building sector, e.g. product life extension is

put to use by designing modular components used in construction. These standardised components can be re-used in new buildings or repurposed and used in infrastructure or in another industrial sector.

The policy instrument for Valencia is based on the legislation development for facilitating circular economy measures on the Building sector. The reasons are the following:

- Construction and demolition projects generate about a third of the total waste in the EU, with a significant share being landfilled [5].
- With buildings being more energy efficient during their use phase, the relative importance of embodied energy and natural resources is becoming more significant to enhance resource efficiency of buildings [6].
- To save embodied energy and resources, a range of strategies that cycle resources at product, component or material level are required [7].

The expanded asset life translates into the use of durable materials and high construction standards can increase the life span of the building. Businesses in the construction sector may increase their circularity by paying more attention

to the design-phase. The potential of possible activities includes:

- Renovation and Retrofitting.
- Resources recovered at the end-of-life (components or materials) need to be reintegrated into the value chain.
- Design-phase, anticipating the possibility of re-use and re-purposing parts of the buildings.
- Standardised components re-used in new buildings or repurposed for other industrial sectors.
- Use of durable materials and high construction standards.

The second interregional meeting began by introducing the Knowledge Base for REDUCES through the following keynotes ([see slides](#)):

- Financing Circular economy: tested business models

Pedro de Alava, Senior VC & fund manager CLAVE.

This presentation developed the funding opportunities available for launching new startups and entrepreneurial activities related to the topic, and developing a procedure with key criteria for facilitating a successful implementation.

- Circular innovation on LIFE project CERSUDS

Irina Celades López, del Instituto Tecnológico de la Cerámica.

The innovative development of SUBurban Drainage Systems reusing unused stocks of tiles presented an interesting development which fulfills the urban implementation for a more sustainable use of rain water, and at the same time recycling unprofitable ceramic stocks.

- Examples on how to apply circular economy principles in policy instruments to enhance the adoption of circular economy business models

Nuria Matarredona, General Director Ecological Innovation in Construction. Generalitat Valenciana.

The relevance of the policy instrument from Valencia was addressed through the introduction of several circular application examples. A debate followed on the key parameters to consider for the new legislation.

- Flexibility and adaptability as a building durability strategy.

Manuel Cerdá UPV.

Professor Cerdá developed an innovative approach on the modular approach to architecture.

The debate which followed concentrated on the opportunities for new businesses on the deployment of the new legislation to the building sector. After the keynotes, four examples of good practices were presented (to learn more about examples visit [interregeurope.eu/reduces](http://interregeurope.eu/reduces)).

- **DRIVE 0 Project** - Driving decarbonization of the EU building stock by enhancing a consumer centred and locally based circular renovation process. Leticia Ortega. Valencia Institute of Building.
- **Casas inHAUS. Modular and prefabricated houses.** Rubén Navarro López. Expansión Manager. The development of modular homes completely fabricated on the workshop for later assembly on location was introduced and analyzed.
- **OKAMBUVA. Bioconstruction. Prefabricated rice straw panels.** Joan Romero Clausell. The innovative startup on bioconstruction using the discarded rice-straw from local agricultural production was introduced developing a very

interesting initiative for sustainable housing using recycled (or discarded) raw materials.

- **Construir la Sostenibilitat.** Foundation dedicated to helping municipalities and companies to assume circular economy principles regarding the demolition, valorisation and use of recycled sand and gravels. Tomàs Ferrandis Moscardó.

The debate after the presentations allowed a comparative analyses of pros and cons for the different cases. The most advanced and closer to the "Product life extension" business model was the InHAUS company, together with the Okambuka initiative. During the evening project partners attendants joined the study visits program for both applications:

- Visit to IVE for getting first-hand knowledge on the Okambuka products. All attendants were presented the prefabricated elements and materials developed by the company getting a relevant insight on the opportunities and potential of this case study. The summary on this Good Practice is:
  - Short description: Okambuva build houses with prefabricated rice straw modules, provides the data sheet with technical-environmental characteristics and offers training for DIY.

- Evidence of success: Different construction systems have undergone to adapt to contemporary construction regulations, giving rise to a type of quality architecture that responds to the new demands of energy efficiency and sustainability. The cooperative has participated in more than 25 projects based on sustainable building principles, with more than 5 buildings having used this type of modules.
- Potential for learning or transfer: Buildings built with these types of modules are usually private houses. Public administrations could take advantage of these type of modules to be used in public spaces and buildings such as schools, libraries, community centres, and they could be included with a positive score rating in public tenders. These modules can be used for both, new and refurbished buildings what is translated into a higher potential to be transferred.
- Link to policy instrument: Considering this good practice, these modules constitute a product that uses natural resources; therefore, it has a low environmental impact. The modules are produced with straw coming from local suppliers. The owners can collaborate in the construction of the modules and the building.



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- Visit to InHAUS where all people were first presented with the company philosophy, product structure and a visit to the workshop followed where everybody could evaluate the quality and relevance of the modules produced. The summary on this Good Practice is:
  - Short description: Full construction of houses in a factory with reusable building materials that are moved to the plot of land and can be installed to a different place afterwards.
  - Evidence of success:
    - ✓ From 5 to 82 people working as staff in 3 years.
    - ✓ 60 people subcontracted.
    - ✓ Agreement with the Chamber of Commerce.
- Potential for learning or transfer: This business model is located in Almussafes (Valencia, Spain). This model can be transferred to other regions of Spain and Europe so that a network of buildings whose life is extended and that can be reused is increased. Finally, the construction sector needs to improve recyclability of material aspects, so if this model is transferred, the rate of regional recyclable building materials and the regional CE skilled workforce would be increased.
- Link to policy instrument: New models of tenure, use and maintenance of residential buildings and continuous regeneration of housing: this type of buildings have an after-sales service that includes several revisions to keep and maintain the house in good conditions.



## 4 Selected regional GP cases

REDUCES interregional meetings are in essence about learning CE Good Practices from each other across the Europe. Below you can see a selection of regional GP cases that were presented in Valencia in March 2020 and selected during the learning process. You can read more about each case from [REDUCES website](#).

Valencia,  
Spain

### **InHAUS: Modular houses**

Full construction of houses in factory, with reusable building materials, that are moved to the plot of land and can be installed to a different place afterwards.

### **Architectural Studio PAM Consult - reuse of old shipping containers in construction**

After Shipping Containers reach their end of life they can find a new use for pre-fabricated Building construction.

Bulgaria

Utrecht,  
Netherlands

### **Circular Renovation in Werkspoorkwartier**

The circular renovation of buildings is part of the Werkspoorkwartier project, which aims to develop this inner industrial area into a creative and circular area.

### **Meublowski**

A couple of artisans refurbish chairs and sofas that customers bring in, but they also refurbish and sell old designer chairs from Poland. The couple also does projects in the region in which they use existing materials to redesign spaces and outfit these with furniture.

### **IT Integrated Business Model in Circular Economy**

MultiNET LTD has developed, in 25 years of activity, an integrated business system to extend the life of IT products, thus having a strong competitive advantage.

Maramures,  
Romania

### **Remanufacturing Automotive components Integrated Business Model in Circular Economy**

ATP Exodus business is based on remanufacturing used parts for extending the life of different brands' auto components, in the context of CE concept.

### **Stitched Up**

Non-profit workers coop – seeking to change to a Community Benefit Society. Share skills and resource to help people dress in a more sustainable way – ie keeping their clothes in use for longer.

Work focuses on bringing people together to share and learn skills; examples include classes in machine sewing, garment making, workshops on repairing and upcycling clothes, a monthly clothes swap and a monthly free repair cafe.

### **Tech-takeback**

Take Tech back accepts unwanted waste electronic items in any condition. The primary aim is reuse, followed by recycling and, as a last resort safe destruction. They focus on safe, secure and sustainable ways to enable disposal of unwanted WEEE (Waste Electrical and Electronic Equipment).

### **Lounais-Suomen Jätehuolto (LSJH): Reuse textiles store**

The regional waste management company Lounais-Suomen Jätehuolto, later LSJH established a store for used textiles. Aim is to extend the life cycle and to get all reusable textiles to reuse.

### **Kalusteet kiertoon - municipal furniture reuse model**

The City of Turku carried out a furniture reuse system pilot during 2015–2018 with the aim of improving the circulation of furniture between the city units. The practise has become then part of the city's normal practise and also its been developed further with other big cities.

Southwest  
Finland

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## 5 Evaluation of selected GP cases

REDUCES evaluates the collected good practices (GPs) applying the methodology jointly defined at the beginning of the project. The goal of the evaluation in the project is to assess the Circular Economy business cases in terms of their environmental impact, replicability and upscaling potentials. Evaluation is performed also for the purpose of gaining a better picture of the CE practices in the partner regions and their impact in transitioning to sustainable economies. The evaluation also highlights the success factors of different business cases, crucial for replication and upscaling in different regions.

### 5.1 REDUCES evaluation framework and evaluation result

In order to assess the potential impact of each good practice collected, an evaluation framework was devised, including assigning indicators to demonstrate potential impact of each GP. The REDUCES assessment framework is structured around the UN Sustainable Development Goals (SDGs) and their targets. The UN Sustainable Development Goals indicate the most relevant global sustainability challenges of the moment, ranging from poverty and justice and to climate change and environmental degradation. There

are 17 interconnected Goals and the UN tries to achieve them by 2030. [8] Applying a methodology by Schroeder et al. (2018) [9], the most relevant Goals in relation to the circular economy were identified. Each GP was evaluated in relation to the SDGs, with additional indicators outside the SDGs assigned to a GP when needed. Mapping of the goals showed that the REDUCES Product life extension Good Practises mostly contributed to the following SDGs:

- SDG 4 Quality Education: The goal aims to ensure high quality and availability of education for everyone. SDG 4 aims to substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.
- SDG 8 Decent work and economic growth: The goal is to promote inclusive and sustainable economic growth, employment and decent work for all. The goal includes for example a target for decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.
- SDG 9 Sustainable Industrialization and use of resources: The goal targets to build resilient infrastructure, promote sustainable industrialization and foster innovation. The goal

includes for example a target for promoting inclusive and sustainable industrialization and significantly raise industry's share of employment and gross domestic product.

- SDG 11 Sustainable cities and communities: The goal aims to make cities inclusive, safe, resilient and sustainable. The goal includes for example a target for reducing the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
- SDG 12 Sustainable consumption and production patterns: The goal aims to ensure sustainable consumption and production patterns. The goal includes for example a target for substantially reducing waste generation through prevention, reduction, recycling and reuse.
- SDG 13 Climate Action: The goal targets to take urgent action to combat climate change and its impacts. For example, the goal targets to improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.
- SDG 17 Partnerships: The goal aims to revitalize the global partnership for sustainable development. For example, SDG 17 aims to encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.

Particular emphasis was placed on the following aspects of the GPs applying an impact scale from 1 to 3 (low-medium-great):

- Potential sustainability impact
- Potential for upscaling
- Potential for replication

A peer review was conducted between partner regions to allow for a thorough analysis of the sustainability impact of each GP and to validate the conclusions made by the partner submitting each GP on each of the stated aspects. A joint online meeting was then held to discuss the evaluation results in the Evaluation Coordination Team (ECT). These conclusions are summarized to the following pages case by case.

## 5.1.1 Architectural Studio PAM Consult: Industrial symbiosis - reuse of old shipping containers in construction (Bulgaria)

### Estimating potential impact of GP (SDG indicators reflected)

The Architectural Studio PAM Consult practice represents an example of re-using shipping containers for different modular constructions in Bulgaria. The recycled shipping containers are chosen for a number of projects to keep costs low and to allow off-site prefabrication. Re-using existing structures entails environmental benefits: good insulation, which keeps emissions low; reduced waste during the construction process; use of recycled material. The modular design makes shipping containers a good choice for structures that need to be quick and cheap to assemble but also dismantled and reused elsewhere without negative consequences for the environment. It was concluded that this practice has **medium impact** (or potential impact) in Bulgaria to sustainable production and consumption.

### Potential for upscaling

The business model related to the reuse of old shipping containers has significant potential to be extended in different fields of the construction sector. In this period, the shipping industry could enter into crisis, so the stocks of empty containers will increase. In order to avoid further costs of storing and maintaining these empty assets, the transporters can increase the cooperation with local/regional authorities (for social houses, temporary markets etc.) and with businesses (for restaurants, entertainment, temporary/ itinerary events etc.). Thus, the potential for upscaling was estimated to be **medium**.

### Potential for replication

This model can be transferred to other regions, since many shipping containers are stored and not used for more than half of their 15-year lifespan in a number of regions in Europe. The modular buildings are quick and cheap to assemble and can be moved to other places, extending their life cycle or if they are not productive in a specific location. Thus, we concluded the replication potential to be **high**.



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### 5.1.2 Remanufacturing Automotive components Integrated Business Model in Circular Economy (Maramures, Romania)

#### Estimating potential impact of GP (SDG indicators reflected)

The Remanufacturing Automotive components practice provides an example of reducing the quantity of manufacturing waste and contributes to the achievement of the National recycling rate, tons of material recycled. As a result of the remanufacturing system, the life cycle of the automotive components is extended and their reusability and recyclability are increased. However, the practice is limited in potential of quantities of parts remanufactured. It was concluded that this practice has medium impact in the Region of Maramures with regards to sustainable production and consumption indicator.

#### Potential for upscaling

The business model has potential for being upscaled on regional on national levels. The remanufacturing system demonstrated in the good practice addresses the life extension of components in a growing sector, the automotive industry, at the same time providing a guarantee for quality of the reconditioned parts similar to the new ones. Thus, the upscaling potential was concluded **to be high**.

#### Potential for replication

The practice has already been replicated in other regions of Romania and internationally, but its replication potential depends on the type of cars and parts most popular in the other regions. Thus, the replication potential was concluded to be **medium**.

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### 5.1.3 IT Integrated Business Model in Circular Economy (Maramures, Romania)

#### Estimating potential impact of GP (SDG indicators reflected)

The IT Integrated Business Model practice provides an example of reducing the quantity of electronic waste and contributes to the achievement of the National recycling rate, tons of material recycled. As a result of the repair and upgrade of hardware and software IT equipment is reintroduced on the market, adding new values of use, with an important positive impact for the environment. However the impact of the practice is limited in potential of quantities and types of IT equipment to be upgraded. It was concluded that this practice has **medium impact** in the Region of Maramures with regards to sustainable production and consumption indicator.

#### Potential for upscaling

The business model has the potential for being scaled up in the region and also on a national scale if it is to include all the 4 +R: Repairs (current repairs), Reuse, Remanufacturing (capital repairs), Recycling (Dismantling - reuse of spare parts, WEEE), which is going beyond the Product Life Extension only business model. The upscaling potential was thus concluded **to be medium**.

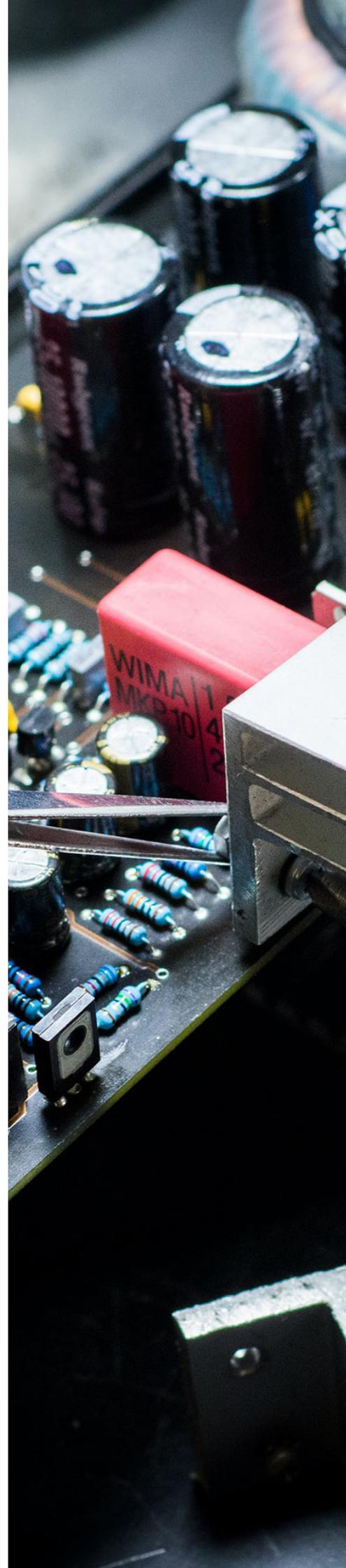
#### Potential for replication

The practice includes elements of the different CE business models. It can be applied in many regions given the fact that the ICT sector is developing very fast and is a major factor of globalization. It entails, however, certain limitations depending on the size and type of the companies. The replication potential was thus concluded **to be medium**.

### 5.1.4 Tech-takeback (Manchester, the United Kingdom)

#### Estimating potential impact of GP (SDG indicators reflected)

Tech-takeback as an initiative makes it possible for consumers to return appliances to new use instead of making them waste. In five locations in the UK this initiative makes the reuse of small appliances possible. In the process appliances are sorted for reuse, repurposing and



eventually waste. Although the initiative is still relatively small scale, this has a reasonable impact on sustainable consumption and climate action. The initiative leads to a small amount of new jobs in circular economy. The level of impact is seen as low.

### **Potential for upscaling**

Although the initiative has a straightforward business model, scaling up is limited by funding and the expertise of employees to be able to prepare the appliances for reuse. Additional limits to the effectiveness of the initiative is the protection of consumer privacy under the European GDPR law. The level of upscaling is seen as medium.

### **Potential for replication**

Replication of this initiative is dependent on several requirements; is there is enough specific labour available with knowledge to help fix appliances, is local law supportive for reuse of appliances, are there enough partners for financing and disposal of waste. Replication potential is medium but strongly depended on available resources.



## **5.1.5 Stitched Up (Manchester, the United Kingdom)**

### **Estimating potential impact of GP (SDG indicators reflected)**

A community initiative for the extension of the product life of clothes. Consumers can come in with clothes to have these repaired or remade, and redesigned to prolong the lifespan of the clothes, as the clothes can be used again. Additionally the initiative teaches clothes mending to consumers, so they can repair their own clothes, preventing these clothes from being thrown out. The impact due to the modest size of the initiative is low.

### **Potential for upscaling**

The initiative is low impact, easy to scale up to more areas provided there is a space to use that is clean, light and where electricity is available. Stitched up is part of an artisanal area in which expertise

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in fabrics and clothes making is concentrated. Upscaling is dependent on that expertise being available in other areas. The initiative is not necessarily able to make enough money to exist independently and scaling up does not lead to economies of scale. Scalability of the initiative is high due to the low level of requirements.

### **Potential for replication**

Provided there is expertise in an area, the initiative is easy to replicate. There is no proprietary knowledge that needs to be shared. For the initiative to succeed an existing infrastructure is required, so consumers know where to go. The impact due to the modest size of the initiative is low.

## **5.1.6 Lounais-Suomen Jätehuolto (LSJH): Reuse textiles store (Turku, Finland)**

### **Estimating potential impact of GP (SDG indicators reflected)**

The LSJH practice provides an example of product life extension in the textile sector. The objective that the company pursues with this initiative is to extend the life cycle of post-consumer textiles and to get all reusable textiles to reuse. As a result of this practice, the company extends the textiles' life, obtaining more value from them, promotes changes in consumption- behavior habits and facilitates socio-labor integration. It was concluded that this practice has **medium impact** (or potential impact) in the region to sustainable production and consumption, specially to reduce waste generation through recycling and reuse and also to social aspects, such as full and productive employment and decent work for all.

### **Potential for upscaling**

The initiative has been very successful in the region. It gives the impression that it works well in other regions that do not count on established and consolidated textile reuse initiatives. The initiative could also be extended to other sectors. However, it does not seem logical that a waste management company would sell clothes, and the fact that the company that did it previously had financial problems makes its long-term viability questionable. Thus, the upscaling potential was concluded to be **medium**.

### **Potential for replication**

Initially, the initiative seemed to have great potential for replicability, given that the resources necessary to manage it are not too extensive (beyond the storage space). However, there are already similar initiatives well implemented and operating in the market in Europe. In the Valencia Region, for example, there are currently companies (usually social cooperatives or NGOs) that through agreements with the municipalities are in charge of locating containers to collect used textiles and later manage, classify and resell them in stores or directly to other companies. Thus, the replication potential was concluded to be **medium**.



### 5.1.7 Kalusteet kiertoon - municipal furniture reuse model (Turku, Finland)

#### Estimating potential impact of GP (SDG indicators reflected)

This practice, undertaken by the city of Turku, provides an example of how to reduce the consumption of new materials and resources through the reuse of available and out-of-use furniture in city departments, avoiding the purchase of new furniture whenever possible. The system is based on a website where city departments can easily add their unneeded movable and craft materials with a mobile app. The system enables inter-city material cycling, increasing the visibility of available materials across unit boundaries, improving decision-making and reducing unnecessary external purchases. The main concern about this good practice is if it can be considered as a business model at all, since although the benefits are very clear, it is unclear whether the GP is economically sustainable enough to be run by a private company instead of a public actor. We concluded that this practice has **medium impact** (or potential impact) in the West Finland region to sustainable production and consumption, by decreasing the waste generated and money spent in new products, but also to social aspects like increasing the number of CE jobs .

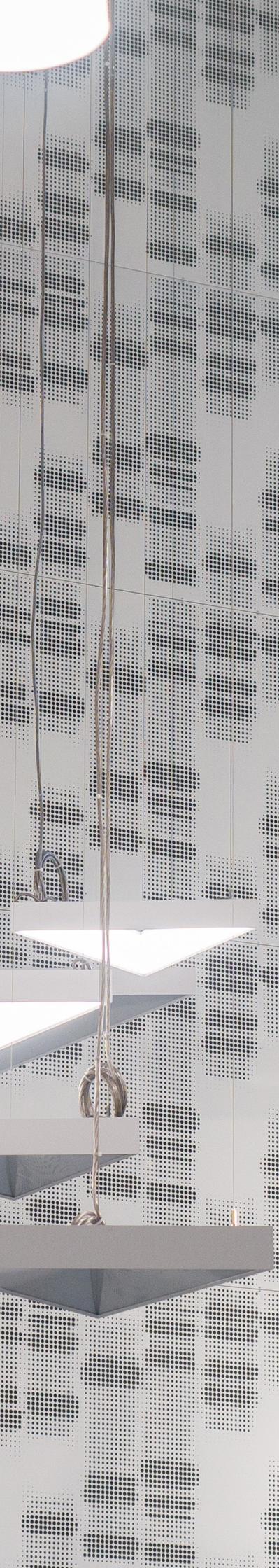
#### Potential for upscaling

This practice has great upscaling potential. It has already been scaled up to other cities in Finland and it is easily scalable to other kinds of activities. Thus, the potential for upscaling was concluded to be **high**.

#### Potential for replication

The practice has great potential to be replicated in other regions. The system is open source and therefore replicable to any organization. Although it is very common that large companies and entities already have furniture inventories in order to reuse them, there is usually no platform or application that allows for quick and open consultation of available furniture. Thus, the potential for replication was concluded to be **high**.

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### 5.1.8 InHAUS: Modular houses (Valencia, Spain)

#### Estimating potential impact of GP (SDG indicators reflected)

The inHAUS practice provides an example of sustainable design and modularization that are instrumental for CE in the construction sector and in extending the life cycle of the buildings and increasing their reusability and recyclability. As a result of the controlled construction process, water consumption is very low, waste management is controlled, and the volume of waste is very small. It was concluded that this practice has **medium** impact (or potential impact) in the Valencia region to sustainable production and consumption, and also to social aspects like unemployment rate of persons by sex, by age and disabilities.

#### Potential for upscaling

The business model entails a strong element of sustainability in the potential for reuse of materials. Upscaling of the business model would clearly reduce the future needs of new material input in the construction sector. However, as the houses are higher priced than houses built in the traditional way, upscaling potential may be reduced. Thus, the upscaling potential was concluded to be **medium**.

#### Potential for replication

The practice has already been replicated in the tourism sector and replication potential for other construction sectors (types of buildings) is strong. Thus, the replication potential was concluded to be **high**.

### 5.1.9 Circular Renovation in Werkspoorkwartier (Utrecht, the Netherlands)

#### Estimating potential impact of GP (SDG indicators reflected)

The circular renovation of buildings is part of the Werkspoorkwartier project, which aims to develop an inner industrial area into a creative and circular area. It will do this through both the refurbishment of existing buildings as well as through the inclusion of circular materials for use in the refurbishment. In addition to the physical regeneration of industrial buildings, the project is part of a wider plan for urban regeneration with strong links to wider skills and employment objectives. It was concluded that the contribution to SDGs has **high impact** in the city of Utrecht, particularly with regards to sustainable economic growth, decent work, entrepreneurship, creativity, innovation and



employment; sustainable urbanisation; working within a wider regeneration programme to give people vocational skills; sustainable Industrialisation and use of resources); and importantly, due to the partnership approach being taken in the development, due to the multi stakeholder approach to develop the area.

### **Potential for upscaling**

Scalability seems high both within the city of Utrecht, the Netherlands and in other European regions. The multi stakeholder approach to the redevelopment of derelict industrial buildings is central to the success of the replication and scalability of this case study. The key role played by the municipality to facilitate this approach is key. Given that this is typical of the Dutch approach to regeneration, scalability is considered **high** across the Netherlands.

### **Potential for replication**

Such partnership working to a large extent is embedded in ESIF programmes across all regions as well as within other regeneration programmes, so the potential for replication remains high in such situations. In addition there is the potential for policy learning transfer, the required role of the state to act as partnership coordinator/facilitator. The potential for replication is also considered to be **high**.



### 5.1.10 Meublowski (Utrecht, the Netherlands)

#### Estimating potential impact of GP (SDG indicators reflected)

Meublowski is a Micro Enterprise with 2 staff based in Utrecht, refurbishing old chairs from Poland and selling them along with interior design services using existing materials, preventing the loss of furniture from both the Netherlands and Poland. Currently, demand for services significantly outstrips supply with only 2 staff in a family business. For this reason, whilst the practice clearly ensures sustainable consumption and production patterns, as the business model currently operates, the impact is considered currently **low** against SDG indicators overall. However, considering the scalability factors below there is potential to improve SDG impact against (by supplying local people high quality vocational skills) and by through decent job creation, innovation and entrepreneurship).

#### Potential for upscaling

There is a large potential to scale up given the practice is currently a family business of 2 employees alongside the large demand for the products. The potential for training local people to provide high quality artisan skills is considered high and there a significant potential to provide more decent job creation within the local community. Scaling up for this particularly will depend on the willingness of the owners to consider a step change in their operations who may decide this is a lifestyle business that suits their personal needs, however that being said there is potential for scaling up and the potential is considered **high**.

#### Potential for replication

Replication of this particular case is considered **high**, but with the caveats mentioned above. In addition, replication will in itself depend on the availability of artisan craft making skills and the skills that either currently exist, or can be developed with local communities.

## 6.2. Transversal success factors

The transversal success factors of each GP were reviewed in more detail by carefully assisting the interview process of businesses with a list of aiding questions based on eight factors presented in an article by Rizos et al 2016 [10]. This list of questions aims to assist the project partners in examining in more detail why a particular good practice has proven successful. Transversal factors also aim to shed a light to the possible connecting success factors and learning points between five different CE business model types examined during the REDUCES project. Three questions concerning transversal factors that may have played a role in the success of the practice were posed to the interviewees and these factors were then analyzed jointly on all the GPs. The main success factors that arose in relation to the product life extension business models were the following:

- Company cultures/values in eight GPs
- Customer Green consumer preferences/customer base/customer profile in three GPs and
- Leadership/individuals within the company in two GPs.

In the REDUCES regions, it seems that company values and so-called green consumer preferences or green customer base/profile are the most significant factors for developing the product life extension business cases. Most of the companies emphasized sustainable values in their businesses, a factor that is likely to make the transition to CE easier. In a similar manner to traditional businesses, the demand from the customers affects how the CE companies develop and brand their products and services to a great extent. In these case companies, it seems that leadership and the commitment of the individual employees are in a much smaller role for the success of the business cases. This is perhaps explained by the prevalence of an ambitious company culture and values, which might make individual choices less relevant for the implementation of CE business cases.

## 7 References

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