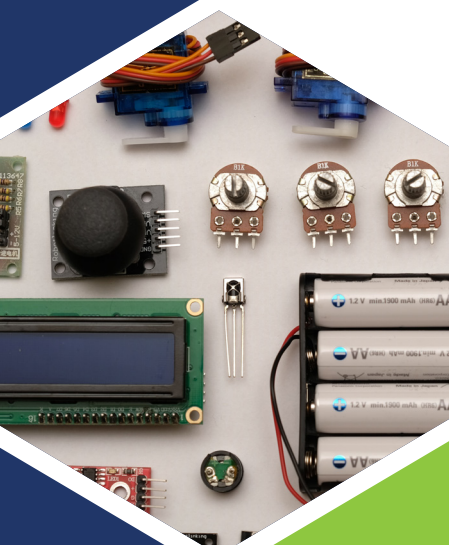


Study Report 4: Resource efficiency and recycling

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



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Maramureș
County Council



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1. Focus of the report

This report presents the fourth study report for Interreg Europe project REDUCES dealing with the circular business models on “Resources efficiency and recycling”. This report is based on the 5th interregional meeting and the presentations and discussions that took place during this event, as well as on the evaluation of the cases that was done in the weeks afterwards. The meeting was set to take place in Maramures County, Romania, but was reorganized to an online meeting as a consequence of COVID-19 restrictions.

As stated in reports 1, 2 and 3, Circular economy (CE) can mean many different things for different actors in different fields. Common denominators are designing out waste and pollution (waste reduction), keeping products and materials in use (upscaling and keeping the value), regenerating natural systems (loops, transition), and social aspects like creating well-being.¹ This broad context requires the focus on specific business models which were introduced and developed during the REDUCES project 1st interregional meeting.

In the next chapter, the business model “Resources efficiency and recycling” is introduced in the context of the REDUCES project. The third chapter reports the highlights of the 5th interregional meeting of the project. The fourth chapter presents the good practice cases that were presented and

discussed during the 5th interregional meeting. In the weeks after the meeting, a peer review evaluation was set up between the partners. The fifth, and last, chapter presents the results of this evaluation process.



REDUCES brings together six European regions.

¹ Ellen MacArthur Foundation. 2017. The concept of a circular economy. <https://www.ellenmacarthurfoundation.org/circular-economy/concept>.



2. Description of the Business Models

2.1. Regional background

The selected best practices within the REDUCES project are part of a project that aims to understand and improve regional policy instruments for a CE. The six regions involved in the REDUCES project 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. CE business models should contribute to this objective. The next paragraph gives more information

about the business model central to this study report: "Resources efficiency and recycling".

2.2. Business Model Definition

During the previous Interregional meetings the project partners concentrated on Sitra's conceptual definition of the different business models from Circular Economy which were selected for the REDUCES project. In the first, second and third study reports four business models in total were presented: "Product Life Extension", "Product-As-A-Service", "Renewability" and "Sharing platforms". Following the descriptions by Sitra², the models are explained respectively as: 'using products according to their original purpose for as long as possible or enabling multiple instances of reuse through means such as maintenance, repair and refurbishment'; 'providing services instead of products'; 'using renewable and recyclable materials as well as renewable energy in product design and manufacturing'; and 'maximizing the usage of goods and resources and extend their life cycles by using digital platforms for renting, selling, sharing and reuse', for instance.

² For the definition by Sitra and Finnish examples, please see: <https://www.sitra.fi/en/projects/inspiring-solutions/#what-is-it-about>

The “Resource efficiency and recycling” business model is seen as a promising model for enabling a circular economy because producing goods using recycled materials is often much less energy intensive than manufacturing goods from virgin materials. Recycling thus has great potential to improve resource efficiency by reducing production costs and carbon dioxide emissions. Using lower quantities of materials in product design can also play a part in improving access to raw materials.

Technological development enhances resource efficiency in value chains, processes and products, and allows for more effective recycling. Side-streams are valuable raw materials for recycled products and materials.

For more examples of the business model under discussion in this report, please see for the Finnish examples in Sitra’s report.³



³ Sitra: <https://www.sitra.fi/en/projects/interesting-companies-circular-economy-finland/#business-examples>



Interregional meeting, REDUCES project Resource efficiency and recycling

Maramureș County – ROMANIA
20-21 April, 2021

Welcome!

Bine ați venit!

3. Fifth REDUCES interregional meeting

On the 20th and 21st of April 2021, Maramureș County Council hosted the 5th interregional REDUCES meeting.

On the first day, the event took place both on-line, on the ZOOM platform, as well as offline. The online event on the 20th of April was attended by more than 30 international participants from the partner regions and the offline event was attended by 25 local stakeholders from Maramureș, who were physically present at Maramureș County Council.

The overall objective of the meeting was to highlight the importance of circular economy business models on resource efficiency and recycling. All partner regions learned from each other from the case studies that presented resource efficiency and recycling business models in each participating region, including their environmental impacts and development potential.

Before the official opening of the first day, Mihaela Lite, REDUCES project manager at Maramureș County, gave relevant information concerning the agenda, links and ways to participate and share information to online and onsite participants.

Ionel Ovidiu Bogdan, the President of Maramureș County Council, opened the meeting on the 20th of

April and addressed the welcome speech, underlining the importance of the REDUCES Project for the local economy.

The first part of the meeting was dedicated to the key developments in Romania in the field of circular economy at national level, in the NW region and in Maramureș County.

Raul Pop, State Secretary in Ministry for Environment, Waters and Forests, presented relevant legislation in Romania and financing programs for the next programme period. He spoke about circular economy as a waste free one where new eco-design rules apply. The products must be durable and repairable, and he spoke about the right to repair. Mr. Pop shared with the participants some provisions linked to the circular economy from the National Resilience Plan (under development). He spoke about industrial symbiosis, and he concluded that Romania faces serious problems concerning resource efficiency and that we have to learn from success cases in other EU countries.

Michaela Mihailescu, expert at the Northwest Regional Development Agency, presented the Regional Development Plan of NW region of Romania – the policy instrument of Maramureș County in the REDUCES project and Northwest

Regional Smart Specialization Strategy (RIS3). The general objective and the specific objectives of the Northwest Regional Development Strategy 2014–2020 contribute to achieving the targets set by the EU's cohesion policy for 2014–2020, being correlated with the 11 thematic cohesion objectives. The main strategic objective of RIS3 refers to the structural transformation of the economy through innovation based on new technologies, with the intent of meeting the main social and economic challenges, underpinned by the principles of sustainability and circular economy.

Successful projects and initiatives in circular economy in the NW Region were presented by Ioana Dragos, expert of the Northwest Regional Development Agency. Innovative solutions for circular economy were presented from the experience of Neptune and C-Voucher projects, funded from Horizon 2020.

The representative of Baia Mare Municipality, Oana Ilies, head of the Project Management Department, presented good practices on energy efficiency projects in Baia Mare.

The first poll (Figure 1) was applied, and a debriefing session followed presenting the results. The linear economy is based on TAKE-MAKE-DISPOSE. The participants expressed their opinions regarding the main disadvantages of this approach: 33% of respondents considered that most of products are used for short time and then disposed; 31% of opinions showed that we produce more than we need; 22% of responses considered as a main disadvantage the intense use of finite natural resources; 14% of respondents considered that the low rate of waste recycling in Europe (only 39%) is a main disadvantage of the linear economy.

The first part of the morning session ended with a video storytelling regarding the restoration of old traditional houses in Maramures.

After a short brake, the second part of the meeting was dedicated to the interregional exchange on the REDUCES project. During this session, moderated by Monica Muresan, consultant in circular economy from Chamber of Commerce and Industry Bistrita-Nasaud County, all six partner regions shared their good practices on resource efficiency and recycling.

The morning program included the first two presentations of REDUCES partners. Jenni Suominen and Timo Mieskonen from Turku University of Applied Sciences, Finland, presented sustainable structural solutions from hemp. The project intended to develop a sustainable and recyclable material for the construction industry to use. The goal is to develop resource efficiency and carbon neutrality, as well as to make hemp construction an alternative at the raw material level with lots of advantages, such as: reducing the need for imports as the hemp building can be built from 100% domestic materials, recyclability and circular economy value (material from the field to the product and back to field), reducing energy consumption and energy efficiency.

Linear economy is based on TAKE-MAKE-DISPOSE model. Please select the main three disadvantages of this approach:

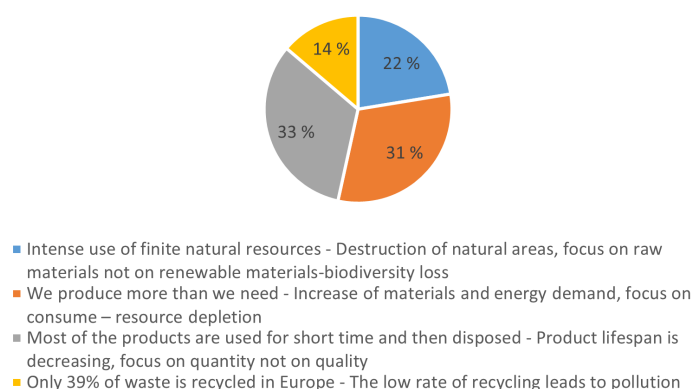


Figure 1. Poll about the main three disadvantages of take-make-dispose model.

Daniel Kostov from Ecologica shared interesting aspects from Bulgaria related to recycling of e-waste. As consumers become more aware of the carbon content in waste and understand the endless life cycle of materials, they will be empowered to take responsibility for their behavior and consumer choices.

During the afternoon session on the 20th of April, the good practices presented by the other four partner regions revealed the impact of resource efficiency business models on the development of circular economy in the EU regions.

Before the presentations, a second poll (Figure 2) was provided to participants with the question “Why do we need a circular economy based on REDUCE-REUSE-RECYCLE model?” The respondents considered that we need circular economy in percentage of 51% because critical materials for the economy are going to be extinct; 41% because the population is growing; 8% because the pandemic crisis had a bad impact on the consumers.

The good practice of Valencia Region, presented by Vera Valero from Valencia Institute of Building, was related to mandatory use of recycled sand and gravel in all municipal works in Gandia, Spain.

The goal is to ensure sustainable consumption and production patterns by reducing waste generation through prevention reduction, recycling and reuse and promoting public procurement practices that are sustainable.

The presentation on the refurbishment and reuse of returned electric appliances was provided by the owner of Retourkoop.nl, Yarno de Hiep and moderated by Holger Hooimeijer, from Utrecht, The Netherlands. It was an excellent good practice example on how we can prevent extra production by applying the 10 Rmodel of circularity.

Further, the participants found out about a new approach to recycling Greater Manchester, Reuse Shops and the Recycle for Greater Manchester Community Fund, presented by Karen Thompson, Partnership and Social Value Coordinator, Recycling and Recovery UK. SUEZ has more than 50 social value commitments within the contractual agreement with GMCA (Greater Manchester Combined Authority), as well as a commitment to increase household waste recycling and transition towards a circular economy. It aims to encourage applications for new and innovative waste and recycling community projects in order to return revenue from waste management back to a wider community.

Why do we need circular economy, based on REDUCE-REUSE-RECYCLE – model? Please select from the following answers:

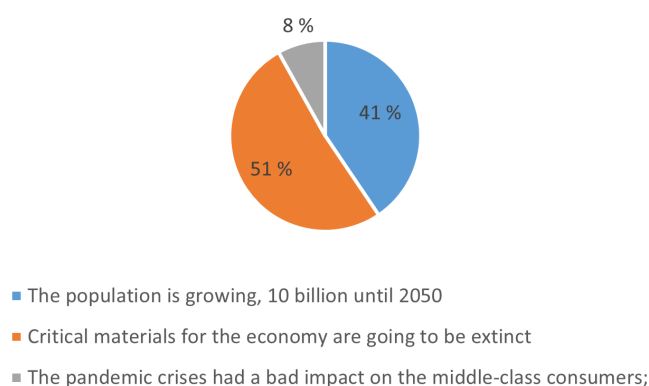


Figure 2. Poll about the need for circular economy.

In your opinion, what are the main challenges for circular economy? Please select three options:

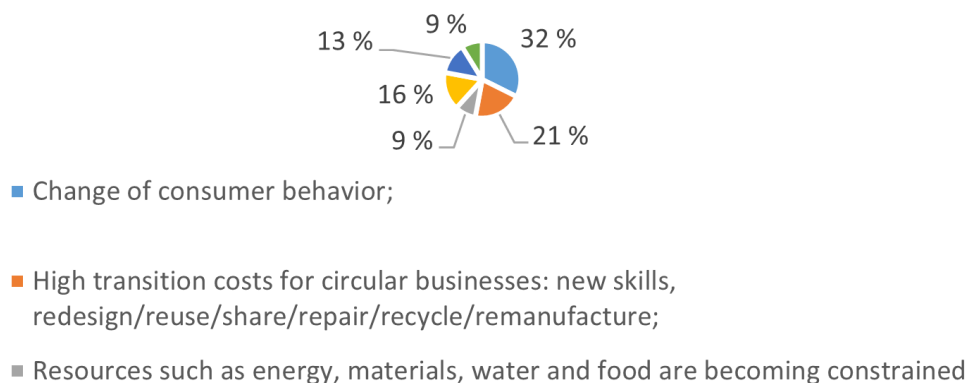


Figure 3. Poll about the need for circular economy.

The third poll (Figure 3) was provided to participants regarding the main challenges for the circular economy. After the poll a debriefing session followed presenting the results. The respondents considered the main challenges for circular economy as follows: change of consumer behavior – 32%; high transition costs – 21%; mission key enablers – 16%; decoupling economic growth from resources use – 13%; constraints on resources such as energy, materials, water and food and changing in financial sector – 9%.

Maramures County from Romania, the host of the 5th interregional meeting, shared two examples on resource efficiency and recycling projects. Sandu Hotima, the representative of the Association of Inter-Community Development for the Integrated Management of the Household Waste in the county of Maramures, presented local approaches for waste collecting, sorting and recycling. The conclusions were that Maramures County is encouraging results and focusing on composting at source can be a solution for significantly reducing the total amount of waste, but also for increasing the compliant recyclable fraction. The population is becoming more involved and more aware of the ecological and economic value of high-performance waste management.

Composite materials from natural fibers was the last business model presented during the first day of the interregional REDUCES event. The presentation of that innovative project was held by Ioan Cionca, Director of R&D Department TAPARO Company from Targu Lapus, Maramures County. Taparo intends to become a platform of raw materials and components for the furniture industry and others. The vision of the company is to create a synergy between composite materials and applications in many industries, providing solutions for alternative materials, parts and components based on circular economy.

On the second day of the 5th interregional meeting, on the 21st of April 2021, an online workshop on development of Action Plans was organized by Maramures Count Council, using the Zoom Platform.

23 participants attended the workshop, representatives of Reduces partner regions, owners of policy instruments and local stakeholders.

The partners had the opportunity to present their ideas for action plans, to share challenges on the expectations of the Interreg Europe programme and the implementation of action plans, as well as to discuss influencing the policy instruments and

to receive feedback from the REDUCES partnership and the owners of the policy instruments.

Monica Muresan, external consultant on circular economy from the Chamber of Commerce and Industry Bistrita-Nasaud gave a presentation of an action plan developed in another Interreg project, Rural SME, sharing with all the REDUCES partners the challenges on the expectations of Interreg Europe program.

In order to see the current stage in the development of Action Plans, a poll was conducted with the following results:

1. Which are the directions (fields of activity/ REDUCES CE themes) that you have selected for your Action Plan and which good practices have you selected?

The answers highlight the interest for the following directions of the regional action plans: circular economy issues in construction: resource efficiency, recycling, socially sustainable CE (7 answers); green procurement / public procurement (2 answers); training on circular economy (4 answers); upgrade waste management system at municipal level (1 answer).

2. How will your Action Plan improve the policy instrument you choose?

This question had three types of answers and respondents chose more than one answer. According to the responses, the action plans of 61.5% partner regions will implement new projects, 61.5% of action plans will produce a change in the management of the policy instrument and 30.8% of regional action plans on Reduces project will entail structural changes of the strategic instrument. Partners will include in their AP at least two different actions and they will provide some influence of the chosen policy instruments on different levels.

3. Have you identified potential challenges to overcome for the development and implementation of your Action Plan?

53.8% of the respondents considered that they identified potential challenges for their action plan development. That question had an open section: "If yes, please indicate some of them". The challenges identified refer to transferring/translating CE principles and lessons learned in regulation requirements; different expectations between companies involved and governmental organizations; revision of the most important PI; OP Environment exhausted funds.

4. Have you identified the relevant stakeholders to be involved in the implementation of your Action Plan

The large majority of the respondents – 92.3% - considered that the relevant stakeholders at regional level are identified to be involved in the action plan development: the businesses environment, local authorities, NGOs, universities and other experts in circular economy.

The first presentation on the regional action plans was delivered by Jenni Suominen from Turku University of Applied Sciences, the lead partner of the REDUCES project. She presented the context of the situation as well as the foreseen actions for the action plan which refer to promoting socially sustainable CE related constructions in SW Finland and development of a reviewed tool to evaluate the (business) impact of CE related ERDF projects in the region.

Some discussions were linked to the instrument as an important tool for public authorities. Jenni Suominen underlined that even if the role of businesses is very important, they do research and investigate better what is the role of public authorities and how public authorities can promote the business impact.

Partners concluded that further on, a transfer to other regions will be an important step within project cooperation.

The second action plan was presented by Vihra Andronova from Sofia, Bulgaria. The plan is developed together with the University of Mining and Geology, but they face a problem as the funding for the Policy Instrument is exhausted to the date.

They will develop three possible actions referring to developing a model for integrated information system to enable industrial symbiosis networks: developing a pilot for construction waste and setting up a center for transfer of knowledge about CE in raw materials industry.

The discussions centered around the capacity of Bulgarian partners to integrate the actions with their policy instrument. This is a matter of further thinking and brainstorming in their team.

The third action plan was presented by Vera Valero from the Valencian Institute for building with a very interesting policy instrument, DC-09 design quality requirements in residential buildings. They will develop two actions for creation of an open commission participated by main stakeholders (experts) – sectorial boards and an information campaign aimed at professionals (private and public sector). The second action is very important for professionals, even if the policy instrument is closed, as they are going to implement the rules under the instrument and an awareness campaign is necessary.

The fourth action plan was presented by Utrecht, Holger Hooimeijer, with two actions related to improving circular business climate for other business/industrial areas and scaling up of a Circular Hub: Transport & Logistics in building and construction. They shared in the partnership some lessons learned that consist transversal success factors as well as some struggles that come from

different expectations of companies vs. policy makers.



The fifth action plan was presented by Russell Yates on behalf the Grater Manchester region. Two actions are foreseen for their action plan too, on sustainable consumption and production plan for the Greater Manchester area and community wealth building /Oldham Green New Deal. Andrew Hunt from Oldham Council added some views about the possibility of creating jobs and social value of the Green New Deal. Some examples were provided from energy savings and materials

Sally Randles discussed the 2 by 2 car initiative as a possible leverage for the importance of the policy instrument in circular economy. Social value and social innovation are very important for business as we know.

The last action plan was presented by Mihaela Lite from Maramures County Council, with two actions that will refer to the management of construction waste and a better identification of the waste flows (produced, selected and recycled). The actions have not yet been chosen but that will be done together with the consultant and stakeholders. For the second action big data will be used so many people will need some training on the on-line platform.

Monica Muresan presented relevant information concerning the action plan developed under the Rural SMEs project.

Meeting conclusions were drawn by Jenni Suominen, the REDUCES project manager:

- It's time for all to return to our region and to think what we have got from the meeting and how we will utilize that;
- It is important to start sharing and learn from each other;
- The learning process cannot end, it has to continue also in phase 2;
- There are quite a few interlinkages between the actions and we need to start working together;
- The peer review will be lead by Manchester and we need to be very aware about the work we are doing in each region;

- The initial thoughts about the actual concrete good practices that we are learning from should continue, and we can learn not only from one region but from several;
- Now we are ready to give more information and focus more concretely on the AP and share some more information if needed;
- We are in a very good status, and we can have good quality action plans.

The second day of 5th interregional meeting on Reduces project, hosted by Maramures County, was closed by Mihaela Lite, the project manager of the Romanian partner, who addressed many thanks to all partners for participation and involvement.





4. Selected regional GP cases

In essence, the REDUCES interregional meetings are about learning from CE Good Practices across Europe. In this chapter, the regional GP cases that were introduced during the 5th interregional meeting in April 2021 are presented. There were more cases collected and evaluated by the partners (see part 5). More information about each case can be found on the REDUCES website: <https://www.interregeu-rope.eu/reduces/good-practices/>.



Southwest Finland

Sustainable structural solutions from hemp

Presented by Jenni Suominen & Timo Mieskonen, Turku University of Applied Sciences

The Hemp Construction project aimed to bring a sustainable new hemp material for the construction industry to use. The long-term goal was to develop resource efficiency and carbon neutrality, as well as to make hemp construction an alternative on the raw material level.

The construction industry in Finland requires new sustainable solutions, especially material-wise. Hemp wasn't seen as a possible alternative at the time and also the awareness on its benefits was quite low.

An important aspect of the project was to highlight the circular economy, especially the recyclability

aspect of hemp material. The recyclability of the structures was tested at the Tuorla Agricultural School, where the material was crushed into the ground and found to be degradable. The material was also found to improve soil structure, and hemp cultivation can be resumed from these points.

The construction of a pilot house was not originally planned, but because a lot of material had been collected during the project, it offered a chance to test the material and structures in a concrete building process. Currently, the house is fully furnished, and it serves as an exhibition space for hemp houses, as well as a remote working space for the staff and students of TUAS.

The project received ERDF funding. Total project budget was 100,595 €.

During the construction of the house, it was possible to study the drying of the material and the properties of the structures. The need for an investment in Hempcrete Sprayer was proven

fruitful as it is now rented for a company operating in the field.

It was found that in Finland, hemp dries on its own in the winter and can be grown all the way up to Lapland, which makes it an ecological and sustainable domestic material.

When the project started in 2016, a little time went ahead: there was a construction boom in the Turku area, and companies did not have time to get acquainted with new materials. Now would be a good time for them due to the situation brought by the corona virus. The work and basis for the introduction of hemp has already been done.



E-waste: producers vs consumers

Presented by Daniel Kostov, "Ecologica"

With its activities and services, Ecologica Bulgaria Ltd contributes to sustainable management of e-waste. E-waste is among the fastest-growing waste streams. The toxic materials in electronics, like mercury and lead, can harm people and the environment. The problem of electronic and electrical (EEE) waste is going to grow considering the rapid changes in technology, increased consumption and more consumers generating e-waste, much of which is still usable.

The Ecologica services include:

- Recycling of e-waste from the corporate and public sector;
- Increasingly intensive e-waste service by home users;
- Creating curricula to strengthen technological competence and environmental culture for schools and start-ups;

- Consultations for businesses to improve the sustainability of their business and strengthen environmental responsibility;
- Trainings and consultations on the rules and good practices in e-waste management;
- Monthly information bulletin for compliance on legal requirements.

To collect the e-waste, the company is using several channels such as their own transport means picking up the e-waste from the clients, special events or clients delivering directly to the recycling center.

The initial investment made by the company is mainly in machines and equipment for the separation of electrical and electronic parts – around 100 000 Euro.

The challenges that face companies and municipalities in e-waste management include an absence of infrastructure for appropriate waste management and absence of framework for end-of-life (EoL) product take-back or implementation of extended producer responsibilities.

The experience in developing appropriate e-waste management business model is a good achievement that can be shared with other regions. E-waste is generated everywhere in Europe. Good management is not a matter of financial resources but of human resources and smart planning and implementation of appropriate measures for every different e-waste stream, different urban areas, and different neighborhoods. Good communication with the authorities, citizens and businesses helps to achieve good results.

REDUCES



Valencia, Spain

Mandatory use of recycled sand and gravel in all municipal works in Gandia

*Presented by Vera Valero,
Valencia Institute of
Building*

Gandia is a municipality and Spanish city in the province of Valencia, in the Valencian Community. The town, located next to the Mediterranean Sea and capital of the La Safor region, is a tourist destination.

Most of the cities in Spain have not incorporated the basic national legislation regarding Construction and Demolition Waste (CDW) into their municipal regulations. There is a lack of interest and will in public administrations (responsible for the control and sanction of the production and management of construction waste) to solve the problem. To add, they have few technical resources to carry out such work. 40% of CDW is deposited into the environment or the landscape illegally. A large part of the remaining 60% ends up at landfills due to the lack of demand.

The municipality introduced obligations related to CDW in all the bidding specifications of the Edificant Plan (Plan for the construction, enlargement and renovation of educational public buildings in the Valencia Region). Since the 26th of May 2020, the incorporation of recycled aggregates in municipal works has been obligatory. Thus, the refurbishment of the Neptuno promenade (October 2020) and the construction of the new Les Foies school in Gandia were made by using recycled aggregates.

New Municipal Regulation on the control of construction and demolition waste was approved on the 21st of February 2021. The legislation defines the obligations of producers, holders and

managers of construction waste, as well as the system of penalties in the event of non-compliance.



Utrecht, Netherlands

Refurbishment and reuse of returned electric appliances

*Presented by Yarno de
Hiep, Owner/ Director of
Retourkoop.nl
Moderated by Holger
Hooimeijer*

Retourkoop is a platform for the reuse of returned consumer electronics and appliances. The company buys up and refurbishes these items and resells the final products through its platform, with a guarantee and at a price that is below the available market price.

From the humble beginnings, the company has grown, employing a small staff of full-time employees and a part-time staff of high school students. Aside from the repairs and clean up, each item is photographed and described for the website. At the same time, the company is building a database of items, variants, repairs, necessary parts etc., thus permanently assessing the viability of repairs and the commercial value of the appliances saved.

The company shows that reusing consumer electronics is easily to be organized and transferred taking into consideration that 90% of the products saved can be made valuable again. The business model of Retourkoop also shows that partnerships are factors of success. Collaborating with spare parts wholesalers and local experts in electric appliances contributes to setting up an alternative business model and secondary market for appliances that are seen as worthless.



A new approach to recycling in Greater Manchester: Reuse Shops and the Recycle for Greater Manchester Community Fund

Presented by Karen Thompson, Partnership

and Social Value Coordinator, Recycling and Recovery UK (SUEZ)

SUEZ has more than 50 social value commitments within the contractual agreement with GMCA, as well as a commitment to increase household waste recycling and transition towards a circular economy. As part of their commitments, they plan to open three new reuse shops called 'Renew', as well as a hub.

These will operate on a not-for-profit basis, with any profits being used to support good causes across Greater Manchester. Each year, £100,000 will be given to the Greater Manchester Mayor's Charity and a minimum of £220,000 will be given to the Recycle for Greater Manchester Community Fund.

Through the shops, pre-loved household items which may have been originally destined for waste will be donated at our household waste recycling centers and will be cleaned/repaired if necessary (at the hub) before being sold to residents, giving them access to affordable items for their home and garden.

A Renew hub will be developed in phases over 2021. Initially, it is a storage place for pre-loved items from the HWRCs to be repaired/upcycled and sold through the renew shops. It will develop into a creative space for residents, other like-minded businesses, charities and partners that we choose to work with, to bring a much greater social value.

The Recycle for Greater Manchester Community Fund (CF) is a Greater Manchester Combined Authority (GMCA) and SUEZ initiative, returning revenue from waste management back to the wider community.

It aims to encourage applications for new and innovative waste and recycling community projects.

The Community Fund will be part of the Greater Manchester Environmental Fund which is managed by Lancashire Wildlife Trust.



Composite materials from natural fibers

Presented by Ioan Cionca, Director of R&D Department, TAPARO Company, Maramures

Being a big consumer of wood materials used for furniture components produced here, TAPARO company, situated in Targu Lapus, Maramures County – Romania, is continuously interested in becoming more competitive and reducing environmental impacts.

The R&D department is looking for better solutions to replace or reduce the quantity of wood and they started to develop composite materials from natural fibers like hemp or linen. Several types of composite materials have been produced for different furniture parts and a patent was obtained for that invention.

The specialists of the TAPCOM center of excellence designed furniture components using composite materials, such as armchair models and frames. After a year of tests and very encouraging results, some innovative models of armchair from composite materials have been delivered on the market, extending the cooperation with big retailers and penetrating many countries. TAPARO

also identified solutions for reusing the waste materials or scraps that are reintroduced in the same process, or other process like injections or extrusions.

All waste is reutilized or recycled, proving that composite materials can be considered material without waste. In addition, a very important characteristic of this process is that the flow can be automated. Considering that natural fibers can be harvested every year but the trees from the forest are good for harvest only after 100 years, the process for using composite materials contributes to saving forests and protecting the environment.

European funds in value of 8 500 000 euros are attracted by Taparo in partnership with two universities and three faculties from Iasi and Cluj Napoca: 1 000 000 euros just for research, innovative recipes and technologies for composites from natural fibers, and the capacity for extruded technologies.

TAPARO delivered more than 14 000 pieces of armchair to the biggest retailers from all around the world with very good market feedback.

Using EU funds up to 60%, the capacity for new generation materials can increase from 1.000 to more than 10.000 tons/ year. The final products are more sustainable: they have better resistance and high durability, they are lighter in weight, 100% reusable, the cost of raw materials is low, apply less formaldehyde and thus minimize contamination risk, the production flow is automated, shorter and quick.



5. Evaluation of selected GP cases

REDUCES evaluates the collected good practices applying the methodology defined at the beginning of the project. The goal of the evaluation in the project is to assess the quality of the Circular Economy business cases in the contexts of their environmental impact, replicability and up-scaling potentials. It is also done to get a better picture of the CE practices in the partner regions and their impact in transitioning to sustainable economies. The evaluation highlights the success factors of different business cases, crucial for replication and upscaling in different regions.

5.1. REDUCES evaluation framework and evaluation results

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

2030.⁴ Applying a methodology by Schroeder et al. (2018)⁵, 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 Sharing Platform Good Practices mostly contributed to the following SDGs:

- SDG 6 Ensure access to water and sanitation for all: The goal is to ensure safe drinking water and sanitation for all, focusing on the sustainable management of water resources, wastewater and ecosystems, and acknowledging the importance of an enabling environment. The goal includes, for example, a target for substantially increasing water-use efficiency across all sectors.
- 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.

⁴ United Nations. Sustainable development goals. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁵ Schroeder, P., Anggraeni K., and Weber, U. 2018. The relevance of circular economy practices to the Sustainable Development Goals. *Journal of Industrial Ecology*.

- SDG 10 Reduce inequality within and among countries: The goal is to reduce inequality within and among countries, for example by reducing income inequalities, promoting universal social, economic and political inclusion, and ensuring equal opportunities and an end to discrimination.
- SDG 11 Sustainable cities and communities: The goal is 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 is 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 17 Partnerships: The aim is 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-high):

- Potential sustainability impact
- Potential for up-scaling
- 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 on the following pages case by case.

GVA Green Guide (Valencia, Spain)

Estimating potential impact of GP (SDG indicators reflected)

The Green Guide on public procurement in the building sector was developed by the Generalitat (Valencia Regional Government) with partners in the sector to boost innovation and CE. The guide deals with the inclusion of environmental criteria in the different phases of public procurement. Developing the guide has been a collaborative effort of stakeholders in the development of public works in the region. The Green Guide has already been updated, showing a continuing effort for improvement.

The practice has potential impacts on multiple SDGs. The impact on creating good jobs and economic growth was considered **medium**, as the Green Guide will probably impact economic growth, but to no bigger impact than other investments in city development. The impact on making cities and human settlements inclusive, safe, resilient and sustainable, on the other hand, was considered **high**. Investments in city areas will become more sustainable when the stakeholders use the guide for the city procurements. When it comes to ensuring sustainable consumption and production patterns, the potential impact was also considered **high**. Partners in sustainable production of the built environment collaborate on the sustainable design, building and maintenance of housing and utilities.

Potential for upscaling

The potential for scaling up this practice is **high**. Within the country more regions can apply the materials and guidance collected in the materials. The Green guide is made publicly available and is accessible for all stakeholders in the development of building and utilities.

Potential for replication

Replication of this practice is relatively easy, making replication potential **high**. Both the process as well as the contents of the Green guide translate to other regions. The principles within the Guide are general but might need to be adapted to meet local law and regulations. The process of collaboration is also easily replicated as the stakeholders and their positions within the use of the Green Guide are very comparable.



CERSUDS – Ceramic Sustainable Urban Drainage System (Valencia, Spain)

Estimating potential impact of GP (SDG indicators reflected)

CERSUDS is a sustainable drainage system pilot that uses low commercial value ceramics as a component for a filtering paving system. Ceramic tiles with no commercial value are reused to make paving units that help filter and regulate drainage for city areas that suffer from drainage issues due to drought and unpredictable rainfall.

The practice entails potential impacts on multiple SDGs. The impact on ensuring availability and sustainable management of water and sanitation for all was considered **high**. The units help manage drainage and filters the water, lowering further costs of filtering water downstream. Also, the potential impact on making cities and human settlements inclusive, safe, resilient and sustainable was considered **high**. The application of the units helps sustainable water management and lowers the dependency on concrete or other high impact materials in paving and drainage. When it comes to ensuring sustainable consumption and production patterns, the potential impact was seen as **medium**. The units are available for purchase by municipalities and application at this moment is limited to public spaces. Commercial application is still limited. Finally, the potential impact on creating good jobs and economic growth was seen as **low**, as the production of the units is strongly automated and the resources for the units are already available.

Potential for upscaling

The practice entails **medium** potential for upscaling. The region at hand is the leading producer of ceramic tiles in the world. Other countries in Southern Europe also have potential supplies of resources. In other words, scalability beyond the region is limited by the availability of local supply.

Potential for replication

Replication of the production process is relatively easy, provided the resources are available. The potential for replication is therefore **high**. As the proof of concept has shown strong results, viability drives the replication score.

Retourkoop (Utrecht, the Netherlands)

Estimating potential impact of GP (SDG indicators reflected)

Retourkoop is a platform for the reuse of returned consumer electronics and appliances. The company buys up and refurbishes these for resale through its platform. Batches of returns are bought, inspected and items are selected to be renewed. Every item is tested, repackaged and offered for sale. The company addresses the problem of consumer returns of electronics which are unwanted or deemed defective by the consumer, and deemed not valuable enough to restock or repair by retailers like Amazon.

As the inflow of appliances is relatively unpredictable (the state of the appliances is indicated by the retailer in quality grades), the company has acquired knowledge of finding spare parts, manuals and easy fixes of the most common defects that would increase the lifespan of these appliances by at least several years. The company partners with technical partners for spare parts and experts help in some cases. The final products are sold through the website with a guarantee and at a price that is below the available market price.

The practice is aligned with SDGs that aim to make cities and human settlements inclusive, safe, resilient and sustainable and to ensure sustainable consumption and production patterns. The practice contributes to the reduction of waste, however the impact of this indicator has been evaluated as **low**, because rather than reducing urban waste, industrial waste is being reduced. The practice contributes to the reduction of waste generation through the recycling and reuse of electronics and appliances. Although quantitative results are not available, it seems that the contribution to the reduction of waste generation it is noteworthy by reducing the appliances dumped. Potential impact was thus estimated to be **medium**.

Potential for upscaling

The upscaling potential is considered **high**. It seems reasonable and relatively easy, once the business model is implemented and consolidated, to expand the product line, and to expand business activity to other regions.

Potential for replication

The potential for replication is considered **high**. There are no expensive barriers to entry into the market, the starting conditions (unwanted or deemed defective by the consumer) are found in other regions.



Buurman Utrecht (Utrecht, the Netherlands)

Estimating potential impact of GP (SDG indicators reflected)

Buurman Utrecht is a company with a workshop and wholesale which facilitate the reuse of discarded materials. Waste gets a second life, and craftsmen are being employed.

Buurman Utrecht aims to reuse building construction materials. The company started with a focus on wood from waste streams and looking at the potential functionality of the discarded wood at hand. However, the company also offers other useful materials and giving those a circular destiny. Buurman makes use of a wide variety of suppliers such as municipalities' recycling centers, waste management companies, building and construction companies with their leftover materials, as well as material traders. The company offers different services. It is both an online and physical marketplace for circular materials, it offers a workshop to craftsmen, and it takes part in projects dedicated to the uptake of discarded materials.

The practice is aligned with the SDG goals of creating good jobs and economic growth and ensuring sustainable consumption and production patterns. The practice contributes to improving global resource efficiency in consumption and production and endeavors to decouple economic growth from environmental degradation. The practice contributes to reducing waste generation through the reuse of construction materials, especially wood. Although quantitative results are not available, it seems that the contribution to the reduction of waste generation it is noteworthy with a reduction of 150 tonnes of material being dumped. Therefore, the potential impact on waste generation was considered **medium**.

Promoting good jobs and economic growth is demonstrated by the additional indicator "Increase in number of FTE in CE jobs", with 14 jobs being created in 2019. The potential impact was hence considered **low to medium**.

The company has also organized 100 workshops and is currently part of 10 circular projects. This demonstrates **medium** impact in the region.

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Potential for upscaling

The upscaling potential was considered **medium**. The company is specialized in working with wood and although it could be possible, it does not seem reasonable to expand the business model to another line of materials. However, the associated specialized services they offer could be increased. The potential to be expanded to other regions is limited as the company does not have a systematized online store.

Potential for replication

The potential for replication was considered **high**. The business model is easily applicable to other regions. As it is based on cooperation, it seems reasonably easy and fast to launch the initiative without big investments. It could be also launched as a complementary business line by already consolidated businesses (e.g. demolition companies offering reused materials).

Recyclable construction solutions from hemp (Southwest Finland)

Estimating potential impact of GP (SDG indicators reflected)

The Hemp Construction project tested domestic hemp and domestic lime, developing various recyclable mixtures for the construction sector to be in line with circular economy principles. The results showed that the tested materials are degradable and improve the soil structure. A pilot house of 10m³ was built using the collected materials during tests. Taking into consideration that this practice does not specify the construction durability and how the hemp materials work over time, the impact in terms of SDG indicators was considered **medium to low**. Traditionally, 15% of the normal construction materials end up as waste already during the construction phase. Hempcrete material is fully recyclable, and it can be used to improve the soil. In addition, the design of the building supports the zero-waste strategy. Therefore, the potential impact on waste reduction was considered **low to medium**.

Potential for upscaling

The practice can be further developed by accessing increased funds for extending the tests related to the properties, design and suitability of hemp materials and the durability of experimental constructions. The project of the hemp pilot house can also be extended to larger buildings with all necessary utilities. Due to these considerations, the potential for upscaling was considered **medium**.

Potential for replication

The potential of replication of the Hemp project is influenced by the need for certification and quality standards in that field, and by the need to include new materials in legislation. The pilot house was built by voluntary work and the necessary costs for the construction work should be taken into account. Therefore, it was concluded that the potential for replication is **low**.

CircVol project, utilization of land masses and high-volume side streams in cities (Southwest Finland)

Estimating potential impact of GP (SDG indicators reflected)

The CircVol project experimented with recycled materials: stabilizing dredging soils and exploitation of clay soils. 12 studies about the usability of land masses have been carried out. As a result, 10 companies involved in the project now have more capabilities to use land masses in their businesses. The research was qualitative and aimed to develop methods and practices, hence quantitative data on SDGs is not available. Taking this into consideration, the impact related to ensuring sustainable consumption and production patterns was considered **medium**.

Potential for upscaling

The experiments were field tests and laboratory tests for dredging mass stabilization, but the project could be scaled up to extend from the pilot stage to getting the product on the market. Scalability potential depends on the cooperation between municipalities and researchers for testing, piloting and approving the side stream-based material or a waste material as suitable materials for infrastructure construction. The stabilized fields can be used for constructions. New funding was obtained for further tests. The upscaling potential was concluded to be **high**.

Potential for replication

The CircVol project addresses dredging masses and clay soils. The City gained more knowledge about the quality of the masses and where to use them. The practice thus has medium potential for replication in other regions due to the specific characteristics of soils.



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CozZo App: Reducing Food Waste (Bulgaria)

Estimating potential impact of GP (SDG indicators reflected)

CozZo App is a food manager, combined with a versatile shopping and cooking planner that helps to avoid food waste by tracking what foodstuff you have and when it expires. According to UN data, one third of the food that the world produces is discarded. In Europe and North America it is households that account for 53% of the total food thrown away and wasted. CozZo combines a smart shopping list with a pro-active inventory catalogue that makes it possible for the users to manage their kitchens with the efficiency of a first-class restaurant. The app tracks food expiration dates by scanning supermarket barcodes on purchase receipts and sends reminders at the right time to ensure that no food will be wasted, and also gives recipe suggestions for the food to be used with. The App is considered to have medium impact on goals to achieve food security and improved nutrition, and promote sustainable agriculture. Reducing environmental impact through the minimization of food waste in a number of countries around the world is at the heart of the App and is considered to have medium impact for making cities and human settlements inclusive, safe, resilient, and sustainable. The company is not currently able to provide more information on the amounts of food being saved, but we can see that there is potential for impact against this criterion to increase. Sustainable consumption and production patterns are strongly being encouraged through the use of the App. Therefore, potential impact on sustainable consumption was considered high.

Potential for upscaling

Scalability seems to be dependent on the number of users using the App. Currently these are users in a number of countries including the US, UK, Bulgaria and many others. The App is currently available to download globally via Apple but not for Android phones, suggesting there is some potential for further reach. Potential for upscaling was considered **high**.

Potential for replication

The technology is owned by the case owner, however, there is potential for greater penetration into more countries and regions around the world. The mobile app makes the technology easy to adapt to. Thus the potential for replication was considered **high**.

Ecoresource: Municipal Waste Management (Bulgaria)

Estimating potential impact of GP (SDG indicators reflected)

Ecoresource is a municipal waste management initiative and company working across seven municipal areas in Bulgaria. It employs 36 people and deals with 25,000 tons of recycled waste per year. The quantity and quality of the recycling materials is increasing annually: +25% separate waste was collected in 2020 compared to the previous year. At the end of 2020, two mobile centers started operation to collect

different types of waste from the households, including metal, glass, paper, plastic, obsolete electrical and electronic and electrical equipment, hazardous household waste / packaging of detergents, expired medicines, old thermometers, etc., batteries, fluorescent lamps, textile waste. Ecoresource Harmanli EOOD together with the municipality of Harmanli organizes campaigns to increase the environmental culture and awareness of children, students and citizens. The practice is considered to provide valuable contributions toward a number of SDGs. The practice was considered to have **medium** impact on good economic growth and jobs because it creates local jobs. It helps to change consumption patterns, thus having **medium** potential impact on the change.

Potential for upscaling

The company currently operates across seven municipalities across Bulgaria and is considered a step change in Bulgaria's waste collection and management system. Further showcasing of the results of this new initiative should assist in achieving upscaling across Bulgaria. The potential for scaling up was therefore considered to be **high**.

Potential for replication

Whilst it is recognized that many regions across Europe might already be operating similar systems, there is scope to replicate in other municipalities across Bulgaria. Potential for replication in other regions of Europe was thus considered **medium**.

ECOLOGICA: Recycling of e-waste in Bulgaria

Estimating potential impact of GP (SDG indicators reflected)

Ecologica Bulgaria is active in e-waste collection and recycling with a national coverage of activities and whilst such waste contains a number of hazardous and toxins e-waste also contains over 60 valuable elements. Manufacturers in the sector are a major consumer of precious and special metals such as nickel and nickel alloys, cobalt alloys, titanium and titanium alloys. Company services include: recycling of e-waste from the corporate and public sector; increasingly intensive e-waste service by home users; creating curricula to strengthen technological competence and environmental culture for schools and start-ups; consultations for businesses to improve the sustainability of their business and strengthen environmental responsibility; training and consultations on the rules and good practices in e-waste management; and monthly information bulletins for compliance on legal requirements. There are 15 500 requests for e-waste collection with more than 4300 tones e-waste being recycled per year including computers, monitors, printers and toners. In addition, education work carried out with schools, SMEs and local authorities is also significant. Impact on goals making cities sustainable is therefore considered **high**; also impact on promoting sustainable consumption patterns is considered **high**. 7 jobs created are good quality jobs and skilled and so impact against on jobs and economic growth is considered **medium** which could be considered high as the company grows and expands. Working in

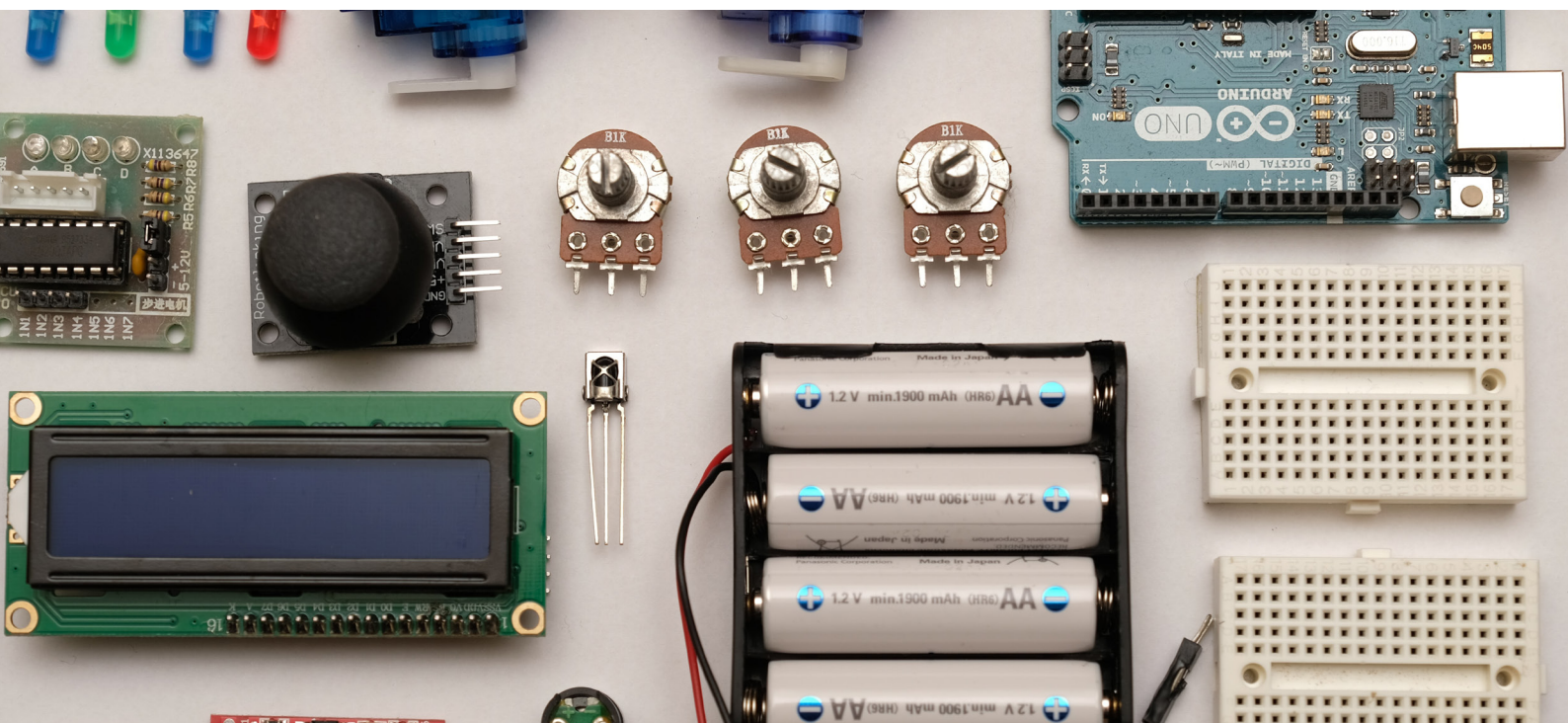
partnership with a number of organisations also shows impact against strengthening the partnerships for sustainable development which is considered **medium**.

Potential for upscaling

The potential for scaling up was considered **high** as the company grows and reaches more regions and municipalities. The vast educational work with SMEs, public authorities and schools can be expected to create greater awareness and therefore usership of the service.

Potential for replication

This is a good example of a private company with a business model that works whilst contributing to national recycling targets. There is **high** potential for replication in other regions.



Case Fundwaste: WASTE TO WEALTH FOR SMEs (Greater Manchester, UK)

Estimating potential impact of GP (SDG indicators reflected)

Fundwaste is a technology-driven solution for resource-efficiency and recycling which facilitates a closed loop for the industry by acting as a recycler and broker of high quality recycled material.

Fundwaste's smart technology allows businesses, schools and community groups to improve their recycling habits and turn waste into wealth as a result. Offering a brokerage service to companies in the recycling market whilst taking care of the logistics, Fundwaste offers these smaller underserved businesses and organisations free collections and drop offs for their clean paper, cardboard and plastic waste.

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The business model of Fundwaste demonstrates the possibility to create high quality jobs in the recycling industry. Nevertheless the current number of jobs in the development and growth of the Circular business is still modest – 8 in 2021. For this reason, the current impact on new job creation and economic growth was currently assessed to be **low to medium**. However, it was recognized that expansion plans for 2021 into 6 additional cities is likely to increase impact from the current base.

Fundwaste's smart technology allows businesses, schools and community groups to improve their recycling habits and gain income as a result. Working with SMEs and schools, the company enables communities to create income from their waste, creating sustainable economic and environmental resilience. As of May 2021, Fundwaste has 160 SME customers in Glasgow. It is expected that the number of schools/recyclables using the system will grow to 13 by 2022. Furthermore, the number of cities served by the company is expected to grow to seven by 2022. Therefore, the potential impact on making cities and human settlements inclusive, safe, resilient and sustainable and on ensuring sustainable consumption and production patterns was evaluated as **high**.

Potential for upscaling

The technology has been developed by Fundwaste to enable expansion into new regions and territories. Considerations need to be given to factors such as distance to the warehouse and a critical mass of population/business density so that to make possible different means of expansion, including franchising. The business model has the potential to be scaled up in the region and on national and international scale. This provides the model with a **high** potential for scalability.

Potential for replication

The practice has potential to be replicated in other regions. The operational infrastructure and technology will remain the same with only language considerations required for transfer. Regional/national waste management policies may need consideration to allow for private collection. However, the regulations on waste management are similar all over the EU and this makes the business model transferable to the EU regions. Thus the potential for replication was evaluated as **high**.

Case DUO: Recycled and Sustainable Packaging (Greater Manchester, UK)

Estimating potential impact of GP (SDG indicators reflected)

DUO develops sustainable packaging solutions for a global customer base, working with clients to develop sustainable packaging solutions that suit their own specific needs. The company produces sustainable packaging for a range of large global online retailers, including in the fashion industry, in a manner that sets out to design packaging with the full lifecycle in mind creating a closed loop in the recycling and manufacturing process.

The company growth is positive and provides good quality jobs – 110 employees, which is the reason to be evaluated for having a **high** impact on job creation and economic growth.

The practice has also reduced the use of virgin polythene materials by 3.5 million kg/3500 tons per year 2018-2021 by ensuring value is retained in the value chain from recycled materials and by working with customers and industry to both minimise resource usage and ensure that more recycled materials are used. Thus the impact on making cities and human settlements sustainable and on ensuring sustainable consumption and production patterns was regarded **high**.

Potential for upscaling

This practice has good scalability potential globally. DUO has been around for over 30 years and is an example of an innovation within an already successful business, rather than innovative disruption caused by a new firm. The market share has expanded to over 300 global clients, enabling an annual revenue of £29m in 2020. Much of this success is viewed being due to their innovation and sustainable practices. The potential for scalability was regarded **high**.

Potential for replication

The practice has good potential to be replicated in other regions. It demonstrates a business model helping their customers to reduce waste, lower their carbon footprint and their ability to be successful in green transition and CE. Therefore there was considered to be **high** potential for replication.

Case Whitecroft: Circular Lighting in the Built Environment (Greater Manchester, UK)

Estimating potential impact of GP (SDG indicators reflected)

Whitecroft Vitality delivers accessible circular lighting solutions for the built environment, working in partnership with its customers to achieve circularity. The case demonstrates the possibility for continuous improvement of attitudes towards circularity. With a total of 280 staff, based in Manchester in a growing CE solution company, and taking 4 apprentices per year the company was considered to have **high** potential impact on economic growth and jobs.

The company has won a significant number of public sector contracts to upgrade schools, hospitals and municipality buildings, creating sustainable lighting solutions that are of the highest efficiency and regularly upgraded. An example of a project carried out by Whitecroft for Cheshire Police Authority (CPA) saw the work carried out save two tons of raw materials, retrofitted lights were £30 cheaper per unit to manufacture than new and used 23 watts of energy less per unit, and light fitting 'packaging' was reduced by 1.5 tons. Similarly, the Re-Light project for Manchester Town Hall is regenerating 2,350 lighting products and will save 56 tonnes of CO2 and energy reduction of 44%. The impact on making cities sustainable was therefore regarded **high**.

Potential for upscaling

One example of a project carried out for the facilities managers of the Cheshire Police Authority (CPA) headquarters demonstrates how a building's 15 year-old internal lighting system can be upgraded through renewing the existing lightings and the introduction of innovative control systems, resulting in an increase in energy efficiency and a significant reduction in waste generation in public buildings, as well as long term cost savings. As a high number of public buildings are facing the same issues, the possibility for upscaling was regarded **high**.

Potential for replication

The practice has good potential to be replicated in other regions. It demonstrates a business model that is helping customers, public or private, to reduce waste, lower their carbon footprint and be successful in green transition and CE. It was regarded with a **high** potential for replication.

Taparo New Generation Materials - recyclable composite materials from natural fibres (Maramures, Romania)

Estimating potential impact of GP (SDG indicators reflected)

TAPCOM project of TAPARO CO. aims is to replace wood or other materials used in furniture and automotive industry with new composites made of recycled and recyclable material.

TAPARO has designed furniture components from composite materials, such as armchair models and frames. TAPARO has also identified solutions for reusing the waste materials in composites that are re-introduced in the same process or other process like injections or extrusions.

Composite materials can be considered materials without waste because all the manufacturing waste is recycled. Reduction of virgin wood in the process saves natural environments. Thus, it was concluded that the case has **high** potential impact on sustainable consumption and material use.

Potential for upscaling

Some furniture models from the composite materials are already in retail in other countries. The composite materials can be obtained from a wide selection of accessible natural materials: linen, hemp,

jute, willow/poplar, coir, textile waste, etc. The new generation materials are versatile and can be used in many fields like furniture, automotive, constructions or decorations. Materials for the composites are available in many places and can be locally sourced. Thus, it was concluded that the potential for up-scaling is **high**.

Potential for replication

Composite materials have good characteristics of resistance, flexibility and they can be used to create many different size and forms of products. But the already created composite sare under patents which can slow the replication. Thus, it was concluded that the potential for replication is **medium**.

Increasing energy efficiency of residential & public buildings and public lighting in Baia Mare (Maramures, Romania)

Estimating potential impact of GP (SDG indicators reflected)

The building sector in Romania has been unsustainable in its energy consumption in the past. However, it has also a high energy saving potential. "Increasing the energy performance of the Baia Mare Pneumology Hospital" is just one example of the many projects of the municipality related to energy efficiency and renewable energy. The costs related to the consumption of electricity and gas were reduced and a pleasant climate for organize the medical act was created.

After the project, the hospital has now 16.6% of annual energy deriving from renewable sources. The annual energy consumption for heating, hot water and lightning has decreased by 58.02% and annual costs for heating energy decreased by 75.87%.

Energy efficiency of the old building stock is considered a very important way to tackle climate change and to make cities more sustainable. Thus the potential impact on making cities and human settlements inclusive, safe, resilient and sustainable was considered **high**.

Potential for upscaling

These kinds of energy efficiency renovations and changes are rather easily expanded to whole city blocks or the city district level everywhere. Potential for upscaling was considered **high**.

Potential for replication

Many cities and regions have developed similar energy efficiency projects, but the integrated approach of energy efficiency projects implemented in Baia Mare could be scaled up and transferred to other regions on EU level. Potential for replication was thus considered **high**.

5.2. 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 2016⁶. 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 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 **recycling** and **resource efficiency** business models were the following:

- **Company cultures/values** in 11 GPs
- **Leadership/individuals within the company (eg understanding of CE, passion, commitment etc)** in 12 GPs
- **Local/sectoral networks/participation in communities of practice/likeminded networking** in 10 GPs
- **Policies/regulation** in 10 GPs

In the REDUCES regions it seems that leadership/individuals within the company, company values and local/sectoral networks in communities and policies/regulations have a significant role in the success of the recycling and resource efficiency business models. Especially the role of leadership and individuals has been valued by companies, but also the value basis of the company is considered a key factor for success. In recycling and resource efficiency companies, where the quality and availability of the material are important for the business, all the combined effects of the values, leadership, networks and underlying regulations provide a suitable environment for successful recycling and resource-efficiency ecosystems. The combination of equally important success factors means that businesses may have a high threshold for starting a business in this field because of added bureaucracy, the needed knowledge base and high initial investments. The upside of this business model is that it has regional and local importance everywhere in Europe as well as also political will for investments.

⁶ Rizos V., Behrens A., van der Gaast W., Hofman E., Ioannou A., Kafyeke T., Flamos A., Rinaldi R., Papadelis S., Hirschnitz-Garbers M., and Topi C. 2016. Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers, Sustainability 2016, 8, 1212.

