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CREATIVE UPCYCLING PROJECTS IN SUPPORT OF THE GREEN DEAL FOR EUROPE

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Abstract

The circular economy plays an important role in delivering on the commitment set out in the Green Deal for Europe. One of its key priorities is plastics - an important material that is ubiquitous in the economy and everyday life due to its functions. The production, use, and consumption of plastics have a negative impact on the environment, generating greenhouse gas emissions and reducing the supply of non-renewable raw materials. The change towards a circular economy, which is intended to preserve the value of products and materials for as long as possible, is to be supported by a hierarchy of waste management methods. The priority is waste prevention, while reuse and recycling are other appropriate ways. The paper presents how the Liberec Region is managing to meet the commitments of the Green Deal for Europe. Every individual can contribute to the implementation by changing their thinking and creative approach. An example is the upcycling of a plastic bottle, where the bottle is not perceived as waste but as a material for creating a new product with a higher use value.

Keywords

Circular economy; Education; Plastics; Upcycling; Waste; Workshop.

Introduction

The transition to a circular economy is one of the prerequisites for achieving the objectives set out in the Green Deal for Europe. The circular economy is intended to reduce the amount of waste produced, avoid wasting scarce raw material resources and thus contribute to reducing greenhouse gas emissions. Contributing to these goals needs to start with the involvement each of individual, which requires education and awareness-raising to promote the spread of sustainable waste management practices. Projects aimed at the general public can be used as an effective tool, not only to disseminate knowledge of the principles of circular waste management, but also to promote a creative view of waste as a resource and opportunity, and to provide practical training in upcycling waste, where waste is turned into a product with new or higher use value. The article presents a project focused on the upcycling of plastic beverage containers, which is implemented at the Faculty of Economics of the Technical University of Liberec, and the benefits that similar projects can provide.

1 Circular Economy in Support of the Objectives of the Green Deal for Europe

The Green Deal for Europe represents a political commitment by the European Union to reduce net greenhouse gas emissions to zero by 2050 and become the first climate-neutral

continent. The sub-target is to reduce greenhouse gas emissions by 55% compared to 1990 (European Commission, 2019). The circular economy is a key enabler for achieving these goals. It is a framework of systemic solutions that address global challenges such as climate change, biodiversity loss, waste and pollution (Ellen MacArthur Foundation, 2023). The circular economy is an alternative to the current linear management principle, which is based on disposable consumption, stimulates consumers to consume more and more, requires the constant use of non-renewable resources and creates unnecessary waste that ends up in landfills. The circular economy aims to preserve the value of products, materials and resources for as long as possible and includes measures such as reducing energy and resource consumption, preventing waste, designing products with minimal waste and extending the life of products and materials in closed cycles (Kirchherr et al., 2017). This approach is based on the principle of renewal and regeneration (Geisendorf & Pietrulla, 2018) and mimics natural cycles (Hofstetter et al., 2021). The transition to a circular economy requires the full integration of sustainable and circular thinking in all areas, including policies, products, production processes and business models.

The waste hierarchy concept provides a guide for the order of waste management activities (Price & Joseph, 2000). The general waste hierarchy has five stages, from the most preferred actions in terms of efficiency and environmental impact to the least preferred, and includes prevention, reuse, recycling, recovery and disposal (European Commission, 2018a). Prevention involves the reduction of waste production, while reuse focuses on extending the useful life of products before they enter the waste stream. Recycling involves converting waste materials into new products, while recovery refers to extracting energy or resources from waste. Disposal, such as landfilling, is considered the least desirable option and is usually used for waste that cannot be managed by other methods.

In terms of the waste hierarchy, waste prevention is the first priority, which should result in a reduction in the volume of waste produced and the consumption of non-renewable resources and greenhouse gas emissions.

It is best to avoid the generation of waste, hence the emphasis on waste prevention and product reuse in the waste hierarchy. Recycling and composting are other ways of managing waste. This is followed by incineration to generate energy, and at the very end of the appropriate methods is landfilling, which is considered the least appropriate method of waste management in terms of its impact on the environment and human life, yet it is still one of the cheapest options.

Plastics are an important material for their functions, widely used in the economy and everyday life, but the way they are currently produced, used and disposed of is damaging to the environment. Plastics raise environmental concerns, including littering, the difficulty of reuse and recycling, greenhouse gas emissions and resource use. Therefore, plastics are one of the key priorities of the circular economy (European Commission, 2018b). The aim is to move towards a circular economy that includes recycling, reuse and minimizing waste and resource use. The focus should be on preventing plastic waste and promoting the reuse and recycling of plastics. In Europe, the most common way of managing plastic waste is through energy recovery, but the potential of recycling plastic waste is not being exploited. Only about 30% of plastic waste is recycled, reuse is low and about a quarter of all plastic waste generated is landfilled (European Commission, 2018b). The European Commission has committed to making all plastic packaging recyclable by 2030.

Concrete actions and strategies need to be adopted to promote a circular economy for plastics and contribute to sustainable development and environmental protection (European Commission, 2018b).

2 Hierarchy of Municipal Waste Management

Municipal waste is defined as waste from households and other sources such as retail, administration, education, health, accommodation and food services and other services and activities that is similar in nature and composition to household waste (European Commission, 2018a). It represents approximately 7 to 10% of the total waste generated in the European Union. The management of this type of waste is one of the most complex, as it is a waste with a very complex and variable composition. Waste is generated in close proximity to citizens, is visible to the public and has an impact on the environment and human health. An efficient system of collection, sorting, monitoring of waste flows and financing is necessary for the management of municipal waste. The quality of the municipal waste management system is indicative of the quality of the overall waste management system in a country and the achievement of recycling targets (European Parliament, 2018a).

The common EU objectives of the Waste Framework Directive (European Commission, 2018a), the Packaging and Packaging Waste Directive (European Parliament, 2018b) and the Landfill Directive (European Parliament, 2018c) are to accelerate the transition to a circular economy and deliver environmental, economic and social benefits (European Commission, 2018a) are as follows:

1. Recycle 65% of municipal waste by 2035, with sub-targets of 55% by 2025 and 60% by 2030 (European Commission, 2018a).
2. Recycle 70% of packaging waste by 2030, with a sub-target of 65% by 2025 (European Parliament, 2018a).
3. Reduce landfilling to no more than 10% of municipal waste by 2035 (European Parliament, 2018c).

According to the Commission's 2023 report (European Commission, 2023), the Czech Republic is one of the nine Member States that are on track to meet the municipal and packaging waste recycling targets (European Commission, 2023). Increased efforts are needed to address the still-distant target of the proportion of waste going to landfill.

The share of material recovery of municipal waste in 2021 was 38% in the Czech Republic, while in the Liberec Region, it was 43%. As regards recycling of packaging waste, the recycling rate for the Czech Republic in 2021 was 68%, while the Liberec Region recycled only 44% of packaging waste. A significant share of municipal waste is plastic waste, which is difficult to recycle (Cenia, 2021, Liberecký kraj).

The complex design often hinders recycling and contributes to high sorting losses during processing. Moreover, the Commission's assessment (European Commission, 2023) shows that current collection systems often capture only a very limited proportion of plastics from municipal waste. To increase the recycling rate of plastic waste, it will be necessary to promote new designs for recyclable packaging, improve the efficiency of separate collection systems for plastics as well as introduce a payment system to incentivize operators to sort at the source.

One of the sustainable approaches to waste management is also upcycling which involves reusing waste materials, repairing, and reprocessing to avoid disposal (Caldera et al., 2022). It brings environmental benefits and advantages compared to conventional approaches (Igalavithana et al., 2022). Upcycling reduces the volume of waste, saves energy and water, reduces greenhouse gas emissions by extending the life of materials, and avoids the use of other valuable natural resources. Upcycling helps to create a circular economy where materials can be continuously reused instead of turning into waste. It can be applied to

different types of waste, including plastic waste (Wang et al., 2021). According to Eriksen et al. (2019), by exploiting the specific properties of plastic bottles, it is possible to maximize the value of the recycled material.

Upcycling encourages creativity in finding ways to use waste materials for new, unique and useful products, and can help reduce production costs through the use of waste materials and support local businesses. Governments, industries and businesses should work together to promote and implement upcycling technologies in waste management programs. However, further research, investment and supportive policies are needed to fully exploit the potential of upcycling in waste management.

3 Raising Public Awareness of Waste Management through Creative Upcycling Projects

Starting with small upcycling projects is one way to introduce the general public to sustainable ways of waste management and to build their confidence in the principles of circular economy and sustainable development of society. Appropriate communication with citizens (European Commission, 2018a) and environmental education and training significantly impact public awareness of this issue, contributing to behavioral change in waste management (Sokolíková & Andreska, 2021) and thus increasing the efficiency of separate waste collection systems.

3.1 Creative Upcycling of Plastic Beverage Containers

Creativity, i.e. the ability to discover new opportunities, develop creative ideas and adapt to a changing environment (Cropley, 2020), combined with education and awareness raising on how the circular economy works, promotes a new view of waste as a resource and an opportunity. It encourages individuals to take a proactive approach to sustainable waste management. Workshops on creative upcycling of plastic beverage packaging, where participants learn to create useful products with higher or new use value from plastic waste, support the development of participants' creativity and skills and can also become the basis for their future entrepreneurial activities.

The claim that upcycling plastic bottles is a creative activity that benefits the environment and society can be verified in the literature. Widiati (2021) shows how upcycling plastic bottles can create new useful items such as pencil cases or pencil stands and reduce waste. Sapada & Mawardah (2023) implemented a project focusing on the creative processing of plastic waste in a selected community. The project had both environmental benefits for the local community, as it helped to effectively reduce the amount of plastic waste and change the perception of waste as a resource, and economic benefits, as it contributed to the creation of new jobs and improved the living standards of the residents. According to the results of this project, the introduction of innovative approaches to waste management is important not only for environmental sustainability but also for socio-economic development.

3.2 Potential Benefits of Upcycling Projects for the General Public

Experience from abroad shows that to promote environmentally friendly activities, recycling and waste prevention in line with the concept of circular economy, it is advisable to actively involve the wider community and entire families.

Involving all family members in upcycling projects is a great way to create a culture of waste reduction and encourage each family member to think creatively about reusing waste materials. This activity can reinforce awareness of the importance of protecting the

environment and encourage cooperation and teamwork within the family and the wider community actions that each individual can take to achieve these goals.

Donating or selling upcycled products is a great way to reduce waste and promote sustainability awareness. Alternatively, these items can be sold online through platforms that allow the sale of handmade and upcycled products. In this way, it is not only possible to reduce waste but also to promote sustainable trade and economy.

3.3 Creative Upcycling Project "KUTIL"

At the Faculty of Economics of the Technical University of Liberec a project called "KUTIL" is underway. The designation of the "KUTIL" project is an acronym for the full name "Creativeness for the Sustainable Life of the Planet" in the Czech language. At the same time, the word KUTIL means DIY person and this acronym expresses the essence of the course, i.e. to create something new with your own hands from waste and think about how to value this new product.

The project promotes creative creation, and entrepreneurial thinking and introduces participants to the basics of a systematic approach to circular economy through practical workshops focused on upcycling plastic beverage containers. The intention is to combine the topics of circular economy, and creative management techniques for problem-solving with the creation of their own original product from plastic beverage packaging. The purpose of the project is to offer interested participants a space for their own creation in the context of sustainable development, but also to evaluate the possibilities of applying the created product on the market.

The workshops are intended for the general public and are suitable for high school and university students, seniors and entire families. The timing of the workshop can be adapted to the participants and their time possibilities, the minimum is 4 hours.

Source: Own

Fig. 1: *Sample product from a plastic bottle*

In the first part of the workshop, participants will gain an understanding of the concept of circular economy, the perception of waste as a resource and sustainable waste management with a focus on upcycling plastic beverage containers. Creative management techniques based on free association are used to foster the participants' creativity, e.g. group elaboration of a

mind map on a current topic related to plastic waste. In the next part of the workshop, participants learn about the tools and components needed to upcycle a plastic bottle and watch a practical demonstration of the material processing process. For inspiration, participants can see specific products that have been created by upcycling a plastic bottle, photos of the products (see Figure 1), or workflows.

In the second part of the workshop, participants will try working with the material themselves and create their own original product. Making a piece of jewelry out of a plastic bottle, a lampshade or a stationery case are simple projects that can be easily completed and further developed. In this part of the workshop, participants will get the basic information needed to prepare a business plan and price the product, which they will then use to prepare the basic framework of their business plan. At the end of the workshop, participants present their business plans.

The benefit of the project is the use of beverage containers to produce products that have artistic and economic value, helping to develop creativity and entrepreneurial spirit. The project raises awareness of sustainable waste management practices, how to prevent waste and how to reduce unused waste. The benefits are mainly in the area of education and awareness raising, but in the long term it can also contribute to improving the quality of life and the quality of the environment.

Conclusion

Everyone can contribute to the goals of the Green Deal for Europe, which focuses on sustainable development and environmental protection, and the related goals of the circular economy by changing their mindset and being creative. By integrating upcycling into household waste management it is possible to reduce waste, save resources and promote creativity and innovation.

Involving the individual or the wider community in upcycling projects can be seen as the first step towards finding new solutions for waste management. The development and implementation of upcycling technologies, innovative materials and products require further research, investment and collaboration between different stakeholders (Roy et al.,2021). Businesses can integrate upcycling into their industrial processes and production chains (Caldera et al., 2022), closing the circle of the circular economy and achieving better waste management results. There is a need to prepare an environment and regulations that encourage and support upcycling practices (Caldera et al.,2022). Addressing waste-related issues can be seen in a broader context as an opportunity for economic competitiveness, can spur economic growth, job creation and innovation, and help achieve climate neutrality in Europe.

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PROJEKTY KREATIVNÍ UPCYKLACE NA PODPORU ZELENÉ DOHODY PRO EVROPU

Významnou roli v plnění závazku uvedeného v Zelené dohodě pro Evropu hraje oběhové hospodářství. Jednou z jeho klíčových priorit jsou plasty – důležitý materiál, který je díky svým funkcím všudypřítomný, jak v ekonomice, tak v běžném životě. Výroba, používání a spotřeba plastů má negativní vliv na životní prostředí, vznikají emise skleníkových plynů, snižují se zásoby neobnovitelných surovin. Změnu směrem k oběhovému hospodářství, které má přinést zachování hodnoty produktů a materiálů po co nejdelší dobu, má podpořit dodržování hierarchie způsobů nakládání s odpady. Na prvním místě je prevence vzniku odpadů, která se projeví ve snížení objemu produkovaného odpadu, další vhodné způsoby jsou znovupoužití a recyklace. V příspěvku bude uvedeno, jak se daří v Libereckém kraji plnit závazky Zelené dohody pro Evropu. K plnění může přispět každý jednotlivec změnou myšlení a kreativním přístupem. Příkladem může být upcyklace plastové lahve, kdy lahev není vnímána jako odpad, ale jako materiál pro tvorbu nového výrobku s vyšší užitnou hodnotou.

KREATIVE UPCYCLING-PROJEKTE ZUR UNTERSTÜTZUNG DES GREEN DEAL FÜR EUROPA

Die Kreislaufwirtschaft spielt eine wichtige Rolle bei der Erfüllung der im Green Deal für Europa eingegangenen Verpflichtungen. Eine ihrer wichtigsten Prioritäten sind Kunststoffe – ein wichtiges Material, das aufgrund seiner Funktionen in der Wirtschaft und im Alltag allgegenwärtig ist. Die Herstellung, die Verwendung und der Verbrauch von Kunststoffen haben negative Auswirkungen auf die Umwelt, da sie Treibhausgasemissionen verursachen und die Versorgung mit nicht erneuerbaren Rohstoffen verringern. Der Wandel hin zu einer Kreislaufwirtschaft, die darauf abzielt, den Wert von Produkten und Materialien möglichst lange zu erhalten, soll durch eine Hierarchie der Abfallbewirtschaftungsmethoden unterstützt werden. Vorrangig ist die Abfallvermeidung, während Wiederverwendung und Recycling andere geeignete Wege sind. Dieser Beitrag stellt dar, wie die Region Liberec die Verpflichtungen des Green Deal for Europe erfüllt. Jeder Einzelne kann zur Umsetzung beitragen, indem er seine Denkweise und seinen kreativen Ansatz ändert. Ein Beispiel ist das Upcycling einer Plastikflasche, bei dem die Flasche nicht als Abfall, sondern als Material für die Herstellung eines neuen Produkts mit höherem Nutzwert betrachtet wird.

KREATYWNE PROJEKTY UPCYKLINGOWE WSPIERAJĄCE EUROPEJSKI ZIELONY ŁAD

Gospodarka o obiegu zamkniętym odgrywa ważną rolę w realizacji zobowiązań określonych w Europejskim Zielonym Ładzi. Jednym z jego kluczowych priorytetów są tworzywa sztuczne - ważny materiał, który jest ze względu na swoje funkcje wszechobecny w gospodarce i życiu codziennym. Produkcja, wykorzystywanie i zużycie tworzyw sztucznych mają negatywny wpływ na środowisko, ponieważ produkują emisje gazów cieplarnianych i zmniejszają zasoby surowców nieodnawialnych. Przejście na gospodarkę o obiegu zamkniętym, której celem jest zachowanie wartości produktów i materiałów przez jak najdłuższy czas, ma być wspierane przez hierarchię metod gospodarowania odpadami. Priorytetem jest zapobieganie powstawaniu odpadów, natomiast kolejnymi wskazanymi sposobami są ponowne użycie i recykling. W artykule przedstawiono, w jaki sposób w regionie libereckim udaje się pełnić zobowiązania Europejskiego Zielonego Ładu. Każda osoba może przyczynić się do ich realizacji poprzez zmianę swojego sposobu myślenia i kreatywne podejście. Przykładem jest upcykling plastikowych butelek, gdzie butelka nie jest postrzegana jako odpad, ale jako materiał do stworzenia nowego produktu o wyższej wartości użytkowej.