Maramures County, Romania 2020

Regional Circular Economy Status Quo

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

"Impact, Include, Inspire"

REDUCES
Interreg Europe

European Union
European Regional Development Fund

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https://www.cjmaramures.ro/

Cover photo: Baia Mare Butchers' Bastion - Wooden structure (Author - Maramures County Council)

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Content

1 Background and context

1.1 REDUCES project background and objectives

Circular economy changes the methods and revenue models of business. Instead of traditional ownership, consumption is based on the use of services: sharing, leasing and reusing. The new method challenges countries and regions to develop and construct new business models that can be used to respond to the global climate crisis, among other things.

REDUCES contributes to the EU2020 strategy by advocating the priorities of Sustainable, Inclusive and Smart Growth. In addition, improving resource efficiency by sharing experiences on circular economy practices will translate into lower GHG emissions and give a much-needed boost to economic growth in the regional context. The project will also contribute to the vision of "Resource-efficient Europe" via inter- and intraregional cooperation and learning processes. This kind of interaction is vital in order to reach the EU2020 strategy goals. REDUCES also supports the fundamental objectives of decoupling economic growth from the use of resources and increasing the use of renewable energy sources which are underlying themes in the EU2020 strategy. The EU action plan of the circular economy also accentuates the need to create the conditions under which a circular economy can flourish and resources be mobilised. It is recognised in the plan that new business models are needed to enable us to rethink our ways of producing and consuming.

REDUCES brings together six European regions:

- Southwest Finland
- Utrecht, Netherlands
- Greater Manchester, UK
- Valencia, Spain
- Bulgaria
- Maramures, Romania

The overall objective of the project is to improve the implementation of regional policies in order to enable regions to adopt more environmentally sustainable ways of production and to reduce the negative environmental impacts of economic development. Circular business models can be used to help companies achieve resource efficiency and subsequent net revenue gains, and by doing so help regions achieve a more innovative, resilient and productive economy.

Although circular business models are often viewed as sustainable by nature, it is recognised that there are uncertainties about their potential impacts, such as externalities and rebound effects. REDUCES results will facilitate and better enable the adoption of environmentally sustainable circular business models with the support of improved regional policies.

Sub-objectives of the REDUCES project are:

1. To increase the knowledge and capacity of regional and European policymakers and stakeholders on circular economy business models
2. To improve the competence of partners and involved stakeholders to make informed decisions on promoting the transition to the circular economy in regions
3. To discover innovative and the most feasible circular economy business models in each region, which are instrumental to transforming production value chains towards environmental sustainability
4. To improve the competence of regional actors to assess the environmental impacts of circular economy business models in order to choose the most feasible and environmentally sustainable models recognizing regional assets, barriers, needs and strengths necessary for the circular economy transition
5. To improve policy instruments (4 ERDF policies and 2 regional plans) via 6 action plans to better introduce or integrate circular economy business models into the policy instruments and supporting the theme by proposing new project ideas or funding.

The purpose of this Status Quo report is to summarize the results of the studies carried out about the existing circular economy business and actions, strengths, opportunities, threats and weaknesses in Maramures, Romania. The Status Quo report provides the basis for the development work planned in the REDUCES project.

2 Definitions and methods

2.1 Circular Economy

"Circular economy" can mean a lot of different things in different sectors. Common denominators include designing out waste and pollution (reduction of waste), keeping products and materials in use (quality improvement and value retention), regenerating natural systems (loops, transition) and social aspects, such as creating well-being. (Ellen MacArthur Foundation 2017b.)

A circular economy refers to an economic system that is based on business models that replace the current linear economic model. These business models replace the conventional model with reuse, recycling and alternative production, distribution and consumption processes. A new business context aiming at sustainable development requires extensive action at several levels, ranging from the micro-level (products, businesses and consumers) to the meso-level (eco-industrial parks) and even up to the macro-level (cities, regions, states and even more extensive entities). All of these share a common view and goal of more sustainable business that takes into account the environment, economic well-being and social justice at different operational levels. (Kirchherr et al. 2017, 224–225.)

According to the Ellen MacArthur Foundation, the aim of a circular economy is to look beyond the current take-make-waste extractive industrial model. The idea is to gradually decouple economic activity from the consumption of finite natural resources. At the same time, the amount of waste is reduced and finally it is designed out of the entire system. The focus is on positive, society-wide benefits. The circular economy builds economic, natural and social capital, supported by the transition to renewable energy sources. (Ellen MacArthur Foundation 2017b.) The Finnish Innovation Fund Sitra defines the circular economy as a future economic model in which natural resources are used within the Earth's carrying capacity. (Sitra 2019a).

Based on the knowledge and understanding of the REDUCES project partners, the circular economy refers to socially sustainable business that creates well-being. The objective of the economy is to maintain and restore the value of our natural resources. Even though the objective is full circulation, the number and level of loops can vary. The transition to a circular economy, as well as business in a circular economy, requires extensive cooperation between different parties.

2.1 Circular economy business models

The corporate world is shifting from the traditional model of a linear economy towards a circular economy. In the circular economy, production and consumption are increasingly based on services instead of owning. The operating methods

and earning models of companies change, and operations need to be updated so that they will support the mitigation of climate change. (Sitra 2019b.)

The themes of the circular economy business models investigated in the REDUCES project are based on the definitions of the Finnish Innovation Fund Sitra. The themes are renewability, sharing platforms, product as a service, product-life extension and resource efficiency and recycling. (Sitra 2019a)

The circular economy business model is an economic model in which business is largely based on the forms of business mentioned above, i.e. consumption is based on the use of services – sharing, renting and recycling – instead of owning and increasing production of goods. Materials are not destroyed at the end but used over and over again for making new products. (Sitra 2019a)

Design plays a crucial role in ensuring that products are durable and environmentally friendly and that the materials can be reused at the end of the product life cycle. The circular economy requires us to redesign our ways of working: our products, business models, cities and the linear systems that have lasted for the past centuries. Choices made at the start of the life cycle have impacts on each phase during the product life cycle. (Ellen MacArthur Foundation 2020a)

2.3 Multi-stakeholder governance model

The multi-stakeholder governance model is a governance structure that comprises institutional ways of involving non-governmental actors, i.e. internal and external stakeholders in the dialogue, decision-making and implementation of solutions to common problems or goals. It relies on the principle that if enough input is provided by all actors involved in a question, the eventual consensual decisions gain more legitimacy and therefore better reflect the set of perspectives rather than a single source of validation. Unlike in multilateralism, in which governments, as representative of their citizens, take the final decisions on global issues and direct international organizations to implement them, in multi-stakeholderism stakeholders become the central actors. Multi-stakeholderism often disconnects decision-making and the implementation of these decisions from the interngovernmental sphere, having no obligation to either report to or take instructions from the interngovernmental community. (Lin 2018, Gleckman 2018, Szuppinger & Kállay 2017)

In the REDUCES project, the multi-stakeholder governance model appears in involvement and engagement of the stakeholders from the different sectors and levels in all the regions in the project. Circular economy is not an individual game, and this gives a crucial role to wide cooperation between different stakeholders. Involvement appears in different ways for different project regions depending on the policy instrument and its role and activities in the field of business and circular economy activities.

2.4 Policy instrument

In general, a policy instrument is a means for public intervention in local, national or international economies, referring to any policy, strategy, instrument or law developed by

government/public authorities and applied on the ground in order to improve a specific territorial situation. Policy instruments are linkages between policy formulation and policy implementation, intended to achieve outcomes which conform to the objectives of public policy. They can take many forms, ranging from regulatory régimes to the provision of services to help improve the performance of businesses, and in most cases, financial resources are associated. However, an instrument can sometimes refer to a legislative framework with no specific funding. (Interreg Europe 2020, Saublens 2012)

Policy instruments are often known as governing tools as well, particularly when they are applied to all conditions associated with them. The implementation of governing tools is usually meant to achieve policy targets of resource management but adjusted to social, political, economic, and administrative concerns. Concerns of sustainability largely depend not only on what instruments are selected but also on how they have been applied. Assessment of policy instruments can therefore be an important component of policy sustainability. (Ali 2013)

In the context of Interreg Europe, "operational programmes for Investment for Growth and Jobs as well as Cooperation Programmes from European Territorial Cooperation are considered policy instruments. Beyond EU Cohesion policy, local, regional or national public authorities also develop their own policy instruments. Macroregional strategies can also be considered policy instruments in the context of Interreg Europe. However, considering the characteristics of these strategies, it may be easier for projects to influence the corresponding transnational cooperation programmes than the macroregional strategy itself." (Interreg Europe 2020)

3 Regional Circular Economy Status Quo: Maramures

3.1 Main characteristics of Maramures County

Maramures County is part of the North-West Region of Romania that covers six counties: Bihor, Bistrita-Nasaud, Cluj, Maramures, Satu Mare and Salaj. It borders Ukraine to the North; to the East with Suceava County; to the South with the counties of Bistrita-Nasaud, Cluj, Salaj; and to the West with Satu Mare County. Total area: 6304.4 km2, representing 2.6% of the country's territory, being ranked 15th in area among Romania's counties. 43% of the total area is constituted by the mountains; 30% hills, plateaus, foothills; 27% depressions and lowlands.

Maramures County is one of the most picturesque regions in Romania, with a unique charm and an exquisite cultural heritage in different ethnographic areas, unique in this part of Europe. There are 76 administrative units in the County (2 cities, 11 towns and 63 communes), the most important being Baia Mare - the county seat, hosting all administrative institutions, universities as well as a large part of the companies.

Figure 2 - Romanian administrative map

The total population of Maramures County in 2019 is 460,469 inhabitants, compared with 19,405,156 at national level.

Economically, Maramures County is medium developed, in 2018 ranking 20st amongst the Romanian 42 counties, with a GDP of 6,350 euro/ inhabitant compared to 9,500 euro/inhabitant at national level (EUR, current prices, 2017).

According to EURES on 01/01/2018 and the labour force ledger, the labour resources in the NW region amounted to 1,647,100 persons, of whom 71.6% were in civilian employment. The rate of registered unemployment as at 31 March 2019 was 2.6%, corresponding to 26,500 unemployed persons. EURES shows the lack of data concerning migration and emigration. There is a double movement of persons in the NW region: an internal one, from each county to Cluj (the most developed centre of the region) and an external one, to different target countries in the Europe: Germany, Austria, Italy, Spain, UK and more. There is a large emigration of persons to work abroad (estimated 231,661 persons according to Eurostat, at national level), and that generated within Maramures County, a workforce crisis, before COVID 19 Pandemic. According to Chamber of Commerce and Industry Maramures, labour resources are declining (since 2014) and maintain their declining trend at national, regional and county level. Following the Covid 19 Pandemic, the number of persons coming back started to increase, but there is far too early to consider that the workforce can be balanced, or the number of persons are coming back to stay.

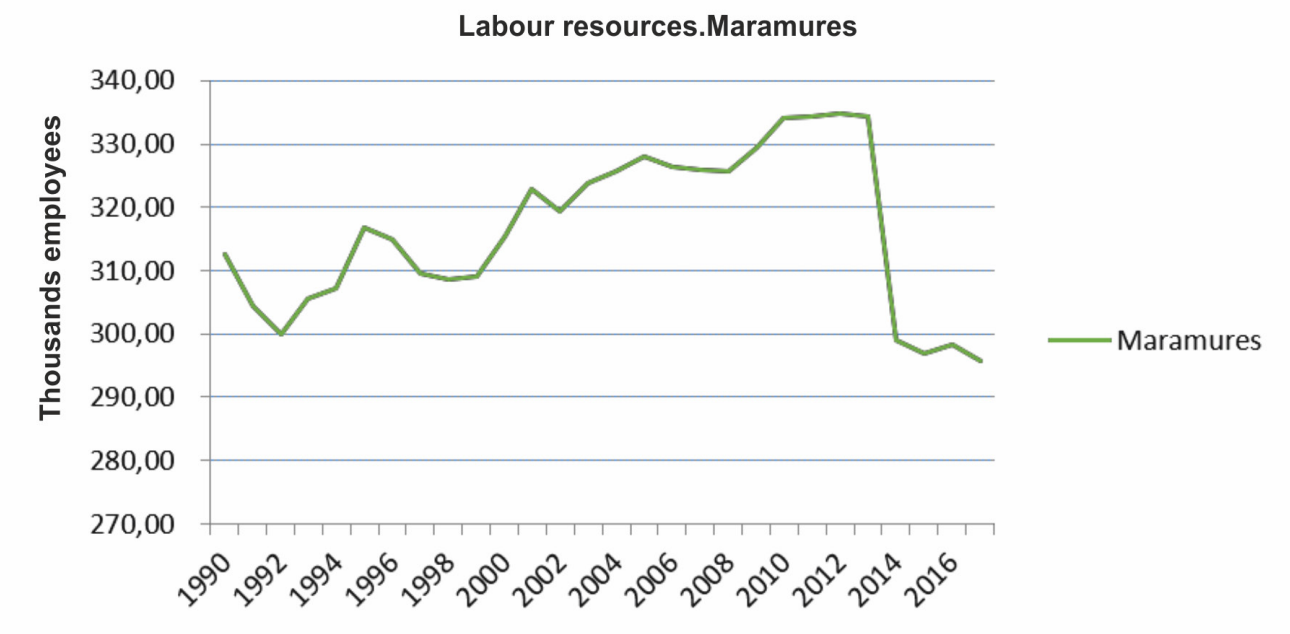


Figure 3 - Labour force situation at Maramures county level

The North-West region is, after the Bucharest-Ilfov area, the most economically attractive development region in Romania, because of a well-developed labour market, higher level of salaries and many foreign investment. There is a private and competitive business environment, based on innovation and modern technologies directly linked with the 16 Universities that are acting within the NW region. As already showed, the most important county is Cluj, with Cluj-Napoca municipality, a very important IT center (Cluj IT Cluster) and a centre of excellence in medicine, as well as a very well-known University Centre. Cluj-Napoca has an excellent potential for developing an ICC economy (innovative, creative and competitive) and it represents the most important growth pole for the region.

The economy of Maramures County is diverse: the region has long traditions in the field of agriculture, wood exploitation and processing, the extraction industry - a very important sector in the old times, and other industries. In the recent years, the county's economy has undergone deep structural changes, materialized in the almost disappearance of the extractive industry, the decreasing number of people employed in agriculture, and a strong restructuring of the manufacturing sector and continuing raise of the service sector. Maramures County hosts 12,842 companies, among them 11,595 are micro companies. The percentage of companies' number, in 2018, shows the following important sectors: Commerce – 25.60%, Services – 23.74%, Construction – 14.10%, Industry – 12.93% and 2.21% - Research, development and high tech.

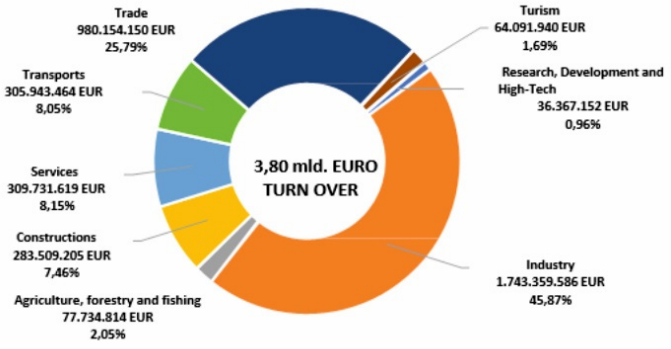


Figure 4 - Maramures County, Companies Turnover 2018

Even if the number of companies in industry is not the highest, concerning the total income, industry provides 45.87% and employs 45% of employees. However, the industrial sector is considered insufficient developed, with relying on low to medium value products, resource intensive, in particular natural resources (wood) and human resources, with high vulnerabilities to market fluctuations and environmental risks. In spite of the existing competitive advantages (first national exported of furniture, tradition, know-how, qualified staff, traditional customers), the development of the industrial sectors are limited in terms of technological capabilities and the research environment, as well as poor horizontal and vertical integration in supply chains.

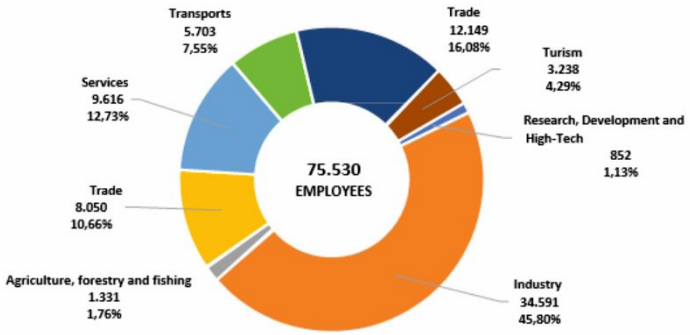


Figure 5 - Maramures companies, employees by sector

Steam Train – Viseu de Sus (Photo: Maramures County Council)

Tourism is an important sector as well, Maramures County being currently one of the most popular tourist destinations in Romania, both for Romanian and foreign tourists, due to its rich and divers offer: traditions, authentic culture, history, beautiful landscape and nature and local food. There are 849 active companies in tourism, employing a number of 3,238 persons.

Maramures County is predominantly rural, but nevertheless the intensity of the number of companies in rural areas is well below the national average. Most companies are located in Baia Mare, benefiting from adequate infrastructure and labour. According to the answers received at the survey conducted for this Status quo, it is also the area where the principles of the circular economy are better known and the industrial symbiosis begins to be considered as a business model.

Location	Area	Number of companies	Number of employees	Inhabitants
Municipalities				
Baia Mare	urban	6,281	40,674	145,444
Sighetu Marmatiei	urban	952	6,568	43,257
Towns	urban&rural	2,793	13,533	124,777
Communes	rural	2,870	14,755	208,042

Table 1. Number of companies/urban-rural area

3.2 Policy Instrument of Maramures County within REDUCES project

Romania had intensively developed its programmatic framework approaching the ecologic and innovation aspects, although a national policy addressing in particular circular economy do not exist yet. Amongst the main programming documents considering to a certain extent the circular economy are the National Strategy for Sustainable Development 2013-2020-2030, the National Strategy for Competitiveness 2014–2020, the National Strategy for Research, Development and Innovation 2014-2020 and the National Waste Management Plan 2017-2020.

In the NW region, the key policy instruments linked to EU Investment and Growth are managed mostly by the Regional Development Agency North-West, and should have high impact in all counties of the NW region as they consider the counties needs in particular, the actions towards innovation and transfer to a circular economy.

According to REDUCES project, the policy instrument addressed by Maramures county is the **Regional Development Plan for North-West Region (RDP NW)**, developed by the Regional Development Agency North-West. In targeting the improvement aimed at increasing resource-efficiency, green growth and eco-innovation and environmental performance management, the Romanian partner of REDUCES project – Maramures County Council will consider also the experience from **Maramures County Sustainable Development Strategy 2014-2020** and **Smart Specialization Strategy of the North-West Development Region 2014-2020, RIS3**.

The Smart Specialisation Strategy of the North-West Development Region as well as Regional Development Plan NW were not, for the programming period 2014-2020, ex-ante conditionality for the Structural instruments 2014-2020, or any other programme, even though they can be linked to financing sources of the operations that are in the strategy portfolio. They are important for the relevance of the projects at national, regional and local level.

In the RDP NW - Long-term vision (2034), the communities of the North-West Region (Northern Transylvania) understand to capitalize together, **respecting the principles of sustainable development, natural, material, human resources**, historical and intercultural traditions for a sustained, constant development that makes Northern Transylvania one of the most dynamic European regions.

The General objective of RDP NW is "*Growth of the regional economy through multidimensional and integrated development to reduce intra- and inter-regional disparities and increase the regional standard of living*".

At the regional level, the priorities set out in the Regional Development Plan North-West Region for the period 2014-2020 are:

Priority 1 - Increasing the economic competitiveness of the region and stimulating research and innovation

Priority 2 - Increasing the accessibility of the region, the mobility of people, goods and information

Priority 3 - Increasing the quality of life of the inhabitants of the region

Priority 4 - Protection of the natural and anthropogenic environment, efficient use of resources and reduction of pollutant emissions

These priorities will also contribute to achieving the targets set for the 2020 horizon in the EU 2020 Strategy, being correlated with the 11 European Thematic Objectives.

Understanding, at a high level, the strengths and possible development areas of the current policy landscape, allows for more targeted identification of relevant policy interventions later in the project, and to engage stakeholders early on in a discussion on which broad types of policy interventions could make sense for the country. This discussion will of course be refined once specific circular economy opportunities and related barriers have been identified; yet getting a reflection started with key stakeholders as soon as possible is a valuable end in itself. Such a discussion could reveal potential upcoming policy revisions, which are highly relevant to consider when new policy interventions are developed. (EMF, 2015)

Once the barriers have been identified for each circular economy opportunity, an important exercise is to systematically map policy options to overcome them. Mapping policy options is just a first step and needs to be followed by cost-benefit analysis and prioritisation, packaging and sequencing and building the necessary political consensus and momentum for change. Six types of policy can be useful to enable the circular economy: Education, Information & Awareness, Collaboration Platforms, Business Support Schemes, Public Procurement and Infrastructure, Regional Regulatory Framework, Fiscal Framework.

The European Green Deal is a set of policy initiatives by the European Commission with the overarching aim of making Europe climate neutral in 2050; The general objective of the Green Deal is to become the world's first “climate-neutral bloc” by 2050 and sets goals to many different sectors, including construction, biodiversity, energy, transport and food. The EU Green Deal and the EU Circular Economy Plan are the main policies driving the adoption of the private and public sector to circular economy principles. Other existing policy interventions are mapped in the table 1, also some examples of such policies at the local, county, regional, national level are provided.

Circular Economy action Plan, launched in March 2020, is a main part of the European Green Deal and announces initiatives for the entire products life cycle, from design and manufacturing to consumption, repair, reuse, recycling and bringing resources back into the economy. The aim of the EU action plan is to reduce the consumption footprint in EU, over the next decade, and to double the rate of circular use of materials, while stimulating economic growth.

The Plan on circular economy includes a "sustainable products" policy to support the circular design of all products based on common methodology and principles. It gives priority to reducing and reusing materials before they are recycled; promoting new business models and setting minimum requirements to prevent the placing on EU market of environmentally harmful products. It will also strengthen the extended liability of producers and will encourage the consumer empowerment.

Other existing policy interventions are presented in Table 1, as well as some examples of such policies at local, county, regional and national levels.

Map of policy intervention	Level of government					Examples	Existing
	Local	County	Regional	National	European		
Education, information & awareness						Consumer awareness campaigns Waste recycling info.	No
Collaboration platforms						Regional clusters and business associations	CLEMS, Cluster, IT Cluster , Transilvania Furniture Cluster , Chamber of Commerce and Industry Maramures
Business support schemes						Funds for green business development , programmes	C- Vaucer POCU- Start up + POCU – Social companies
Public procurement and infrastracture						National Waste Strategy on waste prevention Green Public Procurement Law	Law 69/2016
Regulatory framework						Waste laws,Waste recycling targets,Energy efficiency,and targets	Waste law 211/2015 EO 74/2015 EPR Schemes
Policy framework						Taxes on landfilling Taxes on energy and emissions Taxes on natural resources harvesting	Circular economy tax Green Certificates CHC emissions certificates Environmnetal taxes

Table 1. Policy interventions map

There are many documents and interconnected strategies at the regional, county and local levels; although the problem is not their number and consistency, but less effective monitoring mechanisms and reduced level of their implementation. The main policy instrument of the region is the Regional Development Plan 2014–2020, providing four Strategic Objectives, and three out of four being consistent with the objectives of circular economy (table 1).

Moreover, at the Maramures County level, the main policy instrument to be considered is the Maramures Sustainable Development Strategy for 2014-2020 (MSDS), updated in 2018, setting up ambitious vision and aspirations related to Maramures County as the ”tourism destination” and the ”country’s brand”, consequently for this ”a green County with clean environment” is needed, an ”attractive business environment” due to its high competitiveness, relying on innovation and continuous cooperation with public institutions and the research environment, an involved community of ”educated people” and finally, ”a proactive, efficient and less bureaucratic administration”.

Amongst the thematic objectives in line with this vision, we have identified at least three thematic objectives consistent with the aim of circular economy, as can be observed in table 1, for "keeping products and materials in use", or increasing the durability of the products, innovation is needed, based on better collaboration between industry and research, leading finally to an increased competitiveness of enterprises (O1/OT2, O2/OT4), while "designing out waste and pollution" means "more efficient use of resource", waste prevention and recycling, and finally less pollution"(O3/OT4).

Apart from local policies, the experience from other countries shows that national policy instruments, provided by the Romanian regulatory framework[1] are most effective in waste preventing and recycling:

- **Pay as you throw instrument (PAYT)**, in force since 1st of January 2019, is a usage-pricing model for reducing the disposal of municipal solid waste and an effective tool in increasing waste separation and recycling, and also encourage waste minimization. The result is significant energy savings from transportation, increases in material recovery from recycling, and reduction in pollution from landfills and incinerators, and thus reduces the load of landfills.[2] PAYT programs also indirectly encourage producers to develop **more efficient designs** and **environmentally friendly product life cycles**.[3]

- **Deposit return system (DRS), in force since 31st of March 2019** for reusable beverage containers, also known as the advanced deposit fee or deposit-return scheme, is a surcharge on a product when purchased and a rebate when it is returned. A well-known example is when container deposit legislation mandates that a refund is given when reusable/recyclable packaging is returned. Deposit-refund system is a market-based instrument to address externalities, in this case the impact of the waste produced out of plastic/glass containers of any kind. The DRS aims to limit pollution of various types by creating an incentive to return a product.[4]

- **Extended producer responsibility (EPR) scheme** is a strategy to add all of the environmental costs associated with a product throughout the product life cycle to the market price of that product.[5] Extended producer responsibility legislation is **a driving force behind the adoption of remanufacturing** initiatives because it "focuses on the end-of-use treatment of consumer products and has the primary aim to increase the amount and degree of product recovery and to minimize the environmental impact of waste materials".[6] (EPR) for packaging, electric and electronic equipment and batteries and accumulators waste fluxes (WP, WEEE, WA&B), intended to provide incentives for manufacturers to design resource efficient and low impact products (referred as 'eco-design' or circular design) and to ensure effective end-of-life collection, environmentally-sound treatment of collected products and improved reuse and recycling of waste. Until now, the EPR schemes did not proof to be entirely effective; measures were recently taken to increase their responsibility, transparency and accountability, so far in Romania.

- The **Green Public Procurement Law no. 69/2016** should play an important role in ensuring circularity of products and secondary raw materials. The adopted Law on Green Public Procurement states that within 6 months of its adoption, a guide with minimum environmental criteria for groups of products and services will be published, as well as standard specifications and the national green public procurement plan with mandatory targets. The green public procurement guideline was approved by the Order no. 1068/1652/2018 of October 4th, 2018.

Maramures County Headquarters (Photo: Maramures County Council)

3.3 Regional Circular Economy profile - Maramures County

Romania is struggling regarding circular economy efforts with the majority of circular economy performance indicators ranking in the bottom quarter of member states, meanwhile its potential for transitioning to the circular economy is high and it has the lowest per capita waste production with just 261kg per year, compared to the EU average of 487kg/capita.[7]

The Waste Management Law no. 211/2011 and its amendments, as the main legal act in Romania, is a full transposition of the Waste Framework Directive and establishes the hierarchical approaches in waste management, starting from **product sustainable design, waste avoidance** and **waste sorting** and **recycling** obligations for all stakeholders, to the waste final treatment.

The only national research so far, analysing the national potential for circular economy, was released in by European Institute in Romania in 2018 and aimed at promoting a systemic perspective of the circular economy, identifying the steps needed to operationalize this concept, developing cross-sectoral industrial value chains, highlighting synergic aspects in relation to the green economy.[8] The research highlighted the need for updating legislations, developing new standards for various waste categories, improving data collection and identify opportunities for developing sustainable business, and promoting resource efficiency.

A suggestive research about the circularity potential in Romania, has been performed in the frame of the Moveco Interreg Europe Project and has been concluded in a roadmap for circular economy from the perspective three resources and waste fluxes, packaging and packaging waste, electric and electronic equipment and waste, batteries and accumulators and related waste. According to the study, due to the social economic conditions Romania is only at the beginning of its transition for a circular economy, the policy framework is perceived as fragmented and discontinuous. There is a need for holistic, systematic approach by public authorities to create good conditions for circular economy, while the cooperation between SMEs and research institutes shall be enhanced. The recommendation is to create communication platforms between the industries and academia and raise engagement of the companies in research projects.[9]

There are several local and regional strategic documents analysing the status and trends in the county's economy, the most important, the Maramures County Sustainable Development Strategy for 2014–2020 (MSDS), last reviewed in 2018 and the North-West Smart Specialisation Strategy elaborated in 2015 (RIS3NV), used as a source of information for identification and characterisation of the sectors relevant for the circular economy.

- **Smart Specialization Strategy of the North-West Development Region:** The research highlights the potential of Maramures County for smart specialisation and circular economy in wood processing and furniture manufacturing, the opportunities for more resource efficiency and the development of more durable products, the advanced manufacturing of electrical equipment, focused on developing new equipment automation and robotics and the agro-food sector meaning production of safe, healthy, accessible and nutritionally optimized foods based on indigenous varieties and breeds, based on culinary traditions and on the application of high value natural agriculture, precision agriculture and sustainable agriculture. More information on sectors is provided in the following section.

- **Maramures County Sustainable Development Strategy 2014-2020**, setting at least three thematic objectives consistent with the aim of circular economy principles such as: increasing the durability of products, a key direction that requires increased innovation, better collaboration between industry and research, leading finally to more competitive enterprises, prevent waste and pollution and preserve the clean and attractive natural environment of Maramures. Apart from key economic, well developed and mentioned in the above section, the documents highlights the opportunities in the tourism sector, that could become indeed more circular and two other sectors that could support the circular economy, the IT&C sector and the existing potential for renewable energy.

Another academic research, attempts to identify the potential or circular economy at the County's level , by calculating the Circular Economy Potential Indicator (CEPI) to quantify the development potential of a circular economy, based on the County's waste recycling performance, the level of economic development, infrastructure, urbanization, and education.[10] The indicator has been calculated for 2014, and indicates Maramures as an area with important potential for circular economy.

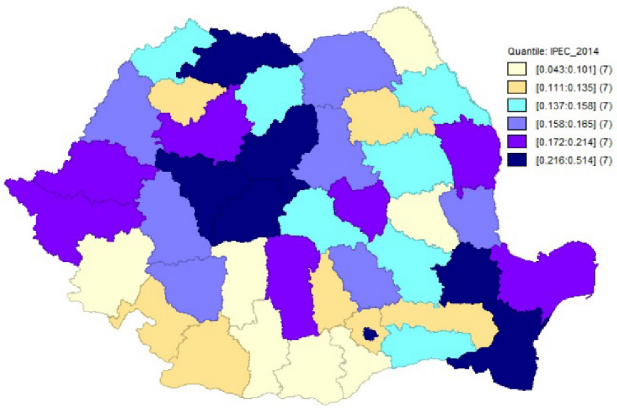


Figure 6 - Circularity potential of the Romanian Counties

According to international experiences, **assessing the current level of circularity** provides useful guidance to set an appropriate ambition level. The circularity baselining gives a first indication of the areas in which a country/region is more or less advanced compared to its peers, which provides useful input for setting the ambition level. It also provides initial high-level direction on the solution space. The **'circularity potential'** dimension considers not only **total resource consumption** and **waste generation**, but also the potential to avoid and/or valorise that waste.

According to international experiences, assessing the current level of circularity provides useful guidance to set an appropriate ambition level. The circularity baselining gives a first indication of the areas in which a country/region is more or less advanced compared to its peers, which provides useful input for setting the ambition level. It also provides initial high-level direction on the solution space. The 'circularity potential' dimension considers not only total resource consumption and waste generation, but also the potential to avoid and/or valorise that waste.

In order to understand the regional circular economy profile, the **level of circularity** in the focus sectors shall be assessed. According to the EU monitoring framework on the circular economy, the indicator used to measure the circularity level is the **circular material use rate**, or the **circularity rate** as the share of material resources used coming from recycled products plus the recovered materials and the overall materials use. Other metrics characterising the circular economy profile are referring to four key areas (HMF, 2015), such as: **resource productivity**, as the share between the GDP and the domestic material consumption, the **recycling rate**, as the share between the recycled waste and the overall waste generation, **energy and greenhouse gas emissions**, **circular activities**, ideally comprises of a complete set of indicators including the adoption of product

long life (circular design, maintenance, reuse, repair), regenerate (refurbish, remanufacturing) and using a service instead of a product (sharing, leasing, renting) that are not measured due to unavailability of data.

The baseline indicators are difficult to calculate at the county's level in Romania (not only for Maramures), due to data gaps, in particular referring to material resources used coming from recycled products and recovered materials. However, the circularity rate in Maramures is probably near or below the national circularity rate value: 1.8 comparing to 11.2 (Eurostat, EU27 2017), meaning that the circularity rate in the region was almost 10 times smaller than the EU 27 average.

Companies cannot create a circular economy on their own, and relevant stakeholders have an important role to play. Whilst most manufacturers will need to change or to adapt business models, regulatory environments need to provide appropriate frameworks, and consumers need to shift their mind-set and to be educated in this regard.

National governments play a central role in setting the political scene, for instance by introducing new tax regulation, including higher taxes on unsustainable products and energy to mitigate their negative impact, and lower taxes on labour to promote repair services.

Local authorities have a key role in building the appropriate infrastructure, setting the right entrepreneurial environment and enhancing collaboration between the main actors that make possible circular economy. Convening and engaging with stakeholders in a variety of ways can also support the design and application of other policy levers, such as creating a sense of shared ownership of a circular economy city roadmap, working with businesses to identify regulatory barriers, and understanding how other policy levers can best be developed.

The main identified stakeholders relevant for the future development of circular economy in Maramures County are actors from the public and private sector, academia, research and civil society:

- County Council and 76 local administrations, the local government fully decided to enable required conditions, get involved, and stimulate and enable companies and consumers to contribute to a circular economy;

- Association of Intercommunity Development for Integrated Waste Management (ADIGIDM MM), having responsibilities in setting up, organizing, regulating, financing, operating, joint monitoring and management of a necessary sanitation service and management solid waste within all local administrations in the County;

- Five Local Action Groups (GAL) with activities in education and advisory for farms and small agricultural producers, micro businesses development in tourism and creative industries;

- Energy Management Agency Maramures having as main mission to promote energy efficiency and renewable energy in the public and private sector;

- Environmental NGOs: EcoLogic Association, WWF Romania – Maramures Branch, Maramures Ecology and Tourism Centre, Geommed Professional Association, Ecological Society, Eco Rodna Association and others.

- Chamber of Commerce and Industry Maramures – is a very important local stakeholder being an economic development

driver. The organization activity focus on adult education, business development as well as sustainable development of the area;

- Maramures Entrepreneurs Association is a member of the Regional Thematic Group (GTR) on Energy Efficiency and the Circular Economy, which aims for a greener, low-carbon Europe by promoting the transition to clean and fair energy, green investment and the circular economy, climate change adaptation and risk prevention and management";

- Center for SMEs Development Maramures is an organisation focused on vocational education, business incubation and development, start-up programs, sustainable entrepreneurship, etc.;

- Research Institutes, the sector is underdeveloped as a result of the strong dismantling or restructuring of former research institutes and the underfunding of this sector, worth mentioning here the Research and Design Institute for Non-Ferrous Metallurgy CEPRONEF Baia Mare and the Technology Information Center – UTCN CUBM Baia Mare;

- Relevant public institutions: Statistical Direction, Environment Protection Agency, Environmental Guard;

- Utilities provider companies: DRUSAL, HERODOT, VITAL;

- Private sector: agriculture, industrial sectors, tourism and agro-tourism, local public authorities, universities and research institutions;

- Waste collectors and recyclers – 84 companies authorised to collect waste, from those 8 authorised also for recovering and recycling packaging waste and metals.[11]

In order to assess the circularity of Maramures County, a survey was conducted through a targeted questionnaire applied to the main stakeholders in the County, aimed at gaining insights into the general perception of circular economy, main characteristics of circular products, barriers and enablers of circular economy.

There were 93 responses to the questionnaire, coming from nine different sectors: 31.2% of the responses came from public authorities in the region, 16.1% from the industrial sector, 12.9% from public institutions, 7.5% from the service sector, 7.5% from NGOs and 5.4% from IT, 5.7% from retail sector and only 3.2% from tourism sector.

The great majority, 96.7% agreed that are taking into consideration the environmental protection in current and future activities, 60% of the respondents are familiarised with concept of circular economy, while 39.8% have never heard of it. From those familiarised, 43% have been informed regarding circular economy, 34.4% have been involved in resource efficiency and waste reduction projects, 15.1 % in projects regarding product life extension based on repair and maintenance, 9.7% in projects regarding renewal/ regeneration, 46.2% in project regarding services instead of products, 5.4% in projects regarding sharing platforms, while 30.1% have no experience at all in circular economy projects.

In the stakeholder's view (between 63 and 73 answers per topic), the main characteristics of the circular products are: **durability, reparability, possibilities for reuse, the materials used, those should be recyclable, biodegradable and compostable, high content of secondary raw materials and a minimised impact of the life cycle.**

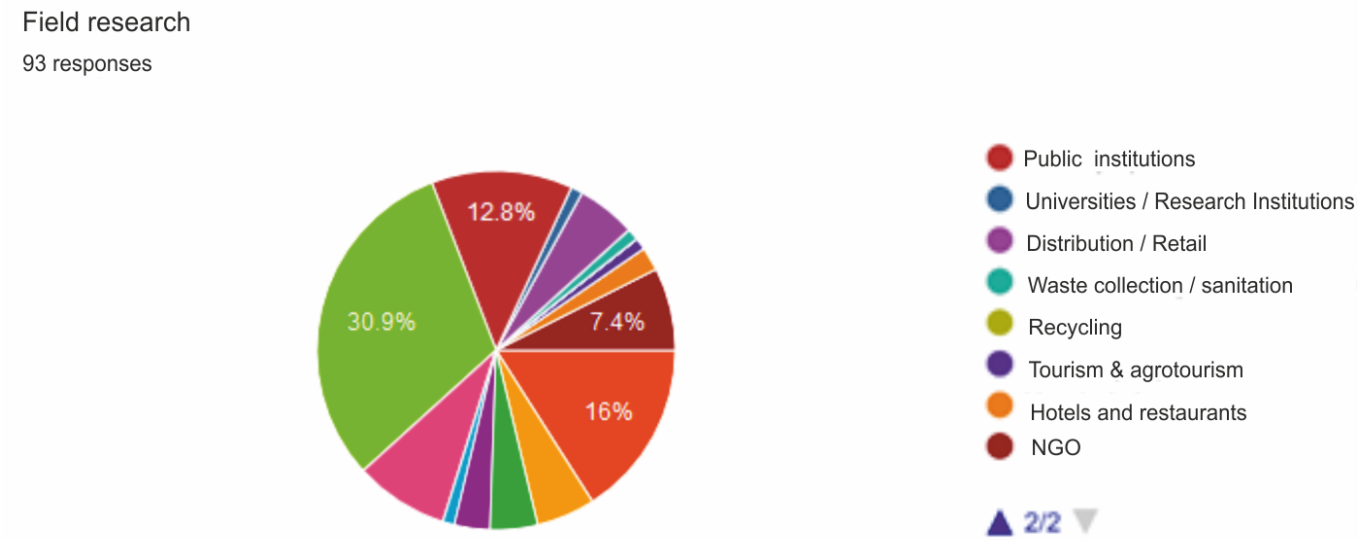


Figure 7 - Field research - answers received/stakeholders

In the same time, they consider measures such as international networking, knowledge exchange and regional cooperation, voluntary schemes, important in promoting circular economy. (59 to 74 responses per topic.)

Key sectors relevant to circular economy were identified based on the findings of RIS3NV, the sectors identified in the Maramures County, as **having potential** for smart specialisation, resource efficiency and **circular economy** are: Wood Processing and Furniture Manufacturing, Electrical Equipment Production, Agro-Food Industry, Food and Beverage Industry, Services Sector, Trade and Repair Subsector, Tourism Sector.

Wood processing and Furniture Manufacturing - with a turnover of about 1,562 million Euro (42.6% of the total turnover of the County in 2018) and over 39,480 employees (36.7% of the total), is represented by 129 furniture factories, producing chairs, tables, sofas, mattresses and other types of housing furniture (ARAMIS INVEST, ITALSOFA, PLIMOB, SOFA WORKS, TAPARO, TIFEX CHAIR, TRANSVAL MOB, XPERT PROJECT), parquet, baseboards, panels, carpentry elements, beams, galleries, stairs, panelling (AVIVA, KARELIA UPOFLOOR, RG HOLZ, RIDORAIL), moulded elements and plywood (SIGSTRAT), wooden houses (RUSTIC, CORI BLUE), wooden barrels, timber, firewood, pallets and euro pallets, pellets, strips, sleepers, beams and other wood products (BAMGARDEN, DENCOVA, ECO-ENERG-WOOD, NOVAARTIS, POP FRANCE, PRISLEMN, TRANSILVANIA BOIS, XILOBAIA). (MSDS, 2018)

Overall, we can say that the furniture sector in Maramures County is based on products with low and medium added value, which extensively exploits the natural (wood) and human resources of the area, being vulnerable to rising prices as well as some issues related to environmental sustainability. Although these branches have considerable competitive advantages (Maramures County holds the first place at national level in the production and export of furniture), on the domestic market and external, based on tradition, know-how, qualified staff, traditional customers, their development is limited by the **reduced technological transfer from the research environment**, as well as poor horizontal and vertical integration in supply chains.

In the field of wood processing, the trend is to

minimize the amount of material used and the waste resulting from the production process, but also to optimize/reduce energy consumption in the manufacturing process. These require new technologies and materials and can also lead to a reduction in the amount of adhesives used or to the use of functional textiles for coatings. (RIS3NV, 2015)

Advanced Manufacturing of electrical equipment - has a turnover of about 902 million euros annually (24% of the total turnover in 2018), over 3,577 employees and 11 companies. The product generated in the industry are products with added value, ranging from transformer stations and electrical panels (ELECTRO SYSTEM), components electrical connection systems (WEIDMULLER INTERFACE), electrical wiring (DIETER, EIFLER, PGA ELECTRIC), to equipment and components for electricity distribution systems (EATON) and Universal Alloy Corporation Dumbravita – a branch of US company - a global leader in manufacturing aerospace products. The business environment structure is 96% based on SMEs.

The competitive advantage of the sector is demonstrated by the volume of exports. Although the field has a relatively small contribution to the formation of regional gross value added, it has serious development prospects based on the growing external demand, while the potential for differentiation is high. The biggest challenge for production technology companies is to align with European and global trends, in particular through **product innovation** based on the use of essential generic technologies as well as digital technology. The field has an extremely important role in serving other industries, through automated, robotic solutions, which contributes to the **increased efficiency** of production processes by reducing operating costs and improving product quality and consistency, thus maintaining the competitiveness of the industry. Definitely, the sector requires a more efficient use of resources and the adoption of the principles of the circular economy. (RIS3NV, 2015)

Agri-food industry - has a contribution of 5.6% from the total County turnover, although it employees the highest number of workers occupied in the sector (around 30%) with only 10,800 were officially employed in 2018, while the rest are people working in own household and practicing subsistence farming, with rudimentary means on individual holdings of several hectares. From the total available land, only 26.5% is arable, 31.7% are grasslands, 39.3% are hayfields, 0.1% are vineyards, and 2.4% are orchards. From the perspective of cultivated arable land, Maramures County is on the last fifth in the country in terms of total production of grain cereals, oil plants, technical plants and vegetables. (MSDS, 2018)

Food and beverage industry - achieves an annual turnover of over 205 million euro and provides 13.2% of the total jobs. There were 255 companies, many units in the County producing meat, canned meat and meat preparations (SELMONT, FERMA ZOOTECHNICA, SALAMANDRA PLUS, CARMANGERIA DALIA, GHITTA, CETINA), sweets, pastry, confectionery and bakery (R&B COM, GRUP CERNESTEAN, BIZO TRADE), dairy products, distilled alcoholic beverages (VALCO), products from vegetables and fruits etc. and are concentrated in Baia Mare, Baia Sprie and Seini. Export of agri-food products is about 15 million Euro/year, most of the products made in the County being destined for the internal market. Maramures County is the second region in Romania in terms of number of certified traditional products, which turned to be a recognized gastronomic brand of the country. Among traditional products are bakery, pastry products, fruits and vegetables, beverages, dairy products an also traditional dishes, representing a special variety appreciated both nationally and internationally. Products are manufactured by using traditional recipes and processing technologies and most important, the

local raw materials. Maramures County Council will introduce, in 2020, the labelling system "GOOD OF MARAMURES /BUN DE MARAMURES", which addresses to products that exploits a local resource, have a traditional recipe and / or use a traditional or innovative technique, all related to the Maramures specificity.

Maramures County has a good agricultural potential especially for the cultivation of vegetables (mushrooms) and fruits (apples, strawberries, peaches, nuts, plums), respectively for animal husbandry, in this case being present in the whole value chain. The region also has a comparative advantage in the field of animal or vegetable fats and oils. Unfortunately, the agricultural and animal production in the County is inefficiently capitalized, being oriented mainly to self-consumption, while large farms are missing, and production is affected by seasonality.

The agri-food field is labour and capital intensive. Its energy intensity is medium to high, and its technological intensity is low to medium. Challenges include the complex and expensive logistics system, the fragmentation of raw material production (lack of forms of association), which in many cases is exported as raw material instead of being processed in the region. Agricultural waste (vegetal, animal manure, waste from food and drinks processing) generated in the individual households is managed by owners, through their use in the natural fertilization of agricultural land. Nevertheless, the storage of animal manure in individual households until its spread in the field, is a potential source of groundwater pollution, used in many cases as the only source of drinking water.

There are good practices however for managing bio-degradable waste in Maramures, such as the "pilot plant for biogas production" in the city of Seini, an investment financed within the project "Integrated Control of Nutrient Pollution" financed in by GEF / World Bank aiming to treat the organic waste generated in agriculture and commercial activities and energy production (electrical and thermal) as well as creating a demonstration project for good practices in the area. The project is indeed a good practice, ensuring the circularity of the biological waste and returning of the nutrients contained in remaining compost into the soil.

Smart development in this area requires product-level innovation (especially goods), given the growing demand for safe and healthy food, but must also consider the need to protect the environment, reduce water consumption and energy used in the production process or the quantities of waste resulting from it. Competitiveness can increase through the use of new packaging, respectively the use of digital technology in marketing, distribution, processing. (RIS3NV, 2015)

Service sector - the tertiary sector (of services) has the most important contribution to the County's economy Maramures, generating in 2018, 1,700 million euro and 22.31% of the total turnover. The service sector is responsible for the highest number of employees, as well as higher salaries due to the higher value added of the sector, comparing to agriculture and industry. The largest share of the employed population in the services sector is registered in the cities, were the commerce is well developed and polarised around the big retailers (Lidl, Carrefour, Profi, Dedeman, etc), rapidly expending in the urban area.

The trade and repair sub-sector - have the largest contribution to the tertiary sector, bringing over 469 companies, most of them small family and neighbourhood businesses.

Tourism sector - Maramures County is an attractive tourism destination due to its natural reserves, protected natural areas, mountains, lakes and salted water resorts, but most important

due to its local traditions and stunning ethno-folkloric attractions that highly contributed to the development of agro tourism. On the Maramures territory there are: Rodna Mountains National Park - Biosphere Reserve, 9 "Natura 2000" sites and 34 natural areas of national interest. Maramures represents a highly desired tourist destination worldwide, because of its unique and indisputable natural and traditional heritage, being one of the most famous and popular tourist destinations in Romania. There are more than 500 registered businesses from small hotels, pensions, restaurants, bars, that generated in 2018, a turnover of 64.091.940 EUR. While, the salaries in this sector continues to be the lowest salaries in the County.

A touristic destination can obviously influence all the steps from accommodation to local activities as they take place in the destination itself. The migration towards circular economy is very much related to the tourist options, deciding how to travel, i.e. with which transportation mean, how to consume and what to do at destination. Transitioning from linear to circular tourism is definitely a way to differentiate. The latest tendency in accommodation is in line with the reduction of goods & services' possession (linear view) and in favour of borrowing goods & services (circular view). As far as agro-tourism is concerned, the rational use of resource and proximity agriculture could be valuable opportunities for the owners, for the tourist and for circular tourism as well.

Maramures is a well-known destination for practicing eco-tourism and rural tourism, with tourism businesses that already apply components of the circular economy. In Maramures, many tourist and agro-tourist guesthouses serve authentic food, based on local products and offer integrated services for recreation, which are part of the circular economy approaches. Many of Maramures' tourism and agro-tourism businesses offer tourist packages that include outdoor and leisure activities (bicycle and sports equipment rental, sports, services adjacent to sports such as transportation and catering, hiking and guided tours, spa treatments, etc.), as well as cultural experiences (initiation into traditional crafts and local art, participation in cultural and traditional events, thematic excursions, etc.). These circular business models from Maramures tourism sector can be further developed and multiplied, which will lead to increasing the share of tourism in the county's economy and to valorising the special potential of Maramures' tourism.

Visit Maramures App

Prelucii Hills – Preluca Nouă (Photo: Maramures County Council)

The IT&C (information and communications) as support sub-sector - has a low presence in Maramures County, compared to other areas in the region. There are 241 active companies, providing equipment, software solutions, development services, consulting and IT&C services, with a number of about 900 people, and a turnover of 69.95 million Euro, meaning 1.90% from the total turnover of the County. The main companies in terms of turnover and number of employees are MULTINET, ONE IT, ASTINVEST, FIDA SOLUTIONS, INDECO SOFT, PROGRAMMING POOL, REPKA ELECTRONICS, SOFTVISION, TRENCADIS, YELLOW SOFTWARE, and GOSERV.

The development potential of the IT&C sector at the local level is significant, as a response to the growing demand for digitalisation of the public and private sector, the existing financing opportunities for the new start-ups and spin-offs, and the large number of young people graduating in the field, including at the Centre University North Baia Mare, branch of Technical University of Cluj Napoca, as long as the new graduating specialists are retained in the County.

Renewable energy sector as a support sector - is not well-developed but potential exists. According to the studies performed by Ministry of Industry, the potential for renewable energy in Maramures consist of solar energy, with an optimal global annual radiation (figure 8) and biomass, with the potential of 2062 Tera Joule, of which 71.29% from agricultural biomass and 28.71% from forestry (figure 9), as well as geothermal resources, insufficient analysed so far.[12]

Due to rural character and the existing agricultural resources, the County has an important potential for bioenergy and nutrients recovery, through bio waste anaerobic digestion, this refers, but is not limited, to biomass from agriculture and forestry, manure, organic waste, vegetal waste, potential totally unexplored so far. Valorisation of such waste brings ecological benefits, income diversification for farmers and forest owners, jobs in rural enterprises and business opportunities for them, new and better energy infrastructure and services in rural areas and new sources of revenue to support essential public infrastructure and services in rural areas. (Special Report 05, EU Court of Auditors, 2018)

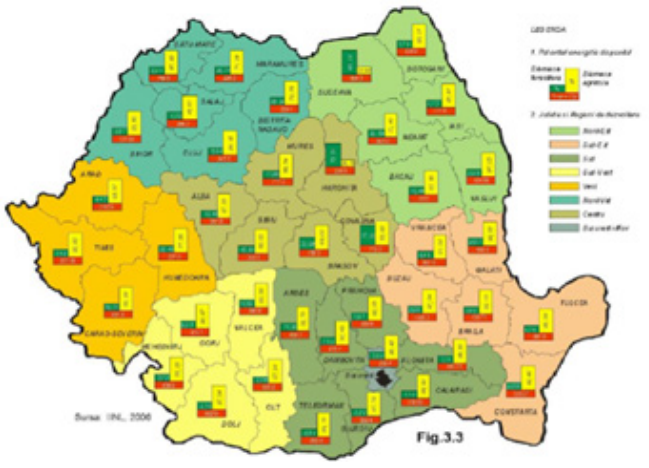


Figure 8 - Biomass map of Romania (MININD)

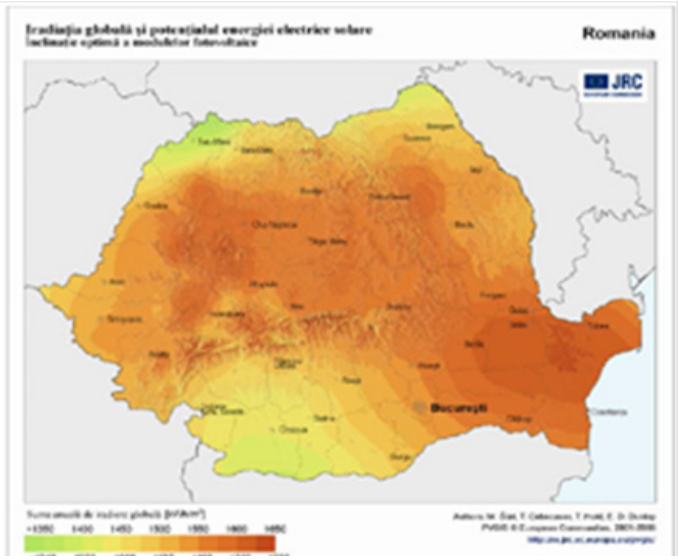


Figure 9 - Solar map of Romania, Joint Research Center of the EU Commission

Activities and projects important for county circularity

There are different operations that public administration and private stakeholders implement in order to fulfil some aspects of the transition to a circular economy. Some of them are:

- **The pilot plant for biogas production in the city of Seini** - achieved three main objectives: reducing the pressure on the environment as a result of ensuring a better one, waste management - results from animal husbandry activities (both at the level of individual households as well as at the level of companies); energy production (electrical and thermal) using as raw material - waste animal - manure and vegetable silage; creating a demonstration framework on good practices in this field. The investment is funded by the Ministry of Environment and Climate Change within of the project "Integrated Control of Nutrient Pollution", financed in turn by GEF / Bank World Bank, International Bank for Reconstruction and Development and co-financed by the Romanian Government.

- **Construction works in order to reduce carbon emissions in the City of Seini** - by creating an Eco-Friendly transport infrastructure funded under ROP-Axis 3, priority 3.2. The total amount is 22,530,991.64 lei.

- **Baia Mare - Thermal rehabilitation, replacement of thermal and electrical installations and installation of renewable energy sources** - to increase the energy efficiency of public buildings. There are many projects already implemented with a direct impact on the decrees of the natural resources consumption (to generate heat and warm water).

- There are many operations under ROP 2014-2020 for the Intervention works regarding the increase of the energy performance of the blocks of flats all over the county with a valuable impact on the resource consumption and quality of life for the citizens. They are part of a modern city planning activities and first steps to transition to a circular county.

- **Maramures Integrated Waste Management System (IWMS)** – a project of Maramures County Council, financed by the Environment Sectoral Operational Program - EU financial instrument.

Waste management is a sector of a vital importance for the circular economy, because is depicting the population' consumption habit and has a great potential for waste reducing and recycling. This could happen by modifying consumer's habits, improving the waste management and consequently diverting waste form landfill and by enabling a market for secondary raw materials out of waste recycling.

The sector is managed under the **Integrated Waste Management System in Maramures (IWMS)**, implemented under the responsibility of the Maramures County Council, and consisting of investments in building the necessary waste infrastructure and integration of all necessary

IWMS Maramures – Farcasa (Photo: Maramures County Council)

elements for sorting, collection, transport, transfer, treatment, recycling and final storage of a small quantity of waste. Apart from the infrastructure, final closure and greening of six waste brown fields was foreseen.

The Integrated Household Waste Management System in Maramures County apply the principles of circular economy, because all stages (Collection of household waste; Transport to transfer stations; Sorting / Treatment; Storage) have been designed to achieve the specific objectives of the project IWMS, established on the basis of the Large Infrastructure Operational Program 2014-2020 and of the 2020 Strategy objectives, as follows:

- Decreasing the amount of stored waste;

- Promoting the use of waste for the production of alternative raw materials, by increasing the amount of recycled / recovered waste;

- Creating decent living conditions by establishing efficient waste management structures and ensuring a clean living environment.

The mechanical-biological treatment plant in Sarbi will have an average capacity of 150,000 tons of waste / year. After the mechano-biological treatment, the biodegradable waste will be 100% processed, and 23,898 tons of recoverable waste will be sent to recyclers. The amount of biodegradable waste will be reduced by deviating from collection as a result of individual composting in rural households with about 12,530 tons of waste and by selective collection of about 83,600 tons. The biodegradable waste, from the rural environment, will be transformed into natural fertilizer based on composters that each household will receive from the town hall.

Preparation for reuse and recycling of municipal waste: the project provides investments both for the separate collection of municipal waste and for the sorting of separately collected waste (2 sorting stations – in Sarbi with a sorting capacity 32,000 tons / year and in Sighetu Marmației with a sorting capacity of 22,600 tons / year). The sorting stations will sort paper, cardboard, metal and plastic waste collected separately, and glass waste, which will be transported directly to recyclers.

The administrative-territorial units from Maramures County (Maramures County Council together with the 76 Administrative Units) have associated within the Intercommunity Development Association for Integrated Household Waste Management in Maramures County (IDAIHWM), in order to elaborate and implement the Project of Integrated Waste Management in Maramures County.

The objectives of IDAIHWM refer to:

- Improving the environment quality for the population of Maramures County by renewing and developing the local infrastructure for household waste management;

- Creating the necessary institutional structures for implementing the county waste management system;

- Approaching and managing waste in a unitary and integrated way, the final goal being to solve the environmental problems and to ensure specific quality public services for the inhabitants of Maramures County;

- Developing and implementing a common strategy on the operation of the waste system. Implementing the concept of circular economy;

- Creating and managing new services for the community of Maramures County, in order to increase the quality of life and to reduce the impact of human population on the environment.

IWMS Project is under development: about 86% of the construction works are finalized, and the contracts for delegation of waste management to the sanitation companies are under work (only two contracts are signed so far). Waste is collected from population, commercial activities, industry and institutions. Waste is managed based on rules provided for separate collection of biodegradable waste, packaging waste, voluminous waste and dangerous waste. Vegetal waste generated in housing shall be composted at the site, electric and electronic equipment waste and batteries and accumulators waste are subject of separate campaigns, while waste from constructions and demolitions are only partially collected.

The total municipal waste quantity generated in 2017 was 86,382.3 tonnes with a waste generation indicator of 186 kg/capita, while the connection rate to sanitation services was 100% (APM Annual Report, 2018).

The waste composition in 2017 was 52% biodegradable waste, 11.2% paper and cardboard, 10.6% plastic, 3.1% wood, 5.1% glass, 11% metal, 6.5% inert waste. The high percentage of biodegradable waste is explained by the low sorting rate, only 11% from the total generated amount (9861.6 tonnes in 2017), meaning that a great amount of waste is remaining is unsorted and cumulated in the biodegradable waste category.

IWMS Maramures – Farcasa (Photo: Maramures County Council)

The Maramures County Council has been and is involved in various national and international projects, with many opportunities for cooperation and partnership, exchange knowledge and experience. Among those is worth mentioning:

- **Environmental Education and Education for Sustainable Development in Romania** - with the objective to develop a program for education in the field of environmental protection and education for sustainable development in Romania.

- **MORE4NRG** - Measuring progress of regions in renewable energy and energy efficiency, the overall objective of the project is to develop a method for measuring the progress of the regions in achieving their energy related goals, Evaluation is an essential step in developing an action plan, and by implementing the project the regions will become more efficient in terms of energy production and consumption.

- **Energy Games - Energy Takes Shape** - envisage to stimulate the active participation of students and teachers in order to reduce greenhouse gas emissions, by training them on how to save energy in schools and at home, as well as raising their awareness of the importance of conserving natural resources, by promoting energy efficiency and renewable energy.

- **SMART EUROPE** - Smart strategies for work creation based on regional innovation had a scope to develop those strategies and anchor them in the local and regional economic development strategies and policies.

- **Regions 4 Green Growth** - Regions for green development had the role to consolidate the partnerships and continue to explore the progress of energy efficiency and renewable energy in the regions.

- **MOBI** - started in 2020 and aims to create a sustainable platform for cross-border mobility of people and goods, by improving transport and border infrastructure and connectivity of public transport routes, strengthening cooperation between public administrations and professional organizations, developing infrastructure for transport and border.

- **Mara Strategy** - one of the important projects has started in 2019, aiming to digitise public administration and facilitate the interaction between citizens and County public administration. An informatics system will be designed to manage the County's archives, digitize processes and document flows, including retro-archiving from the existing traditional archive and a portal created to provide online interface for citizens by providing information and assistance, forms, receiving requests, issuing documents, including computer system for managing geospatial information. **Based on a complementarity with REDUCES project, within the next investment strategy of Maramures County will be included important issues linked to the transition to circular economy.**

But not only public administration is interested to the transition to circular economy. That includes local companies as well.

During REDUCES project, interesting business model cases are identified in each region, related to 5 general topics of Circular Economy: product life extension, product as a service, renewability/ regeneration, resource efficiency and recycling and sharing platforms.

In the first year of REDUCES project, Maramures County Council has identified several businesses in Maramures, as good practice in applying the Circular Economy' principles, on following topics:

Product life extension:

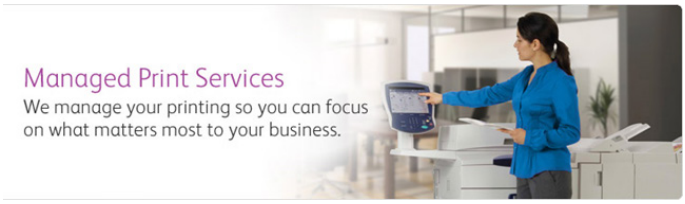
MultiNET
MULTImedia & NETworking
IT Integrated Business Models in Circular Economy

- MultiNET LTD - has developed, in 25 years of activity, an integrated business system to extend the life of IT products, for maintaining on market the obsolete products (morally or physically outdated), by maintaining their functional parameters and adding new values of use. The used IT products are reintroduced into functional circuit by applying 4xR: Repair (current repairs), Reuse, Remanufacturing (capital repairs) & Recycling (Dismantling - reuse of spare parts, WEEE).

ATP Exodus GROUP

- ATP Exodus Group has developed a remanufacturing system for extending the life of different brands' auto components, in the context of Circular Economy concept. The technology used in remanufacturing process ensures a quality of the reconditioned parts, similar to the new ones.

Product as a Service:



- ONE IT LTD - offers Managed Printing Services: printing equipment with consumables included and payment only in regime per printed page. Implementing the printing solution offered by ONE-IT, the beneficiary company outsources the printing activities, thus saving up to 30% of the initial costs of printing documents.

- A&C Ferma Agricola LTD - owns the necessary equipment for agricultural activities and provides full packages of agricultural works and products, for landowners. The landowners do not have the possibility to own all the necessary equipment and they look for the most complete services for cultivating their land.

Renewability:

- CEPRONEF Baia Mare - has realised a unit for electricity production from solar source and its capitalization on the profile market, benefiting from the Green Certifiers mechanism. The beneficiary is Baia Sprie City Hall that initiated the photovoltaic park project, accessing the Green Certificates scheme both the effort to limit greenhouse gas emissions and an attractive transfer of economic effects for the local community.

- RUSTIC Co - builds wooden houses with innovative & ecological design, combining the advantages of natural resources with the high performance of modern materials. The business model of Rustic contribute to achieve high quality, durable wooden constructions with current design, respecting the principles of energy efficiency, fire resistance, earthquakes resistance, made in a short period of time and at an affordable price.

- Kema Tronic LTD - member of the CLEMS Cluster, is an engineering firm, specialized in renewable energies, technical design, having 5 patents in wastewater treatment (one in circular economy) and more than 200 projects in all over the country, being strongly involved in tackling the circular principles in wastewater treatment. During 2012-2014, Kema Tronic introduced an innovative and intelligent technology for advanced anaerobic fermentation at Danutoni Wastewater Treatment Plant - Valea Jiului (Romania). Through this technology, Danutoni WWTP has significantly increased the renewable energy production, in the same time reducing the resources required for final sludge disposal. This technology saves 50% of the energy required to treat wastewater and sewage sludge and instead produces energy. Another problem they want to solve is the sludge management costs, which are at least 50% of a wastewater treatment plants costs. Through this technology, the final sludge quantity has decreased with 30%, the digested sludge quality has improved with 15%.

The business models related to the last 2 topics of the circular economy - relevant for the REDUCES project - Resource efficiency / recycling and Sharing platforms, will be analysed by all project partners, in the second semester of 2020 and in the first part of 2021.

Taking into consideration the major interest of Maramures County for waste management through the implementation of IWMS (Integrated Waste Management System), Maramures County Council will host the inter-regional learning event "Circular Economy - Resource Efficiency and Recycling". The event will address to relevant issues regarding the application of the principles of circular economy in Romania, the North-West Region and Maramures County: legislation, policies, funding programs, other ways to support local initiatives in the field of circular economy with emphasis on resource efficiency and recycling, as well as business models from Maramures County, on the topic of resource efficiency and recycling. Also, the international partners will visit 2 business models from Maramures County, with activities related to the efficient use of resources and recycling.

At Maramures County level there are many other projects funded on ROP 2014-2020 mainly for 2.1 and 2.2 calls. The funding philosophy, behind private operations funded by RDA North-West, is the company's development, performant technologies acquisitions, eco efficiency increase, new products/services and other. At least 61 private projects were implemented according to statistical data provided by RDA North-West.[13]

Education and Research. Higher education is represented by four universities in Maramures County, with over 5,188 students (of the 3,788 undergraduate level, 1,314 at master's level and 86 at doctoral level), while the municipality of Baia Mare has long tradition in the field of higher education of 59 years, since 1961.[14]

Three out of four universities, performing also research activities, could contribute to the development and uptake of circular economy in the region; however, at the moment none of them offers circular economy education:

- North Baia Mare University Center of the Technical University of Cluj-Napoca, having the Engineering Faculty and a Department on Engineering and Technology Management, offering bachelor, master's and doctoral studies; The offer of the Faculty of Engineering includes Bachelor studies - Engineering and Environmental Protection in Industry, as well as Master studies - Environmental Impact and Risk Assessment. These specializations have a high potential to further include the circular economy in the Curricula;

- "Babes-Bolyai" University Cluj-Napoca - Sighet Extension - with 3 faculties: Sciences in Economics and Business Management, Geography, Psychology and Educational Sciences – with bachelor's and master's degree programs;

- "Vasile Goldis" Western University - Baia Mare Branch - with 2 faculties: Sciences Economics and Natural Sciences, Engineering and Computer Science - with 4 study programs at license level.

Apart from the formal education, there is an important non-formal educational offer coming from more than 29 educational institutions, focused on developing new competencies and skills for the changing work environment, social economy, social responsibility and integration of the unemployed people, most of them offered based on financed European programmes. Is worth saying that non-formal education in sustainability related topics, including circular economy is provided mainly by various entities in the framework of international projects, described in the above section. For example, at least one educational program in circular economy is recently available in Romanian language:

"Education for Zero Waste and Circular Economy'', offered by the EduZWaCE Erasmus Plus project consortium and addressing two target groups: managers from industrial companies, and workers from construction /deconstruction sector. (www.eduzawce.eu)

As a conclusion, emerged also from the 93 interviews performed with the stakeholders in the County, the large majority of them consider that educational offer is not responding to the actual needs, they are claiming the "low level of information / skills / learning resources" and request the introduction of new curriculum in the field of circular economy at all educational levels.

Research-development-innovation activities in Maramures County are undeveloped as a result of the dismantling or restructuring of former institutes, active during the communist and due to the general underfunding of the research sector in the last 20 years. R&D institutions relevant for circular economy, refer to: Research and Design Institute for Non-Ferrous Metallurgy CEPRONEF Baia Mare, focused on the renewable energy and energy management sector and environmental engineering and the North Baia Mare University Center of the Technical University of Cluj-Napoca, is currently the most important actor in the field of research at County level, with functioning research centers in fields of electrical engineering (energy quality and efficiency), engineering and technological management, IT&C (intelligent dedicated systems). These research centres are oriented more towards fundamental research than applied research and in this context, only few results end up being implemented in industry. (MSSD, 2018)

Moreover, at the regional level, the **Research Institute for Circular Economy & Environment "Ernest Lupan"– IRCEM** is an entity attached to the Technical University of Cluj-Napoca and an official partner within the European Stakeholders Platform for Circular Economy. The Institute is acting to support new policies and development in the circular economy and is available for establishing new research and demonstration projects in collaboration with the industries.

Business support and financed programs for the circular economy. In 2014, the Action Plan for supporting Innovative Companies and Job Creation in Innovative Areas was prepared by the County Council with the help of foreign experts, within the INTERREG IVC "Smart Europe" project. The peer-review evaluation, preceded the plan, revealed some strengths for innovation: the availability of a positive, cost-effective workforce competitive, cooperation in local business circles, and also weaknesses such as the missing structured cooperation between authorities and companies or missing business incubators at the North University Center. Problems in accessing EU funds by SMEs, insufficient support from the authorities for companies, migration of young labour abroad. The Plan sets up a couple of very interesting measures with the main aim of boosting cooperation between the research and companies, and preparing companies for innovation. (MSDS, 2018) Clusters and business support structures creation were measures proposed by the Innovation Plan.

In spite of this infrastructure for business remained undeveloped, although several companies are part of the clusters set up in others counties in the region, such as the: Transylvanian Furniture Cluster (TAPARO, EUROCOMFIL, REMAT MARAMURES), implemented a project to enhance waste recycling from the furniture sector in the region; the ECO-Innovation Cluster for SUSTAINABLE ENVIRONMENT (CLEMS), located in Bistrita, the Cluj IT Cluster including various companies from Maramures. The main business structure remains the Chambers of Commerce and Industry Maramures, comprising several consultancy and assistance centres for companies

and offering promotion and business information, training and integration services.

3.3.1 Regional circular economy drivers, strengths and opportunities - Maramures

The **main driver for circular economy** is the specificity of Maramures County itself and the willingness of the County authorities to transform the County into a brand and an international tourism destination. This will not be possible, unless the nature is preserved, the environment is kept clean (free of littering, clean soil, fresh waters and air), the touristic offer comes with traditions, local food, authentic products of any kind, opportunities for outdoor sports (mountain hiking trails, hiking, trekking, rafting, mountain biking, etc.), and the County's economy is sustainable, resource efficient and free of waste and pollution.

The **local strengths**, as they result from previous discussions and interactions with the stakeholders in the framework of the Smart Europe project and the responses received during the interviews, refer to the high interest in circular economy, the positive mentality of the local actors and their perception related to the opportunities offered by circular economy, in particular resource efficiency and waste prevention and recycling.[15]

The presence of strong, well developed manufacturing sectors, such as wood processing and furniture manufacturing, electrical equipment, local agricultural and food products, as well as tourism and agro-tourism, provide many opportunities for the development of circular products and the adoption of new business models, while the high number of SMEs, reflects the strong drive of entrepreneurship in the region, interested in developing their workforce and educating their own employees, including in the area of circular economy.

The local government is fully determined to further develop the County economically and to increase its resilience and this is highly depending on certain amount of self-sufficiency and the ability to make more effective use of local resources. The local governments have a unique ability to engage with multiple stakeholders from across sectors and catalyse action and this is key to the emergence in cities of circular economy opportunities, which require understanding, collaboration, and action within and between sectors.

The Maramures County Council will produce, during the next period, five new sectoral documents important for the community, which represent strong points in the development of the county and in the application of the principles of the circular economy:

• **Mobility Plan** - will be developed within MOBI project "Modern Border Infrastructure Successful Carpathian Region"; will be the starting point for the vision on the development of urban mobility;

• **County Spatial Planning Plan** - will be developed within MaraStrategy project - will represent the spatial expression of the socio-economic development program of the county having the role of harmonizing the sustainable development of the territory;

• **Investment Strategy of Maramures County** - will be developed within MaraStrategy project - will be a strategic investment document to engage investments by valorising the resources of Maramures County and including a section dedicated to the circular economy;

• **Tourism Development and Promotion Strategy in Maramures County** - will be developed within MaraStrategy project - will lead to the diversification of local economy through the sustainable development of tourism;

• **County Waste Management Plan of Maramures**

County 2019-2025 - is in an advanced stage of preparation and includes a Program for the prevention of waste generation, which is part of circular economy.

Another local strength is the presence of the Association Bun de Maramures (Good of Maramures Association), founded within an Interreg Europe project – Food Chains 4 Europe. Good of Maramures Association will contribute to the sustainable innovation of the food chain in Maramures County, by introducing the "Good of Maramures" labelling system for the most representative local products. “Good of Maramures” label will start to be implemented in 2020, representing an alternative and an opportunity for local food producers that do not have the "Traditional Product" certificate, to be recognized as exponents of traditional food from Maramures, based on local recipes and materials.

In addition to the strengths determined on the basis of actions and initiatives carried out at the level of local authorities the **opportunities for circular economy** have been explored through the interviews. In formulating the possible opportunities, the five key elements proposed by the project have been considered: (1) resource efficiency and waste prevention; (2) renew/ regenerate/renewable energy; products life extension through maintenance and repair an important opportunity; (3) sharing platforms and (4) products as service, important opportunities for circular economy.

The responses to the questionnaires confirm the status quo of the companies in the region, those are more interested in improving their resource efficiency and reduce/recycle their waste; opportunities which are actually the first approach in a circular economy. More sophisticated solutions such as, “services instead of products” or “sharing platforms” are less considered, probably also due to incapacity, at this moment, of imagining this type of solutions applied in their organisations. Other identified opportunities refer to:

- High raw material costs can encourage reuse / recycling;
- Interest in renewable energy and combating climate change can encourage investment in the circular economy;
- The possibility of extending the life of products can increase interest as it reduces costs;
- The opportunity to exchange experiences and good practices at European level;
- The characteristics of products and services specific to the circular economy can encourage both consumers and entrepreneurs if they are properly promoted;
- The possibility of developing networks at EU level to promote the circular economy;
- European directives and funding opportunities in this area can encourage public authorities to support the development of the circular economy.

Concerning funding opportunities it is very important that starting with 2021 a new multiannual financial period is coming into force and Romania will benefit from it. To the moment, the negotiation process is not ready yet but, there are some figures for Romania such as 19.6 billion Euros – allocated to Romania from Recovery Plan. Next Generation EU to direct investment quickly to where it is most needed, reinforce the single market, step up cooperation in areas such as health and crisis management, and equip the Union with a long-term budget to **drive the green** and digital transitions and build a fairer and more resilient economy. Hence, Maramures County need to prepare to use all these opportunities to

decrease the impact of threats and weakness.

More opportunities are related to the presence of several educational, R&D and business support entities that could get involved in further uptake of the circular economy in the region. Those are "North Baia Mare University Center" of the Technical University of Cluj-Napoca, the Babes-Bolyai University Cluj-Napoca - Sighet Extension, the "Vasile Goldis" Western University - Baia Mare Branch - with 2 faculties: Sciences Economics and Natural Sciences, Engineering and Computer Science - with 4 study programs at license level; the regional level the Research Institute for Circular Economy & Environment "Ernest Lupan" – IRCEM, and regional clusters such as the

- **Cluj IT cluster** - established in 2012, is currently the largest cluster in the field in Romania. In 2016, the cluster acquired the SILVER label from the European Secretariat for Cluster Analysis (ESCA).

- **The Transparent Energy Cluster (TREC)** - acquiring legal personality only in 2015 under the name Transylvania Energy Cluster. It received the SILVER certificate from ESCA in 2018.

- **The Transylvanian Furniture Cluster** - established in 2013, developing continuously, in the first months of 2016, managing to obtain GOLD certification from ESCA in 2017.

There is highly interesting international education and research projects offered in the region and is worth mentioning:

EduZWaCE
Education for Zero Waste and Circular Economy
NR.2018-1-EL01-KA202-047749

The educational program in circular economy, available in Romanian language: "Education for Zero Waste and Circular Economy", offered by the EduZWaCE Erasmus Plus project consortium and addressing two target groups: managers from industrial companies, and workers from construction /deconstruction sector. (www.eduzawce.eu)

Interreg
Danube Transnational Programme
MOVECO

Moveco – "Mobilising Institutional Learning for Better Exploitation of Research and Innovation for the Circular Economy", an Interreg Danube Project, facilitated the preparation of a "Transnational strategy for the transition to the circular economy in the Danube region" including the identification of possible material streams for the Danube region and roadmaps for the strategy's implementation, a Roadmap and Action Plan to implement the transnational strategy and country roadmap for Romania and a Circular economy toolbox for small and medium-sized enterprises, including financial, technical and information tools.

C-Voucher

C-Voucher, an instrument developed through a Horizon 2020 project with the aim to develop new cross-sectorial value chains across the EU by

supporting SMEs on the move away from linear value chains (cradle to waste) towards circular models (cradle to cradle -Cradle to Cradle® concept this is a new approach for designing intelligent products, processes and systems taking into account the entire life cycle of the product, optimizing material health, recyclability, renewable energy use, water efficiency and quality, and social responsibility).

INSIGHT Erasmus Plus project – "Fostering Industrial Symbiosis through the development of a novel and innovative training approach", offering to develop a new professional profile, the industrial symbiosis facilitator, and the training curriculum necessary for it. This industrial symbiosis facilitator would be responsible of different tasks: to conduct an analysis in its area of influence, to define and promote possible synergies between companies from different sectors, to capitalise on the benefits of the circular economy in them, etc.

Moreover, the specific sectoral opportunities, have been identified in correlation with the five elements of circularity proposed by the project, as they are emerging from the specific challenges identified in the above section, those are presented in table 2 (overleaf).

Opportunities	Long-life products	Renew/Regenerate	Product as a service	Resource Efficiency and Waste Recycling	Sharing Platforms
Furniture manufacturing	Prolong the life of the furniture products by better quality and design; Offer longer warranty and repair services Use recyclable materials (wood).	Renovate/renew old wooden furniture and elements	Lease furniture instead of sale (office model)	Reduce consumption of wood, energy, chemicals in the production process Reduce waste and emissions	Identify opportunities for sharing equipment and machinery for wood processing or related means
Wood processing	Wood with FSC certificate for wood products; More innovative products; Product design focused on durability by applying modern treatments, meaning that wood can resist biological degradation even longer, as well as locking in carbon.	Industrial symbiosis – for using sawdust – e.g sawdust pellets	Lease of wooden houses	Improve procurement practices in order to avoid low quality timber Improve the product quality value added	Identify opportunities for sharing equipment and machinery for wood processing or related means

Table 2: Elements of circularity

Opportunities	Long-life products	Renew/Regenerate	Product as a service	Resource Efficiency and Waste Recycling	Sharing Platforms
Electric equipment manufacturing	Better product design, focused on product performance and long life; Products innovation based on the use of essential generic technologies as well as digital technology.	Analyse opportunities for remanufacturing of components and new business models based on performance contracts and reverse logistics	Lease complex equipment instead of sale	Improve manufacturing processes. Use resources more efficient (materials and energy), limit their utilisation of chemicals in the production process and reduce waste and emissions	Electrical equipment to be used through sharing platforms (consumer model, Moveco platform)
Agrofood processing	Opportunities for more local food products and local supply	Processing agricultural waste, manure, animal and food waste through anaerobic digestion, producing nutrients and biogas	N/A	Improve manufacturing processes. Reduce consumption of wood, energy, chemicals in the production process Reduce waste and emissions	Sharing paltforms for food exces and near to expiration date, that could be oriented to disadvantaged people

Opportunities	Long-life products	Renew/Regenerate	Product as a service	Resource Efficiency and Waste Recycling	Sharing Platforms
Tourism	Ecotourism and sustainable destinations brand	Processing food no more than 50 km distance from the hotel & restaurants	N/A	Energy efficiency in hotel buildings, the use of renewable energy	Sharing accomodations with tourist Sharing platforms for food leftovers for charity
Waste management	New business models providing from the design stage onwards, prolongation of the product lifecycle and reducing the amount of waste resulting at the end of the life cycle	Maintaining the materials in use for longer through products reconditioning	Lease products instead of buying	Your trash is my treasure model Collaboration at county level, within IWMS, between authorities, local communities, waste collectors and recyclers	Moveco Platform https://danube-goes-circular.eu/

3.3.2 Regional Circular economy barriers, weaknesses and threats

In identifying **barriers for circular economy**, the approach provided by the EMF Toolkit has been followed. This is to combine a standard analysis of market failures and regulatory failures with social factors and the economic concerns of business. The methodology refers to **15 types of barrier in four categories**. It starts with the economic concerns of businesses that are assessing these opportunities: profitability, capital and technology. Barriers in applying circular economy, as perceived by the stakeholders, respondents to the applied questionnaire, are:

- The most important economic barriers, according to half of responses, are the unavailability at large scale, of the affordable technology and the high level of the required investments, while respondents referred the low level of awareness from the consumer side, to the need of providing economic incentives to companies.

- Perceived market barriers are the cost, still acceptable, for the raw materials, the inexistence of product standardisation, as well as the low level of financing of the circular business models.

- The legal framework for circular economy is considered inadequate, while the unpredictable legislation and undesired consequences of the existing requirements are perceived as barriers for circular practices.

- The vast majority consider that the low level of information and education regarding circular economy, the mentality and unsustainable behaviours are important barriers for circular economy.

- 60 out of 92 respondents considered the financial and technical business support schemes as important for the development of the circular companies, while some comments pointed out the inefficiency of the existing business support models and their need for concrete technical assistance.

- The last perceived barriers as important for 50 to 70 of the respondents are the ineffective environmental infrastructure in terms of wastewater collection and treatment, waste, as well as the business infrastructure and digitalisation.

The importance of these barriers has been established based on the responses provided by the interviewed organisations and also based on the previous analysis and strategies performed in the regions; those are presented in table 3 (overleaf).

Type of barrier	Description	Importance
Economic	Not profitable	30
	Capital intensive	53
	Technology not available	50
Market failures	Acceptable cost of natural resources	60
	Inexistence of circular standards for products	50
	Missing incentives	62
Regulatory failures	Inadequately defined legal frameworks	62
	Low predictability of legislation	67
	Implementation and enforcement failures	50

Table 3: Barriers

Type of barrier	Description	Importance
Social factors	Low level of information / skills / learning / specialization in the circular economy	66
	Linear way of thinking, mentality based on consumption	51
	Unsustainable consumer behaviour	62
Business support	Reduced financial support for businesses that want to become circular	62
	Reduced technical support for businesses that want to become circular	63 63
	Insufficiently promoted existing funding schemes	62

	High importance	(60-90 answers)
	Medium importance	(30-60 answers)
	Low importance	(0-30 answers)

Main **weaknesses** for the development of circular economy in Maramures County, as perceived by stakeholders are:

- The quality of environmental, business and educational infrastructure

- Low level of specialized, competent staff, in all structures of the County (69)

- Lack of traceable data and information and accessible over time (big data) (66 responses)

- Low level of collaboration between research and industry (71 responses)

- The academic and vocational education is not matching the needs of the companies[16]

- Low waste recovery rate;

- The concept is not well known among consumers and there is thus no market demand for products from the circular economy or specific services;

- Very few facilities / investments at local level;

- The mentality regarding the status of "garbage" and not of waste resources

Main identified threats for circular economy, as for innovation and smart economic development refer to:

- Inadequate legal framework

- Inadequate infrastructure

- Lack of educational programs in circular economy is reducing the chance for implementation of CE

- Low level of accessing all the available EU funding

- Exodus of labour force and brain drain because of a lack of possibilities

- Changes in the political climate and their influence over the businesses

3.3.3 Development of prospects for circular economy

The Circular Maramures is definitely an ambitious goal if we consider the national and regional context, although is not impossible. Many opportunities have been identified in the public and private sectors and those relate first of all to the expected improvements in resources efficiency and waste reduction/recycling, the type of opportunities which are actually the first approach in the circular economy. These could unlock important financial savings, drive innovation ahead and contribute to business competitiveness, and last but not least, bring the desired environmental benefits: a reduction of HGH emissions, preservation of natural resources (forest, wood, and water), a reduction of consumption of the selected products, green jobs creation and a general boost to the local economy.

Responsible exploitation of natural resources (wood, soil, water) will ensure sustainability of sectors connected to those resources (wood processing and furniture and agri-food sectors). In the field of the wood processing and furniture manufacturing the trend is to minimize the amount of material used and the waste resulting from the production process, to optimize/reduce energy consumption in the manufacturing process, including other modern trends that could be easily embraced: renovate/ renew of old wooden furniture and elements, furniture and wood elements leasing instead of selling, opportunities for sharing wood elements, equipment and machinery for wood processing. The electric equipment manufacturing has an extremely important role in serving other industries, through automated, robotic solutions, which contributes to the increased efficiency of production processes by reducing operating costs and improving product quality and consistency, thus maintaining the competitiveness of the industry. Definitely, the sector requires a more efficient use of resources and should concentrate in the future to better design of products that will ensure increased product performance and longer life. The potential for local agricultural products and traditional food products is increasing, along with their demand in ecotourism and cities that contributes to shortened supply chains reduced emissions from transportation, food waste and packaging waste. There are a lot of opportunities to improve agricultural production and in food processing and to reuse/process the agricultural and food waste (manure, animal and food waste) through anaerobic digestion, producing nutrients and biogas contributing and advancing with the nutrients cycle; an anaerobic digestion installation could then process the bio-waste generated from different sources, including the wet fraction from population, and requires the public founding and local authorities involvement due to the high level of necessary investment.

Maramures has a great potential to become an ecotourism destination and an international brand, "to capitalize on the authenticity of architecture, wood culture, folk art, well-preserved local folklore, crafts and traditions, gastronomy, museums, contemporary cultural production, but also the uniqueness of landscapes, diversity natural resources or the historical heritage of the county"(MSDS, 2018). In this respect, more attention will be paid to ecotourism elements, transportation, sharing accommodations, increasing the energy efficiency of existing hotel buildings, purchasing locally, etc., measures that will stimulate the development of other sectors, in a circular, sustainable manner.

The building sector, even if not mentioned as a key sector, due to its rather small contribution to the county's economy, has an important potential for a circular economy. Three perspectives should be mentioned here: the need for renovation of the old public and private buildings, in particular housing

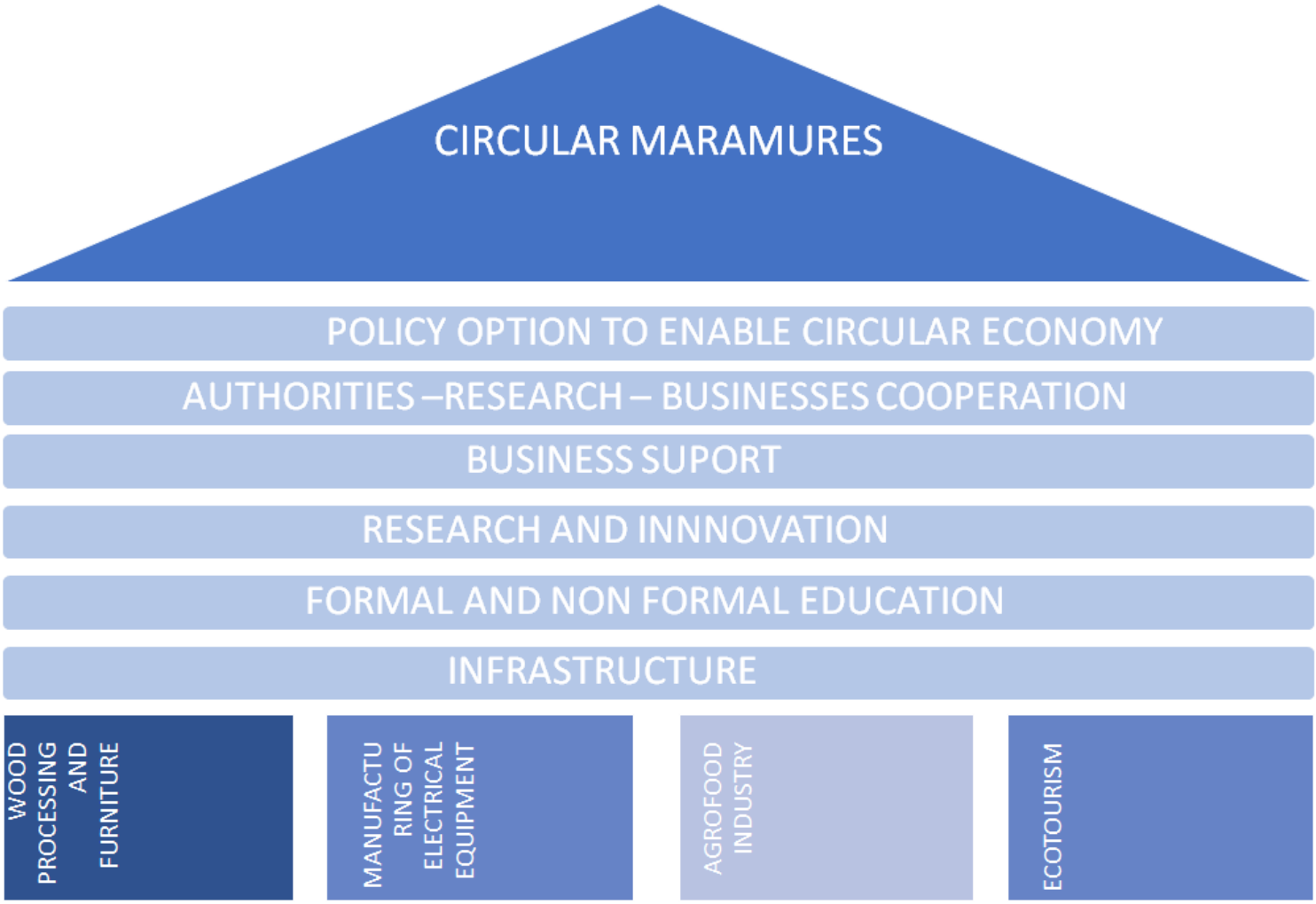


Figure 10 - The framework conditions for circular economy in Maramures County

erected in the communist time, applying industrial production processes to reduce waste during construction and renovation, including modular construction of wood building components, prospect interesting the opportunities in the wood processing sector, expanding the reuse and high-quality recycling of building components and materials by applying design for disassembly techniques, material passports, increasing the utility of existing assets by unleashing the sharing economy (peer-to-peer renting, better urban planning), multi-purposing buildings such as schools, and repurposing buildings.

Each of these opportunities is limited, to a certain degree, by a number of barriers. Potential options to overcome these barriers have been identified. To enable a systemic transition towards the circular economy, local authorities might also consider, apart from regulatory changes that should come from the national government, to set the local framework conditions for the circular economy by building the necessary environmental and business infrastructure, acting as a facilitator and gathering at the same table the public institutions, academia and businesses for a real cooperation. The waste infrastructure is now finalised and it is the role of public authorities to ensure this will be fully exploited, including by stimulating citizens to reduce and sort their waste, applying

the economic instruments now provided by the legislation (pay as you throw, deposit return schemes for packaging), working in cooperation with environmental responsibility schemes for further developing waste recovery infrastructure and recycling technologies, and building a strong system for traceable and reliable waste data. The potential for increasing energy efficiency in buildings and using more renewable energy is huge.

Therefore, the capital city of the county, Baia Mare, is part of the Covenant of Mayors Pact and has committed to reduce its energy consumption by 22% until 2020 and beyond. A sustainable energy action plan has been developed setting up measures for increasing energy efficiency of public buildings, adopting economic instruments to stimulate private buildings renovation, investments in renewable energy. Moreover, green public procurement is enacted and in spite of not having yet methodology for green public procurements, circular and green criteria's are possible to introduce if a minimum education on the topic is provided.

Education has a key role in advancing circular economy, and reformation of universities' curricula in order to include resource efficiency and circular economy topics is mandatory. There is a lot of enthusiasm out there coming from companies, NGOs, and other entities that could be better harnessed, by keeping consumers and producers informed, offering vocational education and facilitating the emergence of new circular initiatives and ideas! These potential policy options should not be considered as recommendations but as mandatory actions that set the ground for circular economy in Maramures.

The focus of Maramures County Council for the county sustainable development and for increasing the circularity potential is materialized by the sectorial documents that will be elaborated in the next period: Mobility Plan, County Planning, Maramures County Investment Strategy, Development and Promotion of Tourism Strategy in Maramures County, as well as the County Waste Management Plan of Maramures County 2019-2025.

Mobility Plan - developed within MOBI project - funded by the HUSKROUA Program, will underpin the vision for the development of urban mobility: strategic axes, lines of action and measures on urban models and mobility networks, integrated public transport, efficient and qualitative, as well as efficient and flexible governance of the county mobility, integrated information and communication systems, new mobility monitoring systems, optimizing asset management, new energy paradigms, mobility and transition, encouraging habits change, education for sustainable mobility, awareness and promotion of mobility sustainability.

Maramures County Spatial Planning - developed within MaraStrategy project, represents the spatial expression of the socio-economic development program of the county having the role of harmonizing the sustainable development of the territory. The document will take into account the socio-demographic structure and economic activities, the inter-county, regional and national territorial context, the directions and development priorities of the county at the territorial level, for a maximum period of 10 years, established based on the prospective diagnosis to skipping /reducing of development gaps. At the same time, the document will have an action plan for implementing its provisions - territorial public policies, programs and projects, measures of organization over time, specifying responsibilities and sources of funding, public policies, programs and public investment projects necessary for sustainable development and competitive territory.

Maramures County Investment Strategy - developed within MaraStrategy project, will contribute to the development of the county communities, by identifying investment opportunities and attracting investors. The circular economy section will cover EU policy, including its contribution to the European Environment Plan, national policy, the state of transition to the circular economy, and measures - instruments - programs. Within the Maramures County Investment Strategy, European and national regulations, the advantages of the transition to a circular economy, the impact on the environment will be presented. In addition, the relevant factors (economic sectors, enterprises, universities, authorities and public institutions) and their activity applying the circular economy will be identified and evaluated. Important components will relate to public-private partnerships and cooperation in the field of the circular economy, as well as to the population awareness, the public sector and the business environment concerning the adoption of the principles of the circular economy. In addition, European and national programs in the field of circular economy compatible and applicable in Maramures County will be identified.

Strategy for Development and Promotion of Tourism in Maramures County - developed within MaraStrategy project, will lead to the diversification of local economies through sustainable tourism development, by supporting employment-friendly growth, by developing endogenous potential as part of a territorial strategy for certain areas, including the conversion of declining industrial regions, as well as increasing accessibility and valorising the specific natural and cultural resources (investment in tourism infrastructure). The proposed investments will contribute to the sustainable capitalization of the local tourist resources and of the competitive advantages of tourism at local level, while preserving the Maramures identity.

Maramures County Waste Management Plan 2019-2025 - is being prepared under the coordination of Maramures County Council, in collaboration with Maramures Environmental Protection Agency. The County Waste Management Plan will include a chapter entitled "Waste generation prevention program", which will present the analysis of the waste sector, elements provided in art. 41 and art. 42 of the Law no. 211/2011 on the waste regime republished, with subsequent amendments and completions. The waste prevention program is part of the circular economy and will be the first county tool for the evolution towards a sustainable model, from the environmental, economic and social point of view. In addition, the Master Plan on Integrated Waste Management in Maramures County will be updated and a Report for the development / extension of the Integrated Waste Management System in Maramures County will be elaborated, correlated with the County Waste Management Plan and the Master Plan.

4 Regional Conclusion – Maramures County

To assess the status of circular economy in the county of Maramures had been used information provided by the key strategies focusing on the smart specialisation of the region sustainable development of the region as well as on a field research conducted before.

The baseline indicators that characterise the level of circularity in the focus sectors could not be calculated due the unavailability of some data and the lack of previous studies concerning circular economy in Maramures County. The circularity level provides the necessary guidance to set the regional ambition level and is referred to as the baseline for monitoring and measuring the progress and refers to the circular material use rate, or the circularity rate as the share of material resources used coming from recycled products plus the recovered materials and the overall materials use. However, in order to have a clear picture and a baseline for planning and monitoring the progress, we will need the data and will continue discussions with the responsible agencies about what kind of data is needed and how it can be collected / extracted from the existing data basis.

The key sectors, identified based on findings of RIS3NV and MSDS. The presence of strong, well developed manufacturing sectors, such as wood processing and furniture manufacturing, electrical equipment, local agricultural and food products, provides many opportunities for the development of circular products and the adoption of new business models, while the high number of SMEs, reflects the strong drive of entrepreneurship in the region, interested in developing their workforce and educating their own employees, including in the area of circular economy. As support sectors the IT&C sector and the energy/renewable energy sector could play a role in increasing the potential for a circular economy.

Education in the circular economy does not exist in the formal/academic system although the presence of three universities in the major cities of Maramures, is a good sign for potential improvement of the existing curricula. There are however, opportunities in education based on several European projects, and the training in "Zero Waste and Circular Economy", "Facilitator for Industrial Symbiosis" along with specific tools (Moveco tools and roadmap), are available on free online platforms and will be promoted to the interested stakeholders.

The local government is fully determined to further develop the county economically and to increase its resilience and this is highly dependent on a certain amount of self-sufficiency and the ability to make more effective use of local resources. The local governments have a unique ability to engage with multiple stakeholders from across sectors and catalyse action and this is key to the emergence in cities of circular economy opportunities, which require understanding, collaboration, and action within and between sectors. They have a key role in ensuring the necessary environmental and business infrastructure, for example the municipal waste management that could highly contribute to improvement in the way waste is generated, collected and recycled, and consequently diverting waste from landfill. The IWMS is in its final stage of implementation and the local authorities plus the Association for Intercommunity Development for Integrated Management of the Household Waste in Maramures County (AIDIMHWM), as well as Maramures County Council, who is the owner of IWMS assets, should take full responsibility in managing the system and achieving the waste recycling objectives.

The position of the stakeholders have been explored through a targeted questionnaire, 93 responses demonstrated a real interest in circular

economy, the positive mentality of the local actors and their perception related to the opportunities offered by circular economy, in particular resource efficiency and waste prevention and recycling.

Key opportunities for the circular economy have been identified in all sectors, such as the improving products in the key sectors by applying circular design, life extension tactics and new circular business models. The potential for renewable energy and energy efficiency, including in the public sector and for digitalisation is important and assumed by the local governments (the Sustainable Energy Action Plan Baia Mare, Energy Management Agency Maramures and Mara Strategy Project). Opportunities are coming along with barriers, of economic, market, regulatory, business and social nature. The first three barriers as perceived by stakeholders are the (1) unpredictable legislation, (2) low level of information/skills/learning / specialization in the circular economy, (3) reduced financial and technical support for businesses that want to become circular.

Maramures County has an excellent tourist potential and hosts a significant number of protected areas. Attracting a large number of tourists must be properly managed from environmental point of view, in synergy with European initiatives. The European Commission launched, in May 2020, two strategies to bring nature back into our lives and ensure a fair, healthy and environmentally friendly food system. Adopted in the midst of the COVID-19 pandemic, the New Biodiversity Strategy and the "From Farm to Consumer" Strategy are key parts of the European Green Deal and will support economic recovery, bringing together nature, farmers, businesses and consumers to create a sustainable and competitive future.

The "Good of Maramures"/ "Bun de Maramureș" labelling system, which is initiated and supported by Maramures County Council, fits into the objectives of the "From Farm to Consumer" Strategy and should take into account:

- Provisions related to the sustainable labelling of food products that cover aspects related to food products that fall into the nutritional, social and environmental climate;

- Targets for reducing food waste by 2023;

- Existing funding opportunities through the Horizon Europe program, which aims for investments of 10 billion. Euro in research & innovation in areas such as food, bio economy, natural resources, environment and others;

- Initiating at the level of Maramures County, public policies meant to encourage sustainable consumption and reduction of food waste.

Maramures County Council should also take into account the targets and measures provided in the New Biodiversity Strategy, which refers to the restoration of damaged ecosystems and rivers, improving the health of protected habitats and species, reducing pollution, "greening" our cities, strengthening organic farming and other biodiversity-friendly agricultural practices and improving the health of European forests. The application of such measures will contribute to the improvement of circularity in the sectors of interest in Maramures County: Furniture Manufacturing and Wood Processing, Agricultural Sector and Food Processing, and also Waste Management. The planned actions in the field of protection, sustainable use and restoration of nature will bring economic benefits to local communities, creating sustainable jobs and growth. Funding of EUR 20 billion / year for biodiversity will be released through various sources, including EU funds and national and private funding.

Efforts have been made also in the past to understand the innovation potential of the region,

as well as the R&D capacities. The county has adopted an Innovation Plan but its implementation is pending. The research-development-innovation activities in Maramures County are undeveloped, and it's becoming clear that new R&D&I structures shall take the place of the old structures; these started to develop in the form of clusters and new structures created as spin off the international projects.

The future action plan should rely on three "I"pillars in order to raise awareness and capacity of policy makers and local stakeholders about both economically and environmentally most viable business models in the County based on the five important themes REDUCES project consider: 1) Product life extension, 2) Product as a service, 3) Renewability/regeneration, 4) Resource efficiency and recycling and 5) Sharing platforms. They are:

- **Impact**: incorporate circular thinking at political, business, community and societal level;

- **Include**: implement operations, improve programs and attract funding schemes to enable circular initiatives/businesses;

- **Inspire**: marketing and PR campaign. Spread circular economy thinking through knowledge sharing and creation.

In Maramures County, there are many active businesses that already implement the principles of circular economy starting to make changes within the business models. There are steps in implementing industrial symbiosis but they are still hesitant because of the lack of legislations, networks and because of the materials prices. There isn't yet a market for secondary row materials at the level of the County or region. Sharing platforms should be developed in the future at regional & national level.

The REDUCES action plan developed by Maramures County will have to take into account the recent initiative of the European Commission - the new Action Plan for the Circular Economy, which paves the way for a competitive economy, neutral in terms of climate impact in which consumers are responsible.

At County level measures will start by improving the education level of policy makers, businesses, communities and citizens (Impact), identify funding schemes that enable circular initiatives/ businesses (Include) and create awareness on new materials pathways, business models, more efficient waste management, and logistics, local benefits, networking, counselling, financing, and so on. (Inspire)

Also, the Maramures County Action Plan should address to the measures on waste in the EU Circular Economy Action Plan, especially since Maramures County has a major interest in waste management by implementing and expanding the IWMS project. Initiatives will be considered on: waste prevention; extended producer responsibility; modernization of EU waste legislation; helping citizens to sort waste, etc.

RECOMMENDATIONS

- New regional development strategy as well as new Maramures County development strategy (and other strategies) should consider circular economy solutions for improvement in all important sectors. A circular economy working group can be initiated to better design and plan the information flow that can lead to the circular Maramureș County, as a starting point. This group should include not only policy makers but as well business representatives, educators and trainers, representatives of NGOs, Clusters as well as the civil society.

- Strategic planning should take into account the correlation of lists and types of projects, which

may increase the level of circularity of Maramureș County, and the common framework of the county should be able to answer several questions, namely:

- Where we are (Status quo REDUCES)
- Where we want to go (Shared vision)
- How to get there (REDUCES action plan)
- How do we know we got there (PA REDUCES assessment)

- This approach will allow stakeholders, including public authorities, to follow a red line of environmental and innovation policies, in order to align with national and European policies funded through funding programs included in the Multiannual Financial Framework 2021-2027 or other funding mechanisms, having common goals and achieving clear synergy by overlapping long-term effects.

- In the transition to a circular economy, the fact that circularity begins with production must be taken into account and, therefore, the design of products for reuse and recycling must be considered. An awareness program for company employees should be encouraged, using the opportunities provided by the new ESF + fund through the Education and Employment Operational Program (2021-2027).

- Elaboration of some quality secondary materials, at local level, based on research, development, innovation. Therefore, it is necessary to find intelligent investment solutions that address not only the waste industry but also the interested companies. The new Regional Operational Program (existing for the first time in this form) will have multiple types of ERDF interventions to encourage innovation, cooperation of SMEs with the research environment, digital transformation, product portfolio development, etc. As the financing philosophy changes, the objectives regarding the transition to the circular economy of Maramureș County need to be clear so that they justify the relevance of projects of local, public or private interest.

- The new business models that accompany the transition to a circular economy must be known and communicated permanently, therefore it is necessary to encourage the creation of networks, the development of cluster associations and public-private partnerships. Together, they will be able to approach major projects that will support, in the medium term, the achievement of the Maramureș Circular objective.

- Encouraging the application of extended producer responsibility schemes could create a uniform model for the collection of waste data thus allowing the authorities to take action when the situation requires. The digitization of data collection systems is a necessity and corresponds to the position of the European Commission, which considers that the circular economy strategy and the digitization strategy are two twin strategies. To this end, local strategies should provide for concrete measures on digitization.

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