SUSTAINABLE FORESTRY
COLLECTION 87-88, 2023

ODRŽIVO ŠUMARSTVO
ZBORNIK RADOVA 87-88, 2023

DOI: 10.5937/SustFor2388183B
UDK: 630*331.1(497.11)
Review paper

POSSIBILITIES FOR THE USE OF BIOMASS FROM FORESTRY WITH THE AIM OF ESTABLISHING A CIRCULAR BIOECONOMY IN SERBIA

Ljiljana BRAŠANAC-BOSANAC[1], Nevena ČULE[1], Ilija ĐORĐEVIĆ[1], Goran ČEŠLJAR[1], Tatjana ĆIRKOVIĆ-MITROVIĆ[1]*

Abstract: *In the last ten years significance of biomass is growing, due to exhaustion of fossil fuel reserves and their negative impact on climate and environment. In the region of Southeastern Europe, biomass is the most significant renewable energy source, due to abundance of forests and agricultural areas. Serbia is one of the countries of Southeastern Europe with significant potentials for using biomass from forests and wood processing industry in the form of wood residues. Despite its potential, the use of wood biomass in Serbia is not efficient. Significant amounts of wood residue produced in the course of tree felling and timber assortment production are left unused in forests. It is necessary to improve the national legislative and regulatory frameworks and support mechanisms for the rational use of biomass, make a precise assessment of its potential and promote the importance of the circular bioeconomy in Serbia in the coming period. The paper presents the results of a complex analysis of the current state of the circular bioeconomy in Europe Union countries, comparing with state in Serbia, the goals and initial results of the CEE2ACT project, and highlights the importance of the formation and long-term functioning of the National Bioeconomy Hub.*

Keywords: forestry, biomass, circular bioeconomy, CEE2ACT, HUB, sustainable development

MOGUĆNOSTI KORIŠĆENJA BIOMASE IZ ŠUMARSTVA U CILJU USPOSTAVLJANJA CIRKULARNE BIOEKONOMIJE U SRBIJI

Sažetak: *Usled iscrpljivanja rezervi fosilnih goriva i njihovog negativnog uticaja na klimu i životnu sredinu, korišćenje biomase poslednjih deset godina dobija sve veći značaj. U zemljama Jugoistočne Evrope, biomasa je najznačajniji obnovljivi izvori energije, zbog obilja šuma i poljoprivrednih površina. Srbija predstavlja jednu od zemalja u regionu Jugoistočne Evrope koja ima značajne potencijale za korišćenje biomase iz šumarstva i drvno-prerađivačke industrije u obliku drvnog ostatka. Uprkos potencijalu, upotreba drvne biomase u Srbiji nije efikasna. Značajne količine drvnog ostatka nastalog pri seči drveta i proizvodnji drvnih sortimenata ostaju neiskorišćene u šumama. U predstojećem periodu neohodno je da se unaprede nacionalni zakonodavni i regulatorni okviri, kao i mehanizmi*

[1]Institute of Forestry, 3 Kneza Višeslava, 11030 Belgrade, Serbia
*Corresponding author. E-mail: brasanlj@yahoo.com

podrške racionalnoj upotrebi biomase, izvrši precizna procena njenih potencijala i mogućeg korišćenja i promoviše značaj cirkularne bioekomije u Srbiji. U radu su prikazani rezultati kompleksne analize aktuelnog stanja cirkularne bioekonomije u zemljama Evropske Unije, upoređujući ga sa stanjem u Srbiji, ciljevi i početni rezultati CEE2ACT projekta i istaknut je značaj formiranja i dugotrajnog funkcionisanja Nacionalnog Centra za Bioekonomiju (NCB).

Ključne reči: šumarstvo, biomasa, cirkularna bioekonomija, CEE2ACT, NCB, održivi razvoj

1. INTRODUCTION

The Republic of Serbia is one of the countries with significant biomass potential, both in terms of biodiversity and distribution. Numerous studies and analyzes show that biomass is the most significant potential renewable energy source in Serbia. It is estimated at 3,448 Mtoe annually, of which 48% is agricultural and 44% wood biomass (table 1). But, despite its great potential, the use of biomass in Serbia has not been efficient. Wood biomass is most abundant in the mountainous regions of central Serbia and its current utilization rate is very high (over 70%).

The Central and Eastern European countries wanted to devote more attention to developing national strategies or action plans aimed at promoting the transition to the bioeconomy in Europe with a bottom-up approach. For this reason, the Horizon project CEE2ACT was launched in September 2022. The Institute of Forestry from Belgrade has been involved in the implementation of the CEE2ACT project. The main objective of this project is to enable countries in Central Eastern Europe and beyond (Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Serbia, Slovakia and Slovenia) to develop strategies and action plans for a circular bioeconomy, using innovative governance models and examples of good practices from developed countries.

The realization of circular bioeconomy in Serbia can be called a pioneering undertaking, because this term is not recognized in strategic, legal and institutional frameworks in Serbia. Adoption and implementation of the National Bioeconomy Strategy and Action plans, the National Bioeconomy Hub (NHB) establishment, support and financial incentives for entrepreneurs who apply the principles of the bioeconomy and sustainability are some of the measures that need to be implemented to realize a circular bioeconomy in Serbia.

With the aim of improving the use of biomass from forestry paper studies resources and gives recommendations for increasing the utilization of forest-based biomass for energy purposes and establishing circular bioeconomy in Serbia.

2. MATERIAL AND METHODS

In order to determine the potential and real state of biomass from forestry and to observe effective solutions and proposals for measures that would increase the use of wood biomass for energy purposes in Serbia, the methods of analysis, synthesis and generalization are used.

Data on potential and actual biomass related to the topic of biomass and circular economy were obtained from the Institute for Statistics of the Republic of

Serbia, SE "Srbijašume", SE "Vojvodinašume", existing laws, strategies and action plans, scientific works, studies and projects.

Bioeconomy Strategy does not exist in Serbia, but there is the concept of circular economy. The concepts of both the bioeconomy and the circular economy have been introduced in the European Union (EU) in response to concerns about long-term sustainability and the prevailing resource-intensive economic model. Although different in origin - the first mostly driven by an innovation agenda and the second by environmental concerns and resource scarcity - both aim to contribute to strategic and operational EU policy objectives.

Concept of existing circular economy in Serbia is analyzed and elaborated through 3 national strategies - Strategy of Agriculture and rural development in the Republic of Serbia for the period 2014-2024, Strategy of Industrial policy of the Republic of Serbia from 2021-2030, Strategy of Sustainable urban development of the Republic of Serbia until 2030 and 2 national programs - Waste Management Program in the Republic of Serbia for the period 2022-2031 and Public Procurement Program 2019-2023.

3. RESULTS

3.1. EU rules on sustainable biomass

Biomass is derived from organic material such as trees, plants, and agricultural and urban waste. It can be used for heating, electricity generation, and transport fuels. Increasing the use of biomass in the EU can help diversify Europe's energy supply, create growth and jobs, and lower greenhouse gas emissions. It is also needed in the electricity production to balance variable renewables.

For biomass to be effective at reducing greenhouse gas emissions, it must be produced in a sustainable way. Biomass production involves a chain of activities ranging from the growing of feedstock to final energy conversion. Each step along the way can pose different sustainability challenges that need to be managed.

The European Union does not prescribe how a state should organize its own agriculture, forestry, waste management whether there will be one or more enterprises, but it requires the legislation to be in accordance with the principles respected by European countries (the principle of sustainable development, ecological principles, Pan-European Criteria and Indicators, etc.). In accordance with the Kyoto Protocol, the Paris Agreement and the EU Directives, and based on the obligation to increase the share of renewable energy sources in the total energy consumption, a lot of EU countries are encouraging the use of biomass as fuel. Increasing the use of biomass in the EU can help diversify Europe's energy supply, create growth and jobs, and lower greenhouse gas emissions. It is also needed in the electricity production to balance variable renewables.

In the Figure 1, overview of EU strategies, policies and legislative documents relevant to the biomass, circular economy and bioeconomy is shown.

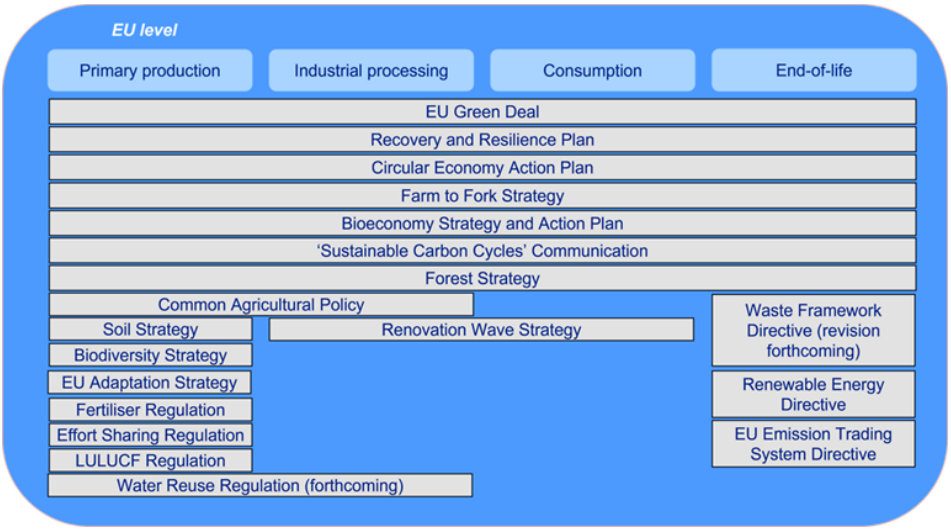

Figure 1. *Overview of EU strategies, policies and legislative documents relevant to the biomass, circular economy and bioeconomy*
Source: European Commission (2021), OECD (2022) (Adapted by authors)

3.2. Current status of the use of biomass from forestry in Serbia

Of the registered 3448 Mtoe biomass potential in Serbia, about 1.67 Mtoe is derived from agriculture and food processing industry, while biomass from forestry accounts about 1.53 Mtoe (table 1).

Table 1. *Technical potential of BIOMASS in the Republic of Serbia*

Types of BIOMASS	Available realized technical potential (Mtoe)	Unrealized available technical potential (Mtoe)	Total available tehnical potential (Mtoe)
Agricultural biomass			
Agricultural crop residue	0.033	0.99	1.023
Residue from fruit growing, viticultureand fruit processing	-	0.605	0.605
Liquid manure	-	0.042	0.042
Total AB	**0.033**	**1.637**	**1.67**
Biomass from forestry			
Wood (forest-bassed) biomass	1.021	0.509	**1.53**
Energy plantation	-	-	not available
Biodegradable waste			
Biodegradable municipal waste	0	0.205	0.205
Biodegradable waste (excluding minicipal)	0	0.043	0.043
Total BW	0	0.248	0.248
BIOMASS IN RS (Mtoe)	**1.054**	**2.394**	**3.448**

Source: Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030 (2016) (Adapted by authors)

Biomass from forestry belongs to solid biomass which includes firewood, plant mass of fast-growing plants, branches and wood waste from forests, sawdust, bark and wood residue from the wood-processing industry. Despite the great potential of wood mass, biomass from forestry in Serbia has not been used sufficiently. There are several reasons:

- ✓ Significant amounts of wood residue produced in the course of tree felling and timber assortment production are left unused in forests.
- ✓ Poorly developed forest road infrastructure (insufficiently opened);
- ✓ difficult accessibility (terrain with extremely unfavorable orographic characteristics and poor access to forest stands);
- ✓ In the areas with extremely unfavorable orographic characteristics and poor access to forest stands, the profitability of the collected products is disputable;
- ✓ Inappropriate mechanization for the collection and transportation of wood biomass, i.e., high costs of biomass collection making the collection of forest residue unprofitable;
- ✓ Unsolved logistics problems in the collection and distribution;
- ✓ The absence of a regulated biomass market and appropriate technologies for its use as fuel;
- ✓ The poor financial power of potential buyers and expensive commercial loans;
- ✓ The lack of state subsidies for the construction of biomass plants;
- ✓ Demographic emptying of villages and border settlements, together with the economic underdevelopment of local communities and extreme poverty of the population, especially in the Southern and Eastern Serbia limits the possibilities of collecting and using this biomass.

Intensive use of forest biomass requires the establishment of system measures for control and supervision in the chain of use as well as the adaptation of the planning and forest management pattern (Brašanac-Bosanac, Lj. et al. 2018). It is necessary that wood and wood biomass be given the right importance in Serbia, not only in energy balances and official consumption analyses but also in the application of methods for estimating its consumption. Sustainable use of biomass brings an opportunity for Serbia by providing additional natural resources for the economy and products, and closing the biological cycle of biodegradable materials.

3.3. Relations and overlaps between the deferent concepts of economy

Green, Circular and Bio - economy are mainstreamed as global sustainability concepts.

Despite their evidently different assumptions and operationalization strategies, the concepts of green economy, bioeconomy, bio-based economy, circular economy and circular bioeconomy joined by the common ideal to reconcile economic, environmental and social goals. In the past decade, they have all gained political interest, coming to exercise great influence on several societal actors and their activities, including for instance industries, academia, NGO's and policy makers (D'Amato, D. et al. 2017).

Us result of this research, comparative analysis of the relationships and overlaps between these five concepts is showen in Figure 2.

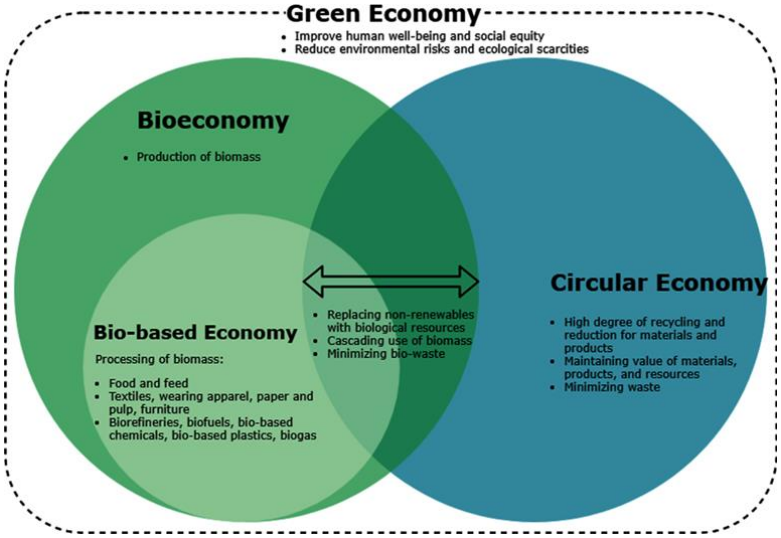

Figure 2. *Relations and overlaps between the concepts of green economy, bioeconomy, bio-based economy and circular economy*
Source: Kardung et al. (2021) and Philp and Winickoff (2018) (Adapted by authors)

Green economy
The green economy is a concept that emphasizes the lowering of environmental risks and ecological scarcities. The concept applies to low carbon, resource-efficient and socially inclusive economies.

Bioeconomy
The bioeconomy is part of the green economy. Relates to promoting global economic growth and technological development for primary production and industry, especially where advanced life sciences are applied to the conversion of biomass into materials.

Bio-based economy
The bio-based economy is part of the bioeconomy and relates to converting biological resources into products and materials. Food and feed production usually involves processing agricultural goods, which enters into the bio-based economy.

Circular economy
The circular economy relates to the use of products and materials that show the highest degree of recycling and lowest waste. That is, the linear production model "take, make and dispose" is replaced by a circular model in which waste products (disposed of in a linear model) are kept within the system. In this way, waste materials are drastically reduced, recycled and remanufactured.
Circular bioeconomy

The circular bioeconomy is a complex and dynamic system and thus decision-makers need new strategies and tools to steer and govern this complex system towards the desired outcomes. The circular bioeconomy is seeking new ways of producing and consuming resources while respecting our planetary boundaries and moving away from a linear economy, based on extensive use of fossil and mineral resources. The importance of a CE in the priority area of biomass lies in its potential to contribute to climate change mitigation, socio-economic development and environmental protection over time by maintaining the value of bio-based products, materials and resources in the economy for as long as possible (Figure 3).

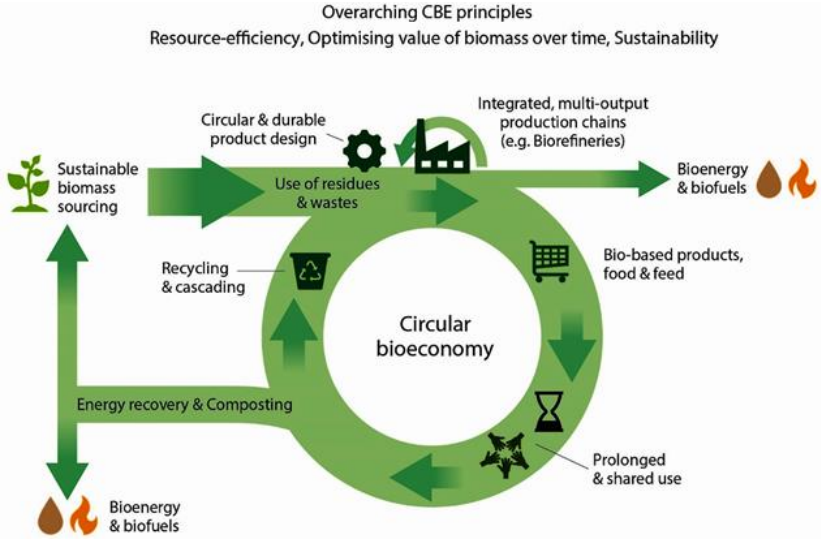

Figure 3. *Overarching Circular Bioeconomy principles*
Source: Stegmann, P., Londo, M., Junginger, M. (2020)

3.4. The importance of a Circular Bioeconomy in EU

In the Updated Bioeconomy Strategy 2018, the European Commission states that "*the European Bioeconomy needs to have sustainability and circularity at its heart*" to manage concerns around increasing demands for biomass for short-lived and linear use. In contrast, a comprehensive circular economy needs to include the bioeconomy, which consists of organic material from agriculture, forestry, fisheries, the food and feed industry and organic processes of waste, as well as knowledge-based processes and applications (Carus, M., Dammer, L., 2018).

Developed countries of the European Union understands the circular bioeconomy as the economy that uses renewable biological resources to sustainably produce food, bio-based materials, feed, products, fuels and bioenergy, and in which waste products are kept within the system. Their policies of development and Strategies of Bioeconomy are focused on the sustainable conversion of biomass and bio-based resources into marketable products, and places biomass production and processing in a single system, while underscoring the role of technology in biological resources to create added value and encourage new business models.

Despite many efforts and activities, there has been a poor approach to the bioeconomy in Serbia for several decades.

EU countries understands the circular bioeconomy as a new techno-socio-economic paradigm of production and consumption. This requires: 1) rethinking its development orientations and principles; 2) taking advantage of its technological solutions; 3) setting economic thinking on a new pathway; 4) strengthening political and institutional support; 5) ensuring policy coherence across objectives, instruments and practices; and 6) involving relevant stakeholders in policy design processes to a greater extent.

Biomass also helps diversify Europe's energy supply, create growth and jobs, and lower GHG emissions.

According to the and latest available data from European Commission (Joint Research Centre, Biomass flows) the total biomass supply in the EU27 added up to 1 billion tons of dry matter. The agriculture sector is the biggest producer of biomass (69%), followed by forestry (31%) and fisheries (<1%). Around 60% of the biomass in the European Union is used for food and feed, with 24% of identified biomass used for energy and 16% for biomaterials3 (Gurria Albusac, P. et al., 2022).

3.5. Circular Bioeconomy and establishment of the National Bioeconomy HUB in Serbia

Concept of bioeconomy is not recognized in strategic, legal and institutional frameworks in Serbia. Most of the representatives of the target groups have heard of the concept of circular economy, which is defined in different frameworks, but they are not familiar with the details.

Since September 2022, the Institute of Forestry from Belgrade with its team of experts has been involved in the implementation of the HORIZON EUROPE CEE2ACT project "Empowering the Central and Eastern European Countries to Develop Bioeconomy Strategies and Action Plans", in which 17 European countries participate. The objective of CEE2ACT is to empower more than 10 beneficiary countries in Central Eastern Europe and beyond to develop bioeconomy strategies and action plans, through knowledge transfer and innovative governance models enabling sustainability and resilience, to achieve better informed decision-making processes, societal engagement and innovation.

The realization of CEE2ACT project is very important for Serbia. Based on the obtained results and guidelines, it can enable the implementation of circular bioeconomy concept, as one of the seven key ways to achieve climate neutrality, identified in the European Clean Planet Strategy. Also, the Project can help Serbia join Europe on its way to become the first climate-neutral continent by 2050 within the framework of the European Green Deal.

The series of workshops and the bottom-up participatory approach of the CEE2ACT project are designed to empower 10 countries of Central and Eastern Europe and beyond: Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, **Serbia**, Slovakia, and Slovenia to develop Circular Bioeconomy Roadmaps, Strategies and Action Plans through knowledge transfer and adoption of innovative management models of developed bioeconomy countries, taking into account the relevant economic, social and environmental aspects of each country

individually. The 10 National Bioeconomy Hubs are built on existing networks and clusters, and they will be supported by e-solutions such as inventories of best practices, e-learning modules, self-assessment tool, B2B matchmaking tool, and methodology for developing bioeconomy strategies and action plans.

The establishment of the National Bioeconomy Hub and the first CEE2ACT workshop "Building trust and understanding between stakeholders for the development of bioeconomy strategies" was held in Belgrade on October 6, 2023. The workshop aimed to foster collaboration, trust, and understanding among stakeholders, the driving forces behind shaping Serbia's bioeconomy future. The objectives were twofold: to establish a shared vision for the national bioeconomy, uniting different players in relevant sectors, and to create broad support for bioeconomy goals and activities, with a shared commitment to local engagement and idea exchange. The workshop brought together a diverse group of 29 participants. Twenty-one stakeholders from 20 different institutions were present, including decision-makers in the creation and implementation of policies, public administrators, actors in the primary sector of the economy, the waste sector and the bio-based industry, small and medium-sized enterprises, public enterprises, suppliers of raw materials, scientific research and educational institutions and organizations for environmental protection. It should be noted that there were no representatives of non-governmental organizations and civil society organizations.

4. DISCUSSION

Application of circular business models play an essential role in the transition to a circular bioeconomy. Innovation and examples of good practices helps companies bring bio-based products and services with a higher value added onto the market and helps them compete in global value chains. Circular business models help the economy to reduce the use of natural resources and the generation of industrial and household wastes (OECD, 2019). Despite existing of Road map of circular economy, the knowledge capacities about circular bioeconomy in Serbia has not established yet. Serbian companies are characterised by a lack of forward planning and a general concern and feare for innovation. They are mostly engaged in low value-adding activities in global value chains, therefore, the share of domestic value added is low in Serbia, especially in manufacturing. The purpose of establishing and existing the NBH in Serbia is to improve the legislative and regulatory framework and support mechanisms for the rational use of biomass in the coming period.

5. CONCLUSION

Despite all potential, advantages and the existence of potential investors, we cannot be satisfied with the level and modes of utilization of biomass in Serbia. In order to improving the use of forest-based biomass for energy purposes in Serbia it is necessary to adopt relevant measures existing in other European countries and the regulations harmonized among decision makers in the fields of agriculture, forestry, energy and environmental protection. It must not be allowed for the increase of woody biomass demand to lead to the increased pressure on forests and exceeding

of allowed cuts. In that case, positive effects of biomass use on one side could lead to the degradation of forests on the other. Because of that it is very important that Serbia get Bioeconomy Strategy.

The analysis of the circularity potential in the Serbian biomass production sector and the stakeholder consultation process identified the need to promote the use of natural bio-based solutions in agriculture and forestry, such as compost or bio-based products. It also identified the need to support new initiatives for alternative source of energy production. The national circular economy strategy should focus efforts on these two key areas of primary production. According to the consulted stakeholders, agriculture and forestry have most potentials in the circular bioeconomy of Serbia.

In the next few years Serbia will need to step up its innovation efforts in the use of biomass from forestry, including the use of circular business models, by increasing the effectiveness of its existing technical and financial support for innovation in this area. The technical support may consist of better communication of information to companies about financing opportunities beyond conventional grants, and helping them develop business plans of a higher quality that would help them secure external funding. According to some of the consulted stakeholders, access to finance and to business support is the key challenge that Serbian forestry companies face in the country.

The key solution is in knowledge transfer. It is necessary to define which sectors are the carriers of innovative ideas and which institutions are involved in the implementation of these ideas, what capacities exist for the short-term support of start-ups, etc. Active participation of all HUB stakeholders (20 so far) in the CEE2ACT project, conducting and participating in workshops, better cooperation with scientific research institutions, formation of clusters, networking, knowledge transfer and conducting workshops with cluster participants could best promote the concept of bioeconomy in Serbia in the near future.

Acknowledgement: *The paper is part of the results of the projects:*
**SocioNext SE project (2017-2018): More Inclusive, Clean and Affordable Biomass Energy Production from Agricultural Residues and Waste", No. 48-00-00203/2014-28-19„Study on SSI rural job creation opportunities in Serbia"– EU GENERAL BUDGET;*
***CEE2ACT project (2022-2024), that has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement, No. 101060280.*

REFERENCES

Brašanac-Bosanac, Lj., Ćirković-Mitrović, T., Eremija, S., Stajić, S. Lučić, A. (2018): Improving the use of biomass from energy purpose in forestry in Serbia, *Sustainable Forestry*, Vol. 77-78, Institute of Forestry, p. 113-122, Belgrade. ISSN 1821-1046, DOI: http://dx.doi.org/10.5937/SustFor1877113B

Caruse, M., Dammer, L. (2018). The Circular Bioeconomy - Concepts, Opportunities, and Limitations. *Industrial Biotechnology*, Volume: 14 Issue 2: April 1, 2018, 83-91. doi.org/10.1089/ind.2018.29121.mca

D'Amato, D., S., Droste, N., Allen, B., Kettunen, M., Lähtinen, K., Korhonen, J., Leskinen, P., Matthies, B.D., Toppinen, A. (2017). Green, circular, bio economy: A comparative analysis of sustainability avenues, *Journal of Cleaner production*, Volume 168, 1 December 2017, Pages 716-734; https://doi.org/10.1016/j.jclepro.2017.09.053

Gurria Albusac, P., Gonzalez Hermoso, H., Cazzaniga, N., Jasinevičius, G., Mubareka, S., De Laurentiis, V., Patinha Caldeira, C., Sala, S., Ronchetti, G., Guillen Garcia, J., Ronzon, T. and M`barek, R. (2022): EU Biomass Flows, *Publications Office of the European Union*, Luxembourg, 2022, ISBN 978-92-76-49477-5, doi:10.2760/082220, JRC128384.

Kardung, M., Cingiz K., Costenoble, O., Delahaye, R., Heijman, W., Lovrić, M., Van Leeuwen, M., M'Barek, R., Van Meijl, H., Piotrowski, S., Ronzon, T., Sauer, J., Verhoog, D., Johannes Verkerk, P., Vrachioli, M., H. H. Wesseler, J, Xinqi Zhu, B. (2021). Development of the Circular Bioeconomy: Drivers and Indicators. *Sustainability 2021*, 13, 413; https://doi.org/10.3390/su13010413

Philp, J., Winickoff, D. (2018). Realising the circular bioeconomy, *OECD Science*, Technology and Industry Policy Papers, No. 60, OECD Publishing, Paris; https://doi.org/10.1787/31bb2345-en.

Stegmann, P., Londo, M., Junginger, M. (2020). The circular bioeconomy: Its elements and role in European bioeconomy clusters, *Resources, Conservation, Recycling:* X, Vol. 6, p. 100029; https://doi.org/10.1016/j.rcrx.2019.100029.

Decision on the Energy Balance Determination in the Republic of Serbia for 2018, *Official Gazette of RS*, No. 119/17.

Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with Projections by 2030 (2016), Republic of Serbia, Ministry of mining and energy, Department for strategic planning in energy sector; https://meemp-serbia.com/wp-content/uploads/2018/09/Legislative-Energy-Sector-Development-Strategy-of-the-Republic-of-Serbia-for-the-period-by-2025-with-projections-by-2030.pdf

Expert Group Report, *Review of the EU Bioeconomy Strategy and its Action Plan* (2017). *Title of the legal/government document* (ISBN 978-92-79-74015-2, KI-05-17-075-EN-N). Publisher: Luxembourg: Publications Office of the European Union, 2017; https://doi: 10.2777/149467

European Parliament and the Council (2018), Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018L0851.

European Parliament and the Council (2018), Consolidated text: Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources; https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02018L2001-20220607.

European Commission (2018), A sustainable bioeconomy for Europe - Strengthening the connection between economy, society and the environment: Updated bioeconomy strategy, https://data.europa.eu/doi/10.2777/792130

European Commission (2021), Carbon Economy - Studies on support to research and innovation policy in the area of bio-based products and services, https://op.europa.eu/en/publication-detail/-/publication/8c4de15d-a17d-11eb-b85c-01aa75ed71a1/language-en. (accessed on 2 December 2023).

OECD (2022), Closing the loop in the Slovak Republic: A roadmap towards circularity for competitiveness, eco-innovation and sustainability, OECD Publishing, Paris, https://doi.org/10.1787/acadd43a-en.

https://www.oecd-ilibrary.org/sites/88367bd2-en/index.html?itemId=/content/component/88367bd2-en

https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass_en

www.cee2act.eu

POSSIBILITIES FOR THE USE OF BIOMASS FROM FORESTRY WITH THE AIM OF ESTABLISHING A CIRCULAR BIOECONOMY IN SERBIA

Ljiljana BRAŠANAC-BOSANAC, Nevena ČULE, Ilija ĐORĐEVIĆ, Goran ČEŠLJAR, Tatjana ĆIRKOVIĆ-MITROVIĆ

Summary

The bioeconomy includes and interlinks all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture), and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services). It is very important to promote a circular and low-carbon economy, create new local value chains and provide solutions for the current food security and energy independence crisis, while protecting biodiversity and the environment. The circular bioeconomy uses renewable biological resources to sustainably produce food, bio-based materials, feed, products, fuels and bioenergy, and in which waste products are kept within the system by transforming them into value-added products. The CEE2ACT project is empowering Central and Eastern European countries to develop circular bioeconomy strategies. To date, there are 17 Member States of EU including many countries from Central and Eastern Europe (CEE) that do not have a national bioeconomy strategy and

action plan despite their high biomass resource base and new bioeconomy potential. Serbia is one of them. However, there are relevant regional initiatives supporting bioeconomy in Central and Eastern European countries. National Bioeconomy Hub with Serbian Chamber of commerce, clusters and other organizations, institutes, faculties and other research institutions and organizations in it, can play an important role in the dissemination and knowledge transfer of financing instruments. Dissemination of examples of good practice from EU countries, profitable business successes and innovative business models can be a useful tool for attracting the attention of small and medium-sized enterprises and entrepreneurs in Serbia to the circular bioeconomy, especially in the forestry sector.

MOGUĆNOSTI KORIŠĆENJA BIOMASE IZ ŠUMARSTVA U CILJU USPOSTAVLJANJA CIRKULARNE BIOEKONOMIJE U SRBIJI

Ljiljana BRAŠANAC-BOSANAC, Nevena ČULE, Ilija ĐORĐEVIĆ, Goran ČEŠLJAR, Tatjana ĆIRKOVIĆ-MITROVIĆ

Rezime

Bioekonomija obuhvata i povezuje sve sektore primarne proizvodnje koji koriste i proizvode biološke resurse (poljoprivreda, šumarstvo, ribarstvo i akvakultura), kao i sve privredne i industrijske sektore koji koriste biološke resurse i procese za proizvodnju hrane, bio-proizvodi, energija i usluge). Veoma je važno promovisati cirkularnu i niskougljeničnu ekonomiju, kreirati nove lokalne lance vrednosti i obezbediti rešenja za trenutnu krizu bezbednosti hrane i energetske nezavisnosti, istovremeno štiteći biodiverzitet i životnu sredinu. Kružna bioekonomija koristi obnovljive biološke resurse za održivu proizvodnju hrane, biomaterijala, stočne hrane, proizvoda, goriva i bioenergije, pri čemu se otpadni proizvodi zadržavaju unutar sistema i pretvaraju u proizvode s dodatom vrednošću. Projekat CEE2ACT osnažuje zemlje Centralne i Istočne Evrope da razviju strategije cirkularne (kružne) bioekonomije. Do danas, postoji 17 država članica Evropske Unije, uključujući mnoge druge zemlje iz Centralne i Istočne Evrope (CEE) koje nemaju nacionalnu bioekonomsku strategiju i akcioni plan uprkos njihovoj visokoj bazi resursa biomase i novom bioekonomskom potencijalu. Srbija je jedna od njih. Međutim, postoje relevantne regionalne inicijative koje podržavaju bioekonomiju u zemljama Centralne i Istočne Evrope. Nacionalni Centar za bioekonomiju sa Privrednom komorom Srbije, klasterima i drugim organizacijama, institutima, fakultetima i drugim istraživačkim institucijama i organizacijama u njemu, može imati važnu ulogu u širenju i transferu znanja o instrumentima finansiranja. Upoznavanje sa primerima dobre prakse iz zemalja EU, profitabilnim poslovnim uspesima i inovativnim poslovnim modelima može biti korisno sredstvo za privlačenje pažnje malih i srednjih preduzeća i preduzetnika u Srbiji na cirkularnu bioekonomiju, posebno u sektoru šumarstva.