

# ACCELERATING GREEN TRANSITION IN CENTRAL AND EASTERN EUROPE - OVERVIEW OF SOME EU-11 GREEN SPECIFIC STRATEGIES

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## Abstract

This study examines the state of research on green transition, with a focus on circular economy, and bioeconomy, across eight Central and Eastern European countries (EU-11): the four Visegrád countries plus Slovenia (who joined EU in 2004), and the later entrants Romania, Bulgaria (2007), and Croatia (2013). A systematic review of peer-reviewed articles (2015-2023), along with official documents, forms the basis of analysis. The paper identifies the status of green and circular transition research in EU-11, highlighting key policy interests, including the need for coordinated strategies, cooperation, stakeholder engagement. The study also evaluates the influence of EU accession timing on green transition dynamics and underscores the importance of national efforts in shaping these strategic visions. While circular economy strategies are in place for most countries, dedicated bioeconomy strategies are still lacking, with Visegrad countries and Croatia currently under development.

**Keywords:** circular economy, bioeconomy, green economy, Central and Eastern Europe

## Introduction

In its Communication on the European Growth Model (2022), the European Commission recognizes that the European economy is undergoing unprecedented transformations in the context of major uncertainties linked to the global and security landscape. These multiple crises necessitate coordinated responses (Trusina and Jermolajeva, 2021). It highlights that the pursuit of a green transition offers a unique opportunity to steer Europe towards a new path characterized by sustainable and inclusive growth. The blueprint for this transformative shift is encapsulated within

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the European Green Deal (EGD), published in December 2019. This growth strategy outlines a roadmap to achieve climate-neutrality, resource-efficiency, innovation, and socially inclusivity, thereby shaping a forward-looking and holistic vision for Europe's future. To achieve these aims, the EGD covers a range of policy areas such as biodiversity, sustainable agriculture, climate action, sustainable industry, etc. The advancement of a sustainable and circular bioeconomy presents viable remedies to align with the objectives set out by the EGD. Included in these goals are the achievement of a climate-neutral economy by 2050, promotion of clean mobility, the ambition for zero-pollution, a shift towards greener industries, and efforts to preserve and enhance natural ecosystems and their services (EC, 2020).

The Circular Economy Action Plan (European Commission 2015; 2020a), stands as a cornerstone of the EGD. This action plan aims to achieve numerous outcomes, ranging from the reduction of waste generation to the normalization of sustainable products, and the optimization of circular practices for the benefit of individuals, regions, and cities throughout the European Union (EU).

Furthermore, the bioeconomy serves as an additional catalyst for driving sustainable systemic change and addressing key economic, societal, and environmental challenges faced by the EU member states. The European Bioeconomy Strategy (2013, 2018) plays a crucial role in promoting the transition towards a more sustainable future. However, complying with the EGD requirements and transitioning to a green, circular economy presents distinct challenges for all EU member states, particularly for Central and Eastern Europe countries (EU-11).

A number of researchers are meticulously assessing the countries' performances in transitioning towards a Circular Economy (Marino and Pariso, 2020), measuring the degree of transformation achieved by the member states in the implementation of circular economy and/or bioeconomy initiatives. Several studies find that, in comparison to Western European countries, Central and Eastern European countries lag behind in the pace of green transition (Mazur-Wierzbicka, 2021), (Fura, Stec and Miš, 2020), (Škrinjaric, 2020). As highlighted by Vaceková et al. (2019), the lack of relevant research on circularity in the Central and Eastern Europe (CEE) underscores a considerable gap that strongly indicates the need for a deeper insight.

Regarding bioeconomy, there is an uneven distribution of activity associated with the development of sustainable, circular bioeconomy across the EU member states. Notably, a majority of the Central and Eastern European (the so-called EU-11) countries lag in the development of specialized national Bioeconomy Strategies and/or Action Plans (EC, 2021). Such a shortfall could have implications for the ability to effectively achieve the objectives set forth in the EGD as well as the national goals.

The aim of this paper is to assess the existing body of scientific literature concerning the advancement towards green, circular, and bio-based economies within EU-11 countries. Its main objective is to identify the complex governance

dimensions associated with the EU circular transition and to examine whether the timing of EU accession for the most recent enlargement waves has influenced progresses towards the green economy.

The study addresses the following research questions:

- What is the current state of research on the transition to the green and circular economy in the EU-11 countries?
- Has the timing of accession for the newer EU member states influenced their level of progress during the ecological transition process?

Therefore, the paper is divided into three parts. Section 1 briefly describes the concepts and the EU perspective on the topic of green economy, circular economy, and bioeconomy. Afterward, Section 2 presents the study's methodology followed by Section 3 which gives an overview of the current state-of-art in some of the EU-11 countries regarding green economy, circular economy, and bioeconomy.

## **1. The EU's perspective on the Green Transition**

Three major narratives - the green economy (GE), circular economy (CE) and bioeconomy (BE), are attracting increasing attention worldwide and are increasingly being embraced as prominent pathways for development and sustainability (D'Amato et al., 2017). Loiseau et al. (2016) highlighted GE, BE and CE as key concepts in sustainability research and provided a generic framework of different theories, concepts, and approaches, while also identifying the interlinkages among these concepts. Indeed, notable synergies between the bioeconomy and circular economy concepts are significant (Kardung et al., 2021).

Figure 1 shows the interrelation and overlap among these three concepts.

While the green economy is often considered an umbrella concept (D'Amato et al., 2017), the circular economy and bioeconomy are generally considered to be covered by this broad notion.

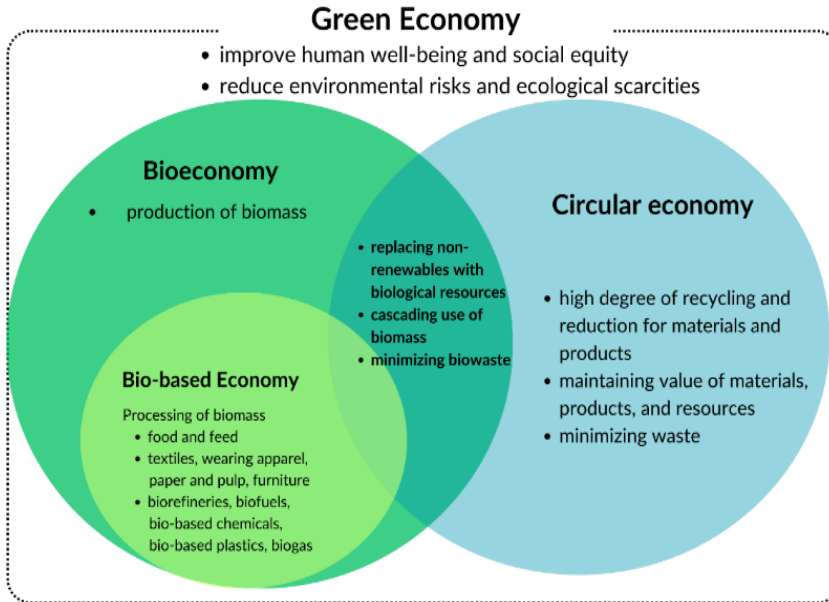
### **1.1. Green economy from the EU perspective**

According to the European Environment Agency, the green economy is “one in which policies and innovations enable society to use resources efficiently, enhancing human well-being in an inclusive manner, while maintaining the natural systems that sustain us” (EEA, 2012).

The foundation of the green economy within the EU's strategic direction can be found in a combination of high-level strategic documents and sectoral policies, each characterized by different focal points and clear, firm commitments. One pivotal cornerstone in shaping the EU's green economy was the strategy “Europe 2020” renowned as the “Strategy for smart, sustainable and inclusive growth”. Its impact on the European green economy trajectory has been particularly profound. The implementation of the strategy was conditioned on the efficient use of resources

(especially primary resources), transition to a low-carbon economy, greater use of renewable energy sources, increasing energy efficiency, and implementation of new technologies and innovations (especially of ecological nature) (Adamowicz, 2022).

**Figure 1. Relations among bioeconomy, green economy, and circular economy**



Source: Kardung et al., 2021

More recently, the most significant action taken by the EU is the European Green Deal (2019). This concept gains particular attention since the signing of the Paris Climate Agreement signed in 2018 (Adamowicz, 2022). This new European plan aims at making the European economy sustainable and completely green by the year 2050. Protecting the EU's natural capital, transitioning to a resource-efficient economy and protecting people from environment-related pressures are key priorities of the European Green Deal (see Figure 2).

**Figure 2. The European Green Deal**

Source: European Commission, 2019

The European Green Deal encompasses a comprehensive set of actions, including the restoration of biodiversity and reduction of pollution, advancement of resource efficiency through a shift towards a clean and circular economy, establishment of an equitable, health-conscious, and environmentally friendly food system, development of agriculture with a focus on environmental protection, reduction of gas emissions and positive externalities of rural farming, provision of support for regional energy transformation programs and innovative solutions, facilitation of the transition through financial mechanisms for green innovation and public investment, enhancement of energy systems to produce clean, secure, and affordable energy, as well as climate improvement and adaptation of strategies for sustainable and intelligent mobility, including improvements in alternative fuel production and infrastructure (EC, 2019).

The successful implementation of the Green Deal requires collective efforts from all EU member states on an equal footing, calling for substantial changes across various aspects of both Community and national policies (Adamowicz, 2022). EU member states are supported by the EC to design and implement reforms that accelerate the green transition and contribute to achieving the goals of the European Green Deal. Member states are engaging in reforms to address these challenges by

further developing their environmental policies and strategies (European Union, 2020). Moreover, in 2018, the EU Commission established a comprehensive and unified EU-wide classification system, commonly referred to as “the EU Taxonomy”. This system has been designed to guide green investments towards economic activities that are essential in achieving the EGD’objectives. The EU taxonomy creates an operational list of economic activities accompanied by specific technical screening criteria. These criteria serve to identify instances in which each economic activity substantially contributes to achieving environmental objectives (European Commission, 2020). Subsequently, a new package of the EU-Taxonomy was adopted in 2023, signifying an evolving and adaptive approach to addressing sustainability (European Commission, 2023).

## **1.2. The circular economy from the EU perspective**

The circular economy stands as a central focus within the EU’s economic strategy. Crucial to this perspective are fundamental documents like “Closing the loop—an EU Action Plan for the Circular Economy” (European Commission, 2015), and the more recent the “New Circular Economy Action Plan (CEAP) for a cleaner and more competitive Europe” (European Commission, 2020). Centered on fostering sustainable practices, the CEAP focuses on the product design, advancing circular economy processes, encouraging sustainable consumption patterns, and aiming to reduce waste generation. Its objectives are to prevent waste and retain within the EU economy for as long as possible. Introducing a mix of legislative and non-legislative measures, the CEAP specifically targets areas where the EU level brings real added value.

In accordance with the EC’s definition (EC, 2023), the circular economy represents a departure from “the linear take-make-waste economy”, advocating for a regenerative model. This approach involves processes that restore, renew, or revitalize their own sources of energy and material sources, with a strong emphasis on minimizing waste generation.

Regarding the CE policies and strategies, member states are actively engaged in either formulating or have already adopted such measures (Geerken et al., 2022), as evidenced by Table 1. The European Circular Economy Stakeholder Platform (ECESP) serves as a comprehensive repository, systematically accumulating and documenting all circular economy-related strategies, spanning across local, regional, and national contexts (see Figure 3).

**Figure 3. Circular economy-related strategies in the EU**

Source: ECESP Platform

**Table 1. EU27 Member States that adopted National Circular Economy Strategies, by year and cumulative total**

2016	2017	2018	2019	2020	2021	2022	2023
Belgium	Italy	Denmark	Poland	Latvia	Cyprus	Romania	Hungary
Finland	Portugal	France		Malta	Czechia	Austria	
Netherlands		Greece		Spain	Luxembourg	Bulgaria	
		Slovenia		Sweden	Ireland	Estonia	
					Lithuania	Slovakia	
					Germany		
3	5	9	10	14	20	25	26

Source: authors' representation

National circular economy strategies appear to have accelerated between 2016-2021 in most of the Western European countries: Belgium (Belgium Federal Government, 2016), Finland (Sitra, 2016; Finnish Government, 2021), Netherlands (Government of the Netherlands, 2016), Italy (Ministry for the Environment, 2017; Ministry for Ecological Transition, 2022), Portugal (Council of Ministers of Portugal, 2017), Denmark (Ministry of Environment, 2018, 2021), France (Ministry for Ecological and Solidary Transition, 2018), Spain (Government of Spain, 2020), Sweden (Government Offices of Sweden, 2020), Luxembourg (Schosseler et al.,

2021), Ireland (Government of Ireland, 2021), Germany (Circular Economy Initiative, 2021) and Southern European countries: Greece (Hellenic Republic Ministry of Environment & Energy, 2018, 2022), Malta (Government of Malta, 2020), Cyprus (Cyprus circular economy network, 2021). The majority of the Central and Eastern European countries and Baltic States elaborated their strategies starting from 2021: Czechia (Ministry of Environment of the Czech Republic, 2021), Lithuania (MITA, 2021), Austria (Federal Ministry Republic of Austria, 2022), Romania (Government of Romania, 2022, 2023), Bulgaria (Council of Ministers of the Republic of Bulgaria, 2022), Slovakia (OECD, 2022), Estonia (Ministry of the Environment of Estonia, 2022) and Hungary (OECD, 2023). Three countries, though, Slovenia (Godina Košir, L. et al., 2018), Poland (Council of Ministers of Poland, 2019) and Latvia (Cabinet of Ministers of Latvia, 2020) have developed their CE strategies earlier. See Appendix A1 for circular economy strategic documents of the EU-27 Member States.

From the EU-27, Croatia remains the only member state without a dedicated national circular economy policy, though this stance could evolve as it integrates CE elements into other policy frameworks (Geerken et al., 2022).

To better track progress in the transition to a circular economy, the EU employs a CE Monitoring Framework. This framework aims to provide a comprehensive overview by measuring direct and indirect benefits of increasing circularity. It comprises 11 indicators grouped into 5 dimensions: (1) production and consumption; (2) waste management; (3) secondary raw materials; (4) competitiveness and innovation; and (5) global sustainability and resilience (Eurostat, 2023). Another key framework that refers to the transition to a Circular Economy is included in the EU Taxonomy, developed by the European Commission's Platform on Sustainable Finance (European Commission, 2023).

### **1.3. The Bioeconomy from the EU perspective**

One of the most used definitions of the bioeconomy is that of the European Commission (2018):

The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; 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.

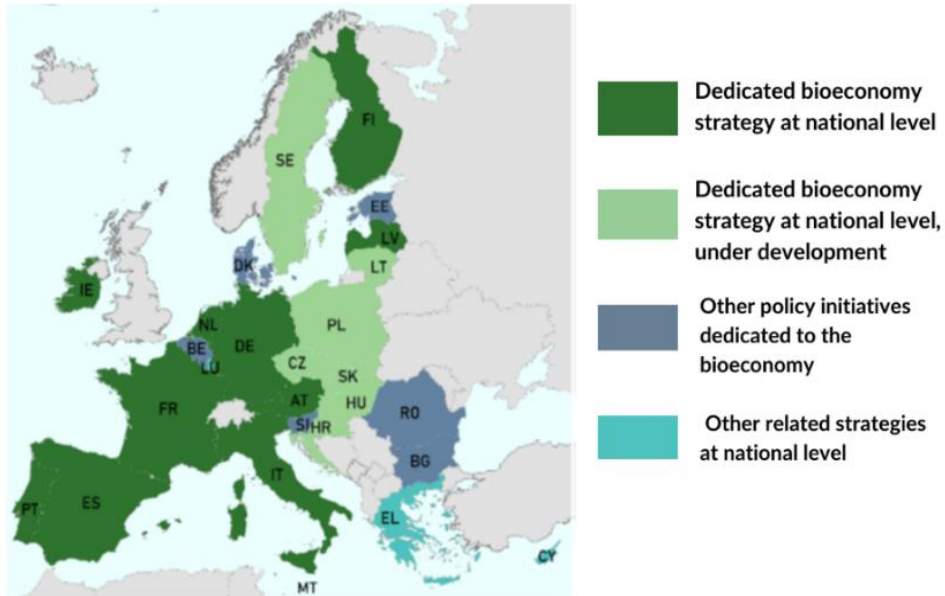


The EU emphasizes that the bioeconomy can significantly contribute to the achievement of the objectives of the European Green Deal, acting as a catalyst for sustainable systemic change and transition. Through its Bioeconomy Strategy - initially published in 2012 and updated in 2018, the EU is committed to ensuring that the bioeconomy's economic and social benefits go hand in hand with environmental benefits. This strategy follows five key goals: ensuring food and nutrition security; sustainable management of natural resources; reducing dependency on non-renewable, and unsustainable resources; addressing climate change through mitigation and adaptation; and strengthening European competitiveness and generating employment opportunities.

Therefore, the Bioeconomy Strategy is key in reaching climate neutrality. It contributes to the three dimensions of sustainability: environmental (management of land and biological resources within ecological boundaries), economic (sustainable value chains and consumption), and social (social fairness and just transitions) (Swisscore, 2022). To advance its objectives, the European Commission launched the Bioeconomy Monitoring System (2021, 2022), that offers a comprehensive overview of European trends in EU Bioeconomy indicators. Selected indicators cover different parts of the system, although there are gaps in the knowledge or data, which are progressively addressed. Furthermore, a first Progress Report entitled “*European Bioeconomy Policy: Stocktaking and future developments*” was released in 2022. The report offers an assessment of the state of play of the European Bioeconomy, evaluating the progress made in the implementation of the 2018 EU Bioeconomy Strategy and its Action Plan (European Commission, 2022c).

No specific EU bioeconomy legislation exists. However, sectorial legislation, in many cases considerably older than the bioeconomy concept, has major impact in the field. Currently, some EU members have already developed multiple strategies, while others have these strategies under development. The status of the current national bioeconomy strategies (2022) is depicted in Figure 4.

According to the Bioeconomy Strategy Progress Report (EC, 2022c), Austria (Federal Ministry Republic of Austria, 2019), the Netherlands (Ministry of Economic Affairs and Climate Policy, 2018) and Portugal (2021) have developed a (new) national strategy. Germany (Federal Ministry of Education and Research, Germany, 2020), Ireland (Government of Ireland, 2018, 2023), Italy (Government of Italy, 2019, 2020), Finland (Finnish Government, 2022), France (Ministere de l’Agriculture et de la Souveraineté Alimentaire, 2017, 2018) and Spain (Government of Spain, 2015) have updated their existing strategies or action plans. Furthermore, according to the data evidenced by the European Knowledge Centre for Bioeconomy (Haarich et al., 2022) Sweden started to develop its national bioeconomy strategy, while Belgium, and Denmark have other policy initiatives dedicated to the bioeconomy. See Appendix A2 for bioeconomy related strategic documents of the EU Member States.

**Figure 4. National bioeconomy strategies in the EU in February 2022**

Source: European Commission's Knowledge Centre for Bioeconomy Administrative Boundaries: ©EuroGeographics ©UN-FAO ©Turkstat

Of particular significance is the situation of the Baltic States and the Central and Eastern European countries, namely: Estonia, Lithuania, Latvia, Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, and Slovenia - all part of the BIOEAST initiative, in the frame of which National Bioeconomy Strategies Concept Papers have been developed (Rozakis et al., 2023). Moreover, national-level roadmaps for the Bioeconomy Strategies are to be further developed within the CEE2ACT Horizon Europe project in the period 2023-2025. However, there are a few member states that have yet to develop their national bioeconomy strategies (Cyprus, Luxemburg, and Malta).

Regarding regional level strategies Finland, France, Italy, Poland, Spain, and Sweden have developed intense, regional strategic actions to deploy bioeconomy. Additionally, there are 15 countries having at least one region with bioeconomy relevant strategy in regional level (Austria, Belgium, Croatia, Czechia, Denmark, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Netherlands, Portugal, Romania, and Slovakia).

## 2. Methodology

This paper employs a qualitative research method through a literature review, following the established systematic review principles outlined by Tranfield et al.

(2003) and Prieto-Sandoval et al. (2018). Consequently, the review process comprises three distinct stages, planning, execution, and reporting. Within these stages, the approach has involved defining the research question, formulating an appropriate search strategy, and establishing clear criteria for study inclusion.

During the first step, a comprehensive search was conducted in the SCOPUS database using a two-level keyword structure. The purpose of the first level, known as the context keywords, is to identify papers that discuss topics related to circular economy (CE), bioeconomy (BE), or green economy (GE). The second level of keywords was aimed to include papers specifically relevant to the geographical region of the Central and Eastern Europe (the so-called EU-11 countries). By utilizing a two-level keyword approach, the intention was to capture papers that address the intersection of circular, bio-based, and green transition concepts within the context of the EU-11 countries. Other sources that were included in the review process represented EU-level and national-level policy documents as well as studies, reports tackling the topic of the circular economy and bioeconomy in the EU-11 countries.

The research primarily targeted eight specific countries located in the Central and Eastern European region: Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, and Slovenia. Among these, Slovenia and four nations belonging to the Visegrad group—Poland, Hungary, Slovakia, and the Czech Republic—having become EU member states in 2004. The remaining three countries, Romania, Bulgaria (joining in 2007), and Croatia (joining in 2013), constitute the latter accession to the EU. This split of the two groups of countries aims to understand whether the timing of accession had any impact on the progress towards green transition.

During the second step, the search results for individual countries were grouped into the specified topics of GE, CE, and BE to have a general overview of research in the EU-11 countries. In the final third step, a thorough analysis was conducted, the results being evidenced in the following section of the paper.

### **3. Green Transition in the EU-11 - focus on the eight selected countries**

To successfully converge on the path to climate neutrality in the EU-11 countries, understanding and addressing the major challenges hindering the expansion of green solutions is an important pre-requisite (Riepl and Zavaršká, 2023). The convergence to green targets represents a particular challenge for economies of newer member states (the Central and Eastern European countries), given their fossil fuel-intensive industrial orientation and the presence of highly carbon - intensive regions across Europe.

The green economy is a highly complex construct that requires the involvement of a diverse range of stakeholders and appropriate governance mechanisms to regulate economic recovery processes (Bogovic et al., 2020). This

complexity represents a challenge for both scientists and experts, underscoring the necessity for additional theoretical and empirical advancement to effectively address this complexity.

Ciot (2022) has investigated the main factors that influence the EGD capacity building implementation in five EU member states from Central and Eastern Europe, the four Visegrád countries (Poland, Czech Republic, Slovakia, Hungary) and Romania. The study reveals the existence of four distinct categories of influencing factors, cultural, political, economic, and social but also highlights significant disparities in the implementation of the EGD across various stages within the EU.

In the case of Visegrád countries, the EU path towards climate neutrality has encountered some reluctance, observed Riepl and Zavorská (2023). These nations face a distinct challenge in aligning with green targets due to their strong industrial orientation and high fossil fuel dependence and progress in the region's green transition has been uneven. Thus, while Slovakia and partially Poland have scaled up renewables, Czechia and Hungary have experienced stagnation and respectively, decline. At the same time, a better understanding of the unique obstacles faced by the Visegrád countries is useful for EU policymakers to be able to lead a conducive climate dialogue despite the prevailing cross-country differences in the progress made thus far (Riepl & Zavorská, 2023, pp. 17-22).

Regarding the green economy in Romania, Mihai et al. (2021) stresses out that for a sustainable development, organizations need to develop coordination and management skills, participation, involvement, and commitment.

Furthermore, Licastro and Sergi (2021) analyzed the drivers and barriers to a green economy, based on the latest scholarly articles on the green economy indexed in the Scopus database. Opinions and policy recommendations of experts about green policies and relative challenges in policy changes have been evidenced with emphasis on some of the EU-11 countries: Slovenia and Croatia.

### **3.1. The advancements and challenges regarding the circular economy in the EU-11**

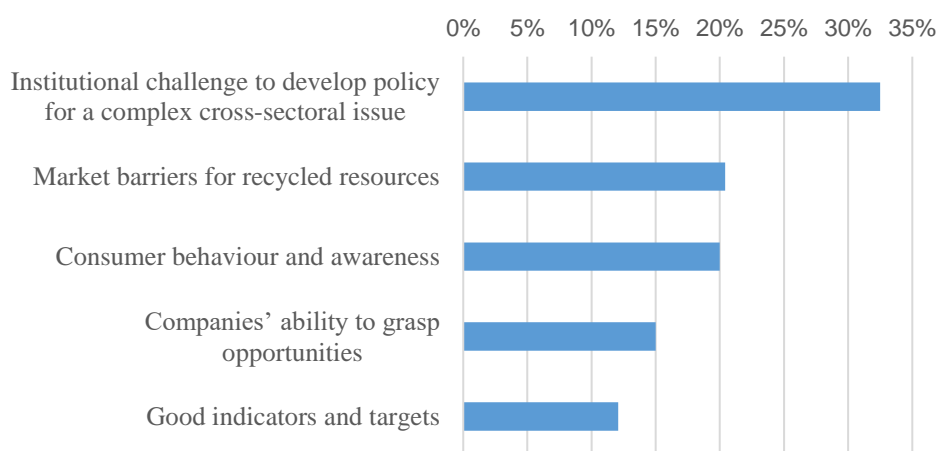
Member States are encouraged to advance circularity at a national level by adopting policies and initiatives that go beyond EU regulations, while preserving the Single Market. Nevertheless, given the complexity and interdisciplinary nature of transitioning to circular economy, this process is a challenging endeavor.

Several authors (Pomázi and Szabó, 2020; Lacko et al., 2021; Mazur-Wierzbicka, 2021a; Mazur-Wierzbicka, 2021b) have analyzed the efficiency of circular economies, by comparing countries' performances and evaluating the impact of selected variables on the performance of the circular economy of countries. Some articles refer to the perspectives of the transition to CE and the need of changing the perspective of society, improving the regulatory framework and the application of legislation (Dobre-Baron et al., 2022), others to the long-term vision, political determination and consistency, and funding (Topliceanu et al., 2023).

Vaceková et al. (2019) review the theoretical, and methodological approaches to the circular economy originating in the Western countries with a view to assessing their applicability in the (post-) transitional context of Central and Eastern Europe. In order to accelerate the green transition process, practical improvements of public policies and business development are needed (Švarc, Dabić and Lažnjak, 2022).

From the point of view of implementing the circular transition in EU, the main challenges and barriers that have been marked by the EU-11 countries are evidenced in the Figure 5.

**Figure 5. Key challenges in transitioning to a circular economy in the EU**



Source: authors' representation based on Geerken et al. (2022)

The challenges related to the institutional framework and the quality of governance refer to the lack of collaboration and coordination in the development of coherent policies between the responsible authorities and institutions, difficulties in implementing different policies, strategies, roadmaps, related to such a broad concept as “circular economy”, etc. In terms of market reactions and economic and financial challenges, several countries highlighted the lack of incentives or positive tax environments for circular strategies.

A key obstacle is consumer behavior, i.e. their difficulty in changing their behavior, or even lack or low levels of awareness about EC. Regarding indicators and targets, EU countries highlighted the lack of harmonized indicators and targets for monitoring and evaluating circular practices, which could discourage countries with fewer resources and less capacity to implement circular solutions (Geerken et al., 2022).

## **Dynamics of the development of circular economy's strategic visions in the EU-11 countries. Focus on the eight selected countries**

In terms of planning and drafting specific strategic documents on Circular Economy, at the request of the European Commission, a comprehensive evaluation has been done by the EEA (2022). The EEA Report (EEA, 2022) provides an updated view of circular economy policies being implemented at a national level in the EU, with a particular focus on elements that go beyond EU mandatory regulations, while preserving the Single Market.

*Bulgaria:* The “*Circular economy country profile - Bulgaria*” published by the European Environment Agency (2022) stated that addressing the transition to a circular economy in Bulgaria necessitates significant management changes. The collaborative management approach across the entire value chain mandates that each ministry and institution revamp their organizational framework, allocate sufficient administrative capacity, and secure resources to effectively address the emerging challenges (EEA, 2022). These findings are echoed in the “2022 Environmental Country Report - Bulgaria” that highlights that Bulgaria is among the EU member states falling significantly behind in the implementation of circular economy policies. The report underscores that the Bulgarian economy remains highly resource-intensive within the EU and is lagging in adopting circular economy principles and eco-innovation. Notably, Bulgaria lacks an overarching circular economy program and faces waste management challenges (European Commission, 2022b).

*Croatia:* Although at the time of joining the EU (2013), Croatia had adopted the main European strategic documents, the circular economy became a strategic priority for the EU only in 2015 (with the adoption of the first EC Action Plan). As such, because current Croatian strategic documents do not tackle CE topics adequately, the Croatian government has the obligation to adequately implement the main CE policies at a national strategic level. According to the “*Circular economy country profile - Croatia*” a new cycle of drafting strategic documents on circular economy is under development. (EEA, 2022). This is what various Croatian authors have pointed out. Švarc (2022) in his research paper highlights the fact that in the case of Croatia the systemic paradigm shifts towards CE are still not the focus of public policies and national strategies. In accordance with the observation made by Govindan and Hasanagic (2018), there are instances of favorable developments within both the public and private sectors, indicating the presence of the necessary capacity and intent for transitioning to a circular economy. However, it remains noteworthy the absence of effective policy leadership, which is identified as a pivotal factor in facilitating circular economy transitions (Govindan and Hasanagic, 2018).

*Czech Republic:* According to the information presented in the country report elaborated by the EEA European Topic Centre, the Czech Republic has taken a significant step by introducing a dedicated national Circular Economy Strategy

known as the “Strategic Framework of the Circular Economy of the Czech Republic 2040” (Circular Czechia 2040), officially adopted at the end of 2021. The main goal of this strategic framework is “*less waste and more value for the Czech Republic*”. This endeavor is set to be realized through the execution of three different Action Plans. The first Action Plan, for the period 2022-2027, had to be released by the end of October 2022 (EEA, 2022).

*Hungary:* Hungary is cooperating with the Organization for Economic Co-operation and Development (OECD, 2022) to develop a national CE strategy with a vision statement for 2040. The country aims to develop “a holistic approach to the CE transition, focusing not only on waste management, but also on the industrial, agricultural and service sectors” by mutual cooperation and involving stakeholders, market participants (EEA, 2022).

*Poland:* The Polish Circular Economy Roadmap has been in effect since 2019, with a defined action timeline extending until 2023. The assessment of the overall transition progress toward a circular economy in Poland, according to the Polish Academy of Sciences 2020 report, indicates a gradual and slow advancement. The Academy views this deliberate pace as desirable, steering clear of radical transformations and excessive limitations (EEA, 2022).

*Romania:* The approval of the National Strategy for the Circular Economy in Romania was made in September 2022. To enforce the Strategy, an Action Plan should be implemented by the end of the third quarter of 2023. The Head of the Chancellery of the Prime Minister will lead a collaborative inter-ministerial coordination process. This process aims to adapt to national specificities and EU/international trends related to the circular economy, ensuring effective means of implementation and involving key stakeholders in the process (EEA, 2022). Public policy recommendations in the process of green transition to a circular economy are also evidenced by Vermeşan et al. (2020).

*Slovakia:* Slovakia cooperated with the Organisation for Economic Co-operation and Development (OECD, 2021) as well as the European Commission, in developing the Roadmap for Circular Economy. The current policy landscape related to the circular economy is fairly well advanced in the area of waste management, but there are still important implementation gaps that need to be addressed (OECD, 2022).

*Slovenia:* The country started a strategic and systemic circular transformation in 2016, after the Circular Economy Package was released. CE also gained special emphasis in Slovenian Development Strategy 2030 (Lavtizar, V. et al., 2021). An important document for the circular transition is the “Roadmap towards the circular economy” (Godina Kosir et al. 2018) already adopted in 2018. It is the result of strong collaboration of 3.000 stakeholders, representing a bottom-up driven initiative. The foundation of the systemic circular transition is the so-called “circular triangle” (Godina Košir and Giacomelli 2018). The roadmap aims to guide the country towards a circular transition, to become an inspiration and a leader of the

transition in EU-11; to involve stakeholders in identifying and connecting circular practices and to create recommendations to the government for facilitating a more efficient transition.

### **3.2. Advancements and challenges in the bioeconomy field in EU-11**

The EU-11 countries are frequently perceived as falling behind in the advancement of their bioeconomy, since they have yet to fully tap into the significant potential that this sector offers (Lovec and Juvančič, 2021). Considering the recent crisis resulting from the Russian invasion of Ukraine, the bioeconomy is regarded as pivotal for enhancing policy coherence and attaining the objectives outlined in the Green Deal. To accelerate the integration of the bioeconomy within the EU-11 macro-region, targeted governmental support, amplified stakeholder engagement, and research and technology advancement are imperative (Hájek et al., 2021).

Some authors argue that for the EU-11 region, a model based on tacit transfer of knowledge and practices and vertical and horizontal interaction within the value chains and trade, model of the “*do-use-interact*” (DUI) type, would be more relevant. Another model is based on research and innovation-oriented policies, being a “*science-technology-innovation*” (STI) model. The latter, however, is more suitable for developed countries that have advanced knowledge and capital-intensive bioeconomy sectors.

Progress in the bioeconomy requires multifaceted actions at different levels, nationally and regionally, accompanied by a deeper and more comprehensive understanding of specific mechanisms (Vanhamaki et al., 2019) and basic concepts (Woźniak and Twardowski, 2018). Woźniak et al. (2021) underline the importance of formulating transformative policies for sustainable development, emphasizing the need to involve diverse stakeholder groups through collaborative efforts, while encouraging open dialogue, and mutual learning. This perspective aligns with Kirs et al. (2021), who stress that effective systemic and policy-supported transitions toward the bioeconomy rely on stable and extended policy timeframes tailored to specific systems, participatory processes in policy co-design for vision co-development, and the societal legitimacy and commitment to the bioeconomy. It is evidenced that the requirements of systemic and policy-supported transitions towards bioeconomy are threefold: stable and long timeframes in policy-making and dynamic change agents; participatory processes in policy co-design to co-develop visions; and the societal legitimacy of and commitment to bioeconomy (Kirs et al. 2022).



## **Dynamics of the development of bioeconomy's strategic visions in the EU-11. Focus on the eight selected countries**

A recent progress report elaborated by the European Commission (EC, 2022c) evaluates progress in implementing the 2018 EU Bioeconomy Strategy and its action plan. This Progress Report indicates that the national initiatives are making significant progress in attaining the core goals of the EU Bioeconomy Strategy. In addition, notable progress has been made in the implementation of the bioeconomy in Central and Eastern European countries, supported by substantial EU funding contributions and the creation of new platforms and networks. It should also be noted that one of the 3 macro-regional initiatives in the field of bioeconomy is dedicated to the CEE (EU-11), respectively BIOEAST - *The Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy*<sup>1</sup>. Since 2018 (when the EU Bioeconomy Strategy Action Plan was adopted), Bulgaria, Croatia, Czechia, Poland, Hungary, Romania, Slovakia, and Slovenia (supported by the BIOEAST initiative) started the process of developing a bioeconomy national strategy. Furthermore, CEE2ACT project - *Empowering the Central and Eastern European Countries to Develop Circular Bioeconomy Strategies and Action Plans* - aims to enhance development of circular bioeconomy strategies and action plans until 2025, through knowledge transfer and innovative governance models, to achieve better informed decision-making processes, societal engagement, and innovation.

Below, some specific information regarding the progress of the realization of national / regional strategies in the field of bioeconomy in the eight selected countries:

**Bulgaria:** A draft Strategy for the Development of the Bioeconomy in Bulgaria 2023-2030 was developed by the Agricultural Academy, in the framework of the BIOEASTsUP project. Also, Bulgaria is developing a Strategy for “Strengthening the Role of the Agricultural Sector in the Bioeconomy”. In 2022, the Council of Ministers adopted a Strategy and Action Plan for the transition to a circular economy for the period 2022-2027, which partly includes the circular bioeconomy.

**Croatia:** To develop the strategic framework for the development of the bioeconomy sector, the Government has appointed a working group to develop the bioeconomy strategy and push for more organized activities. The leading role has been given to the Ministry of Agriculture, supported by the Ministry of Regional

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<sup>1</sup> BIOEAST initiative offers a common political commitment and shared strategic research and innovation framework for working towards sustainable bioeconomy in the Central and Eastern European (EU-11) countries: Bulgaria, Czechia, Estonia, Croatia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia and Slovakia. Concept papers have been published in April 2023.

Development and EU Funds, the Ministry of Economy and Sustainable Development, and the Ministry of Education.

*Czech Republic:* The Bioeconomy Concept paper has been elaborated by the Ministry of Agriculture. The sustainable management of natural resources, sustainable agriculture, forestry, water management and aquaculture, and the sustainable production of food were defined as key sectors for the development of the bioeconomy. Strengthening the role of primary producers and their integration into the bioeconomy value chain, as well as on the forestry side the involvement of the entire value chain of downstream sectors.

*Hungary:* The Ministry of Agriculture as a core member of BIOEAST Initiative has published in 2023 the elaboration of a strategical bioeconomy concept paper in the framework of BIOEASTsUP project (2019-2023).

*Poland:* Poland has developed a ‘*concept paper*’ as part of the BIOEASTsUP project that may contribute to the development of a bioeconomy strategy. Moreover, several regions have a bioeconomy related strategies or its elements are included in Regional Innovation Strategies.

*Romania:* A concept paper has been developed in the frame of the BIOEASTsUP project. Additionally, seven regions (NUTS 2) have already published strategies related to the bioeconomy: one region with a fully dedicated bioeconomy strategy, two regions have a strategy with a strong bioeconomy focus and four regions have strategies with minimum bioeconomy content. Moreover, one region at the NUTS 3 has published a bioeconomy roadmap within the framework of the BE-Rural project.

*Slovakia:* Currently, there is not a dedicated National Bioeconomy Strategy. However, the Ministry of Agriculture and Rural Development of the Slovak Republic is currently working on the Roadmap for Circular Bioeconomy under the CEE2ACT project.

*Slovenia:* There is no independent bioeconomy strategy on the national level. A concept paper has been released in 2023 as part of the BIOEAST initiative. Slovenia has many policies addressing the bioeconomy which are developed and structured by different actors. As bioeconomy covers a variety of sectors, there is more than one ministry that is involved in the development of the strategy plan.

## **Conclusions**

This article has examined the state of research on the green transition, with a specific focus on green transition, circular economy, and bioeconomy, in eight countries from the Central and Eastern Europe (EU-11): Slovenia and the four Visegrad countries, which joined the EU in 2004, and the latest entries, Romania and Bulgaria (2007) plus Croatia (2013). The analysis was based on a systematic review of peer-reviewed articles published between 2015-2023 in the Scopus database,

complemented by other sources, including official documents (reports, strategies, government acts, etc.).

The paper has contributed to identifying the status of research in the field of green and circular transition in the EU-11 countries, highlighting the major topics of interest in policy development in the field of circular economy, bioeconomy, and green economy. The review identified the existence of several common key themes and challenges for the entire Union (including the EU-11 countries) that surface within the literature. These encompass the need for a coordinated and integrated strategic approach, the importance of cooperation in policy shaping, as well as stakeholder engagement and collaboration endeavors. On the other hand, the study found that although there is a growing interest in green transition, the scholar exploration on this topic in the EU-11 region is still limited in comparison to Western Europe.

Several articles have also evidenced the need for accelerating the green transition within (post) transitional economies, notably within countries comprising the EU-11 macro-region. This necessitates a more comprehensive understanding of the concepts and mechanisms, as well as a nuanced strategy tailored to the distinctive traits of the EU-11 (Vaceková et al., 2019; Lovec and Juvančič, 2021). For instance, the convergence towards green targets represents a particular challenge for some newly member states from Central and Eastern Europe, due to the presence of highly carbon - intensive regions and their fossil fuel-intensive industrial orientation.

The paper also analyzed whether the timing of EU accession for the newer EU member states (2004 versus 2007/2013) has influenced the dynamics of the ecological transition process. Consequently, it assessed how the selected countries managed to formulate their strategic visions towards a low-carbon, resource-efficient, inclusive green transition, encompassing both circular economy and bioeconomy strategies. The analysis indicates that the advancements achieved in the development of strategic visions and action plans were not impacted by the timing of accession, but rather by the individual efforts undertaken at the national level by each respective state. Regarding circular economy strategies, Slovenia and Poland adopted them earlier, followed by the other five analyzed countries with a delay of one- or two-years. Presently, all analyzed countries, except Croatia, have developed their circular economy strategies. On the other hand, dedicated bioeconomy strategies are currently missing in all the eight analyzed countries. However, the Visegrád countries (PL, CZ, SK, HU), along with Croatia, are currently developing their dedicated strategies, while in the remaining three countries (SI, RO, BG), only related strategies and policies have been observed so far. However, the EU initiatives like BIOEAST and CEE2ACT aim to support the CEE macro-region countries in developing their strategic visions for the bioeconomy.

In conclusion, the European Green Deal and the associated policy documents (such as CEAP and BE) have set forth ambitious objectives for every EU Member State on the path to achieving a green economy transition. Presently, it holds

paramount significance for all EU member states, regardless of their status as newer or older members, to acknowledge the crucial importance of formulating unified strategic visions and effectively implementing them, either regarding the circular economy or the bioeconomy.

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**Appendix A1 - National circular economy strategies in EU-27**

<b>EU Member state</b>	<b>National circular economy strategy</b>	<b>Year</b>
Austria	The Austrian Circular Economy Strategy	2022
Belgium	Ensemble faisons tourner l'économie en développant l'économie circulaire en Belgique	2016
<b>Bulgaria</b>	Strategy and Action Plan for the transition to a circular economy for the period 2022-2027	2022
<b>Croatia</b>		
Cyprus	National Action Plan for the Circular Economy 2021-2027	2021
<b>Czechia</b>	Strategic Framework of the circular economy of the Czech Republic 2040 (or Circular Czechia 2040)	2021
Denmark	Strategy for Circular Economy Action Plan for Circular Economy	2018 2021
Estonia	Circular Economy Strategic Document and Action Plan	2022
Finland	The Critical Move - Finland's Roadmap to the Circular Economy 2.0	2016
	Strategic Programme to Promote a Circular Economy	2021
France	Roadmap for the Circular Economy	2018
Germany	Circular Economy Roadmap for Germany	2021
Greece	National Circular Economy Strategy National Circular Economy Action Plan (National CEAP) for the implementation period 2021-2025	2018 2022
<b>Hungary</b>	Towards a National Circular Economy Strategy for Hungary	2023
Ireland	Whole of Government Circular Economy Strategy 2022-2023	2021
Italy	Towards a Model of Circular Economy for Italy - Overview and Strategic Framework National Strategy for the Circular Economy	2017 2022
Latvia	Action plan for the transition to a circular economy 2020-2027	2020
Lithuania	Roadmap for Lithuania's industrial transition to a Circular Economy	2021
Luxembourg	National circular economy (CE) strategy	2021
Malta	Towards a Circular Economy 2020-2030	2020
Netherlands	A Circular Economy in the Netherlands by 2050	2016
<b>Poland</b>	Roadmap for the Transition to Circular Economy	2019
Portugal	National Action Plan for the Circular Economy 2018-2020	2017
<b>Romania</b>	National Strategy for the Circular Economy Action Plan for the Implementation of the National Strategy for the Circular Economy	2022 in progress
<b>Slovakia</b>	Roadmap for Circular Economy of the Slovak Republic	2022
<b>Slovenia</b>	Roadmap towards the circular economy	2018

Spain	Spanish Circular Economy Strategy (España Circular 2030)	2020
Sweden	National Strategy for the transition to a CE	2020

### Appendix A2 - National bioeconomy strategies and concept papers in EU-27

EU Member state	National bioeconomy strategy	Year
Austria	Dedicated Bioeconomy Strategy at national level Progress Report on the Implementation of Bioeconomy Strategy	2019 2022
Belgium	Other policy initiatives dedicated to the bioeconomy	
<b>Bulgaria</b>	Concept paper BIOEAST initiative	2023
<b>Croatia</b>	Concept paper BIOEAST initiative	2023
Cyprus	-	-
<b>Czechia</b>	The Concept of Bioeconomy in the Czech Republic from the Perspective of the Ministry of Agriculture for 2019-2024	2019
Denmark	Other policy initiatives dedicated to the bioeconomy	
Estonia	Concept paper BIOEAST initiative	2023
Finland	The Finnish Bioeconomy Strategy. Sustainably towards higher value added	2022
France	Dedicated Bioeconomy Strategy at national level Dedicated Bioeconomy Action Plan	2017 2018
Germany	New national bioeconomy strategy Bioeconomy Action Plan	2020
Greece	Other related strategies at national level	
<b>Hungary</b>	Concept paper BIOEAST initiative	2023
Ireland	National Policy Statement on the Bioeconomy Action Plan for 2019-2020	2018 2019
Italy	Bioeconomy Strategy (updated) National Bioeconomy Action Plan 2023-2025	2019 2023
Latvia	Latvian Bioeconomy Strategy 2030	2017
	Concept paper BIOEAST initiative	2023
Lithuania	Lithuanian Bioeconomy Development Feasibility Study	in progress
	Concept paper BIOEAST initiative	2023
Luxembourg	Other related strategies at national level	
Malta	Other related strategies at national level	
Netherlands	The position of the bioeconomy in the Netherlands	2018
<b>Poland</b>	Concept paper BIOEAST initiative	2023
Portugal	Plano de Ação para a Bioeconomia Sustentável (PABS)	2021
<b>Romania</b>	Concept paper BIOEAST initiative	2023
<b>Slovakia</b>	Concept paper BIOEAST initiative	2023
<b>Slovenia</b>	Concept paper BIOEAST initiative	2023
Spain	Spanish Bioeconomy Strategy: Horizon 2030	2016
Sweden	Dedicated Bioeconomy Strategy at national level	in progress