

Overview on the Bioeconomy Strategies and the Main Challenges for Central and Eastern European Countries

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Abstract

The bioeconomy concept is one of the newest trends in economy, in the world. Based on the principles of the bioeconomy, the policies and strategies elaborated by countries must follow the goals established by this concept. For European countries, whether European Union (EU) states or non-EU countries, the bioeconomy will play an important role in their national economy, by policies and strategies promoted.

The goals of this paper are to present the bioeconomy concept, the EU bioeconomy strategic agenda, the state of the national bioeconomy strategies creation and implementation at EU level, and the main challenges for Central and Eastern European (CEE) countries. For this analysis, we use official documents elaborated at EU level by EU institutions, also national documents from a few selected countries for exemplification.

The research, which is based on text analysis, comparisons and judgements, offers a broad view on the bioeconomy strategy at EU and CEE level. For better image, we highlight the main characteristics and challenges of the countries.

Key words: Bioeconomy; EU Strategic Agenda; National strategy; CEE countries

Преглед на биоикономическите стратегии и основните предизвикателства за страните от Централна и Източна Европа

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Резюме

Концепцията за биоикономика е една от най-новите тенденции в икономиката в света. Въз основа на принципите на биоикономиката, разработените от държавите политики и стратегии трябва да следват целите, установени от тази концепция. За европейските държави, независимо дали са държави от Европейския съюз (ЕС) или страни, извън ЕС, биоикономиката ще играе важна роля в тяхната национална икономика чрез насърчавани политики и стратегии.

Целите на настоящия документ са да представи концепцията за биоикономиката, стратегическата програма за биоикономика на ЕС, състоянието на създаването и изпълнението на националните стратегии за биоикономика на ниво ЕС и основните предизвикателства за страните от Централна и Източна Европа (ЦИЕ). За този анализ използваме официални документи, разработени на ниво ЕС от институциите на ЕС, както и национални документи от няколко избрани държави за пример.

Изследването, което се основава на текстов анализ, сравнения и прогнози, предлага широк поглед върху стратегията за биоикономика на ниво ЕС и ЦИЕ.

Ключови думи: Биоикономика; Стратегическа програма на ЕС; Национална стратегия; страни от ЦИЕ

Introduction

The concept of bioeconomy is relatively new but the term “bio-economics” has the roots in 60’s. We can consider 60’s the date of birth for the present concept. In 60’s, Zeman mentioned that, bio-economics “designate an economic order that appropriately acknowledges the biological bases of almost all economic activities” (Birner, 2018). Later, from the early 70’s, Georgescu-Roegen used the term to summing up the most important conclusions he had come to in a lifetime of research. His main concern as regards the term bio-economics was that “unlimited growth would not be compatible with the basic laws of nature” (Birner, 2018).

There is no unique general accepted definition for bioeconomy. For instance, the European Commission states “*bioeconomy comprises those parts of the economy that use renewable biological resources from land and sea – such as crops, forest, fish, animals, and micro-organisms – to produce food, materials and energy.*” (<https://youmatter.world/en/definition/bioeconomy-definition/>). The BIOEAST Initiative, on its web page, says that, “The bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bio-energy independently of the processing technologies. It thus includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, bio-technological and energy industries.” (<https://bioeast.eu/bioeconomy/>). The US official document (White House, 2012) related to bioeconomy says that, “A bioeconomy is one based on the use of research and innovation in the biological sciences to create economic activity and public benefit. The U.S. bioeconomy is all around us: new drugs and diagnostics for improved human health, higher-yielding food crops, emerging biofuels to reduce dependence on oil, and biobased chemical intermediates, to name just a few.” In a simple way, we can say that, “Bioeconomy can be seen as a knowledge-based production and use of natural/biological resources, together with biological processes and laws, that allow providing economy goods and services in an environmentally-friendly way.” ([\[world/en/definition/bioeconomy-definition/\]\(https://youmatter.world/en/definition/bioeconomy-definition/\)\). And the examples of definitions can continue. Anyway, it is obvious that bioeconomy plays a bigger and bigger role in our life.](https://youmatter.</p></div><div data-bbox=)

Material and methods

The research uses official documents from the European Commission and other EU institutions with responsibilities in the field of bioeconomy. Also, national documents from some EU countries were used. They are documents in force or documents under debates, in different stages of elaboration and approval. This research is based on text analysis and comparisons, also forecasts on medium and short term. Parts of the research were done in frame of the Horizon 2020 project BIOEASTsUP “Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries” (<https://bioeast.eu/bioeastsup/>), funded by the European Commission for the period 2019–2022 and BIOEAST Initiative, established in 2014 (<https://bioeast.eu/>).

Results and discussions

Besides other reasons, “the major reason why bioeconomy became an important policy concept in Europe was a deliberate decision by staff members of the European Commission to promote this concept. One of the key actors in this effort was Christian Patermann, the former Program Director of “Biotechnology, Agriculture and Nutrition” in the Directorate General for Research, Science and Education of the European Commission” (Birner, 2018). In other words, “The transition to such a greener economy, a sustainable bioeconomy, is not possible without political decisions. It requires incentives to make the long-term benefits of bioeconomic business activities more tangible for entrepreneurs and to give consumers an understanding of the need for sustainable consumption.” (<https://bioekonomierat.de/en/bioeconomy/index.html>).

1. Bioeconomy Strategy 2012

In 2012, the European Commission adopted the strategy “Innovating for Sustainable Growth:

A Bioeconomy for Europe”. The publication contains the Communication from the European Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions “Innovating for Sustainable Growth: A Bioeconomy for Europe” and the “Commission Staff Working Document” (Bioeconomy Action Plan) (EC, 2012). It is the first official document about bioeconomy, at EU level.

The strategy has a comprehensive approach for the ecological, environmental, energy, food supply and natural resource challenges that Europe and the world are facing today. The need for a bioeconomy strategy started from experts’ estimations about the growth of the world population, pollution, climate change, limits of the natural resources, bigger and bigger consumption, waste and others. A strong bioeconomy can help Europe to live within its limits (EC, 2012). This means that EU must have a sustainable production, must produce more from less, including from waste. The exploitation of the biological resources limited the negative impacts on the environment and must reduce the heavy dependency on fossil resources, mitigating the climate change. The idea is to move Europe towards a post-petroleum society.

The bioeconomy in EU is one of the biggest and important sectors encompassing agriculture, forestry, fisheries food and chemicals, if we have in view the annual turnover (about two trillion Euros) and employing (about 22 million people). In this way, it is obvious that the bioeconomy is not a niche area; it is a distinct area connected to economic growth and jobs creation. With this strategy, the European Commission was committed to take clear action through existing policies such as the Common Agricultural Policy (CAP) and the Common Fisheries Policy (CFP) and through research initiatives such as Horizon 2020, to change the present trends of economic development of the member states.

The Bioeconomy Strategy and the Bioeconomy Action Plan are focusing on three key aspects (EC, 2012):

- developing new technologies and processes for the bioeconomy;

- developing markets and competitiveness in bioeconomy sectors;

- pushing policymakers and stakeholders to work more closely together.

The Strategy has in view the societal challenges: ensuring food security, managing natural resources sustainably, reducing dependence on non-renewable resources, mitigating, and adapting to climate change, creating jobs, and maintaining European competitiveness. To develop a coherent bioeconomy there are specific actions that maximize the impact of the Strategy. First is needed a coherent policy, at EU, national and regional level. Secondly, investments in knowledge, innovation and skills are necessary. Thirdly, participative governance and informed dialogue with society will ensure the success of the Strategy. Finally, new infrastructures and instruments are expected like integrated and diversified biorefineries, including small-scale local plants.

The Bioeconomy Action Plan describes the Commission’s main actions for the implementation of the Bioeconomy Strategy objectives. There are twelve objectives, in three major areas, which refer to: Investments in research, innovation and skills, Reinforced policy interaction and stakeholder engagement, Enhancement of markets and competitiveness in bioeconomy, each with four objectives. Investments in research, innovation and skills have in view: Research and innovation funding (Horizon 2020), Leadership in biosciences, Implement multidisciplinary education programmes across the EU, Increasing opportunities for high- and low-skilled labour forces. Reinforced policy interaction and stakeholder engagement has in view: Creating a favourable environment for the bioeconomy: policy coherence and cross-sectoral interaction, Policy coherence, Improved policy interactions, Engaging society, reaching end-users and linking with policy makers, Regional approaches, International cooperation for a global bioeconomy, Social innovation. Enhancement of markets and competitiveness in bioeconomy has in view: Agriculture and forestry (Land use and the transition towards more sustainable production, Agriculture and climate change, Livestock production, Forestry, Policies and public goods, Agricultural ad-

visory and support services, extension services), Fisheries and aquaculture (Sustainable fisheries, Sustainable aquaculture, Marine biotechnology), Bio-based industries (Biorefineries, Waste as an alternative biomass source, Biotechnologies, Bio-based products), Food chain (Resource efficiency, Food waste, Packaging, Food safety, Nutrition and dietary choices).

The document ends with four scenarios that assess how to best unlock the innovation and employment creation potential of bioeconomy research. The analysis of the social, economic and environmental impacts of the four scenarios allow for identification of the most efficient one to achieve the objectives, while respecting the principles of subsidiarity and proportionality (EC, 2012). The scenarios are:

- SO1: The bioeconomy under “business as usual” conditions;
- SO2: A Non-EU coordinated Research and Innovation in bioeconomy;
- SO3: The bioeconomy is supported by enhanced efforts in research and innovation;
- SO4: The bioeconomy supported by reinforced policy interaction and enhanced efforts in research and innovation.

2. Bioeconomy Strategy 2018

In 2018, the European Commission adopted the updated Bioeconomy Strategy for EU. The name of the document is “A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated Bioeconomy Strategy”. The updated Bioeconomy Strategy 2018 is the result of the review from 2017 of the Bioeconomy Strategy 2012. In this document it is stated that, “To be successful, the European bioeconomy needs to have sustainability and circularity at its heart. This will drive the renewal of our industries, the modernisation of our primary production systems, the protection of the environment and will enhance biodiversity” (EC, 2018a). A sustainable bioeconomy is essential to tackle climate change, also the land and ecosystem degradation. The EU and “global challenges like climate change, land and ecosystem degradation, coupled with a growing population force us to seek new ways of producing and

consuming that respect the ecological boundaries of our planet” (EC, 2018a). The purpose of this update to the Bioeconomy Strategy 2012 is to address these challenges through a set of 14 concrete actions. The actions proposed are presented in Figure 1.

Five of these actions are from the old Strategy: Ensuring food and nutrition security; Managing natural resources sustainably; Reducing dependence on non-renewable resources; Mitigating and adapting to climate change; Strengthening European competitiveness and creating jobs. The New Bioeconomy Strategy proposes actions to support rural and coastal development, also in remote areas, ensuring a more proportionate sharing of the benefits of a competitive and sustainable bioeconomy across EU and European territories and value chains. These actions will ensure that the bioeconomy respects the limits of the planet.

The New Bioeconomy Strategy proposes three main action areas (EC, 2018a), and the actions are created based on these areas:

- Strengthen and scale up the bio-based sectors, unlock investments and markets;
- Deploy local bioeconomy rapidly across the whole of Europe;
- Understand the ecological boundaries of the bioeconomy.

The update Bioeconomy Strategy 2018 aims to accelerate the deployment of a sustainable European bioeconomy so as to maximise its contribution towards the 2030 Agenda and its Sustainable Development Goals (SDGs), as well as the Paris Agreement (https://ec.europa.eu/knowledge4policy/publication/updated-bioeconomy-strategy-2018_en). Sustainable bioeconomy activities are deemed central to meet the SDGs (Figure 2), from food and nutrition security to ensuring energy access and health. The figure is an overview of the economic, social, and environmental dimensions of the bioeconomy and its expected impacts towards 2030.

The new bioeconomy concept, horizon 2030, can be shown like in Figure 3.

3. Bioeconomy Strategy in CEE countries

Not all EU countries created a national bioeconomy strategy. At the end of 2019, only 10

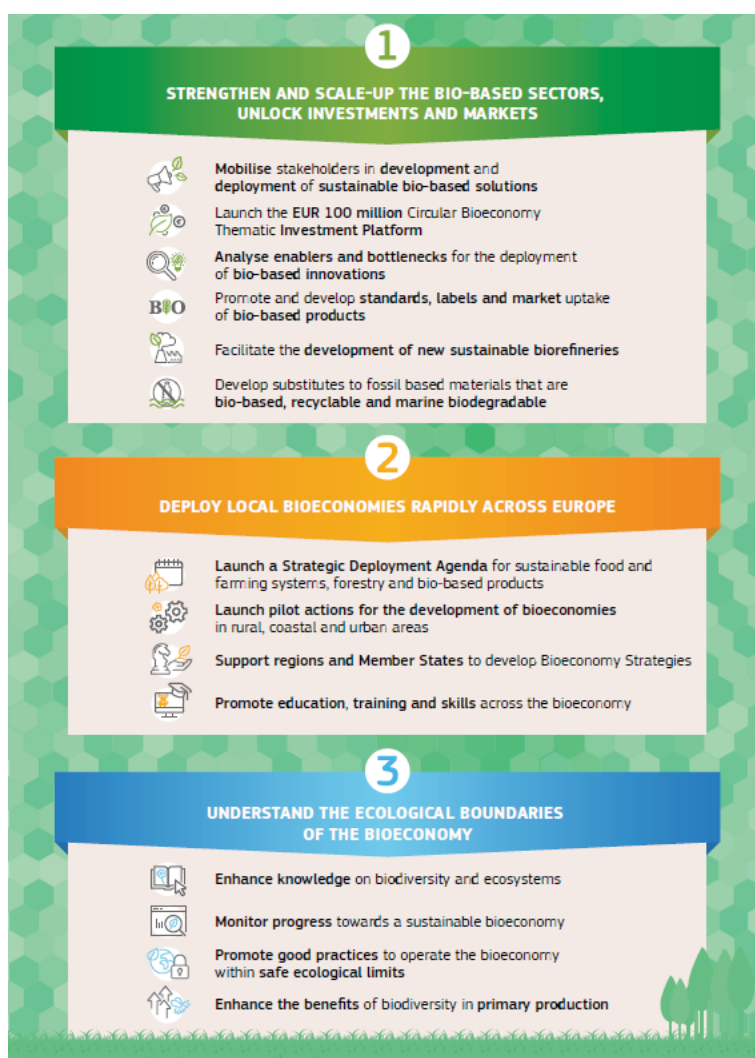


Fig. 1. Actions for New EU Bioeconomy Strategy 2018

Source: European Commission, 2018b, *Bioeconomy: the European way to use our natural resources-Action plan 2018*.



Fig. 2. Sustainable Bioeconomy Activities and Sustainable Development Goals

Source: European Commission, 2018a, *A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated Bioeconomy Strategy (pick up after Azote Images for StockholmResilience Centre)*.

EU countries developed a dedicated bioeconomy strategy at national level and other 6 had dedi-

cated bioeconomy strategy at national level under development (https://ec.europa.eu/knowledge4policy/visualisation/bioeconomy-different-countries_en). Meantime, after Brexit, only 9 EU countries are considered with bioeconomy strategy at EU level (Figure 4).

As we see, from 27 EU member states only 15 have already, or are going to have in short time, dedicated bioeconomy strategies, that show how difficult and slow the process is.

Generally, the countries from CEE are at different stages as regards the creation and the implementation of their national bioeconomy strategies according with bioeconomy strategy that was established at EU level in 2012 and updated in 2018. From CEE, only Latvia has a Bioeconomy Strategy. Other five (Croatia, Czech Rep., Lithuania, Poland, Slovakia) have strategies under development and the rest have other policies and strategies. Having in view these simple statistics, we can conclude that the CEE countries are behind the Western countries in this process.

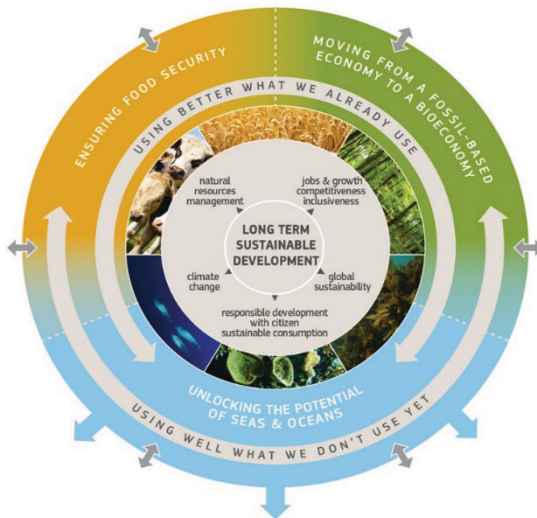


Fig. 3. New EU Bioeconomy Strategy 2018
 Source: https://ec.europa.eu/knowledge4policy/publication/updated-bioeconomy-strategy-2018_en

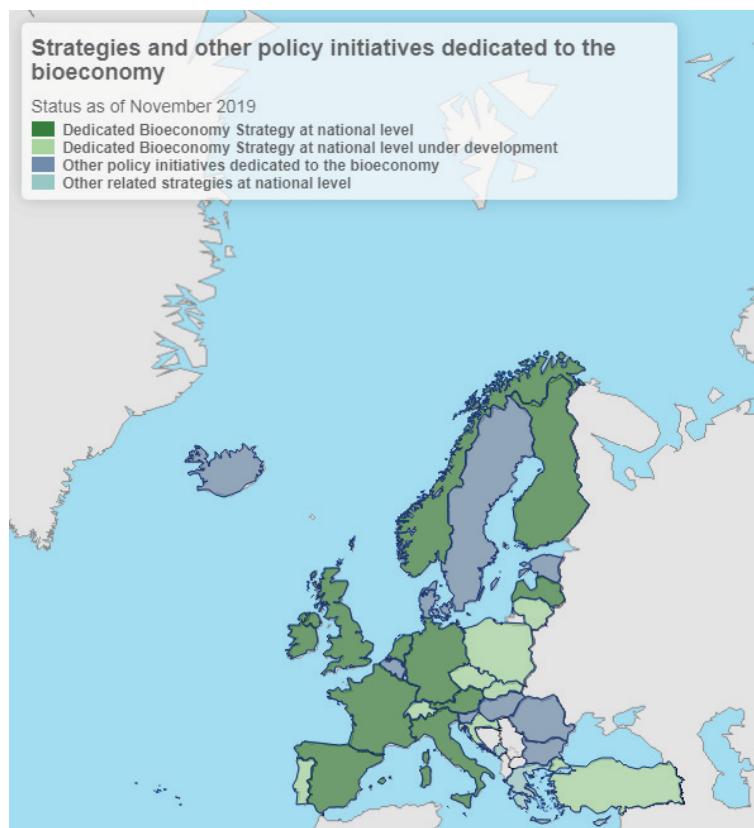


Fig. 4. Bioeconomy Strategies in EU
 Source: https://ec.europa.eu/knowledge4policy/visualisation/bioeconomy-different-countries_en

Based on BIOEAST Initiative information (<https://bioeast.eu>) and BIOEASTsUP Project H 2020 results (<https://bioeast.eu/bioeastsup/>), we present the stage of the creation and implementation of the national Bioeconomy Strategy in CEE, for all countries that are members of BIOEAST Initiative.

Latvia

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/latvia_en):

- Lead ministry: Ministry of Agriculture of the Republic of Latvia, Ministry of Economics of the Republic of Latvia, Ministry of Education and Science of the Republic of Latvia;

- Other ministry: Ministry of Environmental Protection and Regional Development;

- Other institutions: State Education Agency, Latvian Biomass Association, Latvian Wood Construction Cluster, Forest and Wood Products Research and Development Institute (MeKA); Institute of Agriculture Resources and Economics; Institute of Food Safety, Animal Health and Environment "BIOR"; Institute of Horticulture; Latvia University of Life Sciences and Technologies; Latvia Plant Protection Research Centre; Latvia State Forest Research Institute "Silava"; Latvia State Institute of Wood Chemistry, etc.

In general, the institutions involved in bioeconomy are, besides the ministries, universities, research centres, innovation networks, innovation clusters, associations, agencies, different stakeholders like: large industry, SMEs, technological platforms, NGOs/other networks.

In Latvia, the national bioeconomy definition is (https://ec.europa.eu/knowledge4policy/bioeconomy/country/latvia_en): "Bioeconomy covers those parts of economy where renewable bioresources (plants, animals, microorganisms etc.) are used in the production of food, feed, industrial products and energy in a sustainable and well-considered way".

Latvia is the first CEE country that has a dedicated National Bioeconomy Strategy, which was adopted in 2017. The objectives of the Latvian Bioeconomy Strategy 2030 are to be implemented within three main fields: Promotion and pres-

ervation of employment in bioeconomy sectors to up to 128 thous. Employees; Increasing the value added of bioeconomy products to at least EUR 3.8 billion in 2030; Increasing the value of bioeconomy production exports to at least EUR 9 billion in 2030.

Sectors included in the Strategy are: Agriculture, Aquaculture, Bio-based chemicals and materials, Bio-based textiles, Bioenergy (incl. transport biofuels, bioelectricity and H&C), Biotechnology, Ecosystem services, Fisheries, Food, Forestry, Organic waste, Pulp & paper, Wood, wood products & furniture.

Lithuania

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/lithuania_en):

- Lead ministry: Ministry of Economy and Innovation, Ministry of Agriculture, Ministry of Education, Science and Sport;

- Other ministries: Ministry of Energy, Ministry of Environment;

- Other institutions: Agencies, Innovation Network (Lithuanian Innovation Center), Universities, Research centres, Association (Lithuanian Biotechnology Association, Lithuanian Biomass Energy Association, Forest owners association of Lithuania), Innovation cluster (Smart Food Cluster, National Food Cluster, Sunrise Valley, Science and Technology Park, Biopower Plants Development Cluster, Cleantech Cluster Lithuania).

Lithuania has a national definition for bioeconomy (https://ec.europa.eu/knowledge4policy/bioeconomy/country/lithuania_en): "The bioeconomy encompasses the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy".

Other national bioeconomy-related strategies:

- The National Progress Program (NAP) 2021–2030, which is under development. Preparation of the National Progress Program is one of the Government's priority objectives, it is necessary to clarify the fundamental changes leading to progress in public policy and other areas of national importance.

- Draft Integrated National Energy and Climate Plan of the Republic of Lithuania (2018).

Poland

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/poland_en):

- Lead ministry: Ministry of Entrepreneurship and Technology, Ministry of Agriculture and Rural Development, Ministry of Science and Higher Education, Ministry of Investment and Economic Development;

- Other ministries: Ministry of Maritime and Inland Waterway Transport, Ministry of Energy, Ministry of Environment;

- Other institutions: Innovation Network (Green Chemistry Cluster “West-Pomeranian Bioeconomy Cluster”), Research institutes, Innovation cluster (AgroBioCluster, Klaster Life Science Kraków, Polish Bioeconomy Technological Platform);

- Other stakeholders: Large industries and SMEs (Selena Labs, Lotos Group, Unilever Poland, Azoty Group, Ciech).

Poland does not have a national definition related to bioeconomy.

Other national bioeconomy-related strategies: National Smart Specialisation Strategy (2014); BIOSTRATEG Strategic and Research program “Environment, Agriculture and Forestry (2013); The Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries 2014–2020 (national sectoral strategy – in updating process) (2014); Plan for Rural Areas (bioeconomy as one of the priority projects named Agriculture for Ecology) (2014); Draft of National Energy and Climate Plan for the years 2021–2030 (2019).

Czech Republic

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/czechia_en):

- Lead ministry: Ministry of Agriculture of the Czech Republic, Ministry of the Environment of the Czech Republic;

- Other ministries: Ministry of Industry and Trade, Ministry of Education, Youth and Sports;

- Other institutions: Universities, Research institutions, Governmental institution (The Czech Academy of Agricultural Sciences), Association (National Cluster Association);

- Other stakeholders: Agencies (Technology Agency of the Czech Republic), Networks (Technology centre of Czech Academy of Sciences and Czech Biofuels Technology Platform support national stakeholders with relevant information).

In Czech Rep., there is a national definition (https://ec.europa.eu/knowledge4policy/bioeconomy/country/czechia_en): “The bioeconomy is perceived by the Ministry of Agriculture as a tool for ensuring sustainable management of natural resources, sustainable agriculture, forestry, water management and aquaculture, sustainable food and feed production and strengthening the role of primary producers and their integration into the bioeconomic value chain as well as forestry involving the entire value chain of the downstream industries”.

Czech Republic has a Dedicated Bioeconomy Strategy at national level under development (2019), which aims at: ensuring management of the implementation of the bioeconomy concept at national level, supporting the development of bioeconomy in the Czech Republic using international cooperation, strengthening technological development and innovation. The sectors included are: Agriculture, Aquaculture, Bio-based chemicals and materials, Bio-based textiles, Bio-energy (incl. transport biofuels, bioelectricity and H&C), Biotechnology, Ecosystem services, Fisheries, Food, Forestry, Organic waste, Pulp & paper, Wood, wood products & furniture.

Other national bioeconomy-related strategies: Strategic Framework Czech Republic 2030 (2017), Strategy of the Ministry of Agriculture with a view to 2030 (2016), Draft National Energy and Climate Plan of the Czech Republic (2018).

Slovakia

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/slovakia_en):

- Lead ministry: Ministry of Agriculture and Rural Development of the Slovak Republic;

- Other ministries: Ministry of Economy of the Slovak Republic, Ministry of Environment of the Slovak Republic;

- Other institutions: Innovation cluster (Bioeconomy Cluster), Governmental institution (Ministry of Education, Science, Research and Sport of the Slovak Republic, Ministry of Agriculture and Rural Development of the Slovak Republic, Ministry of Economy of the Slovak Republic).

Slovakia does not have a national definition for bioeconomy.

Other national bioeconomy-related strategies: Research and Innovation Strategy for Smart Specialization of the Slovak Republic (2013), Strategy of the Economy policy until 2030 (2018), Updated strategy on biodiversity protection until 2020 (2013), Greener Slovakia-The Strategy of the Environmental Policy of the Slovak Republic until 2030 (2019), Proposal for an Integrated National Energy and Climate Plan (2018).

Croatia

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/croatia_en):

- Lead ministry: Ministry of Economy, Labour and Entrepreneurship, Ministry of Science and Education, Ministry of Agriculture;

- Other ministries: Ministry of Environment and Energy, Ministry of tourism, Ministry of Regional Development and EU Funds, Ministry of the sea, transport and infrastructure;

- Other institutions: Universities, Research centres;

- Other stakeholders: other type of governance body (Croatian Chamber of Agriculture), large industries and SMEs (INA d.d., Saponia, Bio-Mi Ltd., ECOCORTEC Ltd., Particula Group Ltd.), Clusters (Croatian Wood Cluster, EUVITA cluster – food processing), Networks (Bio East Initiative, IEA Bioenergy, Danube Council).

Croatia has a national definition. Based on the Croatian Smart Specialisation Strategy (2016–2020) the term “bioeconomy” can be defined as (https://ec.europa.eu/knowledge4policy/bioeconomy/country/croatia_en): economy that comprises primary agriculture, fishery, and aquaculture

and other economies that use renewable biological resources from land and sea.

Other national bioeconomy-related strategies: Rural Development Programme, Smart Specialisation Strategy and Action Plan, National Strategic Plan for Aquaculture Development – Draft, Croatian Strategy for development of Agriculture and Fisheries 2020, Energy Development Strategy, The Croatian National Development Strategy 2030, Croatian Low Carbon Development strategy – White Book, Waste management Plan, Gastronomy Development strategy with Action plan, National Forestry Policy and Strategy (2003), First Draft of the Integrated Energy and Climate Plan for the Period from 2021 to 2030 (2018).

Estonia

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/estonia_en):

- Lead ministry: Ministry of Economic Affairs and Communications, Ministry of Rural Affairs, Ministry of the Environment;

- Other ministries: Ministry of Education and Research;

- Other institutions: Universities, Research centres, Associations (Estonian Biogas Association, The Estonian Renewable Energy Association), Governmental institution (Estonian Private Forest Centre), Innovation Network (BioCC – Biotechnology competence center);

- Other stakeholders: Networks (Estonian Farmers Union).

The definition for bioeconomy in Estonia is (https://ec.europa.eu/knowledge4policy/bioeconomy/country/estonia_en): Bioeconomy, or bio-based economy, can be defined as economy that utilizes sustainable resources and contributes to the conversion from fossil-based raw materials towards bio-sustainable alternatives. Bioeconomy covers almost all industrial and economic sectors. Mostly, however, it is based on agriculture, fisheries and forestry, as well as related industries, which produce, manage, or otherwise exploit biological resources (for example, food, feed, fibre, paper, power, chemical, biotechnology industry). Ministry of Economic Affairs and Communications considers also bio-

energy as part of bioeconomy. Most often use terms are:

- Bioeconomy means the production of sustainable biomass and conversion of biomass into food, feed, energy and other bioproducts.

- Bioeconomy means adding value to the sustainable utilization of biomass in interrelated economic activities.

Other national bioeconomy-related strategies: National Waste Management Plan 2014–2020, National Development Plan of the Energy Sector Until 2030 (2017), Research and Development Strategy until 2025 Knowledge-Based Bioeconomy (2016), Development plan for 2019–2022 of the Ministry of Rural Affairs (2018), Climate Change Adaptation Development Plan until 2030, Estonian Forestry Development Plan 2011–2020, Agricultural and fisheries development plan up to 2030, Estonian Forestry development plan 2021–2030, Circular economy strategy and action plan 2021+, Draft Estonian national energy and climate plan (NECP 2030) (2018).

Slovenia

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/slovenia_en):

Lead ministry: Ministry of Agriculture, Forestry and Food, Ministry of Economic Development and Technology, Ministry of Education, Science and Sport;

Other ministries: Ministry of the environment and spatial planning, Ministry of Infrastructure;

Other institutions: Universities, Research institutes, Associations (Chamber of Commerce and Industry of Slovenia, Circular Change) Innovation Networks (SusChem Slovenia, Cel. Cycle, Strategic Research and Innovation Partnership – Networks for the Transition into Circular Economy (SRIP – Circular Economy), Strategic Research and Innovation Partnership – Smart Buildings and home with Wood Chain, Strategic Research and Innovation Partnership – Sustainable Food Production.

In Slovenia, the definition for bioeconomy is (https://ec.europa.eu/knowledge4policy/bioeconomy/country/slovenia_en) defined according to the Commission's interpretation, which means

an economy that uses biological resources from land, as well as from waste, sea and raw materials, for food and feed, in industrial production and in the production of energy. It also includes the use of biological processes for sustainable industries. However, the term is not well rooted in the policy jargon at the national level, nor is it covered as a self-standing concept/priority in country's strategic documents; individual attributes of bioeconomy are recognized in national circular economy and green economy strategies; bioeconomy principles can be recognized in four (of nine) priority areas of the Smart specialization strategy of Slovenia.

Other national bioeconomy-related strategies: Slovenia's Smart Specialization Strategy (2015), Slovenian Development Strategy 2030 (2017), Framework Programme for the Transition to a Green Economy (2015), Draft Integrated National Energy and Climate Plan for Slovenia (2018), Roadmap towards the Circular Economy in Slovenia (2018).

Hungary

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/hungary_en):

- Lead ministry: Ministry of Agriculture;

- Other institutions: Universities, Research centres, Public-Private Partnerships (PPP) (Hungarian Chamber of Agriculture), Innovation Network (Eötvös Loránd Research Network (predecessor Hungarian Academy of Sciences), Governmental institution (National Research, Development and Innovation Office);

- Other stakeholders: Large industries and SMEs (Pannonia Bio Zrt., Pilze-Nagy Ltd., Grapoila, Gere Winery, Organica Water), University/ Research institution (Debrecen University, Hungarian Academy of Sciences).

According to https://ec.europa.eu/knowledge4policy/bioeconomy/country/hungary_en there is no national definition for bioeconomy in Hungary.

Other national bioeconomy-related strategies: Medium and long-term food industry development strategy 2014–2020 (2015), National Renewable Energy Action Plan (2010–2030) (2010),

National Energy Strategy 2030 (2012), National Rural Development Strategy 2012–2020 (2012), National Waste Management Plan (2014–2020) (2014), Smart Specialization Strategy (2014), National Research and Development and Innovation Strategy 2020 (2014), National Environmental Technology Innovation Strategy 2011–2020 (2012), National Development 2030 – National Development and Territorial Development Concept (2014), National Climate Change Strategy 2 (2018), Food Industry Program of Hungary 2016–2050 (2016), Draft National Energy and Climate Plan of Hungary (2018).

Romania

The national institutions involved in the bioeconomy are (https://ec.europa.eu/knowledge4policy/bioeconomy/country/romania_en):

- Lead ministry: Ministry of Economy, Ministry of Water and Forests, Ministry of Agriculture and Rural Development;

- Other ministries: Ministry of Health, Ministry of Energy, Ministry of Research and Development;

- Other institutions:

- Innovation cluster like: ROSENC cluster (Renewable energies) (2017, Country Report for Romania – DanuBioValNet project – Interreg Danube Transnational Programme), IND-AGRO-POL cluster (competitiveness pole) – one of addressed sector is bioeconomy (2017, Country Report for Romania – DanuBioValNet project – Interreg Danube Transnational Programme), Green Energy cluster (renewable energies) (2017, Country Report for Romania – DanuBioValNet project – Interreg Danube Transnational Programme), etc.;

- Associations like: “Bioeconomy” Commission of the Consultative Body for Research-Development and Innovation (belongs to the Ministry of Research and Innovation).

Presently, Romania does not have a national bioeconomy definition (https://ec.europa.eu/knowledge4policy/bioeconomy/country/romania_en).

Other national bioeconomy-related strategies: Romanian RDI Strategy for 2014–2020 (2014), Strategy for the development of the agri-food

sector on average- and long-term 2020–2030 (2015), Romanian Strategy for Competitiveness 2014–2020 (2014), Smart specialization domains financed by structural funds within Competitiveness Operational Programme 2014–2020, Draft Integrated National Energy and Climate Change Plan for 2021–2030 (2018).

After this detailed presentation, we can summarize that, generally, Ministry of Agriculture is a common ministry that leads the Bioeconomy Strategy construction for all countries, which shows the importance of agriculture for bioeconomy strategy and the role the agriculture will play in the future in the new national strategies and policies. From country to country, also there are other ministries that contribute to the creation of the strategy, but ministries of agriculture remain the common and the leading ministry. Besides ministries, other institutions (public or private), universities, research centres, SMEs, large industries, NGOs or other forms of associations can participate and be involved in the creation of the strategy. There is no restriction and the group of stakeholders involved in bioeconomy is permanent updated. At the same time, besides national strategies, the initiative to develop the macro-regions and inter-connect the national strategies is welcome and can help the sustainable development of the countries in CEE.

Conclusions

The opportunities to implement the bioeconomy strategy are multiple and beneficial to the states that adopt this concept, both in terms of future economic activities and in terms of daily life, ours and our descendants. The presentation we gave about the Bioeconomy Strategic Agenda, Bioeconomy Action Plan, the level of the development of these strategies at national level among CEE countries, offers us a wide image about this process. As we said, it is not finished yet, the countries are at different levels of creation and implementation. We consider that, the BIOEAST Initiative, also the BIOEASTsUP Project will help the countries from CEE to create and approve their national strategies in very short time and then to contribute, all together, to

the development of the bioeconomy macro-regions in this area. In this way, the gaps between Western and CEE countries will be attenuated. The main challenges we see at this stage are the political involvement of the political parties and the obstacles that arise when all entities that are involved and interested in the bioeconomy are put at the same round table for discussion. In conclusion, deploying a sustainable and circular bioeconomy will boost the competitiveness of the bioeconomy sectors and support the creation of new value chains across Europe while enhancing the overall status of the natural resources. Delivering a sustainable circular bioeconomy means that, our economic prosperity and the health of our environment will mutually reinforce one another (EC, 2018a).

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