

BIOECONOMY CONCEPT PAPER

EXECUTIVE SUMMARY



BULGARIA

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EXECUTIVE SUMMARY OF THE STRATEGIC CONCEPT PAPER FOR BIOECONOMY: BULGARIA

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Executive summary

1.1. Introduction

The concept of the bioeconomy uses as a starting point the natural cycles of materials and encompasses these sectors of the economy that operate with renewable resources such as plants, animals, microorganisms and their derivatives. Biogenic waste and by-products are also increasingly used as raw materials. The Implementation Report on the EU Bioeconomy Strategy states that "The Bioeconomy covers all sectors and related services and investments, which produce, use, process, distribute or consume biological resources, including ecosystem services".

The concept of bioeconomy is relatively new for the public administration, business and society in Bulgaria. The first steps towards its dissemination were following the publication of the EU Bioeconomy Strategy "Innovation for Sustainable Growth: A Bioeconomy for Europe". Following the update of the Strategy in 2018 and the focus on the circular economy, a more tangible understanding of the nature and objectives of the bioeconomy has been gained. The bioeconomy became part of the developed sectoral strategic documents and started the implementation of research and business projects.

In 2016, in pursuant of the EU Strategy's priority to boost the regional development and develop national bioeconomy strategies, a governmental initiative BIOEAST, including 11 CEE countries was established. Later, under the auspices of the initiative, the BIOEASTsUP project was launched within the Horizon 2020 program. Both, the Initiative and the project, contribute significantly to the accelerated inclusion of the bioeconomy in the policy agenda.

In 2020, the Ministry of Agriculture approved a Strategy for strengthening the role of the agricultural sector in the bioeconomy, and in 2022, the Council of Ministers adopted a Strategy and Action Plan for the transition to a circular economy of the Republic of Bulgaria for the period 2022-2027, which partly includes the circular bioeconomy.

The current Strategic Concept Paper complements and builds on these strategies. It applies a multi-sectoral approach, analyzes the opportunities and challenges facing the Bulgarian bioeconomy and suggested actions for its promising development.

The paper is developed by the BIOEASTsUP project team of Agricultural Academy. The study leans on the understanding that the bioeconomy is a system of components, as follows: finance and governance, renewable resources, research and development, innovation and technology, and public and private expectations.

1.2. Current state of the system components

The bioeconomy is an important sector for Bulgaria. It employs 773.5k which is almost a quarter of the country's workforce and generates nearly one-seventh of the GDP (EUR 4.3 billion). The bioeconomy includes the agricultural sector (agriculture, forestry, fisheries and aquaculture) and the food industry, which are involved with all activities, as well as the woodworking and furniture, textile, pharmaceutical, chemical, construction and energy industries, participating only with activities, processing biomass. The agricultural and food sectors have a dominant

place with over three quarters of the generated value added, but the chemical industry, electricity, liquid fuels and paper industry are rapidly evolving. There is an upsurge in forestry and fisheries and aquaculture.

Since Bulgaria's accession to the EU, GVA has grown in all sectors except agriculture. Total employment fell by 20% mainly in agriculture, textile, wood and furniture industries. Forestry, chemical industry, electricity, fisheries and aquaculture attracted an additional workforce. In these sectors the average growth rates of labour productivity were the highest. The total labour productivity grew, but still lags more than six times behind labour productivity in the EU27.

Forestry and agriculture are the main sources of renewable resources (biomass) for the bioeconomy. They have considerable potential to increase the productivity and volume of biomass to be processed into bio-based products with high added value. Now products "champions" that have the highest added value compared to the average for the bioeconomy are biofertilizers, essential oils and beer. More than half of the top products that make up the value of output are bio-based (farm-to fork products, bio-packaging and wood-based products).

The volume of biomass increases annually, more than 1.5 times compared to 2008. The majority of it is cereals and industrial crops, represented mainly by sunflower and rapeseed. The production of cotton, hemp, flax, etc., necessary for the textile industry, is neglected. Green fodder accounts for a small share of biomass and is insufficient to expand livestock and increase productivity, which are a priority of the primary bioeconomy sector. Recently, the production of aromatic, herbal and medicinal plants has grown significantly.

The share of forest areas offering wood in the total forest area is lower than the BIOEAST average, the density per ha is the lowest and the felling exceeds the recommended share compared to stocks (66%). Therefore, measures are needed to achieve sustainable forestry use.

In fisheries, optimization of marine catches is achieved and production from aquaculture increases, but technologies for efficient use of unwanted catches and waste fishery products are not yet applied. There is considerable scope for obtaining products from unwanted catches and waste in food, pharmaceutical, etc. sectors.

About 28% of the total biomass supply is used for food and feed, and 34% is exported. Approximately one-third of potential and produced residues and by-products is loss or unclear use. The export is facilitated by good logistics, as the production takes place mainly on the farms of large entrepreneurs.

The transformation to a circular bioeconomy, based on the construction of biorefineries, is taking place slowly and unevenly across sectors. By 2020 in Bulgaria there are 29 biorefineries, dominated by biofuel production. The highest share of processed biomass is occupied by oilseeds (rapeseed and sunflower), cereals and wood. In addition to biorefineries, larger farms have facilities to extract biogas from green residues.

RDI (research & development & innovation) takes place in public research institutions and private companies. The link between R&D actors and the bioeconomy sectors is weak. Public research institutes have a greater role in the primary sectors, producing biomass and 'conventional' processing sectors. In the 'novel' bioeconomy sectors, the focus is principally on innovations, mostly by foreign investors, rather than on R&D (textile, pharmaceutical).

The enterprises in the bioeconomy, as well as those that function in the national economy are SMEs. In Bulgaria, SMEs reach 99.8% of all enterprises. The insufficient administrative capacity of SMEs makes it difficult to access public financial programmes and implement innovation.

The level of business integration (vertically, as well as horizontally) is rather low. A part of enterprises in the 'novel' sectors belong to foreign investors or are part of international corporations and have attracted significant foreign capital.

The role of financial services by specialized venture capital institutions, banks, insurance companies, is very low and neglected, especially when it refers to conventional sectors of the bioeconomy.

1.3. Policy coherent analysis: strategic actions

For a more detailed study with a view to outlining strategic actions, the chemical and pharmaceutical (essential oil) industries were selected as 'niche sectors'. The wood and furniture and food industries are involved as 'conventional sectors'. All of them are considered in terms of their links with the primary sector (agriculture, forestry).

The conducted **SWOT analysis** of these sectors gives grounds to highlight some common or similar strengths and weaknesses that are valid for the bioeconomy in the country.

Among the **strengths** are:

- Great potential in biomass production and processing;
- Well-developed conventional activities in traditional and niche sectors;
- Export orientation and relatively good competitiveness;
- Availability of scientific potential and research infrastructure;
- Harmonized legislation and developed sectoral strategic documents;
- Good capacity for storage, processing and recycling of plastics and bio-based waste
- Existence of big corporations with financial and innovation capabilities.

The **weaknesses** are related to:

- Insufficient provision of raw materials in certain processing activities;
- Deepening the shortage of a highly skilled workforce
- Predominantly small and medium-sized enterprises with limited innovation capacity;
- Underfinanced science;
- Heavy dependence on imported fossil fuels;
- Lack of financial resources for the high start-up and venture capital required;
- Insufficiently developed closed-loop value chains.

The **opportunities** for the development of the bioeconomy are mainly determined by the rapid development of biotechnology, which allows to valorize strengths and overcome weaknesses. The **threats** come from the rising prices of raw materials and resources and Bulgaria's dependence on imports of finished products, the impact of which can be mitigated by increasing the production of biomass and labour productivity and by reducing the energy intensity, fossil fuels replacement and strengthening the networking and cooperation.

The **four directions** for the strategic actions in the selected sectors are:

1. **Use of fast-growing biotechnology for transformation to the bioeconomy and increase the production and exports of bio-based products**

Advances in biotechnology research open up opportunities to green the **chemical industry** and make it a driver of the entire bioeconomy development. Promoting the use of alternative raw materials will increase the potential for obtaining a wide range of products. The relatively

good competitiveness of bio-fertilizers and bio-chemicals on the international market requires support to expand their production and exports and achieve a higher market share. An innovative tool for obtaining bio-based chemicals and plastics, complying environmental limits, is the introduction of an Environmental management system. The production of new bio-based products should be accompanied by the development of new standards and monitoring and control to ensure their compliance. A credible approach to expanding the use of new products is the establishment of a partnership system with consumers to test their safety and feasibility. **The essential oil industry** under the 'Programme for research, development and demonstration of genetic resources of aromatic plants' will develop a public database, procedures and services that support the use of propagating material of known varietal origin, as well as the testing and demonstration to industry of well-functioning genetic resources of aromatic plants suitable for industrial cultivation. In the **woodworking and furniture industry** the focus is on the introduction of new technologies in small and medium-sized enterprises, by facilitating access to funds. CAP Strategic Plan interventions and EU scientific and operational programmes should be more closely linked to the renovation and expansion of facilities. The sector has a potential to maintain its importance for the Bulgarian economy by stimulating exports to new markets, other than traditional ones, and at the same time to increase efficiency. Encouraging the application of nanotechnology will contribute to this goal. The **food industry** orients innovations towards the production of medicinal, dietary and functional foods. Priority should be given to innovations financed with own funds as part of the growing added value in the sector. It is imperative to develop measures, manuals and information for the creation of new partnerships (start-up and spin-off) companies and the use of open innovation. Despite the good performance of the food sector in the country's export, it should be restructured by increasing the share of food products with high added value and reducing the export of raw materials, mainly grain and sunflower.

2. Valorization of by-products and wastes to overcome energy intensity, substitute fossil fuels and improve efficiency of raw material use

Chemical industry needs to prepare recommendations to increase the capacity of SME entrepreneurs for financial management, investment readiness and implementation of risky projects; reduce the high energy intensity of chemical products by promoting the use of bio-based recycled raw materials; set recycled content targets in final products, respecting their safe use; stimulate replacement of fossil fuels by biofuels; construct biorefineries; set up a partnership system with consumers to raise awareness of the benefits of the recycling industry in mitigating climate change. The **essential oil industry** will support the industrial scale implementation of recently developed laboratory and semi-industrial scale technologies through 'Innovation and Demonstration Program on Processing and Valorization of By-products and Wastes by the Essential Oil Industry'. In the **woodworking and furniture industry** it is envisaged development of a national program for the introduction of good practices in the processing of waste and by-products; improved monitoring and control of its implementation; encouraging SMEs to liaise with science and participate in joint projects or ventures. **Food industry** aims at compensating for systemic shortages of raw materials and work force. Good European practices for reducing food loss and waste, as well as the implementation of the Program for reducing and preventing food loss of the Ministry of Agriculture are a prerequisite for increasing the raw materials suitable for food production. Short supply chains will also have an impact on reducing losses, due to shortening of transport time and generally higher price of products for direct sale. The availability of a regulatory base, strategic solutions and scientific potential in the field of digitization is a crucial tool for improving awareness and connectivity between sectors and limiting losses of raw materials and food.

3. Growing the role of the national bioeconomy in addressing the global economic instability

The fast-developing bio-based **chemical industry** in Bulgaria is a significant factor in the fight against the Covid-19 pandemic and the global economic instability. The chemical sector contributes to reducing the pressure from the rising prices of mineral fertilizers, through increasing the production of compost and other bio-fertilizers. Bulgaria's leadership position in BIOEAST in waste treatment facilities, is good evidence of the chemical industry's contribution to climate change mitigation. It is necessary to identify crisis policies to rapidly redesign and increase the production of bio-based products that ensure stability of the sector. Strong imports of finished products, rising raw material prices and volatile global supply chains are to be addressed through policies supporting biomass production from locally selected and adapted crop varieties and encouraging shared innovation among enterprises that could contribute to increase competitiveness. Underdeveloped financial institutions providing venture capital and guarantees are a barrier for SMEs, so bioeconomy projects where risks are greater should be supported through public funds. The **essential oil industry** can stabilize variable yields and prices of biomass and support successful promotion on the international market and acceptance of the generated products, by implementing the 'Demonstration Programme on New Technologies for Cultivation of Aromatic Plants and Biomass Processing'. **Woodworking and furniture industry** should advance in the introduction and use of new raw materials, with cost reduction. This will contribute to obtaining better quality products, resistant to the competitive environment of foreign goods. In order to achieve a balanced and sustainable use of wood resources, it is necessary to conduct an analysis of the entire value chain (production, use, sale, export) for local raw materials. Encouraging association in the sector and cross-sectoral coordination will support the national product. The importance of the national **food industry** is growing given the risk of the high share of imports in food consumption and the uncertain situation at global markets. Development of measures to increase the share of Bulgarian foods in total consumption, incl. by increasing the production of traditional foods with high added value and competitive advantages are suggested. A long-term bioeconomy strategy with regional dimensions not only will accelerate the development of sustainable territorial food chains, but also ensure a more efficient use of resources, according to local characteristics and capabilities.

4. Improving research, education, training, networking and cooperation among stakeholders to mitigate external competitive pressure

Continued underfunding of national science is a major obstacle to the deployment of scientific achievements, leading to dominant foreign funding of innovations. Policies to tackle this problem is reaching the indicative target for a higher share for science of GDP and introducing stimulus for the business to finance the national science.

Training of SME entrepreneurs in the **chemical industry** is a primary task to accelerate bio-based innovations. Although the number of employees in the bio-based industry is growing, there is a shortage of workforce and entrepreneurs with interdisciplinary skills. Vocational training centres are expected to be restored, reorganised and/or established. Policies supporting cooperation between science, bio-based industry and the primary agricultural sector to increase the added value should be applied. If necessary, restructuring of subsidies among sectors should be undertaken. The **essential oil industry** has to address weak cooperation between farms growing oil-bearing plants and distillation facilities and between R&D organizations and the industry, combined with limited entrepreneurship and conservatism among managers. The implementation of adequate 'innovation and demonstration' programme is expected to improve the capacity of entrepreneurs and overcome bottlenecks

in the value chain. **Woodworking and furniture industry** is expected to promote coordination of small enterprises in order to implement joint training and qualification programs; conducting additional courses and qualifications; building educational and professional networks to increase administrative capacity; acquiring membership in branch organizations and cooperatives. It is urgent to develop a Law on branch organizations. **Food industry** needs policies supporting cooperation between processors to apply scientific achievements in the production of innovative and competitive products and to increase their market power. By cooperating with raw material producers as well, the competitive pressure from the increasing demand for biomass can be mitigated. Given the failure of attempts at self-organization of processors and producers of raw materials, a rational approach to cooperation could be the development of national demo projects, incl. with the participation of beneficiaries who are not selectable under the current programs, e.g. small businesses and small farms.

1.4. Synthesis of system components and actions

Governance and policy: (1) set up a Bulgarian Bioeconomy Council to ensure a national and international coordination; (2) enforce the cross-sectoral approach and initiate the development and adoption of a national bioeconomy strategy and action plan (3) organize monitoring of the strategy implementation (4) nominate participants in national and international forums and events in the field of bioeconomy.

Research, innovation and education: (1) development of technologies and local selected crop varieties to increase productivity and adapt to climate change in agriculture; (2) creating new bio-based products and packaging, based on cascading use of by-products and waste in bio-refineries (3) strengthening the link between business and science through new types of partnerships (spin-offs, start-ups, living labs, open innovations); (4) updating research, educational and training programs and creating centres and networks.

Resources, products, services: (1) introduction of alternative raw materials, new product range and nutritional components with high added value; (2) changing eating habits oriented towards traditional, dietary, healing and functional foods; (3) cooperation between enterprises to establish industrial symbiosis (4) digitalization of the bioeconomy.

Public and private expectations: (1) raising public awareness of the benefits of the recycling industry in mitigating climate change; (2) establishing of partnership system with consumers to test the safety and applicability of bio-based products.

1.5. Conclusion

Bulgaria has a growing production of biomass, well-developed biotechnology and modern scientific achievements that are a prerequisite for building a knowledge-based bioeconomy. Targeted policies to strengthen the link between science and business and to promote innovation, technological renewal, staff training and cooperation of the prevalent in the bioeconomy SMEs, are key to achieving this goal.

