

EUROPEAN GREEN POLICIES' IMPACT ON FOOD PRODUCTION IN BULGARIA

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Abstract

The energy policy of the European Union (EU) aims to achieve a sustainable energy future by reducing carbon emissions, increasing energy efficiency and ensuring energy security. The EU's main objectives in this context include reducing dependence on external energy sources, shifting to renewable energy sources and creating an internal energy market that ensures efficiency and fair access for all Member States. The EU aims to achieve climate neutrality by 2050, which implies a significant reduction in carbon emissions, as well as a transition to cleaner and more sustainable technologies for energy production and consumption. Union policy has increasingly focused on transforming the energy production landscape of the continent towards a more sustainable future, with an ever-growing renewable energy sector. This process has also included the agricultural sector as it also has a high impact on the climate neutrality of the continent, with Green Deal policies focusing on reducing greenhouse gases produced by farms, the food supply chain and recourse producers (fertilizers, pesticides, etc.) and improving the food security of the continent. In this context, the aim of this study is to analyse the impact of European green policies on food production in Bulgaria. To achieve this goal, the following tasks must be completed: to highlight the most impactful European eco-policies regarding Bulgarian food production; to analyse the impact of these policies on the development of organic production in Bulgaria, as environmentally responsible, and to assess the possibilities for adapting Bulgarian agricultural practices to the new European green framework. This research uses data supplied by the Ministry of Food and Agriculture of the Republic of Bulgaria, though it's Agrostistics branch. In order to achieve the goal of the study a policy review method was used, with the goal of highlighting the most impactful European policies for the organic production sector in Bulgaria. The main conclusion for the development of Bulgarian agriculture is that the concentration and specialization in production allows these larger-scale producers to be better positioned to leverage institutional support mechanisms. This is not without its challenges, as European green policies that promote sustainability require a more nuanced approach to policy implementation to succeed. The implementation of European green policies in Bulgaria must focus more on the support and promotion of internal markets and the shortening of food supply chains, by strengthening regional food supply.

Key words: agriculture, sustainability, food security

INTRODUCTION

The ability for Bulgaria's agricultural sector to produce food, based on high sustainability standards is highlighted by the European green deal (EGD) [8]. It is oriented towards the reduction of carbon emissions and transition to sustainable agriculture. As part of the European union, Bulgaria's agricultural policy is largely developed in regard to the Common agricultural policy of the Union and aims to achieve the same goals. The aim of this study is to analyse the policy mechanisms of the EDG and their application in the context of Bulgarian agriculture, paying attention to the opportunities for adapting local practices to these new requirements. The carbon neutral

economy that the Green Deal is set to build in Europe by 2050 is relaying on the decarbonisation of its' industry as much as on improving the sustainability of food production. European policies had great impact on Bulgarian agriculture and have been shaping the sector since the accession of the country to the union in 2007. This process is ongoing with the main goal being the integration of the CAP and the European Green Deal into national development strategies for the sector.

Bulgaria should adapt its practices through more sustainable agricultural methods that respond to climate challenges and contribute to reducing environmental risks [4].

Although countries with more developed economies, such as Germany and France, have better access to resources and technology, Eastern European countries, including Bulgaria, face difficulties due to economic and infrastructure constraints (Hurduzeu, et.al., 2022) [20]. However, the Green Deal encourages the introduction of eco-schemes that incentivize farmers to adopt sustainable practices, such as growing legumes and using renewable energy sources (Testi, et.al., 2023) [32]. The differences in the level of participation between EU countries highlight the need for better information and financial support for Bulgarian farmers. The main policy action of the EU that seeks to increase the sustainability of food production and reduce its environmental impact are the Farm to fork strategy and the Biodiversity strategy that are closely related to the European green deal and CAP (Cagliero, et.al., 2021) [5].

Member States must implement national CAP strategic plans that include measures to reduce greenhouse gas emissions, increase organic areas and promote innovation in agricultural technologies. Despite the challenges associated with high initial costs and insufficient infrastructure, the successful implementation of these policies is essential to achieve the EU's sustainable agriculture objectives by 2030.

In this context, the purpose of the paper is to study the impact of current European green agricultural policy implementation in Bulgaria in order to identify any failings and propose pathways for improvement in the future.

MATERIALS AND METHODS

To analyse the impact of European Union's policies on the development of sustainable agricultural practices in Bulgaria we have focused on policy analysis and various policy documentation has been investigated and cited in this research.

Data from centralised statistical databases has been used, mainly the Agrostistics database of the Ministry of Food and Agriculture of the Republic of Bulgaria [35].

The reference system of indicator used in this study includes pressure indicators as land use and livestock dynamics, as well as impact

indicators for European policies. The data used in this study was processed through consolidation of crop types and animal species. The Agrostistics database data was crosschecked for accuracy with the FAOSTAT database, and inaccuracies were not found.

RESULTS AND DISCUSSIONS

European green policies, promote the building and reinforcing sustainable food production networks among member states, as within those states. The impact of these policies in Bulgaria so far is largely felt through the Common Agricultural Policy (CAP) and its set of goals and measures. The CAP Strategic Plan for 2023-2027 [9] introduces a "green architecture" aimed at improving environmental conditions, but poses challenges for Bulgarian farmers, especially in terms of compliance with environmental standards.

The CAP is moving from quantitative to qualitative support, focusing on sustainable practices that meet consumer needs (Hulot, 2025) [19]. The European Union has long promoted sustainable agriculture through various policies and programmes that aim to reduce the environmental footprint of agriculture and improve its sustainability. Sustainable agriculture in the context of the EAC is advocated through various initiatives such as the European Biodiversity Strategy and the Soil Strategy (Boix-Fayos and de Vente, 2023) [3].

The Common Agricultural Policy includes environmental protection measures, agri-environment schemes, innovations for cleaner farming and environmental requirements for farmers. In Bulgaria, these policies play a central role in the modernisation of the sector by providing support for sustainable production and organic farming (Shukadarova, 2023) [29]. The CAP emphasises compliance with standards for good agricultural and environmental conditions, which has proven challenging for grain producers in Bulgaria (Shukadarova, 2023) [29]. Farmers face difficulties in maintaining minimum soil cover and setting aside arable land for unproductive areas, which leads to reluctance to apply for

support due to increased environmental requirements. The CAP for 2023-2027 emphasises environmental friendliness, competitiveness and social fairness, by promoting multifunctional agricultural production (Zinchuk and Kutsumus, 2023) [34].

Financial resources are directed towards eco-schemes and support for small and medium-sized farms, increasing food security and rural development (Oliinyk, 2022) [25]. Improvements in soil cultivation, soil cover and crop rotation are increasing, thanks to the introduction of conditioned practices. In addition, support for reduced use of targeted mineral fertilizers, as well as investments in precision agriculture, help reduce N₂O emissions. Overall, 35% of cultivated agricultural land in the EU should benefit from voluntary actions that will contribute to both carbon sequestration and N₂O emissions reduction.

These measures not only contribute to the sustainable management of agricultural resources (Pinta, 2024) [26] but also lay the foundation for further steps in reducing the environmental impact of agriculture (Smedescu, et.al., 2023) [30]. A significant part of the Farm to Fork Strategy is its goal to shrink the usage of chemicals (mainly pesticides, herbicides and fertilizers) by food producers in the EU by no less than 50% in a very short timeframe – by 2030. This ambitious goal is correlated to actions planned to be supported by multiple other EU initiatives.

The European Green Deal (Green Deal), which was introduced in 2019, sets ambitious goals for reducing carbon emissions and transitioning to a sustainable economy. One of the main focuses of the deal is sustainable agriculture, which is directly linked to food production. Among the main measures included in the EAA are reducing the use of chemical pesticides, promoting organic farming, and increasing biodiversity through agricultural land management. According to the strategy document, 25% of agricultural land in the EU should be organic by 2030. Some countries, such as Austria, have already exceeded this target, while others, such as

Romania (Ionitescu, 2023) [21], have more modest goals due to lack of demand and limited subsidies. The European initiatives focus on reducing greenhouse gas emissions and promoting organic farming, which is in line with Bulgaria's agricultural practices (Prigoreanu, et.al., 2024) [27].

As a core component of the EES, the Farm Strategy this Fork focuses on transforming food systems in accordance with the main sustainability goals. This strategy encompasses the entire food chain from production to consumption, emphasizing reducing chemical inputs, reducing post-harvest losses, and promoting healthier diets (Vasiliu, 2022 and Guyomard, et.al., 2023) [33, 16]. Regarding the challenges to the EHS objectives, about 50% of agricultural crops in the EU suffer from pollination shortages, droughts have led to annual economic losses of €9 billion, and the fragmentation of agricultural land and the lack of modern infrastructure continue to be barriers for Eastern European member states such as Romania and Bulgaria to adopt renewable energy and sustainable practices (Shukadarova, 2023) [29].

The Common Agricultural Policy (CAP) can support the Farm to Fork Strategy [11] target of reducing the use and risks of harmful chemical agents currently used in agriculture. Mandatory crop rotations and other measures such as bans on pesticides in watercourses and keeping fallow land support integrated pest management (IPM) (Directive 2000/60/EU) [6]. Pesticide reduction will be reinforced through voluntary eco-schemes on 27% of EU farmland. Reinforced soil management rules and buffer strips, combined with voluntary nutrient management interventions, will help reduce nutrient losses by 50% by 2030. Fertiliser restrictions and support for soil improvement cover 15% of EU farmland.

Adapting Bulgarian agricultural practices to European green policies: Just Transition Mechanism (JTM)

The JTM is a policy that encourages the transformation of regions and industries dependent on carbon-intensive practices towards more sustainable production models, including in agriculture. This mechanism is relevant for Bulgarian regions, where

agriculture with a high environmental impact can be transitioned to sustainable agriculture through innovation and financial incentives (Balogh and Toth, 2021) [1].

Promoting the transition to organic farming, which is compatible with the EU's green goals of reducing pesticides and improving soil health. Bulgaria has huge potential to expand organic farming, which would significantly improve the sustainability of agriculture in the country (Hodge and Mullen, 2021) [18].

Supporting farmers in the transition to new green practices requires training in sustainable agricultural methods, the proper application of new technologies and techniques, consultations, and incentives for innovation in agriculture (Kusz and Kusz, 2024) [22].

The transition to a green economy is essential for Bulgaria, focusing on resource efficiency and waste minimization, which can improve the sustainability of agriculture.

While the CAP aims to promote sustainable practices, some farmers express concerns about the feasibility of meeting strict environmental standards, potentially leading to a reduction in agricultural output.

In support of sustainable agriculture and food production in Bulgaria, the CAP provides significant financial resources, including guidelines for reducing negative environmental impacts and incentivizing practices that minimize the use of chemicals and enhance biodiversity. However, in Bulgaria, despite the availability of strategic funds for environmental schemes, there is a need for a wider implementation of these practices, which are key to sustainable food production (Georgieva, 2024) [14]. Bulgarian farmers need to be motivated to switch to agro-ecological and organic production methods to meet the EU criteria for sustainable agriculture and achieve better results in food production.

Innovation and modernization of food production in Bulgaria

The European Commission stresses the importance of innovation for modernising agricultural practices and improving productivity. The CAP provides financial instruments for developing innovation in the agricultural sector, which includes the introduction of new technologies and

sustainable solutions, such as precision farming and digitalisation. Although Bulgaria has many farms with great potential, the country needs to invest in research and the introduction of modern technologies that will help farmers improve the efficiency of food production and respond to changing climate conditions (EEA Report, 2020) [12, 28].

To achieve a successful transition to sustainable food production, Bulgaria needs to implement the CAP strategies for 2023-2027 [23], which emphasize economic sustainability and environmental requirements (Harizanova, 2024) [17]. It is important for the country to raise awareness among farmers about the new requirements and to invest in infrastructure to ensure the successful modernization of the sector. Forecasts indicate that Bulgaria can increase the production of organic products and increase its competitiveness on the sustainable food markets.

Organic farming in Bulgaria has improved greatly during the previous CAP planning period – prior to 2014, with the number of operators in the control system increasing from 214 to over 4,000. This process has a significant impact on the agricultural sector as a whole and thus needs to be further explained. The Ministry of Agriculture and Food of Bulgaria introduced Measure 11 "Organic Production" and promptly adopted Regulation No. 4 for its implementation to be included in the implementation of CAP in the country to support the growth of organic farming during the 2014 - 2020 period. Prepped up by the measure the sector continued to improve with an 18% increase in the number registered organic farmers in the first year of its implementation. Past 2016 the growth of the sector has been stifled by the difficulties producers encounter in the certification process. The lack of competition among the certification bodies in Bulgaria, led to market hegemony of large certification organization that increased the price for their services and made then inaccessible for small producers. Larger holding did not face the same issues and have increased their numbers, but they were mainly processors and traders of organic products.

Under the influence of market trends, a change in the production of organic products in Bulgaria is observed. The organic farms tripled their sizes up to 226 thousand hectares in 2019 (Table 1) compared to 2014. This process was also supported by the concertation of organic

production in Bulgaria, as the number of farms overall decreased. The organic pasture areas did increase significantly and consequently provide the opportunity for growth for organic livestock breeding.

Table 1. Areas of agricultural crops grown organically in Bulgaria (ha)

Crops	2019	2020	2021	2022	2023
Grains, incl. rice	17,845.2	15,550.3	12,496.6	18,802.5	18,439.2
Technical crops	27,578	27,253.1	18,544	17,088.6	18,753.9
Vegetables, melons and strawberries	2,648.3	2,107.8	1,716.2	1,342	1,726.4
Perennial crops	26,502.9	24,829.3	23,124	22,592.6	22,503.6
Pastures	27,338.9	30,153.8	19,063.4	29,855.7	69,894.7
Fodder crops	436.1	468.7	841.5	1,905.3	1,171
Fallow land	2,510.1	3,191.8	3,216.9	12,108.9	7,243.3

Source: Agrostistics of the Ministry of Agriculture [34].

During the period 2014-2019, there was an increase in the number of animals raised organically, but the relative share of organic livestock farms remained low – 2% for cattle breeding, 1.8% for sheep breeding and 4% for goat breeding in 2019. Only Bulgarian beekeeping achieved a significant share of organic production, reaching 27.6% of all apiaries in the country in 2019. Institutional support through the Rural Development Programme 2014-2020, expressed in Measure 11 “Organic Production”, has a positive impact on the development of the sector in the initial stages of its operation. However, the problems faced by producers lead to a slowdown in growth rates.

After 2019 to 2021, we account a significant decline in the areas for growing organic cereals, as this decline is common to the sector and is also reported for technical crops, which continue to be produced on a smaller scale in 2022. This decrease in the production base of organic agriculture in Bulgaria for the period from 2019 to 2021, and for perennial crops until the very end of the research period, reflects the decreasing base for the production of food products from organic crop production in the country.

The areas on which organic cereals are grown increase in 2022 and 2023, with the values even exceeding the areas reported in 2019. Despite the increase in the areas used for technical crops in 2023, they are slightly less than 9 thousand ha. less than the values for

2019. A similar process is observed in the areas on which organic vegetables are grown, as the recovery in 2023, after the period of permanent decline, is insignificant and they are nearly 1,000 ha. less than at the beginning of the research period.

The organic pastures expansion has a meaningful implication for the development of organic livestock farming in the country - is very different and dynamic. Despite the significant decline of more than 11 thousand ha in 2021, the values quickly recovered the following year and in 2023, organic pastures in the country reached peak values of nearly 70 thousand ha. This increase of 130% compared to 2020 reflects the expansion of the production base of Bulgarian organic livestock farming and is a key factor for the future development of the entire sector.

Organic livestock farming in Bulgaria is a small part of the entire sector (Table 2), with the only exception being organic beekeeping, as at the end of the research period over 28% of the bee colonies raised in the country were included in organic production and were in the control system.

Organic cattle farming more than doubles its production base by 2023 compared to 2022. The same process is evident with organic sheep herding and to a lesser extend in organic beekeeping. The base for organic goat farming remained unchanged, due to the production specifics of these farms and their smaller size.

Table 2. Farm animals in the control system

	2019		2020		2021		2022		2023	
Cattle	10,914	2.10%	10,343	1.80%	10,408	1.70%	13,724	2.40%	30,494	5.30%
Sheep	22,982	1.80%	19,090	1.50%	19,873	1.70%	25,995	2.40%	39,497	3.70%
Goats	9,175	4.00%	8,296	3.30%	8,108	3.80%	7,333	4.00%	7,951	4.50%
Bee colonies	239,223	27.60%	223,151	25.80%	218,949	26.10%	214,183	26%	233,920	28.60%

Source: Agrostatics of the Ministry of Agriculture [34].

In organic beekeeping, no significant changes were recorded during the study period, due to the earlier start of its development, as already in 2019, the sector reached its saturation point. Organic apiculture cannot benefit from the organic pastures expansion and the production

base stayed relatively steady throughout the period.

The number of organic beekeeping farms was the lowest in 2022 (Table 3). During the last studied year - 2023 increases to a slightly higher values than in 2021.

Table 3. Operators in the organic farming control system in Bulgaria

	2019	2020	2021	2022	2023
Registered organic farms	6,405	5,844	4,913	4,863	5,026
Ratio of organic farms	7.30%	7.20%	6.40%	5.90%	6.40%

Source: Agrostatics of the Ministry of Agriculture.

Throughout the studied period, the role of organic production as part of Bulgarian agriculture remained very low, with no more than 7.30% of producers choosing to join the control system and offer organic products to the market.

Organic crop farming in Bulgaria is lagging behind in its development compared to the organic livestock breeding in the country. The expansion of organic pastures alone is insufficient and to achieve the sustainable food goals of the union Bulgarian agriculture needs to continue developing its organic productions. The support farmwork will also have to be focused on diversification of organic farms with the inclusion of more traditional crops based on local market demands.

The current concentration of production in the sector is also reflected in organic farms, which may negatively affect these important factors. Adapting Bulgarian agricultural practices to the new EU requirements requires the integration of sustainable agricultural methods. Efforts need to be directed in several main areas, related to the development and support of organic farming, changes in the agricultural structure, training and consulting of farmers, resource efficiency and waste minimization. Modern agriculture is faced with a number of global environmental challenges related to population growth, limited arable land and

fresh water, and climate change. In these conditions, conventional agriculture has led to excessive use of resources, labour is no longer abundant, and energy demand is constantly increasing (Gomiero, 2011) [15]. To respond to the EU's main green policies, the agricultural sector is successfully introducing smart farming technologies, which can be summarized in three categories: farm management information systems; precision farming systems; automation and robotics in agriculture.

Farm management information systems are basic software systems for collecting, processing, storing and distributing farm data necessary to perform farm operations and functions.

Precision agriculture uses technologies to monitor and measure spatial and temporal variability between and within crop fields with the aim of improving economic returns and reducing environmental impacts (Finger, 2019) [13]. Conventional agriculture has a serious negative impact on the environment, human health and can't meet the sustainability goals of the population. Intensive agricultural practices lead to the loss of biodiversity - destruction of natural habitats, reduction of the population of wild animals and plants, destruction of local varieties of crops. The use of chemical fertilizers and pesticides leads to

water pollution, endangers aquatic flora and fauna, the health of agricultural workers and consumers.

Conventional agriculture is a cause of soil depletion, reduction of organic matter and erosion, which reduces soil fertility and resilience. Agriculture can become more sustainable and environmentally friendly by introducing regenerative agriculture practices. Conservation agriculture is a concept of agriculture that promotes zero or minimal tillage, maintaining constant soil cover through cover crops, and crop rotation. (Northrup, et.al. 2021) [24]. Conservation agriculture contributes to reducing greenhouse gas emissions, increasing soil carbon storage, improving soil quality and biodiversity, and reducing soil compaction and erosion.

All of this can improve the environmental performance of the farm, but it can also have a negative effect if herbicides are used uncontrolled in the first years of the transition from conventional to conservation agriculture. based on European Conservation Agriculture Federation (ECAAF) 2018 data only 16.5 thousand ha of arable land are adhering to conservation practices. In a five-year period these areas have increased to 200 thousand ha. Bulgarian agriculture's transition to more sustainable practices is supported through the EU's CAP. European policy is represented in local legislations through the Rural Development Programme (RDP), that provides financial incentives to Bulgarian farmers who commit to transitioning to biological and organic practices. Among the main measures included in the RDP are subsidies for the modernization of equipment, the introduction of innovations and sustainable technologies, as well as for the transition to organic farming practices. These incentives aim to reduce the use of chemical pesticides and fertilizers and promote environmentally friendly methods of growing agricultural crops (RDP, 2020).

The green architecture of the CAP, which has enrolled for the period 2023-2027[31], will introduce mandatory eco-schemes promoting sustainable agriculture. These schemes are part of the CAP reform, which aims to increase the environmental efficiency of agricultural

practices and minimize their impact on natural resources. The implementation of mandatory eco-schemes will provide additional opportunities to improve the production base of organic farming in Bulgaria and stimulate the transition to sustainable agricultural production methods (EU, 2021) [10].

Despite significant support from the European Union, Bulgaria faces a number of challenges in implementing green policies in agriculture. In particular, in areas with limited resources and insufficient awareness, farmers face difficulties in transitioning to sustainable practices. Studies show that smaller farmers in Bulgaria have a lower ability to meet the new requirements for sustainable agriculture compared to larger farms, which have greater access to resources and investments, which gives them an advantage in the adaptation process (Beluhova-Uzunova, 2020) [2].

In addition, despite the positive results achieved in organic farming, the reduction of chemical fertilizers and pesticides does not always lead to short-term economic benefits for farmers. This raises the need for additional support and training for farmers to help them effectively implement new technologies and methods for sustainable production. The inclusion of such measures in future support plans for organic farming development in Bulgaria is paramount for their successful implementation (Eurostat, 2020) [36].

CONCLUSIONS

The analysis of the impact of European green policies on food production in Bulgaria highlights the need to adapt local agricultural practices to the new regulations. The successful integration of these policies in Bulgaria depends on the effectiveness of support for farmers who need to switch to sustainable and ecological production methods. Policy makers need to include all relevant parties when developing plans for the next planning period (Cagliero , R, 2021) [5]. Their success will rely on the accumulative actions of farmers, researchers, investors and innovators.

Throughout the study period, the role of organic production in Bulgarian agriculture

remained relatively limited, with only 7% of agricultural producers offering organic products on the market. Despite the significant development of organic livestock farming in Bulgaria towards the end of the study period, organic crop production progressed at a slower pace. The production of quality and clean food is a fundamental element of the green policies of the European Union, that will in term lead to the improvement of quality of life within it. Organic farming is a key developmental area for agriculture's environmental sustainability and impact capacity and improvement.

To achieve better results and accelerate the development of organic crop production in Bulgaria the increase of the number of organic farms must be supported through all available measures. This will lead to an expansion of the scope of organically grown crops and will contribute to increasing food security in the country. Despite the positive trends in the organic production sectors, the current concentration of farmers and farms in certain regions of the country may lead to limiting the potential for achieving wide-ranging environmental and economic benefits that can be realized through diversification of production and wider application of organic practices.

Encouraging the wider inclusion of farmers in the organic certification system is not only a key element for increasing the capacity of organic agriculture, but also for optimizing the opportunities for its sustainable development in Bulgaria, as an important component of the EU's green policies.

The development of organic production in Bulgaria in the future will be increasingly linked to the opportunities for the sale of the produced products on the national market. The introduction of measures to stimulate the consumption of Bulgarian organic products by local consumers is necessary for the sustainable development of the sector.

The sector is going through a phase of concentration and specialization of production, with the number of operators decreasing, but the area and number of animals raised per producer increasing. These larger producers are better able to take advantage of the institutional support opportunities provided

and are creating a basis for the future development of the sector.

While European green policies aim to promote sustainability in Bulgarian agriculture, challenges to compliance and economic viability highlight the need for a nuanced approach to policy implementation.

The balance between economic growth and environmental protection remains a critical challenge, requiring continued support and adaptation of policies to ensure the viability of agriculture in Bulgaria.

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