



**Faculty of Economics and Social Sciences**

**ECONOMIC, REGIONAL AND SOCIAL CHALLENGES  
IN THE TRANSITION  
TOWARDS A GREEN ECONOMY**



**CONFERENCE PROCEEDINGS**

**30<sup>th</sup> of September 2021**

**Plovdiv, Bulgaria**

**Edited by Prof. Daniela Bobeva, PhD  
Assoc. Prof. Stefan Raychev, PhD**

**PLOVDIV UNIVERSITY PRESS**

**2021**

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Plovdiv University Press, 2021

**ISBN (print)** 978-619-7663-08-2

**ISBN (online)** 978-619-7663-07-5

## TABLE OF CONTENTS

### PLENARY SESSION

Speech by H.E. Mr. Petar Stoyanov, President of the Republic of Bulgaria 1997 – 2002 .....	7
Speech by Mr. Zdravko Dimitrov, Mayor of Plovdiv .....	9

### CHAPTER I

#### GLOBAL AGENDA FOR A GREEN ECONOMY

The EU as a Global Leader in the Green Agenda and the Role of Research and Innovation .....	11
Rosalinde Van Der Vlies	
Comparison of the Green Deal Policy in the European Union and South Korea .....	14
Evgeni Evgeniev	
Sustainable Development and ESG Approaches as the Basis of a Global Centralized Economy .....	36
Danilova Olga, Kashper Harry	
China's Policy for Economy Decarbonization .....	47
Teodora Peneva	

### CHAPTER II

#### MACROECONOMIC AND FINANCIAL CHALLENGES OF THE GREEN TRANSITION

Real Convergence and Green Transition .....	62
Daniela Bobeva, Dobrinka Stoyanova, Ignat Ignatov	
The Circular Economy and the Opportunities for Green Recovery in Bulgaria .....	80
Vania Ivanova	
Fiscal Measures for Diffusion of Environmental Technologies .....	93
Iana Paliova	
Financial Stability Risks Related to Climate Change and Greening of Central Banks .....	107
Silvia Zaharieva Kirova	

The way to Sustainability in European Agriculture: the EU Green Deal and the Farm to Fork strategy.....	124
Hristiyan Uzunov, Eduard Marinov	
Reshaping Finance to Fighting Against Climate Change.....	143
Svetlana Alexandrova-Zlatanska	

### CHAPTER III

#### GREEN TRANSITION IN DIFFERENT INDUSTRIES

Green Economy: Next Generation Competitiveness – Reaching the Goal of Being Climate Neutral – is this Mission Possible for the Bulgarian Industry .....	158
Milena Angelova	
The Green Context of Political, Economic and Social Development and the Tourism Industry.....	172
Mariya Stankova	
Green Deal in public transportation – transitions that actually make sense .....	186
Aygün Ertürk-Mincheva, Yulia Dzhaharova, Stanimir Kabaivanov	
The Green deal – a challenge and a factor for sustainable development of the construction company .....	204
Aneta Marichova	
Energy Transition Because of the Green Deal.....	218
Anton Ivanov	
Waste Products from Wine Production and Possible Paths to a Green Economy .....	233
Stefan Georgiev, Tania Yankova	
Geospatial Approach to Analysis of Greenhouse Gas Emissions .....	249
Galina Ilieva, Tania Yankova	
The Green Transition and Bulgarian Consumers’ Attitudes Towards Ecolabels and Sustainable Products.....	263
Iva Kostova, Daniela Ivanova	

# **The way to Sustainability in European Agriculture: the EU Green Deal and the Farm to Fork strategy**

**Hristiyan Uzunov<sup>1</sup>, Eduard Marinov<sup>2\*</sup>**

**Abstract:** The EU is a region of productive but already relatively intensive agriculture with an array of unresolved environmental issues, and is currently a net exporter in terms of economic value in the agriculture and food sector. Given the challenges it appears that the European Union and its member states are uniquely suited to spearhead the challenge to push towards a more sustainable agriculture of the future – agriculture which maintains and enhances high productivity, which preserves and improves the production resource base, which moves towards more sustainable consumption patterns associated with reduced waste, and which at the same time radically improves the environmental performance of food production. Namely these are the main focus areas of the EU Green Deal and the Farm to Food strategy of the Union. The study aims to analyse the future vision for sustainable agriculture in Europe that these strategic frameworks aim to, examining the EU Green Deal in the context of agricultural sustainability, and assessing the Farm to Fork strategy as means to achieving sustainable agriculture in Europe. The paper concludes with some remarks and considerations relating the EU Green Deal and the Farm to Fork strategy to the notion of sustainability in the context of agriculture.

**Keywords:** Sustainable agriculture, EU Green Deal, Farm to Fork

## **1. Introduction**

Agriculture is the cornerstone of the past, present and future world. It is the key driver behind the population growth on the planet and an essential element that has enabled global economic growth. The most important aspect of agriculture is the supply of food for the human population and also the supply of various agricultural produce for major industries like pharmaceuticals, diesel fuel, plastic and more. In the last sixty years global agricultural productivity has increased throughout the world driven by growing food demand. The main elements that have contributed are the

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<sup>1</sup> Graduate Master of International Business, New Bulgarian University, Department “Economics”, Sofia, Bulgaria

<sup>2</sup> Assoc. Prof. PhD, New Bulgarian University, Department “Economics”, Sofia, Bulgaria

\* Corresponding author

increased agricultural area, progress in seed development technologies, advancement in agricultural machinery, deeper understanding of agricultural processes and plant development, introduction of synthetic fertilizers and innovative crop protection products. Those technologies include but are not limited to modern agricultural machinery, innovative digital tools, new generation of crop protection products, seed varieties with higher yield potential. These changes allowed the expansion of the food value chain across the world.

The European Union has also experienced this positive increase of agricultural productivity even if the observed curve isn't so steep. The reasons driving this growth are similar to the global ones and shouldn't be accredited to the expansion of the union to include more countries from Central and Eastern Europe. To current date France, Germany, Italy and Spain remain the countries with the highest yield of the main agricultural produce.

However, this positive trend that has been observed in the last 60 years looks different if we focus on the short-term development. It becomes apparent that the agricultural productivity in the EU in most recent years is stagnating. This can be attributed to the recent climate changes that have faced agriculture with unprecedented weather conditions. Central and Eastern Europe have faced severe droughts in autumn and spring combined with softer winter leading to lack of humidity for arable crops. On the other hand, strong rainfalls in countries from Northern Europe have caused thousands of hectares to be impossible to farm as they remain under water for long periods of time. This raises certain concerns as data also shows that arable area in the EU is also not increasing and even has decreased by an average of 2% in the period between 2008 and 2018 (EC, 2019). This means that the increasing yield is left as the only element if increasing food demand is to be managed.

In the same time the topic of sustainable agriculture is a top priority in Europe and beyond. All the recent challenges that agriculture has faced raised concerns that moving forward, the higher productivity should not be the only driving force. Sustainable farming practices must be followed to ensure that agriculture is responsible towards the natural resources, biodiversity, climate and the society itself. Sustainable agriculture is not an entirely new topic but it is in the last several years that the need of a common European strategy that will generate the roadmap to achieve it became apparent. One important question for the future would be how to make agriculture more sustainable without having to sacrifice the much-needed productivity. Going in this line of thinking it is quite clear that new innova-

tive technologies need to be implemented in the EU countries to facilitate this transition.

The EU commission however has taken a different direction and imposed quite a restrictive number of legislative acts that create hurdles in the development and implementation of new chemical products and seed technologies. This can be credited to the strong trend of changing consumer requirements and demand. In the past consumer demand was mainly driven by the need to find nutritious and affordable food. The main decision criteria were food quality and price. Now other leading criteria are food origin, food safety, taste, organically produced or not, ethics and beliefs (The European Green Deal, 2019).

Societal demands will remain a key driver in shaping agricultural markets over the next decade. Consumers and citizens show increasingly pressing and at times conflicting expectations towards food, extending beyond food affordability to issues such as health, origin, convenience, environment, climate change, animal welfare, etc. This creates a unique challenge in front of all stakeholders in the food value ecosystem in Europe – a need to increase agriculture productivity but also develop a new sustainable approach towards agriculture that adds value to farming, environment and society. This would require all parties in the value chain to reshape the way they do business to become more sustainable. In the same time, they must remain profitable and financially stable.

The answer of the European commission to the outlined questions above is the recently published Farm to Fork strategy, proposed by the Commission as part of the Green Deal, which wants to enable the EU to make a real contribution to the sustainability goals and address the important challenges faced by our food systems. The Farm to Fork strategy states: “In 2050, the world’s population is projected to reach nearly 10 billion and important that people have sufficient access to safe, affordable and nutritious food. While the transition to more sustainable food systems has started, feeding a fast-growing world population remains a challenge with current production patterns. Food production results in air, water and soil pollution, contributes to the loss of biodiversity, climate change and resource depletion. Food waste is at an unacceptable level: currently, waste food is amounting to about 20% of all food produced in the EU. Obesity is also a growing concern with over half the EU’s adult population is now overweight, contributing to a high prevalence of diet-related diseases and related health care costs.”

To achieve the Farm to Fork strategy the EU needs to involve all stakeholders in the value chain and facilitate actions towards sustainable food sup-

ply. These actions are not just limited to farmers and agriculture but impact also society and environment. For this to be possible a mind-set shift is required. Sustainability is a long-term process which requires commitment and will. The EU commission's role is to push for all stakeholders to move in the same direction they are setting with the new strategy.

This study aims to analyse the future vision for sustainable agriculture in Europe that the Green Deal and Farm to Fork strategy aim to. The first section examines The EU Green Deal in the context of agricultural sustainability, while the second analyses the Farm to Fork strategy as means to achieving sustainable agriculture in Europe. The paper concludes with some remarks and considerations relating the EU Green Deal and the Farm to Fork strategy to the notion of sustainability in the context of agriculture.

## **2. The EU Green Deal – a roadmap to turn the challenges to opportunities**

The Green Deal is EU's growth strategy that aims to address the current challenges that the climate, environment and economy are facing. It wants to achieve a zero net emissions of greenhouse gases by 2050. The Green Deal wants to protect, conserve and improve on the natural capital in the region. By doing so to ensure the health and well-being of all European citizens. When presenting it the president of the EU commission Ursula von der Leyen said "Our goal is to reconcile the economy with our planet and to make it work for our people."

The Green Deal is an ambitious roadmap that wants to make all economic sectors, which previously weren't, sustainable. The communication document clearly states that this transition to a more sustainable future must happen in a just way. It should take in account the needs of the people, the specifics of the different regions and members states and also the needs of the various business industries which would be impacted. Part of the introduction of the document describes EU's unique position to achieve this ambitious target:

"The EU has the collective ability to transform its economy and society to put it on a more sustainable path. It can build on its strengths as a global leader on climate and environmental measures, consumer protection, and workers' rights. Delivering additional reductions in emissions is a challenge. It will require massive public investment and increased efforts to direct private capital towards climate and environmental action, while avoiding lock-in into unsustainable practices. The EU must be at the forefront of coordinating international efforts towards building a coherent financial system that sup-



ports sustainable solutions. This upfront investment is also an opportunity to put Europe firmly on a new path of sustainable and inclusive growth. The European Green Deal will accelerate and underpin the transition needed in all sectors.

The environmental ambition of the Green Deal will not be achieved by Europe acting alone. The drivers of climate change and biodiversity loss are global and are not limited by national borders. The EU can use its influence, expertise and financial resources to mobilise its neighbours and partners to join it on a sustainable path. The EU will continue to lead international efforts and wants to build alliances with the like-minded. It also recognises the need to maintain its security of supply and competitiveness even when others are unwilling to act.” (The European Green Deal, 2019).

This makes it clear that the ambitions of the Green Deal are not focused just on Europe as a continent but want to initiate in globally and lead to collaborative network between countries, united by the same vision.

The Green Deal is viewed as an integral part of the EU Commission’s strategy to implement the UN sustainable development goals and other EU priorities. It consists of various elements which only by working in synergy can bring the desired result.

### ***2.1. Increasing the EU’s Climate ambition for 2030 and 2050***

To clearly define the conditions for a fair transition to a climate neutral economy and offer transparency and predictability for investors the European Union will introduce the first European “Climate Law” which aims to set the legislative frame on how the EU’s target for climate will be achieved. The introduction of these policies will ensure effective carbon management throughout the whole value chain in the economy. It aims to proactively address business and consumer behaviour and facilitate a change towards more responsible management of all activities to mitigate negative effects on climate. The EU will ensure that all parties will have sufficient access to information and will develop instruments to support risk management of activities connected to climate change.

### ***2.2. Supplying clean, affordable and secure energy***

Production and use of energy across the different economic sectors of the EU are contributing more than 75% of the total EU’s greenhouse gasses. The EU aims to stimulate and develop infrastructure for alternative energy. All member states would need to revise their climate plans and take in account rapid transition from coal and decarbonizing gas to clean energy. This

phasing however must not happen at the expense of the consumer. The EU Commission will present a plan that will ensure the energy supply needs and ensure its affordability for consumers and businesses while also pushing towards clean energy transition. Various financial programs would be put in place to stimulate renovation of households to improve energy efficiency.

### ***2.3. Mobilizing industry for a clean and circular economy***

It takes a whole generation to transform an entire industrial sector throughout the different value chains. To achieve the 2050 targets decisions, need to be made in the short-term. The transition to a greener EU is an opportunity to discover new business opportunities and find innovative ways to intensify economic activity. The EU business has already taken steps to become more sustainable but this is happening at a slow pace. To accelerate the transition The Commission aims to mobilize all industrial sectors to transition to a sustainable model of inclusive growth.

### ***2.4. Building and renovating in an energy and resource efficient way***

Construction and renovation of buildings account for more than 40% of energy consumed. The EU aims to increase the percentage of annual renovation rate of buildings which is on average 1% today. To address the challenges of energy efficiency and affordability the Green deal will set in motion actions to have Member states engage in a renovation wave of public and private buildings. This offers an opportunity to both optimize energy consumption and also stimulate SMEs in the construction sectors.

### ***2.5. Accelerating the shift to sustainable and smart mobility***

Transport accounts for almost a quarter of the GHG in the European Union. The Green deal aims to have a 90% reduction in transport GHG emissions by 2050. This target includes all rail, aviation, road and waterborne transport. The Commission aims to adopt a strategy for sustainable and smart mobility that will address this challenge and tackle all emission sources. This would lead to a substantial part of inland freight carried today by road to shift onto rail and inland waterborne transport. Automated and connected multimodal mobility will be a key role for the future. The EU aims to create an appropriate infrastructure to support new sustainable modes of transport that can reduce pollution and congestion, especially in densely populated areas.

## ***2.6. Preserving and restoring ecosystems and biodiversity***

The EU has not been able to meet some of its most important environmental goals for 2020 like the Aichi targets under the Convention on Biological Diversity. With the new Green deal the EU aims to halt biodiversity loss across its Member states by presenting a Biodiversity Strategy in 2020. It will outline EU's targets to protect biodiversity and also address the main causes of biodiversity loss. It will present a set of specific measures such as increasing the area of protected land and sea under Natura 2000 network. In fact, all future EU policies would be aimed at contributing and preserving the natural capital of Europe.

## ***2.7. A zero-pollution ambition for a toxic-free environment***

To protect Europe's citizens and ecosystem the EU aims to better monitor and remedy pollution from air, water, soil and various consumer products. To achieve this The Commission aims to provide a framework in which all Member states will need to systematically need to look at all policies and regulations. In addition, The Commission will adopt a zero-pollution action plan.

The Green Deal contains a number of strategies and plans, such as the Sustainable Europe Investment Plan, an action plan for circular economy, a new industrial strategy, the new EU Biodiversity Strategy to 2030 and a Farm to Fork sustainability strategy aimed at agriculture. In addition to that there is a concept of implementing a carbon border tax in order to prevent carbon leakage. The Green Deal also pushes the idea to transform the current European Investment bank into a European climate bank, focusing on financing predominantly green projects. It also envisions a financial mechanism to ensure a just transition to the vision of the future that the Green Deal aims for.

The Green Deal also led to the creation of the draft of a climate law which sets a goal for Europe to become climate neutral by 2050. This legislative document would allow the EU Commission to track and assess the progress of member states through reaching carbon neutrality. It plans to start this process as early as 2023 and perform assessments every five years. It goes even further by pushing for reduction of greenhouse gas emissions by 50% already in 2030. It sets this ambitious target to tackle the increasing risk of a catastrophic climate change.

### **3. The Farm to Fork Strategy – for a fair, healthy and environmentally-friendly food system**

The Farm to Fork strategy is outlined as one of the major elements of the EU Green deal which provides a set of objectives for agriculture to achieve by 2030. It addresses the challenges of sustainable food systems and underlines the strong connection between healthy people, societies and a healthy planet. The strategy is also the answer to the United Nations' Sustainable Development goals. The EU commission believes that a sustainable food system which is responsible towards the environment, health and society would not just ensure the food security of Europe but also bring new economic gains. This is even stronger implied in the times of the Covid-19 pandemic.

European food by default is accepted as a high standard for safe, plentiful, nutritious and high quality. This is the result of steps which have been taken in the last years materializing in various policies. The Farm to Fork strategy now aims to turn European food into a global standard also for sustainability. It is important to note that the Farm to Fork strategy by itself is not a legislative document. However, it sets the direction for the EU Member states and would be taken in account in all future agriculture policymaking. For the purpose of this paper we would highlight the relevant to this research objectives that the Farm to fork strategy presents.

The Farm to Fork aims to reduce the environmental and climate footprint of the EU food system and strengthen its resilience to ensure food security in Europe in times with great challenges such as climate changes and biodiversity loss. In practice this would mean that all stakeholders in the food value chain – starting from production, through transportation, distribution, marketing and finishing with consumption have a positive or neutral environmental impact. This would require a responsible usage of all natural resources such as land, water, soil, air, plant and animal life. In addition to ensure food security it is required to have sufficient access to healthy and nutritious food for the entire population in the EU. There is also the element of preserving the affordability of food and in the same time to generate fairer income throughout the food supply chain, focusing mostly at farmers. To facilitate all of the above the Commission is expected to submit a framework for sustainable food system before the end of 2023. The framework will promote policy coherence at EU and local level and aim to mainstream the topic of sustainability and food security.

In fact, just a framework on sustainable food system would not suffice as currently there is no clear definition or criteria which define such kind of system. The EU would need to invest in providing it by tackling

the topics of certification and labelling of food throughout the different levels in the food value chain.

The Farm to Fork strategy also addresses the topic of circular bio-based economy which the Commission defines as a largely untapped potential for farmers and their cooperatives. The strategy calls for farmers to grasp opportunities to reduce GHG emissions from their activities by developing circular models such as production of renewable energy from manure.

### ***3.1. New approaches to plant protection and fertilization***

One critical point that the strategy addresses is the usage of chemical pesticides. By using the already established Harmonized Risk Indicator to quantify the progress in reducing the risks linked to pesticides, the Commission sets an ambitious target to achieve by 2030. Additional action will be taken to reduce the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50%. To do so the Commission will revise the Sustainable Use of Pesticides Directive, enhance provisions on integrated pest management and promote use of safer alternatives for crop protection. However, this commitment has already met a lot of backlash from the crop protection industry and member states. These ambitious targets should not risk the food security and competitiveness of European farmers. It is important that a right approach is adopted to ensure more responsible usage of chemical pesticides by leveraging new technologies such as digital tools and new seed and trait development.

One of the key competitive advantages of European agriculture has always been the fact that food originating from the EU member states has to respond on various safety standards. This has given a certain competitive advantage to the EU compared to other leading agricultural regions in the world. However, this higher quality doesn't always materialize in a higher price on the market. Thus, European farmers are still strongly dependent on their yields. The proposal to severely reduce pesticide usage needs to be carefully evaluated and requires a thorough impact assessment. Already some member states have voiced concerns about the scientific reasoning behind such an ambitious target. In addition, he stressed the need to carefully approach the legislative framework that the Farm to Fork aims to generate.

Research done by the European Parliament Research Service shows that a ban of plant protection product use can lead to 80% yield losses (EU Scientific Foresight Unit, 2019). Data shows that major grown crops like wheat can have a yield gain of up to 19% thanks to the use of the crop protection products, while in potatoes it can lead to 42% compared to crops

grown without any pesticide applications. An example of that are farms in Denmark, specialized in potatoes, sugar beet and grass seeds which lost 270 euro per ha after a certain group of active ingredients were banned for use. The study points that a pesticide reduction is possible in countries with high productivity and high intensity of arable crop cultivation. An example is study in France where low pesticide usage in selected farms did not lead to a reduction of yield or profitability (Lechenet et al, 2014). It is important to underline that a possible reduction of plant protection usage in agriculture is almost impossible to precise due to the complexity. Different crops and cultivation systems have different needs and requirements in achieving desired yield and ensuring needed profitability. So, as it may stand that some intensive crop growing like cereals can retain current yield levels even with a reduction of plant protection products, others like vegetables may not be able to do so. In the end a total removal of pesticide usage is not feasible today and may be possible only after a technological jump in cultivation and crop growing.

The topic of pesticide usage is one of the most discussed ones in recent years. Societal pressure has led a call for more sustainable practices which often is only correlated with a decrease in plant protection product usage. Mass media rarely changes existing attitudes but rather reinforces message and strengthens public perception through constant repetition. One of the key problems in the dialogue between stakeholders and media coverage is the lack of accuracy, objectivity and sourcing when it comes to statements and measures. The STOA research shows a 1999 study in 5 different countries found that more than half of consumers trusted NGO's messages on food safety, which was more than the people trusting scientists and even more of the authorities (EU Scientific Foresight Unit, 2019).

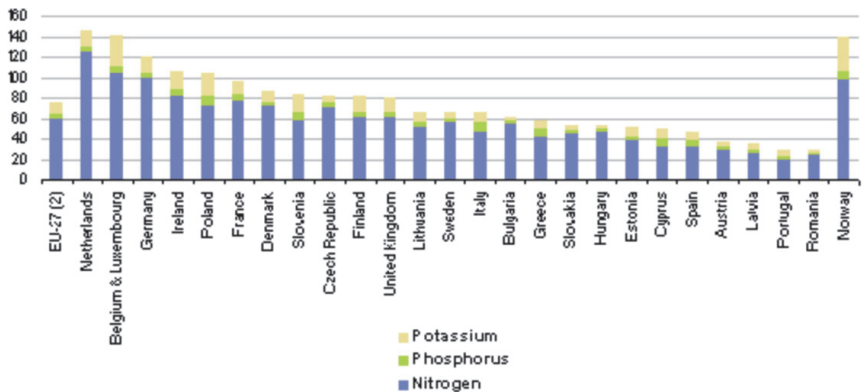
Farmers, who should be the ones which should be the focus of the dialogue, find plant protection products as a necessary input for their production. Due to the complexity of growing different crops and facing various external factors, precise forecasting of disease appearance and development is often not possible. Following the principles of integrated plant protection can ensure that pesticide treatments are used as a last resort but unfortunately with the currently available technologies this is not the case. Chemical treatments are viewed as an insurance for the farmer to reach the desired outcome.

Last but not least consumers, which are the ones heavily referenced in the Farm to Fork strategy, call for a reduction or avoidance of pesticide usage. Their expectations are often not substantiated with in-depth understanding, meaning they require a near-perfect product which is grown

without any chemical usage. This however is almost not possible and delivering imperfect produce results in a lower price that the farmer receives for it. A reduction of plant protection product usage is only possible is society is well informed and sets the right expectation. However, this reduction again cannot result in total avoidance and needs to be adapted to the various production system requirements.

In addition to reducing pesticide usage the Farm to Fork sets out to reduce also fertilization usage by 20% by 2030 (Figure 1). To do so the Commission would propose an integrated nutrient management action plan which would ensure sustainable nutrient management throughout their lifecycle and ensure soil fertility.

**Figure 1:** *Estimated consumption of manufactured fertilizers*



**Source:** *EUROSTAT, Fertilizer consumption data in kg of nutrient per hectare*

The Commission will also work with Member States to extend the application of precise fertilization techniques and sustainable agricultural practices, notably in hotspot areas of intensive livestock farming and of recycling of organic waste into renewable fertilizers. This again poses the need of a careful assessment of the potential effect on yield. Nitrogen is the most used nutrient in agriculture. And is regarded as essential for a number of processes determining good crop growth and higher yields.

Furthermore, the EU Commission will act to reduce nutrient losses by at least 50%, while ensuring that there is no deterioration in soil fertility.

### ***3.2. Supporting the move towards organic farming***

The EU Commission will put forward an Action Plan on organic farming, as part of the Farm to Fork strategy. This will help Member States stimulate both supply and demand for organic products. It will ensure consumer trust and boost demand through promotion campaigns and green public procurement. This approach will help to reach the objective of at least 25% of the EU's agricultural land under organic farming by 2030.

Making 25% of EU's agriculture organic in the next 10 years will not, for example, reduce the climate footprint of the EU. The main reason behind this rationale is the yield gap between conventional and organic agriculture. Producing less within the EU will, broadly speaking, increase the need for importing certain products and hence occupying more land to produce these goods outside the EU. The yield gap between the two production systems has been widely covered in scientific literature (Smith et al., 2019; Wilbois & Schmidt, 2019).

Additionally, literature on land-use change, which would be the main driver of additional emissions, is ample. A recent study highlights the increase in overseas emissions due to a change in the farming system from conventional to organic: Smith et al. (2019) argue that food production would drop by 40 percent (expressed as metabolisable energy (ME)) under a 100 percent shift to organic food production in England and Wales. Direct emissions associated with organic crop and livestock production are smaller for organic farming compared with conventional: by 20% for crops, 4% for livestock and 6% overall. It is estimated that the land area needed to make up for shortfalls in domestic production is nearly five times the current overseas land area used for food for England and Wales. The GHG emissions occurring due to the increased need for land overseas depend on the kind of land use change (conversion of existing natural or semi-natural vegetation or pasture to crops). In the medium scenario, GHG emissions could increase by 21% compared to conventional agriculture.

It is important to think about consequences of increased agricultural imports. Importing food always means leaving a complex footprint of land and water use, GHG emissions and pressure on biodiversity in the producing country. These footprints differ greatly from country to country, depending on a multitude of factors, including growing and climate conditions, agricultural regulations, and productivity of the agricultural system. Now, this might differ from product to product, but EU agriculture has a comparative advantage on several agricultural products. For wheat, for instance, Europe has higher yields than the rest of the world. If one would



now reduce agricultural area in Europe, more than this area would be needed elsewhere to produce the same amount.

Costs of eating organic-only are generally higher than a diet based on conventional food (Carlson, 2019). However, pricing of organic versus conventional products on the consumer level is very heterogeneous and strongly depends on the product category. One source analysing the German organic market finds an average increase of 5-70% for switching from conventional to organic food. 146 In contrast, price premiums on the producer level are usually easier to trace, as can be seen in the figures below for wheat and milk. As a reference, in 2017, households in the European Union spent 12,2% of their total consumption expenditure on 'food and non-alcoholic beverages'. This is the third most important category of household expenditure after 'housing, water, electricity, gas and other fuels' and 'transport' (Eurostat, 2020). Globally, household expenditures for food are relatively low in Europe. Nevertheless, the macro- and micro-economic theory behind yield declines and price increases on complex and closely connected international agricultural markets is highly complicated, hence, the impact of the shift to organic farming on food prices is difficult to predict. Furthermore, the price premium would probably disappear in case 'organic products' would become a commodity.

Having discussed possible methodologies for measuring and comparing the environmental impact of organic farming, it is important to highlight the yield difference between organic and conventional agriculture. This difference in yields, usually referred to as the yield gap is broadly documented and accepted in the scientific literature.

Several meta-analyses have been conducted in the past years, the three most widely recognised studies come to the following conclusions (average across all crops and regions):

- Seufert et al. (2012): – 5 to – 34% yield gap;
- de Ponti et al. (2012): – 20% yield gap;
- Ponisio et al. (2015): – 19% yield gap.

All three studies highlight, that the yield gap between the two production systems strongly depends on the crop type and region. Caldbeck and Sumption (2016) have provided a useful summary of the yield gap in different crop types. For the European Union, data for wheat and maize as well as milk indicates a rather strong variation between producing countries. Organic wheat yields in Germany are only roughly 40 percent of conventional yields, while in Italy, organic wheat yields are 85 percent of conventional yields. For maize the differences are not as substantial ranging from slightly above 60

percent in Poland and Austria to over 90 percent in France. For milk, organic yields range between 65 percent (Poland) and over 90 percent (Netherlands).

### ***3.3. Output and productivity***

A likely implication of the measure to European agriculture is a reduction of agricultural output and productivity. Reducing the use of PPP, increasing the area for organic farming, and setting aside land for protected areas will put pressure on agricultural land. A reduction of domestic production will, unless consumption levels in Europe will change significantly, be buffered by an increase of agricultural and food imports from third countries. As many of the trading partners of the EU have less strict environmental standards, a loss in competitiveness might be a consequence. Increasing imports is especially problematic when analysed from an environmental point of view. The EU is highly productive and yields of many agricultural products are amongst the highest on the planet. Outsourcing production to other countries will have negative effects on the environmental conditions of the trading partners, or as Fuchs et al. (2020) put it: “EU member states are outsourcing environmental damage to other countries, while taking the credit for green policies at home.”

As a reference: In 2019, the European Union (EU-27) imported 153 million tons of agricultural products from outside the EU, worth a total of EUR 143 billion. Between 2002 and 2019, the volume of food imports annually increased by an average of 1.7%, while the value of imports annually increased by an average of 4.4% (Eurostat, 2020).

The targets of both the Biodiversity Strategy as well as the F2F Strategy are very likely to put considerable pressure on agricultural areas and consequently on agricultural output. Increasing the agricultural area within the EU to maintain or increase current food production is unconvincing and not in line with the targets of both strategies. Essentially, this thought is part of the ongoing debate between ‘land sharing’ and ‘land sparing’, which Pearce (2018) summarizes as follows: “Should we be sharing our landscapes with nature by reviving small woodlands and adopting small-scale eco-friendly farming? Or should we instead be sparing large tracts of land for nature’s exclusive use – by creating more national parks and industrializing agriculture on existing farmland?”

The two discussed strategies seem to combine both an increase of protected areas and a decrease of intensified agricultural production on agricultural areas, consequentially, combining both approaches. Agricultural land in the EU has, in fact, been declining in the past decades.

One of the main drivers for this is the expansion of artificial areas (urban areas, infrastructure, and industrial areas). At the same time, agricultural

productivity in the EU has been increasing. For example, yields for wheat, maize and barley grew substantially since 1965 (these three main crops accounted for over 85 percent of total cereal production in the EU28 in 2018 (Eurostat, 2019).

On a global level, growing yields have contributed to the sparing of land for other uses. As Ritchie and Roser (2021) argue that, had yields stayed at the level of the early 1960s, the area needed to produce today's amount of cereals would be roughly 1,26 billion hectares bigger.

### 3.4. The expected results

By deriving from the Farm to Fork targets and following the basic assumptions (Table 1): organic farming results in 30% yield reduction in the EU, 50% in Germany; set-aside land for biodiversity does not yield anything (nothing harvested); when 25% organic farming and 10% set-aside land are achieved, 27% of reduction of crop protection products is already achieved; Remaining 23% results in at least 5% yield reduction – a rough estimate on the cumulative impact of the Farm to Fork measures suggested that productivity in EU would decrease by 20% and in the EU by 27%.

**Table 1:** Expected results (3 different scenarios)

		Aspect 1	Aspects 1+2	Aspects 1-3
EU	Current	F2F 25% Org	F2F + 10 n.p.	F2F - 50% PPP
<b>Conventional farming</b>				
Land (percent)	92,5	75	67,5	67,5
Yield (percent)	100	100	100	92,87
Production units	9250	7500	6750	6268,725
<b>Organic farming</b>				
land (percent)	7,5	25	22,5	22,5
Yield (percent)	69	69	69	69
Production units	517,5	1725	1552,5	1552,5
<b>Production units total</b>	<b>9767,5</b>	<b>9225</b>	<b>8302,5</b>	<b>7821,225</b>
		<b>-5,6%</b>	<b>-15,0%</b>	<b>-19,9%</b>

*Source: own calculations*

The Farm to Fork strategy is high on the agenda of the agri-food community. Reactions range from emphasizing its positive aspects, at times despite negative expectations, to raising doubts or criticism. In gen-

eral, ecologist NGOs welcomed the strategy as a timely potential game-changer to save the planet from destructive practices, and as a shift towards sustainable future policies, though commitments are still just aspirational. Others see it as a first real attempt at an EU food policy that favours biodiversity and health over agribusiness profits, aims at empowering consumers to make informed healthy food choices, and can offer opportunities to food and drink sector SMEs hit by the crisis. This entails changes in production and consumption patterns, including alternative proteins for food and feed.

Critics emphasize the lack of a scientific approach, such as in the case of the farming sector's claims that certain proposals lacking an impact assessment would endanger EU agriculture and mislead consumers.

Sector stakeholders question targets on pesticides as unrealistic and those on fertilizers as too ambitious, whereas targets on organic farming would be achievable by rewarding organic conversion. Others regret the absence of issues such as access to land, or consider new farm policy proposals are needed. In certain views, meat production and consumption are not adequately addressed by the strategy, despite being a main societal challenge.

On the other hand, the meat sector warns about simplistic measures putting off meat consumption and recalls meat's important place in the EU's rural economy and eating habits, and as a key component of circular food systems. Think-tanks generally welcome a strategy that identifies the conditions for reaching sustainable food systems, but warn that broad support for its realization is essential, in particular for overcoming its intrinsic limitations.

#### **4. Conclusion**

The recent challenges that Europe is facing have initiated a given way for an increasing focus and discussions on the topic of sustainable agriculture. Issues like loss of biodiversity and climate change have shown the importance of implementing practices to ensure a sustainable development for agriculture that takes in account the importance of economy, environment and society. These practices include selecting appropriate production systems fit for the specifics of the agricultural market in Europe, considering also the national and local agriculture needs. Sustainability and productivity should not be viewed as separate things and need to be achieved in parallel to ensure the future food security of the continent.

The right approach for European agriculture should consist of farmers adopting a more systematic approach on how they manage their farms. This

means shifting the focus from managing inputs to maximize outputs to the overall interaction between the different elements like – water, biodiversity, soil, crops, cultural specifics, societal requirements, economic concerns. It is usually the case that investments in R&D are pointed in the direction of the largest types of production systems which are the ones bringing the highest profit. This may seem like a solid approach for many industries but for farming that is not the case. Farmers vary in what production systems they apply, how they realize their produce, what's their cultural and agronomical background. The high diversity of conditions both climatic, environmental and cultural throughout Europe present a complexity which might hide new opportunities moving forward.

European agriculture is faced with many challenges for the future. It has set out to become more sustainable without compromising the high levels of productivity it was able to reach in the last decades. This is crucial for assuring food security for European citizens. The EU commission has identified that to continue growth in the region it has to make sure this is done in a sustainable manner. To address the challenge of becoming more sustainable the EU has published the Green Deal – a set of legislative measures and policies which aims to make Europe the first climate neutral continent by 2050. Sustainable agriculture has been specifically addressed by the new Farm to Fork strategy, part of the Green Deal. Both documents show the priorities of the region and draw the vision for future Europe.

Sustainable agriculture is long-term process, a transformation, towards not just increasing efficiency in agriculture by producing more but by doing so in a sustainable manner that adds value to farmers, society and the environment. The European Union aims to be the front runner in this transformation and have set a bold vision for leading Europe towards a green economy. This is outlined in the EU Green Deal and Farm to Fork strategy, which focus on agriculture. The bold vision for farming in Europe needs to be reviewed systematically and a thorough impact assessment of the proposed measures needs to be done. A careful consideration of the opportunity that sustainability can provide for farmers and the risk to their ability to compete with producers in other parts of the world is needed.

Agriculture is uniquely positioned to address many of the challenges our planet faces today. Transforming agriculture towards more sustainable production models can lead to positive effect towards fighting climate change, preserving the environment and safeguarding biodiversity. However, this transformation would require development and adaptation of new technologies and strong collaboration between all stakeholders in the food value chain.

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30<sup>th</sup> of September 2021

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**Edited by:** Prof. Daniela Bobeva, PhD  
Assoc. Prof. Stefan Raychev, PhD

Plovdiv University Press, 2021  
ISBN (print) 978-619-7663-08-2  
ISBN (online) 978-619-7663-07-5