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The European Green Deal – challenges for agriculture and the agri-food sector

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Abstract. Growing climate and environmental problems oblige the search for efficient business solutions. In December 2019, the European Commission issued a communication on the European Green Deal strategy, which set ambitious goals in the pursuit of climate neutrality in 2050.

The presented study is based on a literature review and legal acts. It identifies the rationale behind the European Green Deal strategy, its aims and objectives. It also presents the farm-to-fork strategy, which is intended to contribute to a fair, healthy and environmentally friendly food system. The transformation will require committed action from all actors in the food chain, including agriculture and the agri-food sector. The challenges faced by agriculture and the food industry in achieving the objectives of the strategy have therefore been identified. An attempt was made to answer the question of what actions should be initiated so that their implementation in agriculture and the agri-food sector contributes to improving the state of the environment and stabilizing the climate. Great importance in this regard is attributed to the implementation of mitigation practices.

Keywords: sustainable production, food system, agriculture, climate neutrality, European Green Deal

INTRODUCTION

The dynamics of anthropogenic climate change are so great that they create the need to revise the objectives to combat climate change, which have been legislated and implemented with such difficulty. Implementation of the 2015 Paris Agreements has not yet begun in earnest (United Nations, 2015), in which 195 countries accepted the need to introduce measures to ensure that the increase in global average temperature is kept well below 2°C, preferably below 1.5°C, and already in 2018 it has become apparent that more ambitious measures are becoming necessary to achieve this goal. Indeed, the report of the Intergovernmental Panel on Climate Change stated, among other things, that "Achieving and maintaining zero net anthropogenic greenhouse gas emissions globally would halt global warming over decades" (IPCC, 2018). This statement has become the foundation for shaping policies, programmes and actions towards climate neutrality, which is conditional on achieving net zero emissions by 2050.

For the European Union to meet its 2050 climate neutrality target, it is necessary to raise its ambitions for the coming decade and update its climate and energy policy framework. At the December 2020 European Council, EU leaders endorsed a new target proposed by the Commission that the EU should reduce net greenhouse gas (GHG) emissions by at least 55% by 2030 compared to 1990. They also called for the swift adoption of a climate law consistent with the 2030 target. An agreement on the discussed climate law was approved in 2021 (European Commission, 2020d).

The EU has declared its intention to become the first zero-carbon continent by 2050, to ensure the realisation of the European Green Deal strategy (European Commission, 2019). This document presents directional actions relating to all sectors of the economy. Its essential element, dedicated to agriculture and the food economy, is the farm-to-fork strategy (European Commission, 2020a).

The aim of the study is to present the main issues related to the implementation of the European Green Deal and to identify key challenges for agriculture and the agri-food sector. This research task was reflected in the structure of the work. The premises for the introduction of the European Green Deal and the main provisions resulting from its implementation for agriculture and the agri-food sector were presented. The "farm to fork" strategy was discussed in detail, with the priority of ensuring food security and sustainable food production. An attempt was made to answer the question of what actions should be initiated so that their implementation in agriculture and the agri-food sector contributes to improving the state of the environment and stabilizing the climate.

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RATIONALE FOR A EUROPEAN GREEN DEAL STRATEGY

An analysis of trends in anthropogenic GHG emissions has led to the conclusion that the EU's emission reduction targets may not ensure the implementation of the Paris Agreement (Fig. 1). Meeting these targets would require a reduction in net GHG emissions, relative to 1990 emissions, of 55% in 2030 and 100% in 2050, resulting in climate neutrality (net zero emissions) in that year.

An initial outline of the vision for the transition of the EU economy to climate-neutral activity was presented in the European Commission's 2018 communication "A Clean Planet for All" (European Commission, 2018). This document did not introduce new policies or change the 2030 emissions reduction targets adopted by the European Commission. Instead, it set out directions for the EU's climate and energy policies on the way to achieving the goals of the Paris Agreement (United Nations, 2015) and implementing the UN 2030 Agenda for Sustainable Development Goals (United Nations, 2015a). The lines of action outlined therein have opened the political and social debate on EU climate policy, including in particular the potential to achieve net zero GHG emissions by 2050 through a socially equitable and cost-effective transition. With regard to agriculture, the paper emphasises, among other things, that it will need to provide the necessary food, feed and fibre for a growing human population and support the economy with the necessary amount of sustainably sourced biomass. The expected contribution of bioenergy to a zero-carbon economy could increase by 80% by 2050. It also states that agriculture will always produce greenhouse gas emissions such as methane and nitrous oxide, but by 2050 these emissions can be reduced through efficient and sustainable production methods.

In 2019, a special report on the links between land use and climate change was published (IPCC, 2019). It states that agriculture, forestry and other economic land uses contribute globally to 13% of CO_2, 44% of CH_4 and 82% of N_2O emissions, which amounts to 23% of total global greenhouse gas emissions. The uptake of these gases (mainly in forestry) is equivalent to 29% of total global CO_2. If, on the other hand, the pre- and post-consumption activities of the global food system are taken into account, it contributes 21–37% to net global GHG emissions. One of the report's conclusions is that limiting the temperature rise to 1.5° C requires reductions in emissions from land use, land use change as well as increased afforestation and reduced deforestation.

EUROPEAN GREEN DEAL

The European Commission has clarified its intentions to tackle climate change and environmental degradation in the European Green Deal strategy (European Commission, 2019). This is an action plan for growth to transform the Union into a modern, green, more prosperous and competitive economy that meets three criteria:

- achieving zero net greenhouse gas emissions in 2050,
- decoupling economic growth from resource consumption,
- not leaving anyone behind in these activities.

It aims to improve the sustainability of the EU economy by transforming climate and environmental challenges into new opportunities across all policy areas and ensuring that the transition is fair and inclusive. The actions planned in the strategy are intended to enable: more efficient use of resources through the transition to a clean, closed-loop economy; tackling biodiversity loss; and reducing pollu-

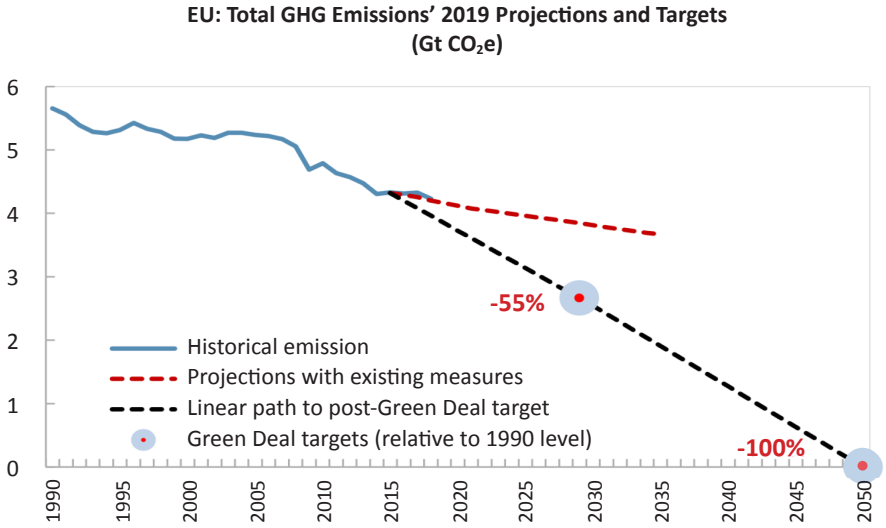

Figure 1. New targets for reducing anthropogenic greenhouse gas emissions in the EU.
Source: Jobst, Shabunina, 2021

tion levels. The document outlines the investments that will be needed to achieve this and the tools available to finance them. It also explains how to transform the economy in a fair and inclusive way.

The European Green Deal includes elements presented in the graphics below (Fig. 2; European Commission, 2019):

More ambitious EU climate targets for 2030 and 2050

The European Commission has adopted a very ambitious goal of achieving climate neutrality by 2050 (European Commission, 2018). Achieving this goal requires the development of a long-term strategy and the introduction of a European Climate Law. According to the assumptions, net greenhouse gas emissions for EU countries combined in 2050 are expected to be zero. An intermediate GHG emission reduction target of 55% in 2030 compared to 1990 is also indicated (European Commission, 2020c). All sectors of the economy will be engaged in this process, thus including non-ETS i.e. sectors not previously covered by the emission trading system. Such sectors include agriculture, transport and construction. Emissions from land use, land use change and forestry are also to be included (European Commission, 2019a).

Providing clean, affordable and secure energy

In order to achieve the climate targets set for 2030 and 2050, it is essential to decarbonise the energy system and improve energy efficiency. Creating an energy system based on renewable energy sources and thus moving away from the use of non-renewable resources can play an important role in this process. Member States should take account of the new ambitious climate targets when updating their national energy and climate plans.

Mobilising industry for a clean, circular economy

The European Commission expects a transformation of the industrial sector and a shift away from the extraction and processing of traditional raw materials towards material reuse and recycling. It aims for all packaging to be reusable or recyclable in a cost-effective manner by 2030. Businesses are encouraged to offer reusable, durable and repairable products.

Building and renovating in a way that saves energy and resources

Building, renovating and using buildings in an energy-saving way is important, as they account for 40% of energy consumption. The annual rate of building renovation ranges from 0.4 to 1.2%, depending on the Member State, and should be twice as high. The renovation of public and private buildings is encouraged, which will reduce energy bills.

Zero emissions for a non-toxic environment

Ensuring a non-toxic environment requires both measures to prevent new pollution and to reduce existing one. Measures are to be aimed at: restoring the natural functions of surface and groundwater, protecting the air, reducing pollution from large industrial installations and protecting against hazardous chemicals.

Accelerating the transition to sustainable and intelligent mobility

Transport is responsible for 25% of GHG emissions. Achieving climate neutrality will require a 90% emission

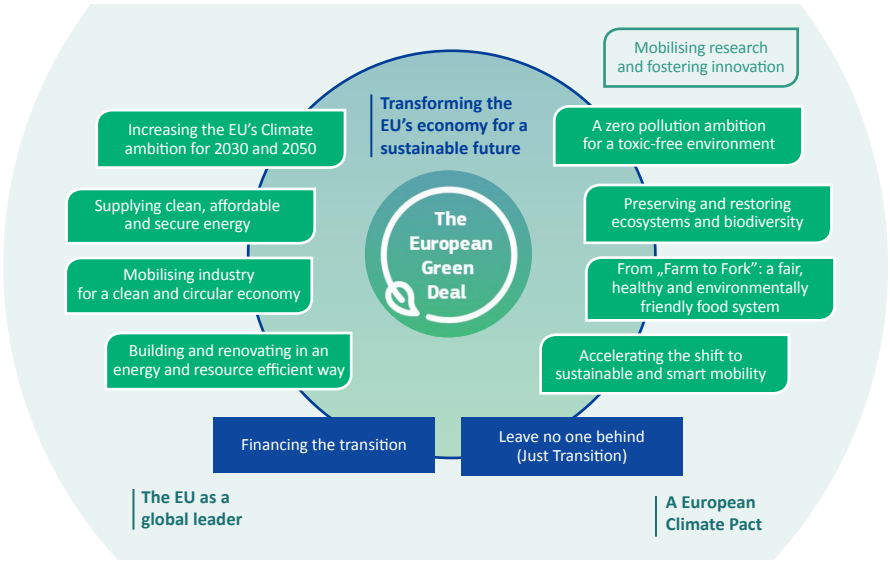

Figure 2. European Green Deal
Source: European Commission, 2019.

reduction in the transport sector by 2050. All modes of transport – road, rail, air and water – will be involved. A strategy for sustainable and intelligent mobility will need to be adopted, as well as a review of the Alternative Fuels Infrastructure Directive and the Trans-European Transport Network Regulation.

Protection and restoration of ecosystems and biodiversity

In May 2020, the European Commission published the strategy 'Bringing nature back into our lives' (European Commission, 2020). It is a long-term plan to protect nature and reverse ecosystem degradation. The plan is to create a much larger network of protected areas ensuring preservation of 30% of the land and 30% of the seas. Commitments and actions to regenerate damaged ecosystems are indicated. The field-to-fork strategy addresses the use of pesticides and fertilisers in agriculture. One of the EU's initiatives is a new forestry strategy, which aims to afforest and protect and rehabilitate forests. This will increase the uptake of CO_2, improve forest resilience (fires) and support a circular bio-economy. Attention was also drawn to the role of water and marine resources in mitigating climate change and biodiversity loss. Improving the use of these resources can contribute to a green transition. By promoting new sources of protein, pressure on agricultural land can be reduced.

Farm to Fork strategy: creating a fair, healthy and environmentally friendly food system

The agri-food system is expected to play an important role in the implementation of the European Green Deal (European Commission, 2020a). This is indicated by the new farm-to-fork strategy, which is an important part of it. It is expected that food produced in Europe will be safe and of high quality, and that the way it is produced will not be harmful to the environment and will be climate-neutral. A robust and resilient food system is sought that is able to function under different circumstances (e.g. COVID-19 pandemic) and to ensure sufficient food supply at affordable prices. Solutions to combat food quality and safety deficiencies are not indicated. It is presumed that a stricter control system will be implemented.

FARM-TO-FORK STRATEGY – A KEY ELEMENT OF THE EUROPEAN GREEN DEAL

The farm-to-fork strategy is seen as a roadmap towards a fair, healthy, sustainable and environmentally friendly food system. The strategy has six main objectives to be pursued within and together with the other strategic objectives of the Green Deal (European Commission, 2019; European Commission, 2020a):

- reducing the environmental and climate footprint of the EU food system,
- strengthening the resilience of the agri-food sector,
- ensuring food security in the face of climate change,
- reducing biodiversity loss,
- being at the forefront of the global transformation towards competitive sustainability from the farm-to-fork,
- creating new opportunities for a sustainable and environmentally friendly food system.

The strategy aims to contribute to changing the current food system towards a sustainable food economy, thus ensuring a neutral or positive environmental impact at each stage of the food chain (production, transport, distribution, marketing and consumption of food). In addition to sustainable food production, an important objective is to ensure food security, i.e. access to sufficient, wholesome and sustainable food for all, and to maintain food affordability with fair returns in the food supply chain so that the most sustainable food becomes the most affordable. In addition, the following will be implemented: promoting sustainable food consumption, facilitating the transition to a healthy and balanced diet, tackling food loss and waste, and combating food adulteration in the food supply chain.

Looking ahead to 2030, the strategy envisages: a 50% reduction in the use of pesticides and the associated risks; a 50% reduction in the use of the most hazardous pesticides; a 50% reduction in nutrient losses without deteriorating soil fertility; a minimum 20% reduction in the use of fertilisers; a 50% reduction in the sale of antimicrobials to farm animals and aquaculture; promoting the development of organic farming to achieve a 25% share of total land area; and a 50% reduction in food waste in trade and consumption. Conditions will also be created for the transition of EU citizens to a healthy diet. To this end, food will be compulsorily labelled accordingly.

The European Commission will allocate €10 billion, under Horizon Europe, for research and innovation related to food, bioeconomy, natural resources, agriculture, fisheries, aquaculture and the environment. During the transformation of the sector, farmers will be able to benefit from CAP advisory services. A farm sustainability information network will also be set up to provide instrumental assistance to farmers during farm transition.

CHALLENGES FOR AGRICULTURE AND THE AGRI-FOOD SECTOR

Implementing the farm-to-fork strategy will be a huge challenge for agriculture and the agri-food sector. Farmers constitute the first link in the sustainable food chain, which determines their decisive role in the implementation of the strategy.

Ensuring sustainable food production will require a shift in production methods towards those that reduce negative environmental impacts, biodiversity loss and green-

house gas emissions from agriculture. One challenge is to undertake activities that reduce and optimise the use of pesticides and fertilisers.

The use of plant protection products and fertilisers is important for the protection and the amount of yields obtained. A proposal for reducing the use of industrial inputs is the implementation of precision farming, which allows the right treatment to be applied at the right place and at the right time. However, the implementation of the principles of precision farming requires a significant financial investment for the purchase of monitoring equipment and precision tools, as well as the upgrading of farmers' skills to operate them. A serious limitation to the application of this practice is also the fragmented agrarian structure characteristic of Polish agriculture. It is indicated that the use of precision farming techniques may be an opportunity for farms with over 50 ha of agricultural land. On smaller farms, using services or labour-intensive mechanical methods remains the main option.

A reduction in fertiliser intensity results in a decrease in productivity and efficiency of agricultural land use (Kopiński, Jurga, 2021). A decrease in crop production and thus a lower supply of agricultural products should therefore be expected. A way to reduce the negative impact of fertilisation (especially with nitrogen) on the environment may be: mandatory application of fertiliser plans, increased efficiency of the use of fertiliser components, rationalisation of fertiliser management and precision agriculture. However, the adaptation of production technology requires financial outlays, which will be reflected in higher prices for products that should be affordable.

Although the European Commission envisages supporting investment in agriculture and directing funds to agricultural producer groups and associations, according to the register of the Agency for Restructuring and Modernisation of Agriculture (ARMA), in 2022 there were only 738 active producer groups with 9114 members.

Opportunities in reducing the negative impact of agriculture on the environment are created by increasing the share of organic farming in the total land area. In Poland, organic farming is a niche segment. In 2020, the acreage of organic crops was about 400,000 ha, i.e. 2.6% of agricultural land. Although many farms (especially small ones) have the potential to produce organically and using extensive methods, the problem is obtaining the relevant certificates (adjustment processes, costs).

A sustainable approach is expected of all those involved in the food chain. The food industry must also produce healthy and sustainable food. Companies need to invest in production technologies, which will improve their economic and financial situation. A greater commitment to environmental investments, a closed loop economy (minimising the use of raw materials and waste generation), new storage technologies, the use of environmentally friendly and reusable and recyclable packaging are now expected. It is also important to promote the reduction of food waste and to offer healthy food and promote a healthy diet in order to convince the last link in the food chain – the customer – to change his/her current eating habits.

In summary, it should be stated that sustainable agricultural production carried out in accordance with the assumptions of the European Green Deal may significantly affect the supply of agricultural products that constitute the raw material base for the food industry. A reduction in yields and availability of raw materials may be noticeable for those processing industries that rely on domestic raw materials. Hence the question remains open as to whether food security will be guaranteed?

Also, the adjustment processes to sustainable production in the food industry will require significant financial investments. Combined with high and constantly rising energy prices, pressure to raise wages will increase production costs. Naturally, this will translate into higher prices for the offered products.

EUROPEAN GREEN DEAL AND REDUCTION OF GREENHOUSE GAS EMISSIONS IN AGRICULTURE

A major challenge in the implementation of the European Green Deal is the need to reduce greenhouse gas emissions. Achieving climate neutrality requires action to reduce GHG emissions in all sectors of the economy, including agriculture and food.

Agriculture is the main culprit of non-CO_2 emissions (methane and nitrous oxide) which, together with fluorinated gases, account for 20% of total EU GHG emissions (European Commission, 2020c). Emissions of these gases can be effectively reduced by up to 30% compared to 2015. Additional reductions in emissions of these gases can be achieved most cost-effectively in the energy sector by avoiding methane emissions from the production and transport of oil, natural gas and coal. Agricultural emissions of non-CO_2 gases are projected to decline slowly at best until 2030 (European Commission, 2020c). They cannot be fully eliminated from agriculture, but they can be reduced to some extent.

According to the National Balancing and Emissions Management Centre (KOBiZE), the share of agriculture in total greenhouse gas emissions (expressed in CO_2 equivalent) in Poland in 2021 was 8.5%. Agriculture was the source of 80.6% of national nitrous oxide emissions and 37.5% of national methane emissions (KOBiZE, 2023).

As the ambition to reduce greenhouse gas emissions by 2030 and 2050 increases, the question arises about the technological possibilities of increasing the Polish agricultural sector's contribution to national and EU targets in this respect. The methodologies used by the KOBiZE do not contain algorithms to provide a direct answer to such a question. They take into account only population, raw

material and area changes, and, to a lesser extent, technological and production changes.

An important issue in the quest for climate neutrality is not only reducing GHG emissions but also increasing CO_2 absorption.

Wiśniewski and Kistowski (2019) analysing the regional differentiation of GHG emissions from the agricultural sector indicate that higher emissions are characterised by areas (farms above 15 ha) with intensive livestock production, a large-scale farming system with monocultures and simplified crop rotation. This results in increased erosion processes, reduced soil organic matter content and poor soil carbon sequestration (Wiśniewski, 2018).

Numerous mitigation practices are recommended in the literature, such as: efficient use of fertilisers (fertiliser nutrient management), fertiliser application techniques, soil management (optimisation of soil pH, organic matter enrichment), use of conservation tillage systems, attention to livestock health, protection of ponds and wetlands, buffer zones, afforestation of agricultural land, popularisation of biogas plants and valorisation of organic waste (Pieszka et al,, 2022; Wąs et al., 2022). Alternatively, the widespread popularisation of sustainable shellfish and algae production could provide an opportunity for protein production, with low GHG emissions. In addition, the production of perennial crops on agricultural land for various economic sectors could contribute to their decarbonisation.

SUMMARY

By implementing the Green Deal, the European Union wants to become a climate-neutral community by 2050. This political commitment is legally regulated in the European Climate Law (European Commission, 2020d). Among other things, the document emphasises that achieving climate neutrality requires contributions from all sectors of the economy and a common endeavour by all Member States, which should put in place the necessary measures to achieve this goal. In doing so, Member States are committed to developing long-term national strategies on how they plan to achieve the greenhouse gas emission reductions necessary to meet their commitments under the Paris Agreement and the EU's climate goals. The CAP (European Commission, 2020b) will play an important role in achieving the objectives of the European Green Deal in the area of agriculture.

Achieving climate neutrality will require actions in the EU and Member States such as (European Commission, 2019): investing in environmentally friendly technologies; supporting industrial innovation; introducing cleaner, cheaper and healthier forms of private and public transport; decarbonising the energy sector; making buildings more energy efficient; and working with international partners to improve global environmental standards.

The European Green Deal is considered the most comprehensive programme for building a green future in the EU. Equally groundbreaking for the agri-food sector could be the implementation of its part – called the farm-to-fork strategy. It outlines targets to be achieved by 2030, the fulfillment of which will require far-reaching structural and functional changes across the sector. This is a challenge that could profoundly change not only the countryside, agriculture and the agri-food industry, but also the behaviour and preferences of food consumers. An important issue is to create further solutions that improve the state of the environment in pursuit of a sustainable, low-emission and environmentally friendly economy. It is also important to build ecological awareness of society, including farmers, and to popularize desired activities for the environment and climate.

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