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Blue Growth and Food Security Sustainability

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Abstract

This article examines and analyzes the processes for implementing sustainable methods and technologies in production through the implementation of a "blue economy". Blue growth is a strategy that aims to unlock the potential of the seas and oceans as engines for economic growth, innovation, and job creation, while ensuring the sustainability of the marine environment and food security. The introduction of environmental standards and sustainability criteria in various industries is examined in detail. A review of the legislation regarding the "blue economy" and environmental standards is made. Emphasis is placed on maritime planning within the framework of the regulatory framework created to regulate economic activity in the World Ocean, as well as control, monitoring, and other measures.

Keywords: *Blue Economy, Sustainability, Food Security, Marine Environment, Environmental Standards, Maritime Planning.*

1. Introduction

Sustainable agricultural development necessitates integration and synergy among sectors, as well as a harmonious combination of social, economic, and environmental aspects. It is a process in which different frameworks intersect – from technical to managerial and financial. Sustainable production methods and technologies also imply an approach based on synergy between the production and supply chain and natural resources. These methods include, in particular, agroforestry systems, the integration of crop production and forestry, and the co-production of crops and aquaculture, which contribute to the conservation and use of

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ecosystem services and biodiversity for the benefit of producers and local communities. In this way, crop and livestock production, forestry, fisheries, and aquaculture will no longer compete for political support, territories, and natural resources.

The term "Blue Growth" is related to the "Blue Economy" and most often refers to a long-term strategy to support sustainable growth in the maritime and related sectors. Blue Growth is a strategy that aims to unlock the potential of the seas and oceans as drivers of economic growth, innovation, and job creation, while ensuring the sustainability of the marine environment and food security. In the European Union, "Blue Growth" is the strategic contribution of the maritime sector to achieving the objectives of the Europe 2020 strategy for smart, sustainable, and inclusive growth (Kathijotes, 2013). The aim is to promote sustainable and inclusive economic development stemming from economic activities in the oceans, seas, wetlands, and coastal areas, while minimising environmental impacts and maximising economic and social benefits (Keen, Schwarz, & Wini-Simeon, 2018).

2. The Contribution of the Blue Economy to Food Security

The European Union is stepping up its efforts to regulate and manage the maritime economy. In a communication published on 17 May 2021, the European Commission outlined a new approach for the European Union to develop a sustainable Blue Economy (European Commission, 2021a). The fourth annual report on the Blue Economy (European Commission, 2021b) was published on 20 May. Its publication coincides with the European Maritime Day, which has been celebrated in the European Union since 2008.

A country's food security is an integral part of its economic and social well-being and a key vector of its national security. In recent years, the role of fish and fish products as a source of food has been steadily increasing. In the 1960s, around 65-67% of all fish and other aquatic organisms caught and produced were used for human consumption. In 2010, this figure increased to 86.5%, and by 2015 it had reached 87.5%.

The 15th session (Agadir, Morocco, December 2015 COFI:FT/XV/2016/3) of the Food and Agriculture Organization of the United Nations (FAO) emphasized, "... that fish and fish products are among the most traded food products worldwide. Fish and fish products, which account for approximately 17% of global animal protein consumption, play a critical role in nutrition and global food security. Fish provides about 17% of the animal protein in the diet of the world's population and 6.7% of the total protein consumed." According to FAO data, it supplies 20% of the animal protein for 3.1 billion people (Soma, Van den Burg, Hoefnagel, Stuiver, & Martijn van der Heide, 2018c). Theory and practice prove that the level of food security directly depends on the degree and role of state regulation of agriculture, and the higher the level of state regulation, the higher the degree of self-sufficiency of the country in food supplies. The correct and scientifically based choice of methods for achieving the goals of the state's agricultural policy plays an extremely important role.

The mechanism for implementing the agricultural development strategy of the European Union countries within the framework of the Common Agricultural Policy from 2023 can be presented in the form of a logical scheme (Fig. 1).

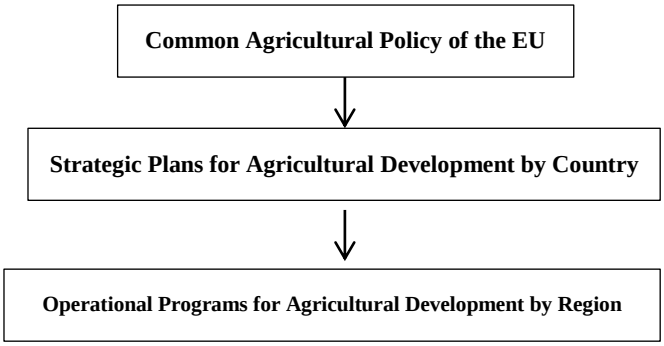

Figure 1. *Mechanism for implementing the agricultural development strategy of the European Union countries within the framework of the Common Agricultural Policy from 2023.*

Source: *Authors' elaboration*

The strategic guidelines for the development of fisheries in Bulgaria are the conservation, reproduction, and rational use of fish stocks in water bodies of natural origin, the implementation of the latest resource- and energy-saving technologies for fish production in water bodies of different origin and purpose (Van den Burg, Aguilar-Manjarrez, Jenness, & Torrie, 2019).

2.1 The Blue Economy as Part of the Green Deal

The Blue Economy must be fully integrated into the EU Green Deal implementation program, becoming a resistance. By fulfilling this condition, it will be able to play an important role in forming a competitive and resource-efficient economy of the European Union and will contribute to achieving its environmental and climate goals.

The key focus is defined as transforming existing production and logistics chains into resistance. But this path poses several major challenges to be resolved. Greenhouse gas emissions must be reduced, environmental pollution must be reduced, and underwater noise levels must be reduced. It is planned to reduce the carbon footprint of the maritime economy by developing coastal renewable energy and greening maritime transport and ports. The development of carbon-neutral industries is also planned (Belova, Starchikova, & Starchikova, 2020a).

The EU aims to develop a circular economy and limit the amount of waste in the marine environment, primarily by reducing the level of pollution and combating its sources. Another priority is the preservation and restoration of biodiversity. This includes an ecosystem approach to marine environment management, by increasing the share of protected marine areas, creating "ecological corridors" in marine waters, etc.

For better adaptation of coastal territories to the consequences of climate change, the development of green infrastructure is proposed, relying on various financial and organizational measures. The formation of "responsible food systems" implies a more efficient use of marine resources, as well as the possibility of using alternative types of food supply. For each of the listed tasks, the European Commission proposes a list of measures (European Commission, 2021e).

2.2 Greening the blue economy sectors

The Commission identifies a number of sectors on which the overall result of the greening of the maritime economy will depend. A crucial role is assigned to the marine (coastal) renewable energy sector. In the European Union, this sector is

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represented mainly by offshore wind energy, where the European Union is a global leader – 90% of global capacity (European Commission, 2021d). Although marine renewable energy is developing at an accelerated pace, its share in the maritime economy remains more than modest. By the end of 2018, the sector provided 0.1% of all jobs and 0.5% of the gross added value of the EU maritime economy (European Commission, 2020b). By 2030, the European Union plans to increase the capacity of renewable energy sources on the shelf 5 times, and by 2050, 30 times (European Commission, 2021e). New technologies for energy production in the World Ocean are also being developed.

The transformation of the European Union's industrial landscape also includes ports. They must act as clean energy suppliers for ships, as well as import points for energy resources (liquefied natural gas and hydrogen). Ports must handle and process waste from ships and port enterprises (in support of the circular economy), which can have negative environmental impacts.

The European Commission identifies such important sectors for the maritime economy as fishing and aquaculture, responsible for carbon dioxide emissions, environmental pollution, and biodiversity loss. Within the framework of the European Union's fisheries policy, which was last reformed in 2013, measures have already been provided for the transition of the sector to the principles of sustainable (resistance) development. Similar measures are contained in the "Farm to Fork" strategy adopted in 2020 (European Commission, 2020c). In these and other similar documents, the European Union uses concepts such as responsible fishing and sustainable aquaculture. Their production, along with algae production, is an alternative to agricultural production.

Great importance is attached to the traditional sectors of the blue economy, such as maritime and coastal tourism, maritime transport, shipbuilding, etc. On the one hand, they play a significant role in the economy of individual European Union countries (such as coastal tourism in Croatia and Bulgaria (European Parliament and Council, 2014a; Kolesnikova, 2020d), and on the other hand, in their current state, they often cause environmental damage. Another focus concerns developing industries (biotechnologies, seawater desalination) and new types of activities, the emergence of which is expected in the future.

2.3 Five key principles for sustainable food security of the FAO

FAO has developed a common vision and a comprehensive approach to ensuring sustainability in all sectors of agriculture, forestry, and fisheries. This unified position, formed for all agricultural sectors and taking into account the totality of social, economic, and environmental factors, increases the effectiveness of efforts in this direction. It is based on the results of the latest scientific research, adapted at national and community levels, in order to ensure their local applicability and relevance.

First principle: Increasing the efficiency of resource use is the most important condition for ensuring the sustainability of agriculture.

Principle Two: Sustainability requires targeted efforts to conserve, protect, and enhance the natural resource base.

Principle Three: Agriculture that does not contribute to maintaining and increasing rural livelihoods, improving equity, and enhancing social well-being cannot be considered sustainable.

Principle Four: The key to sustainable agriculture is to enhance the adaptive capacity of people, local communities, and ecosystems.

Principle Five: Sustainable food production and agriculture require the establishment of mechanisms for responsible and effective governance.

By strengthening the many international and national instruments and mechanisms for agricultural governance, FAO continues to promote sustainable resource use, including building the capacity of key stakeholders to negotiate and implement these instruments, as well as those who have access to data and use it to inform policy decisions and planning. In 2014 and 2015, FAO supported 74 countries through 215 initiatives that applied an integrated approach across sectors and enabled tangible results, such as improving natural resource management practices, exploring ecosystem-based approaches in fisheries and aquaculture, sustainably managing land and water resources, conserving biodiversity, and improving the planning and management of agricultural landscapes and territories. FAO is developing a coordinated approach aimed at increasing agricultural productivity and sustainability, using three interrelated fundamental principles:

- Resource efficiency: moving towards sustainable agricultural intensification that allows us to produce more with fewer negative impacts on our resources;
- Environmental protection and conservation: conserving resources to protect ecosystem biodiversity, water resources, soil fertility, and reduce environmental pollution;
- Transitioning to more climate-smart agriculture: using a new approach, namely sustainable agriculture, to adapt to and mitigate climate change.

These principles have different meanings depending on the specific agro-climatic and socio-economic conditions existing at national and local levels. Climate-optimized agriculture takes advantage of the synergies between these principles, but also allows for trade-offs between them and encourages evidence-based decision-making on the choice of options that will best contribute to achieving development goals.

2.4 Mechanisms for the European Union's transition to a sustainable blue economy

To achieve these principles, the European Union plans to use the instruments of an integrated maritime policy and blue growth (European Commission, 2007; European Commission, 2012). These instruments include management technologies (maritime spatial planning) as well as the introduction of environmental protection norms and rules (achieving good environmental status of the European Union's marine waters in accordance with the 2008 Marine Strategy Framework Directive).

Among the mechanisms for implementing the transition to a sustainable (resistance) blue economy, the European Union also includes (Kolesnikova, 2020e):

- programs for the formation of an integrated infrastructure for the collection of complex data on the World Ocean (European Marine Observation Network and Database);
- systems for complex marine observation (Common Information Sharing Environment);
- financial, personnel, scientific, social, and other projects.

At the same time, the EU is expanding its areas of application for the transformation of the blue economy, as well as developing new initiatives. For example, forming a base of marine data and ensuring their adaptation for widespread use, and then, through

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digital processing, transforming them into "knowledge and tools", as a center for monitoring the development of the blue economy to provide up-to-date information and ocean monitoring to structure data collection.

The ongoing EU transition to sustainable investments in the maritime sectors, which is planned to be organized on the basis of the Principles for Financing a Resilient (Resistant) Blue Economy (2018) (United Nations Environment Programme Finance Initiative, 2018d). At the same time, the European Union continues to develop the Taxonomy - a system for classifying environmentally sustainable types of economic activity (European Commission, 2021c). To implement these plans, the European Union is improving methods for managing marine use, expanding the application of maritime spatial planning, and introducing multi-purpose use of marine space. It is also proposed to allow the use of the same water areas for non-conflicting types of activities. At the same time, the European Union is synchronizing the processes of transformation of the blue economy with the introduction of changes in the guiding documents, updating the Marine Strategy Framework Directive - the main document in the field of environmental marine policy. A characteristic feature of the European Union initiatives is their focus on internal (within the Union) and external use, as well as cross-border interaction, contributing to the progress of maritime spatial planning at the international level.

The European Union's plans are based on the need for a transition from a blue economy to a sustainable blue economy. The boundary between these two concepts is blurred, as the blue economy represents an intermediate stage of transition from traditional sea use to a new, sustainable management of marine resources.

The European Union continues to collect information in order to improve management mechanisms (maritime spatial planning), develop and implement environmental standards (good environmental status of marine waters), improve information (data collection) and control (monitoring of maritime activity) activities, as well as improve and expand interaction between participants and regulators of maritime activity (international, regional, within a basin, etc. cooperation).

3. Blue growth and sustainable food security

In the European Commission's formulation, the blue economy encompasses types of activities that can be linked to the marine environment in one way or another. A sustainable economy, in addition to the economic component, includes "economic value that is based on natural capital and non-market goods and services, through the preservation of marine habitats and ecosystem services" (European Commission, 2021f). It can be assumed that in the conditions of a sustainable blue economy, economic activity will be linked to the environmental component (natural capital, ecosystem services, and their economic value). In particular, the European Commission plans to develop a methodology for integrating the concept of natural capital into economic decisions. To this end, the European Union has developed methods for the economic valuation of marine ecosystem services, as well as the socio-economic costs and benefits of protecting the marine environment (European Commission, 2021e).

Key sectors with potential for "Blue Growth" (According to the European Union strategy) are five sectors with high potential for jobs, growth, and food security:

- Aquaculture (fish and shellfish farming);
- Coastal and maritime tourism;
- Marine biotechnology;
- Ocean energy (e.g., offshore wind, wave, and tidal energy).

Seabed mining (although the transition to a "sustainable blue economy" places emphasis on reducing mining activities). In recent years, the focus has shifted from the term "Blue Growth" to "Sustainable Blue Economy". "Blue Economy" (as a general term) encompasses all economic activities related to the oceans, seas, and coasts, and "Sustainable Blue Economy" is the more recent concept that calls for the transformation of these sectors to make them more resource efficient, competitive, and beneficial to ocean health. This includes eliminating net greenhouse gas emissions, protecting natural capital, and investing in restorative activities, not just in extraction.

3.1 Initiatives related to "Blue Growth" in Bulgaria and the Black Sea Region

The concept is also important for Bulgaria, especially in the context of the Black Sea:

National focus: A World Bank report notes that Bulgaria has a significant contribution of the blue economy to the national economy (including coastal tourism, fisheries, aquaculture, and shipping).

Regional projects: There are cross-border projects, such as the "BLUE GROWTH COLLABs" project, which aims to establish blue growth research centers in Burgas and Edirne and focuses on:

- Microplastic pollution;
- The ecological status of water bodies and ecosystem services;
- The potential for sustainable use of water resources.

There is growing interest in the development of the blue economy by countries and businesses. The blue economy can be defined as an economy that is based on the resources of the coastal strip of the seas and oceans and the maritime economic zone. Sometimes this model is narrowly associated with the ocean economy. The development of the blue economy is closely related to the "Sustainable Development Goal", aimed at the conservation and rational use of the oceans, seas, and marine resources in the interests of sustainable development (Mulazzani, Trevisi, Manrique, & Malorgio, 2016). The blue economy includes both already established sectors and activities (fish catching and processing, shipping, port management, maritime tourism, offshore oil and gas production, etc.), as well as new – largely innovative and high-tech – forming sectors and activities (aquaculture, offshore wind energy facilities, marine and ocean tidal energy, marine biotechnology, etc.) (Table 1).

Already formed (traditional) sectors and activities	New, emerging (innovative and high-tech) sectors and activities
– Industrial fishing; – Processing of marine products (fishing, fish farming, canning);	– Aquaculture (farming of aquatic organisms, using new methods); – Wind energy facilities in water areas (offshore wind farm);

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– Shipping (transport of goods and passengers); – Port services (operation and management of ports); – Shipbuilding and repair; – Maritime tourism (cruises, beach tourism, water sports). – Offshore oil and gas production (exploration and exploitation of hydrocarbons on the sea shelf); – Maritime education and research and development; – Dredging.	– Energy from sea and ocean tides (tidal energy); – Marine biotechnology (using marine organisms to develop new products, such as medicines, cosmetics, food supplements); – Deep-sea mining; – Maritime security and ocean monitoring and marine data (using sensors, satellites and big data).

Table 1. *Sectors and types of activities in the blue economy depending on the nature of their formation*

Source: *Authors' elaboration*

This list of sectors and activities can be expanded to include other factors that can affect the economies of coastal areas. For example, the significant role of the economies of water basins related to seas and oceans is obvious. For the Republic of Bulgaria, this includes the Danube River.

The need to form a blue economy is reflected in the United Nations Sustainable Development Goals (SDGs), in their targets and quantitative indicators for the period 2016-2030, adopted by all countries, and specifically in Goal 14 "Conserve and rationally use the oceans, seas and marine resources for sustainable development".

The theory of the "blue economy" from the perspective of national macroeconomic strategies focuses on three aspects:

- National macroeconomic management;
- Policy frameworks;
- Management technologies.

Since 2012, the blue economy has entered a practical phase, as some countries and regions have proposed strategic frameworks and action plans for its development (Sarker, Bhuyan, Rahman, et al., 2018b). The European Union's Blue Growth Strategy and Blue Innovation Plan are examples. In 2012, the European Union proposed the Blue Growth Strategy, stating that Blue Growth would become the core of maritime policy and clearly outlining key areas for development and concrete measures for the future. The Blue Growth Strategy sets out initiatives in many policy areas relevant to Europe's oceans, seas, and coasts, encouraging cooperation between maritime businesses and public authorities across borders and sectors, as well as with stakeholders, to ensure the sustainability of the marine environment and its role in ensuring food security (Soma, Van den Burg, Hoefnagel, Stuiver, & Martijn van der Heide, 2018c; Van den Burg, Aguilar-Manjarrez, Jenness, & Torrie, 2019; Sarker, Bhuyan, Rahman, et al., 2018b).

In 2014, the Blue Economy Innovation Plan was launched, stating that it would be implemented by three parties:

- Developing sectors with high potential for sustainable jobs and growth;
- Key components for providing knowledge, legal certainty, and safety in the Blue Economy;
- Sea basin strategies to provide individual measures and develop cooperation between countries.

In 2017, the European Union issued a report on the Blue Growth Strategy. The report described five aspects:

- Striving for growth in five key areas, including blue energy, aquaculture, coastal and maritime tourism, blue biotechnology, and seabed minerals;
- Leveraging marine data, spatial planning, and maritime surveillance to support growth in the Blue Economy;
- Promoting a partnership approach;
- Stimulating investment;
- Aligning the Blue Growth Strategy with Future Challenges.

An example of a classic document is the 2018 Annual Economic Report on the Blue Economy of the European Union, which states that the concept of the Blue Economy – the maritime and coastal counterpart of the Green Economy – continues to take root in the community. At the same time, the Blue Economy remains firmly committed to conservation and sustainable management, based on the idea that healthy ocean ecosystems are more productive and are fundamental to sustainable economic activity and food security. Sustainable management is understood as economic activity being in balance with the long-term capacity of ocean ecosystems to support such activity and ensure food security (Howard, 2018a; Häyhä & Franzese, 2014b).

New concepts are introduced in the Blue Economy theory: "blue resources", "blue natural capital", "blue potential", "blue growth", and "blue sector of the economy". Surface and groundwater are defined as "blue waters".

Underpinning all aspects of the blue economy from the perspective of natural blue capital is the ecosystem approach, which defines all the Sustainable Development Goals set out in the United Nations General Assembly resolution "Transforming our world: The 2030 Agenda for Sustainable Development".

The report "The Ocean Economy. A Case for Action – 2015" considers two meanings of the term "blue economy":

- The use of the sea and its resources for sustainable economic development;
- Any economic activity in the maritime sector.

In some cases, the terms "blue economy" and "ocean economy" are identified and used interchangeably. However, these two terms represent different concepts:

- The "ocean economy" is simply related to the use of ocean resources and is strictly aimed at expanding the capabilities of the ocean economic system;
- The "blue economy" goes beyond considering the ocean economy solely as a mechanism for economic growth. Its main focus is on the sustainability of the ocean for economic growth. The blue economy thus encompasses the environmental aspects of the ocean alongside the economic aspects.

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The blue economy, like the green economy, aims for sustainable development without harming the environment and seeks to reduce environmental risks.

In addition to traditional ocean activities such as fishing, tourism and maritime transport, the blue economy encompasses new industries including renewable energy, aquaculture, seabed mining, marine biotechnology and bioresearch. It also seeks to include the ecosystem services of the ocean that are not covered by the market but provide significant contributions to the economy and human activities. These include carbon sequestration, coastal protection, waste disposal, and the existence of biodiversity.

3.2 Sustainability criteria

The new approaches of the European Union shift the focus from blue growth to a sustainable blue economy. Companies that comply with the requirements will have an advantage in the initial stage of introducing the principles of sustainability. They must use or generate renewable resources, as well as take action to protect marine ecosystems, reduce pollution, adapt infrastructure to climate change, etc. Companies that do not comply with the requirements will be obliged to take appropriate measures and reduce their impact on the environment.

An important step towards a sustainable blue economy is the development of sustainability criteria for the assessment of maritime economic activity. In March 2021, the European Union published a study, "Sustainability Criteria for the Blue Economy", the result of which is the draft Rules for Measuring the Sustainability of the Blue Economy (Blue Economy Sustainability Framework). The study brings together four dimensions of sustainability: economic, environmental, social, and governance. It presents a preliminary set of criteria and indicators that define the sectoral parameters for compliance with the new requirements. It is envisaged that individual criteria and indicators will be used to assess the sectors and sub-sectors of the blue economy. Their application leads to the personalization of the sustainability of individual types of activity. They can also become the basis for new environmental requirements of the European Union. They will probably be correlated with other environmental rules of the European Union, for example, with the achievement of good environmental status of marine waters. The European Commission promotes the principles of a sustainable blue economy at a global level, since “many value chains are global and are subject to global competition, and operators from the European Union do business all over the world”, with the aim of “exporting their approaches” beyond their borders.

4. Conclusion

The protection of the world's oceans and the Black Sea in particular is a global problem, and every country, even landlocked ones, can contribute to finding solutions. The concept of the "blue economy" is certainly suitable for solving this global problem, providing a unique and extremely relevant approach that combines social, economic, and environmental aspects, allowing us to strive for sustainable development of countries and management of the seas and oceans.

The transition to a sustainable blue economy is declared by the European Union as a condition for the implementation of the Green Deal. The blue economy is presented as an intermediate and preparatory stage, during which management technologies and mechanisms for ensuring sustainable development are developed. The basis of sustainable development is personalized responsibility for the use of marine resources and possible environmental damage. This can be seen as the personalization of activities aimed at addressing the challenges of sustainable development.

The introduction of environmental standards and sustainability criteria in relation to various sectors will limit economic activity. Non-compliance with the specified criteria may lead to sanctions and fines against individual operators (sectors) or to restrictive measures (restriction of access to marine areas, for example, through the use of maritime spatial planning mechanisms).

The concept of a sustainable blue economy and environmental standards in relation to economic activity are legally enshrined in the regulatory documents of the European Union. In relation to maritime planning, achieving good ecological status of marine waters, fishing, and sustainability criteria, etc., together create a regulatory basis for regulating economic activity in the World Ocean. Together with control, monitoring, and other measures, they form a new system for managing the marine resources of the European Union.

The European Union openly declares its aspiration to become a world leader in the field of ecology and, in terms of implementing the principles of a sustainable blue economy, promotes its strategies at the global level. To this end, it develops databases and modern monitoring tools, improves data processing, and creates new scientific and information products. In this way, it concentrates in its own hands the information and scientific base for the World Ocean, strengthening its positions in these areas.

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