

# The role of digital technologies in the implementation of environmental policy priorities

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**Abstract.** With the European Green Deal, the EU aims to implement new growth models that are climate neutral. Industry and ecosystems in the EU are undergoing a rapid green and digital transition. Cooperation between industry, public authorities, social partners, and stakeholders is envisaged in European policies, along the transition path of each ecosystem. In the tourism ecosystem, eco-entrepreneurship plays a crucial role in promoting responsible travel and ensuring the preservation of local ecosystems and cultures. One of the key strategies for eco-entrepreneurs in the travel industry is to constantly innovate and look for new ways to reduce travel's environmental footprint. To achieve the set goals, the EU focuses on the implementation of policies that promote the conservation of natural resources, the preservation of cultural heritage and support for local communities, activities also important for the development of tourism. The aim of the present study is to present the potential of European eco-policies and indicators for measuring the effect of their implementation to achieve the priorities set in European policies and their impact on the tourism ecosystem.

## 1 Introduction

Environmental policy in Europe is diverse and multifaceted, focusing on protecting, preserving and improving the environment for present and future generations. Environmental policy in Europe has a number of key priorities, including [1]:

- This includes designing products and systems that minimize waste and maximize resource efficiency, promote recycling and reuse, and reduce overall environmental impact.
- Air quality: Improving air quality is a major concern for European politicians, as air pollution remains a major health risk across the continent. The EU has introduced strict regulations on air pollutants, promoting cleaner transport and supporting research into innovative technologies to reduce emissions.
- Water management: Ensuring sustainable management of water resources is essential to maintaining healthy ecosystems and supporting human well-being. The EU has developed a Water Framework Directive that sets targets for the protection and restoration of surface water, groundwater and transboundary water.

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- **Chemical management:** Reducing the risks associated with chemicals and ensuring their safe use is another important aspect of European environmental policy. The REACH Regulation establishes a framework for the registration, evaluation, authorization and restriction of chemical substances in order to protect human health and the environment from the potential hazards posed by chemicals.

- **Noise pollution:** Tackling noise pollution is an emerging priority in European environmental policy, as exposure to high levels of noise can have harmful effects on human health and wildlife. The EU has adopted guidelines for the assessment and management of environmental noise and is working to reduce noise levels in urban areas and along major transport routes.

- **Sustainable consumption and production:** Promoting sustainable consumption and production patterns is a key objective of European environmental policy. This includes encouraging businesses to adopt more environmentally friendly practices, such as reducing waste, using renewable materials and minimizing the environmental impact of their products throughout their life cycle.

- **International cooperation:** Given the global nature of many environmental challenges, European environmental policy also emphasizes international cooperation and diplomacy. The EU works closely with other countries and international organizations to develop and implement global environmental agreements, share best practices and mobilize financial resources to protect the environment.

- **Mitigating and adapting to climate change** is a critical environmental challenge for Europe. The European Union (EU) has established challenging goals to cut greenhouse gas emissions, boost energy efficiency, and encourage the use of renewable energy sources. Furthermore, by making investments in early warning systems, ecosystem-based remedies, and sustainable infrastructure, the EU hopes to adapt to the effects of climate change.

- **Biodiversity protection:** Another top concern in European environmental policy is the preservation and restoration of biodiversity. In order to stop the loss of biodiversity by 2020, the EU has developed a comprehensive plan that calls for the preservation and restoration of natural ecosystems, the reduction of pollution, and the promotion of sustainable forestry and agricultural methods.

- **Transitioning to a circular economy:** One of the main goals of European environmental policy is to achieve this. This entails creating systems and goods that minimize waste, optimize the use of resources, encourage recycling and reuse, and lessen their overall impact on the environment.

- **Enhancing the quality of the air** is a top priority for European policymakers, since air pollution continues to pose a serious threat to public health throughout the continent. Stricter air pollution laws have been implemented by the EU, encouraging cleaner transportation and funding the development of cutting-edge emission-reducing technologies.

- **Water resource management:** To preserve thriving ecosystems and promote human well-being, sustainable water resource management is crucial. A Water Framework Directive created by the EU establishes goals for groundwater, surface water, and transboundary water restoration and preservation.

- **Chemical management** is an essential component of risk reduction since it guarantees the safe use of chemicals while also lowering associated hazards. To safeguard the environment and public health from the potential risks that chemicals pose, the REACH Regulation provides a framework for the registration, assessment, authorization, and limitation of chemical compounds.

- **Noise pollution:** Because exposure to excessive noise levels can have negative impacts on both human health and animals, combating noise pollution is becoming a top concern in European environmental policy. In addition to attempting to lower noise levels

in cities and in important transportation corridors, the EU has established guidelines for the assessment and management of environmental noise.

- One of the main goals of European environmental policy is to promote sustainable patterns of consumption and production. The EU has created criteria for assessing and managing environmental noise, and it is aiming to minimize noise levels in cities and along major transportation routes.

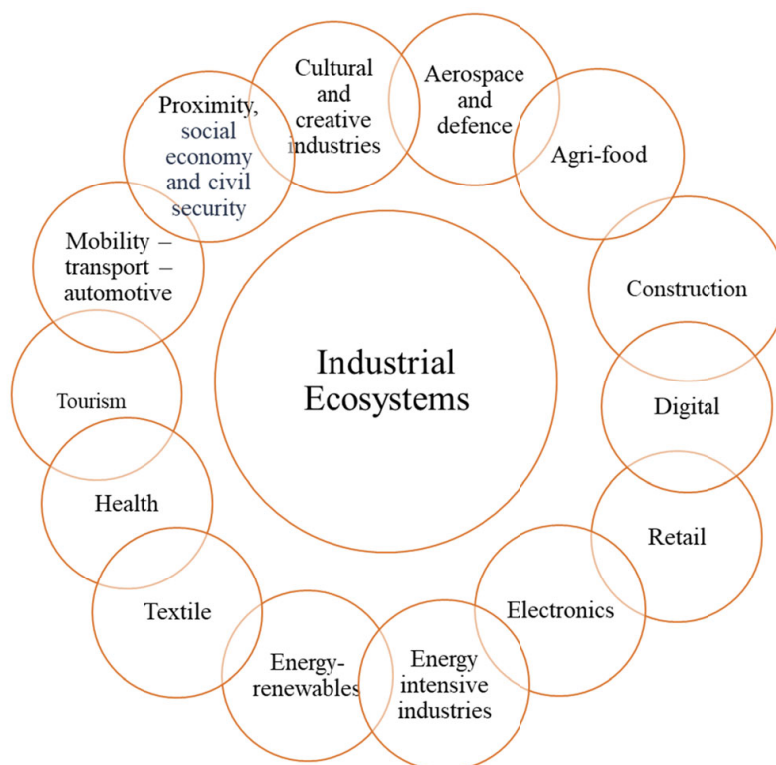
- European environmental policy aims to promote sustainable consumption and production. This involves encouraging firms to embrace more environmentally friendly practices like decreasing waste, using renewable materials, and limiting their products' environmental impact throughout their life cycle.

- European environmental policy prioritizes international cooperation and diplomacy to address global concerns. The EU collaborates closely with other nations and international organizations to negotiate and execute global environmental treaties, share best practices, and mobilize financial resources for environmental protection.

These priorities reflect the recognition that environmental sustainability is essential for the well-being of European citizens, the competitiveness of European industries and the long-term stability of the planet.

Tourism plays an important role in the European Union's environmental policy, as it is both an economic sector and a contributor to environmental challenges. The EU recognizes the importance of balancing tourism growth with the need to protect and preserve the environment.

The significance of the tourism sector for the development and economy of the European Union (EU) places it within the scope of the EU Industrial Strategy [2]. The strategy supports the dual transition to a green and digital economy, which would make EU industry more globally competitive and lead to Europe's strategic autonomy. The industrial strategy highlights the need to accelerate the green and digital transition, especially for ecosystems heavily affected by COVID-19, such as tourism (Fig. 1).



**Fig. 1.** Industrial Ecosystems in the EU Industrial Strategy [2].

An industrial ecosystem refers to the interconnected network of organizations, companies and institutions that work together within a particular industry or sector. This network includes suppliers, manufacturers, distributors, customers and other stakeholders who collaborate and exchange resources, knowledge and expertise to create and deliver products or services. Industrial ecosystems are essential to the functioning and success of any industry, as they facilitate the efficient flow of materials, components and information throughout the value chain [3-6].

One key characteristic of the industrial ecosystem is its symbiotic nature, where the activities of one organization directly influence and rely on the activities of others within the network. This interdependence fosters collaboration and innovation, leading to the development of new technologies, processes and business models that drive industry progress [7]. Every industrial ecosystem needs to transform its business models and value chains to contribute to the achievement of a green, digital and sustainable European economy. But such transitions require specific and actionable plans (transition paths) developed for each of the industrial ecosystems.

## **2 Materials and methods**

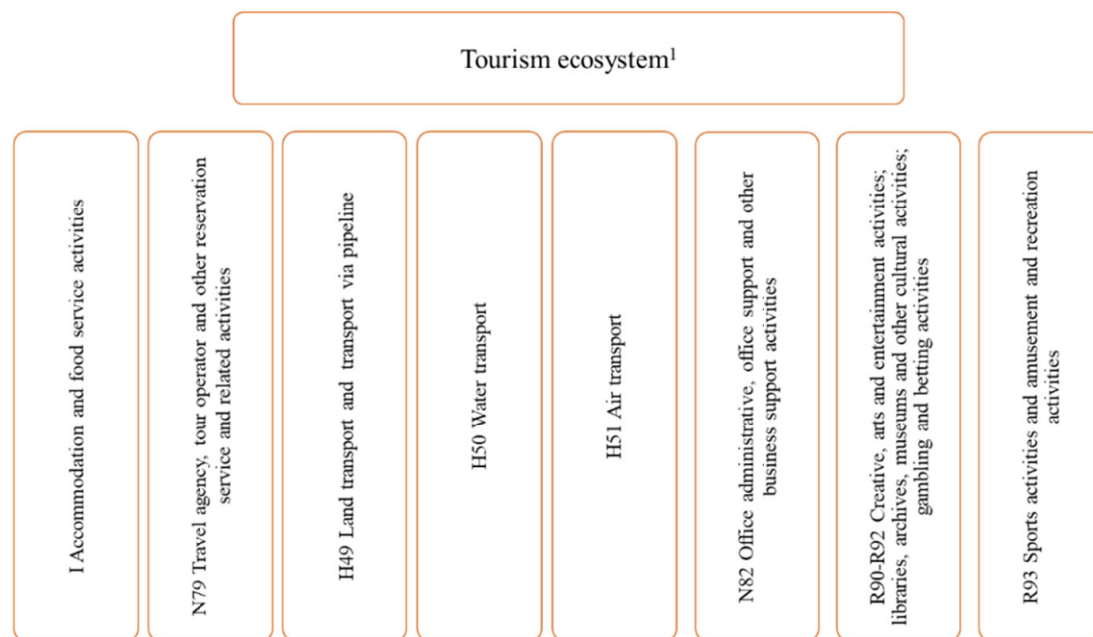
The research is based on standard scientific methods, including a systematic approach, deduction, induction, descriptive method, content analysis, etc. In the course of the research, a literature review is used to clarify the main aspects of the question posed. A significant part of the research is devoted to the analysis of the official sources of information about the national and European policy for sustainable development of tourism and its implementation in the last few years. A qualitative textual analysis of the impact of tourism development on the environment has also been made.

## **3 Results**

The COVID-19 pandemic has had a significant impact on the travel industry worldwide. Travel restrictions, border closures and fears of contracting the virus have led to a sharp drop in international and domestic travel. As a result, many airlines, hotels and tourism businesses were severely affected, leading to layoffs, closures and financial losses [8]. 2023 saw a rapid recovery in international tourism, which managed to account for 88% of trips in 2019, or over 1,286 million international tourists [9]. UNWTO [7] reports 34% growth in international tourist arrivals from 2022 and total tourism export earnings of US\$1.6 trillion, the tourism sector regaining its pre-pandemic share of tourism direct gross domestic product (TDGDP) – 3%.

According to UNWTO [10] data on the number of tourist trips in 2023, Europe emerged as the most visited tourist destinations in the world, occupying a market share of 54%, followed by the Asia-Pacific region - 18%, the Americas tourist region - 15%, the Middle East – 7% and Africa – 5%. The high interest of tourists in Europe is dictated by the rich natural diversity, cultural heritage and economic development, with which in 2023 it attracted over 694 million visitors. The economic contribution of the tourism sector varies significantly in individual countries and regions of the EU, both directly and through its multiplier effect in related sectors, providing the necessary raw materials and materials for the implementation of tourism activities. The tourism ecosystem, in turn, comprises a set of globalized and interconnected value chains, involving in whole or in part service providers and suppliers not only in areas such as accommodation, travel and transport, food, culture, recreation, safety and security, information organizations, but also destination and attraction management organizations, scientific research and government bodies.

The tourism ecosystem refers to the interconnected network of individuals, organizations and resources involved in the tourism industry. This includes various elements such as accommodation providers, tour operators, transport services, attractions and local communities. The tourism ecosystem plays a vital role in the overall experience of travelers and tourists as it encompasses all the components that contribute to their visit. By understanding and maintaining this ecosystem, destinations can ensure sustainable tourism development that benefits both the industry and the local environment and community (Fig. 2).



<sup>1</sup> Definition by DG GROW Annual Single Market Report

**Fig. 2.** Tourism Ecosystems in the EU Industrial Strategy [11].

With the European Green Deal [12], the EU is promoting new growth patterns and setting climate-neutral targets by 2050. By 2030, it has already pledged to cut emissions by at least 55%.

A transformational and efficient collection of legislative actions and policies are used to achieve these goals. The Commission's Fit for 55 package, which was unveiled on July 14, 2021, updates and expands upon the Green Deal's legislative goals in the areas of energy, transportation, and the climate [12].

For the sustainable development of the tourism sector, in June 2021 DG GROW initiated a process of co-creation of the Tourism Transition Pathway [11] involving industry, public authorities, social partners and other stakeholders. In this plan, the tourism community is called upon to implement measures in twenty-seven areas, including [11]:

- investing in circularity to reduce energy and water use, waste generation and pollution, while better responding to the growing demand for sustainable tourism;
- reconstructing data exchange practices to authorize new creative tourism aids and better sustainable goal administration;

investing in abilities to guarantee the availability of a skillful trained workers and attractive courses in the tourism ecosystem. As a leading tool for the analysis of the tourism ecosystem and the implementation of the Tourism Transitional Pathway, the EU Tourism Scoreboard is used. The scoreboard currently contains a total of 19 indicators grouped under the three main policy pillars:

- Green pillar;
- Digital pillar;
- Socio-economic pillar.



A fourth pillar is also observed, called "Main characteristics of tourism", containing additional data and statistics to provide further context and characterization of the tourism activity of countries and regions (e.g. tourism supply, tourism demand, supply of tourist services).

This conceptual framework assumes that tourism destinations that show higher scores on the pillars are also more likely to have a more sustainable and resilient tourism ecosystem. The presented policies and measures of the EU show the importance and priority of making environmentally friendly decisions in the development of tourism, and the promotion of eco-entrepreneurship is one of the possibilities for a smooth transition to environmentally friendly and sustainable tourism [13-15].

Eco-entrepreneurship is emerging as a strategic tool to promote economic development and sustainability in various industries, including tourism. Eco entrepreneurship focuses on creating innovative solutions to environmental challenges while generating profits [16]. By integrating sustainable practices into business operations, eco-entrepreneurs can contribute to the conservation of natural resources and the reduction of the carbon footprint [17]. In addition to promoting responsible travel, eco-entrepreneurship promotes the development of green technologies and practices within the tourism industry. These innovations can lead to cost savings for businesses while reducing their impact on the environment [7]. By adopting renewable energy sources, waste reduction strategies and sustainable water management, eco-entrepreneurs can set an example for larger enterprises and inspire the adoption of green practices throughout the industry [18].

In addition, eco-entrepreneurship promotes collaboration between various stakeholders, including local communities, government agencies and non-governmental organizations. This collaborative approach can lead to the creation of policies for sustainable tourism, protection of natural habitats and empowerment of local residents through job creation and skills development. As consumer demand for sustainable travel options continues to grow, eco-entrepreneurship will have an even greater impact on the tourism sector, driving positive economic and environmental outcomes.

The success of eco-entrepreneurship in the tourism industry depends on continuous support from consumers, investors and politicians. As awareness of environmental issues grows, there is a growing opportunity for eco-entrepreneurs to drive positive change while contributing to the economic prosperity of destinations. By promoting a balance between economic growth and environmental protection, eco-entrepreneurship is positioned to play a key role in shaping the future of sustainable tourism.

All that has been said so far shows that eco-entrepreneurship unites the priorities of the European Commission set in the path of transition for tourism and can be accepted as an important engine for economic growth and environmental sustainability.

European environmental policy has a significant impact on the development of the tourism ecosystem. The priorities outlined in the policy, such as biodiversity conservation, integrated planning, support for the local economy and environmental education, directly influence the development of the tourism ecosystem in Europe. Biodiversity conservation efforts lead to the preservation of natural habitats and the promotion of ecotourism, attracting visitors interested in the region's unique flora and fauna. Integrated planning initiatives contribute to the sustainable development of tourism infrastructure by ensuring that the growth of the industry is in harmony with the environment. Supporting the local economy promotes tourism development and eco-entrepreneurship to provide authentic experiences for travelers. In addition, environmental education programs raise awareness among tourists and promote sustainable travel and appreciation of Europe's natural beauty.

The priorities of European environmental policy not only shape the tourism ecosystem, but also position Europe as a leader in sustainable and responsible tourism.

The development of eco-entrepreneurship in recent years is a consequence of the change in the behavior of consumers and businesses, which are becoming more and more aware of the environmental impact of their activities. One of the key areas in which eco-entrepreneurship is flourishing is in the realm of eco-friendly forms of tourism [19].

This type of tourism focuses on minimizing the negative impact on the environment and helping local communities. Eco-entrepreneurs in this industry create innovative solutions to promote sustainable tourism, such as developing eco-lodges, organizing eco-tours and partnering with local organizations to protect the environment, flora and fauna. Empowering local stakeholders and fostering a sense of ownership can lead to more sustainable and responsible tourism practices. Furthermore, partnerships with local communities and local groups can not only provide authentic cultural experiences for travelers, but also ensure that the economic benefits of tourism are distributed equitably.

In addition to environmental and social benefits, eco-entrepreneurs can also differentiate their offerings in a competitive market by emphasizing the unique experiences and connections with nature that eco-tourism provides [20].

According to data from Grand View Research [21] and The Brainy Insights [22], ecotourism in its various forms is gaining popularity and increasing its market share in recent years. In 2022, the global sustainable international tourism industry was valued at \$214.60 billion and is forecast to grow to \$785 billion by 2030 [23].

According to data from the United Nations Intergovernmental Panel on Climate Change (IPCC) as of February 2022, 81 percent of global travelers believe that sustainable travel is important. A 2020 global survey found that Generation Z (56%) and Millennials (51%) are most concerned about sustainable travel. Gen X (49%) and Baby Boomers (46%) are least concerned about it. 77% of travelers aged 18-29 say sustainability influences their travel decisions, compared to 48% of travelers aged 51 and over. 76% of travelers surveyed in 2023 say they want to travel more sustainably in the next 12 months [23].

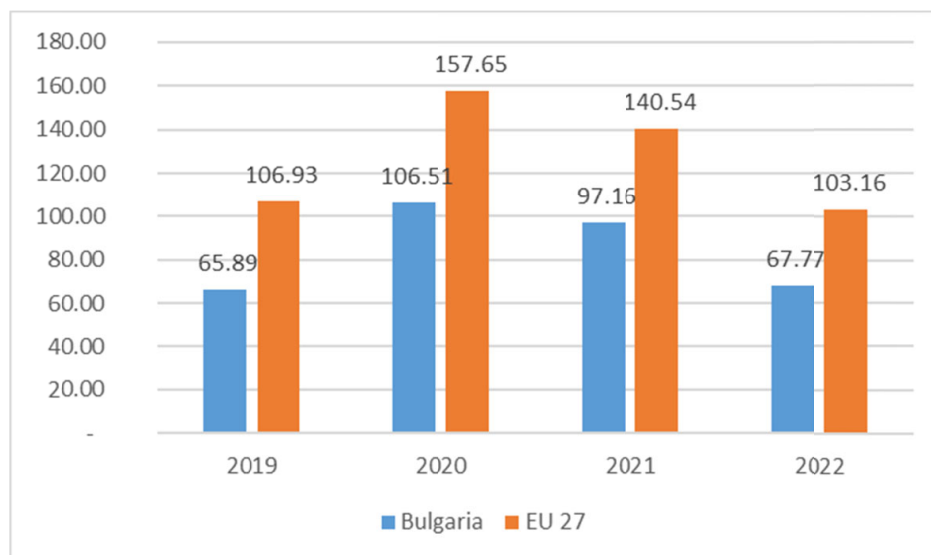
These data show that tourists' attitudes towards sustainable development and the protection of the environment and local communities are becoming increasingly decisive in their choice of a tourist destination.

To measure the impact that tourism has on the environment, the European Commission tracks seven main indicators in the green pillar [24]:

- Air travel emission intensity (Kg CO<sub>2</sub>/passenger) - represents an estimate of the average amount of CO<sub>2</sub> released per passenger in air transport for a reporting country;
- Intensity of Greenhouse Gas Emissions in Tourism (Tons of CO<sub>2</sub>-eq./Million EUR) - measures the amount of Greenhouse Gas (GHG) emissions generated by the tourism ecosystem per million Euros of Gross Value Added (GVA) in the tourism sector (at constant prices from 2015);
- Energy intensity of tourism (TJ/million EUR) - the amount of energy used in tourism-related economic activities per million euros of gross value added (GVA) in the tourism sector (at constant 2015 prices), indicating the average energy efficiency of the tourism ecosystem;
- Share of train journeys (%) - measures the relative importance of sustainable means of transport within a tourist destination, approximated by the share of train journeys;
- Excellent bathing water (%) - measures the quality of bathing waters and is calculated as the proportion of sampled bathing sites classified as "excellent" in the tourist destination;
- Dependence on distant origin (%) - measures the dependence of a given country's tourism on distant international markets (at distances over 2000 km.);
- Ecolabels and schemes (Number) - provides the number of tourist accommodation services registered under EMAS or awarded the EU Ecolabel or other ecolabels.

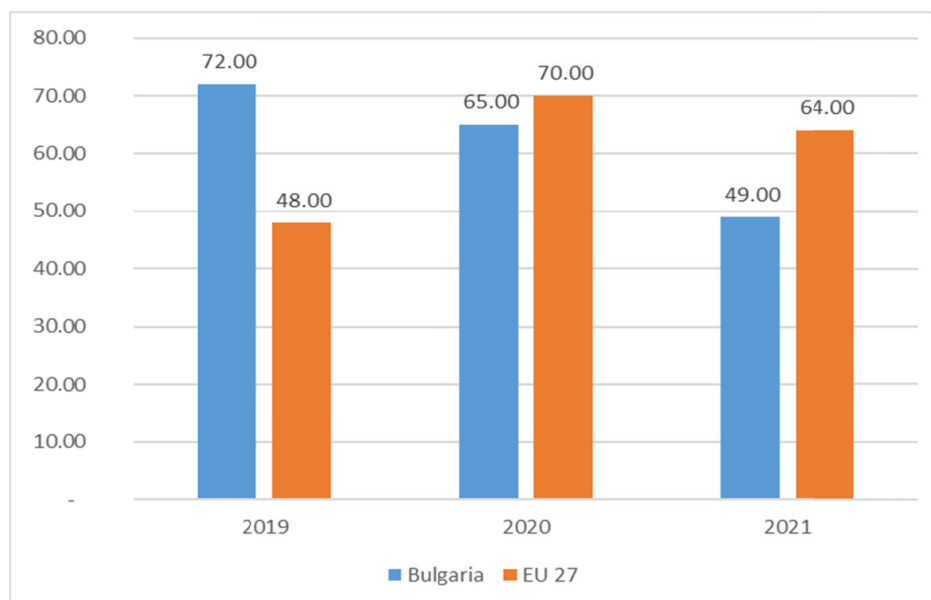
## 4 Discussion

In order to determine the sustainability of the tourism ecosystem of Bulgaria, we will follow the indicators considered in the tourism dashboard for the member states of the European Union. As can be seen from Fig. 3 and Fig. 4, lower CO<sub>2</sub> emissions from all passenger flights are observed in Bulgaria compared to air transport emissions for the EU 27 [24].



**Fig. 3.** Air travel emission intensity (Kg of CO<sub>2</sub>/passenger) [24].

Greenhouse gas values are also lower, hence the impact the tourism ecosystem has on air pollution.

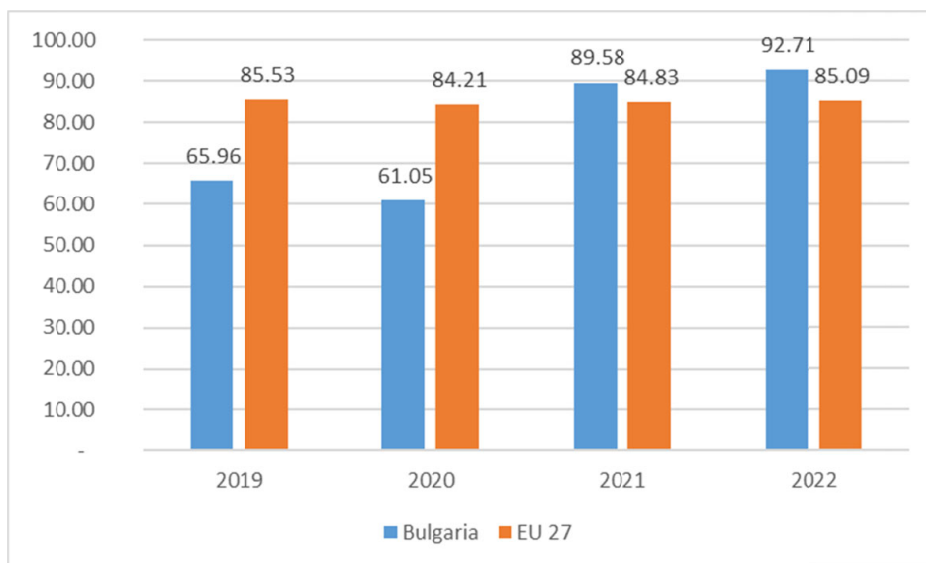


**Fig. 4.** Tourism GHG intensity (Tone's CO<sub>2</sub>-eq / Million EUR)) [24].

An important indicator for both tourism development and ecology is the quality of bathing water. The measurement criterion is based on the presence of significant pollutants in fresh and coastal waters between May and September and takes into account the proportion of bathing sites sampled that are classified as 'excellent'.



As can be seen from fig. 5, the values in 2019 and 2020 are significantly below the EU average – by almost 20% each. In 2021 and 2022, an improvement of the indicator is observed Excellent bathing water, which exceeds the EU average.

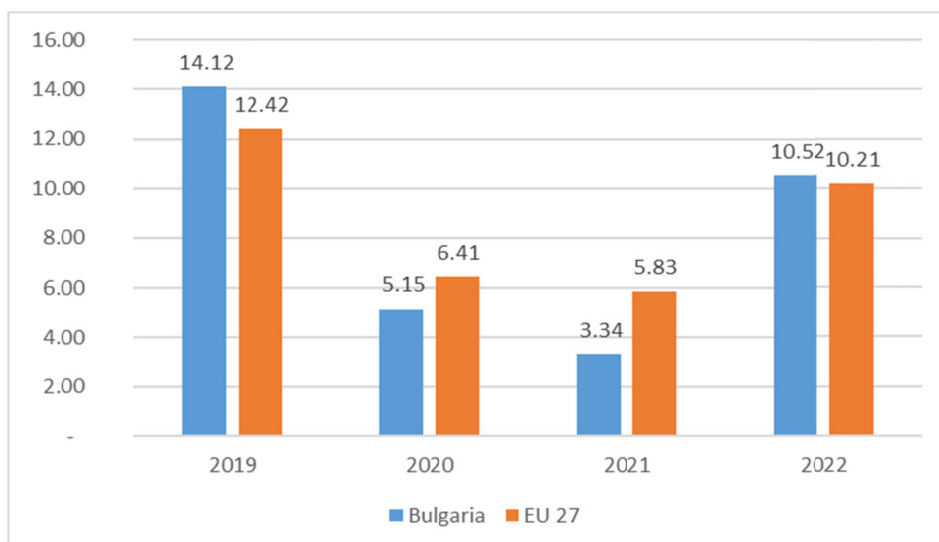


**Fig. 5.** Excellent bathing water (%) [24].

Unlike the three indicators presented, Bulgaria does not report favorable values for the remaining indicators. Regarding the indicator showing the Energy intensity of tourism, low energy efficiency of tourism-related economic activities is reported. The energy intensity of the Bulgarian tourism ecosystem is 3.5 times higher than the EU average.

Unfavorable indicators are also reported in relation to the Share of trips by train indicator, which shows that only 0.02% of passenger trips in the country are by rail transport (transport, accepted as one of the most environmentally friendly modes of transport). During the four-year monitoring period, the indicator was 6 times lower than the reported values for the EU countries.

The next indicator that considers the impact of the tourism ecosystem on ecology considers the dependence of a country's tourism on distant international markets. It is calculated as the share of nights spent in accommodation facilities by foreign tourists arriving from places that are geographically distant from the destination being studied.



**Fig. 6.** Dependence on distant origins (%) [24].

From Fig. 6 it can be seen that during the years of COVID-19 restrictions and the predominant share of domestic travel, the percentage of foreign tourists is lower and this has a favorable effect on the impact of long-distance travel. The restoration of tourism, the opening of borders and the increase in the number of foreign tourists leads to an increase in the values of the indicator. In 2022, its values even slightly exceed those for the EU.

If for the rest of the indicators, Bulgaria reports certain values, whether they are better or worse than the average for the EU, then with regard to the last indicator, the statistics are desperate. One of the desired outcomes of the Tourism Transition is the increased use by the tourism ecosystem, and in particular the Hospitality and Restaurant sector, of the EU Eco-Management and Audit Scheme (EMAS), the EU Ecolabel or other credible ecolabels. According to data in the tourism dashboard for 2022, in Bulgaria there is not a single representative of the tourism ecosystem with an EMAS certificate, among 4150 certified organizations in the EU. Not a single EU Ecolabel, with 423 in EU countries. According to data from the Green Key website [25] for Green Key certified organizations, in 2023, 11 sites were reported in Bulgaria, compared to 4,800 sites in the other EU member states.

Regardless of the weak certification activity in the country, in Bulgaria 34.89% of its territory falls into a Natura 2000 protected area, which is 15% higher than the EU average. "Natura 2000" is the ecological network for the protection of wild animal and plant species and natural habitats of European presented policies, objectives and priorities of the EU aim to promote eco-entrepreneurship and the implementation of green innovations in the tourism sector [25-29]. Business opportunities are sought in new sectors (including eco-, green or sustainable tourism) and markets [30-34].

The greening of European tourism is one the wider aim of cultivating a bearable and responsible environment, a process including all partners in multi-level governance: manufacturing, goals, interstate, regional and local experts, but still the services [26-27].

## 5 Conclusions

In summary, tourism plays a vital role in European environmental policy as it is both an economic sector and a contributor to environmental challenges. The EU promotes sustainable tourism practices that balance economic growth with environmental protection in order to ensure the long-term viability of Europe's natural and cultural heritage for future generations.

The European environmental policy plays a decisive role in the development of tourism in the European Union and in Bulgaria. It sets priorities and guidelines that aim to protect the environment, promote sustainability and ensure responsible tourism practices. One of the key aspects of European environmental policy is the emphasis on sustainable tourism practices. This includes measures to minimize the environmental impact of tourism activities, such as promoting energy-efficient accommodation, reducing waste and recycling and supporting green transport options. In addition, the policy focuses on the preservation of natural and cultural sites, which are essential to maintain their attractiveness to tourists.

In conclusion, the data presented show that the Bulgarian tourism ecosystem has a relatively small footprint on the environment. We believe that compliance with European policy and the measures that the EU envisages to promote cooperation and partnership between stakeholders in the tourism industry will help to collectively address environmental challenges. This collaborative approach encourages the sharing of best practices and the implementation of innovative strategies to minimize the environmental footprint of tourism activities.

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