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# Environmental performance of tourism in Portugal – comparative analysis and challenges

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# Environmental performance of tourism in Portugal – analysis and challenges

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**Abstract**

Tourism is an essential economic activity for the Portuguese economy, allowing raising revenues for the economy and for the state, job creation, new business opportunities and stimulating the various regions that are attractive due to the quality of the infrastructure, products and services, namely hospitality services, as well as because of their cultural and historical interest. In addition to these factors, the tourism sector also relies on the quality of the natural environment, clean water, clean air, pleasant climate and the quality of the ecosystem. It is, therefore, important to guarantee that the economic and social contribution of this sector follows along environmental sustainability patterns.

The present study analyses several indicators to analyse the tourism ecosystem in Portugal in terms of environmental sustainability, namely the ability and challenges to contribute to the achievement of climate-neutrality and sustainability objectives.

The data presented in this analysis is part of the EU Tourism Dashboard, a tool developed by the Joint Research Centre (JRC) from the European Commission (EC), aimed at promoting and monitoring the green and digital transitions of the tourism ecosystem and factors of socio-economic resilience of the tourism ecosystem. This dashboard results from the work carried out during the Portuguese Presidency of the Council of the European Union (EU).

Through the analysis of the indicators, we can conclude that:

- Portugal has improved the performance regarding air travel emission intensity in 2021 (112.7), performing as the 10$^{th}$ country among the EU27 and positions better in relation to the EU average (131.8);
- When analysing the train, the public transport that stands out due to the lowest carbon emission per passenger, the share of trips by train in Portugal in 2021 (3.4) is in the 19$^{th}$ position and below the EU27 average (13.6), reflecting a less widespread use of train for domestic travel compared to vehicles with a higher environmental impact;
- Portugal recently decreased its performance in the tourism greenhouse gas (GHG) intensity indicator, as the 11$^{th}$ country with the highest tourism GHG intensity indicator in the EU;
- The tourism energy intensity has recently decreased in Portugal, occupying the 7$^{th}$ position among the EU countries, but the country has still a lower energy efficiency compared to the EU average;

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- Portugal performs better than the EU average regarding the share of excellent bathing waters, ranking in the 7th position; and
- Portugal presents a potentially higher environmental footprint due to long-distance travelling, occupying the 5th position and above the EU average.

When acknowledging the positive evolution of Portugal regarding the contribution of the tourism sector for climate-neutrality and sustainability objectives, important challenges need to be addressed:

- It is important that the tourism sector, namely in Portugal, continues to consider its impacts on environmental terms by mitigating the adverse environmental impact activities and following best practices to reduce their environmental impact;
- Enterprises should improve their environmental management and planning, raise environmental awareness and contribute to environmental protection and preservation;
- Both the dissemination of good practices and the awareness of more sustainable behaviours (e.g., "slow travel", "zero ecological footprint" or "say no to plastic") are essential not only for enterprises to become more sustainable but also for making travellers more responsible for their behaviour;
- The high prevalence of economic activity dependent on tourism creates pressure in terms of environmental sustainability that must be addressed by public policies.

This topic gained an additional relevance with the "European Agenda for Tourism 2030", just recently approved by the Council of the EU (2022), on December 1, 2022. This Agenda results, in large part, from the commitment assumed during the Portuguese Presidency of the Council of the EU. It is now up to the European Commission and the Member States to implement and monitor the application of the multi-annual EU Work Plan of the European Agenda for Tourism 2030, strengthening competitiveness based on a model of circular and sustainable tourism.

**JEL Classification:** F64, L83, Q56, Z32
**Keywords:** Tourism, environmental impact

**Note: This article is sole responsibility of the authors and do not necessarily reflect the positions of GEE or the Portuguese Ministry of Economy and Maritime Affairs.**

## 1. Introduction

Tourism is an essential sector for the Portuguese economy, promoting revenues' generation for the economy and for the state, job creation, new business opportunities and stimulating the various regions that are attractive due to the quality of the infrastructure, products and services, as well as because of their cultural and historical interest.

In line with other economic activities, tourism is not exempt from creating significant challenges and risks namely in environmental terms. In this analysis, we will focus on the environmental impact of tourism from the following perspectives: emissions of greenhouse gas (GHG) due to travel, the use of more sustainable means of transport, emissions of GHG from the tourism sector, the energy intensity of tourism, water quality in areas bathing resorts and dependence on long-distance tourism.

Aiming to address these challenges and risks, the European Commission Staff working Document of June 2021, on "Scenarios towards co-creation of transition pathway for tourism for a more resilient, innovative and sustainable ecosystem", presented an analysis of the tourism ecosystem (European Commission, 2021). One of the main focus of the report was the need to ensure that tourism allows the achievement of defined sustainability goals, considering possible outcome scenarios for 2030.

The present study analyses several indicators to analyse the tourism ecosystem in Portugal in terms of environmental sustainability, areas of contribution and challenges to the achievement of climate-neutrality and sustainability objectives.

The data presented in this analysis is part of the EU Tourism Dashboard (European Commission, 2022a), a tool developed by the Joint Research Centre (JRC), aimed at promoting and monitoring the green and digital transitions of the tourism ecosystem and factors of socio-economic resilience of the tourism ecosystem. This instrument helps policymakers in assessing progress in the green and digital transitions and in the definition of policies and strategies for the tourism ecosystem based on the comparative assessment of EU countries according to policy-relevant indicators for tourism.

The indicators of the EU Tourism Dashboard are organised under three policy pillars: environmental impacts, digitalisation, and socio-economic vulnerability. All the listed indicators in this analysis are part of the environmental impacts pillar.

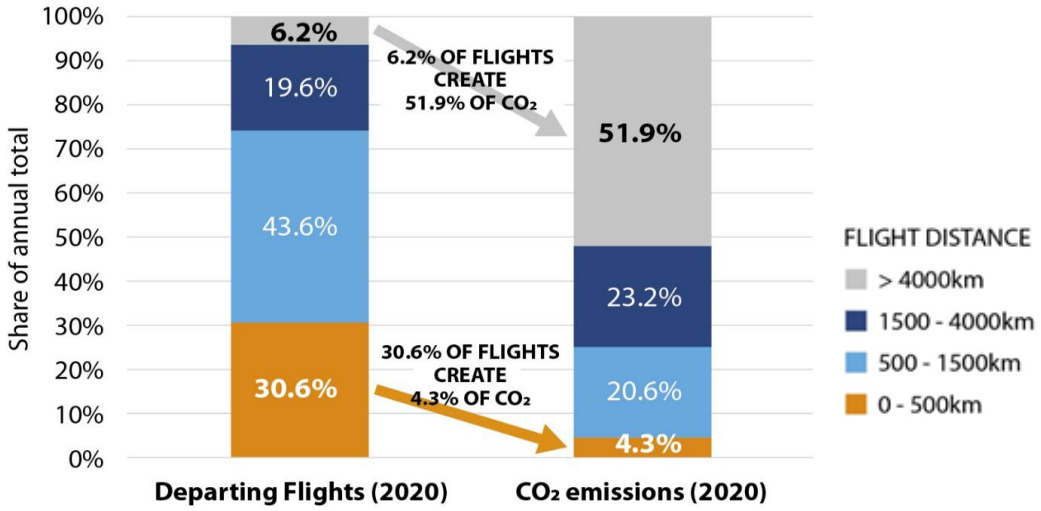
This dashboard results from the work carried out during the Portuguese Presidency of the Council of the European Union (EU) in which Portugal managed to obtain unanimous approval, on May 27, 2021, of the Council conclusions on "Tourism in Europe for the next decade: sustainable, resilient, digital, global and social" according to which the presidency invited the commission to "work with the Member States and relevant international organizations to jointly design an EU Tourism Dashboard, as an EU flagship tool for the tourism ecosystem. For this purpose, INVITE the Commission to work with Member States' experts to present a first outline by the end of 2021" (Council of the EU, 2021).

## 2. Air travel emission intensity

The indicator of air travel emission intensity is an estimate of the average amount of $CO_2$ emitted per air passenger[3]. Lower values indicate lower emissions per air passenger. Higher country values are usually associated with more long-haul flights.

According to Eurocontrol (2021), in 2020, longer-distance flights (over 4,000km) represent 6.2% of total flights and 51.9% of $CO_2$ emissions. There is, therefore, an environmental cost associated with longer distances.

**Figure 1 – $CO_2$ emissions by flight distance**

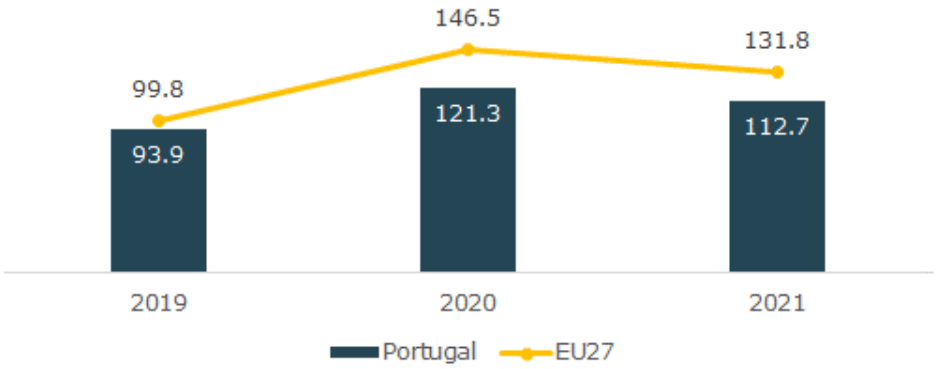



**Source:** Eurocontrol (Data Snapshot #4)

The air travel emission intensity decreased in 2021 in Portugal (from 121.3 to 112.7). This indicator in Portugal is lower than the EU average in 2021 (131.8), which suggests a lower emission level per air passenger in Portugal when compared to the other EU countries.

[3] It is calculated by dividing the amount of $CO_2$ emitted by all passenger flights by the number of passengers within a year. The emission quantities and the number of air passengers are associated with the airport of departing flights. Therefore, the indicator considers, for every airport, both residents travelling to a destination and tourists returning home.

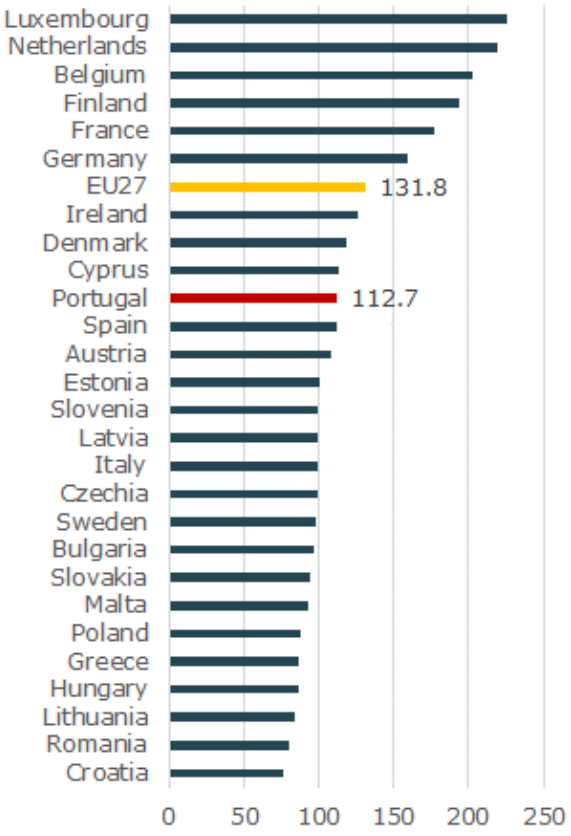
**Figure 2 – Air travel emission intensity | Portugal and EU27 | 2019-2021**




**Source:** Eurocontrol (air travel emissions); Air transport measurement, Eurostat (table: avia_paoc)

Portugal is the 10th country with the highest air travel emission intensity among the EU27 in 2021. Luxembourg, the Netherlands and Belgium are the countries with the highest indicators in the EU.

**Figure 3 – Air travel emission intensity | All EU27 countries | 2021**

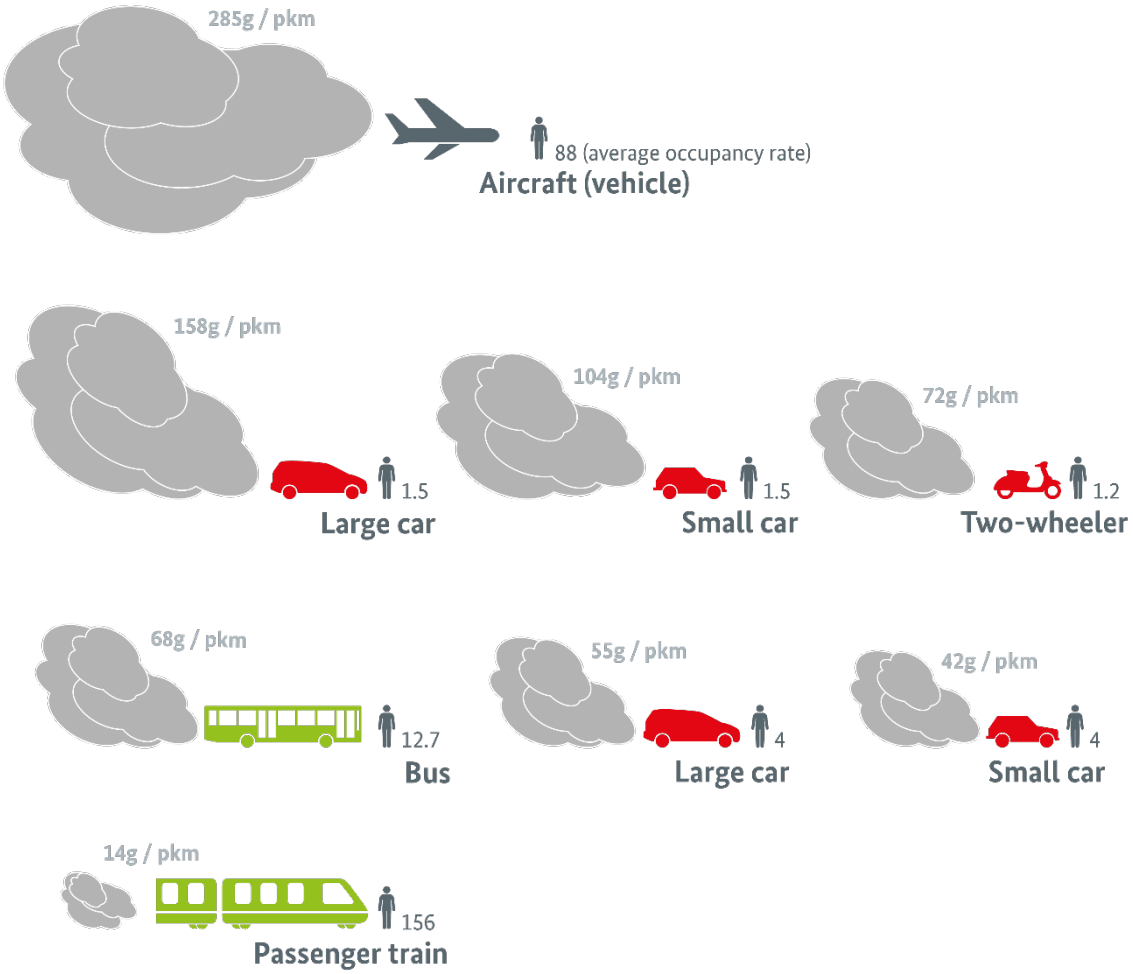



**Source:** Eurocontrol (air travel emissions); Air transport measurement, Eurostat (table: avia_paoc)

## 3. Share of trips by train

According to the Transformative Urban Mobility Initiative (2019), green transport depends on the sustainability of the option. Among these green vehicles, public transport trains stand out due to the lowest carbon emission per passenger.

**Figure 4 – Carbon Emissions Per Passenger**



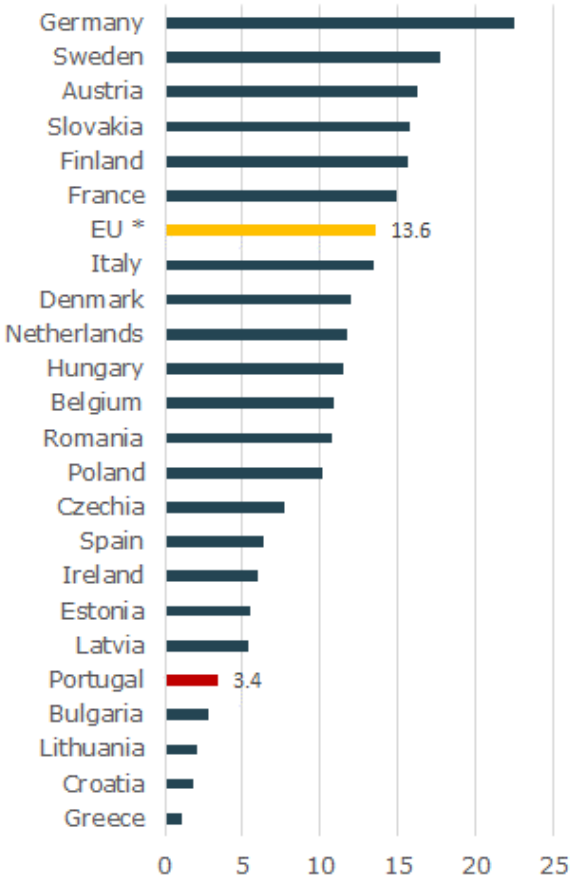

**Source:** Transformative Urban Mobility Initiative

The indicator of share of trips by train measures the relative importance of sustainable means of transportation within a tourism destination (considering transports that are sustainable in terms of their environmental and social impacts). For this purpose, it uses as a proxy the share of trips using train as mode of transportation.

In Portugal, the share of trips by train in 2021 is relatively low (3.4) compared to the EU average (13.6). Lower values of this share suggest a less widespread use of train for domestic travel compared to vehicles with a higher environmental impact.

Germany, Sweden and Austria are the top 3 countries in the EU with the highest shares of trips by train among 23 countries with information available and Portugal is in the 19th position.

**Figure 5 – Share of trips by train | 23 among the EU27 countries | 2019**




*** Note:** Data is not available for Cyprus, Luxembourg, Malta and Slovenia. The share for the EU was calculated considering the 23 EU countries with information available regarding the number of trips by mode of transport

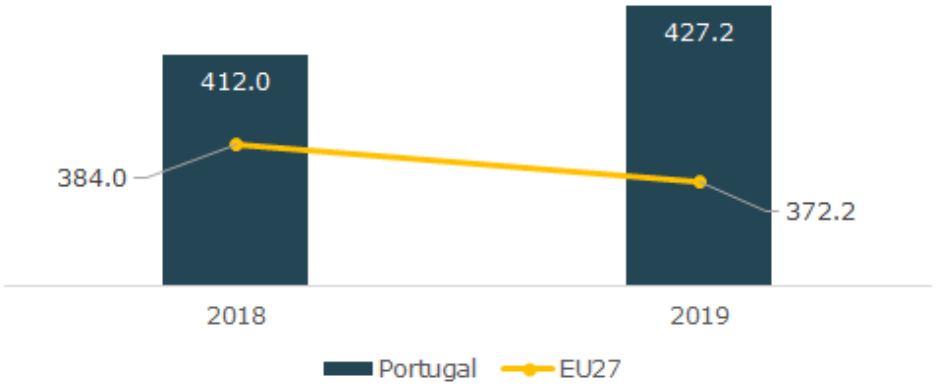
**Source:** Annual data on trips of EU residents, Eurostat (table: tour_dem_tttr)

## 4. Tourism greenhouse gas intensity

Tourism GHG intensity measures the amount of GHG emissions produced by the tourism ecosystem per Million Euro of Gross Value Added (GVA) in the tourism sector[4].

The tourism GHG intensity indicator increased in Portugal, from 412 in 2018 to 427.2 in 2019, is above the EU average (372.2). Higher values indicate a higher contribution to GHG emission and air pollution per Million Euro of GVA generated by the tourism ecosystem at the destination.

**Figure 6 – Tourism GHG intensity | Portugal and EU27 average | 2018-2019**

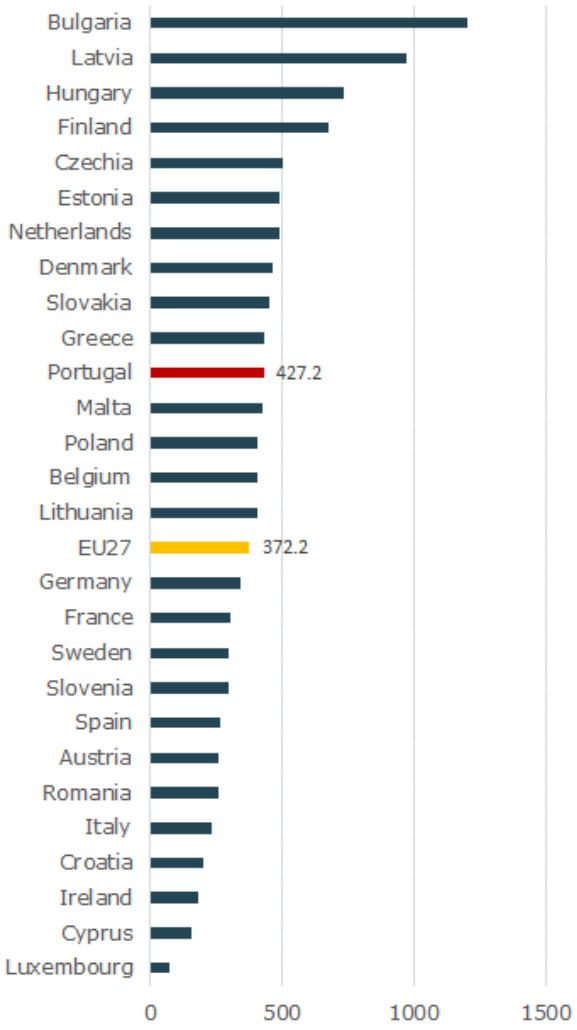



**Source:** Air emissions accounts by NACE Rev. 2 activity, Eurostat (table: env_ac_ainah_r2); National accounts aggregates by industry by NACE Rev. 2 activity, Eurostat (table: nama_10_a64). 2-digit NACE sectors considered: H49, H50, H51, I, N79, R90-R92, R93

Portugal is the 11th country with the highest tourism GHG intensity indicator in the EU. Bulgaria, Latvia and Hungary are the countries with the highest tourism GHG intensity in the EU in 2019.

[4] This indicator includes the following greenhouse gases: $CO_2$, and $N_2O$, $CH_4$, HFC, PFC, $SF_6$, $NF_3$, all in $CO_2$ equivalent.

**Figure 7 – Tourism GHG intensity | 24 among the EU27 countries | 2019**



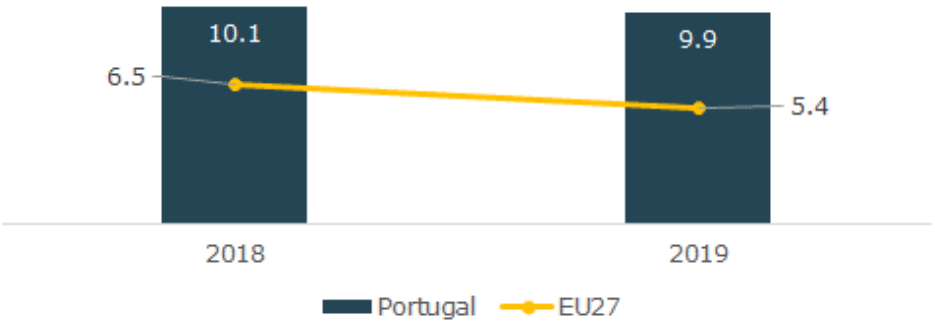

**Source:** Air emissions accounts by NACE Rev. 2 activity, Eurostat (table: env_ac_ainah_r2); National accounts aggregates by industry by NACE Rev. 2 activity, Eurostat (table: nama_10_a64). 2-digit NACE sectors considered: H49, H50, H51, I, N79, R90-R92, R93

## 5. Tourism energy intensity

Tourism energy intensity is defined as the amount of energy used in tourism-related economic activities per Million Euro of Gross Value Added (GVA) in the tourism sector, indicating the average energy efficiency of the tourism ecosystem. Improve tourism energy intensity implies using less energy to obtain the same output.

Portugal improved the tourism energy efficiency since the tourism energy intensity decreased from 2018 (10.1) to 2019 (9.9), although it remains above the EU27 average, which also registered a positive evolution from 6.5 in 2018 to 5.4 to 2019.

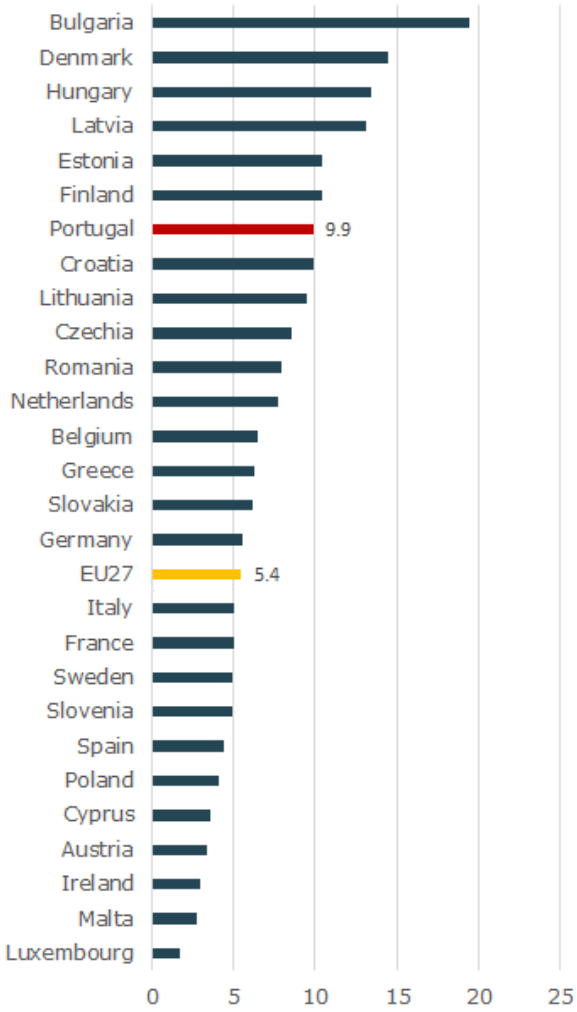
**Figure 8 – Tourism energy intensity | Portugal and EU27 average | 2018-2019**




**Source:** Physical energy flow accounts by NACE Rev. 2 activity, Eurostat (table: env_ac_pefasu); National accounts aggregates by industry by NACE Rev. 2 activity, Eurostat (table: nama_10_a64). 2-digit NACE sectors considered: H49, H50, H51, I, N79, R90-R92, R93

Bulgaria, Denmark and Hungary are the countries in the EU with the worst performance in this indicator. On the other hand, Luxembourg, Malta and Ireland are the ones that present the lower indices in 2019. Portugal occupies the 7$^{th}$ position among the EU countries.

**Figure 9 – Tourism energy intensity | All EU27 countries | 2019**




**Source:** Physical energy flow accounts by NACE Rev. 2 activity, Eurostat (table: env_ac_pefasu); National accounts aggregates by industry by NACE Rev. 2 activity, Eurostat (table: nama_10_a64). 2-digit NACE sectors considered: H49, H50, H51, I, N79, R90-R92, R93

## 6. Excellent bathing waters

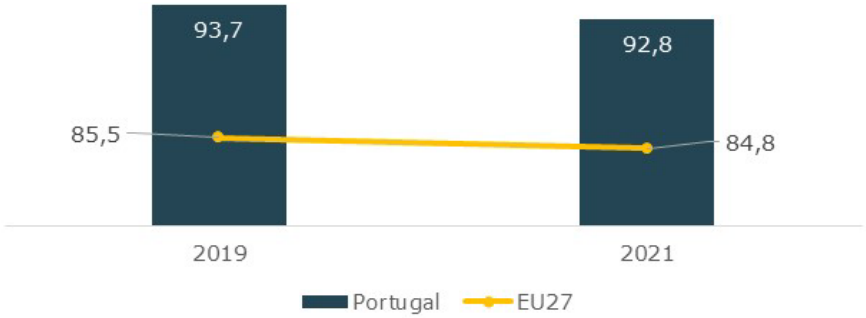
The quality of bathing waters not only indicates environmental quality, but it is also very important to support economic activities such as tourism, promoting destinations' attractiveness.

According to the European Commission (2022b), a "large number of Europe's bathing waters meet highest quality standards".

The indicator considered to measure the quality of bathing waters uses the share of sampled bathing water sites that are classified as "excellent" within a tourist destination[5]. Higher values indicate higher quality of bathing waters in the tourist destination.

While the share of excellent bathing waters in Portugal decreased from 93.7 in 2019 to 92.8 in 2021, the country performs better than the EU27 average (84.8 in 2021).

**Figure 10 – Excellent bathing waters | Portugal and EU27 | 2019-2021**

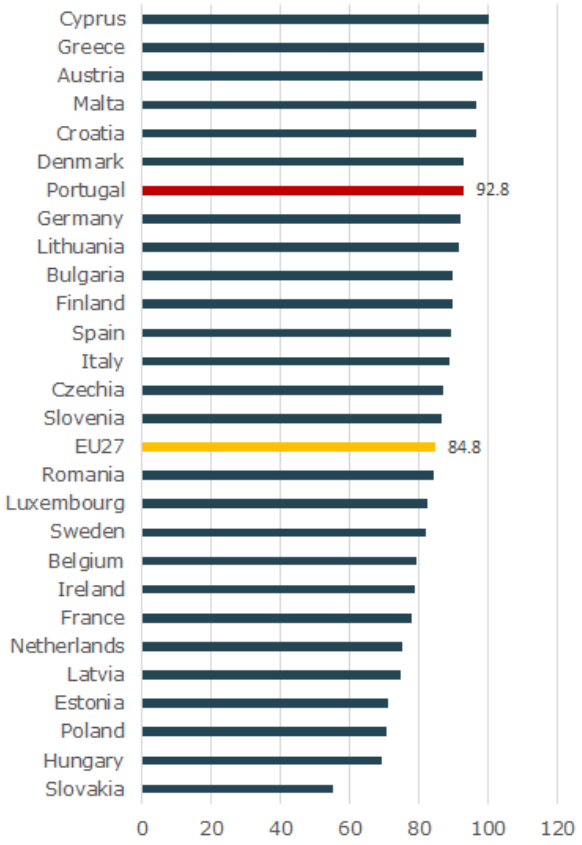



**Source:** State of Bathing Water, European Environmental Agency

Portugal ranks 7th in this indicator. The countries with the highest shares are Cyprus, Greece and Austria.

[5] The measurement criterion is based on the presence of significant polluting substances in fresh and coastal waters throughout the period May-September.

**Figure 11 – Excellent bathing waters | All EU27 countries | 2021**




**Source:** State of Bathing Water, European Environmental Agency

## 7. Dependence on distance origins

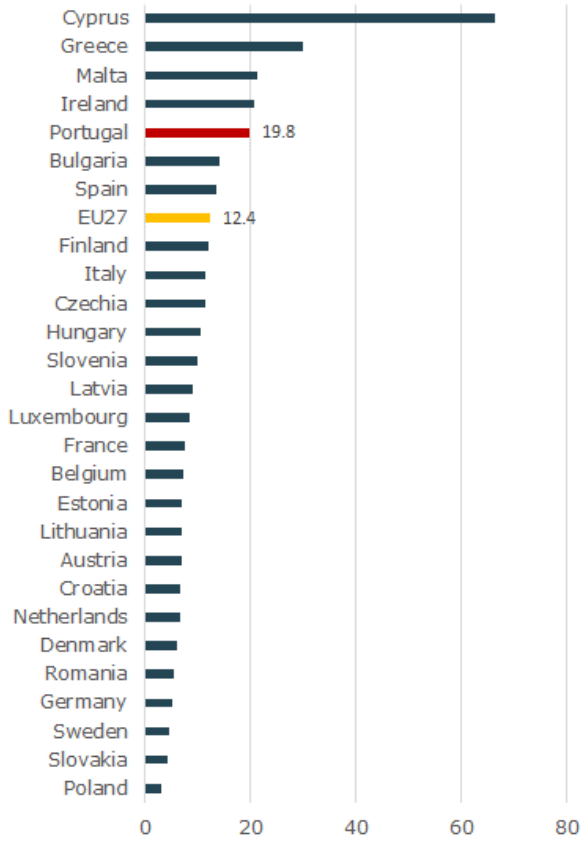
This indicator measures the dependence of a country's tourism on distant international markets. It is calculated as the share of nights spent at accommodation establishments by foreign tourists arriving from distant origins[6].

On the basis of this indicator is the fact that long distance travels result in a higher climate burden, related to $CO_2$ emissions.

Portugal is the 5th country in the EU most dependent on distance origins (19.8), which implies a potentially higher environmental footprint due to long-distance travelling. Portugal is above the EU average, which was 12.4 in 2019.

Cyprus, Greece and Malta are the three most dependent countries on distance origins in the EU in 2019.

**Figure 12 – Dependence on distance origins | All EU27 countries | 2019**




**Source:** Occupancy and capacity of tourist accommodation establishments, Eurostat (table: tour_occ_ninraw)

[6] Within the European continent, the countries of origin are considered distant if they are at a distance of 2,000km or more from the destination. Origins outside the European continent are always assumed distant.

## 8. Final remarks

The tourism sector, namely in Portugal, relies on a set of distinctive factors, namely history, culture, but also environmental such as the quality of the natural environment, clean water, clean air, pleasant climate and the quality of the ecosystem. As such, it is important to guarantee that the economic and social contribution of this sector – activities, innovation, jobs, welfare – goes along environmental sustainability.

The interest in measuring sustainability, particularly in the tourism sector, and the need to provide better information to support the formulation of public policies led the EU to create a dashboard that specifically considers the environmental impact. The set of indicators considered in this study, although not constituting a synthetic indicator, provides an overview of the sustainability regarding the tourism ecosystem in Portugal.

Based on those indicators, we can conclude that Portugal is ahead of the EU in several areas:

- Portugal has recently improved the performance regarding air travel emission intensity, and positions well below the EU average;
- The share of trips by train in Portugal is below the EU average, reflecting a less widespread use of train for domestic travel compared to vehicles with a higher environmental impact;
- Portugal recently decreased its performance in the tourism GHG intensity indicator, ranking as the 11$^{th}$ country with the highest tourism GHG intensity indicator in the EU;
- The tourism energy intensity has recently decreased in Portugal, but Portugal has still a lower energy efficiency compared to the EU average;
- Portugal performs better than the EU average regarding the share of excellent bathing waters; and
- Portugal presents a potentially higher environmental footprint due to long-distance travelling, than the EU average.

In this context:

- It is important that the tourism sector, namely in Portugal, continues to consider its impacts on environmental terms by mitigating adverse activities and following best practices to reduce their environmental impact;
- Enterprises should improve their environmental management and planning, raise environmental awareness and contribute to environmental protection and preservation;
- Both the dissemination of good practices and the awareness of more sustainable behaviours (e.g., "slow travel", "zero ecological footprint" or "say no to plastic") are essential not only for enterprises to become more sustainable but also for making travellers more responsible for their behaviour;

- The high prevalence of economic activity dependent on tourism creates pressure in terms of environmental sustainability that must be addressed by public policies.

This topic gained an additional relevance with the "European Agenda for Tourism 2030" very recently approved by the Council of the EU (2022), on December 1, 2022. This Agenda results, in large part, from the commitment assumed during the Portuguese Presidency of the Council of the EU, set out in the Council conclusions on "Tourism in Europe for the next decade", of May 27, 2021, in which the Member States were invited to design and implement an "European Agenda for Tourism 2030/2050" (Council of the EU, 2021).

The approved Agenda identifies, among other essential areas, the need to promote sustainable tourism, "taking into consideration all the key dimensions of economic, environmental, cultural and social sustainability, in response to, among other factors, climate change and loss of biodiversity, in accordance with the United Nations 2030 Agenda for Sustainable Development and its commitment to support tourism that creates sustainable jobs and promotes local culture, products and services".

It is now up to the European Commission and the Member States to implement and monitor the application of the multi-annual EU Work Plan of the European Agenda for Tourism 2030, strengthening competitiveness based on a model of circular and sustainable tourism.

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