European Network of the Heads of Environment Protection Agencies (EPA Network) - Interest Group on Environment and Tourism (IGET)

# ANALYSIS OF THE ENVIRONMENTAL INDICATORS OF TOURISM SURVEYED BY IGET

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**Preface**

*This report has been developed within the framework of Work Area 1 of the IGET Work Plan 2023–2025, focused on mapping nationally used environmental indicators related to tourism and identifying the underlying data sources and methodologies. The goal is to contribute to a shared understanding of tourism's environmental impacts through an analysis of data collected from six member countries (Italy, Germany, Ireland, Malta, Croatia, and Portugal), complemented by indicators from international initiatives (EU, UNWTO, Eurostat).*

*The findings reveal significant heterogeneity across countries in terms of approaches, tools, and priorities, highlighting the need to harmonize indicators to improve comparability and support effective environmental policymaking in tourism. A set of key priority indicators is proposed, along with recommendations on supporting data and common methodologies.*

*This report also aims to contribute to the ongoing debate on how to measure sustainable tourism more effectively. By providing a technical foundation for harmonization, it seeks to support both the advancement of policy tools and the development of sustainable tourism practices at the European level.*

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## Introduction

As part of Work Area 1 of the IGET Work Plan 2023-2025, a preliminary analysis of the environmental indicators collected was conducted. To date, information was provided from the following countries: Italy, Germany, Ireland, Malta, Croatia and Portugal. This report presents the main findings, focusing on the environmental impacts of tourism and providing an overview of the data sources and collection methods used.

The analysis was subsequently expanded to include the main core sets of international environmental indicators used for "sustainable tourism". Specifically, the indicators considered are from:

- the green pillar[1], the general descriptive indicators of the European Tourism Dashboard by DG-GROW and developed by the JRC;
- the "environmental" indicators from the initial proposal by UNWTO[2], following the United Nations' approval in March 2024 of the Statistical Framework on Measuring Sustainable Tourism;
- selected "environmental" indicators from Eurostat that are more easily linkable to tourism compared to others.

## Preliminary analysis of the collected indicators

The following overview shows that the initial survey within the IGET countries was not homogeneous. This is due to various factors related to: the actual involvement of IGET members measuring the environmental impact of tourism; the varying degrees of synergy existing in different countries between IGET member organizations and other national institutions more directly involved with such indicators, and other challenges that can be addressed with a greater national commitment. Despite these challenges, nearly 80 indicators used/potentially usable nationally by IGET participating countries and 30 indicators from the main international core sets mentioned above (EC-DG GROW, UNWTO, Eurostat) have been identified.

Table 1 – Countries and associated indicators reviewed to date.

| Country Code | Country | n. indicators |
|---|---|---|
| IT | Italy | 17 |
| DE | Germany | 26 |
| MT | Malta | 3 |
| IE | Ireland | 6 (+1 aggregate) |
| PT | Portugal | 1 |

[1] https://tourism-dashboard.ec.europa.eu/background-methodology?lng=en&ctx=tourism#section-3
[2] https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2023-09/MST_Indicators_EG_version_Sep2023_13092023_REV1.pdf

| Country Code | Country | n. indicators |
|---|---|---|
| HR | Croatia | 22 |
| EU Tourism Dashboard | European Union | 11 |
| UNWTO Proposal | UNWTO Proposal | 8 |
| Eurostat | Eurostat | 11 |

A quick country-by-country overview reveals that:

- *Italy (IT)* reported 17 indicators covering the following themes: waste production, energy consumption, water consumption, greenhouse gas emissions, sustainable transport, land use, environmental certifications, etc.
- *Germany (DE)* reported 26 indicators generally covering energy consumption, water management, emissions, transport, and other environmental indicators, predominantly derived from the Tourism Satellite Account (TSA).
- *Malta (MT)* reported 3 indicators related to emissions from international aviation, land use, and water consumption due to tourism.
- *Ireland (IE)* reported 6 indicators not specifically designed to measure tourism impacts but also applicable for this purpose, generally covering the themes of waste, water quality, and tourism-related emissions.
- *Portugal (PT)* reported only 1 indicator deemed of absolute environmental priority, namely Hospitality establishments with efficient water management.
- *Croatia (HR)* reported 22 indicators, albeit with limited metadata, covering various areas of environmental impact from tourism, including waste production and water consumption.
- From the *EU Tourism Dashboard,* 11 indicators were considered of which: 7 used at the European Union level to monitor the environmental impact of tourism both directly and indirectly and 4 more indirectly. These indicators still have short historical series and irregular updating frequencies.
- From *UNWTO proposal*, 8 indicators currently considered as derived from the accounting approach underpinning the Statistical Framework approved by the United Nations to monitor the environmental aspects of sustainable tourism.
- From *Eurostat data center,* 11 indicators provide comparable data at the European level on various environmental aspects related to tourism.

The survey reveals that environmental protection agencies are not always directly involved in these aspects despite the need to monitor the environmental aspects of tourism. More than 100 relevant indicators, currently being used have been identified. These have been collated from across different countries and categories, offering a reasonable overview of the current situation with regard to monitoring of tourism's environmental aspects. This information is crucial for harmonizing indicators and developing more sustainable tourism-related policies internationally.

## Main environmental themes

The main environmental themes highlighted in the analysis of the identified indicators are shown below:

- Energy and water consumption: numerous indicators address energy and water consumption in the tourism sector, emphasizing the significant impact on natural resources.
- Greenhouse gas and air pollutant emissions: many indicators monitor emissions attributable to tourism, including CO2, NOx, and fine particulate matter.
- Waste management: specific indicators measure the quantity and type of waste generated by the tourism sector.
- Resource optimization: some indicators examine resource efficiency, such as optimizing water consumption in accommodation facilities.

## Predominant calculation methods

For monitoring of national tourism-related indicators, the most common methodologies used are:

- Ratio calculations: For example, consumption intensity (energy and water per unit of added value) and emissions per capita or tourist activity.
- Statistical surveys: Use of data collected through *ad hoc* statistical surveys to calculate the percentage of facilities adopting sustainable practices.
- Input-Output models: Used to assess the overall impact of tourism activities on resource consumption and waste production, closely linked to TSA (Tourism Satellite Account) experiences.

## Data sources

Data is often collected from national statistical bodies such as ISTAT in Italy, Destatis in Germany, environmental protection agencies (e.g., ISPRA, EPA, UBA), national tourism authorities (such as Turismo de Portugal, Failte Ireland), and international or local organizations managing specific aspects of tourism and the environment.

## Priority indicators for harmonization

Harmonisation of environmental indicators in tourism is crucial for creating a comparable data foundation. This is needed to help guide effective environmental policy formulation and promote sustainable practices globally. Currently, the data collected shows significant disparities in data collection methods, definitions, and usage of indicators. Countries like Italy, Germany, Malta, Croatia, and others collect data on critical themes such as energy consumption, waste management, greenhouse gas emissions, and water quality. However, the lack of standardization limits the ability to compare and understand tourism's environmental impacts uniformly.

The primary goal of this report is to identify and propose some priority indicators for harmonization and adoption on a European scale, with EPAs serving as "endorsers" of the environmental interpretation of indicators on the basis of their different remits. These indicators are chosen for

their potential to provide a clear and quantifiable view of tourism's environmental impacts, facilitating cooperation and dialogue between countries.

Based on these premises, harmonization of approaches should contribute to "real" comparability. Using standardized indicators, would allow countries to directly benchmark the environmental sustainability performance of their tourism sector, identify areas for improvement, promote the adoption of best practices and simultaneously provide robust and quantitative support to policies. Harmonized indicators also provide a solid foundation for developing more evidence-based environmental policies and supporting informed decisions that promote tourism sustainability.

From our review, while different methodologies, baseline data, and sometimes "focus areas" were noted, the most frequently "used" indicators identified, are shown below:

**Waste Management**

- *Indicator: Urban waste production by tourists*
- *Countries using it:* Italy, Croatia, Ireland
- *Rationale:* The high generation production of waste by tourists is a common challenge for many high tourism countries. Harmonizing this indicator allows for comparing the effectiveness of waste management policies and implementing common strategies to reduce environmental impacts.

**Energy Consumption**

- *Indicator:* Energy intensity of tourism
- *Countries using it:* Germany, Italy, International Indicators
- *Rationale:* Monitoring energy consumption by the tourism sector is crucial for assessing the environmental impact of tourism. A harmonized indicator allows for measuring and

  comparing the energy efficiency of tourist infrastructures between countries, promoting the adoption of more efficient technologies.

**Greenhouse gas emissions**

- *Indicator:* Greenhouse gas intensity in tourism
- *Countries using it:* Italy, Germany, International Indicators
- *Rationale:* Greenhouse gas emissions are a global issue, to which tourism contributes significantly. Harmonizing indicators related to GHG emissions from tourism (including air travel) is essential to implementing emission reduction strategies at the European and global levels.

**Water consumption**

- *Indicator:* Water consumption by accommodation facilities

- *Countries using it:* Italy, Portugal
- *Rationale:* Water is an essential resource for the operation of accommodation facilities, and its consumption represents a significant environmental impact. Efficient water management is crucial for ensuring sustainability, especially in regions where water is a scarce resource. Harmonizing this indicator would allow for comparing water management practices and promoting more effective conservation strategies.

**Sustainable transportation**

- *Indicator:* Share of train travel and other sustainable transport modes
- *Countries using it:* Italy, International Indicators
- *Rationale:* Reducing dependence on air and automobile travel through tourism is crucial for lowering carbon and air pollutant emissions. Harmonizing sustainable transport indicators allows for the promotion of public transportation and other low-impact options, encouraging sustainable mobility policies.

## Supporting data for priority indicators

To ensure the effectiveness and relevance of environmental indicators in the tourism sector, we need to have accurate and consistent supporting data. This data forms the basis for calculating and interpreting the indicators which enable countries to effectively monitor and manage the environmental impacts of tourism.

The analysis of the indicators collected during IGET activities has highlighted a need to collect specific and reliable data to support the selected priority indicators, including waste management, energy consumption, greenhouse gas emissions, water consumption, and sustainable transport.

Having a common baseline data approach, it would contribute to:

- *Better accuracy and reliability:* Ensure that the collected data is accurate and reliable, will provide for a solid foundation for populating indicators and making informed decisions.
- *Comparability:* Providing a standardised approach to data collection across countries, should translate into greater comparability of environmental performance and the identification of best practices.

The supporting data for the identified priority indicators come from various sources, including national statistical bodies, environmental agencies, tourism authorities, and specific sector studies. These data specifically include:

**Waste Management**

- **Indicator:** Municipal waste generation by tourists
- **Baseline Data:**
    - *Municipal waste generation data:* Total amount of waste generated by tourist activities, collected through urban waste management systems and/or specific studies on waste flows.

- *Tourist demographic data:* Number of tourists, length of stay, and type of accommodation, collected through tourist presence records and/or surveys at accommodation facilities.

  ***Data sources:*** Eurostat, National Institutes of Statistics, National Environmental Authorities, National Tourism Authorities.

**Energy Consumption**

- **Indicator:** Energy intensity of tourism
- **Baseline Data:**
  - *Sectoral energy consumption:* Detailed data on energy consumption for various tourist activities (e.g., hotels, transportation, tourist attractions) collected from energy providers and sector studies.
  - *Economic data:* Added value generated by the tourism sector (e.g., tourism GDP) for calculating energy intensity.
  - ***Data sources****:* Eurostat, National Institutes of Statistics such as the Statistisches Bundesamt (DE) and ISTAT, reports from energy providers.

**Greenhouse Gas Emissions**

- **Indicator:** Greenhouse gas intensity in tourism
- **Baseline Data:**
  - *$CO_2$ emission data***:** Emissions from transportation (air, sea, land) and accommodation facilities, calculated using emission calculation models based on energy consumption data.
  - *Tourist activity data:* Number of flights, kilometres travelled, number of overnight stays in tourist facilities.
  - ***Data sources****:* Eurostat, EUROCONTROL, European Environment Agency (EEA), data collected from emission monitoring agencies often EPAs.

**Water Consumption**

- **Indicator:** Water consumption of accommodation facilities
- **Baseline Data:**
  - *Water usage data:* Detailed data on water consumption in accommodation facilities, including hotels and resorts. These data can be collected through water meters installed in the facilities or derived from per capita assumptions.
  - *Water efficiency:* Information on water management practices implemented in facilities, such as gray water reuse and installation of low-consumption devices.
  - ***Data sources****:* These data can be collected from local water authorities, National Institutes of Statistics, and direct surveys at accommodation facilities.

**Sustainable Transport**

- **Indicator:** Share of train travel and other sustainable transport modes
- **Baseline Data:**
  - *Tourist mobility data:* Transport modes used by tourists, collected through transport surveys, data from public transport providers, and mobility studies.

- *Transport emission data*: Emissions related to different transport types (cars, trains, planes), derived from fuel consumption data and emission studies.
- ***Data sources***: Eurostat, national transport agencies such as Deutsche Bahn (DE), Ferrovie dello Stato (IT), data collected from emission monitoring agencies often EPAs, and/or sector studies.

## Summary of predominant data collection methods

The analysis of IGET 's review of environmental indicators reveals a variety of data collection methods used in different countries. Understanding these methods is essential to identify best practices and promote the standardization necessary for comparison and to identify areas where harmonization is needed to improve data quality and comparability.

The data collection methods for indicators identified can be grouped into the following main categories:

- *Administrative records:* Use of data collected through official and administrative data records, such as those related to energy consumption and waste management. These data are often collected by government agencies and local authorities.
- *Statistical surveys:* Data collected through direct surveys and questionnaires at accommodation facilities and tourist operators. This method is particularly useful for obtaining detailed data on resource consumption, such as water and energy.
- *Calculation models*: Calculation models applied, for example, to estimate greenhouse gas emissions and energy consumption intensity. These models use available data and standardized assumptions to produce reliable estimates.
- *Environmental sampling and monitoring:* Execution of field sampling to direct data collection from field sampling of environmental parameters, such as water quality and waste management. These data are crucial for assessing the direct impact of tourism activities on the environment.

These data collection methods are essential to ensure that environmental indicators are comparable between countries and that environmental management policies are based on reliable data. Promoting standardization of data collection practices will improve the quality of the available information and will support informed policy decisions at international level.

## Relevance and difficult aspects in harmonization

In addition to the priority indicators for harmonization identified, we also have defined relevant criteria for harmonization. Examples of these are listed below.

The criteria for relevance considered are:

1. *Availability and quality of data:* Difficulty in obtaining accurate data or lack of standardized data reduces the relevance of an indicator.

2. *Direct environmental impacts:* Indicators that do not directly represent significant environmental impacts may be considered less relevant.
3. *Relevance for policies:* Indicators that do not significantly contribute to the formulation of effective environmental policies or are not directly usable by decision-makers may be considered less relevant.
4. *Possibility of harmonization:* Difficulty in harmonizing an indicator at the international level limits its comparative utility.

Based on these four criteria, we can identify the following indicators as "less relevant" for the European level and "difficult to harmonize":

Table 2 – Tourism Indicators considered to be of lower relevance, from a harmonization perspective.

| **Indicator** | **Country** | **Description** | **Rationale for being of less relevance** |
|---|---|---|---|
| Dependence on Distant Origins | Italy / DG GROW | It measures the dependence of Italian tourism on distant markets. | **Explanation** |
| | | | - Data collection complexity: Collecting accurate data on all tourist origins can be complex and variable. |
| | | | - Indirect impacts: Direct environmental impact is more complex to quantify as dependence on distant origins leads to more complex and indirect effects on emissions. |
| | | | **Harmonization challenges** |
| | | | - Cultural and geographical variability: Tourist origins can vary greatly between countries based on cultural, economic, and geographical factors. |
| | | | - Disaggregated data: Difficulty in collecting homogeneous data on tourist origins at the international level. |
| Tourism Intensity | Italy / DG GROW | It measures the tourism pressure on a specific territory. | **Explanation** |
| | | | - Complex measurement: While useful for urban planning, the indicator is less direct in evaluating specific environmental impacts. |
| | | | - Local focus: Often more relevant at a local level than nationally or internationally. |
| | | | **Harmonization challenges** |
| | | | Local context: Strongly influenced by the demographic and geographical specifics of each country. |
| | | | - Variable definitions: Tourism intensity can be defined and measured in different ways, making direct comparability difficult. |

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| Hotel Area | Malta | It estimates the land area occupied by hotels. | **Explanation** |
| | | | - Stable data: The physical land area occupied by hotels rarely changes, making the indicator static and less dynamic. |
| | | | **Harmonization challenges** |
| | | | - Non-standardized measurement methods: Various definitions on what to include as "hotel area." |
| | | | - Local context: The density and area of hotels depend heavily on urban planning and local regulations. |
| Blue Flag Certification | Italy | Certification for beaches meeting certain environmental standards. | **Explanation** |
| | | | - State indicator, not impact: More a symbol of compliance than a direct environmental impact indicator. |
| | | | - Variability of criteria: Award criteria can vary between countries and years, limiting comparability. |
| | | | **Harmonization challenges** |
| | | | - Different evaluation criteria: Criteria for obtaining the Blue Flag can vary between countries and years, hindering comparability. |
| | | | - Qualitative nature: Some aspects of certification can be subjective and based on qualitative assessments. |
| Number of Tourism Nights per 100 Inhabitants | Croatia / Italy | It indicates tourism intensity relative to the resident population. | **Explanation** |
| | | | - Demographic focus: More useful for economic and social analyses than for direct environmental impacts. |
| | | | **Harmonization challenges** |
| | | | - Limited comparability: Differences in tourism and demographic dynamics between countries reduce international comparability. |

It is important to note, however, that such indicators may still be relevant at a national level, depending on the specific circumstances and priorities of each country.

## IGET Conclusions on the importance of harmonizing indicators

The analysis of various tourism-related environmental indicators across European countries, highlights the importance of harmonizing these indicators where possible. This will improve comparability and support more informed and coordinated policy decisions. The "priority" indicators identified, such as waste management, energy consumption, greenhouse gas emissions, water consumption, and sustainable transport, offer an opportunity to enhance the sustainability of tourism through policies based on harmonized and comparable data.

There are, however, significant gaps that need to be addressed, not only in terms of information but also in terms of implementation, as the harmonization of environmental indicators to monitor tourism across Europe is a complex process with numerous challenges. These challenges must be addressed to obtain comparable and reliable data across Europe, in a manner that can support effective tourism policies, plans and environmentally sustainable tourism practices. The identified key harmonization challenges in the process of selecting and populating relevant indicators at a European scale, are:

**1. Differences in data collection methods:**

- *Variety of methods:* Data collection methods vary significantly between countries due to differences in infrastructure, technological capabilities, and available resources. For example, some countries use advanced technologies like IoT sensors, while others rely on more traditional methods like paper surveys.
- *Inconsistency in data:* Differences in collection methods can lead to inconsistencies in data, making it difficult to compare across countries. For instance, the methods for calculating greenhouse gas emissions may vary, affecting the accuracy and comparability of the data.

*Proposed solution:* Establish standardized guidelines for data collection and analysis, promoting the adoption of advanced technologies in countries with less developed infrastructure, but above all, review of the current EU Tourism Statistics Regulation (Regulation (EU) No. 692/2011) from an environmental perspective. It is crucial to review the regulation on tourism statistics to incorporate the need to collect environmentally sustainable tourism data. This recommended change is essential to address existing information gaps and to identify the data needed, at European level, to develop relevant and comparable environmental indicators for the tourism sector.

It is important to better promote awareness of the environmental aspects of tourism, focus on environmental pressures and associated impacts and align the measurement methodologies used across European countries.

**2. Inconsistent definitions and methodologies:**

- *Variable definitions:* Indicator definitions can vary significantly between countries. For example, the concept of "sustainable tourism" may have different interpretations, affecting measurement and reporting methods.

- *Lack of standard methodologies:* The absence of standard methodologies for calculating and reporting indicators makes harmonization difficult. This is particularly evident in complex indicators such as energy intensity and greenhouse gas emissions.

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| *Proposed solution:* The recent approval of the Statistical Framework for Measuring Sustainable Tourism by the United Nations in March 2024 represents a milestone for approaching this challenge. |

3. **Cultural and geographical variety:**
   - *Unique local context:* Cultural and geographical differences influence tourism practices and, consequently, the data collected. For example, waste management may be more relevant in some regions than others due to cultural habits and local geography.
   - *Influence of local culture:* Cultural differences can influence the availability and interpretation of data, leading to discrepancies in indicator results.

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| *Proposed solution:* To integrate indicators that consider cultural and geographical specific elements. Ensure that the collected data is relevant and context specific. Establish minimum standards of requirements for this data collection, to guarantee the ability to provide for comparison at European level. |

4. **Resistance to change:**
   - *Institutional inertia:* Institutions and organizations may resist changes in data collection and analysis methods, especially if these require additional resources or significant modifications to existing processes.
   - *Conflicting interests:* The interests of different stakeholders, such as governments, tourism businesses, and local communities, may be in conflict, making it difficult to implement harmonized practices.

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| *Proposed solution:* Promotion of the adoption of new practices through incentives, training, and awareness-raising, demonstrating the long-term benefits of harmonization for all involved parties. |

To address the challenges identified in this report effectively, we need to:

- create synergies between the main European data centres collecting information of relevance to tourism and the environment,
- encouraging collaborations for *ad hoc* data collections activities,
- identifying and sharing accurate and shared indicator processing methodologies, acknowledging the international standards identified by the recent UNWTO Statistical Framework for Measuring Sustainable Tourism.

The main objective is to inform and guide more effective and targeted environmental policies and promote long-term sustainability in the tourism sector. Political support is crucial to progress these needs.

IGET aims to advocating for an effective route for cooperation and coordination among countries in relation to the tourism sector, enabling common and shared initiatives to monitor and address environmental challenges. Implementing a harmonized approach, as proposed, provides significant benefits to both the environment and the tourism industry. This also helps to build a more sustainable and resilient future for tourist destinations worldwide.