WORLD TRAVEL & TOURISM COUNCIL

In partnership with:

وزارة السياحة
Ministry of Tourism
Kingdom of Saudi Arabia



TRAVEL & TOURISM ENVIRONMENTAL & SOCIAL IMPACT

METHODOLOGY

October 2023

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1. INTRODUCTION

This document provides detail on the methodology that Oxford Economics uses to quantify the environmental and social impact of Travel & Tourism in 185 territories worldwide. It focuses on the sources, approaches and assumptions used to produce these environmental and social indicators.

We note that this report does not explore the methodology underpinning WTTC/Oxford Economics' Economic Impact Research (EIR) reports. These data describe the magnitudes of Travel & Tourism activity, the composition of tourist expenditures, and the sector's contributions to national GDP and employment in each country. These figures are taken as inputs into our research, and the economic concepts and definitions used in this project are equivalent to those detailed in that methodology report.[1]

1.1 SCOPE OF THIS ANALYSIS

Our framework utilises a demand-led perspective, tracing the footprint of Travel & Tourism-linked expenditures, whether by domestic travellers, inbound tourists, businesses, or governments. Our analysis encompasses tourists who travel for both personal/leisure reasons, as well as for business.

The Global Sustainability Model (GSM) that underpins the estimates and methods discussed in this report. The GSM is an environmentally extended input output model, resolving environmental and social datasets into the national accounting framework. In doing so, it is consistent with the principles of the System of Environmental Economic Accounts (SEEA-CF).[2] Official data on physical environmental flows (e.g., GHG emissions, material extraction, water use) are matched to Travel & Tourism's economic data, itself expressed in a harmonised system of Tourism Satellite Accounts (TSAs) that are in concordance with the System of National Accounts (SNA 2008).

This analysis is conducted on a territorial basis, meaning that Travel & Tourism's impacts are quantified with reference to the tourism activity (both domestic and inbound) taking place within each territory. The impacts associated with cross-border travel are estimated and modelled separately, as discussed in Chapter 4.

The geographic scope of the project encompasses 185 countries and territories.[3] While the modelling utilises economic and environmental datasets that are global in scope, this exhaustive coverage necessarily involves estimation and extrapolation in certain countries where data are less detailed, less timely, or unavailable. These estimations involve the adoption of regional averages in certain cases, and in other cases applying data drawn from comparable countries.

1.2 RELATIONSHIP TO TOURISM SUSTAINABILITY FRAMEWORKS

In recent years, international standards for measuring sustainable tourism have become more advanced. Building on the SEEA and TSAs, organisations such as the UNWTO, along with other international agencies, national statistical offices (NSOs) and national tourism agencies (NTAs), have developed a draft Statistical Framework for Measuring the Sustainability of Tourism (SF-MST).[4] While only draft at present, this framework is comprehensive

[1] For more detail on the methodology underpinning estimates of tourism activity and its economic impact; please see WTTC & Oxford Economics, "Travel & Tourism Economic Impact Research" (Methodology, 2022). Available at https://wttc.org/research/economic-impact. Throughout this methodology document, references to 'WTTC EIR' refer to this project.

[2] UN Statistics Division, "System of Environmental-Economic Accounting 2012" (Central Framework, 2014).

[3] The full list of countries included in the study are set out in the Appendix to this document.

[4] UNWTO, "Statistical Framework for Measuring the Sustainability of Tourism" (Draft framework, 2023).

and wide-ranging, establishing a coherent basis for global economic, environmental, and social measurement and reporting.

While the methodology described here does overlap partially with the draft SF-MST approach, the estimates in this project do not comprise a complete set of SF-MST accounts or indicators. For example, we do not attempt to quantify the full economic value of Travel & Tourism's dependencies on natural and environmental assets, or the annual flows of ecosystem services that are integral to its functioning. There is also no estimate of the generation and flows of solid waste associated with Travel & Tourism. These are all vital metrics to consider, not least due to the centrality of the natural environment to tourism itself. Their exclusion reflects the complexity of their measurement and the data challenges involved, rather than a choice to disregard them.

The objective of this research is to provide an initial estimate of Travel & Tourism's environmental and social footprint, utilising official data in a manner that is robust, global, and multidimensional. The methodology is structured to facilitate the consistent and timely future tracking of these metrics, with each update representing an opportunity for methodological refinement.[5] We also anticipate that these figures will be incrementally superseded by official estimates, as more and more NSOs publish official tourism sustainability assessments.

In light of these emerging standards, it is hoped that this project will form a starting point for such assessments, helping to support immediate insight and action, in advance of more rigorous and detailed statistical efforts to come.

1.3 THIS REPORT

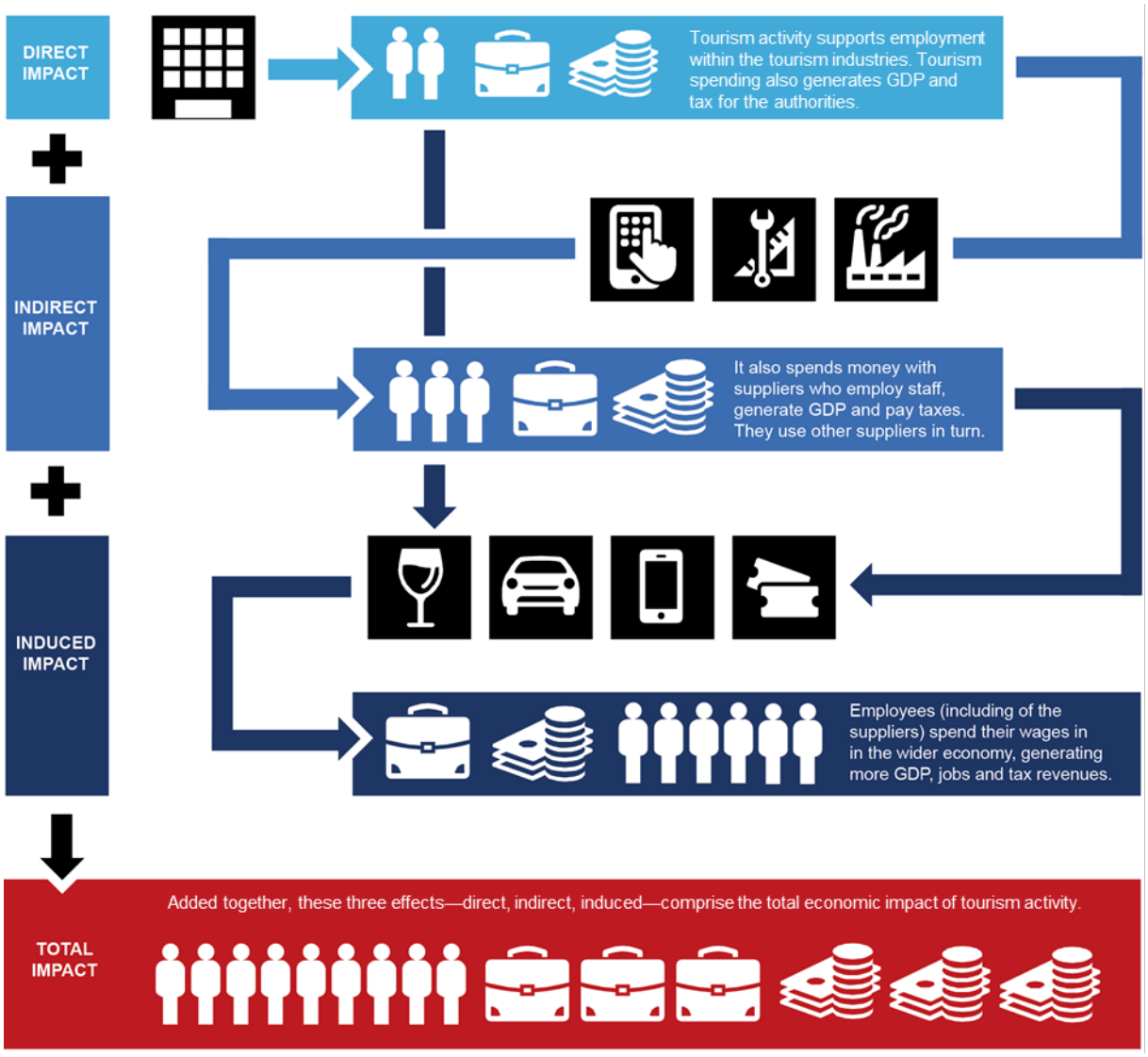
This report is encompasses the following chapters:

- Chapter 2 sets out the methodology for disaggregating Travel & Tourism's economic impact into its constituent industry sectors, permitting subsequent strands of the research.
- Chapter 3 details how the aligned GSM results help to understand Travel & Tourism's direct and value-chain environmental footprint.
- Chapter 4 sets out the approach for measuring the environmental impact of international flights and cruises.
- Chapter 5 describes the sources underpinning the GSM.
- Chapter 6 explains how some social and demographic aspects of Travel & Tourism's employment impact is identified.
- The appendix contains detailed tables and resources referred to throughout.

[5] In this context, the SF-MST also provides a useful pathway for methodological improvements over time.

2. THE INDUSTRIAL BREAKDOWN OF TRAVEL & TOURISM

Fig. 1. Overview of direct, indirect and induced impacts



2.1 DIRECT, INDIRECT AND INDUCED IMPACTS

2.1.1 Direct impacts

The direct impacts of Travel & Tourism, identified in the WTTC EIR research, are allocated among the industry sectors in which Travel & Tourism activity takes place. To begin with, tourist expenditures are broken down into a common designation of tourism expenditure categories, as detailed within many countries' Tourism Satellite Accounts (TSAs): for example, accommodation, food and beverages, retail, transportation, etc. We transfer this activity – revenue, GDP and jobs – into a more detailed 34-sector breakdown used by the GSM, based on the ISIC Rev. 4 system of industrial classification.

Fig. 2. Alignment of direct Travel & Tourism activity, between TSA headers and GSM sectors [6]

TSA tourism sector	GSM industry and ISIC Rev. 4 equivalent
Retail	Wholesale and retail trade (ISIC 45 - 47) Food products manufacturing (ISIC 10 - 12) Clothing & footwear manufacturing (ISIC 13 - 15) Various other manufacturing sub-sectors (ISICs 16 - 33)
Transportation	Transportation and storage (ISIC 49 - 53)
Accommodation	Accommodation and food services (ISIC 55 - 56)
Food & Beverage services	Accommodation and food services (ISIC 55 - 56)
Recreation, culture & sports	Arts, entertainment, recreation & other services (ISIC 90 - 96)

These disaggregated results allow Travel & Tourism in all study countries to be analysed along sectoral lines. For example, it is possible to assess the number of manufacturing jobs in a given country or region that are supported by Travel & Tourism. It also permits the appraisal of resource consumption impacts, and the estimation of the social dimensions of Travel & Tourism's employment footprint.[7]

2.1.2 Indirect impacts

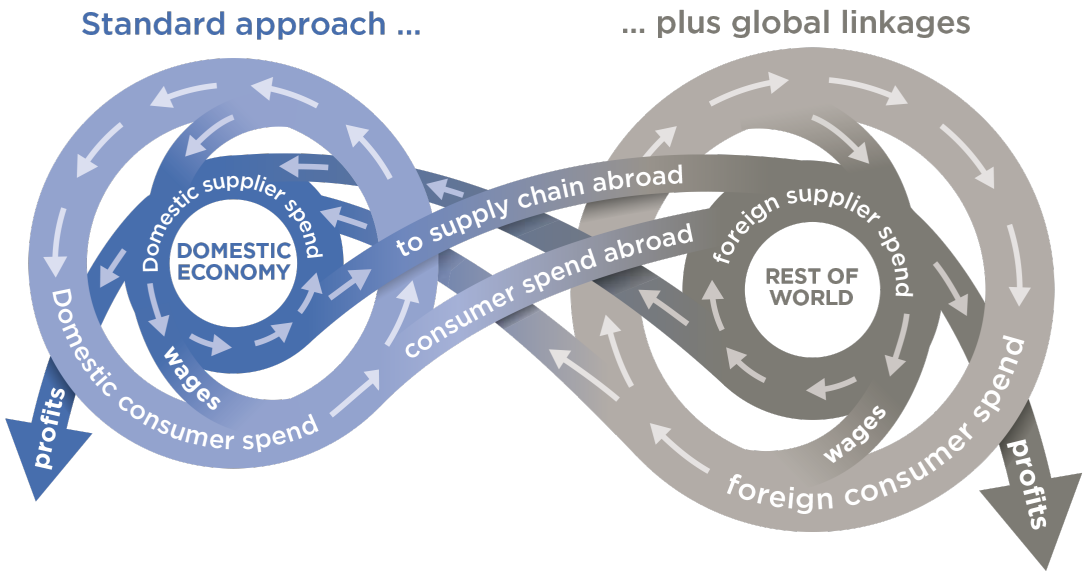
Following the alignment of direct impacts, the GSM provides an analogous set of indirect impacts, for each country. This is determined by the pattern of inter-industry supply chain links, as specified in the input-output tables underlying the GSM.

The GSM allows the measurement of indirect/supply-chain impact to go beyond the 'home' country and extend across the world. This is because the GSM explicitly maps the trade relationships between all industries and countries in the model. As such, the spending of tourists in (e.g.) Spain will have knock-on impacts upon value chains that extend throughout Europe and the wider world. It is crucial to understand the magnitude and composition of these global impacts, in order to establish the full, global resource footprint of Travel & Tourism in each country.

[6] Where these TSA aggregates need to be split into more than one GSM sector, the weightings reflect the relative magnitude of household consumption from each of the industries, within the domestic economy in question. This is discussed further in chapter 2.2.1.

[7] The ratios and intensities that convert Travel & Tourism's economic activity into environmental impact are estimated with respect to these ISIC Rev. 4 designations (see Chapter 5 for more detail). Social impact methodology is discussed in Chapter 6.

Fig. 3. Visualisation of the GSM's global linkages



When discussing the GDP and jobs sustained by Travel & Tourism (i.e., the indirect impact), the results encompass only the 'within-country' portion of the supply chain. This is consistent with the conceptual framework of the existing WTTC EIR. However, when we assess the full environmental impacts of Travel & Tourism, we include a global measurement of its supply chain activity. This allows us to understand the environmental impacts embedded within its imported goods. These impacts are characterised as **value chain** environmental impacts. Throughout the research, these are split between domestic (in-country) and international components.

2.1.3 Induced impacts

The GSM also incorporates official data on the average household consumption basket in each country. This permits the calculation of induced impacts, taking into account the GDP and jobs supported by the consumption spending of workers in tourism industries (and their supply chains). The GSM disaggregates this induced impact along industrial lines, consistent with the other two channels.

We note that Travel & Tourism's induced impact is **only** considered in terms of economic and social metrics (i.e., GDP and employment). This is due to the lack of a corresponding concept in environmental measurement and reporting. Where our report discusses "total" Travel & Tourism environmental impacts or intensities, it encompasses only the direct and (global) indirect economic measurements.

2.2 THE TREATMENT OF TOURISTS' RETAIL EXPENDITURES

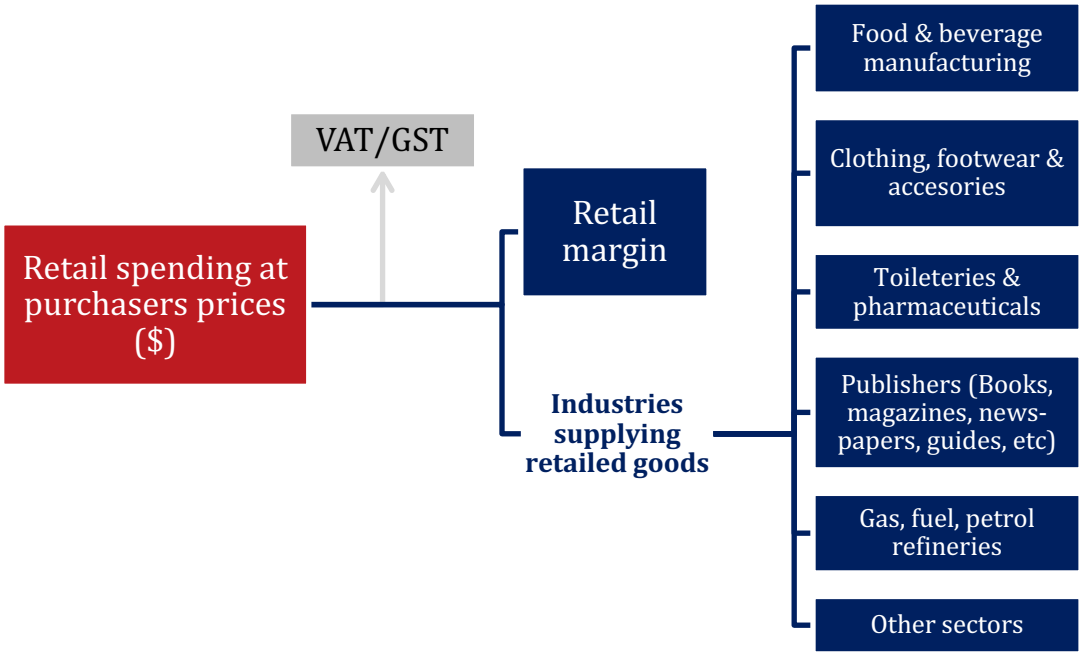
While most of the expenditure items in TSA data map directly to one GSM industry (see Fig. 2 above)Fig. 4, retail is a special case, with this spending flowing to many more industries than just the retail sector. This breakdown of retail occurs because under national accounting rules, retail acts as a 'margins' activity. This means its primary activity is not to produce commodities for sale, but rather to facilitate consumers' purchases of commodities from other (non-retail) producer industries.

As such, the 'production' of the retail industry is measured as the gross margin it achieves on all of the items it sells. This margin represents the valuation of the services that retailers provide to consumer. The remainder of the purchasers' expenditures flow onward to the industries that produced the goods (whether the goods are produced domestically or imported).

This means that ascribing all of tourists' expenditures as revenues to the retailer would overstate the economic and environmental impact within the retail industry. Distributing the spend among the producing sectors allows the appropriate retail impact (via margins) to be estimated. Fig. 4 below illustrates the treatment of tourists' retail expenditures, and their onward flow to industry sectors.

The blue-shaded boxes collectively represent the **direct impact** of tourists' retail expenditures. This encompasses many manufacturing sub-sectors, as well as the retail industry.

Fig. 4. Depiction of how retail spending flows through the modelling process



We note that these manufacturing sub-industries do not form part of the *supply chain* of retailers (and so do not form part of the *indirect* impact). This is because under national accounting principles, supply chain inputs are defined as goods and services that are transformed or 'consumed' in an industry's production process, to create a new product.[8] In circumstances where goods are sold in the same condition as they were purchased, this is termed a margins activity, and the goods in question are not considered inputs into a production process.

2.2.1 The composition of retail expenditures

Our estimation of how retail expenditure breaks down across different products and industries is based on the typical household retail consumption basket for residents in each country. This information is drawn from each country's published or estimated I-O table.[9] We recognise that this is necessarily a simplistic assumption, in the sense that we have not assumed a 'tourist-specific' basket of retail goods, or attempted to measure how this composition differs from the average consumer demand in each country. This is due to a number of factors:

- Even for countries with detailed published TSAs, these datasets do not typically break down the composition of retail expenditures by tourists. 'Retail' is presented overall, meaning other sources would be needed to break this down into industries.

[8] An example of this would be the transformation of raw metals into a fabricated metal product.

[9] A complete list of sources for I-O tables, along with any proxy sources used, are set out in the appendix to this document.

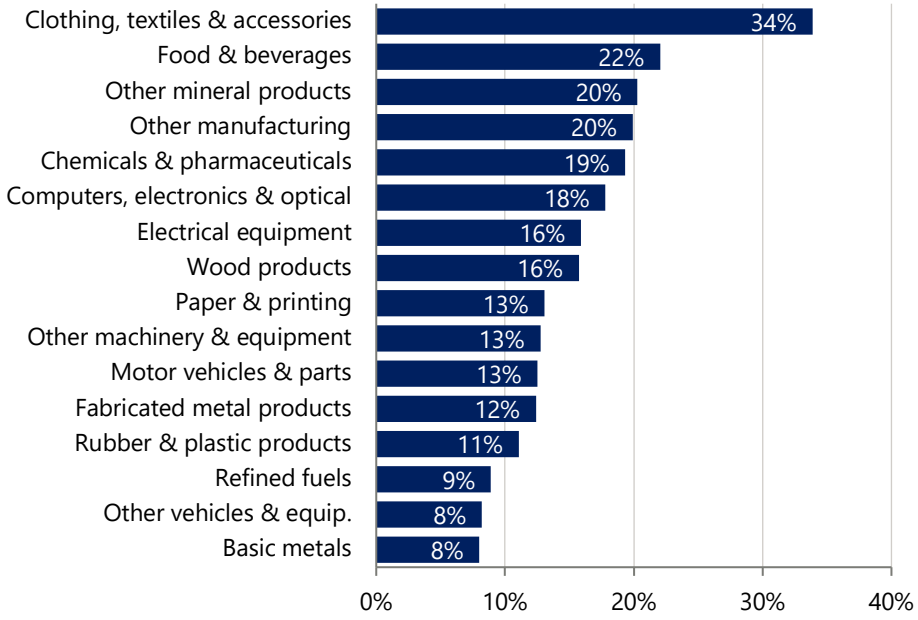
- It would be possible to estimate a 'template' of tourist demand, that differs from ordinary consumer demand, but this would be based on a small number of developed countries for whom data do exist. This was not considered sufficiently representative to be generalisable.
- Using household consumption as a guide/template permits a country-specific mix of industries, informed by their relative dominance (or absence) in the local consumer economy. It also allows us to capture the country-specific extent of import-dependence within each of these products.
- The household consumption basket also exactly captures any differences in relative price levels in each country.[10]

Applying the pattern of household retail consumption to tourism retail expenditure results in about two-thirds (65%) of all tourist retail expenditure is estimated to purchase food and beverages, clothing and footwear, and toiletries/cosmetics. The exact basket of retailed goods varies by country, informed by the I-O accounts as detailed in the appendix to this document.

2.2.2 Calculating the retail margin

For each product in the retail consumption mix, there is an associated percentage of the purchasers' price that flows to retail sector in the form of margins (as represented in Fig. 4). These margins, derived for each country through the I-O framework, are applied to the retail expenditure to derive the share of this spending that is 'captured' by the retail industry. The remainder flows to manufacturing industries (domestic and international) of these products.

Fig. 5. Estimated average margin rates (retail and wholesale margin, as a percentage of purchase at consumer prices), world average, 2019



2.2.3 Direct impacts in the retail sector

In our modelling framework, the retail margin is then assigned to the retail industry. The activity contained in this definition encompasses all shops, department stores, stalls and markets, street vendors, vending machines,

[10] For example, a 'template' tourist spending profile, derived from developed nations' data (where fuels are more expensive) would exaggerate the scale of fuel purchases if applied to a country in the Middle East (where fuels are relatively cheaper).

etc. It excludes any sales of products purchased directly from farmers (i.e., food from farm shops). By identifying the retail-specific economic activity, via estimates of expenditures and retail margins, we can then quantify the contribution of retail to Travel & Tourism's environmental footprint. The direct environmental impacts, attributed to the retail sector, encompass (for example):

- GHGs from the gas boilers (or other fuels) for space heating in shops and shopping centres. It also includes emissions by any vehicles and machinery owned by retailers or retail companies.
- The water used by retail premises for cleaning and sanitation, fountains, outdoor lawn watering etc.
- The energy consumed to supply electricity to retailers, shopping malls or markets; whether by electricity grids or by local/on-site generators.
- Pollution contributed by on-site gas boilers, or fertilizers applied on outdoor vegetation, or vehicles owned and operated by the retailer.

The retail sector's environmental impacts will exclude the resource footprint embodied in any of the sold products. These impacts can be assessed by including the environmental footprint that is ascribed to the various manufacturing sub-sectors.

3. THE ENVIRONMENTAL FOOTPRINT OF TRAVEL & TOURISM

Travel & Tourism's environmental footprint is quantified using the disaggregated economic activity as a starting point. Given that the preceding modelling exercise allocates Travel & Tourism activity across 34 industries and 185 countries, the footprint is then estimated using the average environmental- and resource-intensity linked to each of those industries (see Chapter 5.2 for detail).

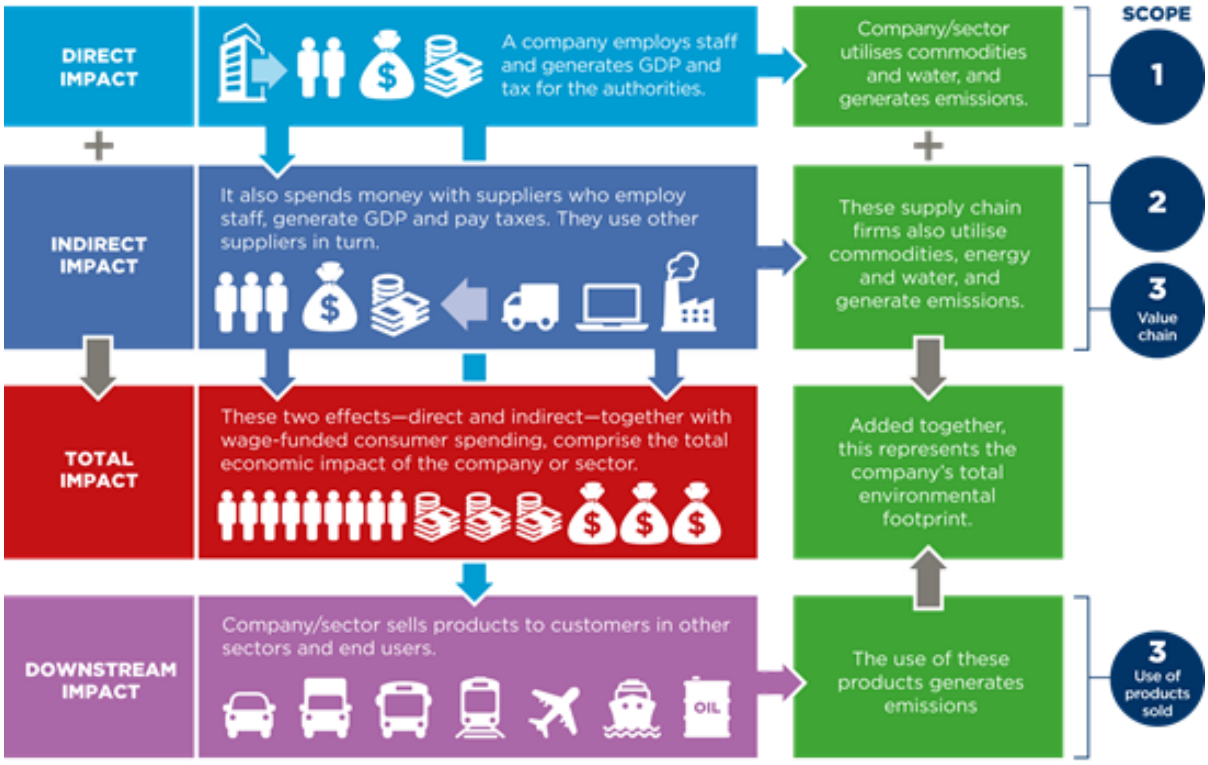
The environmental assumption here is analogous to the economic assumptions underlying the I-O framework. Economic impacts are quantified according to each industry's production volume, along with its average rate of productivity, labour-intensity, its propensity to generate tax revenues, etc. Environmental impacts are likewise estimated using each industry's production volume, along with (e.g.) its average rate of greenhouse gas (GHG) emission intensity, or water consumption intensity, etc.

But quantifying the environmental footprint of Travel & Tourism involves a slightly different conceptual breakdown to its economic impact. Rather than direct, indirect and induced channels; we discuss:

- **"Direct" or "Scope 1"** environmental impacts, referring to the activities and businesses that directly-serve Travel & Tourism demands, and
- **"Value chain"** environmental impacts. These are the emissions and resources that are created within the tourism industry's supply chains, and embedded in the goods and services (including electricity) that the tourism industry purchases to produce its output.

In the case of GHG emissions, this value-chain measurement can be thought of as Scope 2 and (a subset of) Scope 3, as defined by the GHG Protocol. An alignment between economic impact channels (direct, indirect and induced) and environmental impact channels (direct and value-chain) is illustrated in **Error! Reference source not found.** below.

Fig. 6. Alignment between economic and environmental impact channels [11]



3.1 DIRECT (SCOPE 1) ENVIRONMENTAL IMPACTS

Direct emissions and environmental impacts are ascribed to the tourism market's domestic nation or territory. In other words, the boundary includes the industries and businesses that generate tourism's direct GDP and employment in every country. Some examples of these direct environmental impacts are discussed for each of the tourism sub-markets below:

- **Transportation:** The fuels used by road and rail vehicles, domestic marine and aviation tourism, the air pollution emitted by vehicles carrying tourists, space heating and water use in transport firms and HQs.
- **Accommodation:** The fuels burned by hotel boilers to heat rooms, the water used for cleaning/house laundry, grounds maintenance, etc.
- **Food & beverage**: Emissions from fuels for space heating, gas or coals used in cooking, water used for food preparation and cleaning, etc.
- **Retail:** The fuels burned for space heating in shops; water used by employees for drinking or cleaning, etc. It will exclude resource consumption embodied in any of the sold products.
- **Recreation, culture & sports:** water used to maintain greens and pitches; fuels used in space heating for recreational venues.

[11] We note that the "use of products sold", i.e., the downstream aspects of Scope 3, are outside the scope of the GSM and are not included in its measurements. To this extent, our estimates could be considered conservative. See Fig. 9 in the Appendix for further detail.

3.2 ENVIRONMENTAL IMPACTS IN THE VALUE CHAIN

Our accounting of environmental impacts via the value-chain extends beyond the direct tourism market. These impacts encompass all 'upstream' resource consumption and pollution, and crucially, map these to specific countries and regions of the world.

For example, the tourism sector in Country A features a value chain that causes environmental impacts within Country A. Importantly, this features electricity consumption, that comprises Scope 2 GHG emissions, and is a very significant driver of all global emissions.[12] It also identifies the resource implications of all domestic supply-chain activity that supports tourism in the same country.

However, Country A's value-chain accounting reveals resource impacts in many other countries too. These impacts can be identified and disaggregated, based on the supply chain information embedded within the GSM. These totals encompass all of tourism's upstream resource consumption, including the embedded GHG emissions, energy and water use contained in all of the products and services that are marketed to tourists.

[12] Our estimates of emissions and energy use from electricity generation follow a 'grid-average' approach. This means the emissions-intensity of power generation in Country A is assumed be the same for all consuming sectors. It reflects the average mix of generation technologies in use in the country. The GSM does not contain detail on (e.g.) self-generation, or industry-specific renewable electricity contracts, that would mean that electricity purchases of certain industries are less polluting than others.

4. INTERNATIONAL TRANSPORT EMISSIONS

4.1 INTERNATIONAL AVIATION

National GHG emissions inventories are exclusive of international aviation. While domestic aviation is included in national totals, international aviation and marine emissions are recorded and reported separately. This means that the Travel & Tourism emissions modelling described previously in this document (based on national inventories) exclude the emissions linked to international aviation and international cruises.[13]

International aviation emissions are computed at a global level, but allocating them to countries is not straightforward. A range of possible solutions exist, and our analysis involves developing such a solution to enable the reporting of international aviation impacts alongside our national-level results. This helps us present a more comprehensive view of tourism's environmental footprint in every country.

OPTIONS FOR ALLOCATING AVIATION EMISSIONS

- **Origin-based**[14]: emissions are assigned to the country where the flight takes off.
- **Origin-based with tourism adjustments:** This refinement of the origin-based method is intended to better-reflect the countries responsible for tourism activity. It pushes emissions more strongly towards the countries that contribute a lot of outgoing tourists, while reducing the burden from countries which predominantly host tourists.
- **Destination-based:** allocates aviation emissions to the destination country (of either the flight, or the passenger).
- **Balanced origin-destination approaches**[15]**:** This method seeks to split aviation emissions between origin and destination country. The rationale is that environmental responsibility is shared between the countries which benefit economically from the person flying between them.

In this study, we applied a modified origin-destination approach, that additionally captures the role of hub airports. This allows for the role of hub airports in facilitating aviation to be reflected in emissions estimates. As such, the emissions from flights arriving at and departing busy hubs are attributed to these hub nations, even though they do not themselves generate an equivalent level of inbound or outbound tourists.

The starting point for the analysis is OECD's Air Transport CO_2 Emissions figures, an origin-based dataset.[16] Our 'destination adjustment' makes use of the OAG database. We use the OAG platform to calculate total passenger-km from each country to all other countries in the dataset. This ensures that the 'destination half' of origin-based emissions are shared out appropriately among all partner countries, based on the thickness of routes between origin and destination country. It is worth highlighting the simplifying assumption that takes

[13] National inventories do, however, include emissions domestic aviation and domestic water transport.
[14] The OECD provides origin-based emissions accounting for approximately 150 countries. This provides a comprehensive dataset for international aviation emissions from passenger and cargo flights from 2013-2021.
[15] The UN World Tourism Organization (UNWTO) published a landmark study using this balanced approach: UNWTO, "Transport-related CO2 Emissions of the Tourism Sector" (Modelling results, 2019).
[16] This dataset is CO_2 terms, meaning that the international aviation estimates encompass CO_2 only, rather than a wider GHGs measure. This dataset is used in the absence of an equivalently rich GHGs measure, and uncertainty around the full warming potential of other (non-CO_2) aviation emissions.

place here: we assume that each route departing a given country 'accrues' CO_2 emissions in proportion to its passenger volumes (rather than in proportion to actual flights and frequencies).[17]

The destination adjustment is performed with reference to individual journey legs. This means that we do not allocate the emissions from multi-stage routes only to the ultimate origins and destinations. Rather, each journey leg is treated separately: routes which connect via a hub airport will have 50% of that leg's emissions attributed to the nation of the hub airport.

The analysis is performed for four years: 2013, 2019, 2020 and 2021. Data for these years are available in the OECD and OAG datasets. However, for comparability with the rest of our economic impact work, we also estimate a distribution for 2010. This makes use of historic trends in OE's Air Passenger dataset, as prepared for IATA. We project 'backwards' the pattern of passenger-km from 2013 to 2010, using the growth in international passengers in each country from 2010-13. As such, estimates for 2010 can be considered less precise than for the other specified years, and is provided mainly as a base for comparison.

4.2 INTERNATIONAL MARINE TRAVEL

Our estimates for total global cruise emissions are built up from the Scope 1 reporting of major cruise ship companies. Emissions data from Carnival Corporation and Royal Caribbean are used, along with an estimate that they account for roughly 75% of the global cruise market, to 'scale-up' to cover the entire industry. The allocation among countries then makes use of each country's share of total global cruise passenger arrivals, using data from Tourism Economics' Cruise Intelligence Platform. While clearly a relatively simpler method compared to aviation emissions, this reflects the data challenges and conceptual issues involved with the allocation of cruise emissions.

[17] This simplifying assumption is made in the absence of sufficiently detailed flights data.

5. GSM SOURCES

5.1 ECONOMIC MODEL

Underlying the GSM is an environmentally extended input-output (EEIO) table of the global economy. The I-O table that forms its basis is constructed by Oxford Economics, and comprehensively represents the economies of the world, disaggregating gross output and value-added between 34 industries across 185 countries (and a 'rest of the world' aggregate). Its global scope enables the measurement of economic impact and resource use throughout the world. The base year of the structural economic data is 2019.[18] The model is drawn together from a wide variety of sources:

- **Input-output tables:** the OECD's database of I-O tables form the initial basis for the model. We extend this framework across more than 100 additional countries, adding I-O tables for each. The additional I-O tables are sourced from respective national statistical offices, or constructed by Oxford Economics.[19]
- **Global trade flows:** information about how each economy interacts with every other is mapped using UNCTAD's trade structure database. This is combined with an estimated bilateral disaggregation of global services trade, by Oxford Economics.
- **National accounts:** To ensure a common base year for the entire model, we source national accounts information from the Oxford Economics Global Industry databank,[20] a variety of national statistics offices, and the UN National Accounts database. This ensures that our model reflects the actual observed size of all industries in each calendar year.
- **Employment:** The GSM incorporates Labour Force Surveys (LFS) from national statistical agencies, or the International Labour Organisation (ILO). This allows us to resolve global employment into the industry sectors included in the model.

The full sectoral disaggregation is set out in the appendix to this document. All economic and environmental variables are estimated and aligned to this sectoral definition.

In many cases, particularly in the case of smaller economies, the level of detail available in national accounts or LFS data are below the disaggregation required for the GSM.[21] To achieve greater detail within these aggregated sectors, we assume a similar composition of sub-sectors as is observed in comparable economies. These comparator nations are selected based on their geographic proximity, and for their similar levels of development, and comparable economic structure.

5.2 ENVIRONMENTAL AND RESOURCE DATA

To link environmental impacts and resource consumption to the economic activity represented within the model, the GSM incorporates a range of government/NGO, industry, and academic sources. These sources use a

[18] The base years of the underlying country I-O tables, which define the inter-industry interactions, ranges from 2015 to 2019. The global I-O is harmonised to a 2019 base year.

[19] Oxford Economics constructs input-output tables for countries where no official dataset exists (or if an existing official I-O table is considered old and unrepresentative). These utilise the published national accounts as a starting point. Our estimation method resolves the known macroeconomic data for a country (output and GDP, labour force data, trade data, etc) and reflects its unique economic characteristics and industrial mix.

[20] This databank, built and maintained by OE's Industry team, is in turn sourced from respective national statistical offices.

[21] For 74 GSM countries, national accounts and employment data are available only at the 1-digit ISIC level, typically covering 16 industries. These countries collectively cover about 2.1% of global GDP in 2023, and around 5.1% of world GHGs. This illustrates that while modelling is used to achieve greater detail across a relatively lengthy set of countries, these countries collectively account for only small shares of Travel & Tourism's global impact.

range of methodologies, generally based on national and industry estimates, along with satellite/earth observation data and spatial modelling. They are incorporated into the GSM as they spatially-resolve humanity's global resource footprints, patterns of GHG emissions, land use, water use, and so on.

These sources typically provide environmental data at the national level, or sometimes using a limited form of sectoral disaggregation. This means that constructing the GSM involved aligning national totals appropriately to the unified set of industrial categories in use throughout the model. Our industrial allocation utilises a range of methods, depending on the environmental variable. These are discussed throughout this chapter of the document.

5.2.1 Greenhouse gas emissions

Our principal source for GHG emissions data is the PRIMAP-hist dataset.[22] This is a project led by the Potsdam Institute for Climate Impact Research, that combines and resolves a variety of emissions sources (see box below) into a comprehensive GHG inventory for every country and Kyoto gas type. The latest PRIMAP-hist dataset describes all years between 1850 to 2019.[23] The figures we report are headline CO_2-equivalent measure, inclusive of all Kyoto protocol GHGs (e.g., CO_2, CH_4, N_2O, HFCs etc).[24]

SELECTED SOURCES OF THE PRIMAP-HIST DATASET

- **UNFCCC** (Framework Convention on Climate Change) national inventory reports and updates.
- **EDGAR** (Emissions Database for Global Atmospheric Research), European Commission's in-house database. It is informed by satellite data that guides the spatial (and thus industrial) distribution of national emissions.
- **CDIAC** (Carbon Dioxide Information Analysis Center), US government's now-discontinued dataset.
- **FAOSTAT database** for estimates of agricultural emissions and fertiliser use.
- **BP Statistical Review of World Energy**

PRIMAP-hist resolves these sources into a coherent long-term series, addressing the volatility and conflicts inherent with diverse primary sources, and applying smoothing and interpolation where necessary.[25] This processing facilitates our analysis of economic developments alongside emissions data, such as (e.g.) trends in emissions-intensity, comparisons with economic growth, and international variations. Such analysis would be confounded by using a single primary source that may feature discontinuities, or a collation of self-reported country data at various levels of quality.

The PRIMAP-hist data are expressed for every country among the main IPCC 2006 categories, with limited industrial disaggregation (e.g., energy, industry, agriculture). Our modelling breaks these emissions down and allocates each to constituent ISIC Rev. 4 sectors. This allocation makes use of national emissions data, where available. Almost all European and OECD nations publish an industrial GHGs inventory (disaggregated in an ISIC-

[22] Johannes Gütschow, Annika Günther and Mika Pflüger, "The PRIMAP-hist national historical emissions time series v2.3.1 (1850-2019)". Accessed at https://www.pik-potsdam.de/paris-reality-check/primap-hist/

[23] We use timelier data from the BP Statistical Review to project GHG inventories beyond 2019, to encompass 2020 and 2021.

[24] Emissions from biomass burning/forest fires, and from land-use, land-use change and forestry (LULUCF) are excluded.

[25] It should be noted that these estimations and smoothing can mean that a PRIMAP-hist estimate for emissions in a given year and country may not cohere exactly with any other single source.

consistent form), that can be straightforwardly mapped to the GSM sectors. For the nations that do not publish industrial breakdowns, we use an estimation system, that considers:

- The national inventory GHG emissions totals, broken down by IPCC category, drawn from PRIMAP-hist,
- The industrial structure of the country in question, observed from national economic accounts, and,
- The estimated consumption of emissions-linked commodities, such as oil, natural gas, and refined (oil-derived) fuels by each industry, modelled using Oxford Economics' I-O database.

This process results the estimated volume of emissions contributed by each of the GSM industries per country and year. Following this, each industry's GHG emissions were expressed as a proportion of their gross output (in dollar terms). This is the GHG emissions intensity, measured in terms of mass per dollar of output. Our subsequent modelling allocates Travel & Tourism-related expenditures among the industries that accrue this spending, thereby deriving the emissions associated with this production.

The exception to this involves the emissions associated with international transportation, that do not feature in national inventory totals. These are measured separately in the PRIMAP-hist dataset, and are allocated according to the methodology discussed in Chapter 4.

5.2.2 Air pollutants

Our principal source for air pollution data is the European Commission's Emissions Database for Global Atmospheric Research (EDGAR) database.[26] This provides national time series estimates for a wide range of air pollutants, disaggregated into IPCC categories. Our analysis encompasses the following:

- **Particulate matter (PM),** tiny inhalable particles including dust, mould, minerals, and other chemicals. The metrics include the most common two measures: PM2.5 (particles of 2.5 microns or less in diameter) and PM10 (particles with a diameter of 10 microns or less).
- **Carbon monoxide (CO)**, a toxic gas linked to vehicles and industrial processes.
- **Non-methane volatile organic compounds (NMVOCs),** a class of harmful chemicals associated with fuel burning, solvents and cleaning products.
- **Ammonia (NH3)**, commonly produced by agricultural activities, which can cause damage to plant and soil health.
- **Nitrogen oxides (NOx),** a class of poisonous gases linked respiratory problems and ecosystem damage.

We combine these air pollution estimates with the national accounts and I-O accounts for each country. This allows us to identify each industry's size in output terms, and its relative consumption of pollution-linked fuels and commodities. Each industry's estimated pollution footprint was also informed by the typical air pollutant intensity of that ISIC industry. This was represented by an index, developed using pollution data across 30 European and OECD countries that are disaggregated across an ISIC-linked industrial scheme.

The air pollutants associated with international aviation and marine travel are identified separately in the EDGAR database. These pollutants are measured at a global scale. We assess a share of these global totals to individual countries, in proportion to their share of international Travel & Tourism GHGs, as described in Chapter 4.

[26] Crippa, Monica and Guizzardi, Diego and Muntean, Marilena and Schaaf, Edwin and Oreggioni, Gabriel (2019). EDGAR v5.0 Global Air Pollutant Emissions. European Commission, Joint Research Centre (JRC). http://data.europa.eu/89h/377801af-b094-4943-8fdc-f79a7c0c2d19. Date accessed: 30 November 2022

For four air pollutants, we also compare the Travel & Tourism-linked air pollution in each country with its existing, baseline level of exposure to these air pollutants. These exposure levels are sourced from Yale University's Environmental Performance Index.[27]

5.2.3 Water use

The water use definition in this analysis refers to fresh water. It is based on water withdrawals statistics from the UN Food and Agriculture Organisation's statistics (UN FAO AQUASTAT). This concept describes the water drawn from renewable freshwater resources (e.g., rivers, lakes, and groundwater) by human infrastructure. Our calculations also include the direct use of non-conventional sources (e.g., treated wastewater, desalination).

Given that this water use measure pertains to fresh water, it is broadly comparable with the 'blue' water footprint, as defined by the Water Footprint Network (WFN). It does not include the other elements of the WFN framework, such as green water or grey water.[28] In our reporting, the terms water *use*, water *withdrawals* and water *consumption* may be used interchangeably, and are not intended to refer to different concepts. Where the term water *footprint* is used, it is intended to mean direct and indirect water use (i.e., inclusive of the embodied water in products purchased by Travel & Tourism from its value chain), it is not intended to refer to the WFN concept.

AQUASTAT national water use data are split into three broad categories:

- **Agriculture**: fresh water used for irrigation, livestock and aquaculture purposes. Principally self-supplied (rather than drawn from public mains water networks).
- **Industry**: water used by mining, manufacturing, power supply and construction industries. Principally self-supplied.
- **Municipal**: primarily the fresh water that is supplied via public networks, to commercial and domestic users. This subcategory is interpreted to represent water consumption by service sectors and households.[29] However, it does also include some water that is used by agriculture or industrial firms (for example, those in urban centres and/or small-scale activities that use mains water rather than a dedicated self-supply).

Our analysis disaggregates these three AQUASTAT sectors further, into the GSM industry scheme. To achieve this breakdown, the I-O accounts of each country are used. These economic accounts measure each sector's transactions of various products including water.[30] The relationships described in them can be used to estimate how much of each AQUASTAT water demand category is contributed by each of the detailed GSM sub-sectors.

5.2.4 Energy use

The main source of energy data within the GSM is the International Energy Agency's (IEA) World Energy Balances dataset.[31] This measures the total production, supply, transformation, and consumption of energy throughout

[27] Environmental Performance Index, Yale University (2021): a population-weighted average of air quality measurement readings for four separate pollutants. https://epi.yale.edu/epi-results/2022/component/noe

[28] The Water Footprint Network concept includes other categories of water use. Green water refers to rainwater collected in soil and embedded in harvested crops. Grey water is an estimate of the volume of freshwater needed to dilute waterborne pollution sufficiently to ensure that prevailing water quality standards are met.

[29] Service sectors here refer to ISIC Rev.4 divisions 45-98.

[30] The product flows described in I-O accounts are measured in monetary values. These monetary sums also include imputed values for commodities that are used by an industry but not purchased from an external party, i.e., those which are produced and consumed by the same entity (e.g., self-supplied water). As such, the monetary values can be considered broadly representative of total water use, including self-supply.

[31] IEA, "Energy balances", in Data and statistics, accessed January 2023. https://www.iea.org/data-and-statistics/

the world. These energy data are presented across the following forms, which we aggregate into the three broad categories:

- **Fossil fuels:** including coal, oil, and natural gas.
- **Low-carbon energy:** renewables (e.g., solar, wind, wave, and geothermal), traditional hydroelectricity, and nuclear.
- **Biofuels and waste:** this category encompasses broadly different activities in different regions and income levels. In lower-income regions, it predominantly involves (e.g.) wood and charcoal fires, and domestic and industrial waste burning. In higher-income areas, this energy category features a higher prevalence of bio-additives to gasoline and diesel, such as crop-derived ethanol.

These IEA data include a limited form of industrial disaggregation, allowing us to allocate and map energy flows both between the main energy industries (i.e., from extraction, to refining/petrochemicals, and electricity), as well as the final consumption by industry, disaggregated among several high-level economic sectors. We then allocate the energy consumption of these aggregated sectors into the more detailed set of GSM industries, in proportion to each industry's consumption of the relevant energy commodities, as recorded in each country's I-O accounts.[32]

Countries that are missing from the IEA dataset have their total energy consumption modelled, based on their estimated share of regional energy use.[33] Where detailed breakdowns of energy sources are not available, these are estimated based on the prevailing regional energy mix, with appropriate exclusions applied for countries within that are known to not utilise electricity from (e.g.) nuclear or hydroelectric sources.

The energy demand associated with international aviation and marine travel is stated separately in the IEA data. We allocate these global energy use totals among the countries of the study, in the same proportion as the GHGs allocation described in Chapter 4.

Our measure of **direct energy use** includes all final uses of energy by industry, inclusive of its own direct consumption of energy commodities (e.g., burning natural gas in a boiler, diesel fuel in a generator or vehicle engine), as well as their consumption of electrical energy. The electricity consumed by each industry is assumed to have been supplied by the average mix of generation technologies in use in that country and year. **Indirect energy use** describes the energy that is embedded in purchased inputs of goods and services.

5.2.5 Materials use

Our estimates for materials use draw upon the UN Environment Programme (UN EP)'s global material flows database.[34] This dataset forms the basis for UN materials footprint data and similar research, that measures the extent of all countries' extraction, consumption and trade of various raw materials:

- **Biomass:** encompassing crops and crop residues, animal grazing of biomass, wood and timber, and fishing;
- **Fossil fuels:** including all coal, oil and natural gas-derived energy products;
- **Metal ores:** ferrous and non-ferrous ores; and
- **Non-metallic minerals:** construction (e.g., stone, sand and clay) and other industries (e.g., chemicals and fertilizer minerals, salts).

[32] When estimating the energy use of the electricity generation sector, the sector's own-use of energy and losses in transformation are included.

[33] This is based on each country's economic accounts, and World Bank measures of energy use per unit GDP.

[34] UNEP IRP Global Material Flows Database (2022). https://www.resourcepanel.org/global-material-flows-database

We allocate domestic materials extraction to the primary sectors within our model (agriculture, forestry, fishing, mining of energy products and mining of non-energy products). This allows us to trace the indirect demand for these materials that are contributed by Travel & Tourism, by appraising the extent of their supply chain interactions with these industries.

6. SOCIAL IMPACT

We also sought to investigate some of the social dimensions of Travel & Tourism's employment impact. Given that the starting point for these breakdowns is the WTTC EIR project data, this elaboration of Travel & Tourism's footprint encompasses each of the direct, indirect, and induced impacts of the industry.

6.1 GENDER AND AGE SPLITS

This project measures the distribution of Travel & Tourism's employment benefits among two important demographic categories: gender and age. The approach used to assess these distributional impacts is comparable in both cases, so here their methodology is discussed in conjunction.

Using the WTTC EIR employment estimates as a starting point, the sectoral allocation explained in Chapter 2 permits Travel & Tourism's direct, indirect and induced employment contributions to be linked to GSM sectors. Given that these sectors are defined in ISIC Rev. 4 terms, they can be aligned with official data on employment by industry, split by personal characteristics such as age and gender.

We estimate the female share of Travel & Tourism employment, by multiplying the industrially disaggregated employment figures by the female share of employment within each constituent industry. These shares were estimated using official statistics from NSOs, Eurostat and the ILO.[35]

The age breakdowns are presented in two relatively wide categories: young people (aged 15 to 24) and older adults (aged 25 and older). While recognising that this is not a particularly detailed breakdown, these groupings are chosen because they facilitate comparisons across the broadest possible range of countries. The youth share of Travel & Tourism employment is estimated using the GSM employment data, along with official estimates of sectoral employment that falls within the 15-24 and 25+ age groups.

6.2 HIGH-WAGE EMPLOYMENT

To understand more about the relative quality of the jobs created and sustained by tourism, we sought to break down its employment contributions by different earnings levels. However, this is analytically challenging, because harmonised international wage data is patchy at best. There are wide variations in the sources, methods, timeliness, concepts and coverage of such data. International comparisons are also further-complicated by currency effects, as well as differences in price levels and purchasing power.

In recognition of this, we develop a crude measure of 'high-wage' sectors. Industry-average wage levels are estimated in a cross-sectional (within-country) fashion, using the sources and definitions available in each country. These industry averages are then compared to the national earnings distribution: if the industry's average wage would place it roughly in the top one-third of earnings in that country (above the 65th percentile), it is classified as a high-wage sector. The 'high-wage' designation effectively becomes a binary indicator, and the Travel & Tourism-linked employment impact that falls within those industry sectors is defined as high-wage.

This approach is a necessarily limited one, in recognition of the data challenges involved. The intention was to assess the relative quality and desirability of Travel & Tourism jobs, in a broadly consistent manner across countries. It should be noted that what high-wage means (in cash terms) is different in every country, and implies a different standard of living in every country. Indeed, our designation does not even assert that this

[35] The implicit assumption here is that in this regard, Travel & Tourism businesses are reflective of the wider industries of which they are a part.

earnings level is sufficient for a worker to avert significant hardship, only that someone earning their industry-average wage would be roughly among the top one-third of earners in their country.

APPENDIX

Fig. 7. ISIC categories contained in the GSM and in simplified OE/WTTC results sectors

Simplified category	ISIC Rev. 4 Code	Sector Detail
Agriculture & Food	01-03	Agriculture, forestry and fishing
	10-12	Food products, beverages and tobacco
Manufacturing	13-15	Textiles, clothing and accessories
	16	Wood products and parts
	17-18	Paper products and printing
	19	Petroleum refining
	20-21	Chemicals and pharmaceuticals
	22	Rubber and plastic products
	23	Other (non-metallic) mineral products
	24	Basic metals
	25	Fabricated metal products
	26	Computers, electronics and optical products
	27	Electrical equipment
	28	Other machinery and equipment
	29	Motor vehicles and parts
	30	Other transport equipment
	31-33	Other manufacturing; R&M
Utilities	35-39	Electricity, gas, water and waste services
Retail and Wholesale	45-47	Wholesale and retail trade
Transportation	49-53	Transportation and storage
Hospitality	55-56	Accommodation and food services
Other	05-06	Mining and extraction (energy products)
	07-08	Mining and extraction (non-energy products)
	09	Mining support services
	41-43	Construction
	58-60	Publishing and broadcasting activities
	61	Telecommunications
	62-63	IT and other information services
	64-66	Finance and insurance
	68	Real estate activities
	69-82	Other business sector services
	84	Public administration
	85	Education
	86-88	Human health and social work
	90-96	Arts, entertainment, recreation and other services
	97-98	Private households as employers

Fig. 8. Income category and regional classifications used in the study

Region	High income	Upper middle income	Lower middle income	Low income
Africa	Reunion Seychelles	Botswana Gabon Libya Mauritius Namibia South Africa	Algeria Angola Benin Cameroon Cape Verde Comoros Cote d'Ivoire Egypt eSwatini Ghana Kenya Lesotho Morocco Nigeria Republic of Congo Sao Tome and Principe Senegal Tanzania Tunisia Zimbabwe	Burkina Faso Burundi Central African Republic Chad DR Congo Ethiopia Guinea Madagascar Malawi Mali Mozambique Niger Rwanda Sierra Leone Sudan The Gambia Togo Uganda Zambia
Americas	Anguilla Antigua And Barbuda Aruba Barbados Bermuda British Virgin Islands Canada Cayman Islands Chile Curacao Guadeloupe Martinique Panama Puerto Rico St. Kitts and Nevis The Bahamas Trinidad And Tobago United States Uruguay US Virgin Islands	Argentina Belize Brazil Colombia Costa Rica Cuba Dominica Dominican Republic Ecuador Grenada Guatemala Guyana Jamaica Mexico Paraguay Peru St. Lucia St. Vincent & Grenadines Suriname Venezuela	Bolivia El Salvador Haiti Honduras Nicaragua	
Asia-Pacific	Australia Brunei Hong Kong Japan Macao New Zealand Singapore South Korea Taiwan	China Fiji Kazakhstan Malaysia Maldives Other Oceanic States Thailand Tonga	Bangladesh Cambodia India Indonesia Kiribati Kyrgyzstan Laos Mongolia Myanmar Nepal Pakistan Papua New Guinea Philippines Solomon Islands Sri Lanka Tajikistan Uzbekistan Vanuatu Vietnam	

Region	High income	Upper middle income	Lower middle income	Low income
Europe	Austria Belgium Croatia Cyprus Czechia Denmark Estonia Finland France Germany Greece Hungary Iceland Ireland Italy Latvia Lithuania Luxembourg Malta Netherlands Norway Poland Portugal Romania Slovak Republic Slovenia Spain Sweden Switzerland United Kingdom	Albania Armenia Azerbaijan Belarus Bosnia and Herzegovina Bulgaria Georgia Moldova Montenegro North Macedonia Russia Serbia Türkiye	Ukraine	
Middle East	Bahrain Israel Kuwait Oman Qatar Saudi Arabia United Arab Emirates	Iraq Jordan	Iran Lebanon	Syria Yemen

Fig. 9. Resolution of coverage of 'Scope 3 emissions' (GHG Protocol) and 'Value Chain emissions' (Oxford Economics GSM)

GHG Protocol Category		Protocol designation	Included in GSM?	Note/further detail
1	Purchased goods and services	Upstream	Yes	Emissions embedded in reporter's intermediate purchases
2	Capital goods	Upstream	Yes	Emissions embedded in reporter's capital purchases
3	Fuel- and energy-related emissions not included in scope 1 or 2	Upstream	Yes	
4	Upstream transportation and distribution	Upstream	Yes	(a) Transportation & distribution of purchased products, between Tier 1 suppliers and reporter's own operations (b) Transportation and distribution services purchased by reporting company (inbound logistics, outbound logistics, external transport providers between reporters' sites)
5	Waste generated in operations	Upstream	Yes	Disposal/treatment of waste generated in reporter's operations (by external provider)
6	Business travel	Upstream	Yes	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)
7	Employee commuting	-	No	Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)
8	Upstream leased assets	Upstream	Yes	Applicable to companies that operate leased assets.
9	Downstream transport and distribution	Downstream	No	Downstream use/disposal of sold products
10	Processing of sold products	Downstream	No	Downstream use/disposal of sold products
11	Use of sold products	Downstream	No	Downstream use/disposal of sold products
12	End-of-life treatment of sold products	Downstream	No	Downstream use/disposal of sold products
13	Downstream leased assets	Downstream	No	Emissions from assets owned by reporter but leased to others, and not in Scope 1 or 2
14	Franchises	Downstream	No	Emissions from operating franchises not included in Scope 1 or 2
15	Investments	Downstream	No	Downstream category covering equity, debt, project finance, and managed investments. Mainly applicable to banks and other investment managers

In Fig. 10 below, **source of I-O table** describes the main source of the I-O accounts underpinning our calculations. Where this source is stated as Oxford Economics, this means that the I-O model of that country was estimated by OE. Our method uses up-to-date (2019) national accounting information as a starting point, and applies an assumption about the economic structure of the country. This assumption can take one of two forms:

- **Older country-specific source:** Where the country has some available SUTs or I-O accounts, but they are quite dated, we estimate an updated version of this model. This update is constrained to the country's economic situation in 2019 (in terms of GDP, industry output, imports and exports, final consumption, etc).
- **Proxy country used:** Where the country does not have available I-O information to our knowledge, we begin with the I-O accounts of a comparable country. This information is then adapted iteratively, to converge and cohere with the country's own economic structure in 2019. This means each I-O model is specific to the country in question (in terms of industry output, consumption and investment, imports and exports etc). Our calculations do not simply calculate multipliers from a proxy country and assign them to new geographies.

Fig. 10. Sources of I-O information

		Where models are OE-estimated:	
Country	Source of I-O Table	Older Country-Specific Source	Proxy Country used
United States	OECD	:	:
China	OECD	:	:
Germany	OECD	:	:
Japan	OECD	:	:
United Kingdom	OECD	:	:
France	OECD	:	:
Italy	OECD	:	:
India	OECD	:	:
Spain	OECD	:	:
Mexico	OECD	:	:
Brazil	OECD	:	:
Australia	OECD	:	:
Thailand	OECD	:	:
Canada	OECD	:	:
Netherlands	OECD	:	:
Philippines	OECD	:	:
Russia	OECD	:	:
Türkiye	OECD	:	:
Saudi Arabia	OECD	:	:
South Korea	OECD	:	:
Indonesia	OECD	:	:
Switzerland	OECD	:	:
UAE	Oxford Economics	Qatar (2010), Emirates Stats Offices I-Os (2014-15)	
Austria	OECD	:	:
Macao	Oxford Economics	:	Hong Kong
Hong Kong	OECD	:	:
Argentina	OECD	:	:
Malaysia	OECD	:	:
Greece	OECD	:	:
Singapore	OECD	:	:
Portugal	OECD	:	:
Sweden	OECD	:	:
Taiwan	OECD	:	:
Iran	Oxford Economics	:	Türkiye
Norway	OECD	:	:
Belgium	OECD	:	:

		Where models are OE-estimated:	
Country	Source of I-O Table	Older Country-Specific Source	Proxy Country used
New Zealand	OECD	:	:
Poland	OECD	:	:
Egypt	Egypt CAPMAS	:	:
Chile	OECD	:	:
South Africa	OECD	:	:
Vietnam	OECD	:	:
Israel	OECD	:	:
Denmark	OECD	:	:
Finland	OECD	:	:
Peru	OECD	:	:
Qatar	Oxford Economics	Qatar MDPS SUTs (2010)	
Nigeria	Oxford Economics	:	Ghana
Ireland	OECD	:	:
Pakistan	Asia Development Bank	:	:
Colombia	OECD	:	:
Czechia	OECD	:	:
Croatia	OECD	:	:
Romania	OECD	:	:
Morocco	OECD	:	:
Dominican Republic	DR Central Bank	:	:
Hungary	OECD	:	:
Iraq	Oxford Economics	:	Iran
Other Oceanic States	Oxford Economics	:	Philippines
Cuba	Oxford Economics	:	Dominican Rep.
Panama	Panama National Stats	:	:
Lebanon	Oxford Economics	:	Israel
Ukraine	Ukraine National Stats	:	:
Algeria	Oxford Economics	:	Egypt
Uruguay	Oxford Economics	:	Argentina
Bangladesh	Asia Development Bank	:	:
Sri Lanka	Oxford Economics	Sri Lanka DSC SUTs (2010)	
Kenya	Oxford Economics	:	:
Luxembourg	OECD	:	:
Jordan	Oxford Economics	:	Egypt
Kuwait	Kuwait CSB (2015)	:	:
Costa Rica	OECD	:	:
Cambodia	OECD	:	:
Bulgaria	OECD	:	:
Kazakhstan	OECD	:	:
Slovakia	OECD	:	:
Tanzania	Oxford Economics	Tanzania NBS I-O (2015)	
Puerto Rico	Oxford Economics	Puerto Rico Planning Board SUTs (2007)	
Slovenia	OECD	:	:
Ethiopia	Oxford Economics	EU Ethiopia SAM (2015-16)	
The Bahamas	Oxford Economics	:	Puerto Rico
Ecuador	Ecuador Central Bank	:	:
Tunisia	OECD	:	:
Iceland	OECD	:	:
Oman	Oxford Economics	:	Saudi Arabia
Bahrain	Oxford Economics	:	UAE
Cote d'Ivoire	Oxford Economics	:	Nigeria
Georgia	Oxford Economics	:	Russia
Jamaica	Oxford Economics	JamStat I-O (2007)	
Myanmar	Oxford Economics	:	Cambodia
Guatemala	Oxford Economics	:	Mexico
Ghana	Oxford Economics	Ghana SS SAM (2015)	
Belarus	Oxford Economics	:	Russia

		Where models are OE-estimated:	
Country	Source of I-O Table	Older Country-Specific Source	Proxy Country used
Azerbaijan	Oxford Economics	:	Iran
Estonia	OECD	:	:
Venezuela	Oxford Economics	:	Colombia
Cyprus	OECD	:	:
Lithuania	OECD	:	:
Cameroon	Oxford Economics	:	Nigeria
El Salvador	El Salvador Central Bank		:
Albania	Oxford Economics	:	Greece
Serbia	Oxford Economics	:	Romania
Maldives	Oxford Economics	:	Sri Lanka
Uzbekistan	Oxford Economics	:	Kazakhstan
Honduras	Honduras Central Bank	:	:
Mauritius	Oxford Economics	:	Sri Lanka
Angola	Oxford Economics	:	DR Congo
Latvia	OECD	:	:
Sudan	Oxford Economics	:	Ethiopia
Malta	OECD	:	:
Bolivia	Oxford Economics	Bolivia INE SUTs, 2014	
Nepal	Oxford Economics	:	India
Uganda	Oxford Economics	IFPRI Uganda SAM (2013)	
Aruba	Oxford Economics	:	Trinidad & Tobago
Reunion	Oxford Economics	:	Sri Lanka
Senegal	Oxford Economics	:	Cote d'Ivoire
Botswana	Oxford Economics	:	South Africa
Bosnia & Herzegovina	Oxford Economics	:	Croatia
Namibia	Oxford Economics	IFPRI Namibia SAM (2007)	
Laos	Oxford Economics	:	Thailand
Trinidad & Tobago	Oxford Economics	:	Jamaica
Madagascar	Oxford Economics	:	Mozambique
Armenia	Oxford Economics	:	Turkey
Zambia	Oxford Economics	Zambia CSO SUTs (2010)	
Fiji	Oxford Economics	:	New Zealand
Montenegro	Oxford Economics	:	Croatia
Paraguay	Oxford Economics	:	Brazil
Mali	Oxford Economics	:	Cote d'Ivoire
Libya	Oxford Economics	:	Egypt
Barbados	Oxford Economics	:	Trinidad & Tobago
Syria	Oxford Economics	:	Turkey
Yemen	Oxford Economics	:	Saudi Arabia
Zimbabwe	Oxford Economics	:	Zambia
Antigua & Barbuda	Oxford Economics	:	Trinidad & Tobago
St. Lucia	Oxford Economics	:	Jamaica
Virgin Islands (US)	Oxford Economics	:	Puerto Rico
Cayman Islands	Oxford Economics	:	Puerto Rico
Rwanda	Oxford Economics	Rwanda NISR SUTs (2011)	
Bermuda	Oxford Economics	:	Panama
Nicaragua	Oxford Economics	:	Honduras
Guadeloupe	Oxford Economics	:	Puerto Rico
Mongolia	Oxford Economics	:	Kazakhstan
DR Congo	Oxford Economics	DR Congo INS SAM (2013)	
Mozambique	Oxford Economics	UN Mozambique SAM (2015)	
North Macedonia	Oxford Economics	:	Greece
Kyrgyzstan	Oxford Economics	:	Kazakhstan
Haiti	Oxford Economics	:	Dominican Rep.
Moldova	Oxford Economics	:	Ukraine
Curacao	Oxford Economics	:	Trinidad & Tobago
Martinique	Oxford Economics	:	Puerto Rico

		Where models are OE-estimated:	
Country	Source of I-O Table	Older Country-Specific Source	Proxy Country used
Brunei	OECD	:	:
Cape Verde	Oxford Economics	:	Cote d'Ivoire
Niger	Oxford Economics	:	Nigeria
Benin	Oxford Economics	:	Nigeria
Belize	Oxford Economics	:	Guatemala
Seychelles	Oxford Economics	:	Sri Lanka
Malawi	Oxford Economics	:	Mozambique
Virgin Islands (UK)	Oxford Economics	:	Trinidad & Tobago
Tajikistan	Oxford Economics	:	Kazakhstan
Grenada	Oxford Economics	:	Trinidad & Tobago
Papua New Guinea	Oxford Economics	:	Philippines
St. Kitts & Nevis	Oxford Economics	:	Jamaica
Gabon	Oxford Economics	:	DR Congo
Guinea	Oxford Economics	:	Cote d'Ivoire
Chad	Oxford Economics	:	DR Congo
Togo	Oxford Economics	:	Ghana
Burkina Faso	Oxford Economics	:	Cote d'Ivoire
Republic of Congo	Oxford Economics	:	DR Congo
Lesotho	Oxford Economics	:	South Africa
St. Vincent & Grenadines	Oxford Economics	:	Jamaica
Vanuatu	Oxford Economics	:	Philippines
The Gambia	Oxford Economics	:	Cote d'Ivoire
eSwatini	Oxford Economics	:	South Africa
Guyana	Oxford Economics	:	Brazil
Anguilla	Oxford Economics	:	Trinidad & Tobago
Dominica	Oxford Economics	:	Dominican Rep.
Sierra Leone	Oxford Economics	:	Cote d'Ivoire
Burundi	Oxford Economics	:	Rwanda
Central African Republic	Oxford Economics	:	DR Congo
Solomon Islands	Oxford Economics	:	Philippines
Comoros	Oxford Economics	:	Mozambique
Suriname	Oxford Economics	:	Brazil
Tonga	Oxford Economics	:	Philippines
Sao Tome & Principe	Oxford Economics	:	DR Congo
Kiribati	Oxford Economics	:	Philippines

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Saudi Arabia's Ministry of Tourism leads the Saudi Tourism ecosystem. The Ministry sets the Kingdom's tourism sector strategy and is responsible for the development of policies and regulations, developing human capital, gathering statistics, and attracting investment. It works in partnership with the Saudi Tourism Authority, which promotes Saudi Arabia as a global tourism destination, and the Tourism Development Fund, which executes the Ministry's investment strategy by providing funding for the sector's development. Headed by His Excellency Ahmed Al Khateeb, the Ministry was founded in February 2020, following the opening of Saudi Arabia to international leisure tourists for the first time in its history in 2019. Saudi Arabia aims to welcome 100 million tourists by 2030, increasing the sector's direct contribution to GDP from 3.8% in 2019 to 10%.
For more information, visit: **MT.gov.sa**

The Sustainable Tourism Global Center (STGC) is the world's first multi-country, multi-stakeholder global coalition, incubated within the Ministry of Tourism of Saudia Arabia, that will lead, accelerate, and track the tourism industry's transition to net-zero emissions, as well as drive action to protect nature and support communities. It will enable the transition while delivering knowledge, tools, financing mechanisms and innovation into the tourism sector. The STGC was announced by His Royal Highness the Crown Prince Mohammed Bin Salman during the Saudi Green Initiative in October 2021 in Riyadh, Saudi Arabia. His Excellency Ahmed Al Khateeb, Minister of Tourism for Saudi Arabia then led a panel discussion during COP26 (November 2021) in Glasgow, United Kingdom, to elaborate on how the Center will deliver on its mandate with founding country representatives and experts from partner international organisations.

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