



# **Drivers of Tourism Emissions**

**Scientific Research on GHG emissions from Tourism Operations**

**Summary of research project and key findings - 10th December 2024**

# Research Team

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# Major global study reveals surging growth in tourism emissions and alarming inequalities between countries



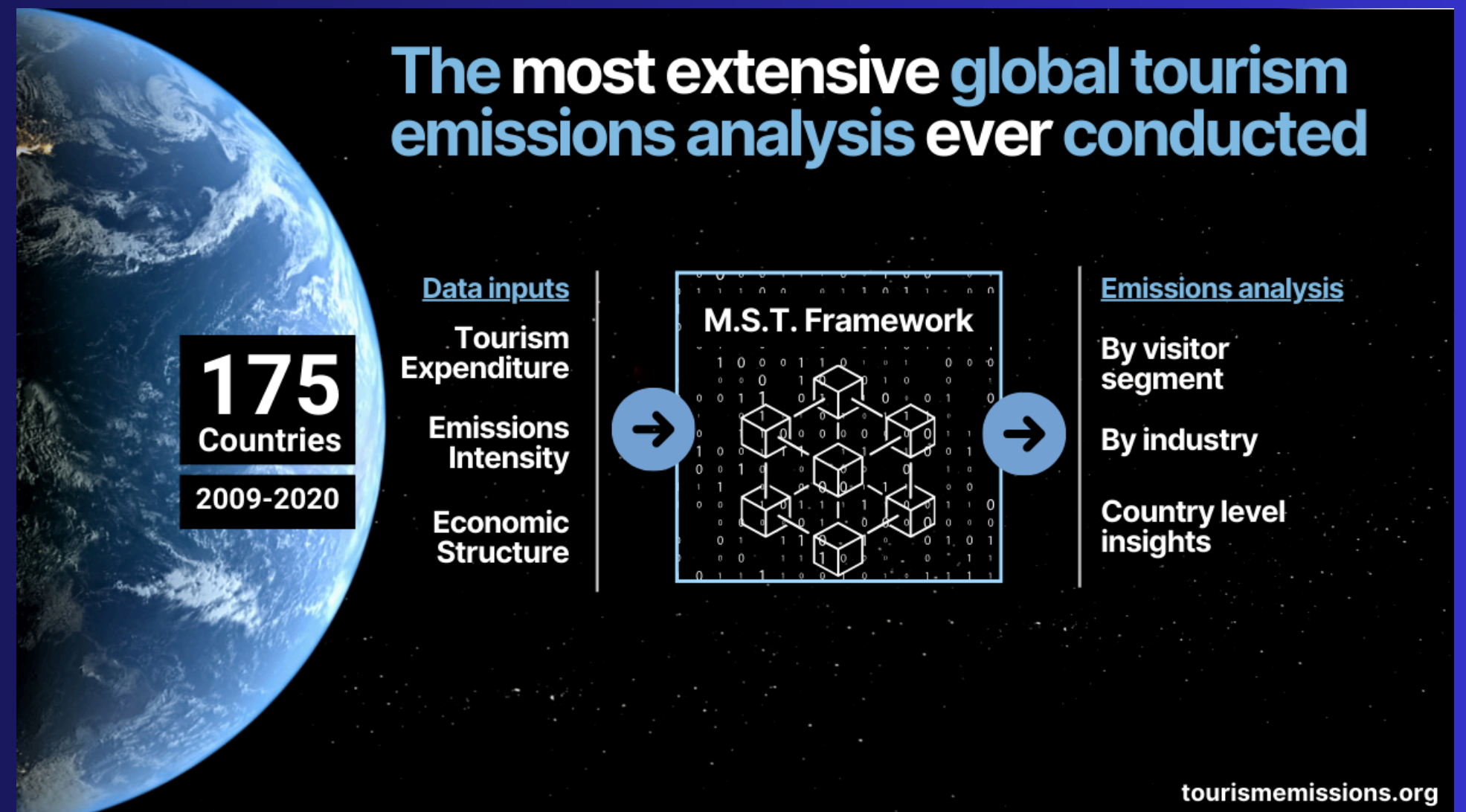
A major global study analysing a decade of tourism data across 175 countries has revealed surging growth in tourism emissions and “alarming” inequalities between countries. Conducted by scientists from four universities, the research is the most in-depth and extensive of its type ever undertaken, covering the years 2009 to 2020. The research has been published this week in Nature Communications.

The team analysed the national tourism carbon footprints of 175 countries, drawing on multiple datasets including those published directly by governments. Data was then validated, analysed and run through a model, leading to the most clear picture of global tourism emissions ever produced. This includes the ability to drill down into the tourism supply chain, specific data sources and emissions by both country of residence and destination country.

We have been able to estimate the tourism carbon footprint across **175 countries, and across a time span of 11 years** (2009 to 2020, inclusive). All of this data has been run through the MST framework (MST stands for “Measuring the Sustainability of Tourism”, a framework which the UN World Tourism Organization strongly endorses and promotes) and enables significant analysis, including back through the tourism industry supply chain.

Source data included tourism expenditure data, data on emissions intensity by sector and economic structure and trade data. In many cases, data sources were direct from government sources. Data was then carefully validated before being run through the model.

Currently, only New Zealand and Denmark publish official national tourism CO2 information. Many other countries should be encouraged to follow suit, as the necessary data, models, and measurement frameworks are available.

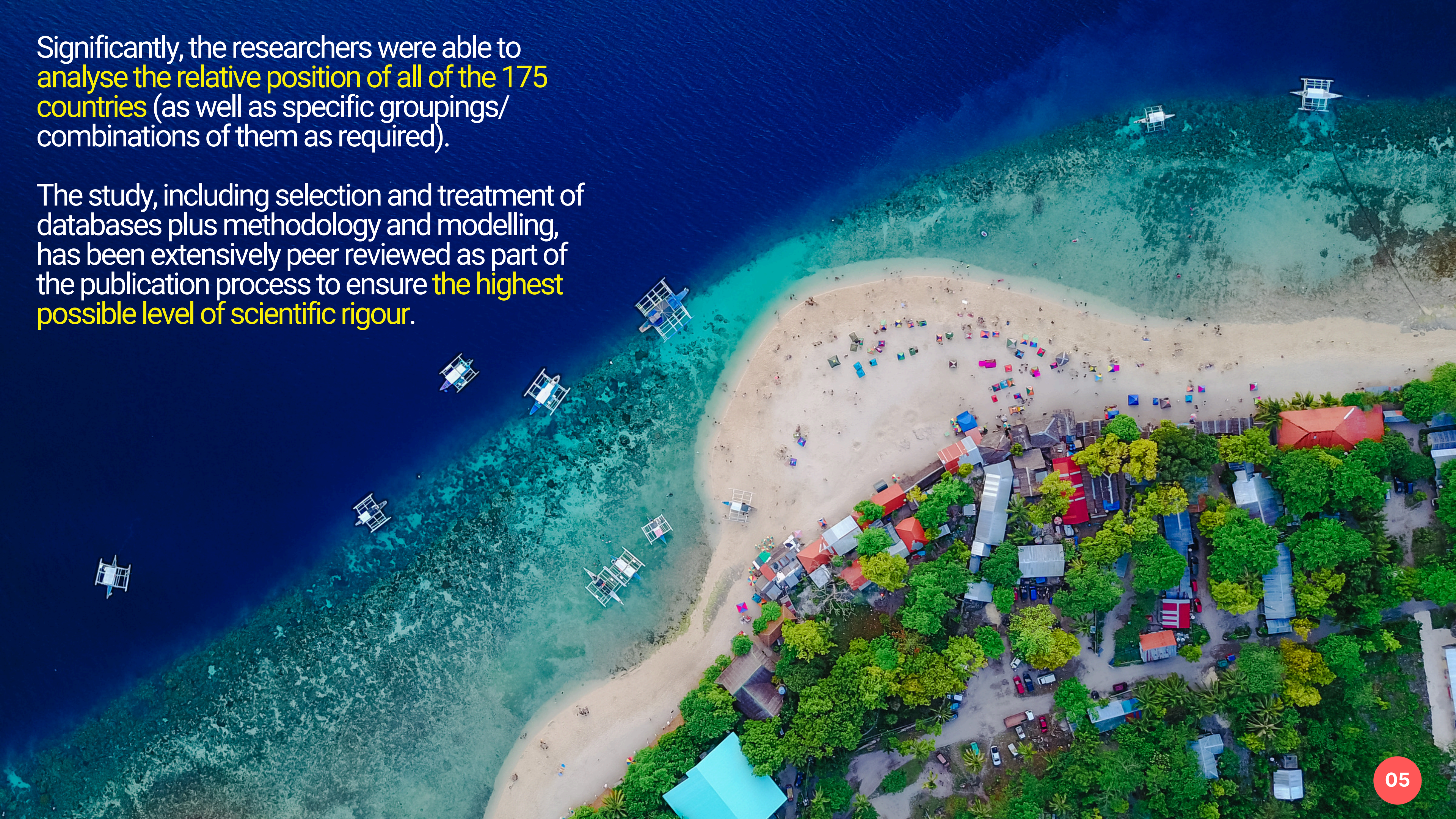


This model has enabled us to proceed with significant analysis, including the following examples:

- Emissions by domestic travel
- Emissions by inbound tourism
- Emissions by outbound tourism
- Emissions from local businesses
- Emissions from foreign producers
- Emissions from international flights
- Emissions from other sources, eg. private vehicle use

Significantly, the researchers were able to analyse the relative position of all of the 175 countries (as well as specific groupings/ combinations of them as required).

The study, including selection and treatment of databases plus methodology and modelling, has been extensively peer reviewed as part of the publication process to ensure the highest possible level of scientific rigour.



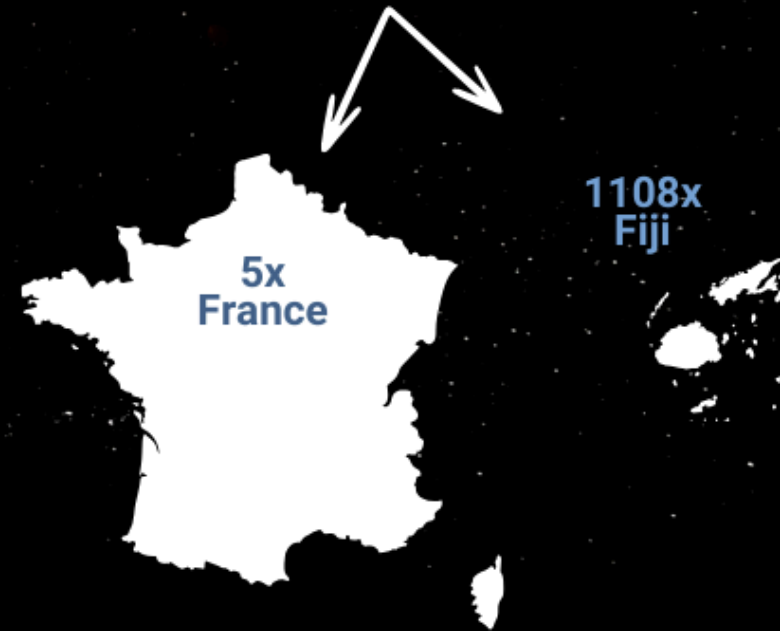
# Tourism's rapidly expanding carbon footprint

Net increase of 1.5 Gt in 10 yrs

Tourism now  
**8.8%**  
of all emissions

5.2 Gt  
in  
2019

compared to country emissions (2019)



tourismemissions.org

At the time of publication, many studies cite the Lenzen study for 2013 tourism emissions figures, in which tourism emissions are calculated 8% of global emissions. In just a decade, we now know that this number has risen to 8.8% – a net increase of 1.5 Gt in 10 years.

Tourism carbon footprint in 2019 (5.2 Giga tonnes or 5,200,000,000 tonnes).

Contribution to the global emissions (8.8%).

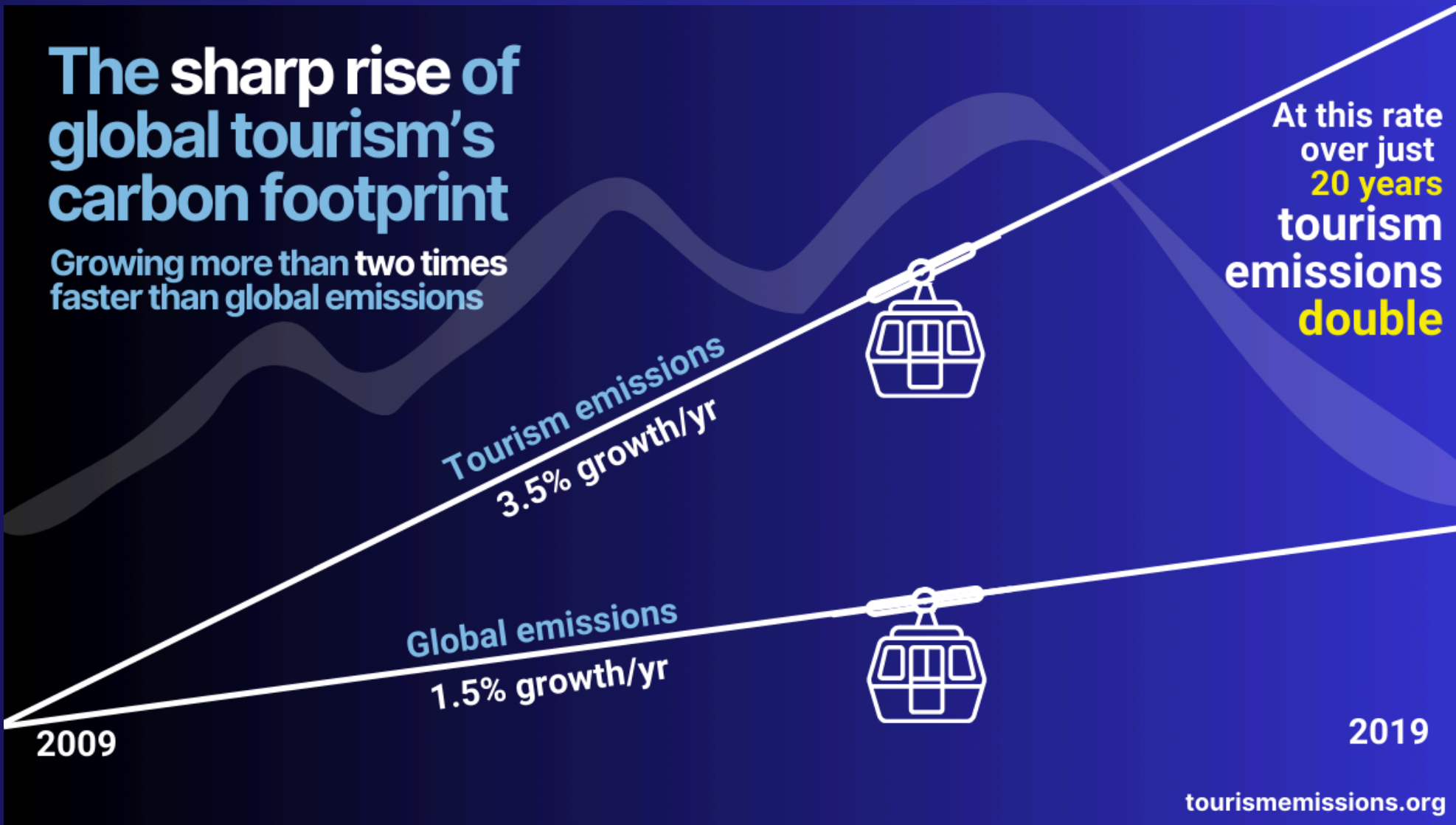
Direct emissions amounted to 1.8 Gt (52% from aviation, 18% from road transport), indirect emissions were 2.5 Gt (34% from utilities, 14% from petroleum manufacturing), and private vehicle emissions added 0.9 Gt.

When compared to the annual emissions of France or Fiji, this net increase between 2009 and 2019 is five times that of France and 1,108 times that of Fiji.

The footprint presented here covers emissions produced by inbound, outbound and domestic travel for 175 countries. We differentiate emissions produced by local businesses, foreign producers, international flights, and private vehicle use. The study offers the first comprehensive evidence and analysis of global tourism carbon emissions when tourism demand peaked in 2019.



One major purpose of this study is to track how rapidly tourism carbon footprint (CF) has increased over a decade (2009-2019).



- Net tourism emissions growth between 2009-2019: 1.5 Gt CO<sub>2</sub>-e
- Growth rate of tourism emissions per year (3.5%)
- Growth rate of global emissions per year (1.5%)
- Tourism emissions growth rate is **2.3 times higher** than the rest of the economy.

Significantly – if current growth rates are maintained, tourism emissions **will double in just 20 years.**

It's important to consider why the tourism carbon footprint has grown so fast.

As this infographic shows, the simple answer is that **we demand too much travel, while technological improvements in businesses simply cannot keep up with this growth**. This is crucial information as it forms the basis for the recommendation that a demand control strategy for the tourism industry to mitigate emissions is required.

Overall, production factors (technology and the supply chain) only offset 25% of the tourism emissions growth, and this growth is driven by consumption factors (expenditure per capita, population, and private car use).

As this infographic shows, despite efficiency improvements of 0.3% p.a., tourism emissions grew by a whopping 1.5 Gt between 2009 and 2019.

## Modest efficiency improvements totally outstripped by surging growth in tourism demand



Demand growth 3.8% p.a.



Efficiency improvements 0.3% p.a.



Net tourism emissions growth 1.5 Gt (2009-2019)

[tourismemissions.org](http://tourismemissions.org)



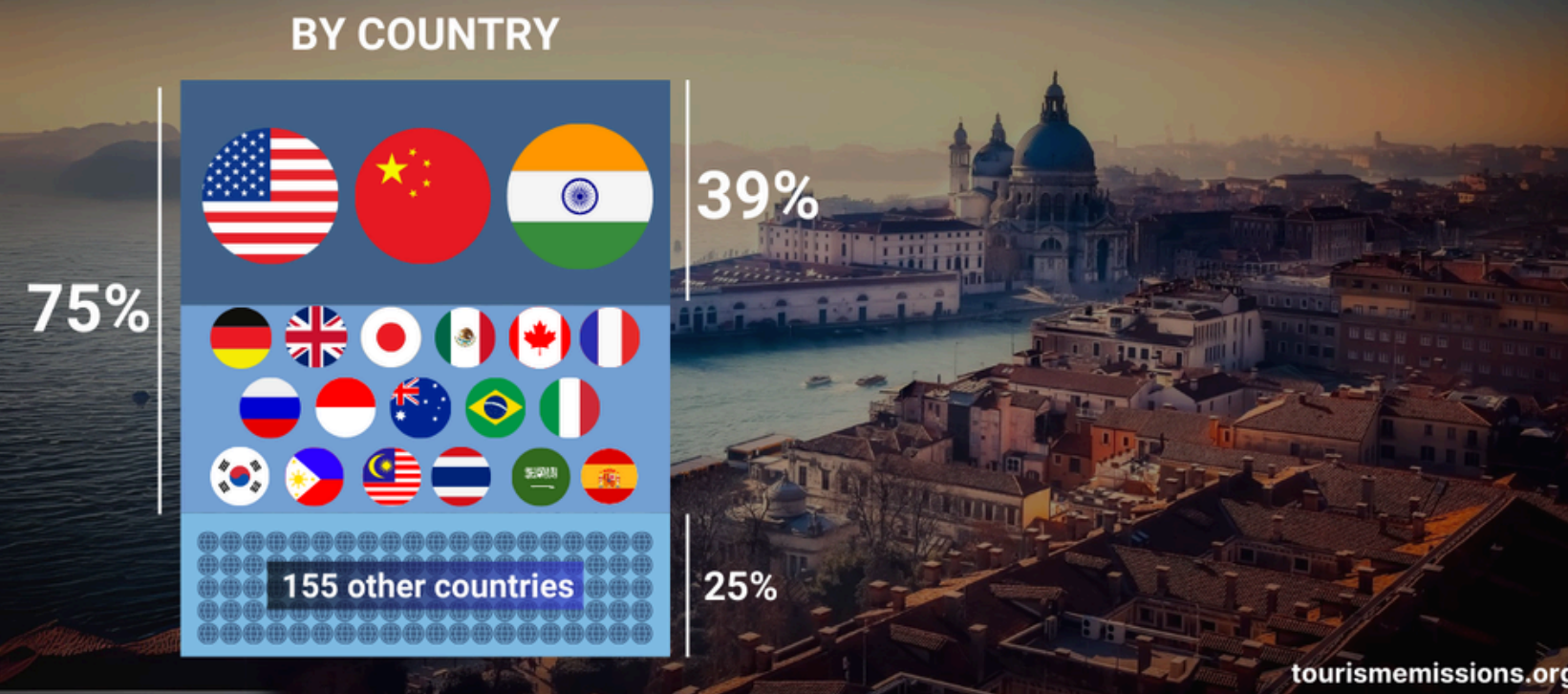
# Alarming distributional inequalities

The research uncovered significant inequalities between countries which the research team describes as “alarming”.

Just three countries produced 39% of global tourism emissions in 2019 - namely, the United States of America, China and India.

These three countries were also responsible for 60% of the growth in tourism emissions over a decade.

## Huge inequality in who creates tourism emissions



The twenty highest emitting countries contributed **three-quarters** of the global tourism footprint, with the remaining 155 countries accounting for only 25% of global tourism emissions.

## Huge inequality in per capita tourism emissions



The difference between countries that travel the most and the least is more than **100 fold**.

# Aviation is the elephant in the room

Aviation is the primary 'hotspot,' with **the biggest growth in emissions among all tourism sectors.**

According to the International Energy Agency, aviation has made **'substantially insufficient' progress** in decarbonising itself due to challenges in management, technology and fuel transition, finance, and governance. Aviation is described as the Achilles heel of global tourism emissions because it is both 'big' in terms of emissions created and 'difficult' to decarbonize.

## Aviation is the Achilles heel of global tourism emissions



of direct tourism emissions

Biggest emissions growth within tourism

Most difficult to decarbonise



[tourismemissions.org](http://tourismemissions.org)

Most people are not aware that tourism is carbon intensive; for many of us, instinct suggests that manufacturing will produce more CO2 per dollar than many other activities.

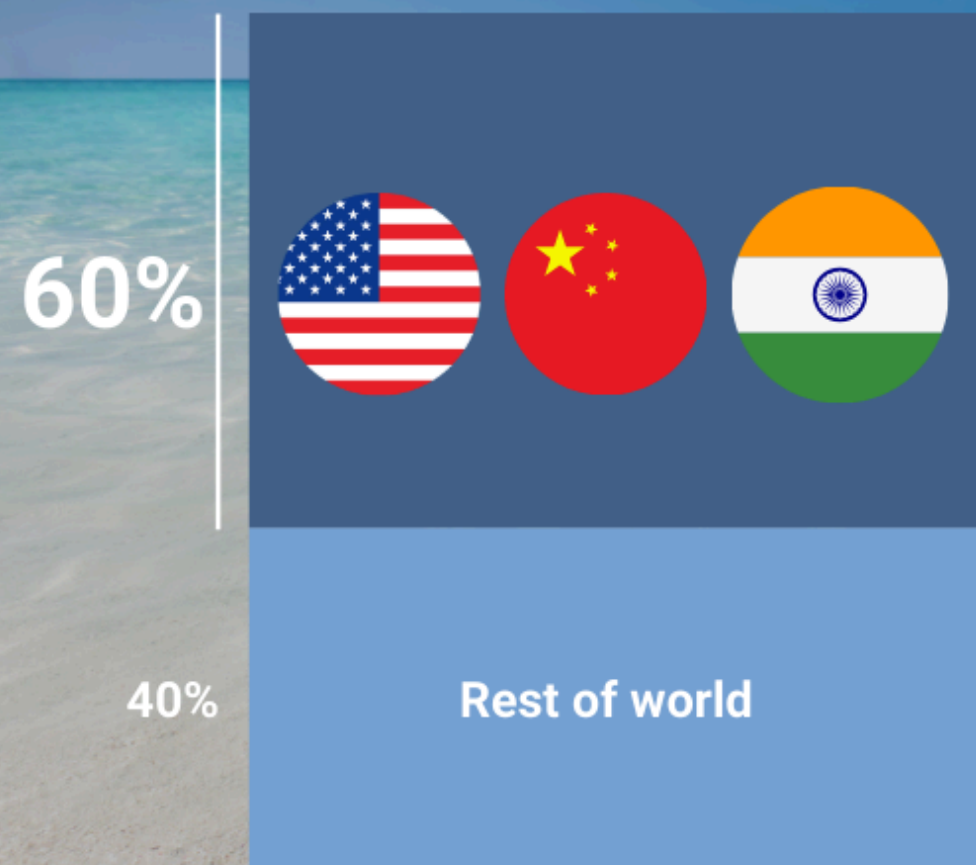
This infographic compares emissions per dollar spent across tourism, the service sector and the overall economy.

This shows that tourism is very carbon intensive per dollar spent, meaning that **each tourism dollar has much more carbon impact than the same spend elsewhere.**

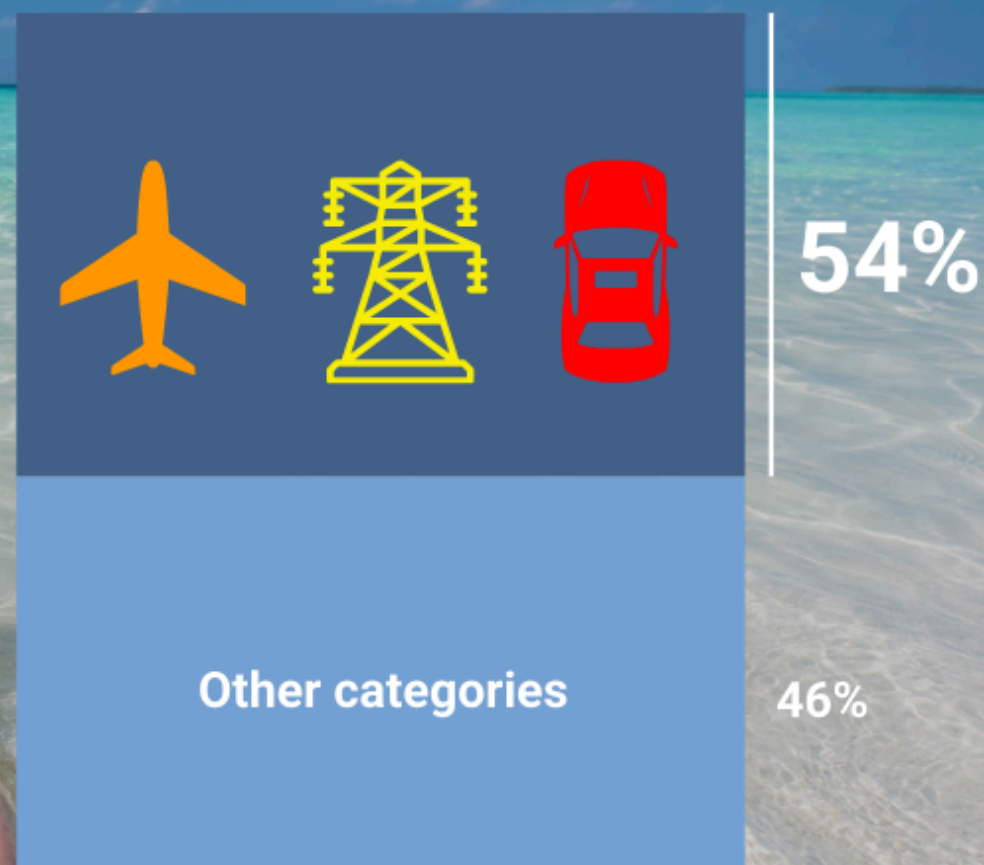


# The hotspots of tourism emissions growth 10 years 2009-2019

## BY COUNTRY



## BY EMISSION SOURCE



tourismemissions.org

Tourism emissions are growing.

Hotspots can be analysed from two perspectives: which countries are most responsible for the growth and which sectors are most contributing to that growth.

From the country perspective, the sheer population size and rapid demand for tourism place the USA, China, and India in the top three. Together, just these three countries alone account for 60% of tourism emissions growth.

The top three sources of emissions come from aviation, utilities, and personal private vehicle use.

Together, they account for 54% of tourism emissions growth.

# An insurmountable challenge for the tourism sector with little progress made

The research team described the challenge facing the tourism sector as “insurmountable” in the absence of significant policy change.

Lead author, Associate Professor Ya-Yen Sun from the University of Queensland said: “The sector is pivotal to global emissions trajectories, but the tourism industry has made **very little progress in reducing emissions**. If this same growth rate is maintained into future years, tourism emissions are expected to double every 20 years, which is **obviously not sustainable**.”

Associate Professor Sun said that sustained high growth emissions **threaten to undermine** the future viability of global tourism. “What this study clearly identifies is that technology efficiency gains and infrastructure improvements offer no chance at all of achieving net zero milestones. The demand growth is outstripping any emission reduction measures currently in place - and the net growth in emissions is massive.”

## Four proven strategies to reduce tourism's carbon footprint

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**Measure** Measure tourism carbon emissions to identify hotspots.
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**Avoid** Avoid excessive tourism development and identify sustainable growth thresholds.
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**Shift** Shift focus on short-haul markets and discourage long-haul aviation.
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**Address** Address inequality between countries by factoring in the social cost of carbon emissions.

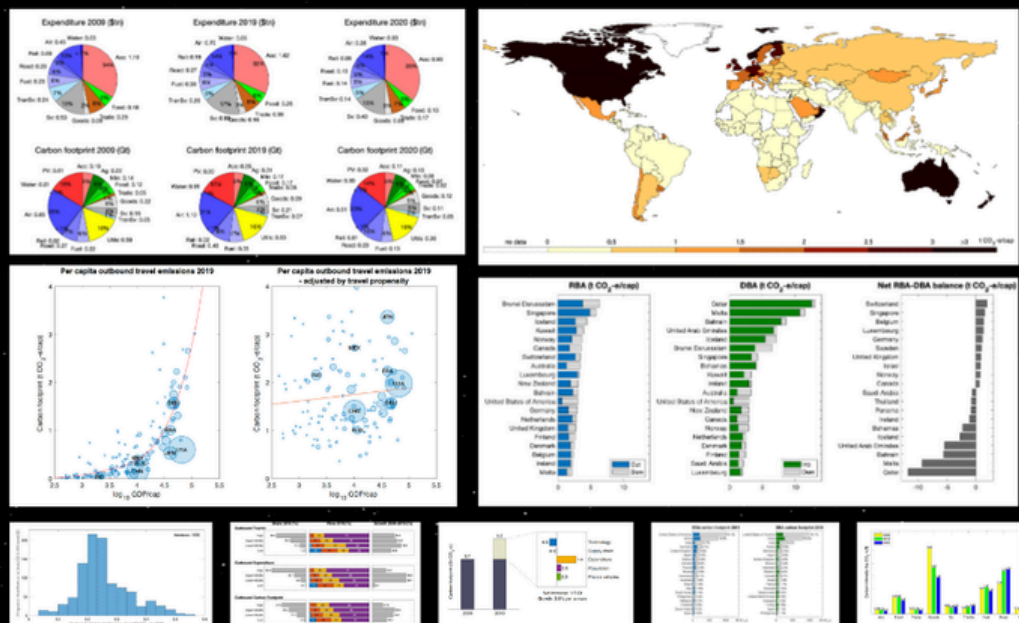
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The research team proposes that national tourism decarbonisation strategies will now require “**demand volume thresholds**” to align global tourism with decarbonisation targets, and that such strategies are “most urgent in the case of the world’s twenty highest-emitting tourism destinations.” They identified that to meet the goals of the Paris Agreement, the sectoral emissions would need to be reduced by **more than 10% annually**, to the year 2050.

Assoc. Prof. Sun says that limiting growth in demand for air travel is the most obvious first step, particularly long haul international travel”. “Focussing on limiting growth in international air travel would also offer a more **socially equitable approach**, which is important in terms of addressing extreme distributional inequalities and the need to transition to a more just and inclusive tourism future.”

## Evidence based policy support

**175**  
Countries  
2009-2020



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The research team is now focussed on working with individual countries and tourism organisations on further data analysis to **inform policy measures and decision making**, as well as on efforts to secure funding for an extension of the study to allow for ongoing monitoring and analysis of tourism emissions globally. Assoc Prof. Sun added “Ultimately, we want to help policymakers and industry leaders to **understand the numbers**, have clarity around the impact of the industry on global emissions, and take appropriate steps to align country tourism emissions with Paris Climate commitments as expressed in Nationally Determined Contributions (NDC).”

**For further information and to read the study in full:  
[tourismemissions.org](https://tourismemissions.org)**

