



TPCC

TOURISM PANEL
ON CLIMATE CHANGE

FOUNDATION
FRAMEWORK

2022

Foreword

We are delighted to present this Foundation document of the TPCC – Tourism Panel on Climate Change – and honoured to have been invited to lead the delivery of this vital initiative.

We are highly appreciative of our academic and tourism colleagues from around the world who have agreed to be a part of this exciting and urgently needed initiative and to contribute their expertise to making TPCC a leading contributor to the Travel & Tourism Sector response to the 'Code Red' Climate Crisis.

Tourism makes an incredibly powerful and positive contribution to human development; however, it is timely to connect fragmented efforts and accelerate cohesive sector climate action for advanced mitigation and adaptation in the decades ahead. TPCC brings together thought leaders from around the world to respond to this clarion call.

Last but by no means least we want to thank the Sustainable Tourism Global Centre and the Kingdom of Saudi Arabia for the foresight in launching this global initiative on Earth Day in 2022, in support of low carbon and climate resilient tourism.

Daniel Scott

Susanne Becken

Geoffrey Lipman

TPCC Executive Board November 2022



VISION

Our vision is a new era of climate resilient global tourism, that is on track to achieve zero emissions by 2050 and is successfully adapting to accelerating impacts of climate change through actions that broadly advance the Sustainable Development Goals.

MISSION

Our mission is to inform and rapidly advance science-based climate action across the global tourism system in support of the goals of the Paris Climate Agreement.

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The ***Sorrento Call to Action: Youth for Sustainable Tourism*** was signed by 57 countries. It calls upon the tourism sector to report 'quantitatively and annually' on progress on sustainability indicators, including emissions.

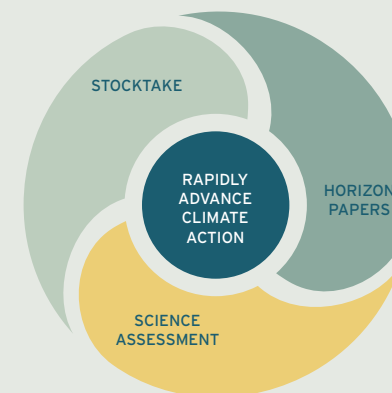
Summary

TPCC: Is an independent science-based network of globally leading tourism and climate experts, supported by the Sustainable Tourism Global Centre, committed to changing the way we think about climate change and tourism and mobilizing knowledge to accelerate climate action in tourism.

VISION: A new era of climate resilient global tourism, that is on track to achieve zero emissions by 2050 and is successfully adapting to accelerating impacts of climate change through actions that broadly advance the Sustainable Development Goals.

MISSION: To inform and rapidly advance science-based climate action across the global tourism system in support of the goals of the Paris Climate Agreement.

ENGAGING EXPERTS: Connecting more than 60 leading experts from over 30 countries and from across academia, business, and civil society, the TPCC represents a new era of collaboration to support science-based tourism climate action in pursuit of the Paris Climate Agreement goals.



TPCC OUTPUTS:

STOCKTAKE 2023: publish an overview of independent open-source indicators that track key connections between climate change and tourism, including progress on sector commitments in support of Paris Climate Agreement goals.

SCIENCE ASSESSMENT 2024: Complete the first synthesis of tourism relevant knowledge in 15 years on emission trends, climate impacts, and options for mitigation and adaptation to support climate resilient tourism development globally, regionally and nationally.

HORIZON PAPERS: Publish leading edge thought pieces on critical issues on the intersect between climate change and tourism mitigation and adaptation.

FOUNDATION STATEMENT: Published at COP 27 November 2022, it sets out TPCC origins, mission, core values, organizational structure, and timelines for its first cycle.

- Stresses the urgent need for intensified sector wide action to meet Paris 1.5C targets, as well as the imperative to adapt to extreme weather disasters and ecosystem change in order to advance a just transition to climate resilient tourism.
- Underscores tourism's incredibly powerful and positive contribution to human development and details why it must respond urgently and collaboratively to evolving climate challenges and opportunities ahead.
- Emphasizes that viable sector wide strategies to accomplish these goals and sector climate action commitments do not yet exist and time is running out.
- Commits to support the collaborative conception, development, and implementation of such positive strategies, through novel data assessment, balanced analysis, and thought-provoking ideas beginning with initial Horizon Papers on decarbonization pathways for air travel and tourism specific climate risk assessment and disclosure guidelines.

TPCC will ensure its network and outputs are:

- Science-based: guided by authoritative science and knowledge and open and transparent peer review.
- Inclusive: of diverse professional expertise and national representation in the respectful exchange of knowledge and mutual learning.
- Reflecting regional characteristics: particularly Least Developed Countries and Small Island States, which are most at risk.
- Solutions-oriented: aligned to priority decision-making needs of tourism stakeholder communities and linked to mainstream societal targets and initiatives.
- Capacity-building: catalyse new collaborations that empower the next generation of scholars and professionals to advance the transition to climate-ready tourism
- Synchronized: linked to delivery cycles of the UNFCCC COP events and IPCC.

Code Red for Climate Resilient Tourism

“**The climate crisis is a code red for humanity.** This assembly, and governments around the world, face a moment of truth. **We need decarbonization now, across every sector in every country.** ... There is one path forward. A 1.5-degree future is the only livable future for humanity.”

– UN Secretary-General Antonio Guterres, 27 October 2021

CLIMATE CRISIS

The IPCC6th Assessment states that all pathways that limit global warming to 1.5°C with no or limited overshoot, and those that limit warming to 2°C involve **rapid and deep** GHG emission reductions in all sectors. It calls for GHG emissions to **peak by 2025, be halved by 2030, and fall to net-zero by 2050⁽¹⁾**.

TOURISM TRANSFORMATION

Climate change will transform tourism destinations, demand patterns, and investment for decades to come⁽²⁾. TPCC brings together tourism thought leaders from around the world to meet this grand challenge and accelerate the evidence-based transition to a **new era of climate resilient tourism**.

DECARBONIZING TOURISM

Tourism contributes between 5–8% to global emissions. An increasing number of organisations are committing to a net-zero target for 2050⁽³⁾. Rapid emission reduction must start now and involve all sub-sectors. An immediate priority is mobility⁽⁴⁾. The difficult to abate aviation sector and tourism implications of decarbonization paths is the focus of a **Horizon Paper** in Appendix 1.

ADAPTING TO CLIMATE RISK

Tourism is a highly climate-exposed system and proactive adaptation is required to manage diverse physical climate risks^(4,5,6,7). Assessing these & responding to these complex climate risks, is the focus of a **Horizon Paper** on evolving climate risk assessment in Appendix 2.

About the TPCC

The TPCC is an **independent science-based international collaboration** supported by the Sustainable Tourism Global Centre (STGC) at least during its Foundation cycle (2022–2024). The TPCC is committed to changing the way we think about tourism and to strengthen the collaboration between the scientific and stakeholder communities to catalyse climate action in line with required emissions reductions pathways (Figure 1). The **core values** of the work by TPCC are:

- **Science-based:** We confront the difficult realities of climate change with the firm belief that solutions should be guided by the best available authoritative science and knowledge.
- **Open and transparent:** We are transparent in our operations⁽⁸⁾ as well as our review processes to ensure an objective and complete stocktake and science assessment that reflects diverse expertise and ensures wide sharing of knowledge and mutual learning.
- **Inclusive:** We believe that partnership and collaboration is crucial to successful and just collective tourism action on climate change. We are committed to diverse disciplinary, professional, and national representation and the respectful exchange of knowledge and experience.
- **Solutions oriented:** Generate and mobilize knowledge and innovation that is clearly aligned to priority decision-making needs identified through meaningful engagement with tourism stakeholder communities⁽⁹⁾.

Projected global GHG emissions from NDCs announced prior to COP26 would make it likely that warming will exceed 1.5°C and also make it harder after 2030 to limit warming to below 2°C.

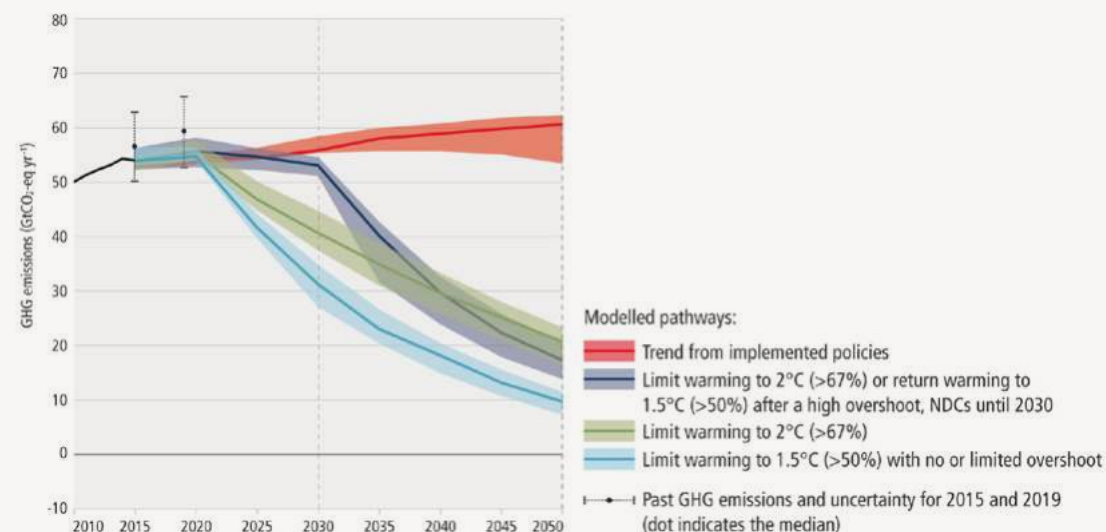


Figure 1: GHG emissions pathway (IPCC, 2021)⁽¹⁾

TPCC Structure

Global leaders emphasize that solutions to climate change cannot be developed in silos⁽¹⁰⁾. The TPCC represents a new era of collaboration to support climate action in tourism. The TPCC has convened over 60 of the world's thought leaders on tourism and climate change from across academia, business, and civil society (Figure 2).

Lead Experts will bring unique and world-leading scientific expertise and knowledge, identify strategic topics and deliver Horizon Briefs. They will also provide input into indicators and data for the Stocktake, as well as undertake analysis and rigorous review to deliver the best-available knowledge through the science assessment. Three quarters (75%) of the top 20 contributors to the climate change and tourism scientific literature⁽¹¹⁾ are part of the TPCC Lead Expert team.

Contributing Experts will identify strategic topics for Horizon Papers, identify indicators and data supporting the Stocktake, and provide rigorous review of the science assessment. Their extensive networks throughout the sector are vital to connect research capacity with decision-makers and their informational needs.

The **Advisory Group** will provide strategic direction and advice for TPCC outputs, including policy engagement and communications.

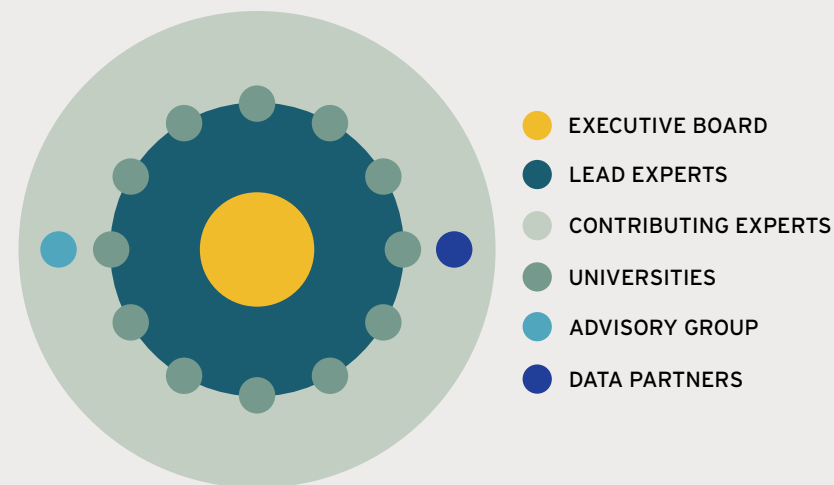


Figure 2: Global network of experts

“ Building tourism resilience requires to maintain and where necessary strengthen, whole of government, multi-stakeholder and multi-level structures for tourism planning and management. ”

– G20 Rome guidelines for the future of tourism, OECD, 2021

TPCC Experts

The TPCC establishes a global network of experts to catalyze collaboration between the scientific community (Figure 3) and tourism stakeholders to identify a strategic research agenda and help rapidly advance climate action.

The TPCC includes diverse experts from 31 countries, representing all IPCC regions and United Nations World Tourism Organization regions. This global collaboration connects the research and experience of multidisciplinary scholars from 35 leading universities as well as professionals from UN Agencies, governments, industry associations and business, destination organizations and civil society organizations. Building capacity among the next generation of scholars and in highly vulnerable tourism regions are also important goals of the TPCC.



Figure 3: Countries represented by TPCC experts

Important differences in climate change knowledge exists across academic, practitioner, and political domains, with information availability, access, and transferability barriers that must be addressed to accelerate climate action across the sector⁽⁸⁾.

TPCC Experts

LEAD EXPERTS

| | |
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| Scott Cohen | University of Surrey, UK |
| Jonathon Day | Purdue University, USA |
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What the TPCC will do

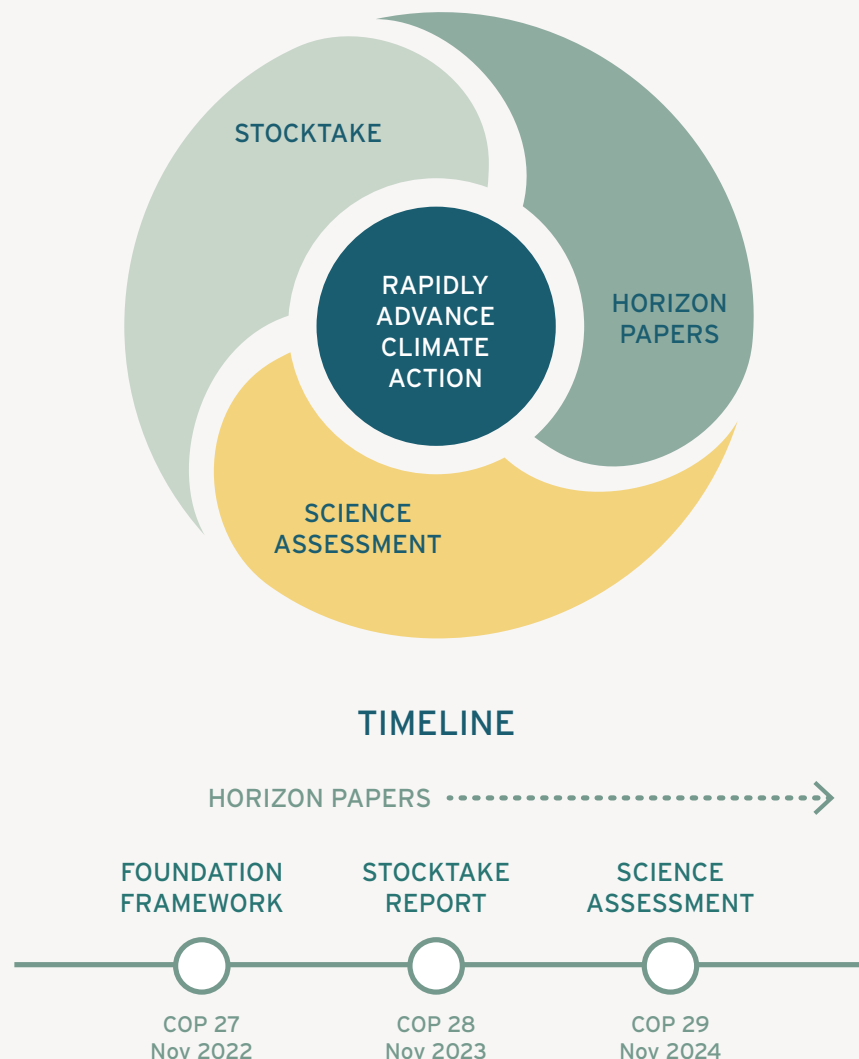


Figure 4: Timeline and outputs

STOCKTAKE REPORT

The TPCC will identify indicators with reliable and open data sources to track important aspects of the relationship between climate change and tourism, including progress on sector commitments in support of Paris Climate Agreement goals. TPCC will publish an update of these metrics every 3 years.

SCIENCE ASSESSMENT

The TPCC will undertake the first comprehensive synthesis in over 15 years, of the current state of tourism relevant knowledge about climate change emission trends, impacts, future risks, plus options for mitigation and adaptation. This assessment will include an open and transparent review process.

HORIZON PAPERS

The TPCC will identify strategic knowledge gaps to meet the sector's Paris Climate Agreement obligations and commission expert reviews or new analysis to support related policy and decision-making. The papers will be stand-alone and reflect the interpretation of science by the authors.

Stocktake 2023

Every five years, countries assess collective progress toward the Paris Agreement's long-term goals. The first Global Stocktake by the UNFCCC is planned for 2023.

In line with this, TPCC will deliver its first "Tourism Stocktake Report" in 2023, assessing progress on mitigation, adaptation and policy⁽¹²⁾ and setting out trackable metrics by country and sub-sector, including:

- Targets set for tourism in relation to Paris 1.5 degrees
- Greenhouse gas emissions (Figure 5)
- Sector-specific policies
- Tourism's representation in National Determined Contributions (NDCs) and other climate policy
- Climate risk assessment, reporting and disclosure
- Financial flows into climate action.

The step of the technical assessment ensures that robust input is secured for a wide range of stakeholders.

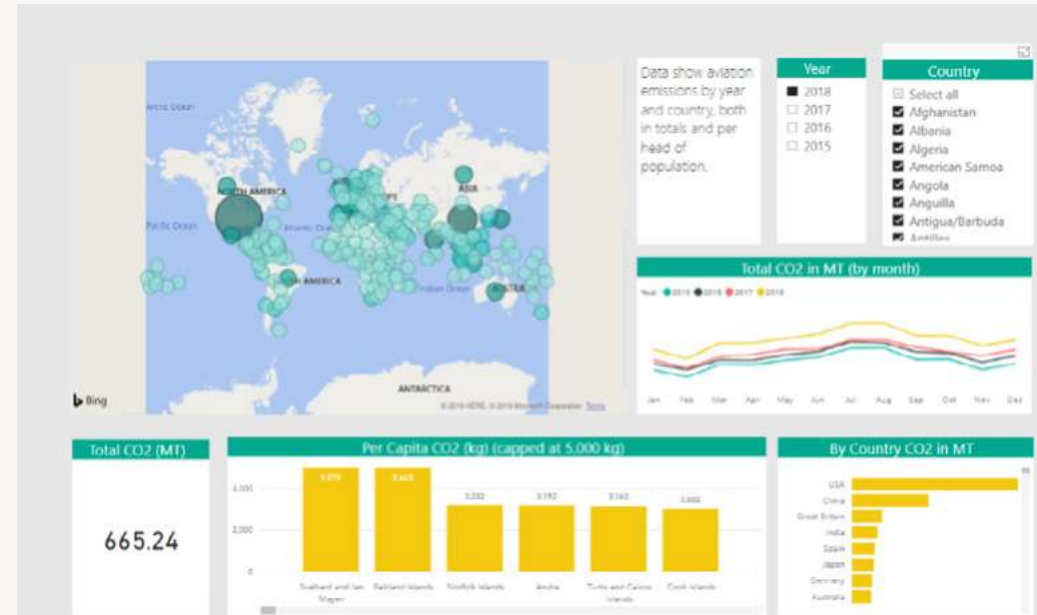


Figure 5: Dashboard of aviation emissions



Science Assessment 2024

The IPCC has the substantial task of providing its 195 member countries with comprehensive scientific information to support the development of climate policies and inform international climate change negotiations. The massive expansion of scientific, technical, and other sources of information on climate change over the last 20 years requires IPCC reports to adopt very strict page limits, constraining content on many themes and sectors. Despite the available scientific literature on climate change and tourism expanding by a factor of five between 2010 and 2020, tourism content in the IPCC 4th, 5th, and 6th Assessments has declined, as measured by number of tourism mentions per published page (Figure 6).

TPCC has assembled over 60 global thought leaders to undertake a science assessment to provide tourism sector and relevant non-tourism policy and decision-makers with a clear view of the current state of knowledge relevant to climate change and tourism. The 2024 TPCC science assessment will replace the highly cited 2007 science assessment, provided as the scientific background to the Davos Declaration on Tourism and Climate Change, when less than 5% of the current climate change and tourism scientific literature was available⁽¹¹⁾.

The scope and focal themes of the science assessment will be refined by the Lead and Contribution Experts in 2022. It will also benefit from non-academic work by leading organizations⁽¹³⁾. Writing teams will be organized in early 2023, with a draft report open to peer and stakeholder review in spring 2024.

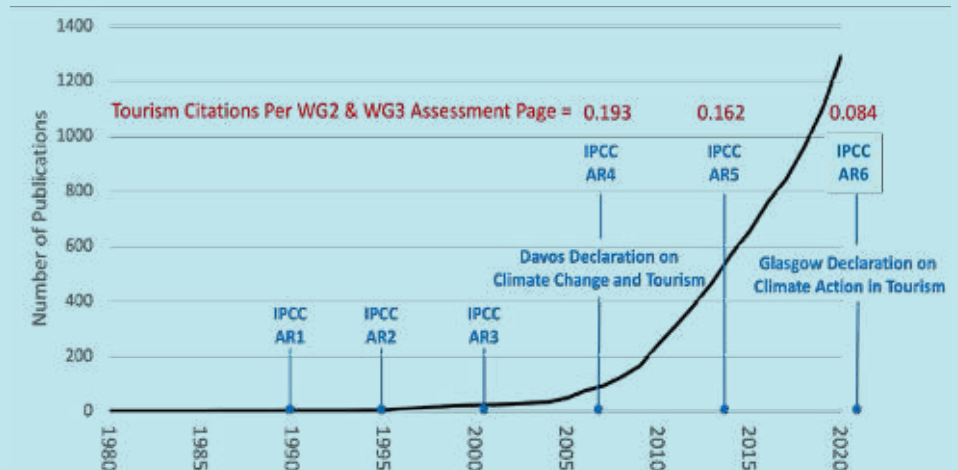


Figure 6: Development of tourism and climate change scientific literature

Horizon Papers

The TPCC will commission occasional critical reviews or new research into pivotal issues relevant to the sector's ability to meet its Paris Climate Agreement obligations. Lead and Contributing Experts will utilize their extensive networks to identify strategic knowledge gaps and undertake these analyses. The first two Horizon Papers were commissioned as part of this Foundation document to initiate dialogue on two strategic elements of climate action in the tourism system.

Aviation is the largest source of tourism emissions and a core decarbonization challenge for travel and tourism⁽¹⁴⁾. Multiple decarbonization pathways have been put forward and Chris Lyle, International Aviation Policy Consultant, has critically compared these diverse strategies and asked important questions about their differential implications for global tourism.

The geography of climate change risk for tourism is very uneven (see Figure 7⁽¹⁵⁾), for example with considerable impacts in coastal areas⁽¹⁶⁾, with visible implications for climate justice. Understanding the complex interactions of physical climate and carbon risks at a destination and how to use this information to fulfil evolving risk disclosure requirements and response, is the subject of the second Horizon Paper by Dr. Bijan Khazai, founder of the company Risklayer.

The summaries are at the end of this Foundation document, with links to the full briefs on the TPCC website www.tpcc.info.



Aviation represents approximately 3% of global GHG emissions today, but as other sectors move to decarbonize more quickly that could rise dramatically by 2050 absent strong responsive action.

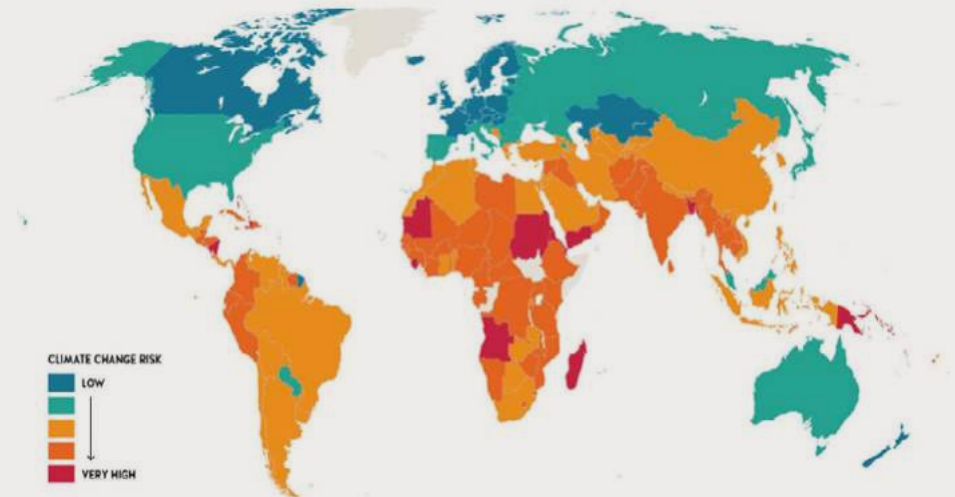


Figure 7: Global climate change risk to tourism

New Capacity for a Code Red Response

In its 6th Assessment Reports, IPCC (2021, 2022) has emphasized that the scale of recent changes in the climate system are ‘unprecedented over many centuries to many thousands of years’, with the risks ‘becoming increasingly complex and more difficult to manage’ as they interact and ‘cascade across sectors and regions.’ The case for urgent climate action has never been stronger or more stark.

The global transition to net zero emissions and the disruptive consequences of accelerating changes in climate will transform tourism in the years ahead. There can be no sustainable tourism if we fail on climate change. The TPCC represents an international response to shape the future of tourism with new knowledge and a legacy of new capacity to empower an accelerated transition to climate compatible tourism.

“The travel and tourism sector, with its significant economic and social benefits, has **no choice but to transform** to survive and thrive in the face of climate change.”

– UN Climate Change Executive Secretary Patricia Espinosa (2019)

“Climate action needs a dramatic step-up if we are to have a shot at limiting global temperature rise to 1.5 C. The travel and tourism sector has a big stake in decarbonization because a destroyed planet serves no one’s purpose. The sector has less than 10 years to accelerate the transition to low-carbon and circular business solutions; to create new opportunities in energy generation and halve transport emissions by 2030; and to integrate nature-based solutions into their operations.”

Inger Andersen, Executive Director, UNEP



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Photo credits

Cover page: (upper left) W. Bulach, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons (lower right) Forest fires are approaching a tourist resort (Source: Shutterstock), (lower left) Warming winters reduce the viability of ski fields (Source: Daniel Scott), (centre) Resorts can lower their carbon footprint by investing into renewable energy, especially in remote locations (Source: Shutterstock), (upper right) High speed rail travel will provide a suitable alternative to short-haul flights in many destinations (Source: Shutterstock).

Page 2: The public is demanding more action on climate change (Source: Shutterstock)

Page 3: Youth climate protests (Source: Susanne Becken)

Page 12: Climate summit held by the UNFCCC (photo: creative commons unfccc_cop26_31oct21_openingplenary_kiaraworth-28)

Page 14: The majority of international arrivals are by air, but much of domestic tourism uses land-based transport (Source: Susanne Becken)

Page 15: The Svart energy positive hotel in Norway showcases a wide range of innovations to support low carbon tourism (Source: provided by Ivaylo Lefterov)

Appendix 1 - Aviation Horizon Paper

BY: CHRIS LYLE, SUMMARY*

Aviation emissions are the Achilles' Heel of tourism, particularly as far as international tourism is concerned. Some 40% of the greenhouse gas emissions from tourism are generated by the air transport component, rising to 60% for international tourism. Air transport is particularly difficult to decarbonize, certainly in the near term, because it presently has a negligible volume of potential alternatives to fossil fueled power. And the average lifetime of jet aircraft coming into commercial service is some 25 years, with many remaining in operation much longer.

The scientific consensus is that if air transport is to make its requisite contribution to the Paris Agreement targets, its CO2 emissions would have to be reduced by 2030 to at least half 2019 levels and by 2050 to zero (not any "net" zero which includes out-of-sector carbon offsetting, capture and storage).

As concern regarding aviation emissions has moved into the mainstream, governments and industry have got the message, and a wide variety of mitigation measures have recently been taken or are being considered. In the past two years there have been a number of studies assessing in detail the relative feasibility and respective contribution of such measures in terms of their prospects and practicability, impact (notably in relation to reduction in full life-cycle emissions), timing and cost.

This TPCC "Horizon Paper" stocktaking exercise considers and compares outcomes of some of these studies and draws conclusions as to ways forward for air transport in the context of tourism. The focus is on globally applicable reports from governments (International Civil Aviation Organization, ICAO), industry (International Air Transport Association, Air Transport Action Group and "Mission Possible" of the Energy Transitions Commission), civil society (International Council on Clean Transportation) and energy (International Energy Agency) but a range of other studies with specific or regional emphasis were also reviewed.

***For full paper see www.tpcc.info**

CONCLUSIONS FROM AVIATION STUDIES

- There is no “silver bullet”, all avenues should be explored
- Improvements in technology and operations will continue to be exceeded by growth in traffic – the game-changing driver will be new aircraft power sources
- Electric (battery at very short haul. and hydrogen fuel cell) and hybrid electric aircraft will make some contribution, initially at shorter distances and with limited capacity
- Hydrogen powered aircraft (pressurized gas and liquid) could become a major factor but face widespread challenges including airframe redesign and the need for new delivery and fueling infrastructure, and they would have a limited global contribution in the 2050 timeframe
- Sustainable Aviation Fuels (SAF) are promising and are already available on a “drop-in” basis for existing aircraft, but they require major scaling up and pricing down, with concerns regarding some of their feedstocks, the potential available volume of supply of raw materials, their full life-cycle impact including land use, and the realities of emissions reduction over kerosene
- Synthetic e-fuels, a form of SAF which does not just reduce but eliminates greenhouse gas emissions from a flight, are negligible in present volume, requiring even more scaling up and pricing down, and notably massive “green” high energy generation sourcing, but they may ultimately have substantial potential
- Out-of-sector measures such as emissions trading and carbon offsetting form part of every scenario to a greater or lesser extent, particularly for the coming decade, and carbon capture is propounded as significant for the long term both as an offset and potentially for conversion to SAF
- Many carbon offsetting mechanisms are of questionable quality and effectiveness and ICAO’s CORSIA Scheme, while incorporating meaningful sustainability criteria, has limited goals and scope of application.

PATHS FORWARD

- Target definitions such as 'carbon neutral', 'zero carbon', 'zero emissions' and 'carbon net zero' need to be clearly specified and consistently applied
- "Visions" or "aspirational goals" for 2050 are meaningless unless they are supported by substantive intermediate waypoints – in this regard airlines should make every effort to become accredited to the Science Based Target initiative
- Non-CO2 emissions and contrails must be fully addressed in relation to each power source
- There is a critical need to transition away from out-of-sector carbon offsetting towards in-sector emissions reduction
- Every opportunity should be taken to promote, develop and apply high grade and certified life-cycle reduction SAF at the greatest number of locations worldwide
- Research is required into traveler changes of behaviour in the light of factors such as the Covid-19 pandemic, response to "overtourism" and climate change considerations
- Carbon labeling of air travel using high quality and consistent standards should be encouraged and where possible identified as a proportional contribution to an individual's total travel and tourism excursion (and ideally to their total personal annual emissions)
- Potential fiscal measures are available and should be widely explored, notably where revenues might be earmarked for aviation emissions reduction activity
- Demand management tools should also be explored, in such a way as to minimize their economic and social impact
- Governments should include international aviation in their Nationally Determined Contributions under the Paris Agreement
- In evolving tourism models industry and destinations should integrate international aviation emissions into assessments and actions to mitigate climate change, notably in relation to evaluation of originating markets
- Better mechanisms are required for determining and realizing national interest and defining essential air services, notably for Least Developed and Landlocked Developing Countries and Small Island Developing States dependent on-air transport for their tourism sectors, in weighing up the benefits and costs of aviation-dependent tourism to their countries.

The bottom line is that the tourism sector needs to get much more directly involved in decarbonization of aviation, and particularly international aviation, and to address ways forward against the risk of the industry becoming a distressed asset. On aviation emissions mitigation the world is already close to "too little, too late". Rethinking of policy and action is required as a matter of urgency.

Appendix 2: The imperative of advancing climate risk assessment

BY: BIJAN KHAZAI

In its Sixth Assessment, the Intergovernmental Panel on Climate Change puts forth evidence of the unequivocal disruption of the global climate system and the pervasive consequences for life and societies around the globe. With each passing year accumulating destination experience and scientific evidence reveals how the tourism sector is **already being impacted** by the early onset changes in climate, including major heatwaves, drought and wildfires, and landscape and ecosystem changes. The new realities of climate change are influencing tourism investment, planning, operations, and demand. Importantly, what we are currently witnessing is but the **tip of the iceberg** versus the impacts anticipated in the decades ahead.

In response, hundreds of tourism companies and organisations endorsed the Tourism Declares a Climate Emergency initiative in 2020. The 2021 *Glasgow Declaration: A Commitment to a Decade of Tourism Climate Action*, WTTC's 2022 *Enhancing Resilience* initiative, and the Nationally Determined Contributions of several countries similarly warn of the critical threat and the **imperative of advancing climate resilient tourism development**. Collective action is not possible without a robust information base. The need to develop innovative tourism **sector specific climate risk assessment methods** and decision support tools has been emphasized by leading experts for years. The complexity of doing so should not be underestimated, nor should the urgency to do so as regulatory and market pressures progress.

Trends and evolving guidance and standards for climate risk assessment and disclosure in financial markets have important potential to inform and influence climate risk assessment practice in travel and tourism. Chief among these are the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), which was established in 2017 at the request of G20 countries to identify information to properly analyze and transparently disclose climate-related risks and opportunities to financial markets and stakeholders. TCFD recommendations have been widely endorsed by policymakers, investor groups, NGOs, and businesses, with G20 nations committing to integrate climate change risk disclosure requirements into domestic regulatory frameworks.

This TPCC Horizon paper reviews how TCFD recommendations are being interpreted and implemented, alongside the scope of information requirements the tourism sector should anticipate by the mid-2020s. The suitability of mainstream climate risk assessment decision support tools for application in tourism is examined. Finding them largely ill-suited to travel and tourism, criteria for decision support tools well suited to destination/company/asset scale are outlined. Finally, a pilot of *Risklayer's* "Hotel Resilient" climate-related financial risk disclosure tool to implement the TCFD recommendations for the accommodations sector is introduced.

***Summary – Full paper at www.tpcc.info**

KEY MESSAGES FROM THE REVIEW

- **Competitiveness:** The direct and indirect impacts of accelerating climate change and extensive policy responses will transform the competitiveness and sustainability of tourism at many destinations. Climate change will represent a headwind for tourism growth in these regions, one that is not well understood or being considered in tourism projections.
- **Magnitude of impact:** The extent of impacts on tourism is highly dependent on the future of emission. Broadly, climate change risk is projected to be highest in regions where the largest growth in tourism is projected into the 2030s.
- **Compounding risks:** There remains an important need to better understand the multiple and interacting risks at the destination scale, including more insight into their distributional aspects. However, everyone in the tourism system will need to adapt.
- **Lack of information:** The lack of destination specific information on climate change impacts and implications of policy responses represents an important barrier to climate action.
- **Capacity:** Understanding of the capacity of current adaptations to successfully cope with future climate change, their co-benefits, and the limits of adaptation throughout the tourism system scale remains very limited. Enhancing practical research is essential.
- **Stakeholders:** An increasing number of investors and stakeholders are asking tourism organisations about the implications of climate change for their long-term performance. Strengthened collaborations amongst all tourism actors is crucial.

PATHS FORWARD

There is much to gain through consideration of the TCFD recommendations by the sector. Destinations, companies, and governments stand to benefit from gaining a better understanding of the potential operational, financial, reputational implications associated with different climate futures. This will result in improved strategic planning, including the development of evidence-based risk management plans and investment-capital allocation strategies, to pursue climate resilient development. Nonetheless, our review of available climate risk assessment tools to tourism found several important **challenges**:

- **Level of Complexity:** the TCFD recommendations are highly technical and even large organizations lack the necessary expertise to carry out the analysis and apply the outputs of sophisticated climate change models and scenario analysis within the organization
- **Climate risk metrics:** producing reliable impact and financial loss metrics at the asset scale (i.e., destination or hotel) is unrealistic with many tools; many do not have the flexibility to incorporate indicators more meaningful for tourism applications
- **Spatial resolution:** The lowest modelable component in the risk modelling process determines the accuracy and usefulness of the final risk output, and many lack sufficient resolution to examine destinations or tourism assets
- **Resource requirements:** tourism companies typically do not have the human resource expertise and data for getting started into the TCFD process
- **Costs:** climate risk assessment model licenses or service fees are typically beyond the budget of smaller DMOs and tourism companies.

For greater uptake of TCFD guidance in tourism, the following **principles** should be considered for the development of decision support tools tailored to travel and tourism:

- Relevant: Metrics and targets are decision-relevant to tourism business operations and understandable to investors.
- Customized: risk management processes must be customizable to the functional and operational context of tourism businesses.
- Structured and Comprehensive: Disclosures should be consistent and consider climate risk and opportunities in a systematic and comprehensive way.
- Simple and Affordable: Tourism businesses should be guided in implementing the TCFD recommendations in an easy and cost-effective manner.
- Best Available Information: Tourism businesses must take action with the best available data that supports prioritizing different climate strategies.
- Continual Improvement: Disclosures must be iterative and anticipatory with the aim for organizations to continually improve their disclosures.

Diverse tools will be needed and both governments and industry associations play a key role in supporting the smaller to medium sized businesses with tourism-relevant information. In the detailed report, we introduce one climate impact assessment tool that has incorporated these principles and is tailored specifically to hotels and resorts. *Risklayer* has developed the “Hotel Resilient” framework for financial climate-related risk disclosures which is a 5-step process for hotels and resorts to conduct a climate risk assessment, including direct impacts (e.g., asset replacement costs) and indirect

impacts (e.g., business disruption). The framework is implemented through a software-supported tool which guides accommodation companies, including smaller independent hotels, through the process of completing their customized report suitable for TCFD-compliant climate-related risk disclosure.

The evolving realities of unavoidable and accelerating impacts of climate change will shape the future of tourism. Everything we do as a sector going forward is going to increasingly need to pass a climate stress test. Yet, we have limited understanding of these multi-faceted climate risks or the tools to develop that understanding. A level of collaboration and investment by the tourism community that is commensurate with our collective risk is needed to rapidly develop decision support tools to assess, monitor, and inform adaptation to physical climate risks.

Contact TPCC

The TPCC welcomes collaboration with all tourism stakeholders to accelerate the low carbon transition and advance climate resilient tourism development.

If you have questions about the TPCC or interests in our Horizon Paper series, Stocktake or Science Assessment, please contact us at:

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🌐 www.tpcc.info

The TPCC website launches in November 2022 during COP 27 in Sharm el Sheikh, Egypt.

It will be the principle point of information on TPCC and for contacting the Executive.

It houses the TPCC Dashboard with access to our synthesized data on climate resilience and GHG reduction.

It also allows downloads of our Foundation and the Horizon Papers on Climate Resilience and Aviation.

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