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Proving the Case: Carbon Reporting in Travel and Tourism

Title:

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Foreword by Amadeus

The concern over human-related emissions and their impact on global temperatures has only increased over the last 25 years. Since the celebration of the Earth Summit in Rio de Janeiro in 1992, until the recent Conference of the Parties last December in Paris, climate change has become one of the most widely discussed topics at international summits and negotiations.

The challenge of reducing emissions to levels that would limit temperature increases to acceptable levels is immense, especially considering the numerous human activities that currently produce emissions. Climate change is therefore global by definition, and thus requires a global approach. The Travel and Tourism industry is also international by nature, and this facilitates interaction among all its stakeholders. We believe that addressing climate change in the Travel and Tourism industry requires all those involved in this sector to work toward reducing emissions, both on an individual basis as well as in cooperation with peers. Both options are necessary, and none of the two is sufficient by itself.

An important – in fact necessary – element of the successful joint work in the industry is the capacity to measure greenhouse gas emissions in a consistent and transparent manner so that areas for improvement can be identified and all stakeholders can benefit from the best practices of industry leaders. At the same time, a common understanding of emission levels helps to determine which stage of the fight against climate change we are in, as well as establish the right level of commitment for each player.

At Amadeus we are delighted to work with the Griffith Institute for Tourism at Griffith University to gain a better insight into the different frameworks, reporting standards, commitments and performance of industry stakeholders, so that we can share a common interpretation of the current situation and work toward common industry goals. Griffith University is well positioned to provide a thorough analysis and diagnosis of the situation in our industry when it comes to the reporting of carbon emissions, and this forms an excellent point of reference to consider when making decisions related to measures that help mitigate climate change in the Travel and Tourism industry.

This White Paper intends to provide visibility on the current situation regarding carbon emissions measurement in the Travel and Tourism industry, as well as identify gaps and recommended next steps to progress much needed measures in reducing the industry's contribution to climate change.

We look forward to making our contribution against climate change and to working closely with Griffith University and other stakeholders toward the common goal of a sustainable Travel and Tourism industry.

Svend O. Leirvaag
Vice President, Industry Affairs
Amadeus IT Group

Foreword by Griffith University

The "Paris Agreement", the key outcome of the 21st meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change, sets out an ambitious greenhouse gas emissions reduction pathway. The long-term goal of containing average warming well below the 2 degrees Celsius limit, demands substantial reductions in anthropogenic carbon dioxide emissions. It also demands global commitment and collaboration.

We know that travel and tourism contribute to climate change, and operating in Australia we are all too aware that long-haul travel in particular poses significant challenges. However, the global travel and tourism sector is highly committed and has set itself ambitious targets for reducing emissions. Setting bold, yet realistic, targets that also take into consideration differentiated responsibilities and tourism's potential to deliver major development benefits, relies on credible data.

This White Paper is important because it synthesises the 'state-of-play' of where the travel and tourism sector is in terms of monitoring their carbon emissions. The summary of mandatory reporting legislation around the world, combined with stock market initiatives and customer demand, make it clear that measuring emissions and reducing them will become the 'new normal' – with many tourism companies already showing great leadership.

Griffith University has a strong commitment to reduce the environmental impact of its 43,000 students and 4,000 staff. Minimising our carbon footprint is an integral part of our Sustainability Policy. As a University of Influence, we like to contribute to change more broadly, and our research is designed to help transform economies towards more sustainable practices. Making a difference through our research is a key priority.

We welcome our partnership with Amadeus, because we see Amadeus as a leader in the travel and tourism industry that – through its unique position at the interface of IT technology and travel – has the potential to use advances of the digital age to the benefit of achieving more sustainable ways of 'doing business' in tourism. Working with Amadeus ensures that research and critical thinking reach a wide range of decision makers and research users.

The White Paper is a first step in a journey to combine research, data mining, and innovation to achieve the much needed change of decarbonising travel and tourism for the long-term sustainability of the sector. We are looking forward to more discussion on this and future collaboration.

Ned Pankhurst
Senior Deputy Vice Chancellor
Griffith University

Executive summary

The measurement, reporting and disclosure of greenhouse gas emissions are becoming more mainstream, especially among larger corporations, followed by smaller operators. Major initiatives originate from both the public and private sectors, indicating widespread recognition of the need to address climate change. Several global reporting frameworks and standards for carbon reporting exist, and compatibility of measurement and accounting between them is improving to facilitate greater uptake.

The benefits of carbon reporting are widely known, and include reduced operational costs, enhanced brand value and better risk management. There is evidence that an increasing number of Travel and Tourism companies are engaging in environmental and carbon reporting. However, considering the size of the sector and its annual growth rates, reporting levels are still comparatively low, and quality is often insufficient. This is particularly so for the measurement of indirect emissions, which can be substantial.

It is expected that, in response to increasing pressure from external stakeholders, as well as mandatory reporting requirements, more Travel and Tourism companies will follow the lead of a growing number of highly committed frontrunners. Third-party verification of emissions has become more central, either as part of compliance or to avoid external criticism, including from travellers. The participation of Travel and Tourism in global reporting is particularly important, considering increasing information on the carbon intensity of travel and the significant contribution of tourism emissions to national and global inventories.

A range of tourism-specific tools are already available to assist companies in their reporting efforts. Several tools also assist in the development of climate change mitigation initiatives. Providing evidence of sustainable practices is beneficial, considering that a large proportion of travellers are aware of climate change and the impacts of travel, although detailed knowledge is often lacking. It has been argued that carbon calculators are an important (educational) tool to provide information to travellers. While there are several tourism-specific carbon calculators, comparative research has found that they often lack consistency and transparency, possibly leading to confusion among users.

Research is inconclusive regarding individuals' propensity to reduce emissions or to purchase 'carbon offsets'. Empirical evidence suggests that an uptake of offsetting options is in the lower single-digit percentage of travellers. These are motivated by their knowledge about negative impacts, pro-environmental attitudes, self-image and social norms. Some companies directly offer offsetting to their customers, but the value of such initiatives has not been evaluated. Participation in carbon offsetting schemes could be enhanced by integrating offsetting with booking at the time of purchase. A transparent and consistent approach to calculating and selling offsets should be part of such a scheme, as it enhances both credibility and convenience – key aspects in travellers' decision making.

In conclusion, a combination of industry leadership on reporting, disclosure and reduction, along with an enabling policy environment (including mandatory schemes), is needed to accelerate progress toward reducing greenhouse gas (GHG) emissions from the Travel and Tourism sector. Customer support for low-carbon products exists, but greater pressure from the travelling public is currently limited due to a combination of lack of willingness to change behaviour, incomplete knowledge about impacts and a lack of readily available and easy-to-understand options.

1. Introduction

1.1 Global context

Following the United Nations Climate Change Conference (COP21) in Paris from 30 November to 12 December 2015 and the signing by 177 nations of the Paris Agreement on 22 April 2016 in New York, the momentum for climate change action is growing. Following the signing ceremony, governments need to formally ratify the agreement. The Paris Agreement goes into effect when a minimum of 55 countries representing at least 55% of global emissions formally join. The deal sets out an ambitious emissions reduction path with a peak of anthropogenic greenhouse gas (GHG) emissions as soon as possible, and net zero emissions by mid-century. These rapid reductions are required to achieve the long-term goal of containing average warming well below the 2 degrees Celsius limit, with an aspirational target closer to 1.5 degrees Celsius. The pathway envisaged for global GHG reductions over the next decades has major implications for Travel and Tourism (Cames et al., 2015).

The Paris Agreement, in contrast with what can be considered its precedent agreement, the Kyoto Protocol, does not follow the approach of setting initial specific emissions targets per country. Setting binding targets has proven to make it more difficult for countries to ratify the agreement, and also to adapt to the changing conditions that influence emissions, like divergent economic growth by geographic area or political instability. Importantly, the Paris Agreement defines a long-term goal to which all parties need to contribute. The differentiation between developing and developed countries is lifted, and all countries have to put forward their best efforts through 'Nationally Determined Contributions'.

A key element of the Paris Agreement is that it demands greater transparency and accuracy in emission reporting (UNFCCC, 2015). It requests countries to convene every five years from 2023 onward to report on their performance in reducing emissions compared with their commitments. The reports will be based on a universal accounting system and made publicly available. This mirrors a trend in the private sector, where sustainability reporting (including carbon dioxide (CO_2) or carbon reporting) is becoming imperative for leading companies, and where sectors are increasingly required to develop emission standards and targets. The International Civil Aviation Organization's (ICAO) recent announcement about a CO_2 efficiency standard for commercial aircraft is a prominent example of this trend.

Carbon reporting and reductions are closely linked to carbon markets, which have gained more prominence following a milestone initiative by the World Bank, the International Monetary Fund and other organisations launched in 2015. The Carbon Pricing Leadership Coalition brings together heads of government, private sector leaders and other key players who support and develop carbon pricing policies with the aim of maintaining competitiveness, creating new jobs, fostering innovation and achieving reductions in GHG emissions. Carbon pricing will steer consumer purchase behaviour toward low-carbon options, supporting movements of greater environmental awareness and demand for more sustainable products.

1.2 Country or sector approach?

The enforcement of GHG emissions reductions can be achieved in an efficient manner using legal instruments at local, regional or national level. This is evidenced by more and more governments developing carbon policies. However, for economic sectors that are international in nature, such as maritime, air transport or tourism, the implementation poses difficulties, as national policies effectively distort markets, with several undesired effects. Global companies, for example, may factor in costs of environmental compliance and be attracted to regions with lower environmental legislative standards, leading to poor environmental outcomes.

The inclusion of international aviation in the European Union Emissions Trading Scheme (EU ETS) in 2012, for example, raised sovereignty and commercial issues and, arguably, created substantial political confrontation, possibly at the cost of achieving environmental outcomes. The attempt to include international flights into the EU ETS clearly highlighted the need for a global agreement bringing together all members of the sector to work together on a joint solution. Considering the agreed urgency of reducing emissions rapidly, further delays in implementing such a global mechanism must be avoided.

For Travel and Tourism, a sectoral approach seems valuable, in particular for those subsectors that are firmly embedded in the global market, such as airlines, cruise ship companies and international hotel chains. Smaller tourism businesses that operate locally are likely to be subjected to, and covered by, national frameworks and policies. But even those small companies operate in the global context of tourism, and are as a result exposed to rising standards of environmental reporting, performance and customer expectations. For this reason of international exposure, tourism companies may well play a leadership role in their respective economies in advancing practices of carbon reporting and, even more importantly, decarbonising operations.

The consideration of sector-based approaches facilitates the development of agreed and meaningful metrics for comparison – for example, total CO_2 emission per annum by an airline and CO_2 emissions per passenger-kilometre as a measure of efficiency. Such globally accepted measures would then remain independent of other country-specific parameters, such as population size, economic performance, development status and trajectory, which are often used to moderate performance assessments. While important in national negotiations, discussions around these moderating factors open doors for 'bargaining' on the grounds of common but differentiated responsibilities,[1] ultimately leading to delays in climate action.

Figure 1 highlights the challenge of assigning equal responsibilities for the top five emitting countries in the word. China's emissions, for example, are almost double those of the US, but per capita are less than half of those of the US. Further, Japan and Russia's populations are similar, but Japan's emissions are 30% lower than Russia's and its GDP is two and a half times larger than Russia's. Russia and India's GDPs are similar, but emissions per capita are seven times higher in Russia. Clearly, for some sectors a global approach may offer greater potential for effective climate policy, although national context and interests (e.g. in particular in the aviation sector) are always likely to shape discussions.

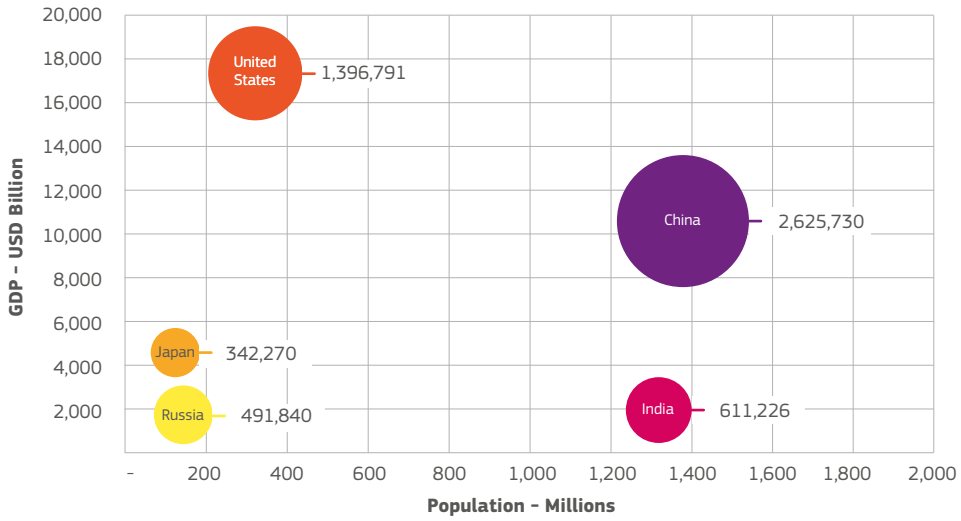


Figure 1 Carbon emissions (thousand t of C), population and GDP of top five emitting countries. Sources: United Nations Department of Economic and Social Affairs, Population Division (2015); World Bank (2014); Carbon Dioxide Information Analysis Center (no date).

[1] Common but differentiated responsibilities is a principle within the United Nations Framework Convention on Climate Change (UNFCCC) that acknowledges the different capabilities and differing responsibilities of individual countries in addressing climate change, given their different degrees of economic development and historic levels of greenhouse gas emissions.

1.3 How engaged is the Travel and Tourism sector?

It has been noted by several commentators that the Travel and Tourism sector lags behind in environmental reporting compared with other sectors (WTTC, 2015), and remains somewhat 'quiet on climate change issues' (Smith, 2015). However, a growing number of Travel and Tourism companies are recognising the benefits of measuring and reporting GHG emissions. As a result, certain tourism companies are beginning to feature among the global leaders both in terms of carbon reporting and emission reduction performance.

The World Travel and Tourism Council (WTTC) (2015) suggests that the sector has now entered a third phase of reporting, following early beginnings of philanthropic initiatives in the 1980s, and limited reporting by a few leaders in the 2000s. This third phase, so the WTTC suggests, is characterised by 'everyone reporting' an integration of environmental and social indicators with core business strategies and increased transparency. Considerable progress is necessary if the sector is to meet its target of a 50% reduction in carbon emissions by 2035, compared with 2005 (WTTC, 2016).

While the practice of Environment, Social and Governance (ESG) reporting is becoming more widespread, quality and transparency need to be increased. Several studies have investigated relevant subsectors, including the airline, cruise ship and hotel industries. Both Grosbois (2014) and Bonilla-Priego et al. (2014) found that the reporting standard in the cruise ship industry is modest and requires considerable improvement, especially in relation to reporting actual performance. Similar findings were found for reporting by airlines, although progress seemed somewhat more advanced (Coles et al. 2014; Cowper-Smith & Grosbois, 2011). Further, a study of 150 of the largest hotel groups showed that while 109 companies provided some information on Corporate Social Responsibility (CSR) activities on their English-language websites, the level of detail and commitment varied considerably (Grosbois, 2012). The same study showed that only a small number of hotel groups reported on reducing energy use (42 hotel groups) and minimising carbon emissions (27 hotel groups).

Transparency, consistency and the need for external verification are critical, and not yet prevalent in the Tourism and Travel sector. Examples of success stories, as reported in the recent WTTC (2016) 'Connecting Global Climate Action' document, are useful in illustrating potential for changes. However, information provided in such publications is often insufficient to support or reject claims made on whether the sector is on course to meet its defined reduction targets. It will be very difficult to measure and verify emissions of the Travel and Tourism sector beyond individual companies, but more prevalent reporting will facilitate such tracking.

1.4 Purpose of this White Paper

This White Paper is written on the premise that increased ESG reporting, and in particular carbon reporting, brings substantial benefits for Travel and Tourism companies. These include direct benefits in terms of cost and risk management, but also relate to compliance, stakeholder pressure and brand management. The need for verified and credible information on GHG emissions is increasing, with pressure coming from a wide range of interest groups (see circles in Figure 2), including local communities, philanthropic groups and non-governmental organisations. Different groups have different information needs, but the common denominator is a call for action and discontent with 'greenwashing'.

Thus, the purpose of this White Paper is to assess the progress of the Travel and Tourism industry on its carbon reporting and management journey. The paper has the following objectives:

1. To provide an overview of the carbon reporting frameworks and mechanisms that are applicable and used by Travel and Tourism companies.
2. To illustrate private sector interests in and needs for carbon accounting, as well as identify challenges and gaps.
3. To examine the changing landscape of government legislation, in particular on mandatory carbon reporting.
4. To synthesise research on tourist demand for carbon information, offsetting behaviour and decision-making tools provided by industry to their customers.
5. To summarise the current state of affairs regarding overall knowledge of Travel and Tourism-related emissions and to identify critical missing information to improve reporting and the management of carbon emissions.

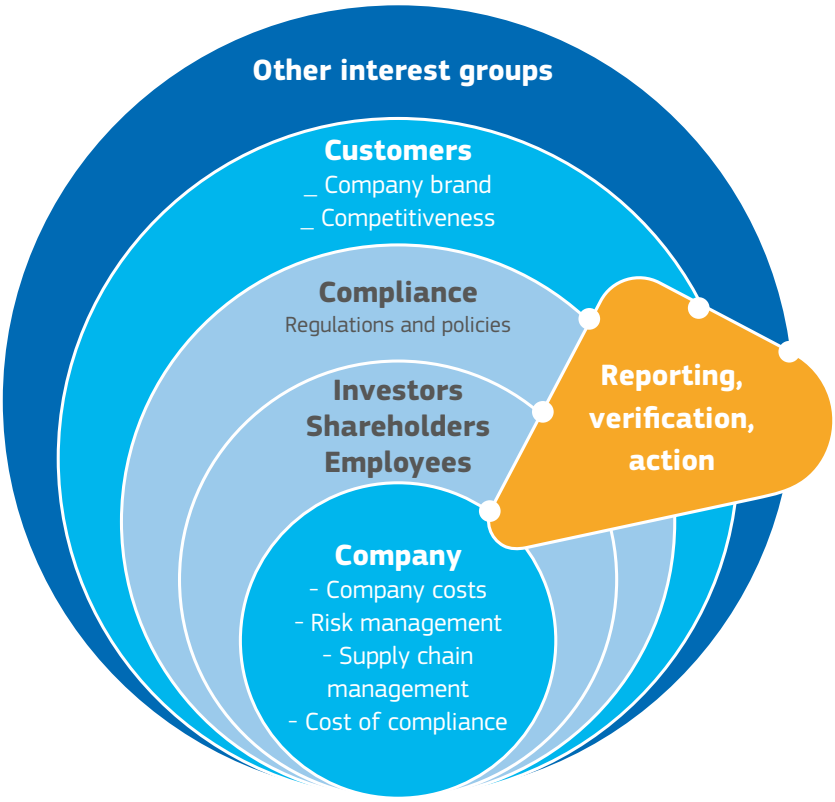


Figure 2 Overview of groups benefitting from carbon reporting.

2. Reporting frameworks, standards and methods

Greenhouse gas reporting programmes exist at the global, national and subnational levels to provide information on emissions, sources and trends (Singh et al., 2015). Most programmes are voluntary, but an increasing number of policies are designed to implement mandatory reporting of both public and private sector emitters (see further below). A reporting framework or platform is a system that facilitates or prescribes the reporting, organisation and analysis of relevant GHG data. A framework also provides a process for quality assurance and sharing of data with stakeholders and the public.

The two most prevalent global frameworks relevant for carbon reporting are the Carbon Disclosure Project (CDP) and the Global Reporting Initiative (GRI). In addition, tourism-specific frameworks or reporting/certification programmes exist. Each of these frameworks uses a set of standards which assist the reporting entity to account for GHG emissions in a transparent and consistent way. Specific methodologies, tools and calculators (including emissions factors for different fuel sources and/or activities) are recommended or specified as part of the standards (Figure 3).

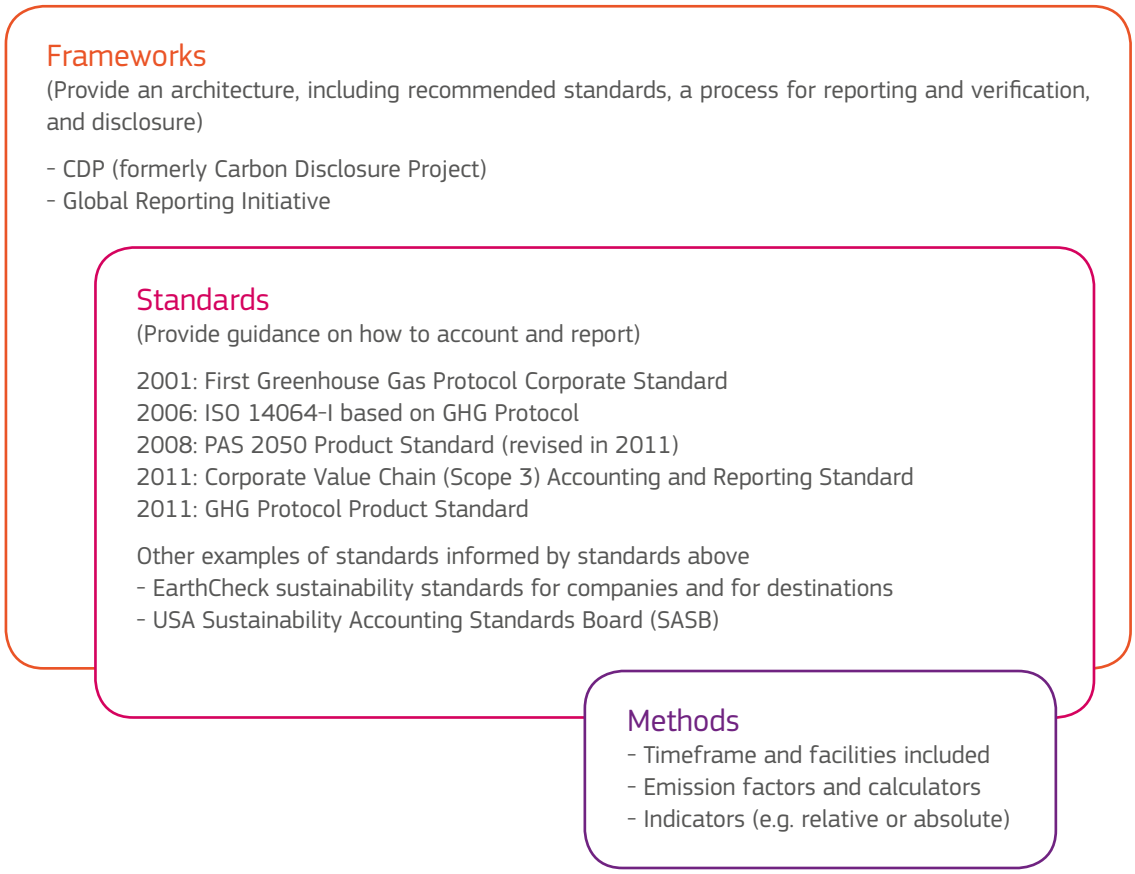


Figure 3 Key GHG accounting frameworks, standards and methods.

2.1 Frameworks

While the CDP focuses primarily on climate change, the GRI has a broader scope of environmental and social reporting. There are substantial linkages between the two frameworks. The CDP and GRI jointly developed a document that identifies overlaps between the two frameworks and assists reporting companies in increasing reporting efficiency (GRI & CDP, 2011).

CDP (formerly Carbon Disclosure Project)

The CDP was established in 2000 as an independent organisation that develops and distributes annual information on GHG emissions. On behalf of investors, purchasers and governments, the CDP requests environmental information from companies and cities, including on impacts and strategies to mitigate these. Initially the data collection mechanism was a single questionnaire on climate change, but now the CDP also collects data for its Water, Forest and Supply Chain disclosure programmes.

The principle 'measure to manage' underpins the CDP, and disclosure provides an incentive for companies, and more recently cities, to reduce their impacts. CDP now holds primary data on climate change-relevant indicators from over 5,000 companies based in more than 80 countries. A key element of the disclosure process is third-party verification to be completed in accordance with recognised verification standards. These standards must meet certain criteria to be comparable. Recognised standards for verification include, for example:

- Airport Carbon Accreditation (ACA) of the Airports Council International Europe
- Australia's National Greenhouse and Energy Reporting Regulations (NGER Act)
- CEMARS (Certified Emissions Measurement and Reduction Scheme)
- ISO14064-3
- EarthCheck
- Verification under the EU Emissions Trading Scheme (EU ETS) Directive and EU ETS-related national implementation laws.

One aim of the CDP is to include and position environmental information at the core of financial and policy decision making. In response to this need, standards are now under development for including ESG information into investor reports. Globally, the Climate Disclosure Standards Board (CDSB) has developed a draft framework for disclosures in mainstream financial reports. The CDSB is a consortium including the CDP, Ceres, The Climate Group, the World Business Council for Sustainable Development (WBCSD), the World Economic Forum (WEF) and the World Resources Institute (WRI).

Analysis of Travel and Tourism CDP reports is difficult due to the lack of a specific Travel and Tourism category in the database. However, several top-performing companies in tourism were highlighted in the 2015 A List[2] (see also box below featuring 2014 top performers). By category these were:

- Consumer Discretionary: NH Hotels (Spain), Meliá Hotels (Spain), Las Vegas Sands Corporation (USA), Wyndham Worldwide Corporation (USA)
- Financials: Host Hotels and Resorts (USA)
- Industrials: Deutsche Bahn (AG) (Germany)

Finnair, TUI Travel and Munich Airport score highly in CDP international climate leadership index

GreenAir Online, Mon 27 Oct 2014:

'Finnair, TUI Travel and Munich Airport are stand-out leaders in this year's Carbon Disclosure Project (CDP) index of climate disclosure and performance by organisations around the world. CDP, an international NGO, provides a global system for companies and cities to measure, disclose, manage and share environmental information with 767 institutional investors worldwide responsible for assets of $92 trillion. The aim is to motivate companies to disclose their impacts on the environment and natural resources, and take action to reduce them. Finnair and Munich Airport have been A-listed on the CDP Climate Performance Leadership Index (CPLI) 2014 for their actions to reduce carbon emissions and climate protection efforts. TUI Travel – which has six airlines – scored an A- on the CPLI and a 'perfect 100' on the Climate Disclosure Leadership Index (CDLI).'

Source: http://www.greenaironline.com/news.php?viewStory=1997.

[2] For details, see https://www.cdp.net/CDPResults/CDP-global-climate-change-report-2015.pdf#page=10

Global Reporting Initiative

The GRI is a network-based non-governmental organisation that aims to drive sustainability reporting and ESG disclosure. GRI constitutes the world's most widely used sustainability reporting framework, with approximately 93% of the world's largest 250 corporations reporting on their sustainability performance.

The framework consists of: reporting guidelines, principles and indicators that organisations can use to measure and report their economic, environmental and social performance. The most recent guidelines are the G4,[3] which put more emphasis on the concept of *materiality*, referring to those impacts that are most relevant for the particular company. The G4 guidelines also have a greater focus on supply chain impacts. The release of the new G4 guidelines has not been without criticism, because of its failure to adequately account for the 'context of sustainability', in particular planetary boundaries and thresholds against which impacts have to be compared to assess their significance and precariousness (*The Guardian*, 2013).

There are several ways of reporting, referred to as 'in accordance' with either the Core or Comprehensive options of ESG indicators.[4] Climate-relevant indicators are shown in Table 1. If carbon emissions are identified as a material aspect they should be reported. Reporting should include base year and rationale for base year, significant changes in emissions that may require recalculation of base year, standards used, methodologies used, the source of the emissions factors used and the global warming potential (GWP) rates for the different GHG.

Table 1 GHG emissions-relevant indicators in the G4 Guidelines (see also GHG Protocol standards below)

Indicator	Detail
G4-EN15: Direct GHG emissions (Scope 1)	Report gross direct (Scope 1) GHG emissions in metric tonnes of CO_2 equivalent, independent of any GHG trades, such as purchases, sales or transfers of offsets or allowances.
G4-EN16: Energy indirect GHG emissions (Scope 2)	Report gross energy indirect (Scope 2) GHG emissions in metric tonnes of CO_2 equivalent, independent of any GHG trades, such as purchases, sales or transfers of offsets or allowances.
G4-EN17: Other indirect GHG emissions (Scope 3)	Report gross other indirect (Scope 3) GHG emissions in metric tonnes of CO_2 equivalent, excluding indirect emissions from the generation of purchased or acquired electricity, heating, cooling and steam consumed by the organisation (these indirect emissions are reported in Indicator G4-EN16). Exclude any GHG trades, such as purchases, sales or transfers of offsets or allowances. Report other indirect (Scope 3) emissions categories and activities included in the calculation.
G4-EN18: GHG emissions intensity	Report the GHG emissions intensity ratio, and the organisation-specific metric (the ratio denominator) chosen to calculate the ratio. Report the types of GHG emissions included in the intensity ratio: direct (Scope 1), energy indirect (Scope 2) and other indirect (Scope 3). Report gases included in the calculation.
G4-EN19: Reduction of GHG emissions	Report the amount of GHG emissions reductions achieved as a direct result of initiatives to reduce emissions, in metric tonnes of CO_2 equivalent, and report gases included in the calculation. Report in which Scope the reductions occurred.
G4-EN27: Extent of impact mitigation of environmental impacts of products and services	Report quantitatively the extent to which environmental impacts of products and services have been mitigated during the reporting period.

[3] Detailed information is provided in the G4 documents 'Reporting Principles and Standard Disclosures' and 'Implementation Manual'.

[4] 'Core' requires that the company discloses the Generic DMA and at least one Indicator for each aspect identified as material, whereas 'Comprehensive' requires disclosure of the Generic DMA and all Indicators related to the material Aspect.

The number of Travel and Tourism companies producing a CSR report based on the GRI is increasing, although it is still very small considering the large number of companies globally. Figure 4 shows that the number of reporting companies has grown across all relevant sectors. Greater numbers do not necessarily mean an increase in quality reporting, as not all reports listed in the GRI database are 'in accordance' only. Some reports merely refer to the GRI guidelines as a generic framework (so-called 'GRI-referenced'), but do not provide detailed information or performance related to specific indicators. Only 29 of the Tourism and Leisure reports in 2014 quantified GHG emissions, with most focusing on Scope 1 and 2 emissions (see below), excluding indirect emissions.

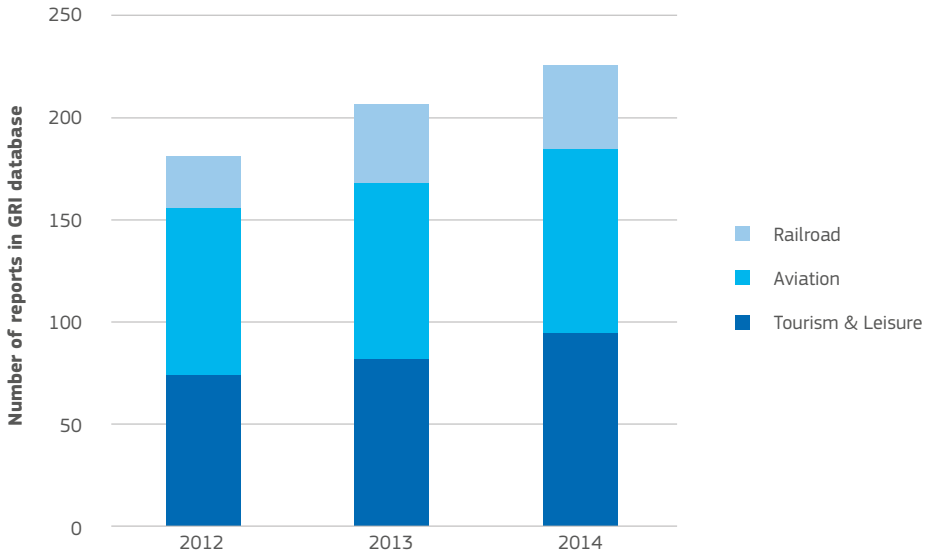


Figure 4 Travel and Tourism companies filing a report with the GRI. Source: GRI database.

2.2 Standards and methods

Having a consistent and comprehensive approach across companies is important for comparison and tracking of progress; however, the latter are still widely lacking in the Travel and Tourism sector (Cowper-Smith & Grosbois, 2011).

Greenhouse Gas Protocol Corporate Standard

There are several standards for GHG accounting, though the most widely used are the standards developed by the Greenhouse Gas Protocol. The GHG Protocol was formed in 2001 as a partnership between the WRI and the WBCSD. The GHG Protocol was built to be consistent with the Intergovernmental Panel on Climate Change (IPCC) Guidance on National Greenhouse Gas Inventories. The GHG Protocol then informed the International Organization for Standardization's (ISO) standard 14064-1 on the 'Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals', which was developed in 2006.

The Protocol covers all six GHG of the Kyoto Protocol, and makes provision for other GHG (e.g. Montreal Protocol gases). In terms of organisational boundaries, accounting can refer to operational control or financial control. Five accounting principles are articulated to ensure a minimum quality standard for the GHG accounts. The most relevant standard for Travel and Tourism is the Greenhouse Gas Protocol Corporate Standard. It divides GHG emissions into three scopes.

- Scope 1: Covers direct GHG emissions from sources (mainly fossil fuels) owned by a company or organisation.
- Scope 2: Covers the indirect emission of GHG from electricity purchases.[5] Electricity consumption (e.g. in kilowatt-hours) is then converted into GHG emissions using an agreed-upon conversion factor that varies by location around the world, depending on how electricity was generated.
- Scope 3 (optional): Covers all other indirect GHG emissions and is considered an optional reporting category, though it can be a major component of overall GHG emissions for some industries. Scope 3 emissions include transportation used by company employees (commuting or business-related travel), emissions from waste disposal at centralised landfills, the extraction and production of purchased inputs other than electricity and the emissions due to the use of produced goods.

Product-related standards

The recognition of upstream and downstream climate impacts is also recognised in other standards, for example those related to products rather than companies (e.g. in conjunction with so-called food miles of imported goods). The most prominent standard is the PAS 2050, which was introduced in 2008 and revised in 2011. It provides a consistent and internationally applicable method for quantifying carbon emissions associated with the complete life cycle of a product. Similarly, the GHG Protocol released its Product Standard in 2011. The two standards are broadly consistent.

Several academic studies have taken a life cycle approach to tourism products (e.g. Filimonau et al., 2011); however, in practice no examples could be found where a company publicly reported the cradle-to-grave GHG emissions associated with a tourism product or service.

Accounting methods

Standards typically recommend a set of methodologies for identifying which parts of a company's operation need to be included and how this is to be done. Broadly, there are two approaches to estimating emissions:

- Direct measurement approach: The direct measurement approach involves measuring the emitted GHG using specific measurement equipment. This method is not typically used by Travel and Tourism companies.
- Calculation-based approach: This approach does not measure GHG emissions, but instead measures the activity that results in emissions. It then provides an estimate of emissions from that activity using relevant coefficients for CO_2 and other GHG.

Most standards provide information or guidance on how to convert activities into emissions and which factors to use[6]. Note that most carbon reporting refers

[5] Most recently the standard has changed, whereby electricity emissions can be reported using grid average emissions factors or market-specific emissions factors where they exist. The benefit is that companies who chose to purchase low-carbon electricity, for example, are now able to use lower carbon emission coefficients.

[6] Methods are often classified by so-called 'tiers', whereby higher tiers indicate higher quality of estimates. Tier 1, for example, commonly describes estimates that rely on default emissions factors, for example those supplied by the IPCC. Tier 2 and 3 methods are more specific and consider source-, technology-, region-, or country-specific emissions factors.

to CO_2 equivalents (CO_2e); relating to the additional climate impacts of non-CO_2 gases. Commonly used sources for emissions factors are:

- Fossil fuel consumption in physical units (e.g. litres, kilograms, kilowatt-hours) Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006), various chapters; http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html.
- Transport-related emissions (often measured in tonne-kilometre, vehicle-kilometre or passenger-kilometre)
  Department of Environment Food and Rural Affairs (2014). Government GHG Conversion Factors for Company Reporting: Methodology Paper for Emissions Factors July 2014, and DCFCarbonFactors_21_4_2015_3052.xls. www.ukconversionfactorscarbonsmart.co.uk.
- Electricity consumption
  International Energy Agency, for example see 'CO_2 Emissions from Fuel Combustion: Highlights' (2013 edition) (year 2011 data) for country-specific electricity emissions factors.
- Country-specific emissions factors, provided through environmental departments or ministries.
- Air travel
  The ICAO emissions factors offer a robust default option, unless more specific emissions factors are available
  http://www.icao.int/environmental-protection/CarbonOffset/Pages/default.aspx

To provide a common methodology and metric, the WTTC and the International Tourism Partnership (ITP) teamed up to develop the Hotel Carbon Measurement Initiative tool (see below). International emissions factors are used to derive emissions, and the metrics are carbon emissions per room night and square metre.

Some tourism-specific standards and certification schemes provide detailed and country-specific databases to their members for emissions from stationary and mobile fuel combustion, electricity use, wastewater and landfill gas, and indirect activities such as staff business travel (EarthCheck, no date).

3. Private sector need for carbon information

3.1 Companies

Carbon reporting provides a range of benefits, including the potential for realising more efficient business operations and direct cost savings, the setting of realistic targets for emissions reductions, improved stakeholder and customer engagement and improved positioning and reputation in the market. From a company perspective there is also growing benefit in measuring supply chain-related emissions (see further below). Understanding upstream and downstream emissions substantially enhances a company's ability to manage its (risk) exposure to climate change, including policies and future prices on carbon (Downie & Stubbs, 2013). A recent study on European hospitality providers found that the sector is (self-reportedly) highly engaged with resource efficiency and savings (Becken & Dolnicar, 2016), but little is known to what extent tourism companies report and communicate direct and indirect carbon emissions.

Carbon intensity of Travel and Tourism subsectors

While there is limited public information on carbon emissions by tourism companies (except for a small number of larger companies that report through the CDP or GRI, see above), the carbon intensity of Travel and Tourism is well established through academic research. Various methods have been used to determine tourism carbon footprints including input-output analyses, Computable General Equilibrium models, process-based analyses and life cycle assessments.

There has been considerable focus on tourist emissions from transport, in particular aviation. Various studies show that the transport component of tourist travel contributes in the order of 60% to 94% of tourism's emissions globally (e.g. Kuo & Chen, 2009; Peeters & Schouten, 2006; Scott et al., 2008). Several attempts have been made to determine average carbon intensities of various tourism-specific transport modes (Table 2), among others with the intention to encourage companies (e.g. tour operators) to switch to low-carbon transport modes as part of the product range (Zotz, 2009). As can be seen, water-based and air-borne travel are generally more carbon intensive than other modes of transport.

Table 2 Examples of tourism-specific transport carbon intensities measured in emissions per passenger-kilometre.

Transport mode	CO_2e (kg/pkm)	Reference
Cruise ships (New Zealand)	0.250 to 2.2	Howitt et al. (2010)
Domestic air 500 km	0.206 to 0.29	Becken (2009); Scott et al. (2008)
Medium-haul air travel	0.130 to 0.154	Scott et al. (2008)
Ferries Sweden/Finland	0.15 to 0.27	Akerman (2012)
Car	0.133 to 0.241	Becken (2009); Scott et al. (2008)
Air > 2,000 km	0.111	Scott et al. (2008)
Bus/coach	0.022 to 0.04	Becken (2009); Scott et al. (2008)
Rail	0.027	Scott et al. (2008)

Similarly, the energy and carbon intensity of tourist accommodation has been researched in relatively great detail and for many types of accommodation and countries (for an overview see Warren & Becken, forthcoming). For example, for tourist accommodation in hotels and homestays in Taiwan, Tsai et al. (2014) report that one guest night in international tourist hotels, standard tourist hotels, general hotels and homestay facilities emits 28.9, 19.2, 12.5, and 6.3 kg CO_2, respectively. These emission intensities are slightly higher than Becken's (2009) findings for New Zealand accommodation, where hotels were found to emit 7.97 kg CO_2e/guest night, motels emitted 2.56 kg CO_2e and camping equated to 1.36 kg CO_2e per guest night.

While some programmes provide benchmarks of carbon efficiency to their members (e.g. EarthCheck provides benchmarks differentiated by business type and climate zone), it is difficult to provide carbon benchmarks for different countries or sometimes regions within a country. The reason is that the largest share of energy consumption in tourist accommodation is in the form of electricity, namely in the order of 60% to 80% (Warren & Becken, forthcoming). Resulting Scope 2 emissions then depend heavily on the country's electricity mix and carbon intensity. These are generally improving, as countries move toward low-carbon electricity mixes.

In summary, academic studies provide an indication of the 'carbon costs' of travel, whereas the industry itself tends to focus more on reporting innovative approaches to reducing their GHG emissions (see Carlton Hotel text box), rather than detailing metrics or targets (Bonilla-Priego et al., 2014). Thus, a combination of academic and industry insights might present a pragmatic way forward to a) understand the 'hot spots' of carbon in the industry and b) design the most effective solution portfolios.

The Carlton Hotel's anniversary celebration

The family-owned Carlton Hotel St. Moritz marked an important anniversary by supporting sustainable projects with the funds that would otherwise be spent on lavish celebrations. The hotel requested that myclimate calculate its annual CO_2 emissions, and then the decision has been taken to invest in the myclimate biogas project in Karnataka in India. The Carlton Hotel is enabling the construction of 100 more systems in the region, symbolising the hotel's 100-year history. Local people benefit from the reduction in GHG emissions and reduced deforestation of high-earning agricultural land, as well as less soot accumulation in their homes.

Source: myclimate.

Science-based targets

Increasingly, the Travel and Tourism sector will be faced with a need to develop science-based targets to develop its specific emissions reduction paths. Science-based targets are those targets adopted by companies to reduce emissions that are 'in line with the level of decarbonisation required to keep global temperature increase below 2°C compared to preindustrial temperatures, as described in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)' (CDP, WRI & WWF, 2015, p. 7), and agreed upon in the Paris Agreement.

There are a number of approaches to developing science-based targets, but the Sectoral Decarbonization Approach (SDA) seems most appropriate for Travel and Tourism companies (see CDP, WRI & WWF, 2015 for more detail). Air transport and commercial buildings, with their relatively clearly defined emissions profiles, are explicitly recognised as suitable sectors for this approach. The method helps outline a company's intensity pathway, which is defined through projected activity (e.g. passenger volume) and carbon intensity, and the total available carbon budget for a given timeframe (the commitment period).

The key challenge for tourism will be its annual growth rate – putting increasing pressure on achieving efficiency gains year after year. The challenge for aviation with limited substitution options, in particular, is highlighted in Cames et al.'s (2015) report, where various approaches to setting targets are juxtaposed. The analysis concluded that the current International Air Transport Association (IATA) targets, ambitious as they are, still result in a level of GHG emissions that is 17% higher than a constant share of aviation's emissions relative to global emissions under a below-2-degree target (scenario of the Representative Concentration Pathway (RCP) 2.6). Measuring and monitoring are key prerequisites to setting and evaluating the targets.

Developing science-based targets (or any targets for that matter) for a sector is not without challenges. This is highlighted by the lack of agreement in the international shipping sector, which once again in a recent meeting by the International Maritime Organization (IMO) failed to develop a mechanism to address global GHG from shipping. While delayed action might provide some economic or operational short-term benefits, long-term impacts might be detrimental. Alastair Fischbacher, Chief Executive of the Sustainable Shipping Initiative, noted: 'The shipping industry cannot go to COP22 in Morocco without this [...] Not only will it damage the industry's reputation, it also runs the risk of external regulators taking the matter into their own hands and circumnavigating the IMO, which no one in the industry wants to see' (Cuff, 2016).

Tools to manage GHG emissions

Several tools have been developed to measure and manage carbon footprints in tourism, but they are often not widely implemented or are retired due to lack of funding. The implementation of a scenario tool to account for GHG emissions from tourism in South West England is hampered by the lack of resources and changes in the institutional arrangements. The Resource, Energy and Analysis Programme (REAP) was informed by doctoral research and designed to not only measure the full carbon footprint related to visitor activities, but also to explore mitigation strategies and emissions reduction potentials. The tool also included supply chain emissions related to accommodation, travel, food, shopping, services, attractions, activities and events (Whittlesea & Owen, 2012). Further examples of tools designed for Travel and Tourism include:

Hotel Carbon Measurement Initiative (HCMI)

The HCMI was developed by the ITP, in partnership with KPMG and 23 global hotel companies. HCMI is freely available and can be used by any accommodation provider. Over 21,000 hotels globally are using the tool to measure their carbon emissions.

Airport Carbon and Emissions Reporting Tool (ACERT)

The ACERT has been developed by the Airports Council International. It is a spreadsheet designed for airport operators to calculate their GHG emissions and prepare an inventory. The tool is freely available to airports. It divides emissions according to the traditional reporting scopes, whereby the following activities fall under Scope 3: aircraft activity in terminal area; airline and other tenant vehicles, ground service equipment and electricity usage; and ground access vehicles for staff and passengers including buses and trains.

Carbon management tool for tour operators (CARMACAL)

As part of a research projects led by NHTV Breda University of Applied Sciences in the Netherlands, a carbon management tool for tour operators was developed. The so-called CARMACAL allows tour operators to measure the detailed carbon footprint of their tour packages, and as a result enables them to include carbon management into their decision making and operations. The tool contains information on the carbon intensity of a range of competing products (e.g. accommodation choices), carbon-efficient airlines and shortest travel routes.

Hotel Energy Solutions (HES)

The HES programme is a UNWTO-initiated project in collaboration with a team of leading United Nations and EU agencies in Tourism and Energy. The project is targeted to small and medium accommodation providers, and it provides technical information, support and training to increase energy efficiency and uptake of renewable energy. The toolkit helps businesses measure their energy use. One desired outcome is to reduce GHG emissions from tourism.

myclimate hotel solutions

Developed by the carbon offsetting company myclimate specifically for the hotel sector, this tool provides assistance for calculating emissions, analysing them and providing carbon offsetting options for guests. In addition, if a hotel offsets all of its CO_2 emissions, it is entitled to use the label 'Climate-Neutral Hotel'.

Nearly Zero Energy Hotel (neZEH)

This initiative is working with 16 pilot hotels to providing technical advice for reducing energy use and carbon emissions. neZEH's goal is to sensitise 15,000 hotels across Europe, saving up to 95,000 tCO_2e per year until 2020. The neZEH hotel owners will gain access to technical expertise, energy audits, financial advice relating to energy solutions, training and enhanced promotional opportunities.

PATA/EarthCheck calculator

This calculator is freely available on the website of the Pacific Asia Travel Association's website, and is designed for small and medium tourism operators. It comes with other resources and tips for reducing GHG emissions and other environmental impacts.

3.2 Investors

Investors and procurers are increasingly interested in the carbon performance of their business partners. Globally, the number of requests sent out to companies by the CDP has grown substantially to several thousands, reflecting the growing interest in companies' GHG reports. Over 500 investors and procurers now rely on the CDP information for their decision making. A recent survey of investors at the Singapore Stock Exchange (SGX) showed that 90% of respondents actively consider ESG in their investment (Yeo, 2016). Carbon Clear's annual survey of carbon reporting among the FTSE 100[7] showed that in 2015, 99 out of 100 companies reported carbon. However, the quality of reporting differs, with 'too many companies [still] lagging behind, showing little consideration of both the impacts of their business on climate change, and the impact of climate change on their business (Carbon Clear, 2015, p. 18).

Global rankings provide exposure for best-performing companies (see box on TUI Travel PLC below). The 2015 Measuring Sustainability Disclosure: Ranking the World's Stock Exchanges report announced the Helsinki Stock Exchange as the leader, followed by Euronext Amsterdam, the Copenhagen Stock Exchange and the Australian Securities Exchange. This ranking provides annual assessment of publicly traded companies and their disclosure on seven sustainability indicators: employee turnover, energy, GHG emissions, injury rate,

TUI Travel ranked fourth in the FTSE 100 for carbon reporting and performance

TUI media release, 01 Oct 2014:

'TUI Travel PLC, one of the world's leading leisure travel companies, has been ranked fourth in Carbon Clear's annual ranking of the FTSE 100 companies. For the second year in a row, TUI Travel is the only travel company to feature in the top 20 and also climbed two places this year to fourth position.

The report from Carbon Clear, the carbon management organisation, assesses the best practice carbon reporting processes, strategy and performance of FTSE 100 companies. This was achieved by scoring publicly available information from each company in the FTSE 100 against 67 reporting criteria. The analysis, which was carried out in the summer of 2014, focussed on how companies measure, report and verify their carbon footprint, their existing and planned strategies for reducing emissions, their actual carbon reductions and their work to engage stakeholders about their climate change programmes.'

Source: http://www.tuitravelplc.com/content/tui-travel-ranked-fourth-ftse-100-carbon-reporting-and-performance.

[7] The FTSE 100, or in full the Financial Times Stock Exchange 100 Index, is a share index of the 100 companies listed on the London Stock Exchange with the highest market capitalization.

payroll, waste and water. Similarly, the FTSE4Good Index takes into consideration environmental, social and governance issues, and climate change is one of the topics included under the environmental evaluation of the company.

Other examples include the Dow Jones Sustainability Index, which evaluates companies' sustainability efforts in three dimensions: economic, social and environmental. Depending on the sector of activity, different weights are assigned in the scoring system to each of the three dimensions. The environmental dimension takes into consideration aspects such as climate strategy, environmental reporting, environmental policy and operational eco-efficiency. Only approximately the top 10% performers of each sector manage to enter the index. Note that the above ranking schemes focus on larger companies; however, leadership and development of best practice among the bigger corporate members of the Travel and Tourism sector may pave the way for smaller businesses to follow on similar initiatives.

The Sustainable Stock Exchanges (SSE) initiative is a noteworthy initiative by the United Nations, involving the United Nations Conference on Trade and Development (UNCTAD), the United Nations Global Compact, the United Nations Environment Programme Finance Initiative (UNEP-FI) and the United Nations-supported Principles for Responsible Investment (PRI). It holds global and regional dialogues with partner exchanges to advance best practice in CSR and associated reporting. Several exchanges (12 out of 55, WTTC, 2015) now demand evidence of environmental and social reporting for at least some of their listed companies. Examples include:

BOVESPA in Brazil

The BOVESPA stock exchange lists 466 companies at a value of about USD 13.5 billion. It has developed sustainability indices to promote transparency and improved ESG performance, and established special listing segments for markets for clean technology companies, carbon credits and other goods and services. Minimum criteria have to be reported by listed companies. In 2010, it launched a Carbon Efficient Index together with the Brazilian Development Calculation, based on companies' free floats and emission coefficients. The index is weighted by companies' GHG emissions. Adherence to the index is voluntary, although of the 60 firms that were invited to adhere, as many as 49 did so. The majority of companies now report emissions data for Scopes 1 and 2 (Kauffmann et al., 2012).

Shanghai and Hong Kong, China

Several stock exchanges in China are beginning to encourage or enforce ESG reporting.

- Companies listed on the Shanghai Stock Exchange are encouraged to disclose, among others, the annual total energy consumption and emission/pollutant types, quantity, concentration and destination.
- The Stock Exchange of Hong Kong Limited – similar to the one in Singapore – has published its *Consultation Conclusions on Environmental, Social and Governance Reporting Guide*. The Exchange has decided to implement the guide as a 'recommended practice' and has now moved to a 'comply or explain' basis of ESG reporting, effective from January 2016. Key performance indicators were upgraded with effect from 2017 (Singh et al., 2015).

Johannesburg, South Africa

The Johannesburg Stock Exchange is Africa's leading exchange, and in 2004 it was the first exchange to develop a Socially Responsible Investment Index (SRI Index). Over 450 companies listed on the Johannesburg Stock Exchange are required to produce an integrated report in place of their annual financial and sustainability reports as a consequence of the adoption of the King III Code, on an 'apply or explain' basis. An integrated report gives users an all-round view of a company by including social, environmental and economic performance along with the company's financial performance (Singh et al., 2015).

Another initiative of significance is the Portfolio Decarbonization Coalition (PDC). The PDC brings together multiple stakeholders who are determined to mobilise institutional investors to decarbonise their portfolios. The idea is that large investors begin to re-allocate their capital on the basis of companies' GHG emissions, and this sends a strong signal to those companies to invest in low-emission activities and technologies. The public disclosure of all GHG emissions and accounting methods is mandatory.

3.3 Supply chain stakeholders

In addition to company performance assessed through reducing direct emissions, there is increasing interest in supply chain management. Thus, Scope 3 reporting is becoming more relevant, especially considering that for some companies Scope 3 represents the largest source of GHG emissions. The CDP analysed their database of over 4,000 companies' emissions inventories in 2015 and found that Scope 3 emissions were on average over twice that of a company's own emissions, and four times as high when energy- and mineral-related companies were removed (CDP, 2015).

Despite increasing recognition of supply chain reduction potentials, the consideration of 'indirect' effects is still insufficient, and Scope 3 reporting practices remain inadequate. Carbon Clear's 2015 report on FTSE 100 companies showed that 56 reported some form of Scope 3 emissions, with nine companies reporting more than five Scope 3 activities. Similarly, research by Downie and Stubbs (2013) on 22 Australian companies revealed that the level of reporting of Scope 3 activities varies considerably, with some companies reporting only two activities and others up to 13. The most commonly reported 'indirect emissions sources' relates to air travel, with 20 out of the 22 companies under investigation having included aviation emissions in their Scope 3 emissions.

To enhance the consistency in reporting, there is an urgent need to improve Scope 3 methodologies. The tourism examples shown in Table 3 were extracted (in most cases word by word, except for minor changes to shorten text) from the 2015 CDP database to illustrate the different ways in which companies collect data, use emissions factors and estimate business travel emissions. Some of the methodological explanations are difficult to follow and would fail scientific standards of reproducibility. Business travel was chosen as an example, because it is reported by most companies, and because it has a direct link to other subsectors of tourism, namely airlines and airports. Interestingly, airport or any other upstream infrastructure emissions do not seem to feature in Scope 3 reporting, despite good data availability on emissions per passenger at a wide range of airports globally (Airport Carbon Accreditation, 2015).

Table 3 Examples of Travel and Tourism companies' reporting on business travel emissions (part of Scope 3) in the CDP

Company	Scope 3 business travel (t of CO_2)	Business travel % of total emissions	Emissions calculation methodology
InterContinental Hotels Group	590,279	14.1%	This figure covers purchased goods and services, waste emissions and business travel. Purchased goods and services data was recorded from 26 hotels as part of a representative sample in the 2007 study conducted by Best Foot Forward.
Kuoni Travel Holding Ltd	17,649	5.3%	Myclimate methodology (each flight segment is calculated separately).
Marriott International	65,028	1.7%	This number represents an average of emissions from business travel from the United States.
Hilton Worldwide	24,203	0.9%	Emissions from business travel (air and rental car) are tracked by Hilton Supply Management's Global Travel and Expense Services.
Meliá Hotels International	1,103	0.5%	Emissions are obtained through the database of the main travel agency used by Meliá. The travel agency directly provides to Meliá the CO_2e emissions generated due to all the airplane and train tickets managed in the reporting year.
Wyndham Worldwide	9,261	0.5%	Emissions related to business travel include long-, medium- and short-haul flights, as well as vehicle emissions from car services and rentals. The data associated with business travel is supplied by Wyndham's corporate travel vendors on a quarterly basis.
Starwood Hotels & Resorts Worldwide	13,636	0.5%	Emissions relate to the corporate offices of all four global divisions. For two of the divisions, Starwood has calculated the emissions based on the flight mileage for all employees within its respective corporate offices. For the North American division, Starwood can only calculate the business travel emissions from the flight miles of those employees within the US and Canada who have used Orbitz to book their flights.
Carnival Corporation	19,200	0.2%	Business travel is calculated from activity data (passenger miles) received from the Operating Lines (OL). Passenger miles were multiplied by the appropriate emissions factor to obtain total emissions in CO_2e.
NH Hotel Group			Not reported.
Amadeus IT Group	8,373	-	International Civil Aviation Organization (ICAO) carbon calculator, which provides a global and industry standard estimation of CO_2 emissions per passenger for any city pair covered by civil aviation in the world.

Which emissions factors	Additional explanation
	Total Scope 3 included purchased goods and services, waste and business travel and was divided by three.
Emission factors for both low- and high-emissions flights.	
Emission factors for short-haul and long-haul flights provided by the United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA) (Table 9, Annexes to Guidelines for Company Reporting on GHG Emissions, July 2013). Rental car: mobile fuel emissions are calculated using Climate Registry Emissions Factors for GHG Inventories (4 April 2014).	Hilton Worldwide corporate policy requires that all business travel be booked through American Express and approved corporate vendors. This ensures accurate reporting of emissions data for air and rental car use.
GHG Protocol (GHG Emissions from transport or mobile sources).	Annual report of the travel agency including the GHG emissions associated with airplane and train tickets bought during the year by 70 participating hotels.
Air travel: DEFRA, updated 5 October 2010, Version 1.2.1 FINAL and CO_2 emissions from business travel. Version 2.0. June 2006. Vehicle-related emissions are calculated using a blended emission factor based on vehicle mileage using data from IPCC, CO_2 emissions factors from the US Environmental Protection Authority (EPA) and Air Resources Board (ARB).	
	Actual flight mile data for three of four business divisions is available; travel flight miles for the fourth division are estimated, and comprise 2.42% of total miles travelled. For Latin America, Starwood is only able to provide estimated flight mileage at this time.
Emissions factors are from climate leaders – optional emissions from commuting, business travel and product transport – May 2008 document.	For some Operating Lines (OL), estimates had to be made to calculate emissions. No data was provided from two of the very small OL, and estimates were made and added to the total emissions figure for these cases. The uncertainty range: 20–30%.
	A materiality analysis for Scope 3 concluded that external laundry is the only Scope 3 activity relevant to the hotel industry.
ICAO carbon calculator takes into consideration type of aircraft, distance, load factor, cargo, etc.	Scope includes air travel from company's top eight sites by number of employees, which represents approximately 70% of the total.

4. Governments, legislation and compliance

4.1 Trends

Travel and Tourism contributes substantially to global and national GHG emissions. A joint study carried out by the UN World Tourism Organisation, UN Environment Programme and UN World Meteorological Organisation estimated that Tourism related emissions are in the order of 5% globally (Scott et al., 2008), and between 3.9% for Australia (Dwyer et al., 2010), 6% for New Zealand (Becken & Patterson, 2006), and 9.1% for Dutch travel-related carbon emissions (de Bruijn et al., 2011). Akerman (2012) found that international travel-related GHG emissions – should they be included into the national GHG inventory – would account for 11% of emissions in Sweden.

To date, however, and with few exceptions, Travel and Tourism companies have largely been excluded from carbon legislation, mostly because of the small size of most tourism companies and due to the exemption of international travel from the climate regime.

Moreover, in the past, most climate change action has been voluntary, including reporting and disclosing emissions. This section demonstrates an increasing trend toward mandatory reporting – in some instances as a preparatory step toward carbon pricing or regulation. Mandatory programmes have the benefit of greater consistency and accuracy, and therefore facilitate better policy making and investment for carbon reduction. In 2014, 19 members of the G20 countries had at least one regulation in place requesting companies to disclose information on their social and/or environmental performance (WTTC, 2015). Some mandatory reporting is sector-specific (see text box on Creative Scotland below).

With the growing scope of environmental policies, the number of companies or organisations reporting their GHG emissions is increasing considerably (Kauffmann et al., 2012). The EU ETS, for example, is now implemented in 30 countries, and covers emissions from over 11,000 installations. In October 2014, the Council of the European Union adopted a new directive that will require large companies with over 500 employees to report annually on environmental, social and employee-related material topics. Companies that are affected by the legislation must begin reporting in 2017.

Increased reporting is also evident in emerging economies, most notably China. Yang et al. (2015) found that, based on an extensive review of both English and Chinese-language literature, there has been substantial growth in CSR or ESG reporting in China since 2008, following new government regulation on information disclosure enforced in 2007. It was also noted, however, that while quantity in reporting increased, quality had not.

Creative Scotland – carbon reporting

Creative Scotland is a public body in Scotland that supports the arts, screen and creative industries. It distributes funds from the Scottish government and the National Lottery to facilitate new ideas, employment and enjoyment of arts.

Creative Scotland is funding an organisation called Creative Carbon Scotland that works with artists and arts organisations to reduce their carbon emissions. It has been announced in 2015 that all Regularly Funded Organisations will have to report their carbon emissions. Mandatory reporting will begin in autumn 2016.

Source: http://www.creativecarbonscotland.com.

4.2 Country-specific reporting

In the following, examples of mandatory reporting schemes from around the world are introduced briefly. Information is drawn from Singh et al. (2015) and other sources. Some programmes are broader in scope and refer to CSR or ESG reporting, whereas others specifically address GHG emissions or carbon markets. Due to eligibility thresholds of emission amounts or company size, many programmes are not directly relevant to Travel and Tourism companies. However, some countries (e.g. the United Kingdom and France) have begun to extend reporting schemes to smaller companies or entities, indicating a shift toward more comprehensive approaches.

Australia

National Greenhouse and Energy Reporting Scheme

The National Greenhouse and Energy Reporting Scheme is a national framework for reporting and disseminating company information about GHG emissions, energy production and energy consumption. Large corporations (based on either facility size or operations) must register and provide a report by 28 February of each year.

To facilitate reporting of Scope 3 emissions, the Australian government provides supplemental guidance on reporting business travel, waste and paper, as well as supply chain impacts, but detail is lacking (Downie & Stubbs, 2013).

Brazil

Government resolutions

The Environmental Agency of São Paulo (CETESB) issued Resolution no. 254/2012/V/I (2012) that obliges companies from specified industries to submit an annual GHG inventory. Reporting includes Scope 1 and 2 emissions, and needs to follow accepted methodologies such as the GHG Protocol. The resolution also requires ongoing monitoring and reporting of mitigating actions. The CETESB has the discretion to verify the information disclosed in-house or through a third party.

In addition, and only for specified sectors (e.g. oil and gas, mining and metals, energy and fossil fuels and chemical sectors), Resolution no. 64, issued by the Environmental State Agency (INEA), establishes mandatory GHG reporting for obtaining environmental licences in the state of Rio de Janeiro. Prior to submission, the GHG inventory must be verified by a qualified entity.

Canada

GHG Emissions Reporting Program

As a part of the Canadian Environmental Protection Act, the GHG Emissions Reporting Program applies to the largest industrial GHG emitters in Canada. The reporting threshold for facilities was initially 100 kilotonnes of CO_2e, and has been lowered in 2009 to 50 kilotonnes per year. This increased the number of reporting entities by 50% (Singh et al., 2015).

Public accountability statements

Since 2012, banks and federally incorporated insurance, trust and loan companies with equity greater than USD 1 billion must publish an annual statement describing their contribution to the Canadian economy and society. Reporting can include emissions and mitigation initiatives. The statements are filed with the Financial Consumer Agency of Canada and are available to the public from the financial institution.

China

National reporting programme

In 2013, China's National Development and Reform Commission (NDRC) created GHG accounting and reporting guidelines for 14 industries, with another eight industrial guidelines likely to follow. Currently, 10 of the relevant guidelines are being converted to national standards (Song et al., 2015). The GHG Protocol's framework and methodologies are used as a reference. Then in 2014, the NDRC mandated GHG reporting for more than 20,000 companies and organisations. In addition, six standards on emissions verification are being developed as national standards. These will also be used by those companies that already report their emissions as part of China's pilot Emission Trading Scheme in five cities and two provinces.

Carbon trading

President Xi Jinping also announced the introduction of a cap-and-trade scheme from 2017 onward. While no official laws, rules or lists have been issued yet, the national scheme will build on the experience of the pilot schemes. It is planned to initially cover large companies in the power, steel, nonferrous metal, building materials, chemical production and aviation industries.

The NDRC has issued rules for the administration of a voluntary GHG emissions reductions training scheme. These rules specify organisational arrangements, procedures and management schemes for generating

certified emissions reductions and carbon offsetting in China (Song et al., 2015).

Denmark

Act amending the Danish Financial Statements Act

Since 2009, large businesses must account for their CSR initiatives in their annual reports. Businesses covered by the Act are those with: 1) total assets or liabilities of DKK 143 million, 2) net revenue of DKK 286 million and 3) an average of 250 full-time employees. The explanatory notes to the amended law, and accompanying guidance documents, encourage the use of the GRI Guidelines. Companies must either report on the elements prescribed or explain why they choose not to report on these. Disclosure on whether or not the company has policies to reduce the climate impact of the company's activities is required since 2013.

France

Grenelle II Act

Article 225 of the Act Since 2012, companies and their subsidiaries have to include information on their environmental and social performance. The *Bilan d'Emission de GES* established mandatory reporting for companies with 500 employees or more, public bodies with 250 employees or more and local authorities with more than 50,000 inhabitants. Entities are required to report GHG (CO_2, CH_4, N_2O, HFC, PFC and SF_6) emissions and publish Scope 1 and 2 emissions, with an update at least every three years. Third-party verification is required. Reporting of Scope 3 is encouraged.

France launched an online database in March 2015, where data submission is voluntary. However, following a new law (the Energy Transition for Green Growth Act), submission will become mandatory (Singh et al., 2015). In addition, France is leading the reporting on transport-related emissions, greatly assisting Scope 3 reporting of companies. 'CO_2 information for transport services' is a provision derived from the Grenelle de l'Environnement to address the ambitious objectives set by the French government in terms of reducing GHG emissions.

Disclosure of transport emissions

Mandatory emission reporting was integrated into Article L. 1431-3 of the French Transport Code in 2013. The article establishes the principle of CO_2 information disclosure from transport services, requiring service providers to inform transport users of their CO_2 emissions. Disclosure is required for all transport activities departing from or travelling to a location in France.

More specifically, the article refers to 'any public or private persons organising or selling transport services for passengers, goods or moving purposes, carried out using one or several means of transport, departing from or travelling to a location in France, with the exception of transport services organised by public or private persons for their own behalf' (Article 2 of the French Decree No. 2011-1336). Examples include transport service operators (trains, airlines, buses etc.), local authorities and professionals selling transport services (e.g. tour operators), whether carried out by themselves or by partner transport operators.

The carbon information must include all emissions from the upstream and operating phases of the services. Calculations follow a guide developed by the French Environment and Energy Management Agency (ADEME) and the French Ministry of ecology, Sustainable Development and Energy (MEDDE), in consultation with the Observatory for Energy and Environment in Transport (OEET). The standard (CEN standard EN 16258) has been published in 2012 and specifies the general principles, definitions, system boundaries, calculation methods, apportionment rules (allocation) and data recommendations to promote standardised, accurate, credible and verifiable declarations (Sustainability Sure, 2013).

Financial institutions

In 2015, France was the first country to introduce a carbon reporting obligation on financial institutions, including pension funds, insurance companies and other institutional investors. More specifically, the draft legislation stipulates that institutional investors have to disclose how they consider ESG issues in their decision making. This includes consideration of climate risks and opportunities, such as liabilities associated with carbon-intensive assets and new investment in low-carbon and renewable energy. Target setting is required as part of this process.

India

Business Responsibility Reports

In 2012, the Securities and Exchange Board (SEBI) mandated the top 100 listed companies to submit Business Responsibility Reports. The reports need to provide information on measures taken to support the *National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business,* framed by the Ministry of Corporate Affairs (MCA). Companies are now requested to abide by the disclosure requirements and is based on a 'comply or explain' principle. Emissions are captured in Part B of the reporting guidelines under Principle 6 – Environment: "'Statement on quantum of

emissions of greenhouse gases and efforts made to reduce the same.

Indonesia

Government Regulation No. 47/2012, 2012

This regulation focuses on companies involved with natural resources, thus it is not directly relevant to Travel and Tourism. Social and environmental reporting is required as a responsibility carried out by the Board of Directors after receiving approval from the Board of Commissioners or the General Meeting of Shareholders. It is stipulated that the implementation of social and environmental responsibilities is to be contained in the company's annual report. Companies may be penalised for non-compliance, and in turn awarded for successful implementation.

Italy

Carbon disclosure

In 2013, the Italian government entered in a memorandum of understanding with the CDP. It articulates that the CDP requests climate change information from the largest 100 companies by market capitalisation in Italy, based on the FTSE MIB Index.

Japan

Mandatory GHG accounting and reporting system

Institutionalised by the Ministry of the Environment and the Ministry of Economy, Trade and Industry in 2006, the reporting system requires companies to report their emissions. Companies with annual energy consumption of 1,500 kilolitres of oil equivalent or more, and those with at least 300 railroad cars or at least 200 vehicles, are required to report. The calculation and reporting manuals published by the Government are based on the EU ETS and ISO 14064. The reporting mandates Scopes 1 and 2, and encourages Scope 3 reporting. In 2009, over 11,000 companies reported their CO_2 emissions, accounting for about half of the total GHG emissions in Japan (Kauffmann et al., 2012).

A local Emissions Trading Scheme has been implemented in Tokyo (the Tokyo Metropolitan Government Emissions Trading Scheme). It covers industrial and commercial sectors and involves a total of 1,400 facilities (Kauffmann et al., 2012). Third-party verification is required.

Mexico

National Emissions Registry

In 2012, Mexico passed the General Law on Climate Change to ensure that climate change remains a long-term priority of the Mexican State independent of political cycles. The law sets requirements for mandatory emissions measurement, reporting and verification, among other provisions. Facilities and companies must report if annual emissions exceed 25,000 tonnes of CO_2e. Facilities relate to energy, transport, industry, agriculture, waste, and business and service sectors. Reporting includes Scopes 1 and 2, covering the following emissions: CO_2, CH_4, N_2O, HFC, PFC, HCFC, CFC, SF_6, NF_3 and halogenated ether. The National Emissions Registry is designed as a platform for a future carbon market.

New Zealand

The NZ Emissions Trading Scheme was introduced in 2010. A participant in the Emissions Trading Scheme is required to collect and record information on activities (both GHG emissions and carbon removed from the atmosphere). This information must then be reported to the Environmental Protection Authority (EPA). Companies that own more than 50,000 litres of obligation fuel per year have to participate in the scheme. Companies purchasing more than 10 million litres of obligation jet fuel per year may join the scheme. Only three tourism companies are part of the Emissions Trading Scheme: Air New Zealand, Nelson Air and Eagle Airways.

Sweden

Guidelines for external reporting by state-owned companies

The guidelines are mandatory for Swedish state-owned companies and require that the companies present a sustainability report using the GRI G3 Guidelines. The guidelines are based on the principle of 'comply or explain', which means that a company can deviate from the guidelines if a clear explanation and justification of this departure is provided. The sustainability report must also be quality assured by independent scrutiny and assurance. In 2011, 53 of the 55 state-owned companies presented a sustainability report. Further, 49 of the 53 sustainability reports were verified externally.

Turkey

GHG reporting scheme

Within the Regulation on Monitoring, Reporting and Verification of Greenhouse Gas Emissions (2012), all facilities must report emissions if their aggregated rated thermal input exceeds 20 MW. In addition, specified source categories are required to report irrespective of emissions level (e.g. heavy industry). The programme covered about 600 facilities in its

first year (Singh et al., 2015). Reporting only includes Scope 1 direct emissions. Data is not publicly available.

United Kingdom

As noted by the WTTC (2015), the ESG reporting focus in the United Kingdom has been on carbon reduction and energy efficiency. The United Kingdom has long been one of the leaders in developing climate change policies and programmes (Kauffmann et al., 2012). These include the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, and the cap-and-trade system with over 2,100 participants. In October 2013, the United Kingdom government introduced mandatory annual GHG emission reporting for quoted companies[8] in their directors' report. For estimating emissions, companies have to ensure that:

- A suitable, widely recognised independent standard is used, such as the GHG Protocol Corporate Standard
- The accounting approach covers emissions from all activities for which they are responsible globally
- All relevant greenhouse gases are included

Reports need to include the present and past years' emissions, as well as absolute and relative emissions. Assurance is recommended as good practice.

United States

The Greenhouse Gas Reporting Program

The US EPA enacted the Greenhouse Gas Reporting Program (Rule 74 FR 56260) in 2010. In general, the rule is referred to as 40 CFR Part 98 (GHGRP). Sources have to report if they emit more than 25,000 tonnes of CO_2e or if the aggregate maximum rated heat input capacity of the stationary fuel combustion units at the facility is 30 million metric British thermal units per hour or more. Some sources (mainly heavy industry and landfills) need to report independent of emission volumes. The programme covers over 6,700 entities or 85% of the nation's top emitters. A range of accepted methodologies that have to be used are prescribed for each source category.

Presidential Executive Order 13514

This order requires all federal agencies to measure and report on their sustainability performance, which includes assessing their supply chain. It is envisaged that this presidential executive order will have a greenhouse gas-reducing effect on contractors, suppliers and any business working with the federal government to report on their environmental impacts. The GRI reporting guidelines are used by some agencies. Reporting will include Scopes 1, 2 and 3, with reduction targets of 28% for Scope 1 and 2 emissions, and 13% for Scope 3 (EIA, 2011).

Aircraft emissions

In June 2015, the EPA, under section 231 of the Clean Air Act, initiated a procedure addressing air pollution by aircraft known as the 'endangerment finding'. In July 2016, the EPA released a final scientific assessment on the matter, which provides a legal prerequisite for the next step of determining whether GHG from aircraft need to be regulated (Centre for Climate and Energy solutions, no date). The path taken is likely to be determined by the outcome of the presidential elections.

[8] Officially listed on the main market of the London Stock Exchange, in a European Economic Area country, or admitted to dealing on either the New York Stock Exchange or NASDAQ.

5. Tourist demand for carbon information

5.1 Traveller awareness

A considerable amount of research has been undertaken on the environmental awareness of tourists in general, and on knowledge about the impacts of travel on climate change in particular (e.g. Eijgelaar et al., 2016; Higham et al., 2016). Broadly speaking, tourists are quite aware of the impact that travel has on GHG emissions and the global climate. Specific knowledge, however, is often lacking, and tourists tend to misjudge the magnitude of their own impact, the relative carbon intensity of travel compared with other activities, the benefits of other environmental behaviours (e.g. recycling) and the opportunities to reduce climate impacts (Becken, 2007). A recent study involving travellers from Norway, the United Kingdom, Germany and Australia confirmed that travellers need and want more information on their travel-related emissions, in particular with regards to greater transparency of carbon emissions of airlines (Higham et al., 2016).

While climate change knowledge is relatively high, tourists often fail to convert knowledge and attitudes into carbon-reducing behaviour. In fact, several studies showed that the environmentally conscious (or 'ultra green', see Davison & Ryley, 2014) often show the largest gap between attitudes and behaviours (Barr et al., 2010). The 'value–action' gap has been studied widely and has been particularly evident for the 'away-from-home' context, compared with everyday life at home (Higham et al., 2016). An example of an innovative attempt to raise awareness and encourage tourists to opt for low-carbon options is shown in the box below (case study Courtyard Marriott Hotel, Zurich).

Researchers have pointed to the need to make carbon information more readily available to travellers, suggesting that carbon calculators could support behavioural changes among travellers (Padgett et al., 2008). More recently, Liu et al. (2015) tested that the display of a calculator along with the booking of an air ticket for Chinese travellers did not affect positive attitudes or purchase of carbon credits. Several research projects have assessed and compared the carbon emissions of different types of tourist trips (Table 4), and this information has then been used to raise awareness (Scott et al., 2008) and discuss ethical and policy implications of travel (Gössling et al., 2008).

Courtyard by Marriott – climate-friendly room

Courtyard by Marriot in Zurich has been offering a myclimate room since 2011 as a commitment to climate protection. 2014 saw the 10,000th booking of a myclimate room. In celebration of this achievement, myclimate set up a stall at the local Christmas market in Zurich Oerlikon at the end of 2014. The stall was designed to look like a hotel room, including furniture and bed linen borrowed from the nearby Courtyard by Marriott. Visitors to the market were offered the chance to take part in a climate and consumption-based competition to win a stay in a myclimate room. The Courtyard in Basel and in Munich will also be offering myclimate rooms.

Source: myclimate.

Table 4 Examples of carbon emissions per tourist-day for different types of trips

Context	GHG emissions	Source
Fly-and-cruise to Antarctica	Ca. 500 to 600 kg CO_2e per day	Amelung & Lamers (2007)
Average tourist trip	490 kg CO_2e per tourist per day	Farreny et al. (2011)
Average global tourist trip, including transit transport	250 kg CO_2e per day	Scott et al. (2008)
Visit to South West England, including transit transport	196 kg CO_2e per day for international tourists 49 kg CO_2e per day for domestic overnight tourists and 48 kg CO_2e per day for day visitors	Whittlesea & Owen (2012)
Holiday from Europe to Thailand (two-week stay)	171.4 kg CO_2e per day	Amelung & Lamers (2007)
Average emissions for international visitor to island destination, including air travel	64.8 kg CO_2 to Jamaica per day 193.1 kg CO_2 to Seychelles per day	Based on Gössling et al., 2008
10-day hypothetical holiday from the United Kingdom to Portugal (Algarve), including air travel	44.5 kg CO_2e per day	Filimonau et al. (2013)
Pilgrimage to the Hajj (United Arab Emirates)	60.5 kg CO_2e per day	Hanandeh (2013)
Visit to Penghu Island, Taiwan	34.1 kg CO_2e per day	Kuo & Chen (2009)
Emissions per tourist travelling in New Zealand (excluding international air travel)	27.5 kg CO_2e per day for domestic tourists; 13.0 kg CO_2e per day for domestic tourists	Becken (2009)

5.2 Carbon calculators

Background

Carbon calculators are tools to estimate GHG emissions from certain activities. In most cases in the Travel and Tourism industry, carbon calculators are used to estimate emissions *before* the trip is initiated or even purchased. This anticipation component, together with the limited accessibility of relevant data, scientific uncertainties related to certain emissions and inconsistent methodologies for allocating emissions from companies to tourists, are specific challenges that jeopardise a homogeneous and credible approach.

Issues with calculators

Most tools available in Travel and Tourism are simple carbon calculators that allow companies or travellers to estimate GHG emissions. Typically, these focus on air travel emissions, but some provide a more holistic view and include emissions for other tourism activities. While calculators are an important tool, comparative research on calculators has found that they often lack consistency and transparency, leading to quite different outcomes depending on the calculator used (Gössling et al., 2007; Juvan & Dolnicar, 2014; Padgett et al., 2008).

One study has specifically investigated the comparability of 50 travel calculators (see Juvan & Dolnicar, 2014). The research found that for an exemplary international flight, there was a difference in emission estimates of 540%. The authors explained that differences resulted from different (and sometimes dated) underlying data sources, choice of emissions factors, consideration of additional non-CO_2 effects at high altitude and assumptions about detour and delay factors. However, most calculators provide very little information on these details, making it very difficult to judge their integrity.

Juvan and Dolnicar (2014) tested the usability of 73 different carbon calculators for four typical tourist itineraries. They concluded the following: there is a large number of calculators available, but only few are suitable to assess tourist emissions. Many were difficult to use and did not appear credible to a sample of 261 university students from Australia and Slovenia.

Travel and Tourism examples

The following calculators are examples of more commonly used calculators in the context of Travel and Tourism:

ICAO Carbon Emissions Calculator

To provide a global and universal way of estimating air travel emissions, ICAO has developed a methodology that considers, among others: travel distance, aircraft types, load factors, cargo carried and booking class. The calculator has been developed to provide credible information for carbon offset programmes. The calculator is available online and as a mobile phone app. The full explanation of the calculation methodology and sources of data are available for the public.

Atmosfair

Atmosfair is a climate protection organisation with a focus on travel. Atmosfair offers offsetting options for air travel, cruises and events. It also provides detailed background information on the impacts of aviation and the EU ETS. Atmosfair focuses on renewable energy projects, in particular in developing countries. Sustainable development is a recognised co-benefit.

myclimate

myclimate offers several calculators, including for flights, car travel and events. The event calculator is comprehensive and includes the event itself, as well as related accommodation and transport emissions. If remaining emissions are offset, the event receives the 'Climate-Neutral Event' label. Compensation projects are verified (Gold Standard, CRM, Plan Vivo) and reduce emissions with a focus on long-lasting development worldwide.

CarboNZero

Based on a university-based research project (Becken, 2002), Landcare Research (a New Zealand Crown Research Institute) developed a comprehensive Travel and Tourism calculator that allows travellers to calculate their GHG emissions for air travel, New Zealand-specific accommodation and recreational activities. Emissions are measured in carbon dioxide equivalents (CO_2e), and carbon offsets can be purchased through the programme.

5.3 Voluntary carbon offsetting

Travellers/tourists

Tourists who want to mitigate the impact of their emissions can either change their travel behaviour or purchase carbon credits through carbon offsetting programmes. The practice of 'compensating' carbon emissions has become more common, but is still at a very low level, possibly on the order of several percent of travellers (McLennan et al., 2014). Higham et al. (2016) found widespread scepticism and uncertainty about carbon offset schemes among travellers from four Western Countries.

Several factors have been found to positively influence people's willingness to mitigate emissions from (air) travel. These are:

- Belief in climate change (Choi & Ritchie, 2014).
- Positive emotions and benefits (Chen, 2013).
- Awareness of tourism's negative impacts (Davison et al., 2014; van Birgelen et al., 2011).
- Pro-environmental attitudes (Mair, 2010).
- The perceived importance/effectiveness of a particular behaviour (i.e. efficacy) (van Birgelen et al., 2011).
- Participation of others and social norms (Araghi et al., 2014; Blasch & Ohndorf, 2015; Chen, 2013).
- Self-perception (van Birgelen et al., 2011) and self-worth (Liu et al., 2015).
- Gender. Choi & Ritchie (2014) found that females more likely to offset, although Mair (2010) could not find gender differences.
- Income. Higher incomes lead to higher willingness to mitigate emissions) (Blasch & Ohndorf, 2014).

Table 5 provides a summary of studies that investigated tourists' views on climate change impacts of travel and their willingness to consider behavioural changes, including travellers' Willingness To Pay (WTP) for carbon compensation.

Table 5 Key studies on tourists' concern about carbon emissions and willingness to engage in travel-related mitigation.

Source	Country and year	Concern about climate change and awareness of travel impacts	Willing to travel less
Eijgelaar et al.	Netherlands, 2016	Participants displayed strong environmental values in life, but, as tourists, the desired freedom to travel was more important than environmental concerns.	21.7%: 'Yes I would choose a holiday with lower emissions in the future'.
Blasch & Ohndorf	Switzerland and USA, 2015	Study found four segments, of which one (31% of sample) showed very high awareness.	
Choi & Ritchie	Australia, 2014	33% believed that carbon offsets would have a positive effect.	
Hagmann et al.	Germany, 2015		
McLennan et al.	Australia, 2014		
Lim & Yoo	Korea, 2014	88% of respondents regarded environmental preservation as important.	
Lu and Shon	Taiwan, 2012		
McKercher et al.	Hong Kong, 2010	80% of regular international travellers are concerned about climate change.	3.4% of regular international tourists plan to travel less often.
Mair	Australia and United Kingdom, 2010	36% of the sample was 'ecocentric', showing high environmental values.	
Davison and Ryley	United Kingdom, 2010		8% will travel less because of the environment.
MacKerron et al.	United Kingdom, 2009		
Gössling et al.	Sweden, 2009	71% concerned and 82% aware of their impact.	Less than 25% consider shorter distances in the future.
Brouwer et al.	Netherlands, 2008		
Hooper et al.	United Kingdom, 2008	75% aware of climate impact of travel.	

Willing to buy carbon offsets	Willingness To Pay (WTP) to offset emissions	Offsets bought	Further notes
			Testing the impact of a carbon label on consumer decision making related to air travel.
	USD 42.4 per tonne of CO_2 for aware segment.		Refers to air travel. Also found for 'medium aware' segment: WTP for emissions from air travel of USD 9.75, for hotels of USD 39.03, and for rental car of USD 31.87.
39% showed a positive intention.	AUD 21.38 per tonne of CO_2.	30% bought in past.	Renewable energy projects in developing countries were most popular. Support for mitigation by airlines was also found.
31.9% had heard about offsetting	Half of respondents willing to pay GBP 10 for lower emissions flight.	7.6% bought in past.	47.7% heard of EU ETS and 64.4% perceived it to be effective.
		2.1–2.7% for this trip.	International visitors to Australia; air travel emissions.
	USD 1.25 per train journey.		Only WTP study on train travel.
	USD 20–28 per tonne of CO_2.		65% of respondents did not know about offsetting programmes.
	USD 25 per trip.	'Virtually non-existent'.	Awareness of carbon offsetting programmes offered by airlines was low.
		5% (UK) – 16% (Aus.) bought in past.	
			A security-concerned segment (9%) was also identified, who are discouraged from flying because of security concerns.
	GBP 11.1–13.2 per tonne of CO_2.		
Less than 30% consider buying offsets		2%	Only less than 5% knew about offsetting options with their airline.
	GBP 25 per tonne of CO_2.		
Less than 10%.			Less than 50% were aware of offsetting options.

Companies offsetting on behalf of tourists

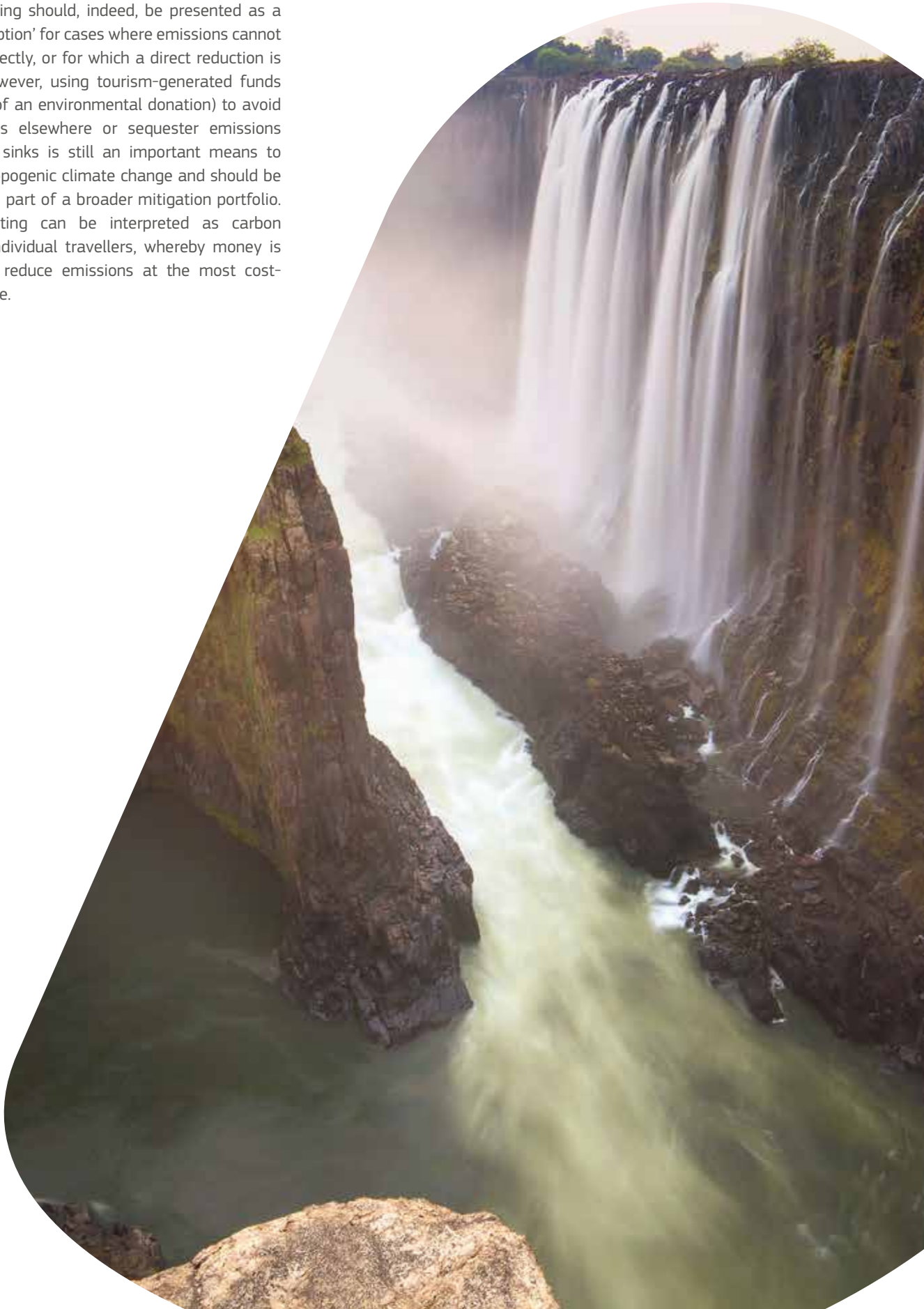
A number of companies provide information on carbon emissions to their customers. In the airline industry, 50% of IATA members communicate information on environmental initiatives to their customers, typically focusing on technological improvements and management. However, only about one third actually provide opportunities to customers to offset (Becken & Mackey, 2016). Some Travel and Tourism companies have begun to offer carbon offsetting to their customers, or they include carbon compensation as part of their ticket prices (Table 6). Often these companies represent niche markets or relate to nature-based forms of tourism.

Some have consciously moved away from carbon offsetting. The travel agent Responsible Travel states on its website: 'In 2002 we were the first travel agent to offer carbon offsetting; in 2009 we believe were one of the first to stop offering offsets to customers. Why? We believe that offsetting distracts from the real issues – that is, we all need to be reducing our carbon emissions as much as possible. Offsetting flights has too often been seen as an opportunity to go on flying the same amount or more.' A similar concern is expressed by Tourism Concern, pointing to the need for behavioural change rather than continuing business-as-usual through purchasing carbon credits.

Table 6 Examples of companies incorporating carbon offsetting into their operations.

Company	Offsetting information	Projects
AdventureSmith Exploration	'When you purchase a cruise with AdventureSmith Explorations we have paid to neutralise the impact of harmful greenhouse gases that were emitted as a result of your cruise. AdventureSmith Explorations has calculated and offset the emissions resulting from your cruise.'	Invests in projects around the world that benefit local communities or businesses in a developing country; examples include: methane collection and electricity generation in South Africa, solar collectors instead of diesel boilers in Costa Rica and weatherising low-income housing in the US.
Spirit of Japan Travel	'We'll offset your carbon footprint. You will no longer feel guilty if you are climate conscious. We calculate and offset your carbon footprint, every trip, every time.' 'All the carbon emission associated with energy required to operate our office, transportation provided for travellers and guides, and accommodations is calculated.'	Company calculates carbon footprints for tourists, and offset on their behalf. Invests in tree planting and sea turtle conservation in Japan. Invests in renewable energy devices.
Intrepid Travel	Offsets global business emissions (from offices and retail stores) and business trips; offers carbon offset flights to passengers booking their flights through Intrepid.	Project example: the Akbük Wind Farm in Turkey.
Ecoventura	Carbon emissions from the company's four yachts (and offices including business travel) are reduced, then offset by a portfolio of projects.	Installation of 40 solar panels and two wind turbines to the upper deck of the vessel (USD 100,000). Emission reduction by 10% through high-performance oil filters and other methods.
Hotelplan Suisse	The Swiss tour operator has systematically integrated carbon offsetting into the advice that it offers customers, and is offsetting its own emissions.	Carbon offset project in the Amazon, Brazil, which promotes the transition from diesel to the more climate-friendly Forest Stewardship Council wood chips for power generation.
Harbour Air Seaplanes Canada	All flight services include a carbon offset surcharge that is used to mitigate the environmental impact of the GHG emissions associated with the flight.	Fuel switching and energy efficiency projects. Became North America's first carbon neutral airline in 2007.

Carbon offsetting should, indeed, be presented as a 'second best option' for cases where emissions cannot be reduced directly, or for which a direct reduction is too costly. However, using tourism-generated funds (in the sense of an environmental donation) to avoid GHG emissions elsewhere or sequester emissions in (biological) sinks is still an important means to slowing anthropogenic climate change and should be encouraged as part of a broader mitigation portfolio. Carbon offsetting can be interpreted as carbon markets for individual travellers, whereby money is exchanged to reduce emissions at the most cost-effective source.



6. Touchpoints

6.1 How are carbon offsets purchased?

The global system of travel booking is complex, and accordingly the opportunities to understand and mitigate one's carbon emissions are various and not always easy to understand for the individual traveller. Moreover, the purchase of carbon offsets or credits is often a parallel rather than an integrated process. Potential travellers may book their trip (airfare and/or other components) via a travel agent or directly with the airline, and in either case the offers (and methods used) for carbon offsetting are likely to differ. In almost all cases, except when a corporate agent provides an integrated service (note that in that case the agent will most likely engage a third party to estimate emissions and provide carbon reduction units or credits), the traveller has to take several steps to calculate and pay for emissions.

A system that delivers the calculated carbon emissions (e.g. based on widely accepted ICAO factors, or alternatively airline-specific factors) as an integral piece of information with the ticket and includes payment in the same transaction is yet to be created. Such a system, if applied consistently and universally, would provide better transparency, credibility and customer service.

6.2 Carbon labels

One way of making 'climate friendly' alternatives options recognisable to travellers is carbon labelling, including comparative labelling for airlines and route choices. The Eurobarometer (2009) found that 72% of EU citizens believe that a label indicating a product's carbon footprint should be mandatory in the future.

To date, however, carbon labels in tourism are in their infancy, and the approaches to certification and labelling are inconsistent (Gössling & Buckley, 2016). The effectiveness of carbon labels is limited due to lack of knowledge among tourists, limited credibility (or scepticism) and lack of belief that choosing a labelled company will address climate change effectively. Gössling and Buckley (2016) further found that labels would be more successful if they were communicated by a not-for-profit organisation, ideally building on already existing labels, such as energy labels for appliances.

The effectiveness of ecolabels might differ for different consumer markets. Dutch consumers, for example, are only making very limited use of labels during their holiday decision making (Eijgelaar et al., 2016), but research on potential travellers from China found labels to be an effective tool to enhancing the purchase of carbon offsets. This was explained by the social status that such a label might provide (Liu et al., 2015).

6.3 Booking tools

A small number of companies or organisations have developed online platforms on which travellers can compare the carbon footprint of different products. Three examples include:

atmosfair Airline Index 2015

This index compares the carbon efficiency of the 190 largest airlines globally. The calculation is based on: aircraft type, engines, winglets, seating and freight capacity and load factors for passengers and freight. atmosfair developed this index to add emissions as an additional factor in traveller's decision-making process.

The index measures an airline's carbon competitiveness by a score between 0 and 100 efficiency points. Flights fall into three categories, namely short, medium and long haul. For corporate clients, atmosfair offers specific analyses of individual routes.

BookDifferent

BookDifferent is an online travel agent for accommodation around the world. Information on the carbon footprint associated with hotels was derived in partnership with NHTV Breda as part of the 'Carbon management for tour operators' (CARMATOP) project. Since February 2015, BookDifferent publicises the carbon emission figures for more than 591,000 hotels. The carbon emissions information complements information on which a hotel is environmentally certified, thus providing several measures for customers to identify a 'green hotel'.

GreenHotelWorld

GreenHotelWorld is a climate-focused online travel agent, which offsets the carbon emissions of all overnight stays of their travellers (with myclimate). More than 130,000 hotels are accessible through this booking site. Users of the booking tool can sort hotels by selecting several green practices, and by certification. This feature is in addition to the usual options, such as price, reviews, stars and distance from landmarks.

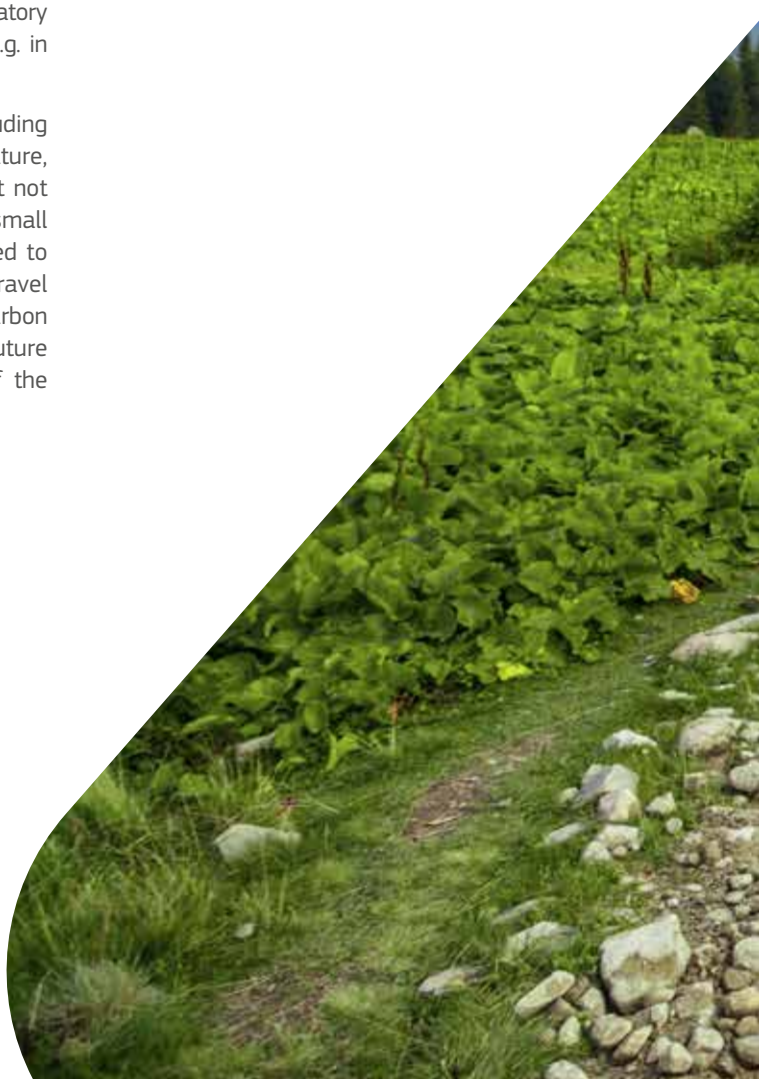
7. Conclusions

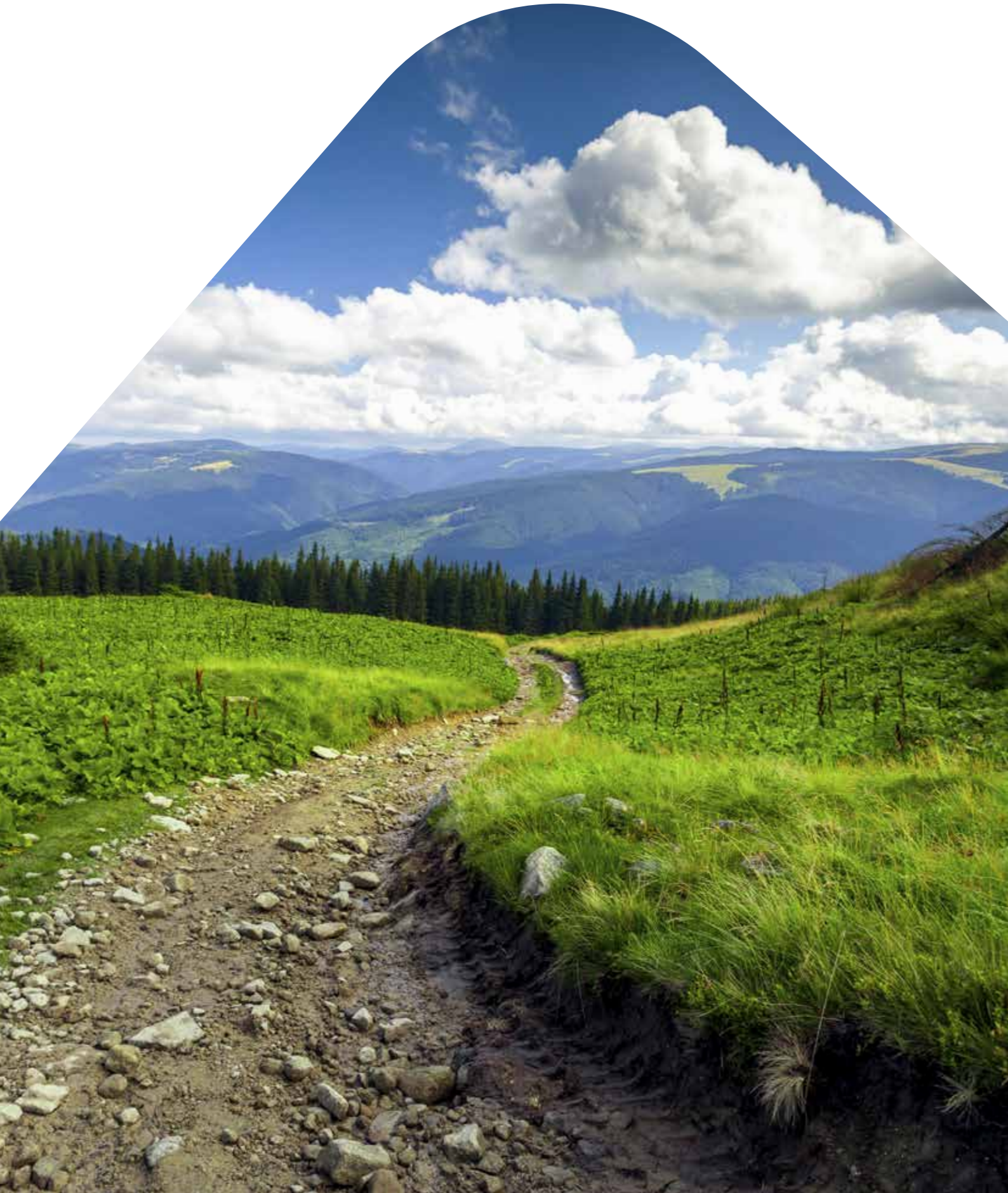
This White Paper aimed to provide a critical assessment of the status of carbon reporting and disclosure in the Travel and Tourism industry. The most important accounting frameworks and standards were introduced, and it was shown that Travel and Tourism companies are increasingly making use of them. Large-scale uptake is yet to be achieved, and major improvements in reporting quality are essential, in particular in relation to performance-reporting (quantified emissions and reductions). Increasingly, investors and financial institutions are considering carbon performance in their decision making.

Increased focus on Scope 3 reporting is also beginning to impact tourism, in that companies have to become better in their reporting of indirect emissions, but also because the non-tourism company's reporting will increasingly include transport-related emissions. Countries are already implementing policies that stipulate mandatory reporting, including indirect transport emissions (e.g. in France under the Grenelle II Act).

Tourist demand for low-carbon products, including carbon offsets, is largely of a passive nature, where travellers are aware of their impacts, but not necessarily willing to make significant changes. A small but consistent group of consumers are dedicated to reducing emissions, manifested in changes to travel behaviour, purchase of carbon offsets, use of carbon calculators and low-carbon booking tools. Future research should investigate what proportion of the currently less-committed types of travellers would participate in schemes that offer highly transparent, credible and convenient solutions.

There is an opportunity to create a virtuous cycle for emissions reductions and carbon offsetting, by first providing robust and transparent carbon estimations, followed by easy and seamless links to low-carbon options and carbon offsetting programmes. Increased uptake creates social norms, which further encourage broader participation and consideration of carbon-relevant behaviours. The power of mass communication and reach of current technologies in the Travel and Tourism industry cannot be underestimated as catalysts and change agents.





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