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The path toward eco-friendly travel in China

Joint research in travel sustainability in China

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Preface: The world is facing an unprecedented sustainability challenge

One need not look further than daily news headlines for a reminder about the many challenges to sustainability our planet is facing: climate change, plastic pollution, depletion of natural resources, carbon emissions, waste generation, and global warming, to name a few. The influence of human beings and their activities on nature is transforming the earth—rising sea levels, recurring droughts, and climbing temperatures are some of the warning signs that action must be taken.

If the current warming trend continues, global average temperatures could climb to between 1.9 and 2.9°C above preindustrial levels by 2100, mainly due to greenhouse gas emissions such as carbon dioxide (CO_2), methane, and nitrous oxide.[1]

Solid waste contributes to nearly 5 percent of global greenhouse gas emissions—a situation worsened by improper waste management and food waste. Frequent and improper plastic waste disposal is a global problem, as waste can find its way into marine and freshwater ecosystems. Marine organisms might suffocate or starve if they become entangled in litter, or they may ingest plastic debris, introducing plastic particles into marine food webs.[2] If this situation deteriorates over the next decade, even with the current level of commitments by governments and industries to reduce waste, the amount of plastic waste in the ocean will add up to between 22 million and 58 million tons per year—the equivalent of dumping a football stadium full of waste into the ocean every day.[3]

The effects of climate change on the earth's water resources and systems, and the mismanagement of this most valuable resource, have been severe. Since 1900, the world has lost half of its wetlands, and water shortages have resulted in destabilized natural ecosystems.[4]

These physical shifts in our natural environment have severe socioeconomic repercussions for the human system. McKinsey Global Institute, in its report *Climate risk and response: Physical hazards and socioeconomic impacts,* developed a five-systems framework to capture how climate threats disrupt human life. The five dimensions are: livability and workability, food systems, physical assets, infrastructure services, and natural capital.[5]

- **Livability and workability.** As temperatures rise, heat stress could hamper humans' ability to work outdoors or, in extreme cases, could put their lives at risk. McKinsey Global Institute estimates that by 2050, between 700 million and 1.2 billion people globally could be living in regions where at least one heatwave a year is experienced—where temperatures exceed the threshold for survivability for a healthy human being in the shade (not factoring in air-conditioning penetration). These regions' excess heat and humidity could double working hours lost. Warmer temperatures could also proliferate and shift disease vectors to the detriment of human health. Inadequate waste management is particularly taxing on the urban poor, as it threatens their livelihoods, health, quality of housing, and access to services.

1 Ole Rolser, Bram Smeets, and Rune van der Meijden, "Charting the global energy landscape to 2050: Emissions," McKinsey, December 1, 2022.
2 Silpa Kaza, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden, *What a waste 2.0: A global snapshot of solid waste management to 2050*, Urban development series, Washington, DC: World Bank Group, 2018.
3 Laura Parker, "Plastic pollution is a huge problem—and it's not too late to fix it," National Geographic, October 6, 2020.
4 "Threats: Water scarcity," WWF website.
5 For the full McKinsey Global Institute report, see *"Climate risk and response: Physical hazards and socioeconomic impacts,"* McKinsey Global Institute, January 16, 2020.

- **Food systems.** Drought, continued water supply shortages, extreme temperatures, and floods affect land and crops, which could disrupt food production. According to McKinsey Global Institute estimates, around 1.1 billion people globally lack access to fresh water, and around 2.7 billion have limited access for at least one month of the year. Water, soil, and ocean pollution from inadequate waste management also diminishes crop and fishery yield. Food systems globally would likely suffer increased yield volatility.
- **Physical assets.** Natural disasters such as extreme precipitation, tidal flooding, and forest fires could damage or destroy physical assets like buildings. The destruction could even extend to entire networks of assets, such as a city's central business district. For example, in Florida, average annual losses for residential real estate due to storm surge damage are $2 billion today are projected to increase to about $3 billion to $4.5 billion by 2050.
- **Infrastructure services.** Infrastructure assets could be damaged or disrupted, leading to a decline in services or a rise in cost. A range of climate threats, including heat, wind, and flooding, can disrupt infrastructure services, destabilizing other sectors that rely on them. For example, power systems could become less productive under higher temperatures.
- **Natural capital.** Climate change is disturbing the balance of ecosystems. The destruction of natural capital, such as ocean ecosystems, forests, and glaciers, endangers human habitat and economic activity. For instance, glaciers are losing an average of 335 billion tons of ice and snow annually, raising sea levels by one millimeter a year and diminishing the provision of fresh water to one-sixth of the global population.

Globally, stakeholders are already starting to move in the right direction, recognizing the productive balance between maintaining effective sustainability programs and creating business value—83 percent of Fortune 500 companies acknowledge climate change and have set climate-relevant targets.[6] While companies may be contributing to the loss of natural capital, they could take action to reverse natural capital depletion whilst generating a positive return on investment. This balance does, however, require support and effort from society as a whole.[7]

The travel and tourism industry is uniquely positioned to advance the sustainability agenda. This diverse, global industry accounts for between 8 and 10 percent of the world's emissions (including direct and indirect emissions across the entire travel and tourism value chain).[8] Given the diversity of actors in the travel and tourism ecosystem, decisive action is needed across the industry to reduce its environmental footprint.

This report examines how the Chinese travel industry impacts the environment and what actions travelers and tourism providers could take to achieve real sustainable travel.

7 *Nature in the balance: What companies can do to restore natural capital*, McKinsey, December 5, 2022.
8 *A net zero roadmap for travel & tourism: Proposing a new target framework for the travel & tourism sector*, World Travel & Tourism Council, November 2021.

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Executive summary

The world is facing an unprecedented sustainability challenge. Carbon emissions are causing global temperatures to climb, waste generation is polluting the oceans, and water systems are under threat. Tourism is a fragmented and often overlooked source of environmental damage—however, the sector's combined footprint along the value chain is substantial.

The Chinese tourism industry has a critical role to play in championing sustainable travel. In 2019, Chinese travelers took six billion domestic leisure trips, and over 150 million international trips from mainland China.[9] Analysis for this report shows that tourism accounted for an estimated 6 to 8 percent of mainland China's total carbon emissions. Accommodation generated 60 percent of domestic travel emissions, mostly due to high energy consumption. Though only one percent of domestic trips involved a flight, aviation was the top emitter in the transportation sub-sector. Accommodation is also responsible for the majority of water use from showers, bathing, and laundry. Waste is generated at all points in a journey.

Data from a recent McKinsey sustainable travel survey reveals that Chinese travelers are concerned about climate change and are starting to seek out sustainable options.[10] But they are unwilling to pay more for sustainable travel solutions. Chinese tourists believe that climate-friendly travel is a shared responsibility, looking to the government and industries to make tourism more sustainable.

Travelers themselves can make smart trade-offs to immediately reduce their environmental footprint. For example, they can slow trips down by spending more time at one destination, travel by rail instead of taking flights for short-haul trips, reduce the frequency of cleaning services at hotels, and refuse single-use plastics. This report shows that by making smarter decisions, and with the help of incentives from travel providers, travelers could reduce 10 to 20 percent of their environmental footprint on a typical trip.

6-8%

of mainland China's total carbon emissions in 2019 were generated by tourism

Tourism providers can support travelers in making sustainable choices. This includes making climate-friendly options more visible—for example, by using food labelling to indicate carbon emissions—and incentivizing sustainable actions through rewards programs and discounts. Industry actors can also do a lot to reduce their environmental footprint directly, identify sustainability gaps in their operations, and develop new compelling sustainability plans. Upgrades to hotel infrastructure can help cut down on carbon emissions, water wastage, and improper waste management. Industry actors could also upgrade building insulation to minimize energy loss, install solar panels to harness renewable electricity, and engage their suppliers to promote sustainability across the value chain. Innovative sustainable technologies, like machine learning solutions, also support greener practices by monitoring and optimizing the consumption of resources in real time.

However, to realize the future of sustainable travel, collaborative industry and stakeholder action will be needed. Transitioning to sustainable practices is often costly. Widespread adoption of sustainable solutions will require sharing knowledge, forming industry-wide binding agreements, unlocking green funding, removing the supply-demand deadlock on sustainable technologies, and unifying certification standards.

Working together, the industry can move China's tourism toward a sustainable future.

[9] "Silent Spring: Tourism's way to fight the epidemic," McKinsey, February 28, 2020; Yang Qian, "The National Economic and Social Development Statistical Bulletin issued by the National Bureau of Statistics shows that in 2019, there were 6.01 billion domestic tourists, and the domestic tourism revenue was 5,725.1 billion yuan," The Ministry of Culture and Tourism of the People's Republic of China, March 2, 2020.

[10] This survey will be published later in 2023.

This report shows that by making smarter decisions, and with the help of incentives from travel providers, travelers could reduce 10 to 20 percent of their environmental footprint on a typical trip.

China's tourism sector plays a critical role in addressing the sustainability challenge

People love to travel. It is a way to connect, learn about other cultures, and visit friends and family. In many cases, travel was what people missed most during COVID-19-related restrictions. Before the pandemic upended lives and livelihoods, the global tourism industry grew unimpeded for 60 years. Globally, tourism outpaced all other economic sectors, and by 2019, was one of the largest. The travel industry added $8 trillion to the global economy that year, just over 10 percent of global GDP.[11]

Unfortunately, this beloved activity has compounded the world's sustainability challenge. The tourism industry's value chain is teeming with diverse stakeholders and activities, so it is easy to overlook the environmental footprint of individual actors. Their combined impact, however, is substantial. Visitors add wear and tear to the natural environment in the form of pollution, overuse of natural resources, poor waste management, and harm to endangered species. For example, humans have damaged nearly 80 percent of the reefs in Thailand's popular Koh Khai islands.[12]

Chinese tourism plays an important role, domestically and internationally

In the past decade, Chinese tourism's total revenue saw double-digit annual growth. Just before COVID-19's shock to the industry, the country's six billion domestic and 155 million outbound trips from mainland China resulted in around $1 trillion travel spend. This propelled mainland China to the top of global rankings for domestic tourism spend and outbound traveler numbers.[13] Furthermore, in 2019, Chinese tourism was responsible for 4.56 percent of the country's GDP.[14] These figures show that China's tourists and tourism industry are important for economic growth at home and abroad—and potentially have a role to play in the global travel industry's sustainability.

Confidence in post-pandemic tourism recovery is growing. McKinsey's outlook for China's tourism sector revealed that Chinese travelers express a desire to travel both domestically and abroad. With domestic and international reopening policies in place, tourism's recovery is on the horizon.[15] And according to the World Travel and Tourism council, mainland China is expected to have the largest tourism market by 2032.[16]

As China's tourism bounces back, it is more urgent than ever to tackle the industry's contribution to environmental damage. Carbon emissions are one of the most pressing threats. Electricity consumption (mainly hotel heating and air conditioning) and transport (especially flights) are the main sources of emissions.[17] Compared with long-haul flights, short-haul flights associated with domestic travel have higher emissions per distance traveled as emission intensity during take-off and landing is higher than at cruise stage.[18]

6 billion

domestic trips and 155 million outbound trips from mainland China in 2019 resulted in $1 trillion travel spend

[11] *The future of work in the tourism sector: Sustainable and safe recovery and decent work in the context of the COVID-19 pandemic*, International Labour Organization, March 25, 2022.
[12] *Coping with success: Managing overcrowding in tourism destinations*, McKinsey, December 14, 2017.
[13] "Silent Spring: Tourism's way to fight the epidemic," McKinsey, February 28, 2020; Yang Qian, "The National Economic and Social Development Statistical Bulletin issued by the National Bureau of Statistics shows that in 2019, there were 6.01 billion domestic tourists, and the domestic tourism revenue was 5,725.1 billion yuan," The Ministry of Culture and Tourism of the People's Republic of China, March 2, 2020.
[14] "2019 tourism and related industry GDP reached 4.4989 trillion RMB in China", National Bureau of Statistics, December 31, 2020.
[15] Steve Saxon, Chen Wei, and Yu Zijian, "Out of the haze, China's tourism market begins to recover," McKinsey, December 30, 2022.
[16] "U.S. retains its position as the world's biggest Travel & Tourism market despite lengthy travel restrictions by boosting domestic travel," World Travel and Tourism Council, September 6, 2022.
[17] Lien-Chieh Lee *et al.*, "The nexus of water-energy-food in China's tourism industry," *Resources, conservation and recycling*, January 2021.
[18] Brandon Graver, Kevin Zhang, and Dan Rutherford, CO2 emissions from commercial aviation, 2018, The International Council on Clean Transportation working paper, A40-WP/560, EX/237, September 2019.

More frequent take-offs and landings also exacerbate noise and air pollution, which can harm nearby residents and natural ecosystems. Moreover, waste generated during a trip, including packaging, disposable consumables, and food waste, is detrimental to the environment if not collected and disposed of properly.

With its huge traveler numbers and market size, Chinese tourism can play a critical role in advancing the sustainability agenda and achieving net-zero. Changes in daily travel activities can lead to significant improvements—and the combined actions of such a large volume of travelers can make a difference to global emissions.

Considering that mainland China had more outbound international visitors than any other country in 2019, this volume of travel and tourism can have significant sway not only on China's resources but also on global carbon emissions levels.[19]

With its huge traveler numbers and market size, Chinese tourism can play a critical role in advancing the sustainability agenda and achieving net-zero.

[19] "Silent Spring," February 28, 2020.

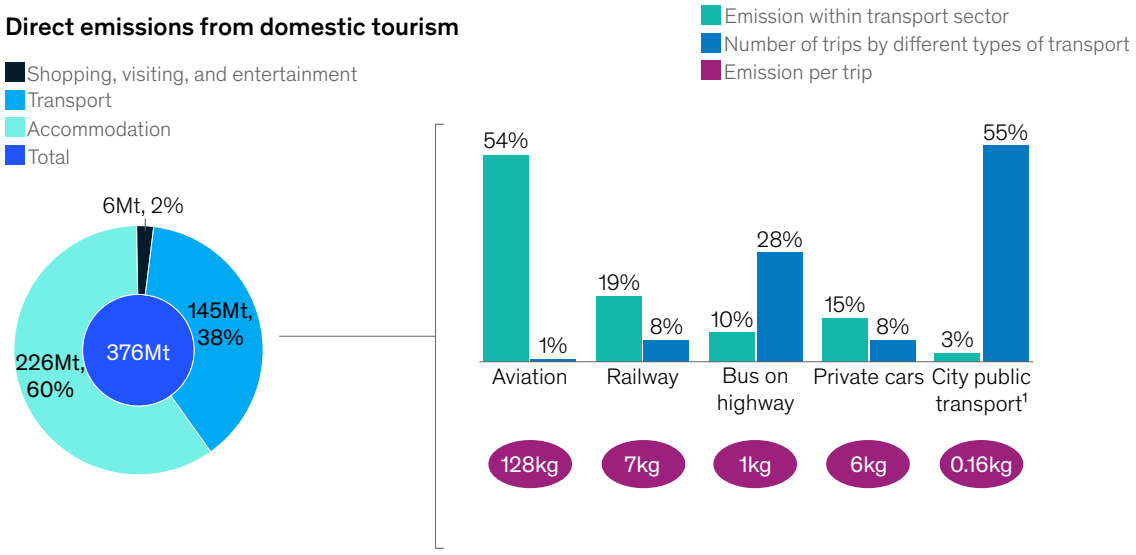
Travel in China: Calculating its environmental footprint

To put travel's environmental footprint into perspective, the following section quantifies the effect of mainland China's domestic tourism on carbon emissions, water consumption, and waste generation.[20] It is worth noting that the damage caused by tourism is not limited to these three elements; other crucial threats including air pollution, deforestation, and biodiversity loss are not included in the scope of this report.

Exhibit 1

The accommodation sector has the largest share of carbon emissions in domestic tourism, followed by aviation in the transport sector.

Scope 1 and 2 carbon emission of China domestic tourism in 2019, CO_2e



[1] Includes city buses, metro, and taxi. 20% of the trips through public transport is for travel purposes based on the assumption that each domestic traveler takes four public transport journeys per trip.
Source: Press search; McKinsey analysis

- **Carbon emissions.** Several studies have shown that global tourism and its affiliated sectors produce between 8 and 11 percent of total global emissions, around half of which are direct emissions.[21] In 2019, mainland China's domestic tourism generated approximately 800 megatons (Mt) CO_2e in total. This accounts for about 6 to 8 percent of overall emissions in China, of which about 50 percent are direct emissions (Exhibit 1). Most direct emissions come from accommodation (around 60 percent), followed by tourism transport (around 35 percent). Analysis for this report also shows that within transport, aviation is the heaviest emitter at approximately 20 percent. The domestic tourism activities that make up the remaining 5 percent of emissions include the transport and electricity consumed during sightseeing, entertainment, and shopping activities.

[21] Manfred Lenzen *et al.*, "The carbon footprint of global tourism," Nature Climate Change, May 7, 2018; "WTTC unveils world-first global travel & tourism climate footprint data," World Travel & Tourism Council, November 29, 2022; and Varsha Arora, "Tourism's carbon emissions in 25 countries: New Skift research," Skift, July 8, 2021.

- **Water consumption.** Domestic tourists consumed between seven billion and eight billion cubic meters (m^3) of water in 2019, which would be enough to fill six million Olympic-size swimming pools.[22] Accommodation accounted for about 50 percent of this, and the rest was used for food preparation, personal hygiene, and drinking.
- **Waste generation.** Travelers are constantly on the move, and thus tend to use more disposable products than they would at home and also discard leftover food. Analysis for this report revealed that mainland China's domestic tourists generate 12 to 14Mt of solid waste annually. If laid flat, this garbage could cover 3,600 football fields. The average tourist generates 0.6 to 0.8 kilograms of waste per day, between 20 and 30 percent more than most individual residents in China produce daily.[23]

To put these numbers into context, the following scenario illustrates the environmental footprint of one tourist trip—in this case, a three-day round trip by air between Beijing and Shanghai. This example may not be representative of a typical journey, as short and medium distances could also be covered by road or rail. But in this case, where the travel distance is further than 1,000km, flight is just as popular a choice as other modes of transport. (Studies show that if high-speed rail is available, travelers are less likely opt for high-speed rail travel if the distance exceeds 1,000km, with only around 25 percent of passengers preferring rail to air travel for distances between 1,000 and 1,500km, and around 10 percent selecting rail for distances over 1,500km.[24])

In this scenario, the traveler takes a private car to the airport and, after the flight, catches a taxi to their hotel. During the three-day hotel stay, the traveler uses the single-use consumables that the hotel provides, including water bottles, soap wrappers, and combs. The traveler showers every morning and enjoys one bath on their last night. Towels are washed and replaced daily, and the bedsheets are changed once. For meals, the traveler eats breakfast at the hotel and dines out for lunch and dinner, leaving behind a small amount of leftover food per meal. As the traveler sightsees and shops, they acquire disposable plastic packaging, discarding these immediately after use. The traveler also generates other waste such as tissues and bottles (Exhibit 2).

The total Scope 1 and 2 emissions that this trip generates add up to approximately 330kg CO_2e. These include direct emissions from fuel spent by hotels, transport, and other tourism assets, as well as indirect emissions from the generation of electricity, steam, and heating and cooling that tourism providers consume. This mass is equal to almost five times the average weight of an adult man in China.[25] Transport accounts for the largest share of the emissions. Hotel electricity is also responsible for a significant share, with the HVAC system consuming the most electricity.

The trip can also generate additional Scope 3 emissions, over and above the 330kg CO_2e. These are indirect emissions across the value chain caused by manufacturing or by providing the goods and services travelers use during a trip. Examples include hotel construction, farming, and vehicle manufacturing.

[22] Based on the assumption that an Olympic-size swimming pool is 50 meters in length, 25 meters in width and 2 meters in depth; "FINA facilities rules 2021-2025", International Swimming Federation, February 8, 2022 (FINA, has been renamed World Aquatics since January 2023).

[23] "Analysis and thinking on the classification of domestic waste in China," Science and Technology Foreign Affairs Office, September 9, 2021.

[24] Xunmin Ou *et al.,* The development of high-speed rail in China, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, a joint report in partnership with the Institute of Energy, Environment and Economy of Tsinghua University, on behalf of the Federal Ministry for Digital and Transport Germany.

[25] "The report is out! The average height of adult males is 1.74 meters, and the average BMI index exceeds the standard," STCN, August 8, 2022.

Direct water consumption during this trip is around 1,200 liters, which is equal to the daily drinking water needs of 400 adults.[26] Accommodation is responsible for more than 80 percent of this water consumption, mainly from the shower, bath, room cleaning, and laundry.

The traveler generates around four kilograms of waste on this trip. Accommodation is the source of most of this waste; food waste from hotel meals, single-use disposable consumables, and packaging from purchased food and goods add to the mounting waste. Leftovers from outside dining, garbage generated during entertainment activities, and packaging from shopping account for the balance (Exhibit 3).

This three-day trip illustrates how quickly finite actions can add up to intensify the carbon emission, water usage, and waste generation footprint of each traveler. When considering the sheer volume of China's domestic travelers, the combined direct environmental footprint is significant. Though there is a clear need to accelerate a transition to sustainable travel for the benefit of the planet, travelers also need to be on board with this shift.

[26] The U.S. National Academies of Sciences, Engineering, and Medicine determined that an adequate daily fluid intake for adults is between 2.7 and 3.7 liters.

Exhibit 2

Travelers generate direct environmental impacts from consumption and travel activities, and indirect impacts from the value chain of goods and services purchased.

Focus of this study[2]

Direct impacts[1]

Scope 1 Direct Emission

GHG emissions from sources that are owned or controlled by the journey participants

Fuel combustion (on-site)

Fuel comsumption (transport)

Scope 2 Direct Emission

GHG emissions resulting from the generation of electricity, heat, or steam purchased

Electricity consumption

District heating

Direct water use

Water consumed directly by the traveler

Drinking

Personal hygiene

Shower and bath

Washing towels and bedding

Direct water generation

Waste disposed directly by travelers

Leftover

Packages

Daily waste

Disposable products

Indirect impacts

Scope 3 - Upstream

GHG emissions from sources not owned or directly controlled by company, but related to its upstream activities

Goods production

Food production

Infrastructure construction

Manufacturing of vehicles

Scope 3 - Downstream

GHG emissions related to the downstream activities

End-of-life treatment of used products

Indirect water use (Virtual water[3])

Indirect water is needed along the value chain to produce, grow, or manufacture the items and services travelers use

Food production

Property or attractions operation and maintenance

Energy supply

Indirect waste generation

Waste generated along the value chain to produce, grow, or manufacture the items and services travelers use

Goods production

Food production

[1] Non-exhaustive and only for the journey analysis.
[2] We choose direct impacts as focus of this study for two reasons: 1) consumers have control over the direct impacts, while the indirect impacts require more efforts from industry players; 2) direct impacts have better data availability.
[3] Virtual water is defined as the water embedded in a product, that is, the water consumed during its process of production.
Source: Greenhouse Gas Protocol; McKinsey analysis

Exhibit 3

Direct environmental impacts of a 3-day base scenario trip between Beijing and Shanghai.

On the way

- ~220kg CO_2e emission from air travel and commuting to the airport by private car
- 4L water consumption for personal sanitization, and ~0.5kg waste from food waste and packaging

CO_2 ~67% | Water <1% | Waste ~10%

Accommodation

- Total ~90kg CO_2e emission mainly due to electricity consumption
- ~1,050L water usage from shower, bathing, and laundry services
- ~1.5kg daily waste and leftovers generated during the stay

CO_2 ~27% | Water ~90% | Waste ~40%

Dining

- Total <1kg CO_2e emission due to natural gas consumed during cooking
- ~25L water consumed from sanitization
- ~1kg wasted generated during cooking and serving meals

CO_2 <1% | Water ~2% | Waste ~30%

Commute in city

- Total ~15kg CO_2e emission from commuting by private car at the destination

CO_2 ~5%

Activities

- Total ~3kg CO_2e emission generated by transport and electricity during tourism activities
- 96L water consumed for self-sanitization purposes
- ~0.75kg waste generated due to packages and materials used during visiting and shopping

CO_2 ~1% | Water ~8% | Waste ~20%

Total

CO_2 ~330kg | Water ~1,200L | Waste ~4kg

Source: China Products Carbon Footprint Factors Database; Ecoinvent; Energy Foundation; McKinsey analysis

McKinsey & Company

Chinese travelers are calling for sustainable travel but, have a long way to go

Chinese travelers can play a key role in elevating sustainable travel—and the desire to travel with a lighter environmental footprint is there. Understanding traveler sentiment is a crucial step in unlocking simple but meaningful behavior changes. McKinsey, various industry actors, and independent third-party researchers explored Chinese travelers' perceptions, attitudes, and preferences. The results show that these travelers are in the early stages of understanding sustainable travel and that there is an interest to learn more. Travelers believe that sustainable travel is a joint effort and are expecting more help from the industry.

Chinese travelers are aware of sustainability but are not yet willing to pay a premium for more sustainable products or services

Chinese travelers are concerned about climate change. Based on McKinsey's 2021 sustainable travel survey, more than 60 percent of Chinese travelers worry about climate change and believe that commercial aviation should become carbon neutral in the future—putting China near the top among surveyed countries.[27] Similarly, in Trip.com Group's Sustainable Travel Consumer Report 2022, almost 85 percent of Chinese travelers rate travel sustainably as important or very important.[28]

Yet, compared to travelers from other countries, Chinese tourists report that they are reluctant to pay a premium for sustainable travel. Only 20 percent said that they would pay 2 percent extra for carbon-neutral airline tickets, ranking near the bottom among surveyed countries (Exhibit 4). However, studies have also found that while 48 percent of tourists across all countries state that they are willing to pay higher rates for sustainable travel, only 14 percent have actually paid a premium for sustainable options.[29] This suggests that Chinese tourists might be clearer on their position that sustainable travel is important, but that the cost should be shared between industry providers and tourists. Based on recent Sustainable Aviation Fuel (SAF) price levels, if travelers took on the cost of replacing traditional air fuel with 100 percent SAF, flight ticket prices would need to increase by around 180 percent.[30]

62%

of Chinese travelers are concerned about climate change, according to McKinsey's 2021 sustainable travel survey

[27] Based on McKinsey's sustainable travel survey 2021, total 5,457 respondents from Brazil, India, Spain, China, US, Saudi Arabia, Germany, Canada, UK, Poland, Australia, Japan, and Sweden.
[28] *Sustainable travel onsumer report 2022*, Trip.com Group, September 2022.
[29] "Accelerating the transition to net-zero travel," McKinsey, September 20, 2022.
[30] Nicholas Cummins and Pranjal Pande, "How much does it cost to fuel a commercial airliner?" Simple Flying, September 11, 2022.

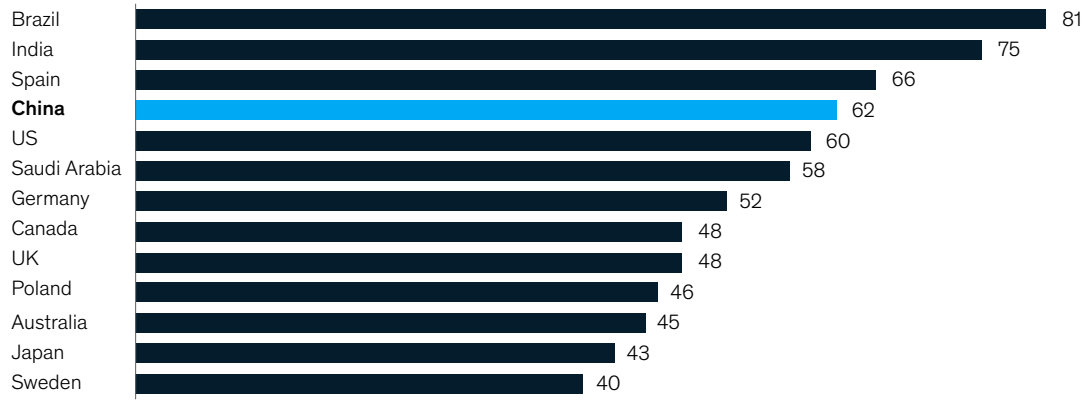
Exhibit 4

Chinese tourists worry about their environmental footprint, but are currently less willing to pay for sustainable travel.

Chinese travelers have relatively high awareness among the global travelers...

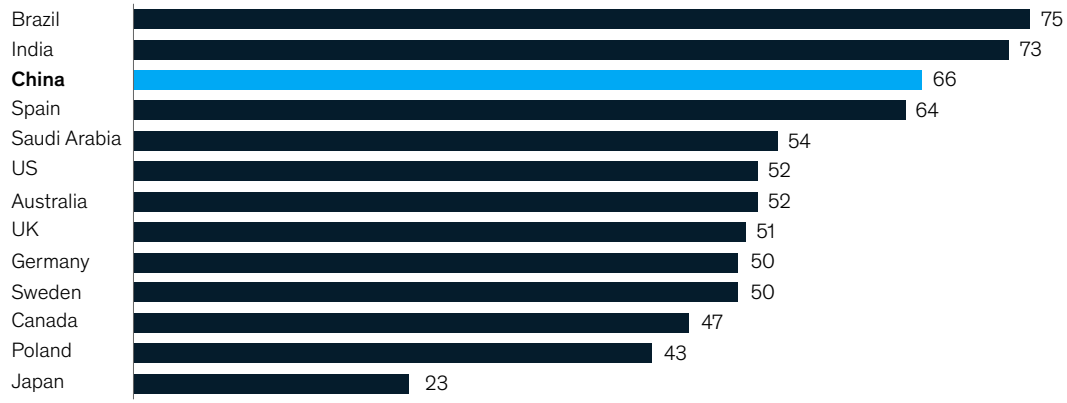
Q: I am really worried about climate change (1=strongly disagree to 6=strongly agree)

n=5,457, % of respondents choose 5 and 6



Q: I believe commercial aviation should definitely become carbon neutral (CO_2 neutral) in the future (1=strongly disagree to 6=strongly agree)

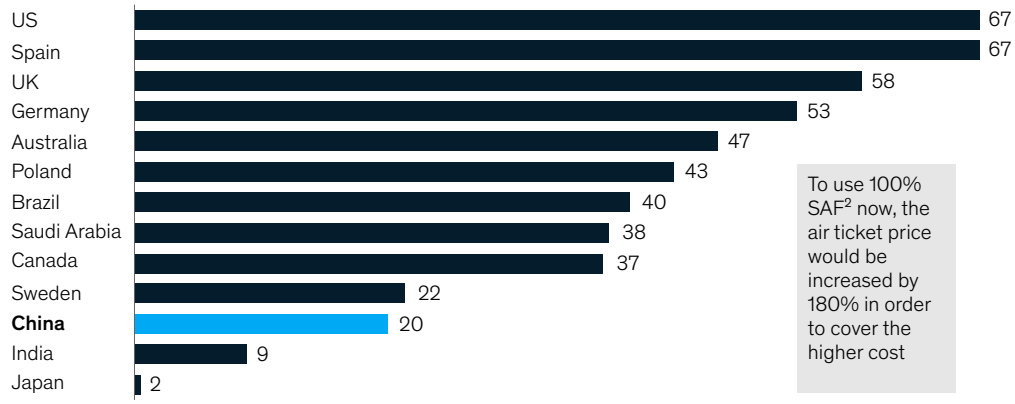
n=5,457, % of respondents choose 5 and 6



... But relatively low willingness to pay a premium for sustainability

Q: Are you willing to pay for more than 2% of the flight ticket price to keep carbon emission neutral?[1]

n=5,457, % of respondents



To use 100% SAF[2] now, the air ticket price would be increased by 180% in order to cover the higher cost

[1]Question based on survey questions: What was the approximate cost of your last round-trip air tickets? What would be the maximum price increase you would be willing to accept for this specific flight to keep carbon emission (CO_2) neutral?
[2]Calculated based on current China SAF price of 3,000 USD/t and typical fuel as 800 USD/t; and fuel cost typically is 30% of the air ticket price.
Source: McKinsey sustainable travel survey 2021; The present and future of sustainable aviation fuels in China; McKinsey Sustainable Fuel Cost Model; McKinsey Hydrogen council; WEF; expert interviews; HIS

Chinese travelers believe that sustainable tourism is a shared responsibility

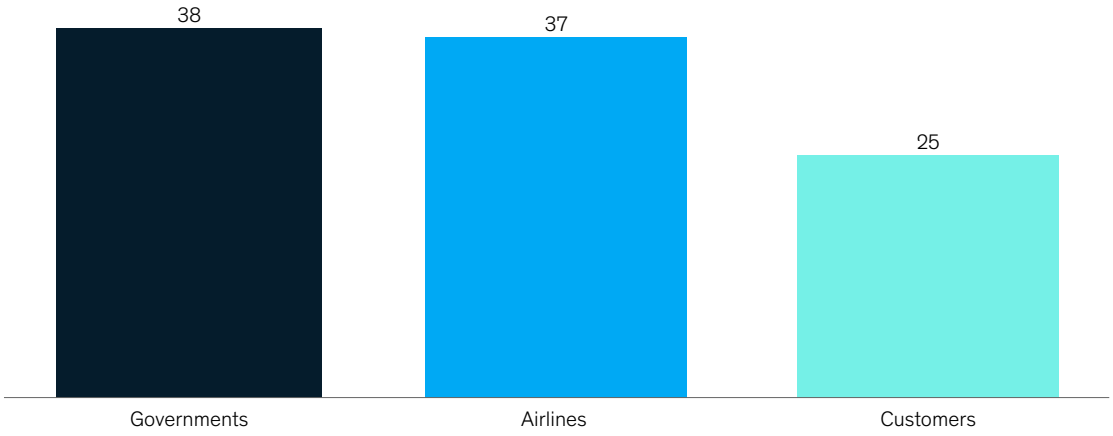
Chinese travelers acknowledge that individual action is not enough to drive the transition to greener travel. According to the Trip.com Group survey, more than 50 percent of Chinese travelers assert that sustainable travel is a shared obligation (Exhibit 5). Chinese respondents reflect similar sentiments in the McKinsey survey. When asked who should pay for the majority of the additional cost for sustainable aviation, 38 percent of travelers expect government subsidies to cover the costs, and 35 percent think that airlines should pay.

Exhibit 5

Chinese travelers think it is a shared responsibility to make tourism more sustainable.

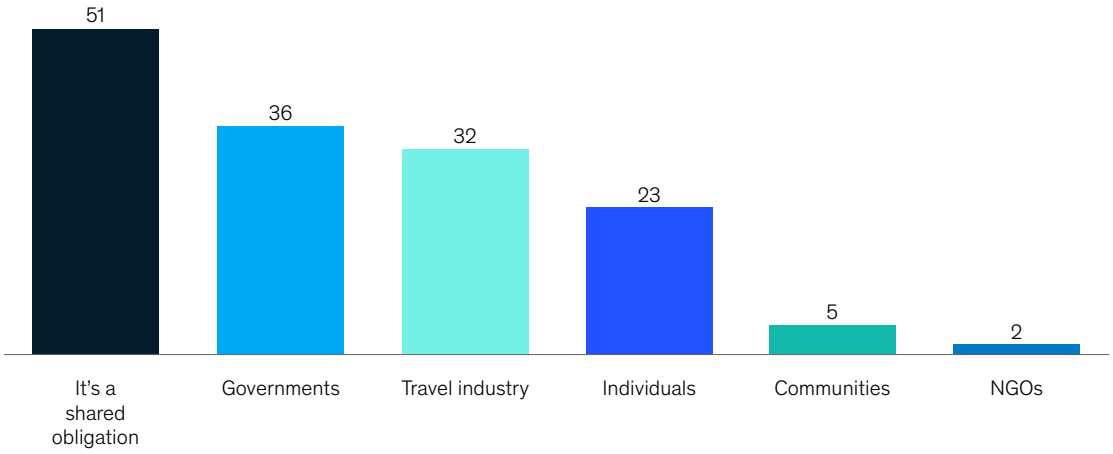
Q: Sustainable aviation (ie, making air travel more climate friendly) could create additional costs. Who should pay for the majority of these additional costs?

n=403, % of respondents



Q: Who should take the most responsibility for reducing the negative impact of tourism? (Select up to two options)

n=1,198, % of respondents



Source: McKinsey sustainable travel survey 2021; Trip.com Group Sustainable Travel Consumer Report 2022 (mainland China data)

Chinese travelers are starting to look for sustainable travel options and may need more help in their search

Chinese tourists are seeking out more sustainable travel options but may need more help understanding where to look. In the Trip.com Group survey, 40 percent of Chinese travelers report that they occasionally look for sustainable travel options when booking online, and 20 percent say they always do (Exhibit 6). However, they need support to turn intention into action. Travelers also need more help to understand how their choices could make a difference, especially where climate-friendly travel products are more expensive. More than half of the Trip.com Group survey respondents think online travel providers can make sustainable options easier to find. Travel providers could help their customers make informed decisions by, for example, labeling options clearly, promoting sustainable travel products, and offering incentives for making sustainable choices.

The tourism industry could harness this intention and empower Chinese travelers to reduce their environmental footprint. Sustainable tourism is indeed a joint effort, but tourists can already do a lot to champion climate-friendly travel. With the right support, they can build a sustainability mindset that guides their actions from the moment they are inspired to travel to the end of their trip. The first step is to equip travelers with options to make sustainable choices and to give them insight into why their actions matter.

More than half of the Trip.com Group survey respondents think online travel providers can make sustainable options easier to find.

Exhibit 6

Chinese travelers are starting to look for sustainable travel options—and need more help to understand where and how to find them.

Chinese travelers are looking for sustainable travel options...

Q: Do you actively look for sustainable travel options when booking online?

n=1,198, % of respondents

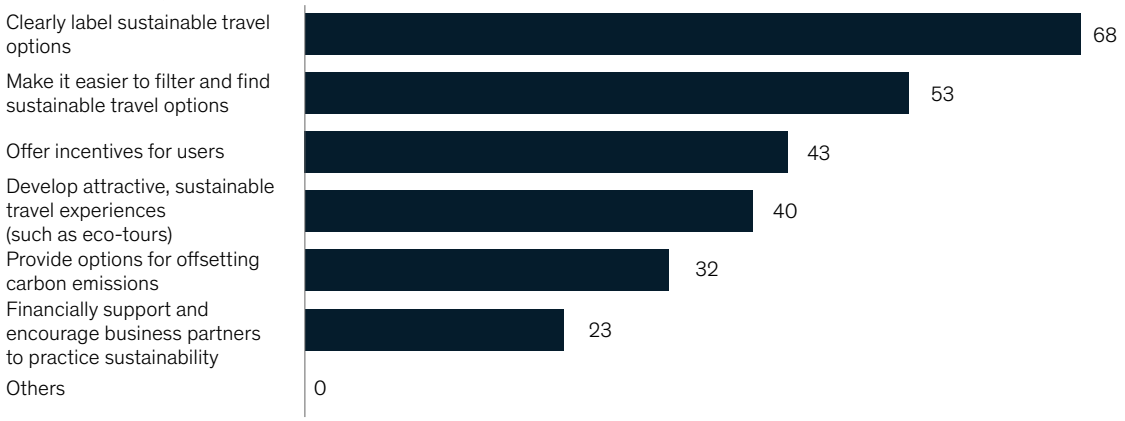
... And they are facing difficulties and asking for help

Q: What difficulties (if any) have you faced when travelling more sustainably? (Please select up to two options)

n=1,198, % of respondents

Q: What do you think online travel websites/providers should do to encourage sustainable travel? (Select all that apply)

n=1,198, % of respondents



Source: Trip.com Group Sustainable Travel Consumer Report 2022 (mainland China data)

Travelers have many “smarter” options available to significantly lower their environmental footprint

There are actions that individual travelers can take to travel sustainably. Given the size of the global tourism market, several straightforward, everyday efforts can play a big part in accelerating large-scale sustainability targets; these actions could advance the global roadmap to achieve net-zero emission by 2050.

What can travelers do?

Travelers can change their habits to effect immediate change in their environmental footprint. There are opportunities at all stages of the customer journey—from booking to transportation, accommodation, dining, and activities. Travelers can make the following choices as they plan and execute their itinerary.

Planning and booking

- **Choose and book sustainable travel options with certified service providers.** Among other criteria, service providers are evaluated and certified based on how they affect the environment and local communities, and on their conservation efforts. Travelers can visit the websites of certification bodies to identify travel services that meet specific sustainability criteria and can be confident that purchasing certified offerings will be a sustainable choice.
- **Slow things down by planning to spend more time in one destination rather than trying to visit every "must-see" place.** This practice saves transit time and can alleviate the environmental pressure of traveling to many locations. Instead of rushing through many attractions in one go, travelers can fully immerse themselves in the culture and experiences of one destination.

Transport

- **Choose more sustainable transport modes.** For short-haul journeys, tourists can opt to travel by rail rather than air. Travelers can also cut down on driving by walking and cycling, and taking pooled or public transport. Travelers could also rethink their usual transport preferences by selecting cars that run on renewable energy sources for rentals or pickup services and booking flights with lower carbon emissions.
- **Reduce unnecessary transport-related products and services.** If every Chinese traveler chose to opt out of their in-flight meal, then, according to analysis for this report, around 1.6 million tons of waste would be avoided every year. If that waste were laid flat, it would cover 3.3 square kilometers (km^2), the equivalent of around 460 football fields.

1.6 million

tons of waste could be avoided each year if travelers in China opted out of their in-flight meal

Accommodation

- **Seek out sustainable buildings.** Travelers could choose hotels that have made an effort to operate sustainably. For example, a building awarded with a platinum Leadership in Energy and Environmental Design (LEED) certification from the U.S. Green Building Council can save around 25 percent on energy.[31] This is equivalent to about 55 tons of CO_2 emissions for a typical three-day trip. China's Green Building System also utilizes a "Three Star" rating system to label sustainable buildings. To identify a building certified by one of the various green building bodies, travelers can look out for a certification symbol on the hotel's website or a physical plate displayed in the lobby of the building. Moreover, in the age of information transparency, travelers are equipped with the resources to search for details on hotels' sustainability standards and targets, and the certified initiatives they have embarked on to reduce the environmental footprint of their buildings.
- **Form sustainable habits.** Good habits and small actions can have a big impact. Travelers can reduce emissions by turning down the air conditioning and heating in their rooms, using fans instead of air conditioning, and switching off unnecessary electronics. They can also save water by taking shorter showers and only asking for towels or bedding to be changed when needed. If every Chinese traveler decided not to have their towels washed for one day, around 63 million m^3 of water would be saved per year, which could fill around 25,000 Olympic-size swimming pools.[32]
- **Say no to single-use plastics.** Travelers can decline the use of disposable plastic items provided in hotels such as toothbrushes, toiletries, shampoo, combs, and bottled water. If every Chinese traveler cut down on single-use items, they would save around 840 football fields' worth of waste every year.[33]

Dining

- **Reduce food waste.** Order only as much as needed, whether at a buffet or a pay-per-order restaurant. Many restaurants have recommended portions to help customers make decisions, and some menus indicate the carbon emissions of their dishes on their menus. Meat production is particularly resource-intensive, so it is important not to waste. To illustrate, producing one kg of beef (from raising the cow to serving the beef on the dining table) emits around 30 kg CO_2e and uses 15,500 liters of water.[34] This is equal to 14 years' worth of drinking water for an adult.
- **Say no to single-use plastics.** Avoid plastic packaging for takeaway food. Travelers could come prepared with reusable items such as water bottles, cutlery, containers, straws, shopping bags, and cloth napkins.

63 million m^3 of water

could be saved every year if each Chinese traveler decided not to have their towels washed for one day

[31] Benefits of LEED: Better for the environment, U.S. Green Building Council (USGBC) website.
[32] *Based on the assumption that each towel weighs 1.5kg and 7L/kg washing water is needed. When multiplied by 6 billion travelers a year, this adds up to approximately 63 million m^3 water.*
[33] Based on the assumption that the density of plastic is 1t/m^3, the amount of waste would add up to around 60,000m^3. If spread out in a 1cm-thin layer, this would total 6,000,000m^2.
[34] China Product Carbon Footprint Factors database; Water Footprint Network database.

- **Try local cuisine and meals made with locally sourced food.** When traveling, tourists could seize the opportunity to live like a local—try the local cuisine and enjoy food produced nearby. This can cut down carbon emissions from logistics, reduce packaging waste, and enrich the trip experience.

Activities

- **Try activities or attractions that involve local culture or nature conservation.** Such activities can add meaning and enhance travelers' experiences of destinations. For example, Singapore's Sentosa Island is recognized by certification body Vireo Srl as a sustainable destination. The island is home to 30 heritage trees and over 20 conserved colonial buildings, some of which date back to the 1800s.[35] The island advocates for the conservation of mature trees and raises awareness about environmental and sustainability issues.
- **Shop with a sustainability mindset.** Travelers can reduce packaging waste by bringing their own carrier bags and buying durable souvenirs instead of those that may be discarded soon after purchase. Buying a souvenir T-shirt made with organic cotton, for example, would be a more climate-friendly choice as it is likely that no toxic chemicals are used and good soil health is maintained during production. Compared to conventional cotton, organic cotton production consumes 62 percent less energy, and its impact on global warming is 46 percent lower.[36]

With these simple measures, individual travelers can transform their environmental footprint. Let's revisit the three-day trip example from the previous chapter. If that traveler adopted all these behaviors and habits, they could reduce up to 45 percent of their carbon emissions, 25 percent of water use, and 65 percent of waste on the trip (Exhibit 7).

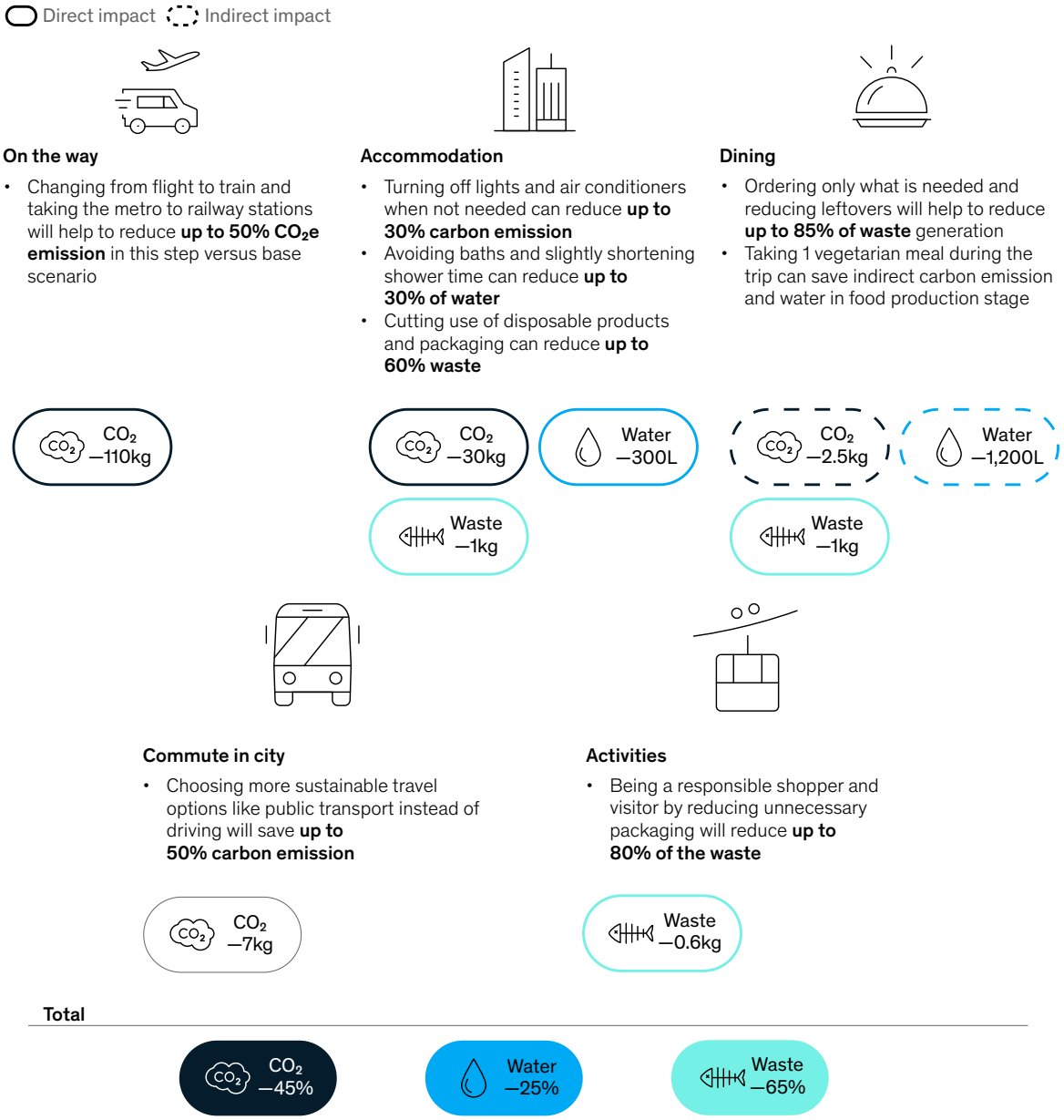
In reality, however, a trip that is more representative of the "average" travel scenario paints a slightly different picture. In many cases, transport choices may not contribute as much to the reduction of carbon emissions. For example, if travelers were given the option of choosing rail or air travel for a 1,200 km flight, around 50 percent might opt to fly. In this scenario, even with all the water and energy-saving actions mentioned above, carbon emissions would only be reduced by 10 to 20 percent.

This comparison suggests that though individual action can significantly reduce overall environmental impact, relying on traveler behavior alone is only the first step. Individual tourism providers can support travelers in making the right choices.

[35] Sentosa, "Sponsored post: 6 Ways Sentosa offers a sustainable leisure experience," Web in Travel, January 18, 2022.
[36] *"The life cycle assessment of organic cotton fiber—A global average,"* Textile Exchange, November 2014.

Exhibit 7

By making smarter choices, travelers can almost halve their environmental footprint compared with base scenarios.



Source: China Products Carbon Footprint Database; Ecoinvent; Energy Foundation; Water Footprint Calculator; team analysis

Tourism providers have business opportunities to reduce their environmental footprint

Industry sustainability pioneers have already started taking actions to help travelers make smarter choices. When individual tourism providers make sustainable changes to their operations, they can reduce their overall footprint. As a result, travelers will have more sustainable options to choose from—if these options are made visible. While tourists are not yet willing to pay a premium for sustainable options, tourism providers could respond to pressure from travelers who have a desire for green travel and take the lead in making the sustainability shift now.

What can individual tourism providers do to support travelers?

There are actions that all tourism providers can take to bring sustainable options to the attention of tourists. Providers who adopt a sustainability mindset can do the following to support travelers and share the responsibility and cost of transitioning to sustainable travel.

Make sustainable options more visible

If sustainable options are easy to find and information is readily available, then travelers can be better equipped to travel sustainably.

Tourism service providers could use technology platforms to engage travelers and make sustainable travel more visible online, for example, by hosting websites dedicated to sustainable tourism. Providers could also make tools available, like carbon emission calculators and personal carbon credit accounts, so that travelers can understand the effect of their travel on the environment.

Providers in the travel industry are starting to convene and collectively assist travelers in making sustainable choices. For example, Trip.com Group is a founding member of Travalyst, a not-for-profit organization that provides transparent sustainability reporting. Users can see at a glance the more sustainable options for their travel, calculated using sophisticated analytics that take into account aircraft type, route, and cabin class. Such efforts, among others, give travelers more control over the choices they make when planning a trip, delivering measurable benefits to the planet, and developing sustainable communities.

Industry providers could use labeling to educate travelers on the environmental consequences of their actions. Food labeling has been used successfully to indicate portion sizes and carbon emissions. For example, food chains like Wahaca and Aramark create transparency for their diners by printing each dish's carbon footprint on their menus.

Travelers might also be presented with flexible options for consumables, empowering them to only use what is needed. For example, tourists could have the option to choose reusable toiletries at a hotel, instead of disposable products. As various businesses across the value chain innovate and develop durable travel products—such as foldable bottles—travelers could be encouraged to bring their own reusable packaging and can rely less on the single-use disposable items.

Provide behavioral prompts

Industry actors can encourage travelers to make sustainable choices by nudging them toward climate-friendly options. The right incentives could encourage sustainable behaviors. Existing traditional rewards programs could be geared towards sustainability goals. For example, airlines like China Southern Airlines and Hainan Airlines already offer travelers the chance to opt out of meals in exchange for loyalty program points. Hotels could also grant discounts to guests who reduce the frequency of laundry services during their stay.

Creative gamification provides an opportunity for all stakeholders—including businesses and the public sector—to trigger a sustainability mindset and hold the attention of travelers who show some interest in climate-friendly travel. For example, hotels could launch competitions that challenge customers to reduce their waste generation and water usage in exchange for a free night's stay. Travel platforms could also run a carbon reduction campaign where travelers are rewarded with discounts for purchasing sustainable offerings.

Train employees to adopt a sustainability mindset

All tourism providers could further magnify their impact by training employees and embedding a sustainability mindset into their work culture as they interact with travelers. For example, hotel training programs such as Accor's School for Change are designed to increase employee awareness of sustainable development challenges and could reward top management with bonuses based on sustainable development performance. An online learning platform can take employees on a learning path that focuses on the fundamentals of climate change.

Each tourism provider has a role to play in reducing emissions under their control

Due to the diversity of stakeholders along the entire tourism industry value chain, the environmental footprint of each tourism provider varies in shape. What follows are some measures that providers can take to target the action areas where they could make the most difference.

While tourists are not yet willing to pay a premium for sustainable options, tourism providers could respond to pressure from travelers who have a desire for green travel and take the lead in making the sustainability shift now.

Hotels

Hotel operations contribute disproportionately to the travel industry's overall energy, water consumption, and waste generation footprint. To overcome this, hotels can revisit their operations management and find opportunities to leverage new smart technologies to monitor and reduce their consumption and waste.

Water consumption can be managed by adopting water metering technologies that detect leaks early by identifying abnormal water usage. This allows leaks to be fixed before too much water is wasted.

There are also solutions for hotels to improve waste management. Smart scales with cameras can capture and compare pre- and post-consumption food quantities to monitor wastage. This could predict the amount of food needed and redirect surplus food accordingly.

Energy consumption is responsible for one-fifth of the accommodation sector's emissions. Hotels could focus on reducing their carbon footprint with the help of smart technologies. For instance, STEY, a new boutique hotel, has adopted the Internet of Things (IoT) to consolidate all smart appliances and hotel services into one operational monitoring platform and application. Such smart technologies not only enable hotel operators to monitor energy and water consumption in real time but also enable each traveler to measure, monitor, and track their own consumption.

Hotels could further reduce carbon emissions by switching to renewable energy sources. Installing building-integrated photovoltaics is a sustainable choice that may also generate positive return from the green electricity generated.

Upgrading infrastructure and keeping up with maintenance could also prevent energy loss and waste. For example, hotels could upgrade refrigerators to units with higher efficiency ratings, clean out air conditioning filters regularly, or upgrade building insulation.

Upstream and downstream emissions contribute over 70 percent to total carbon emission in hotels.[37] Therefore, collaboration with suppliers such as manufacturers of furniture, towels, and sheets is critical to reducing emissions across the value chain. Large hotel chains including Accor, Marriott, and IHG engage their suppliers and work toward a more sustainable supply chain through tracking, advising, and collaborating to minimize waste and emissions.

Hotels could strive to achieve and maintain sustainability certification. This signals a commitment to climate-friendly travel and holds hotels visibly accountable for their sustainability efforts. Examples of established Global Sustainable Tourism Council (GSTC)-accredited certification bodies include Bureau Veritas, Control Union, United Certification Systems Limited, and Vireo Srl.

Collaboration with suppliers such as manufacturers of furniture, towels, and sheets is critical to reducing emissions across the value chain.

[37] Based on CDP data on hotel emissions.

70%

of hotels' total carbon emission come from upstream and downstream activities

Asset owners

Assets within the travel and tourism value chain, such as tour buses, hotel buildings, and rental car fleets, also contribute to the industry's overall environmental footprint. Asset owners, though constrained by the design and build of their assets, can make meaningful changes. These changes might be incremental (such as renovating a building) or fundamental, requiring a significant investment (like constructing a net-zero building or replacing a tour bus fleet with new energy vehicles).

Hotel asset owners, for example, could use sustainable technologies to measure their building emissions baseline, identify key emission areas, and develop strategies to reduce energy loss. Monitoring and planning could empower them to reduce their environmental impact in the short and long term. Strategies could include adding efficiency to operations or undertaking renovations with more sustainable materials.

Examples of successful net-zero buildings demonstrate what is possible for sustainable assets. For example, the Unisphere in Maryland, USA, achieved net-zero by installing photovoltaic panels. In India, Indira Paryavaran Bhawan, which houses the Ministry of Environment, Forest and Climate Change, is a net-zero building that uses technologies including new ventilation techniques, UPVC windows, and high-efficiency glass—along with locally obtainable materials.

Travel agencies

As the first stop for planning a trip, travel agencies are well positioned to educate customers on sustainable travel. As reflected in various traveler surveys, travel agencies could use their existing platforms and new technologies to help travelers plan their trips more sustainably. For example, online travel agencies like Booking.com and Trip.com Group visibly label products and services that are sustainable. Travel agencies can also offer offset options.

Airlines

Due to the high consumption of fuel, carbon emissions constitute airlines' biggest environmental footprint. There is an opportunity for airlines to focus on streamlining operations and further developing innovative technologies.

Airlines could employ digitization and data analytics to tackle emission reduction. Tools like FuelPlus and SkyBreathe, for example, combine flight, environmental, and other external data to predict the optimum amount of fuel needed for a flight. Artificial intelligence can also be used to optimize routes for speed and efficiency. Norwegian Air and Alaska Airlines, for example, have adopted artificial intelligence and machine learning to monitor and optimize routes. Other emission reduction initiatives include improving existing maintenance programs to keep fleets operating at optimum efficiency.

Sustainable aviation fuel has been identified as a promising next step in reducing fuel-based emissions. This solution, however, is only viable if industry stakeholders combine efforts. This is discussed in the next section.

Other operational facilities within the airline's control could also be upgraded and made more sustainable. For example, shuttle buses could be powered by renewable energy, airport lounges can target waste reduction and recycling, and recyclable materials can be used to package in-flight meals.

Airlines may also consider collaborating with suppliers on issues such as transparent carbon reporting, monitoring, and decarbonization—helping to reduce emissions across the supply chain.

66%

Reduction in carbon emissions required to stay within the 2°C threshold agreed at COP21

Other travel businesses

The travel industry comprises a complex network of service providers. In addition to the tourism providers mentioned above, there are more that can play a part in shaping the future of sustainable travel.

Tour operators can encourage travelers to spend more time exploring a single destination by developing in-depth regional travel packages. This could shorten transit times and reduce carbon emissions. Tour operators could further enhance these tours by partnering with organizations to host educational experiences that elevate traveler awareness of local biodiversity and climate challenges. For example, Beyond Green and Beyond Travel developed several sustainable travel packages including gorilla watching, safaris, and nature reserve visits. These are typically led by a professional guide who enhances travelers' understanding and appreciation of the local environment.

Car rental companies can help travelers make sustainable choices and adjust behaviors. For example, technology can be installed that allows the driver to plan an optimized travel route. This could be combined with real-time monitoring and recommendations to maintain energy efficiency while driving. Companies can also switch fleets to renewable energy fuel sources.

Visitor attractions could incorporate environmentally friendly design into their operations and facilities. Attractions may consider promoting sustainable travel by accommodating safe cycling or walking and by building circularity into waste management to encourage the reuse and recycling of materials. They can also support local communities and reduce waste by designing long-lasting souvenirs and sourcing them from nearby locations. City planners also have a part to play in providing more convenient, lower-carbon options for travelers, such as inter-airport high-speed trains and transport hubs that combine public transport and routes to airports with options for local travel.

While there are many actions individual providers can take, collective effort is needed to move the needle on sustainability. Take carbon emissions as an example. Based on CDP reporting, direct emissions (Scope 1 and 2) for all sub-sectors of the travel industry constitute 30 to 40 percent of total emissions. If we zoom into the hotel sector, only around 30 percent of emissions are under the sector's direct control. Other third-party research suggests that adopting the most efficient technologies can reduce the accommodation sector's carbon emissions by between 15 and 20 percent.[38]

But to really make a difference, a study by the Sustainable Hospitality Alliance reveals that carbon emissions must be reduced by 66 percent (from a 2019 baseline) to stay within the 2°C threshold agreed at COP21.[39] It is therefore clear that travelers and individual industry providers cannot act alone.

The industry can act collectively—potentially involving external stakeholders—to set a clear direction, accelerate development of key sustainability technologies and solutions, and secure the financial resources necessary to enable an industry-wide shift to a sustainable future.

[38] *Global accommodation sector: The road to net zero emissions,* EY Parthenon, Booking.com, and OC&C, October 2021.
[39] *Hotel global decarbonization report,* Sustainable Hospitality Alliance, November 2017.

All stakeholders can collaborate to shape the future of sustainable travel

Greater consumer awareness and willingness to choose sustainable options, combined with tourism providers' adoption of more sustainable operations, can help the travel sector realize the "quick-wins" of sustainable impact. However, lasting sustainability improvements will take concerted industry-wide effort.

Multiple challenges across the industry limit its transition towards sustainability. A key hurdle is that return on investment is not high enough to motivate tourism providers to invest in sustainable options. And as shown by traveler sentiment surveys discussed in this report, the premium that a traveler is currently willing to pay for sustainable travel is markedly lower than the cost of providing it. Thus, the industry will likely need to consider covering the costs of the sustainable transition, at least in the short term.

Another challenge is that travelers cannot confidently identify and purchase sustainable travel options. Travelers might be confused by inconsistent measurement frameworks and definitions of sustainability, and tourism providers scramble to meet competing—and sometimes contradictory—sustainability standards.

The complex stakeholder structure of certain sub-sectors means that priorities of different actors may not be aligned. This slows progress towards sustainability in the sub-sector.

Sustainable technologies are sometimes underutilized, underdeveloped, or trapped in a demand-supply deadlock. Suppliers of sustainable technologies are still operating at a small scale, unable to support industry-wide adoption. But low demand hampers growth—the industry is either unfamiliar with or cannot afford the technologies, and thus suppliers are unwilling to invest in scaling up production. For example, SAF suppliers don't have enough capacity to provide affordable fuel at scale. The prohibitive costs lead to low and scattered demand from airlines. Consequently, SAF producers may not be motivated to scale up production and make their product more affordable.

A lack of knowledge could also hinder the adoption of sustainable technologies. Industry actors might not be aware of sustainable solutions nor of how specific technologies can be leveraged to target their sustainability goals. They might also be unaware of the funding options available to support the upfront costs of adoption.

The premium that a traveler is currently willing to pay for sustainable travel is markedly lower than the cost of providing it. Thus, the industry will likely need to consider covering the costs of the sustainable transition, at least in the short term.

Internal and external stakeholders will need to act collectively to overcome these challenges. The industry could consider taking the following actions.

Act collectively as an industry to make binding commitments to sustainability

Market return for sustainable travel may not be attractive enough to motivate industry actors to adopt sustainable practices. Strength in numbers is more likely to drive change than individual efforts. The industry can add weight to its sustainability intentions by collectively agreeing to minimum sustainability requirements and targets. The aviation sub-sector, for example, has made moves in this direction. All member airlines of the International Air Transport Association (IATA) agreed to the association's commitment to fly net-zero by 2050.[40]

A collective commitment could also ensure that individual actors maintain their competitive position, even after adopting costly stainability measures. For example, if only one hotel in a city purchases green electricity, they may need to raise their prices to offset the cost. This could harm their business as travelers could opt to stay at an equally luxurious hotel nearby at a cheaper rate. However, if hotels collectively commit to purchasing green electricity, prices increase across the board, and competitive balance is maintained.

Agree on a unified sustainability measurement framework, evaluation criteria, and ratings

Travelers could grow skeptical of the credibility of sustainability claims if a consistent rating system is not established. There are also multiple and competing standards, and industry actors could waste resources adapting to each one. A standard, industry-wide system is required to add credence to sustainability claims. Some organizations are already making this effort. Travalyst, for example, is assembling key actors from the industry to align the definition and data sourcing framework for sustainability across the industry. The coalition is focusing on consolidating the sources, collection methods, and analysis of environmental impact data.

Once a unified system is established, to ensure its impact, the industry would likely need to pro-actively encourage its adoption. Visible leaders in the travel and tourism sector could adopt and promote it to the rest of the industry. Industry pioneers could also support adoption through data collection and analysis in areas where it is needed most—such as less developed regions.

There is an opportunity for industry actors to extend these standards to the financial market; industry players seeking investment will thus be encouraged to align with the centralized criteria.

[40] "Press release no. 66: Net-zero carbon emissions by 2050," IATA, October 4, 2021.

The industry could also work with external stakeholders to attach funding opportunities to sustainability actions. For example, regulations may be set to encourage investors to favor more sustainable assets.

Align stakeholders' motivation for sustainability improvement

The complex stakeholder structure in sub-sectors like hospitality could obstruct the path to sustainability. For example, hotel owners and operators may have separate responsibilities and sources of income, which could influence their motivations. Individual stakeholder motivations can be aligned by including sustainability in wider industry standards that affect the interests of all involved. This could mean including more mandatory sustainability criteria in the star rating system of hotels. The France Tourism Development Agency took such action when updating the country's hotel star rating system, expanding the number of sustainability criteria from 13 to 27, of which 15 are now mandatory.[41]

The industry could also work with external stakeholders to attach funding opportunities to sustainability actions. For example, to meet net-zero targets, regulations may be set to encourage investors to favor more sustainable assets. Regulations might include the definition of truly green investments and mandatory disclosure and reporting on the sustainability performance of their portfolios.[42] Where the financial market shows preference for more sustainable assets, stakeholders may be motivated to align on sustainability measures to unlock investment—particularly for capital-heavy assets like hotels.

The fourteenth "Five Year" Tourism Development Plan issued by the Chinese government is also driving the transition towards sustainable tourism.[43] The plan encourages tourism providers to use water- and energy-reduction systems and to upgrade their buildings with energy-saving materials. Aligning motivations with the government's development plan means that stakeholders can benefit from large-scale green projects, green finance opportunities, and unified sustainability certification criteria—while furthering the green transformation of the tourism industry.

41 *OECD tourism trends and policies 2022*, OECD Publishing, November 30, 2022.
42 "Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088," Official Journal of the European Union, June 22, 2020; "Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability related disclosures in the financial services sector," Official Journal of the European Union, December 9, 2019.
43 "Notice of the State Council on printing and distributing the "14th Five-Year" Tourism Industry Development Plan," State Council, January 20, 2022.

Create industry funding, incentives, and financial instruments to facilitate the development and adoption of sustainable innovations

Industry and external stakeholders can make the adoption of sustainable technology solutions more affordable by forming funding programs. Financial aid from these funding programs could be especially helpful to smaller actors, as they are less likely to afford the upfront investment required for sustainable solutions. For example, South Africa's Green Tourism Incentive Program targets small tourism businesses like lodges and guest houses.[44] The program funds water- and energy-efficiency assessments and recommends the optimum green solutions for the business. Between 50 and 90 percent of the cost of the identified solution is then funded by the program.

Funding programs could also be set up to finance the development of sustainable innovations for the travel industry. For example, the Ministry of Tourism of Colombia, in alliance with the National Circular Economy Strategy, launched a competition to finance sustainable innovations like circular waste management projects and eco-design projects.[45] The funds for these programs could be raised by pooling revenue from industry actors, sourced from levies on hotel rooms and flights.

The industry can also collectively promote the development of financial instruments that assist stakeholders in purchasing sustainable solutions. This can be achieved by de-risking sustainable projects for private investors, thus attracting more funding. For instance, the industry can mobilize private investors to fund sustainable tourism projects through blended finance—with the backing of public capital such as grants, guarantees, or insurance. The industry can also work with the financial market to provide sustainability-linked bonds or loans that give tourism businesses interest reductions for meeting sustainability criteria. For example, Triodos Bank offers loans for sustainable projects, linking interest rate discounts to the level of environmental certification achieved.[46]

Solve demand-supply deadlock by signaling collective demand and boosting supply scale-up of key technologies

Though certain key technologies and solutions such as SAF are available—and needed—this is not enough to support industry-wide adoption, and supply is limited. The industry could solve the demand-supply deadlock by collectively signaling demand and supporting the scaling-up of production. Leading industry actors could form a first-mover coalition and commit to adopting sustainable solutions. For example, member airlines of the oneworld Alliance have committed to purchasing 200 million gallons of SAF from Colorado-based renewable fuels producer Gevo, starting from 2027.[47] This could significantly improve supplier and investor confidence in future demand, thus attracting the investment needed to scale up production.

Signaling demand could be further strengthened if major stakeholders in the travel industry, such as corporate travelers, temper their travel activities to meet their own decarbonization targets. They can do this by demanding more sustainable options from the industry, such as paying for SAF surcharges on all ticket purchases and booking hotels with a low carbon footprint.

The industry could also help boost the scaling of sustainable technologies by cooperating with technology suppliers and relevant stakeholders to co-develop emerging technologies.

[44] "The Green Tourism Incentive Programme," Industrial Development Corporation, October 4, 2021.
[45] *OECD tourism trends and policies 2022*.
[46] OECD tourism trends and policies 2018, OECD Publishing, March 8, 2018.
[47] "oneworld members to purchase up to 200 million gallons of sustainable aviation fuel per year from Gevo," oneworld, March 21, 2022.

The Clean Skies for Tomorrow Coalition is an example of airlines, airports, SAF producers, corporate buyers, and original equipment manufacturers (OEMs) combining forces to analyze technological feasibility and readiness.[48] Together they can signal demand, foster an enabling regulatory environment, and develop financing mechanisms to accelerate SAF supply and use.

Improve the transparency, accessibility, and distribution of sustainability solution and funding option information

Many industry actors do not have enough information to successfully adopt sustainable measures. Some lack knowledge of what solutions are available in the market, many are not aware of the features and potential benefits of solutions, and others do not know about the funding options available to them. The industry can solve this by bridging actors' knowledge gaps. The industry can establish a centralized platform that identifies key technologies and solutions and directs stakeholders to relevant funding options. For example, the French Chamber of Commerce launched a platform that offers personalized advice according to a tourism provider's proposed project, support needs, and location.[49]

The industry could also actively distribute knowledge by hosting conferences and launching campaigns on sustainability solutions and technologies. The German Hotel and Restaurant Association, for instance, has undertaken a campaign to provide hotels with guidance and onsite consulting and workshops.[50]

Finally, transparency in the sustainable solutions supply chain would allow actors to effectively select and negotiate the purchase of sustainable solutions. The Council on Sustainable Aviation Fuels Accountability is an example of the aviation sub-sector's effort to increase the supply chain transparency of SAF by setting accounting standards to document the production and use of SAF.[51]

The future of sustainable travel could be realized when internal and external actors across the travel and tourism industry combine their efforts. Where diverse voices are aligned to mutually beneficial goals, sustainability efforts could drive long-term change—more so when guided by a common set of core principles.

The industry could also help boost the scaling of sustainable technologies by cooperating with technology suppliers and relevant stakeholders to co-develop emerging technologies.

[48] "About the CST initiative," World Economic Forum.
[49] *Global accommodation sector: The road to net zero emissions,* October 2021.
[50] ibid.
[51] "Press release: Aviation industry announces establishment of the 'Council on Sustainable Aviation Fuels Accountability,'" EBAA, April 15, 2021.

The future of sustainable travel

Combined action across the travel value chain could bring the travel industry significantly closer to the future of sustainable travel. Three guiding principles can shape meaningful action.

- **Zero emissions.** Future travel and tourism could aim to achieve the lowest possible carbon emissions along the end-to-end customer journey. For example, by transport providers using clean fuel and renewable energy.
- **Circular economy.** A circular economy model could be implemented to minimize waste. For example, converting food waste into compost for urban farming.
- **Environmentally non-intrusive.** Environmental and ecosystem impact could be fully considered in all new builds and projects from the onset of design and development. For example, hotels could be designed around emission reduction. New builds could implement features for optimized natural lighting, ventilation, and insulation, and could use low-emission materials during construction.

In this imagined sustainable travel of the future, each stage of a traveler's journey would include numerous elements that reinforce these guiding principles and encourage sustainable behaviors (Exhibit 8).

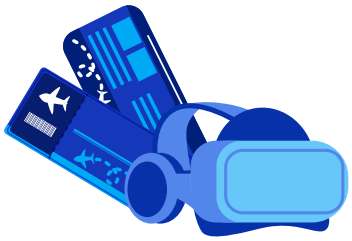
From the beginning of the journey when the traveler becomes inspired, researches, and books a trip, sustainable offerings will be visible and accessible. Throughout the journey, all activities and facilities are geared toward minimizing emissions. The top emission contributors in a typical journey are transport, especially aviation, and electricity consumption at accommodation. This could be minimized by transport providers switching to clean fuel or alternative options such as hydrogen powered shuttles, electric autonomous vehicles, and electric vertical take-off and landing (eVTOL) flights—these innovative technologies having matured through industry-wide co-development efforts. In addition to purchasing green electricity, accommodation providers could collectively commit to installing renewable energy on site.

In this imagined sustainable travel of the future, each stage of a traveler's journey would include numerous elements that reinforce these guiding principles and encourage sustainable behaviors.

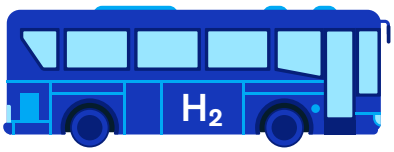
Exhibit 8

The future of sustainable travel is based on the principles of zero emissions, circular economy, and environmentally non-intrusive design.

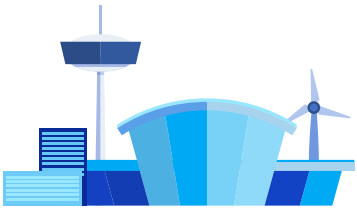
Some examples of sustainable technologies and interventions may be part of the tourism landscape to come



1. Booking platform presents sustainable nature-based tourism package with VR trailer for consumers to pre-experience snippets of the trip



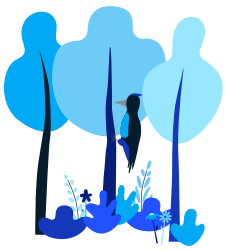
2. Electrified public transport, eg fuel cell electric buses powered by green hydrogen



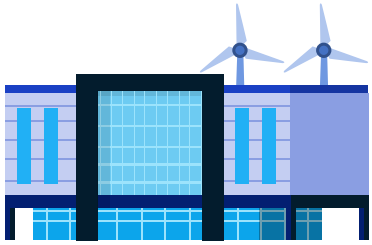
3. Sustainable airport for flights using next-generation sustainable aviation fuels/ green electricity-powered eVTOL flights, with on-site renewable energy, passive design[1], and waste and water recycling facilities

4. Sustainable hotel with on-site renewable energy, passive design, circular waste and water system, and urban farm gardens

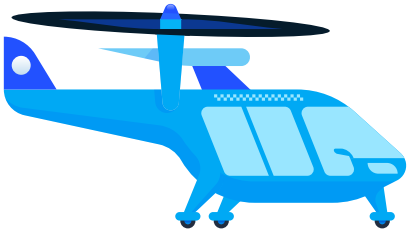
5. Autonomous vehicle powered by clean energy for consumers to travel to sustainable destinations



6. Sustainable nature-based destination with minimal environmental impact, for example, a migratory bird watching tour



7. Sustainable shopping mall complex with eco-friendly products and locally sourced dining



8. Short-distance flight via eVTOL powered by green electricity

[1] Passive design utilizes layout, form, and material to reduce or replace mechanical heating, cooling, ventilation, and lighting demand.

The largest proportion of waste generation and water use occurs in hotels and restaurants. In this scenario, a circular model would ensure that materials are recycled, and water is not wasted. Waste sorting facilities could be onsite in locations with high food and material consumption, such as hotels, restaurants, shopping malls, and airports. Urban farms could compost food waste for fertilizing vegetables and crops. Hotels could have collection and purification systems for gray and rainwater to encourage circularity and prevent water waste. Adoption of these solutions could be funded by financial mechanisms designed to support sustainability projects.

Furthermore, environmental consequences could be considered in the design of all buildings. Steps can be taken to make buildings as non-intrusive as possible, prompted by an industry-wide commitment to sustainability.

The technology required to realize this sustainable travel of the future is available, pioneered by small-scale innovators inside and outside the tourism industry. To bring the full picture to life, however, the entire industry would likely need to commit to greener options, boosting the scale of these technologies and reducing their costs to make them commercially viable.

The Chinese tourism industry is large enough to take the lead in advancing the sustainability agenda. As travelers resume their adventures post-COVID-19, each step of their journey presents opportunities to make small choices—actions that could immediately reduce their environmental footprint. But the onus is not on the traveler alone. Long-term change calls for collaboration between actors across the entire travel industry, from hotels and travel agencies, to green investors and technology suppliers.

The path toward eco-friendly travel in China

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