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# Responding to Global Warming: Mitigation Policies and Actions of Stakeholders in China's Tourism Industry

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**Abstract:** China's tourism industry has witnessed rapid progress in recent years, and is now an important part of global tourism in dealing with climate change. Within a framework of Pressure-State-Response (PSR), this paper focuses on the emission reduction pressure, carbon emission status, and responses of stakeholders in China's tourism industry. Findings include: 1) The central government's strategy and rapid growth of the industry scale exert rising pressure on China's tourism to reduce carbon emissions. 2) Carbon emissions of China's tourism account for 13%–14.6% of global tourism, and about 3% of China's emissions overall. Chinese tourists' per capita carbon emission is lower than half of the global level. 3) The Chinese government attaches great importance to energy-saving and carbon emission reduction. In the tourism industry, documents, standards and other regulative measures have been issued to ensure that business practitioners set up green operational and managerial systems. In the field of tourism transportation, China's high-speed rail, new energy vehicles, and urban shared bicycles, have developed very rapidly in recent years, and they have effectively reduced the carbon emissions in traveling. Furthermore, this paper finds that Chinese tourists already have awareness and willingness for low-carbon tourism.

**Key words:** global warming; mitigation policies; stakeholders' actions; China's tourism

## 1 Introduction

The tourism industry is sensitive to climate change (Hein et al., 2009; Becken, 2013). At the same time, the tourism industry is an important source of greenhouse gases globally. A series of studies have shown that (UNWTO, 2017; Becken et al., 2006; Jones, 2013) by only taking into account tourism transportation, accommodation and activities, the industry has a great contribution to carbon dioxide emissions.

Therefore, the reduction of fossil energy consumption and control of greenhouse gas emissions have become the main propositions of the current global tourism (WTM, 2007; UNWTO, 2009). The World Tourism Organization (UNWTO) stressed at the Second Global Conference on

Global Warming and Tourism in 2007: "Climate change is the most serious threatening factor to the sustainable development of tourism and the Millennium Development Goals of 21 century. All the Industry departments should act urgently, facing the climate change seriously", and identified the theme of World Tourism Day in 2008 as "Tourism: Address the challenges of climate change" (Jones, 2013).

China has about one fifth of the world's population and with the torrid growth of its national economy, the scale of its tourism industry has grown quickly, and this industry has become an indispensable part of the global carbon emissions of tourism (Shi et al., 2010; Shi and Wu, 2011; Yuan, 2013; Zhong, et al. 2014; Zhang, 2016). Under the pressure of global warming, how to respond to emission levels is essen-

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tial for tourism management departments, enterprises, tourists and other relevant stakeholders (UNWTO, 2017; WTM, 2007; UNWTO, 2009). In accordance with the strategies of UNWTO and China's central government for energy saving and emission reduction, Chinese tourism stakeholders have taken a series of actions. Adopting a framework model of Pressure-State-Response (PSR) (OECD, 2017), this paper summarizes the related issues of China's tourism industry, mainly focusing on China's tourism energy-saving emission reduction policies and actions, and discusses the countermeasures of mitigating the impact of climate warming in the national economy and the rapid development of the tourism industry, in the hopes of providing reference and inspiration for the global tourism industry in coping with climate change.

## 2 Materials and methods

With the PSR framework model (Fig. 1), the relevant data, cases and other materials collected from China's statistical yearbooks, industry reports, policy documents and websites, were organized. In this paper, "P" represents the pressure of carbon emission reduction of China's tourism, which comes from the central government's strategy and the growing industry scale. "S" represents the state of carbon emissions of the tourism industry, with the core domains including accommodation, tourism activities and transportation (UNWTO 2017). "R" represents the reaction of related stakeholders, that is, the appropriate actions for energy-saving and carbon emission reduction of governmental policy makers, operators of business units and tourists, which is the focused sector of this study.

## 3 Results

### 3.1 Pressure

According to the BP Statistical Review of World Energy (BIEE, 2017), from 2009 to 2015, China ranked the first in the world in total primary energy consumption (Fig. 2). Responding to this, at the United Nations Conference on Climate Change in Copenhagen in 2009, China officially announced the target of controlling greenhouse gas emissions for the first time. In 2020, the carbon emission per unit GDP

will be reduced by 40%–45% compared with 2005 (State Council of China, 2017). In 2015, at the opening ceremony of the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, Chinese President Xi Jinping announced that, relative to the 2005 levels, by 2030 China will reduce carbon dioxide emissions per unit of GDP by 60% to 65%, raise the share of non-fossil fuel in primary energy consumption by about 20%, and increase forest stock by around 4.5 billion m<sup>3</sup> (Central People's Government of China, 2017).

According to the data of the National Tourism Administration and National Statistical Office of China (CNTA 2017; NBS of China 1997–2016), in last few years, China has become the world's largest domestic tourism market, the world's largest outbound tourism market and the fourth largest inbound tourism reception country. The number of domestic tourists in China increased from 644 million in 1997 to 4.44 billion in 2016, with an average growth of 10.13% per year (Fig. 3); and the inbound tourists increased from 51.12 million in 1997 to 138 million in 2016, with an average growth of 3.8% per year (Fig. 4). Consequently, China's tourism industry is under heavy pressure to reduce carbon emissions.

### 3.2 State

Some Chinese scholars have assessed the carbon emissions of China's tourism industry. Taking account of transportation, star hotels and some of the tourism activities, it was estimated by Shi and Wu (2011) that carbon dioxide emissions of China's tourism industry were 51.34 Mt in 2008, which accounted for 0.86% of the total emission for China. Yuan Y (2013) point out that the study of Shi P only measured the direct part of the energy consumption and carbon emissions of tourism, but in fact, meeting the needs of tourism products and services also requires a lot of indirect energy consumption and carbon emissions. He followed a different approach by using the input-output analysis methodology and calculated that the indirect carbon dioxide emissions of China's tourism in 2007 was 162.84 Mt, accounting for 2.93% of the total carbon dioxide emissions from China's national indirect energy consumption. Zhong et al.

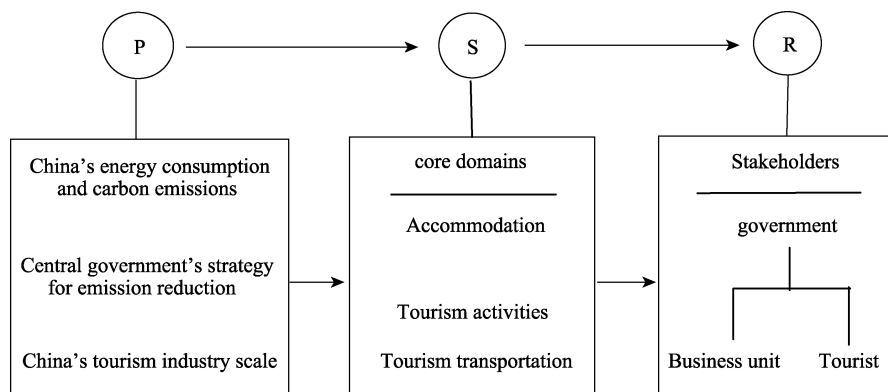


Fig. 1 PSR model of carbon emission reduction in China's tourism industry

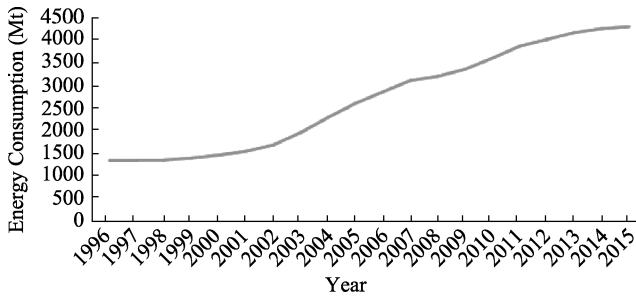


Fig. 2 China's total energy consumption in the most recent 20 years

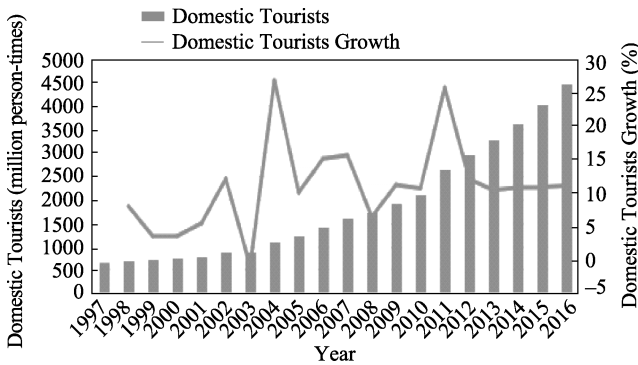


Fig. 3 China's domestic tourists in the last 20 years

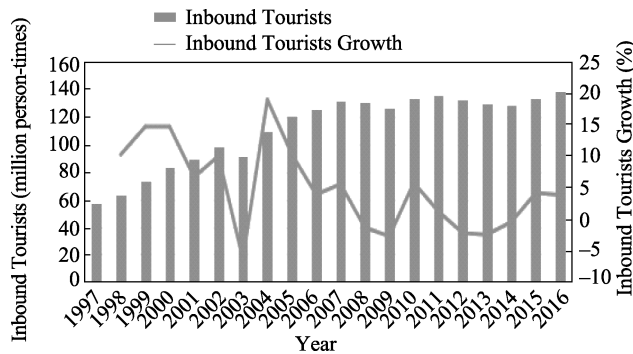


Fig. 4 China's inbound tourists in the last 20 years

Zhang et al. research basically supports this result. Zhong et al. (2014), resorting to life cycle assessment theory and the input-output analysis method, put forward that the total carbon dioxide emissions from China's tourism industry in 2007 was 169.78 Mt, with direct emissions of 73.56 Mt and indirect emissions of 96.23 Mt, and that tourism accounted for 2.71% of the total carbon dioxide emissions of all indus-

tries in China. Using input-output method and literature integration method, Zhang et al. (2016) calculated that the carbon dioxide emissions of China's tourism industry in 2007 were 190.48 Mt, accounting for 3.17% of the Chinese total emissions in this year. Among them, the direct emissions were 74.97 Mt, and indirect emissions were 115.51 Mt; and China's tourists' carbon dioxide emissions per capita were 0.114t, which is significantly lower than the level of 0.25t reported by UNWTO as the global tourism carbon emissions per person.

According to the more comprehensive studies above, the total carbon dioxide emissions of China's tourism industry in 2007 ranged from 169.78 to 190.48 Mt, accounting for about 3% of Chinese total in this year. Based on the per-capita calculations above we can find that China's tourism industry has taken efficient actions to reduce the carbon dioxide emissions.

### 3.3 Response

#### 3.3.1 Government policy

In China, the government plays a central role in social affairs. In response to global warming, the Chinese government has promulgated 1052 policies for energy-saving and emission reduction from 1997 to 2013 (Zhang et al., 2017). In reference to the related literature, there are 16 policies directly related to the tourism industry, without considering transportation. Among them, there are 4 for the whole tourism industry, 7 for hotel and accommodation, and 5 for the scenic areas. See Table 2 for more details.

In the table above, there are 3 milestone policies. Firstly, Several Opinions on Tourism in Addressing Climate Change (CNTA, 2017), issued in 2008 by China's National Tourism Administration, points out for the first time ever that responding to climate change is an indispensable aspect of the sustainable development of the tourism industry. Secondly, the State Council's Opinions on Accelerating the Development of Tourism (State Council of China, 2017), issued in 2009, clearly specified quantitative requirements that water and electricity consumption of star hotels and A-Class scenic spots be reduced by 20% in 2009 compared with 2005. Thirdly, Opinions on Further Promoting Energy Saving and Emission Reduction in Tourism Industry, issued in 2010 by the National Tourism Administration, attached two appendices respectively entitled 100 guidelines for hotels and 30 guidelines for A-level scenic areas (CNTA, 2017). After the

Table 1 Carbon dioxide emissions of China's tourism industry

Scholars	Year	Carbon dioxide emissions (Mt)	Contribution to regional total emissions (%)	Emissions per capita (t/capita)
Shi P H; Wu P	2008	51.34	0.86	—
Yuan Y J	2007	162.84	2.93	—
Zhong Y; Shi S Y; Li S H	2007	169.78	2.71	—
Zhang C L	2007	190.48	3.17	0.114

Table 2 Policies of China's tourism industry for energy-saving and carbon emission reduction

Serial number	Domain	Year	Title	Classification	Departments
1	Industry policy	2008	Several Opinions on Tourism in Addressing Climate Change	Ministry normative documents	National Tourism Administration
2		2008	Notice on Further Strengthening the Energy Conservation Work of Tourism Industry	Ministry normative documents	National Tourism Administration
3		2009	Opinions on accelerating the development of tourism	State Council normative documents	The State Council
4		2010	Opinions on Further Promoting Energy Saving and Emission Reduction in Tourism Industry	Ministry normative documents	National Tourism Administration
5	Accommodation	1993	Star-rating Standard for Tourist Hotels (GB/T14308-1993)	National Standard	National Tourism Administration
6		1993	Energy Conservation Design Standard on Building Envelope and Air Conditioning for Tourist Hotels (GB/50189-93)	National Standard	State Bureau of Technical Supervision, Ministry of Construction
7		2006	Green Hotels (LB/T007-2006)	Industry Standard	National Tourism Administration
8		2009	Cleaner Production Standard Hotel (HJ514-2009)	Industry Standard	Ministry of Environmental Protection
9		2010	The Rationality of Electricity Usage in Guesthouse and Hotel (GB/T12455-2010)	National Standard	State Quality Supervision Bureau
10		2010	Hotel Energy-saving and Emission Reduction 100	Departmental regulations	National Tourism Administration
11		2011	Guidelines for Energy-saving and Emission Reduction of Tourist Hotel (LB/018-2011)	Industry Standard	National Tourism Administration
12	Scenic areas	1999	Standard of Rating for Quality of Tourist Attractions (GB/T 17775-1999)	National Standard	National Tourism Administration
13		2010	Construction and Operation Guidelines for Prototype-zone of National Ecotourism Attractions (GB/T26362-2010)	National Standard	National Tourism Administration and Ministry of Environmental Protection
14		2010	A-level Scenic Area Energy-saving and Emission Reduction 30	Departmental regulations	National Tourism Administration
15		2011	Green Tourist Attraction (LB/T 015-2011)	Industry Standard	National Tourism Administration
16		2016	Demonstration Destination for Green Tourism (LB/T 048-2016)	Industry Standard	National Tourism Administration

last of these policies, the National Tourism Administration carried out special inspector work in Hebei and Shandong Provinces, and some local tourism authorities also worked out corresponding policies and measures for energy-saving and carbon emission reduction.

### 3.3.2 Accommodation

China has attached great importance to Accommodation for energy-saving and carbon emission reduction. Early in 1993, China issued Star-rating Standard for Tourist Hotels (GB/T14308-1993) (1993), which was revised in 2010 to include requirements on green design, clean production and green consumption. According to the National Tourism Administration statistics, by the first quarter of 2016, a total of 12678 star hotels had been certified as satisfying the aforesaid requirements. In 2006, China promulgated Green Hotels (LB/T007-2006) (2006), which divided green hotels into the two categories of the Golden Leaf and the Silver Leaf, on the basis of an overall assessment from the perspective of green design, clean production and clean consumption. The

Hotel Energy-saving and Emission Reduction 100 was issued in 2010 (CNTA, 2017), which developed a total of seven major guideline categories: reducing energy waste, reducing water use, energy measurement, energy management and operation, building energy efficiency, equipment selection and management, and energy conservation and training. Then in 2011, mainly using Hotel Energy-saving and Emission Reduction 100, the Guidelines for Energy-saving and Emission Reduction of Tourist hotel (LB/018-2011) (2011) was issued, which effectively motivated the hotel industry to carry out energy-saving and carbon emission reduction work.

In recent years, China's accommodation sector has developed new trends in energy saving and environmental protection. The Naked Stables is a classic case in the Chinese holiday and accommodation industry in recent years (Naked Hotel & Resort Management Co., Limited 2017)<sup>1</sup>, which is located in Moganshan Town, Deqing County, Zhejiang Province. "Naked" means to live away from the

hustle and bustle of the city, so that life can return to natural purity and achieve self-balance. Naked Stables is dedicated to providing guests with a unique, immersive experience and it is the first in China to achieve Platinum certification from Leadership in Energy and Environmental Design (LEED). The rooms—earth huts and tree huts—are mainly made of local renewable materials with a structural insulation board, solar water heaters, Light Emitting Diode (LED) energy-saving lamps, rainwater collection and recycling devices. The daily operation uses biodegradable environmental protection soap and other cleaning supplies. The village also has many ecological activities such as farming, fishing, and tea cultivation. Since 2010, following its low-carbon and back-to-nature philosophy, Naked Stables has achieved great success with 153 day full-occupancy in 2016. Naked Stables is a high-end resort in China, with Table 3 listing the room price intercepted from its website on May 17, 2017 (Naked Hotel & Resort Management Co., Limited 2017)<sup>2</sup>. Despite such high prices, the success of the Naked Stables shows that environmentally friendly philosophies are gaining endorsement and popularity among Chinese holiday takers.

### 3.3.3 Tourism activities

In China, tourism activities are generally carried out in scenic areas. China attaches great importance to energy saving and emission reduction in scenic areas. The most important document for scenic area management in China is the Standard of Rating for Quality of Tourist Attractions (GB/T17775-1999) (1999). In this standard, items of environment protection, resource conservation, waste disposal, energy saving measures and low-carbon touring, are strictly required. By the end of 2017, China had certified 249 National AAAAA Scenic Areas and 1284 National AAAA Scenic Areas, which include almost all of the important scenic resources in the country (CNTA, 2017). To obtain these ratings, these areas must achieve a high score requirement in resource conservation, environmental protection and energy saving. In 2010, A-level Scenic Area Energy-saving and Emission Reduction 30 was issued (CNTA, 2017), which provides guidance in the following 6 categories: environment protection, resource conservation, waste disposal, energy management, low-carbon touring and operation management, and has strongly promoted the work in this field.

China has made efforts to provide guidance for scenic area green development in four other areas. First, the National Tourism Administration issued Green Tourist Attraction (LB/T015-2011), which made detailed requirements on scenic resources protection, planning and construction, clean production, green services, green management and other aspects, but this has not been carried out substantively.

Second, the National Tourism Administration and Ministry of Environmental Protection developed the Construction and Operation Guidelines for Prototype-zone of National Ecotourism Attractions (GB/T26362-2010) (2010), which specified requirements on scenic planning, ecological and environmental quality, traditional cultural protection, infrastructure and other aspects. Based on assessment in accordance with the aforesaid Norms, the two governmental agencies certified 39 demonstrative zones in 2013, 37 in 2014 and another 35 in 2015. Thirdly, in 2016 the National Tourism Administration developed Demonstration Destination for Green Tourism (LB/T048-2016) (2016), which made the request of the tourism area of space organizations, the quality of the ecological environment and comprehensive conditions of service. Ten tourist resorts, including Changbai Mountain of Jilin Province, were identified as the first group of candidates. Finally, China is actively seeking international certification. The Ministry of Environmental Protection assessed seven scenic areas as ISO14000 national demonstration areas in 2007 (MEP of China, 2017), but since then efforts of this kind have stopped.

Table 3 Price of Naked Stables on weekends

Person	Room	Price
2	Earth Hut with Round Bed	From 2800.00 Yuan/Night
4	2-Bedroom Tree Top Villa	From 7200.00 Yuan/Night
6	3-Bedroom Tree Top Villa	From 10800.00 Yuan / Night

### 3.3.4 Tourism transportation

(1) High-speed Railway. In recent years, the high-speed railway has been the most important transportation mode promoted by Chinese government, and it has become the most frequently chosen transportation option for medium-long distance tours thanks to its fast speed, easy accessibility and comfortableness. At the end of 2015, the total length of the high-speed railway in China reached 19000 km which ranked the first in the world (Liu, 2016). According to the Medium- and Long-term Railway Network Plan (NDRC of China, 2017), by the year 2020, China's high-speed railways will reach 30000 km connecting 80% of China's major cities. Research shows that due to the transportation and usage of large quantities of steel and cement, the energy consumption in construction of the high-speed railway is quite high (Kemp, 2004; Chang and Kendall, 2011). But considering that the trains are driven by the clean energy of electricity and operate at high energy efficiency in the high-speed state, for the whole life cycle it has better energy savings and emission reduction effects. According to Zhou X's report (Zhou, 2015), when the CRH380A(L) train

<sup>1</sup> Naked Hotel & Resort Management Co., Limited, 2017. Available online: <http://www.nakedretreats.cn/naked-stables/zh-CN/>. (accessed on 20 May 2017)

<sup>2</sup> Naked Hotel & Resort Management Co., Limited, 2017. Available online: <http://www.nakedretreats.cn/booking/room.html?hotelCode=H000002&lang=zh-CN&showDebug=false>. (accessed on 20 May 2017)

runs at a speed of 300 km per hour on the Beijing-Guangzhou high-speed railway, the per capita energy consumption for 100 kilometers is only 3.64 kWh, equivalent to 1/2 that of an airliner, 1/8 that of an automobile, or 1/3 that of a bus.

(2) New Energy Vehicles. New energy vehicles have developed rapidly in recent years. Nowadays more and more tourist destinations and scenic spots choose new energy vehicles as a part of tourist traffic. In 2009, 2011 and 2016, Notice on Starting New Energy Vehicles Pilot Promotion, Notice on Furthering New Energy Vehicles Pilot Promotion, and Notice on Adjusting the Application of Financial Subsidy Policy for New Energy Vehicles were promulgated, respectively, (MOF of China et al., 2017), which together granted the financial subsidies for the production and purchase of new energy vehicles and offered preferential measures for obtaining licenses, daily traffic and maintenance. According to China's New Energy Automotive Industry Development Report (CATARC, 2016), the sales of a variety of plug-in hybrid electric vehicles (PHEV) and pure electric passenger cars increased from  $2.74 \times 10^4$  in 2012 to over  $7.0 \times 10^5$  in 2016. According to the Energy Conservation and New Energy Automotive Industry Development Plan (2012–2020) (State Council of China, 2017), the total number of new energy vehicles is expected to be more than 5 million by 2020. According to Tang B's case study of Beijing City, the promoted new energy electric vehicles will save 154 billion kWh of electricity and reduce emissions by 39.4 Mt of carbon dioxide by 2020 (Tang et al., 2016)

(3) Urban Shared Bicycles. According to The Bike-sharing World Map (Meddin, 2017), there were about 946000 public bicycles in the whole world in 2014, of which about 750500 were in China. From 2016, bike sharing has developed explosively in major cities of China, and many tourists choose bike riding as one popular means of city travel. Through the 2017 White Paper of Shared Bicycle and Urban Development (Tongheng UDL, 2017), shared bicycles have entered 50 cities covering more than 20 provinces, and have become the third most frequently used mode of transportation after subways and taxis in Chinese cities. Shared bicycles can significantly replace other modes of transportation (Fishman et al., 2015). After the launch of shared bicycles, in the year ending April 2017, car use for short trips had been reduced by 55%, equivalent to reducing 54 Mt of carbon emissions (Tongheng UDL, 2017).

### 3.3.5 Tourist

As reflected in the case of Naked Stables (Naked Hotel & Resort Management Co., Limited, 2017), Chinese tourists already have a high awareness and willingness for energy conservation and eco-environmental protection, which can be corroborated from several surveys of Chinese tourists. The results of Tang M's survey of tourists in Lijiang City

(Tang et al., 2014), show that 68.5% of visitors have a high awareness of low-carbon tourism, that 87.5% and 57.5% of visitors believe that changing modes of tourism traffic and accommodation can reduce the carbon emissions of tourism, respectively, and that the willingness of low-carbon tourism is generally high (79.5%). But at the same time, 91% of tourists believe that public awareness is the primary factor for affecting the implementation of low-carbon tourism. Zhang et al. (2016) conducted a survey of tourists in the Gulangyu Island and reached similar conclusions. More than 80% of the tourists are willing to learn low-carbon tourism-related knowledge, to participate in low-carbon theme travel, to travel bringing their own toiletries, to reduce the purchase of excessively packaged products, to turn off the lights, television, air conditioning and other electrical appliances when they leave the hotel and to be involved in garbage recycling in exchange for small gifts. But when it comes to behaviors that incur inconvenience, such as car-sharing in self-driving tours, reducing the frequency of towel and sheet replacement in the hotel and always buying low-carbon tourism products (if at a higher price), visitors who are willing to adopt these behaviors dropped to 59.3 %, 63.2% and 62.4% respectively.

## 4 Discussion and conclusions

### 4.1 Discussion

In the context of global warming, as a responsible country, China has twice announced its commitment to energy-saving and carbon emissions reduction to the international community in 2009 and 2015. The tourism industry is one of the fastest growing sectors in China's economy, and therefore it is faced with heavy pressure on carbon emission reduction.

The carbon dioxide emissions of China's tourism in 2007 were between 169.78 Mt and 190.48 Mt (Zhong et al., 2014; Zhang, 2016). In comparison with the 1302 Mt for global tourism reported by the UNWTO in 2005 (UNWTO, 2017), China's tourism contributed about 13% to 14.6%. In developed countries such as the Netherlands, New Zealand and Sweden, the contributions of carbon emissions of tourism to the national totals were about 10% (Bruijn et al., 2013; Smith and Rodger, 2009; Gössling and Hall, 2008), which is basically twice the global average of 4.9% (Table 4). In 2007, carbon emissions of the tourism industry accounted for about 3% of the Chinese total, slightly lower than the global average in 2005. This can be partly explained from the article by Zhang et al. (2016), which shows that the level of Chinese tourist carbon dioxide emissions per capita is only 0.114 t, significantly lower than the level of 0.25 t in global tourism, and far below the level of 0.42 t of developed countries like the Netherlands. In addition, as China is

in the process of rapid economic development, tourism only accounts for a small proportion of the emissions of all economic activities (Gu and Li, 2016).

Table 4 Tourism carbon dioxide emissions of the world and some developed countries

Cases	Year	Carbon dioxide emissions (Mt)	Contribution to regional total emissions (%)	Emissions per capita (t)
World	2005	1302	4.90	0.25
Netherlands	2012	15.4	9.3	0.42
New Zealand	2009	7.9	10.23	—
Sweden	2005	6.03	11	—

Among the stakeholders of China's tourism industry, the National Tourism Administration and related government departments are the leading force, having issued 16 policies aimed at promoting energy-saving and emission reduction. Most of them are standards, to guide and provide incentives for hotels and scenic areas to establish management systems for saving energy and reducing carbon emissions. In tourism transportation, respectively promoted by governmental investment and financial subsidies, China's high-speed railway and new energy vehicles have developed rapidly in recent years, and have effectively reduced the energy consumption and carbon emissions of medium-long distance tours. Within city tourism, the shared bicycles provided by enterprises have quickly become popular since 2016 in China, making short-distance traffic carbon free. In addition, with the continuous improvements of people's incomes and government propaganda, Chinese tourists' awareness and willingness to save energy and protect the environment has gradually increased. According to the experiences from Organization for Economic Co-operation and Development (OECD) countries (OECD, UNEP, 2017), tourism policies responding to climate change generally include five aspects: 1) a scientific assessment of tourism energy consumption and corresponding emissions, to provide a scientific basis for emission reduction decisions and enhance stakeholders' awareness; 2) simultaneous measures, including technological innovation, emissions management, tourism behavior adjustment, education, research and development and others; 3) carbon taxes, emissions trading and other economic instruments, through market-oriented means for adjustment; 4) standards, such as energy-saving building standards, green hotel standards and other constraints; and 5) incentive mechanisms, to provide economic, financial, tax and other incentives for motivating individuals or institutions in energy conservation and emission reduction. In contrast, China's tourism has explored all of the above aspects, particularly in policy guidance, standard constraints and government subsidies, but efforts in these five aspects still need to work collaboratively in a systematic framework.

## 4.2 Conclusions

Using the PSR framework, this summary shows that China's tourism industry is a rapid growing part of global tourism and China's economy, which faces heavy pressure to achieve carbon emissions reduction. Initially driven by the central government, stakeholders of the tourism industry now participate in energy-saving and carbon emission reduction, which have effectively reduced the carbon emissions of tourism.

(1) In 2007, the carbon emissions of China's tourism ranged from 169.78 Mt to 190.48 Mt, accounting for 13%–14.6% of global tourism, and about 3% of China's total emissions. Chinese tourists' per capita carbon emission is lower than half of the global level. Stakeholders of the tourism industry include the Chinese government, companies from many industries including tourism and tourists, and they have already begun to take measures.

(2) In the tourism industry, documents, standards and other regulative measures have been issued to ensure that business practitioners set up green operational and managerial systems. In reference to the related literature, there are 16 policies directly related to the tourism industry without transportation, urban and rural planning and many other industries.

(3) In the accommodation industry, in addition to escalating industry standards and norms, there is a new trend toward building and operating hotels in an energy-saving and advanced-technology manner, which has advanced great success.

(4) In the field of tourism transportation, China's high-speed rail, new energy vehicles, and urban shared bicycles, have developed very rapidly in recent years. These new modes of transportation have effectively reduced travelers' carbon footprint across cities and tourism attractions.

(5) In the construction of tourist attractions, the most important document for scenic area management, Standard of Rating for Quality of Tourist Attractions (GB/T17775-1999), has been upgraded several times and has proposed more detailed standards on the targets of energy-saving emission reduction.

(6) In the survey studies among tourists, we find that Chinese tourists have already shown awareness and willingness to carrying out low-carbon activities, but also need to be guided with a better social atmosphere.

## 4.3 Policy recommendations

China's tourism industry has developed rapidly in recent years and has been under tremendous pressure to reduce carbon emissions. Tourism stakeholders have also responded to the reduction of tourism carbon emissions after China formally announced its goal of controlling greenhouse gas emissions, and the leading role of the Chinese government cannot be ignored. Among the energy-saving

and emission-reducing policies directly promulgated by the government, in addition to the requirements of the entire industry they also include the requirements of stakeholders such as the construction and management of scenic areas and hotels. Other sectors of the policy formulation also contain elements that are closely linked with the tourism industry. In the future, the government should pay attention to the policies and supervision in the tourism industry. With the development of information technology and the rapid expansion of related industries some changes have taken place in such activities as travel, accommodation and catering in recent years. Relevant departments should keep pace with the times and make use of these changes to carry out practicable energy conservation and emission reduction activities.

Tourism-related enterprises are important players in energy-saving emission reduction activities. Increasing costs are inevitable in the process of upgrading hardware and software, but the business managers should realize that energy conservation and emission reduction are imperative. Whether in response to a government request or part of corporate social responsibility, energy conservation and emission reduction will surely bring long-term benefits and balance.

Tourists are an important part of the energy conservation and emission reduction in tourism. It is necessary to strengthen publicity and actively guide "low carbon" consumption behavior. The hotel should guide the guests to understand and support the hotel's energy-saving and water-saving measures, and reward the guests who voluntarily reduce linen washing and the consumption of supplies. The scenic spots should set up tips and initiatives on energy conservation and environmental protection, advocate the concepts of green consumption and moderate consumption, and accelerate the adoption of consumption patterns that are beneficial to resource conservation and environmental protection.

#### 4.4 Limitations and future research directions

This article focuses on the work and progress of tourism stakeholders in energy conservation and emission reduction, which remains inadequate in the following areas.

First, in the aspect of government research, both government supervision and management measures of enterprises are important parts of the government's law enforcement and energy conservation and emission reduction. In future research, we can sum up the experience through the study of specific cases and summarize the experiences and lessons for the future energy conservation and emission reduction work.

Second, in transportation, public transport at tourist destinations is also important. Convenient and reasonable public transportation can reduce carbon emissions, which is not discussed in this article. For example, the extensive devel-

opment of electric buses cannot neglect the role of energy conservation and emission reduction in the city.

Third, this article mainly takes China as the research object, so it lacks the comparative study of related cases in the same period throughout the world. In the future, we can find the suitable ways and the research directions for energy saving and emission reduction in China by taking the experiences and lessons of both developed and developing countries as examples.

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## 应对气候变暖：中国旅游业的政策和行动

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**摘 要:** 中国旅游业规模大且近年来发展迅速, 是全球旅游应对气候变暖的重要组成部分。本文运用 PSR 框架, 综述性考察中国旅游业的减排压力、碳排放状态和以政府为主的利益相关者反应。研究发现: (1) 源于中央政府的节能减排战略要求和旅游业快速壮大的产业规模, 中国旅游业具有较大的碳减排压力。(2) 中国旅游业碳排放量占全球旅游的 12.5%–14.6%, 占中国碳排放的 3%左右, 中国游客每人每次旅游碳排放量低于全球水平的 1/2。(3) 中国政府重视节能减排, 国家旅游局等部门主要通过制定行业标准的方式, 引导饭店、景区等旅游企业建立绿色经营和管理体系; 在交通领域, 近年来中国高速铁路、新能源汽车、城市智能共享单车发展十分迅速, 有效降低了旅行中的碳排放; 中国游客普遍具有较高的低碳旅游认知和意愿, 但也还需要更多的宣传和引导提高公众意识。

**关键词:** 气候变暖; 减缓政策; 利益相关者行动; 中国旅游业