

ANALYSING THE FORMS OF TOURIST TRANSPORTATION WITH MAJOR EFFECT ON GLOBAL WARMING AND SUSTAINABLE DEVELOPMENT

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Abstract: *The paper presents the forms of tourist transport with a major effect on global warming and, implicitly, on sustainable development. Tourism is largely affected by the climatic change; however, at the same time, it has a significant contribution to the worldwide emission of greenhouse effect gases. Between tourism and transport, particularly air transport, there is a close connection, especially at the international level. More than 40% of international tourists travel by air; almost all these people travel for business purposes or for pleasure. It was ascertained that road and air transport have a major influence on the climatic change and, implicitly, on sustainable development, which imposes the taking of actions to prevent negative effects on the environment.*

Key words: *sustainable development, sustainable transport, global warming, road transport, cruise*

INTRODUCTION

Sustainable development means ensuring a better life for all people in a viable way, both now and in the future. The sustainable development of tourism may be considered a process of negotiating interests of the main stakeholders involved in tourism: tourists, local communities, industry and the environment.

The tourist transport is the main component of the tourism product by facilitating the movement of tourists from his home to the tourist destination. But the transportation to and from tourist destinations may have serious impacts on global warming and atmosphere. The air and road transport burn huge quantities of fossil fuel and release large amounts of pollutants into the atmosphere. At ground level, the car movement and parking may seriously harm landscapes and undisturbed nature of protected areas.

Transport is one of the most important sources of pollution that affect negatively the environment quality. The main harmful factors, associated with the transportation and connected activities are: the phonic pollution (the noise), the air pollution and the water pollution.

MATERIALS AND METHODS

Tourist transportation by road, rail, air, sea and water represents, according to the specialists, the most common means of travel for tourism purposes; on the other hand, it holds the largest share of tourism product. Transport produces an important share of carbon dioxide emissions in the total emissions from the tourism sector. In order to identify the effects of tourism transport on global warming and sustainable development, we consulted the following data and publications: the reports and publications of the European Commission, the publications of the World Tourism Organization, and the statistical service of the European Union (Eurostat).

RESEARCH RESULTS

Further analyzing the EU 27 countries reveals a real mosaic in tourists option for a particular mode of transportation (Table 1). In most EU countries, passenger transport by bus and coach was more prevalent than rail transport.

In case of tourist rail transport, Germany holds the first place in 2010, with 83 million passengers. During 2005-2010, 14 Member States of the European Union registered an increasing number of passengers km. The highest rates were reported by Luxembourg (30%), Sweden (26%) and the United Kingdom (25%).

Table 1

EU 27 passenger transport in 2010

<i>State</i>	<i>Passenger transport by bus and coach (billion passengers - km)</i>	<i>Rail passenger transport (million passengers - km)</i>	<i>Maritime passenger transport (thousand passengers - km)</i>	<i>Air passenger transport (thousand passengers)</i>
Belgium	:	9849	829	23040
Bulgaria	10	2090	1	6213
Czech Republic	16	6559	-	12427
Denmark	:	6341	41993	24461
Germany	:	82837	28780	168804
Estonia	2	247	9512	1385
Ireland	:	1678	3089	23165
Greece	:	1383	83993	32624
Spain	51	22348	21215	153916
France	:	c	27218	126287
Italy	:	47172	87658	110739
Cyprus	:	-	107	7231
Latvia	2	741	676	4670
Lithuania	3	244	251	2331
Luxembourg	:	347	-	1606
Hungary	:	7653	-	8175
Malta	:	-	8063	3294
Netherlands	:	c	1994	48904
Austria	:	10263	-	23704
Poland	22	17485	2601	18434
Portugal	:	4111	701	25442
Romania	:	5437	0	8923
Slovenia	3	729	39	1383
Slovakia	5	2309	-	1888
Finland	8	3959	17867	14274
Sweden	9	11219	30185	26865
United Kingdom	:	55831	28824	193534

Source: *Energy, transport and environment indicators*, Edition 2012, Eurostat, pp. 126-135

: - data not available; c-confidential data

Approximately 787 million passengers from the EU27 countries used air transport in 2010. The highest number of passengers using this mode of transportation has been registered in the UK (194 million passengers), Germany (194 million passengers), Spain (154 million passengers), France (126 million passengers) and Italy (111 million passengers).

Tourism is deeply influenced by climate change, but it also contributes to the emission of greenhouse gases worldwide. There is a close relationship between tourism

and transport, particularly air transport, especially internationally. More than 40% of international tourists travel by plane, and almost all these people are business or leisure travelers. According to the World Tourism Organization, the carbon dioxide production from tourism is forecasted to increase with 160% by 2035, compared to 2005.

The transport sector faces major challenges – more and more congested urban traffic, with negative impact on the environment and human health, or oil reserves becoming lower.

The **air transport** is the main gas responsible for the emissions of greenhouse gases in the tourism sector. Air pollution caused by aircraft could be reduced by installing pollutant retention mechanisms during landing or takeoff, along with the use of less polluting engines.

UNWTO made a report describing the reduction process of climate change caused by air and proposed mechanisms to reduce emissions of greenhouse gases, ensuring a positive development of the tourism sector. The main objectives included in that report are:

- Free access of air transport on carbon markets, so that releases are compatible according to the determined objective for the sector;
- Introducing sustainable biofuels in aviation;
- Air tourism transport market may lower carbon losses by modifying air routes;
- Analysing the strategies that reduce carbon dioxide emissions in tourist destinations, in view of reducing poverty and promoting growth in developed and developing countries;
- Developing economic instruments by public and private enterprises in close cooperation with NGOs.

Optimizing air traffic management will be facilitated by new navigation systems such as Galileo, which is being developed in Europe. The air operators try to save as much fuel as possible by renewing their fleet of aircraft, introducing fuel-saving technologies, reducing the time the engine is on the ground, choosing more efficient routes. The technical improvements of aircraft and airspace failed to keep pace with the expansion of air transport, since the carbon dioxide emissions from this sector continued to grow.

Using air transport for arrivals in tourist destinations has significant implications on global warming, even though, according to Oslthoorn, the international aviation produces only 1% of all carbon dioxide emissions. The British Department for Environment Food and Rural Affairs (DEFRA) estimates that passenger air transport on short distances generates 130 grams of CO₂ per kilometer, for an average load factor of 0.65 for aircraft and an average journey of 500 km. Also, DEFRA estimates that a tourist who travels by air on a long distance generates 105 grams of CO₂ per kilometer, based on a load factor of 0.797 and a journey of 3,500 km.

Despite the 1-2% reduction of fuel consumption per passenger per kilometer, made by airlines over the past decade, and significantly reducing noise, the total impact of civil aviation on the environment has increased due to the significant increase in traffic. The European policy for sustainable air transport requires the following steps:

- including aviation in the emissions trading system and wider use of the new generation European system in air traffic management;
- introducing a differentiation based on emissions associated with takeoff and landing fees at airports;
- implementing the joint technology initiative "Clean Sky" to reduce CO₂ and NO_x emissions and noise pollution;
- ceasing European airspace fragmentation by creating a genuine single European sky;

- adopting concrete measures to reduce congestion at airports;
- ensuring a better co-modal and logistics integration of airports, facilitating their access to the rail network.

In order to reduce the emissions of greenhouse gases from the air transport, a range of market instruments may be used, such as additional tax on tickets, fuel tax, taxing carbon dioxide emissions and emissions trading. All these tools are presented in Table 2. The ticket tax is the easiest option for internalisation emissions of greenhouse gases caused by aviation. However, if the ticket tax will be reduced, demand will continue to grow and then the tax would be an incentive to reduce CO₂ emissions from aviation, as this sector will expand.

Table 2

Market instruments for reducing greenhouse gas emissions from air transport

<i>Fee type</i>	<i>Operational results</i>	<i>Funding</i>	<i>Emission effect</i>	<i>Legal aspects</i>
Tax on tickets	Airlines may be responsible for collecting taxes.	The fee may amount to 10-16 billion annually.	Little effect on demand elasticity depending on price; the airlines will not be encouraged to reduce emissions.	Legally possible.
Fuel tax	The tax may be added to a fixed amount per liter of sold fuel or as a percentage of the current price of fuel; the oil companies collect this tax.	A tax of 0.32 euro per liter of kerosene could result in a total of 14 billion euros.	Stimulate emission reductions	Issues relating to the bilateral agreements which include fuel tax exemption.
Taxing emissions	Emission estimate is possible when considering the type of aircraft, engine, route.	Applying a tax on a liter of kerosene CO ₂ of 0.12 euros, 0.12 euros for water vapor and 0.6 euro for nitrogen oxide (NO _x), totaling about 14 billion euros.	Emissions taxation will have a greater impact on reducing emissions.	Legally possible, unless the tax is collected in relation to fuel consumption as this could be seen as a hidden tax on kerosene.
Emissions trading	Trading system based on CO ₂ emitting installations.	CO ₂ emission price depends on the market.	Direct control.	Legally possible.

Source: S. Becken, J. Hay, *Tourism and Climate Change – Risks and Opportunities*, Channel View Publications, Cleveland, 2007.

The European Union leads the global efforts to reduce the emissions of greenhouse gases resulted from human activities that threaten to cause dangerous climate changes worldwide. The emissions trading system (EU ETS) developed by the European Union is the cornerstone of its strategy to reduce the cost of its emissions of greenhouse gases. This system is based on the recognition that the carbon price is the most cost-effective way to significantly reduce global emissions of greenhouse gases; these reductions are needed to avoid reaching dangerous levels of climate changes.

The EU ETS system is based on the common "currency", namely the emission rate. A share gives the right to emit one tonne of CO₂. Currently, the Member States have to

draw up national allocation plans for each trading period, specifying the number of allowances each plant will receive annually.

The **road traffic** is the main source of carbon oxide emissions (about 90%) and oxides of nitrogen (about 59%). Its role is more modest, but comparable to other sources, in terms of carbon dioxide emissions and has less influence on sulfur dioxide (SO₂) (4%). It also has main road share in volatile hydrocarbon emissions (about 45%) and lead emissions, estimated to be over three times larger than those generated by industry. In addition to air pollution by internal combustion engines by: toxic, easily noticeable air pollutants (smoke, odor), long-term greenhouse gas (carbon dioxide), the road transport affects the environment in an aggressive way, as a consequence of the economic development in the last forty years that has led to continuous increase passenger transport (2.20 times increase in passenger number per km). Such traffic levels generate stress elements hardly accepted by people. Given the complex transport problem (road traffic safety, its influence on nature), the main conclusion is that urban areas have to reduce the travel speed (below 30 km / h) and the traffic intensity. Lumsdon and Tolley believes that cycling is the most sustainable form of tourism transport. It is non-motorized and requires no fuel, having minimal impact on the environment, and it is good for tourists' health.

The **rail transport** has unique advantages, as it is a safe and environmentally friendly mode of transportation. Therefore, the rail transport may contribute significantly to the development of sustainable transport. There is a growing need for a dynamic railway sector to form a powerful, safe and clean transport system for passengers, to contribute to a sustainable and prosperous market. The traffic congestions the cities face, the need to address the challenges of climate change and the increasing fuel prices show that it is necessary to stimulate rail transport development.

When comparing the auto / rail indicators, the rail transport shows a higher energy efficiency than road transport, while the pollution level in road transport is 10 times higher than rail; in addition, the road safety reflected in the number fatalities was 2,900 times more fragile than rail.

The main advantage of rail is its high energy efficiency compared with other modes of transport. Rail can use renewable energy. For example, Swedish railways recently used a renewable energy: wind and hydro. The actual energy consumption of trains depends on the speed of trains, landforms and number of accelerations. The main challenge will be to reduce the energy used by high speed trains. The carbon dioxide emissions generated by rail affect certain regions, depending on the energy source of the train. 55 grams CO₂ / passenger km are estimated for transporting high-speed intercity rail (200 km / h) and 86 grams CO₂ / passenger km for a TGV (300 km / h). According to the Association of Railway Companies, rail produces 54 grams CO₂ / passenger km for an electric train and 74 grams CO₂ / passenger km for a diesel train.

The European policy for sustainable rail provides the following measures:

- making a single area or a single European railway market as soon as possible;
- removing technical barriers and adopting measures that lead to a unified traffic management and interoperable solutions;
- improve benefits offered, increasing the quality of tourism services for tourist transport.

The **cruise** generates carbon dioxide emissions. The cruise tourism market has changed its image in recent years, from the luxury market to the mass market and offer, for a wider and younger audience. The recent trends are of shorter duration cruises, combining air arrangements - great with the liberalization of air transport and the diversification of activities taking place on board.

As regards maritime transport, the European Commission recommends:

- reducing the emissions of substances such as CO₂, SO₂ and nitrogen oxides from ships;
- introducing and promoting the use of renewable energy sources such as wind and solar;
- supplies from ship to shore installations that were drawn at anchor;
- carefully examine the possibility to limit emissions trading system due to emissions without penalizing shipping, which affects the environment slightly.

The initiatives on achieving sustainable transport may vary depending on the restrictions regarding the transport to a certain destination (e.g. car-free in tourist resorts) to encourage the use of public transport, bicycle use and benefits to non-car tourist attractions or accommodation establishments.

CONCLUSIONS

Road transport and especially the use of personal cars, have major implications on climate change. Among the measures to be introduced are: a more efficient use of fuel, the use of alternative fuels and setting lower limits on carbon emissions from cars. The car is the most used mean of transportation for tourists, and it is usually their personal property. In some countries, the rental cars are more effective than the usual ones, because they tend to be newer and have smaller engines. The alternative technologies include electric vehicles; these are very efficient and do not emit exhaust gases and harmful pollutants directly. The time required for charging batteries and the high cost of construction prevents electric cars to become extremely popular, but it is clear that the industry strives to make them affordable. The electric vehicles have become popular in some destinations because they are quiet and clean.

In conclusion, it appears that air and road transport have a major influence on climate change and hence on sustainable development, which requires the adoption of measures to combat their harmful effects on the environment. The public and private actors involved in tourism should adopt measures to develop sustainable transport policies.

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