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TOURISM AND ENVIRONMENTAL PROTECTION**

Summary

A dramatic change is presently occurring on the global tourism market. The newest tendencies are characterized by the onset of hypermobility, especially in the form of the large growth of air transport, the largest consumer of energy and CO2 issuer. Hypermobility – made possible by the expansion of so-called "low-cost" airlines, growth of the general level of education, standard of living and extra free time – in industrially developed countries is rapidly leading to global effects that are increasingly negative for the environment. The further uncontrolled trend of hypermobility is, of course, in dramatic collision with the basic principles of sustainable development.

Key words: *tourism, hypermobility, concept of critical sustainable development, energy consumption, CO_2 emission*

JEL classification: L93, Q53

1. Introductory considerations

At first sight it may not be sufficiently apparent how faltering economic development and the accelerated process of globalization are irreconcilably opposed to the *concept of sustainable development*.

We can observe in the economic science itself fundamental differences in defining the ***concept of sustainable development***. From the standpoint of economic development, literature contains three totally different approaches to this concept. Of course, all three approaches start from the same premise – *that the total volume/value of capital must not be reduced*.

The essential difference between them lies in the extent to which they allow for change in the structure of capital, i.e., the substitution of **natural** capital with so-called **man-made** and **human** capital:

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- If the substitution of natural capital with man-made and human capital is allowed/legitimate, then we are talking about the concept of **weak sustainability**;
- If the substitution of natural capital is not at all allowed, then we are talking about the concept of **strong sustainability**;
- If there is an insistence on the preservation of only a critical portion of natural capital, without which survival on the planet would be brought into question, we are talking about the concept of **critical sustainability**.

A separate aspect of *ecological sustainability* is the sustainable consumption of energy and resources. There is a question as to whether it is at all possible to make the current level of consumption and resource use sustainable *in the long term*. This is still possible when it comes to renewable resources (of course, at a high cost) but, by definition, impossible in the case of *non-renewable* resources – which will at some point become exhausted.

For example, air transport is currently totally dependent on fossil fuels and is, thus, unsustainable in the long term, unless some other, renewable sources of energy become available for this use in the future. However, chances are that the dependence of air transport on fossil fuels will be long-lived. Aircraft fuel from renewable sources is produced in limited quantities and is extremely expensive.[1]

As Peter Hall sardonically observes: "Although everyone today enthusiastically supports the concept of sustainable development, the basic problem lies in the fact that no one is actually delving into what it exactly means. Or, to be more precise, although many are citing the definition of sustainable development given in the Brundtland report, no one is actually sure of how those principles can be transformed into decisions of everyday development."[2] Truly, despite the clearly defined goals, it cannot be said at all that everything is going easily and smoothly.

Precisely because of its simplicity and, hence, broad interpretability, the definition given in the Brundtland report: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" – is the one most frequently cited and challenged.

Peter Ness posed the key question a long time ago: "Why isn't development in the OECD countries occurring in accordance with the principles of sustainable development, even though it is precisely sustainable development and a sustainable mobility level that are today being proclaimed as the most important political goals?... The reasons surely lie in the profound collision between *sustainable development* and *economic development* itself. Namely, sustainable development is quite important, but not nearly as attractive as economic development! Thus, for example, for the globalized economy growth in the volume of transport is,

1 P. Forsyth, "Environmental and financial sustainability of air transport: Are they incompatible?", *Journal of Air Transport Management*, 17/2011.

2 P. Hall, *Cities of Tomorrow,* Wiley-Blackwell, 2002, p. 412.

in fact, just a means of achieving economic development. Powerful interests are also included in the development of transport infrastructure... Ever larger private homes and office buildings are also an important element of economic development. All in all, the sum total of costs of transport, housing, heating and lighting makes up one half of total average household expenses... In other words, a change that would lead to lower consumption, i.e., lower expenses for housing and transport, would also bring lower demand in important sectors of the economy."[3]

The following analysis will show the extent to which non-renewable energy sources – especially oil – are a critical factor of sustainable development and that, thus, it is precisely the concept of critical, *conditionally sustainable development* – that is the most acceptable.

2. Energy consumption

By placing the focus on the concept of *non-renewable energy resources*, which touches the very essence of the *concept of sustainable development*, we uncover an interesting paradox.

Just during the period between ***1973-2007, global consumption of energy doubled*** – from 4,765 Mtoe (mil. tons of oil equivalent) to 8,286 Mtoe.[4] Shutting our eyes before this global problem will not, of course, in the least bit contribute to its solution: numerous researches have clearly shown that ***global energy consumption*** will ***triple*** by 2050.[5] No other aspect so clearly shows the extent to which the goals of sustainable and economic development are in dramatic collision as does the sphere of exhaustion of non-renewable energy sources.

Successive energy crises started shaking the world in the 1970s. As a result, already during the 1980s, the creation of the sustainable development paradigm brought the problem of energy consumption to the epicentre of scholarly interest.

As an OECD study reveals: "The energy market is dominated by the OECD countries (*energy hungry*) and several of the largest oil exporters."[6] It is obvious that the developed countries consume the most energy resources, and their energy consumption continues to increase unstoppably. Total energy consumption in the OECD countries is growing at an accelerated pace.[7] The problem is

[3] ECMT/OECD: Land-Use Planning for Sustainable Urban Transport: Implementing Change (Linz workshop), Paris, 1999, p. 3.

[4] National Academy of Sciences: *Limiting the Magnitude of Climate Change,* NAP, Washington DC, 2010.

[5] OECD: *Energy: The Next Fifty Years,* Paris, 1999.

[6] OECD: *Energy: The Next Fifty Years,* Paris, 1999, p. 50.

[7] OECD/ECMT: *Urban Travel and Sustainable Development,* OECD, Paris, 1996.

that the developed countries have oil and gas reserves sufficient for only the next 10-20 years.[8]

Nevertheless, the real problems will appear only when the poor part of the world (which currently consumes a negligible amount of energy but also has an exploding population) achieves a much faster rate of economic development. According to OECD research, "the share of the underdeveloped world in total energy consumption will rise from 26% to 58-67% by 2050, and by 72-83% by the end of the 21st century."[9]

The present-day share of the underdeveloped world in total world energy consumption is indeed quite low – only 26%. While the OECD countries are now consuming 4.5 tons of oil equivalent per capita, the average for the rest of the world (0.8 tons per capita) is 6 times lower![10]

It is obvious that "if global energy consumption at least triples in the near future, as predicted by numerous models, the choice can presently be made between three energy sources, each of which has numerous limitations:

1) **use of fossil fuels** would at least triple atmospheric CO_2, which would seriously contribute to dramatic, irreversible global climatic changes;
2) the **solar option** is the least damaging ecologically, but still exceptionally expensive, requiring huge land areas, while
3) the **nuclear option** (whose technical suitability will need to be proven in the future) requires perfect global political stability.

Thus, the true challenge for our generation is not how to *develop new energy sources*, but how to find possibilities *to reduce the energy demands* of our society."[11]

The share of transport in total world energy consumption is enormous:

- 39% is consumed by the industrial sector,
- 27% by transport,
- 19% by the residential sector,
- 8% by the commercial sector, and
- 7% by agriculture and other activities.[12]

In addition, the share of transport in total energy consumption is rapidly growing parallel with economic development. Just in the last two decades of the previous century, the share of transport in energy consumption in OECD countries jumped from 24% to 31%.[13]

8 OECD: *Energy: The Next Fifty Years,* OECD, Paris.

9 OECD: *Energy: The Next Fifty Years,* OECD, Paris, 1999, p. 50.

10 OECD: *Energy: The Next Fifty Years,* OECD, Paris, 1999.

11 OECD: *Energy: The Next Fifty Years,* OECD, Paris, 1999, p. 80.

12 OECD: *Energy: The Next Fifty Years,* OECD, Paris, 1999.

13 OECD/ECMT: *Urban Travel and Sustainable Development,* OECD, Paris, 1996.

Especially significant is the share of transport in the consumption of oil, which continues to be the basic source of energy, as well as the most concentrated form of energy (except, of course, nuclear energy). Among all the types of fossil fuels, it is the easiest to extract, process and transport, and we have become quite dependent on it for most of our transport needs.[14] In the US, the largest consumer in the world, responsible for 20% of the consumption of global primary energy, transport takes up 70% of total annual oil consumption![15]

Although there have been numerous attempts to develop alternative fuels, it is obvious that they continue to be much more expensive than oil. Namely, no other fuel approaches oil's EPR (energy profit ratio – the ratio between energy produced and energy produced in the process of fuel production).

During the initial phase of oil exploration, the EPR was greater than 100; for undersea and new oil drillings, the EPR equals 5-10, while the EPR coefficients of alternative fuels, such as shale oil and biomass, equal only 1.[16]

Peter Newman makes an ironic comment: "Being preoccupied with technological solutions, we simply forget Jevons' principle. The economist Jevons predicted in 1865 that the exceptional increase in coal combustion efficiency of that time would result in – even larger coal consumption... In the US, oil and oil derivative consumption in transport increased by 20% between 1973 and 1988, despite the doubling of the technological efficiency of vehicles' fuel use... The principle of sustainable development is absolutely not being applied in transport, because the new, super-efficient motor vehicles are covering ever-increasing distances."[17]

The latest research of the US National Academy of Sciences also shows that energy consumption in transport can be significantly reduced only through:

1) Decreasing the volume of traffic;
2) Reorientation to types of transport that consume less energy;
3) Increasing the energy efficiency of different types of transport.[18]

[14] M. Jovanović, "Critical sustainability and energy consumption in urban transport," *Bulletin of the Serbian Geographical Society,* Vol. 90, iss. 3, 2010, pp. 153-170.

[15] National Academy of Sciences: *Limiting the Magnitude of Climate Change,* NAP, Washington DC, 2010.

[16] P. Newman, J. Kenworthy, *Sustainability and Cities: Overcoming Automobile Dependence,* Island Press, Washington DC, 1999.

[17] P. Newman, *Towards Sustainable Transportation, (OECD International Conference, Vancouver Canada),* EcoPlan International Paris, 1996.

[18] National Academy of Sciences: *Limiting the Magnitude of Climate Change,* NAP, Washington DC, 2010.

3. Hypermobility in the sphere of tourism

In developed countries, tourism has undergone essential changes during the past decade. Travelling is now more frequent but shorter (in terms of time), and oriented toward increasingly distant destinations.

Globally speaking, a dramatic change has occurred. An increasing number of tourists is being directed toward faraway, exotic destinations, until recently reserved only for a well-healed minority. Such a sudden increase in the volume of tourist trips – hypermobility – has been made possible, in the first place, by the expansion of low-cost airlines, increased educational levels, living standards and additional free time.[19] Hypermobility is today a recognizable *behavioural norm*, while travelling in one's free time is already considered to be a routine condition.

Hypermobility is, thus, characteristic for industrialized societies, supported by a good, extensive airport network that generates travel variety, including occasional deep discounts (especially in relation to other modes of transport).

The exceptionally high annual growth rates of global air traffic (5-6%) brought a fivefold increase in the 1970-2000 periods, while the share of air transport in international tourist travel reached 42%.[20] This trend is expected to continue and, for example, average distances traveled within the European Union are expected to rise from 1,150 km in 2000 to 1600-1700 km by 2020.[21]

Hypermobility has, thus, become a sacrosanct goal, unquestioned by the majority, even frequently being used as an indicator of progress and economic development. However, over the last fifteen or so years, there has been a growing, sobering realization about hypermobility's accompanying negative environmental effects, especially in the sphere of air transport.[22] Thus, for example, it is estimated that, of all the elements of the average tourist trip, the *airplane* has the most influence on the process of global warming, as much as 60-95%![23]

[19] C. M. Hall, *Tourism. Rethinking the Social Science of Mobility,* Pearson, Harlow, 2004; J. Adams, "Hypermobility: A challenge to governance" in: C. Lyall, J. Tait (eds), *New Modes of Governance: Developing an Integrated Policy Approach to Science, Technology, Risk and the Environment,* Ashgate, Aldershot, 2005.

[20] WTO: *Tourism Market Trends,* WTO, Madrid, 2005.

[21] Peeters et al., *European Tourism, Transport and Environment,* Final Version, NHTV CSTT, Breda, 2004.

[22] Penner et al., *Aviation and the Global Atmosphere; A Special Report of IPCC Working Groups I and III*, *Cambridge University Press, Cambridge, 1999; Sausen* et al., "Aviation radiative forcing in 2000: An update on IPCC (1999)," *Meteorologische Zeitschrift 14 (4), 2005; Schumann, Air Traffic and the Environment*, Springer Verlag, Hamburg, 1990; Schumann, "Aviation, atmosphere and climate-what has been learned," in: R. Sausen, C. Fichter, G. Amanatidis (eds), *Proceedings of the AAC-Conference*, European Commision, Friedrichshafen, June 30 to July 3, 2003, pp. 349-355.

[23] Gossling et al., "The eco-efficiency of tourism", *Ecological Economics*, 54 (4), 2005; S. Gossling, M. Hall, "An introduction to tourism and global environmental change" in: S. Gossling, C. M. Hall (eds), *Tourism and Global Environmental Change. Ecological, Social,*

Airplane travel warrants particular attention, as its gas emissions mostly take place at altitudes of 10 to 12 km (in the upper layers of the troposphere and the lower levels of the stratosphere), where they have a significantly greater effect on the ozone layer, cloud cover and harmful radiation *than on the earth's surface*.[24] Thus, the RF (Radiative Forcing) factor of air traffic emissions equals 1.9-5.1 (which is two to five times higher than that of exclusive CO_2 emission).[25] On the other hand, the RF factor of road, rail and sea transport equals only 1.[26] It is, thus, tourism based on air travel that has the most negative effect on global climate changes.[27]

The results of this research have only recently been included in more complex evaluations of the effects of tourism on the overall human environment, shifting the focus from the previous analysis of local effects – to the global effects of tourism on the ecosystem.[28]

4. Energy consumption and carbon dioxide emissions in tourism

Of course, a particular activity's volume of energy consumption and CO_2 emission directly depends on what is exactly classified under that activity. Here, in accordance with the UNWTO definition, we shall under **tourism** assume "all the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes." Under domestic and international tourism we shall also include the category of so-called excursionists (persons with stays of less than 24 hours), as well as participants of tours and maritime travels.

Economic and Political Interrelationships, Routledge, London, 2005; Peeters – Schouten, "Reducing the ecological footprint of inbound tourism and transport to Amsterdam," *Journal of Sustainable Tourism*, 14 (2), 2006.

24 Penner et al. (eds), *Aviation and the Global Atmosphere,* A Special Report of IPCC Working Groups I and III, Cambridge Un. Press, Cambridge, 1999.

25 Sausen et al., "Aviation radiative forcing in 2000: An update on IPCC (1999)," *Meteorologische Zeitschrift*, 14 (4), 2005.

26 Peeters et al., *Fuel Efficiency of Commercial Aircraft. An Overview of Historical and Future Trends, NLR-CR, 2005-669. Peeters Advies/National Aerospace Laboratory* NLR, Amsterdam; P. M. Peeters – E. Szimba, M. Duijnisveld, "European tourism transport and environment" European Transport Conference, Strasbourg, 3-5 October 2005.

27 S. *Gossling* et al., "The eco-efficiency of tourism", *Ecological Economics*, 54 (4), 2005; S. Gossling, M. Hall, "An introduction to tourism and global environmental change" in: S. Gossling, C. M. Hall (eds), *Tourism and Global Environmental Change. Ecological, Social, Economic and Political Interrelationships*, Routledge, London, 2005.

28 S. Gossling, "Global environmental consequences of tourism," *Global Environmental Change, 12, 2002; K. G. Hoyer, "Sustainable tourism or sustainable mobility? The Norwegian Case," Journal of Sustainable Tourism*, 8 (2), 2000.

Tourism, thus, includes: transport to and from a tourist destination, local travel at the trip destination, accommodations, and all the local activities tied to entertainment and/or business: conferences, meetings, visits to restaurants, bars, cafés, local excursions, etc.

In accordance with this, we shall divide energy consumption and CO_2 emissions in the sphere of tourism into the following segments:

- Transport to/from the tourist destination,
- Use of accommodation facilities and
- Other tourist activities (including local travel within the tourist destination).

Of course, most of the energy consumed in tourism is derived from fossil fuels, and only a negligible portion from so-called renewable sources.[29] As a result, the CO_2 emissions are high as well. The following table gives a classification of CO_2 emissions into three pre-defined spheres of tourism: transport, accommodations and other tourist activities.

Table 1: *CO_2 emissions in tourism (in Mt)*

Total	Transport	Accommodations	Other activities
1,302 Mt (100%)	980 Mt (75.3%)	274 Mt (21%)	48 Mt (3.7%)

Calculated according to: UNWTO – UNEP: *Climate Change and Tourism – Responding to Global Challenges*, UNWTO, Madrid, 2008.

It is obvious that, within tourism, transport plays by far the most significant role in the global warming process – its share in CO_2 emissions is more than 75% and, when RF is included – the figure equals 90%.[30]

Namely, global warming is (usually) manifested in changes in average temperature, which are a consequence of changes in our planet's radiation balance, which are, in turn, highly influenced by the concentration of GHG (Green House Gases) in the atmosphere.[31]

However, tourism's effect on global warming is not only expressed through:

a) CO_2 emissions, but also through
b) Level of RF (Radiative Forcing).

And, while CO_2 is the most important GHG gas largely produced as a result of human activities, other GHG gases also contribute to global warming. This is especially pronounced in air traffic, which at high altitudes additionally influences the global warming process.

[29] UNWTO – UNEP: *Climate Change and Tourism – Responding to Global Challenges,* UNWTO, Madrid, 2008.

[30] Ibidem, p. 133.

[31] For more details, see: M. Jovanović, *Međuzavisnost koncepta urbanog razvoja i saobraćajne strategije velikog grada,* Geografski fakultet, Beograd, 2005.

For most GHG gases it is possible to calculate carbon dioxide equivalents, i.e., coefficients comparable to the CO_2 coefficient of influence on the global warming process. This is not possible for air transport, since its emissions (at high altitudes) poorly bind with the global atmosphere and because these are not long-term – which is why they are expressed by the level of so-called RF radiation. However, even without taking into account the RF indicators, the share of air transport in CO_2 emissions (expressed in kg/pkm) is higher than or close to the share of automobiles, which can be seen in the following table.

Table 2: *CO_2 emission (in kg/pkm)*

Types of transport	Emission of CO_2 (in kg/pkm)	Capacity utilization (in %)
Aircraft	0.129	75%
Automobile	0.133	50%
Bus	0.022	90%
Rail	0.027	60%

Calculated according to: UNWTO – UNEP: *Climate Change and Tourism – Responding to Global Challenges*, UNWTO, Madrid, 2008.

Also, the energy consumption of air transport (expressed in MJ/pkm) is similar to the consumption of passenger automobiles – and substantially higher than that of other types of transport.

Table 3: *Energy consumption of different types of transport in tourism (in MJ/pkm)*

Types of transport	Energy consumption (in MJ/pkm)
Airpcraft	2.0
Automobile	1.8
Other types of transport - average - train - bus	0.9 1.0 0.7

Source: S. Gossling, "Global environmental consequences of tourism," *Global Environmental Change* 12/2002.

It is obvious from the above analysis that the main "rivals" in energy consumption and CO_2 emissions in the sphere of tourism are – air transport and automobile transport (their energy consumption and CO_2 emission *per kilometre travelled* is the same). Thus, a precise calculation of the *volume of passenger kilometres* produced by these two types of transport is of decisive importance for an evaluation of their role in the processes of exhaustion of non-renewable resources and global climate changes. For example, in his (oft-cited in schol-

arly circles) article, Gossling concludes that the main energy consumer and CO_2 emitter in the sphere of tourism is – the automobile, after all.

Table 4: *Energy consumption and CO_2 emission of different types of transport in tourism*

Types of transport	Volume pkm (in bil.)	Energy consumption		Emission of CO_2	
		MJ/pkm	Total (PJ)	CO_2 (gr./pkm)	Total CO_2 (Mt)
Automobile	5,155	1.8	9,279	132	680
Aircraft	1,179	2.0	2,358	396	467
Other	1,643	0.9	1,479	66	108
Water	?	?	107	?	8
Total	7,977	-	13,223	-	1,263

Source: S. Gossling, "Global environmental consequences of tourism," *Global Environmental Change*, 12/2002.

Gossling, however, does not use sound estimates of the volume of *passenger kilometres* produced by different types of transport, which means that, unfortunately, his otherwise very good analyses are, in that regard, problematic, and that his conclusions regarding air transport are, thus, wrong. The following table gives estimates of volumes of passenger kilometres of different types of transport in tourism, according to Gossling and the UNWTO.

Table 5: *Estimates of volume of pkm of different types of transport in tourism according to Gossling and the UNWTO (in bil.)*

Types of transport	Gossling Volume pkm (in bil.)	UNWTO and UNEP Volume pkm (in bil.)
Automobile	5,155	3,354
Aircraft	1,179	3,984
Other	1,643	1,809
Total	7,977	9,147

Source: S. Gossling, "Global environmental consequences of tourism," *Global Environmental Change* 12/2002, pp. 283-302; UNWTO and UNEP: *Climate Change and Tourism – Responding to Global Challenges*, UNWTO, Madrid, 2008.

Table 6 gives much more precise estimates of the role of different types of transport in tourism in *energy consumption* and the *global warming* process, not only in the domain of international tourism, but also of domestic tourism, as well as of so-called excursionists in domestic and international tourism.

Table 6: *Number of tourist trips, total pkm per trip, energy consumption and emission of CO_2, for 2005*

Types of transport	**Number of tourist trips** (in millions)	**Average km (both directions) per** 1 tourist trip (km)	**Total pkm** (in billions)	**Energy consumption in** MJ (bil.)	**Emission of CO_2** in Mt (bil.)
Total	9,750	938	9,147	15,633	982
Automobile	5,956	563	3,354	6,027	420
Aircraft	870	4,580	3,984	7,960	515
Other	2,924	619	1,809	1,628	45

Calculated according to: S. Gossling, "Global environmental consequences of tourism," *Global Environmental Change* 12, 2002, pp. 283–302; UNWTO and UNEP: *Climate Change and Tourism – Responding to Global Challenges*, UNWTO, Madrid, 2008.

The number of tourist trips *by airplane* is incomparably (6.8 times) smaller than *by automobile* but, at the same time, *average length of trip by airplane is 8.1 times greater than by automobile, which means that total passenger kilometres by airplane are higher by about 600 mil. pkm.*

Since the energy consumption and CO_2 emission per pkm for aviation and automobile transport are similar while, on the other hand, air travel achieves a higher amount of passenger kilometres, it is obvious that *air transport consumes more energy* (non-renewable resources) and more strongly influences the process of *global warming* than do motor vehicles.

5. Conclusion

A dramatic change is taking place on the global tourist market. The latest tendencies, as the above analysis has indisputably shown – are characterized by the appearance of hypermobility: especially rapid growth in the volume of aviation transport, the largest consumer of energy and CO_2 issuer.

Made possible by the expansion of low-cost airlines, growth in general education levels, living standards and additional free time, hypermobility in industrially developed countries is fast leading to increasingly negative global environmental effects.

Energy consumption and CO_2 emission in transport can be reduced significantly only by:

1) Lowering the total volume of transport;
2) Orientation towards those types of transport that consume less energy and emit less CO2 and

3) Further increasing the technical-technological efficiency of different types of transport.

Of course, a continued, uncontrolled trend of hypermobility would dramatically collide with the said principles. It is obvious that the sphere of tourism will be faced with great challenges in the coming decades, ones for which it is hard to provide simple, unambiguous answers.

References

- Adams, J.: "Hypermobility: A challenge to governance" in: C. Lyall, J. Tait (eds), *New Modes of Governance: Developing an Integrated Policy Approach to Science, Technology, Risk and the Environment*, Ashgate, Aldershot, 2005
- Babić, B.: "Geo-economics: Reality and science", *Megatrend Review*, Megatrend University, Belgrade, Vol. 6, No. 1, 2009
- Campbell, K. – Laherrere, M.: *The Worlds Oil Supply 1930–2050 (3 volumes)*, Petrolconsultants, Geneva, 1995
- Campbell, K. M.: *The Golden Century of Oil, 1950–2050: The Depletion of a Resource*, Kluwer Academic Publishers, Dondrech, 1991
- Carrico et al.: "Energy and Climate Change", *Journal of Energy and Environmental Law*, 2010
- Davis, S. C. et al.: *Transportation Energy Data: Edition 27*, US Department of Energy, Washington DC, 2008
- ECMT/OECD: *Land-Use Planning for Sustainable Urban Transport: Implementing Change (Linz workshop)*, OECD, Paris, 1999
- ECMT: *Key Issues for Transport Beyond 2000 (15th International Symposium on Theory and Practice in Transport Economics)*, Aristotle University of Thessaloniki, Thessaloniki, 2000
- ECMT: *Round Table 111: Transport and Leisure*, OECD, Paris, 2000
- Fleay, B. J.: *The Decline of the Age of Oil*, Pluto Press, Sidney, 1995
- Forsyth, P.: "Environmental and financial sustainability of air transport: Are they incompatible?", *Journal of Air Transport Management*, 17/2011
- Gossling, S. – Hall, M.: "An introduction to tourism and global environmental change" in: S. Gossling, C.M. Hall (eds), *Tourism and Global Environmental Change. Ecological, Social, Economic and Political Interrelationships*, Routledge, London, 2005
- Gossling, S. – Peeters, P. – Ceron, J-P. – Dubois, G. – Pattersson, T. – Richardson, R.: "The eco-efficiency of tourism", *Ecological Economics*, 54 (4) 2005
- Gossling, S.: "Global environmental consequences of tourism", *Global Environmental Change*, 12, 2002

- Hall, C. M.: *Tourism. Rethinking the Social Science of Mobility*, Pearson, Harlow, 2004
- Hall, P. – Clevland, C. J. – Kaufman, R.: *Energy and Resource Quality: The Ecology of the Economic Process*, John Wiley, Chichester, 1986
- Hall, P.: *Cities of Tomorrow*, Wiley-Blackwell, 2002
- Hoyer, K. G.: "Sustainable tourism or sustainable mobility? The Norwegian Case", *Journal of Sustainable Tourism*, 8 (2), 2000
- Hubbert, M. K.: "Energy Resources" in: *National Academy of Sciences. Resources and Man*, Freeman, San Francisco, 1965
- IEA: *Key World Energy Statistics*, IEA, Paris, 2009
- Jovanović, M.: "Critical sustainability and energy consumption in urban transport", *Bulletin of the Serbian Geographical Society*, Vol. 90, No. 3, 2010
- Jovanović, M.: "Gradski saobraćaj i održivi razvoj bogatih azijskih gradova", *Megatrend revija*, Megatrend univerzitet, Beograd, Vol. 2, No. 1, 2005
- Jovanović, M.: "Public transport and development of Chinese cities", *Megatrend Review*, Megatrend University, Belgrade, Vol. 3, No. 1, 2006
- Jovanović, M.: *Međuzavisnost koncepta urbanog razvoja i saobraćajne strategije velikog grada*, Geografski fakultet, Beograd, 2005
- Naess, P.: "Policy Tools and Barriers to Less Car-Based Land-Use Planning in Cities" in: ECMT/OECD: *Land-Use Planning for Sustainable Urban Transport: Implementing Change (Linz workshop)*, OECD, Paris, 1999
- National Academy of Sciences: *Limiting the Magnitude of Climate Change*, NAP, Washington DC, 2010
- Newman, P. – Kenworthy, J.: *Sustainability and Cities: Overcoming Automobile Dependence*, Island Press, Washington DC, 1999
- Newman, P.: *Towards Sustainable Transportation. (OECD International Conference, Vancouver Canada)*, EcoPlan International, Paris, 1996
- NRC: *Americas Energy Future*, NAP, Washington DC, 2009
- OECD/ECMT: *Urban Travel and Sustainable Development*, OECD, Paris, 1996
- OECD: *Energy: The Next Fifty Years*, OECD, Paris, 1999
- Peeters, P. – Dubois, G.: "Tourism travel under climate change mitigation constraints", *Journal of Transport Geography*, 18, 2010
- Peeters, P. – Schouten, F.: "Reducing the ecological footprint of inbound tourism and transport to Amsterdam", *Journal of Sustainable Tourism*, 14 (2), 2006
- Peeters, P. – Van Egmond, T. – Visser, N.: *European Tourism, Transport and Environment. Final Version*, NHTV CSTT, Breda, 2004
- Peeters, P. M. – Middel, J. – Hoolhorst, A.: *Fuel Efficiency of Commercial Aircraft. An Overview of Historical and Future Trends*, NLR-CR-2005-669, Peeters Advies/National Aerospace Laboratory NLR, Amsterdam, 2005

- Peeters, P. M. – Szimba, E. – Duijnisveld, M.: "European tourism transport and environment", European Transport Conference, Strasbourg, 3-5 October 2005
- Penner, J. E. – Lister, D H. – Griggs, D. J. – Dokken, D. J. – McFarland, M. (eds): *Aviation and the Global Atmosphere; A Special Report of IPCC Working Groups I and III*, Cambridge University Press, Cambridge, 1999
- Sausen, R. – Isaksen, I. – Grewe, V. – Hauglustaine, D. – Lee, D. S. – Myhre, G. – Kohler, M. O. – Pitari, G. – Schumann, U. – Stordal, F. – Zerefos, C.: "Aviation radiative forcing in 2000: An update on IPCC.1999", *Meteorologische Zeitschrift*, 14 (4), 2005
- Schumann, U.: "Aviation, atmosphere and climate-what has been learned" in: R. Sausen, C. Fichter, G. Amanatidis (eds), *Proceedings of the AAC-Conference*, European Commision, Friedrichshafen, June 30 to July 3, 2003, pp. 349-355
- Schumann, U.: *Air Traffic and the Environment*, Springer Verlag, Hamburg, 1990
- Stiglitz, E. J.: *Globalization and Its Discontents*, Allen Lane The Penguin Press, London, 2002
- United Nations: *World Urbanization Prospects: the 2009 revision*, UN, New York, 2010
- UNWTO – UNEP: *Climate Change and Tourism – Responding to Global Challenges*, UNWTO, Madrid, 2008
- World Bank: *Sustainable Transport: Priority for Policy Sector Reform*, World Bank, Washington DC, 1996
- World Bank: *World Development Report 2009*, World Bank, Washington DC, 2009
- World Tourism Organization (WTO): *WTO Tourism Market Trends*, 2004 Edition, WTO, Madrid, 2005

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