

European tourism, transport and environment

*Second draft deliverable 1 for the DG-ENTR
MusTT project*

*NHTV Centre for Sustainable Tourism and
Transport*

Final draft

Breda, 19-08-2004

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*This report is the final draft report by
CSTT for the DG-ENTR project 03-27
MuSST.*

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1 Objectives and status of this deliverable

The general objective of the Multi-stakeholder European Targeted Action for Sustainable Tourism & Transport is to “increase the competitiveness and sustainable development of European Tourism and its enterprises.” The specific objectives for the Multi-stakeholder European Targeted Action for Sustainable Tourism & Transport are:

- uncoupling growth of tourism and of transport related environmental degradation;
- encourage innovative practices that enhance sustainable production and consumption patterns.

The MuSTT projects main objective is to find out if such a Multi-stakeholder Action is feasible and to prepare its forming and working.

In this preparatory phase the main objective is to give a preliminary view on current European tourism, to find data and modelling issues to be solved and to show a way to do so. In this report we will give the data and information gathered based on definitions of European tourism, current European tourist production and consumption patterns, and on current European tourist transport flows and their environmental social and economic impacts. These data will be gathered in collaboration with consortium partners and stakeholders, but will also be used to clarify the issues at stake to the stakeholders and the EC.

MuSTT aims to produce the following deliverables:

- Deliverable 1. Subject matter review
- Deliverable 2. Stakeholder engagement
- Deliverable 3. Preparation of defined tourism transport maps
- Deliverable 4. Development of a Sustainability Framework
- Deliverable 5. Initial design of a consumer information system
- Deliverable 6. Assessment of the feasibility and sustainability of Good Practices

This report, deliverable 1, gives a preliminary analysis of the subject matter and ‘state of the art’ on sustainable tourism and transport. The CSTT report treats the following subjects:

- Definitions
- General overview of European tourism and transport (including mechanisms and some trends)
- Environmental impacts of tourism transport
- Tourist behaviour

The report is meant as a background report to the problem of tourism transport and environment. The current status of the report is final draft. Compared to the former published version 08 of 30-06-2004 the main change is that the databases of tourism (WTO) and transport (TEN-STAC) have been integrated into the ‘MuSTT model’ and results and observations have been based on the analysis with this model as far as appropriate. Further all remarks and observations received on the version 08 and (03) have been processed. Also a section has been added on the subject of seasonality. This position paper is further based on a literature and internet survey and the experience of the researchers of the CSTT.

2 Methodological issues

Key findings:

- *Tourism includes all trips with at least one night, but less than one year for leisure and holiday, business and visits to friends and relatives.*
- *MusTT assesses the tourism within, from and to the 'EU-plus' countries including all current (post June 2004) EU member states plus Norway, Switzerland, Bulgaria and Romania (the 'plus' countries)*
- *Sustainable tourism is tourism development that meets the needs of the present tourists and tourism sector without compromising the ability of future generations of tourists and of the tourism sector to meet their needs.*
- *Impacts can only be described using data on both volume and the specific impact per unit of volume and considering the total impact of the subject on study compared to the total for tourism transport.*
- *Tourism transport data will have to be constructed from both transport (TEN-STAC) and tourism (WTO) data.*

2.1 Definitions

Tourism definitions

The definition of tourism accepted by international tourism organisations gives some difficulties as it does not correspond with the definitions for transport motives normally used within the transport sector. The international definition of tourism as given by the World Tourism Organisation and United Nations (UN, 2001) includes all travel purposes, as tourists are all visitors staying between one night and one year outside their usual environment and are not working for a company based at the destination. The remainder is defined as 'same-day visitor'. Transport statistics normally define the 'tourism' motive as leisure related only. Within the MusTT project the definition for tourism used is:

"Tourism comprises 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 not related to the exercise of an activity remunerated from within the place visited" (source: WTO, 2002).

Tourism is different from travel. In order for tourism to happen, there must be a displacement: an individual has to travel, using any type of means of transportation (he might even travel on foot: nowadays, it is often the case for poorer societies, and happens even in more developed ones, and concerns pilgrims, hikers ...). But all travel is not tourism. Three criteria are used simultaneously in order to characterise a trip as belonging to tourism. The displacement must be such that:

- It involves a displacement outside the usual environment: this term is of utmost importance and will be discussed later on;
- The travel must occur for any purpose different from being remunerated from within the place visited: the previous limits, where tourism was restricted to recreation and visiting family and friends are now expanded to include a vast array of purposes;
- Only a maximal duration is mentioned, not a minimal. Tourism displacement can be with or without an overnight stay.

The description of 'European tourism' will be focused at the former 15 member states, the 10 new members states, two of the applicant countries (Bulgaria and Romania) plus Norway and

Switzerland. These last two have been added as they play a central role in the European tourism and transport sector and because they may deliver some interesting 'good practices'. Also it will make the analysis more complete. Of course all data will be generated separately for the member states, the new member states, and the applicant countries plus Norway and Switzerland.

At this first stage of the study it is proposed to look at all relevant parts of European tourism meaning that the analysis will be given for both destinations (inbound) and countries of origin (outbound). Also a division between domestic, intra-European and intercontinental tourism (inbound and outbound tourists from/to other regions in the world) will be made. This is based on the following assumptions and hypotheses:

- the country of origin perspective is needed to assess the possibilities for changes in European tourist behaviour;
- the country of destination perspective is required to assess the best practices for the tourism industry;
- domestic tourism raises a high share of revenues, but has low adverse environmental or social impacts;
- both inbound and outbound intercontinental tourism have large impacts on climate change and biodiversity, but a relatively low economic impact;
- the transportation of non-Europeans within Europe will be difficult to assess due to systematic gaps in national transport data.

The following definitions will be used:

- *Tourists*: are all visitors staying between one night and one year outside their usual environment.
- *EU10*: all new accession countries and members from June 2004.
- *EU15*: all member states of the European Union before June of 2004.
- *EU25*: EU15 plus the 10 New Member States since June 2004.
- *EU-plus*: EU25 plus Bulgaria, Romania, Norway and Switzerland.
- *EU10 tourism*: all tourism between, within, to and from the EU10 countries.
- *EU15 tourism*: all tourism between, within, to and from the EU15 countries.
- *EU25 tourism*: all tourism between, within, to and from the EU25 countries.
- *EU-plus tourism*: EU tourism plus including the tourism from Bulgaria, Romania, Switzerland and Norway.
- *ICA*: intercontinental tourism.
- *Inbound ICA tourism*: refers to visitors to Europe from other continents.
- *Outbound ICA tourism*: European citizens are travelling as tourist to destinations on other continents.
- *Intra-EUxx tourism* refers to international and domestic tourists within the EU15/EU25 or EU-plus (whatever is appropriate within the context of the data).
- *Domestic tourism* refers to tourists staying within their own country.
- *Trip*: a one –way travel from origin to destination.
- *Journey* is a return travel.

The full list of countries and regions included in the study is given in Table 2-1.

Sustainable development

The term 'sustainable development' finds its roots in the Brundtland 1987 report 'Our common future'. It defines sustainable development as:

development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The Institute for Policy Studies reports the following definitions for sustainable tourism based on the general Brundtland definition (Honey and Rome, 2001):

according to the World Tourism Organisation, “envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled with maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems” (WTO and UNEP, 2002).

According to Agenda 21 for the Travel & Tourism Industry:

“Sustainable Tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems” (European Tourism Forum 2002, 2002).

It is interesting to see the inter-generation part of the general definition has been removed from these definitions or has been reduced to maintaining ‘essential ecological processes’ and ‘enhancing opportunities for the future’.

Sustainable development is lately often operationalised with the principle of the three p’s: planet, people and profit. This means a sustainable development should fulfil the requirements for all three p’s. Mowforth and Munt have defined sustainable tourism based on these three elements, but adding a cultural element (Mowforth and Munt, 2003). The ecological sustainability (planet) is often based on carrying capacity of the destination. Transportation to the destination is left out of the definition. This is a common phenomenon in sustainable tourism publications (see for example Cohen, 1978; Theuns, 2001; APAT, 2002; Tour Operators Initiative, 2002; UNEP, 2002). Several recent papers and articles show that transport between the place of residence and the tourism destination dominates the environmental effects of tourism (Gössling, 2002; OECD Working Party on National Environmental Policy, 2002; Becken, Simmons et al., 2003; Ceron and Dubois, 2003b; Peeters, 2003a). This of course is the most important reason to focus on transport within the MusTT project.

For social sustainability (people) Mowforth and Munt focus on the aspect of tourism developments in remote areas to create a sharper division between those who benefit from it and those who take the inconvenience or are even marginalized by it. To be cultural sustainable it is required societies are able to “continue functioning in social harmony despite the effects of changes brought about by a new input such a tourists”. In fact this is generally seen as part of the people P of sustainable development. Others may add to this the working circumstances in the tourism sector and the share of the revenues left at the destination and taken away with the foreign tourism and transport companies (equal sharing of wealth). Economic sustainability (profit) is of great importance, as without it, no tourism enterprises will survive. However, enterprises surviving economically, but without consideration for environmental and/or social/cultural impacts cannot be called ‘sustainable’. Or to put it in another way: where enterprises, in the first place might go bankrupt due to financial losses, within *sustainable* development social and environmental reasons for bankruptcy are added. In a positive way: new enterprises will have to proof in advance not only their economic viability, but also their environmental and social viability.

To reach sustainable development the OECD has developed four criteria for the planet part of sustainable development (OECD, 2001):

- I. Regeneration: renewable resources are used without exceeding their long-term rates of natural regeneration.

- II. Substitutability: the use of non-renewable resources shall be limited to levels, which can be offset by substitution by renewable resources or other forms of capital.
- III. Assimilation: releases and emissions to the environment shall not exceed its assimilative capacity; persistent and/or bio-accumulative substances shall not be emitted.
- IV. Avoiding irreversibility: irreversible adverse effects of human activities on ecosystems and on bio-geo-chemical and hydrological cycles shall be avoided.

For tourism transport this means it will – at least in the future - have to be powered by renewable energy, built by renewable resources and avoiding creating waste or disrupting natural flows including those of animals and humans by its infrastructure and space use. As the WTO/Agenda 21 definition is the current standard within the tourism sector, this definition will be used within the MusTT project:

Sustainable Tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems.

Sustainable tourism can only be realised by way of the sustainable development process. Principally this requires (ECOTRANS, 2002):

- *The preservation of the natural and cultural landscape of the tourist destination and region, whilst simultaneously ensuring the greening of the products and services that deliver the visitor experience.*
- *The whole process is implemented by a partnership of government, private and civil stakeholders and is guided by a sustainability monitoring and indicator system that provides transparent information on social, environmental and economic interaction for improved policy-making and decision-taking by all stakeholders.*
- *The process is initiated at the destination level by a benchmarking exercise that catalogues the socio-economic and environmental resources of the area in question, and measures the implementation of institutional processes that foster the sustainable development of that area.*
- *These processes and their effect on the destination landscape are then measured by performance indicators, which provide feedback for further policy intervention.*

To make sustainable development measurable a Sustainability Impact Assessment (SIA) has been developed (see Deliverable 4 of the MusTT project). Based on the preferred SIA methods it is necessary to set targets and/or limits for tourism and transport products. Without such targets or limits it is difficult to judge the sustainability of a product. When tourism products should be tagged with for example a colour code (red-orange-green) and if one of the parameters used is the ‘ecological footprint’, it should be made clear for which footprints which colour is applicable. Limits might be set to for example:

- total trip footprint
- footprint per tourist night
- footprint per Euro expenditure
- footprint per Euro expenditure within the destination
- footprint per job

In this way not only 'planet' is defined by the footprint, but also measures of 'people' (like number of jobs or expenditure within the destination) and 'profit' (footprint per total expenditure) are linked into one evaluation system.

Transport

By definition tourism is impossible without transportation. At least the tourist has to be transported from his or her place of residence to the destination of holiday, leisure, business or friends/relatives. But also during the stay on the destination, the tourist often will travel within the region. Two kinds of transport are distinguished:

- *OD-Transport* refers to transport between the place of domicile of the tourist and the tourist destination (including all transport inside and outside the EU-plus, including transfers from home and the tourist accommodations to airports, harbours or railway stations).
- *Local transport* refers to transport at destinations between arrival and departure for transfers, excursions, activities et cetera. This will be all leisure and business related local transport by non-residents.

OD-transport is generally long distance transport between the normal residence of the tourist and the temporary residence at the destination. This kind of transport is generally made only at the beginning and at the end of the trip. Local transport comprises the transport for daily living at the destination (i.e. shopping) and transport for excursions and other forms of leisure during the stay. OD-Transport modes distinguished within the MusTT database will be:

- road (car, coach and ferries)
- rail
- air

Apart from calculations of the above transport modes, we will show estimates of the amounts and impacts of transport by coach and ferries. Additionally, for impacts assessment, assumptions will have to be made on the shares of coaches, campers and caravans within the mode 'car', for high speed within the mode 'rail' and for long haul (>2000 km) within 'air'. This is important because the environmental performance of these categories differs significantly. Overall European local transport for tourism will not be handled quantitatively, due to a general lack of data on transport by non-residents.

Destinations

Within the European Community the international boundaries determinate also the boundaries between tourism destinations, regardless the purpose of the tourist visit (leisure, visiting friends and relatives or business). However, based on destination characteristics some multinational regions may be defined like the Alps, the southern Atlantic coasts, the western and eastern Mediterranean coasts, Scandinavia, the British Isles and Ireland and several regions within the eastern European countries. As most of these regions are covered by more countries, the desaggregation to the EU-plus country level will generally give enough information for MusTT. A problem here is the failure within WTO data to distinguish between Spain's mainland tourism destinations and the Canary Islands, because the transport characteristics of the latter differ very significantly from the first one.

Most tourism statistics of the World Tourism Organisation (WTO) are based on international tourism flows. Therefore destinations are defined as 'countries'. For Europe this is no problem as there are many not too large countries within the area. For large countries like China or the United States, the number of international tourists has less meaning. As tourism is defined as all visitors regardless their motives for travelling, the tourist distribution will not only correspond with the leisure destination 'hot-spots' like Mediterranean coasts or the Alps, but also with important economic centres (business) and large populations areas (visiting friend/family and city trips). This makes it less important for most analysis to distinguish

within countries the most important tourism areas. Therefore only for six countries complementary analysis may be given in future analysis. Table 2-1 gives a list of countries belonging to the EU-plus tourism region as defined within MusTT in §2.1.

abbreviation	Country	EU10	EU15	EU25	EU-plus
AT	Austria		*	*	*
BE	Belgium		*	*	*
DE	Germany		*	*	*
DK	Denmark		*	*	*
ES	Spain		*	*	*
FI	Finland		*	*	*
FR	France		*	*	*
GR	Greece		*	*	*
IE	Ireland		*	*	*
IT	Italy		*	*	*
LU	Luxembourg		*	*	*
NL	Netherlands		*	*	*
PT	Portugal		*	*	*
SE	Sweden		*	*	*
UK	United Kingdom		*	*	*
CY	Cyprus	*		*	*
CZ	Czech Republic	*		*	*
EE	Estonia	*		*	*
HU	Hungary	*		*	*
LT	Lithuania	*		*	*
LV	Latvia	*		*	*
MT	Malta	*		*	*
PL	Poland	*		*	*
SI	Slovenia	*		*	*
SK	Slovak Republic	*		*	*
BG	Bulgaria				*
CH	Switzerland				*
NO	Norway				*
RO	Romania				*

Table 2-1: Countries of the EU-plus zone defined within MusTT (means member of the specified EUnn group of countries.*

The destinations/origins outside EU-plus to be distinguished are:

- Other European countries (all European countries except those mentioned in Table 2-1; so including countries like the Russian Federation, Ukraine, Turkmenistan and Uzbekistan).
- Middle East
- US/Canada
- Oceania
- Japan
- North Africa
- Other Africa (specifically east and south)
- Other America's
- China
- Other East Asia/Pacific

These world-regions will have to be distinguished as the distances to these destinations cover a wide range, which will have a large influence on the environment impacts. For inbound tourism to all destination countries these data are readily available from WTO. For outbound tourism this is much more difficult. Only for the most important countries of origin detailed data are easily accessible. Within this preliminary investigation of the MuSTT project only the Americas, Americas, Asia and Pacific, Africa and the Middle East have been distinguished.

Other definitions

- *LOS*: Length of stay of a tourist (time between departure from the normal residence until return to this place).
- *PM*: Particle matter: emissions of soot to the air.
- *TEN-STAC*: Scenarios, Traffic Forecasts and Analysis of Corridors on the Trans-European Transport Network
- *TTU matrix*: The Tourism and Transport Uncoupling matrix is a four cell table giving a division between markets with high/low relative environmental impact and high/low total revenue (or value added).
- *VFR*: tourism for visiting friends and relatives.
- *WTO*: World Tourism Organisation, Madrid.
- @@PM@@.

2.2 Impact analysis

General method

Impact analysis is based on data for the volume of the activity or product or sector under consideration and its specific characteristics. Only by combining both it is possible to pass statements of the form ‘activity X has the same impact on human health as activity Y’. If for example the volume of activity X is one-tenth of that of Y, still its impact may be larger than for Y, when the relative impact per unit activity of X is more than ten times that of Y. Based on volume alone the first statement would be that X has a smaller impact and based on relative performance it would be that X has a much larger impact as Y.

The total impact of an activity may be evaluated with the following general equation:

$$I_e = \sum_m (\beta_m * V_m)$$

In this form I_e is the total impact of all activities, V_m the volume of activity m and β_m the specific impact (the ‘impact factor’) per unit of activity m . This equation may be used for all kinds of impact assessments – like emissions of carbon dioxide, noise, ecological footprints - and for all levels of activities as world-wide, regional, sectoral, a single enterprise or a specific product.

For the MuSTT project OD-transport and local transport for tourism are the main activities to be assessed. This means the disaggregated tourism transport volume is required. As most impacts, but not all of them, are vehicle kilometre related, the transport volume is not only needed in distances covered, but also expressed in number of trips. Vehicle kilometres related are for example energy consumption and most emissions to the air, numbers of trip related are aircraft noise and parking space use.

2.3 Data issues

The differences between definitions within the transport and the tourism sectors may be one of the reasons no in-depth analysis of *tourism transport* is yet available. The first problem arises with the definition of ‘tourism’. Within transport statistics and data the ‘tourism’

purpose for travel is interpreted as the leisure kind of tourism (holidays and short breaks for leisure). But in most tourism sector data sets tourism is defined including business trips and visiting friends and family with at least one night outside the normal domicile. Further tourism statistics give no data on distances travelled per mode of transport. On the other hand, transport statistics normally give no details on the length of stay of a trip (the time between outbound and return trip).

The two detailed data sets available for MusTT show the same problem. Detailed transport data will be used from the IWW TEN-STAC model¹ and tourism flows will be derived from WTO (World Tourism Organisation) databases. However, these have incompatible compatible tourism definitions: IWW defines the travel motive ‘holiday’ as leisure related trips with at least two nights, where WTO defines tourism as all trips for travels with at least one night and not more than one year. This includes business travels. IWW distinguishes also the travel motive ‘business’, but this includes also all ‘same-day’ returns, which do not fall within the WTO definition of tourism. On the other hand, IWW data are interregional on the NUTS-2 level, which means only longer distance travel is included. This makes it likely most business trips will be tourism related. The motive visiting friends and relatives is part of the travel purpose ‘private travel’ in TEN-STAC, so includes not only same-day visits, but also commuting, shopping, et cetera. Two important parameters are missing within WTO data the number of kilometres travelled and data on domestic tourism (tourists staying in their own country). Table 2-2 gives an overview of data covered by the two databases.

	TEN-STAC (IWW)	WTO
NR. of nights for tourism	>2 nights,	>1 night, <1 year
Leisure related	Defined as ‘holiday’; >2 nights	Part of ‘tourism’
Visiting Friends and Relatives (VFR)	Part of motive ‘private’.	Part of ‘tourism’
Business	Business inter-regional at NUTS2 level including same day visits.	Part of ‘tourism’
Number of OD trips	Yes	Yes
Transport mode	Yes (road, rail, air)	No
Transport kilometres	Yes (road, rail, air)	No
Travel direction (distinction between origin and destination)	No	Yes
Canary Isles	Yes	No
Malta and Cyprys	No	Yes

Table 2-2: Overview of data and definitions used in the two main databases for MusTT.

As the sum of IWW holiday and IWW business have the most in common with the WTO definition of tourism, we have analysed the differences in the results for international tourism for the EU15 states. Figure 2-1 shows clearly IWW estimates are in most cases lower as those from WTO.

¹ TEN-STAC is TEN-STAC Scenarios, Traffic Forecasts and Analysis of Corridors on the Trans-European Transport Network

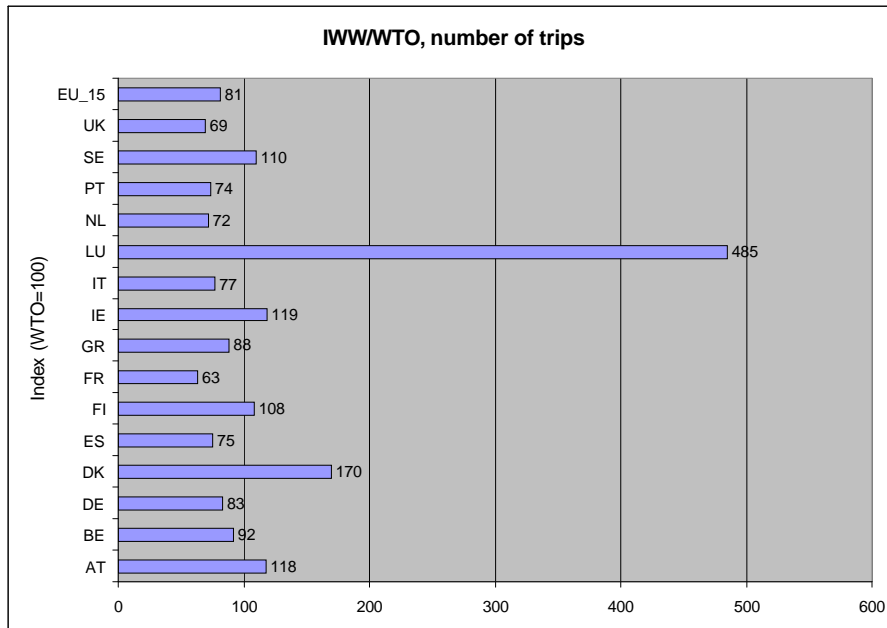


Figure 2-1: Comparing IWW TEN-STAC and WTO data on international tourism travel for the EU15 states (data for WTO: 2001; IWW: 2000).

On average IWW generates 81% of WTO number of trips. IWW is much too high for Luxembourg, Ireland, Denmark and Austria. The picture is based on the average of both inbound and outbound tourism from the WTO data, as IWW does not make a distinction (transport is in equilibrium on every relation) as is normal practice for transport models. The WTO data give the numbers of inbound and outbound tourists, which are normally not equal. Large discrepancies are found for UK, Luxembourg, Ireland, France, Denmark and Austria. For these countries an educated guess correction on WTO data may be required. The WTO data for France for example contain a large number of one night visits of people travelling by car from Northern Europe to Spain or Portugal. The high level for Luxembourg may be caused by the fact that Luxembourg is a very small country, with rather many same-day (business) visits with the neighbouring countries. The largest deviation from the average of Luxembourg is caused by business travel as is shown in Figure 2-2. To find the direction of the tourism flows, WTO data will be used.

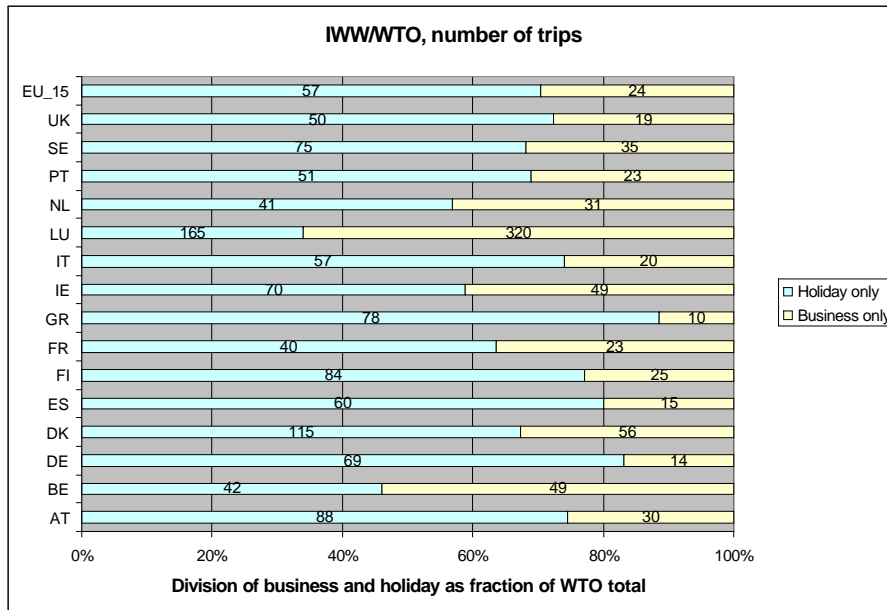


Figure 2-2: Comparing IWW TEN-STAC and WTO international tourism data (2000 for IWW and 2001 for WTO) for the IWW travel motives business and holiday. The numbers within the bars relate to the index of IWW/WTO data for that specific travel purpose (i.e. holiday or business) with respect to ALL WTO tourism (WTO=100). The coloured shares give an impression of the division of this error between the two IWW travel purposes. Generally this should be near the EU-15 average.

IWW does not generate data for travels outside European countries to other continents. These data will also be generated with WTO databases.

2.4 Data processing and matching method

To solve the issues given by Table 2-2 some statistical processing of the datasets available (TEN-STAC and WTO) has been done. This section describes what has been done to the main issues. A general problem with WTO data is the rather high number of missing data fields. These have been filled in with average figures using the TEN-STAC database and other data sources and checked with the WTO estimated totals.

To combine the IWW/TEN-STAC and WTO data the following steps have been taken:

- The total number of tourists has been taken from the totals given by the WTO statistics per country for the EU-plus countries has;
- The inequality of tourism flows (different numbers going from country A to country B as from country B to country A) haven been taken from WTO data;
- The empty cells within the WTO data have been filled. The figures given by the IWW dataset have been taken as a base. These were divided by the number of IWW row partly-totals (for the number of departure) and IWW column partly-totals (for the arrivals) and multiplied with the WTO totals in the same rows/columns. The term 'partly-totals' refers to the IWW total excluding the cells where the WTO data are missing.
- This has been filled by applying the ratio dom/int for outbound tourism for a country as found with the IWW data for the purpose holiday only to the totals of outbound international of the WTO data after filling the other empty cells.
- The WTO data do not distinguish the tourism flows to the Canary Islands. These have been found using the share of Canary Isles arrivals of IWW data times the totals of arrivals to Spain and the share of departures and the totals of departures from Spain. The

- resulting number of journeys has been subtracted from the totals for Spain to keep the total number of journeys constant.
- The missing data for Malta within the IWW database have been found as follows. Inbound has been taken directly from WTO and have all been distributed to air transport only (some 3% comes by ferry according to WTO, 2003b). For departures the total of 200,000 per annum has been distributed over the destinations according to outbound (international) tourism distribution of Italy plus 20,000 on the line for Italy itself (to create an estimated share of some 30% of Malteser to travel to Italy as a destination). All travel by air again, though the number of maritime transport may be larger in this case. Distances from all EU-plus country main airports to Malta have been taken from <http://www.webflyer.com/travel/milemarker/> times 1.1 detour factor. No information on domestic tourism on Malta is available, so this has been set to zero.
 - The missing data for Cyprus have been found in about the same way. Inbound has been taken directly from WTO and set to arrivals by air only (about 19% comes by ferry according to WTO, 2003b). As the distribution of these over the countries of origin is not known and the total Cyprian tourism flow is not a very large part of total EU-plus tourism, these have been all added to air transport). For departures the total of 589,000 per annum has been distributed over destinations according to the distribution of outbound (international) tourism from Greece. Some 5,000 tourists have been added at cell for GR (estimating some 30% of Cyprus inhabitants to travel to Greece as a destination). All air transport only again. Distances from all main international airports of the EU-plus countries to Cyprus have been taken from <http://www.webflyer.com/travel/milemarker/> times a 1.1 detour factor. Some 737,000 bed-nights were taken by residents within Cyprus in 2001 (WTO, 2003b). Assuming average domestic LOS of about three nights this gives 246,000 domestic arrivals. All by added to the mode car.
 - The IWW average distances travelled per relation and transport mode between all EU-plus countries will be used and multiplied with the number of tourists, to calculate the total distances travelled per transport mode.
 - Based on Eurostat data for the EU15 (Schmidt, 2002) the number of coach and ferry journeys have been taken as a share from road travel. For most EU10 countries the share of coach journeys has been based on Panorama of Transport data (Eurostat, 2003) on the distribution over rail and coach passenger kilometrage (pkm). For ferries these have been estimated based on the number of sea-ports available to the inhabitants of the country.

Now the calculations have been all based on the number of journeys as given by the enriched and filled WTO table, but distributions over transport modes from the TEN-STAC data. Total passenger kilometrage (PKM) travelled has been obtained multiplying the average distances for every relation as found within TEN-STAC with the WTO-corrected TEN STAC data per mode on number of trips.

The total emissions have been calculated by multiplying average emission factors per transport mode (see Annex VII) with the number of passenger kilometres travelled with that mode.

3 European tourism

Key findings:

- Domestic tourism arrivals take the largest share (62%) of EU-plus inbound tourism; intercontinental inbound tourism has 4% of the total number of trips and 12% of all international inbound tourism.
- The main tourism flows are directed north-south within Europe, main destinations being France, Spain and Italy.
- The ten new member states attract only a small amount of inbound European tourism, compared to the EU15 member states.
- Most outbound tourism is generated by Northern and Western countries; only 15% of outbound tourism is intercontinental.
- The European tourism industry generates directly about 5% of European GDP and labour; including indirect revenues this amounts to 12%.
- For the EU-plus countries 90% of expenditure and 86% of receipts come from EU15 member states.

3.1 Europe as destination (domestic and inbound tourism)

All data generated with the MuSTT model for the EU-plus countries is presented in Annex I. To set the scene: in 2000 all European countries attracted 393 million international tourists. This is about 57% of the world total of 687 million (WTO, 2003c). North America attracted only 84 million (11%) and Africa and Middle East both just 4%. However, these figures give a distorted view on the total tourism, because domestic tourism has been left out of the data and the number of international tourism is highly depending on the number of countries within a continent and the average size of these countries. In Europe there are many small countries, while Northern America has only two (US and Canada), significantly reducing *international* tourism for Northern America, while the total number of domestic travels will be much larger as in Europe.

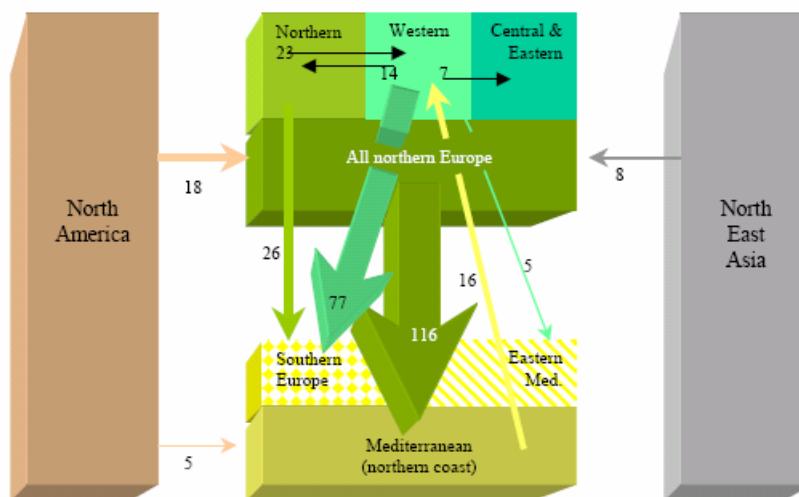


Figure 3-1: Major tourism flows within and to Europe in millions of arrivals per year for 2000 (source: Todd, 2003).

Figure 3-1 gives a rough overview of the main international tourism streams within, and to and from Europe. The graph makes clear most international tourism occurs within Europe at continental or smaller travel distances. Also it is evident the biggest tourism flows are from Northern European countries, with a cold and wet climate, to warmer southern European countries. Most tourists are seeking sun and sea.

A total overview of the results for intra-EU-plus tourism flows is given in Annex I. From the data generated Figure 3-2 has been drawn. Also these maps make clear there is a general tourism stream from north-west to south within the EU-plus.

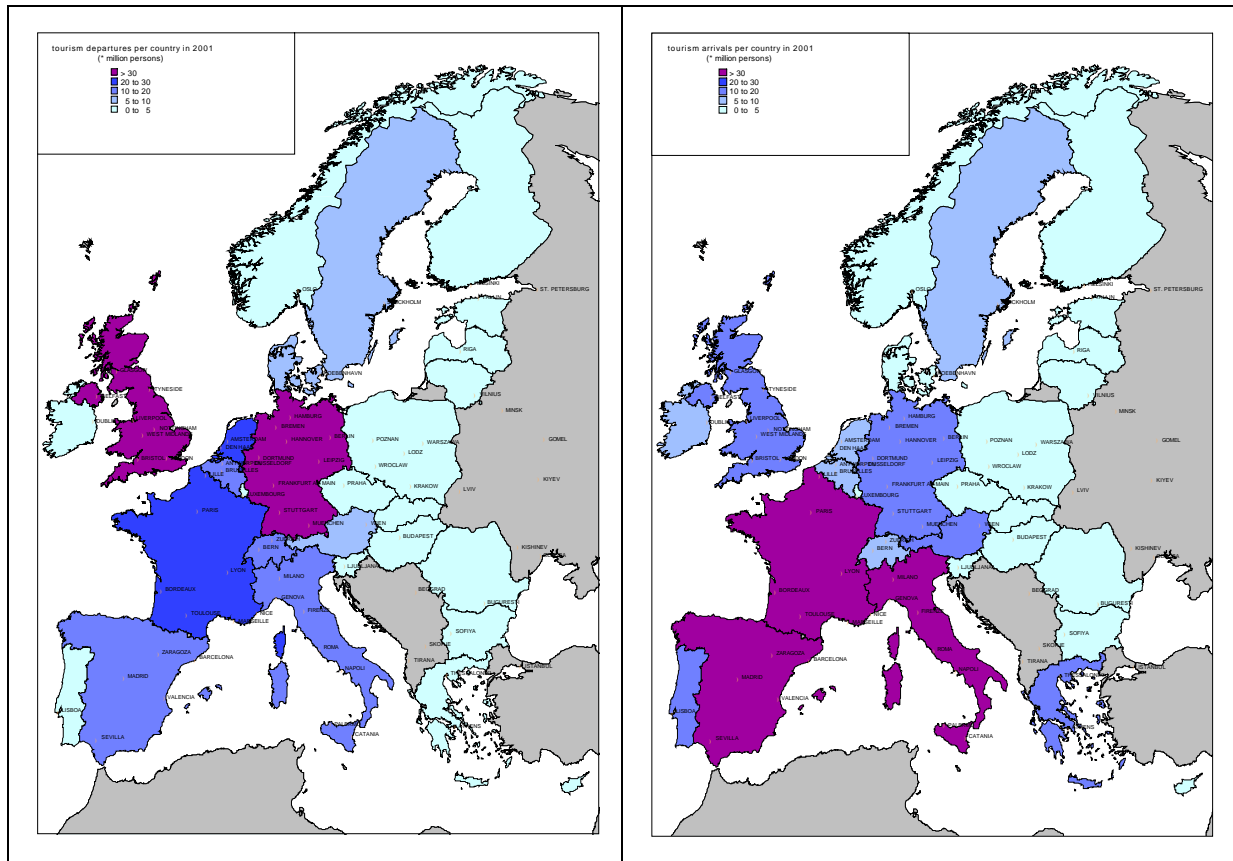


Figure 3-2: Overview of number of outbound tourists (left) and inbound tourists (right) clearly showing the inequality in the tourism streams. Including domestic tourism for 2001 (source: MuSTT model).

The data in Annex I show the total number of domestic tourism is about 68% of the total of domestic plus international (excluding inbound ICA tourism). Though the LOS for domestic tourism will be less than for international tourism, it appears domestic tourism is still more important in terms of number of tourists and number of nights as is international tourism. The example of Austria may prove the statement on LOS differences: from data by the Austrian statistical bureau it appears the average length of stay of residents is 3.5 days and of non-residents 4.6 (Statistik Austria, 2003). With these data the share of domestic tourist nights would become 62%, still more than for international tourism.

Intercontinental arrivals of non-Europeans at EU15 destinations total to 37.1 million, according to WTO statistics for 2001. Figure 3-3 gives an overview of the region of origin for the EU15 destination countries.

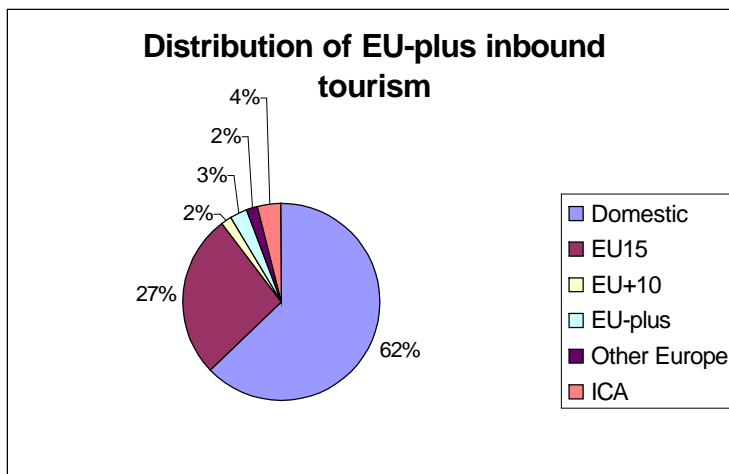


Figure 3-3: Distribution of arrivals within EU15 over the markets of origin of tourists for 2001 (data source MuSTT model plus WTO databases for other world regions).

Figure 3-4 shows the main tourism flows are generated by the inhabitants of the EU15 countries. The EU10 and plus countries together deliver only 11% of total intra-EU-plus departures and arrivals. Also it becomes clear inbound and outbound flows are largely in equilibrium for all three EU regions considered.

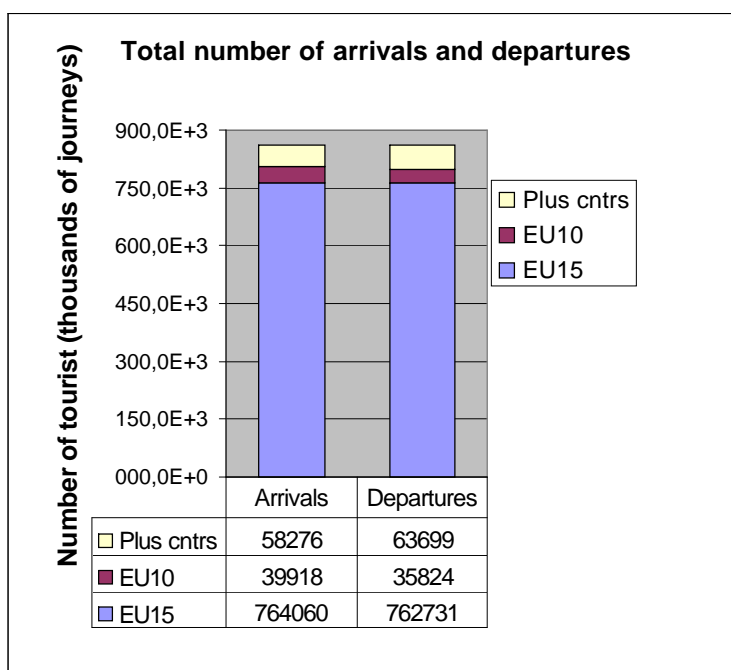


Figure 3-4: Total number of arrivals and departures of tourists including domestic tourism for 2001 (source: MuSTT model).

The international tourism with Europe as destination is dominated by Europeans with 88% (WTO, 2003d, pg. 45). Northern Europe attracts relatively many non-Europeans (23%), Southern and Central/Eastern Europe only 6%, Eastern Mediterranean 12% and Western Europe 16%.

From the WTO Tourism Highlights (WTO, 2003c) it appears France, Spain, Italy and the Austria are the most popular destinations for international tourism (see Figure 3-5).

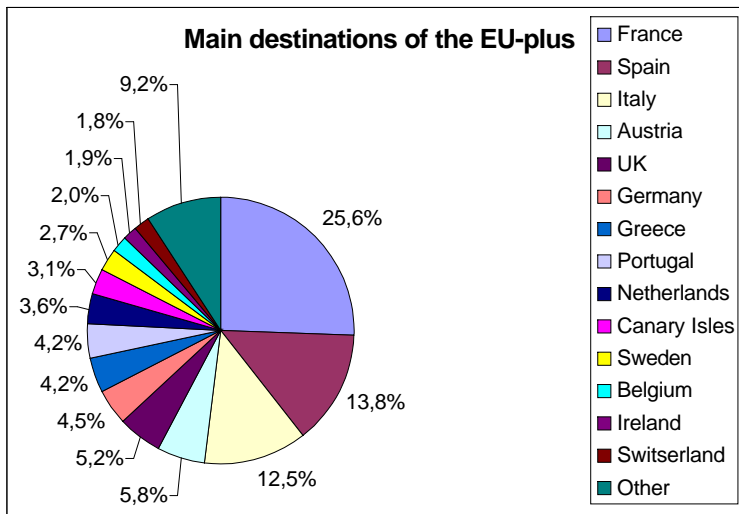


Figure 3-5: Shares of the most important destinations of the EU-plus countries for 2001 (source: MuSTT model).

Due to the large differences with respect to the size and population of these countries a different perspective is obtained when evaluating the tourism sector relative to the area or the population of the country (see Figure 3-6). In the case of arrivals per inhabitant Austria and Ireland end up high. In terms of arrivals per square kilometre it is Switzerland, The Netherlands, Belgium and again Austria at high scores. The first parameter (arrivals per inhabitant) is a measure for the economic importance of tourism to the country, while the second parameter, arrivals/km², give an impression of the environmental pressure of tourism.

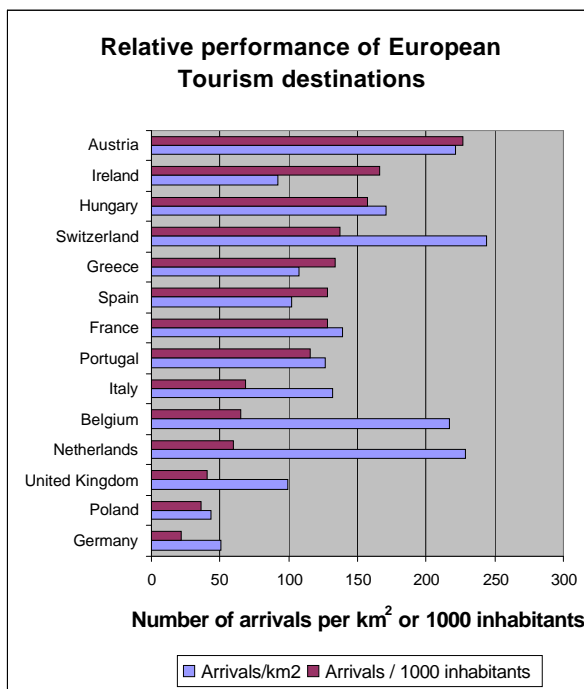


Figure 3-6: Relative performance of the ten largest tourism destinations within Europe for 2001 (data source: WTO, 2003c).

The distribution over the three parts of the EU-plus countries is given by Figure 3-7. The EU member states clearly dominate the inbound and outbound tourism markets in number of trips.

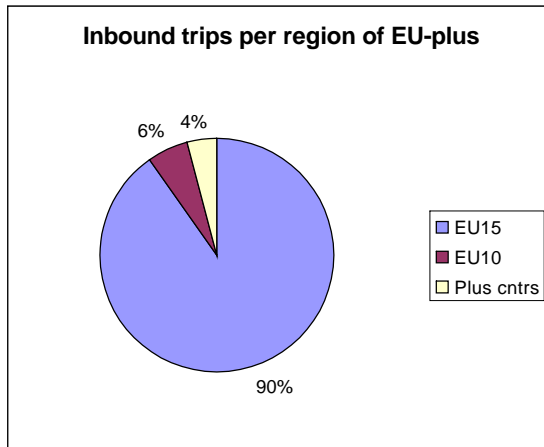


Figure 3-7: Shares of international inbound and outbound journeys (return trips) for the three regions of EU-plus for 2001 (source: MuSTT model).

By definition tourism comprises several distinct purposes of the visit. In 2000 54% of all international arrivals was for 'leisure, recreation and holidays', while 22% was 'business and professional' and 24% 'visiting friends and relatives' (WTO, 2003d, pg. 47-48). Interesting is the share of 'business and professional' has been growing much faster as the other two between 1990 and 2000: from 14% to 22% share. Also 'visiting friends and relatives' grew faster as 'leisure, recreation and holidays'. Figure 3-8 has been drawn from data of WTO, 2003d. This figure shows how leisure related tourism dominates the Southern and Mediterranean markets, while Central/Eastern Europe receives 47% of VFR, health, religion and other. Business has the largest share in Northern Europe (Scandinavia, Ireland and UK).

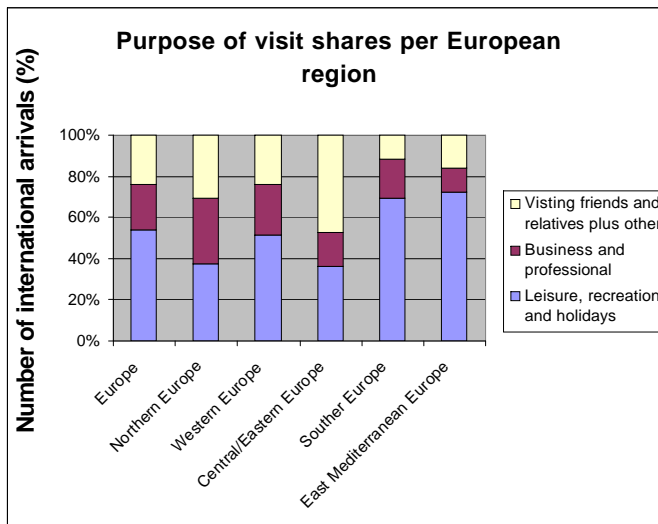


Figure 3-8: Shares of the purpose of visits per European region for 2001 (source: WTO, 2003d).

The country of origin of inbound tourists to Europe is of importance to find the impacts of OD-transport required. Figure 3-9 shows 88% of tourists come from European countries (EU-plus countries plus all other European countries). Of the intercontinental tourists the largest share is from the other European countries followed by the America's. Africa, Asia, Pacific, and the Middle-East generate only small amounts of tourists for the European market.

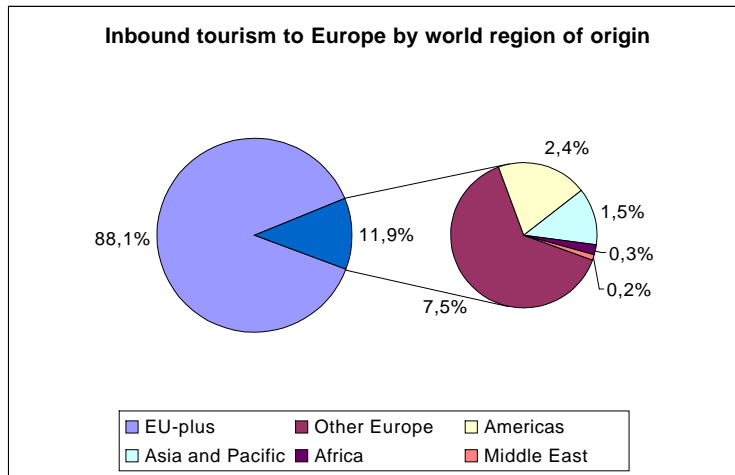


Figure 3-9: Shares of inbound tourism to the EU-plus from the other world regions in 2001 by world region of origin (source: MuSTT model for EU-plus data and WTO, 2003d for the data on other world regions).

3.2 Europeans as tourists

In 2000 European tourists (all European countries including countries like Russia) made a total of 422 million trips abroad (WTO, 2003d). This figure may be too high, as it seems some countries include outbound same-day visits into their outbound tourism statistics. Another WTO publication (WTO, 2003c) gives a lower total with 395 million in 2000. This same number results if the EU-plus figure is replaced with the MuSTT model result for outbound tourism of 278.3 million outbound international tourists.

Most international European tourists stay within Europe, though this share has been declining from 90% in 1990 to 86% in 2000 (WTO, 2003d). This development is also reflected by the historic average growth rates between 1990 and 2000: arrivals of European tourists at European destinations showed a growth rate of 3.7%, while ICA destinations averaged at double this rate (7.3%). Europeans stay much more at their own continent as do tourists from other world regions. The world average is 80%; compared to about 70% of tourists from the Americas and Africa.

Two-thirds of European outbound tourists come from Western and Central/Eastern Europe² (see left graph of Figure 3-10). The total number of tourist is of course a function of the total population and the number of trips taken abroad. As can be seen from the right graph of Figure 3-10 the relative trips abroad are much higher for inhabitants of Northern Europe as for those from southern and eastern parts.

² WTO warns for a problem with these statistics. It appears to be not always clear if the figures reflect tourists, or include also same-day international visitors. This may be an explanation for the high numbers given for the eastern European countries.

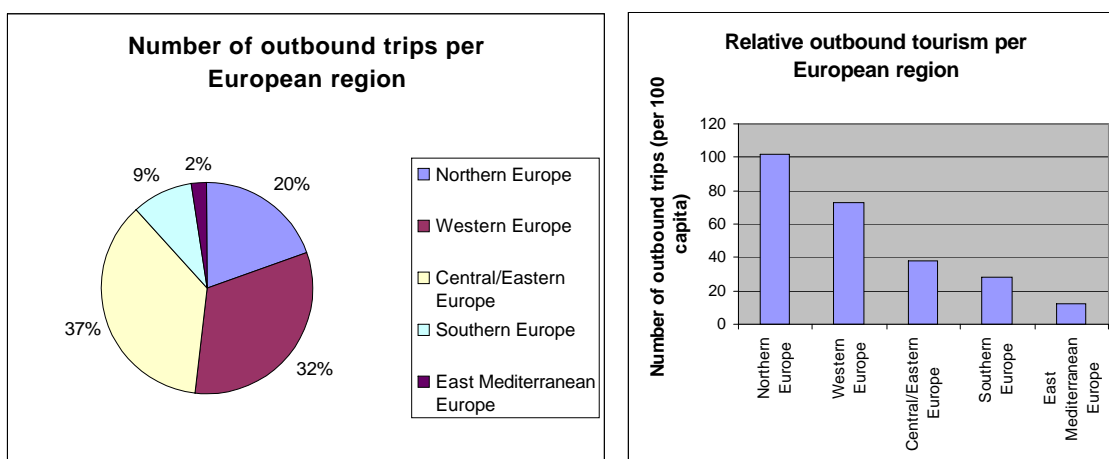


Figure 3-10: Left the number of outbound tourists per European region² and right the number of outbound trips per 100 cap³ for 2001. (source: WTO, 2003d, pg. 53).

The EU-plus region generated 278.3 million international tourists (based on the MuSTT model). About 90% came from the EU15, 4% from the EU10 and the remainder from Norway, Switzerland, Bulgaria and Romania (see Figure 3-11). This means the new members may add some 4% to the total EU outbound tourism.

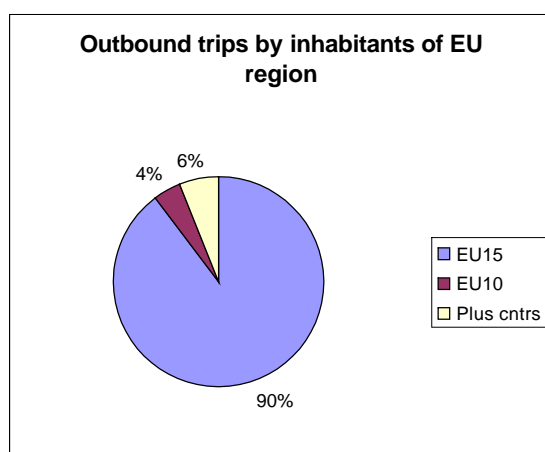


Figure 3-11: Shares of number of outbound trips per EU region for 2001 (source: MuSTT model).

Tourism from the new member states is dominated by Poland and the Czech Republic (together 64%; see Figure 3-12). However the numbers for the EU15 countries appear to be much larger. The largest source of outbound tourists is Germany with 74,4 million. The highest number of international tourism trips per 100 inhabitants is found for Switzerland (166), Sweden (139), Ireland (119) and Finland (111).

³ As many tourist travel more than once a year, a number over 100 does not mean all inhabitants are travelling as international outbound tourists.

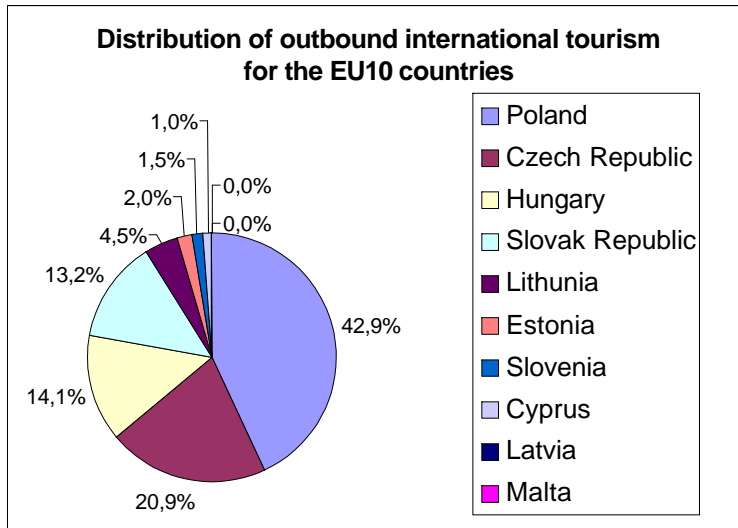


Figure 3-12: Distribution of outbound tourism for the EU10 countries in 2001 (source: MuSTT model).

Reasons for the high rate of international tourist’s travels from Northern and Western European countries compared to Southern European countries may be found in climate, average income and the ability to speak foreign languages (specifically English). However, with growing economy and ability of speaking English within the Southern European countries, these markets are likely to gain a larger share in the future.

A last subject within this section on outbound tourism is about the number of trips outside EU-plus. Figure 3-13 gives an overview. The dominance of European destinations has already been showed. For the intercontinental visits the other European countries (non-EU-plus) and America’s have the largest shares. Of the Americas the United States attract most Europeans.

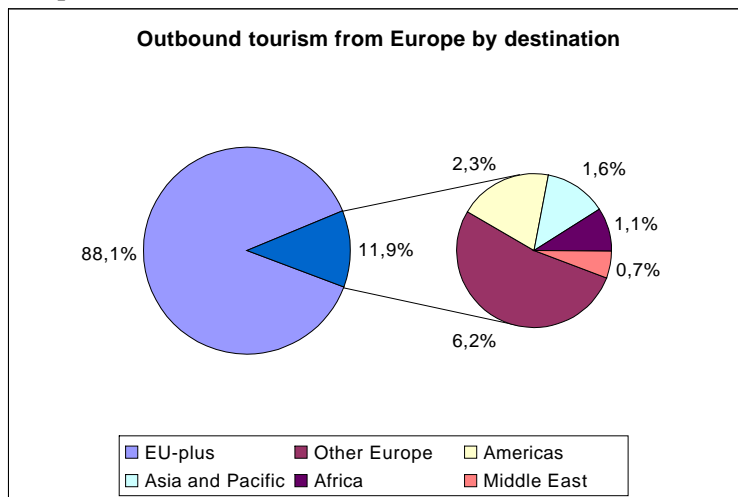


Figure 3-13: Outbound tourism from EU-plus countries by world destination region for 2001 (source: MuSTT model for the EU-plus figures and WTO, 2003d for data on the other world regions).

3.3 Economy of tourism

Tourism is often described as the largest economic sector of this moment. About 12% of the world GDP is connected to tourism and tourism creates some 100 million jobs world wide (OECD Working Party on National Environmental Policy, 2002). Ecotrans (ECOTRANS,

2002) gives slightly lower figures and makes a distinction between direct economic impacts of the ‘Tourism and Travel *Industry*’ and direct plus indirect impacts the ‘Tourism and Travel *Economy*’. The last one includes all indirect contributions by suppliers to the industry itself.

Tourism Industry includes:

- Accommodation
- Catering
- Entertainment
- Transportation
- Travel related services
- Tour operations

The Tourism economy adds to this among others:

- Transport vehicle manufacturing
- Oil and energy industry
- Financial services
- Administrative services
- Publication and paper industry
- Cultural activities
- Building sector

The Tourism Industry contributes about 5% to GDP, the Tourism Economy 11-12% (see Table 3-1). The tourism Industry figures are the most reliable. After all, if consumers were spending less on tourism, but more on other activities, many of the same Tourism Economy suppliers would have the same receipts: people still have to eat, sleep, use energy and exploit financial and other services.

Also it is not clear if for all these other industries only the tourism share of GDP has been incorporated or if all industry performance has been included. Due to these uncertainties a more detailed economic analysis of the tourism sector is recommended to get a proper idea of its importance and of the impacts of developments.

WORLD	Estimate 2001	% of total
Travel & Tourism Industry		
Gross Domestic Product (billion US \$)	1382	4.2
Employment (10 ⁶)	78	3.1
Travel & Tourism Economy		
Gross Domestic Product (billion US \$)	3497	10.7
Employment (10 ⁶)	207	8.2
<hr/>		
EU15	Estimate 2001	% of total
Travel & Tourism Industry		
Gross Domestic Product (billion US \$)	397	4.8
Employment (10 ⁶)	8	4.9
Travel & Tourism Economy		
Gross Domestic Product (billion US \$)	1017	12.2
Employment (10 ⁶)	19	12.3

Table 3-1: Overview of the economic impact of tourism (source: ECOTRANS, 2002, pg. 2).

Total European international tourism receipts were 249 billion in 2000, which is almost equal to total European international tourism expenditure of 242 billion (WTO, 2003d). On a

country basis some large differences exist: the three countries with the largest surplus are Spain, France and Italy, the largest deficits are found with Germany, UK and the Netherlands.

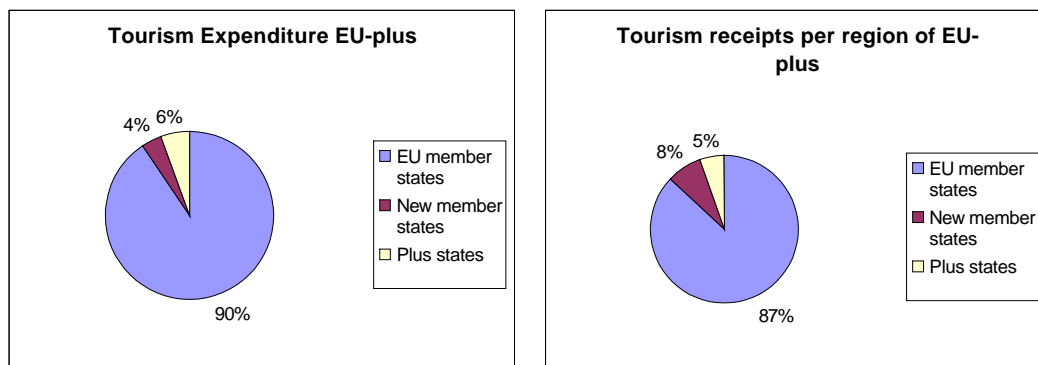


Figure 3-14: Tourism expenditure(left) and receipts (right) for EU-plus states for 2001 (source: WTO, 2003d).

About 90% of this was generated by the EU-plus countries (see Figure 3-14). Comparing this figure to the shares of trips over the three EU categories given in Figure 3-3, makes clear the number of trips for the new member states must include more than tourism trips alone, as nobody can have a multi-day tourism trip for on average only €70 where the EU15 states spend €336 per trip. The same can be said of tourism receipts.

3.4 Special issues: cruises and residential tourism

This section deals with some issues not covered by the general data. Sea-cruises are a small, but fast growing market for tourism. However, most statistics do not include details on cruising. Also the phenomenon of residential tourism, trips to ‘second homes’ at longer distances and abroad by both owners and third parties seems to grow rapidly, but is also not distinguished within general data. The last special issue not covered by the data used is the transport volume and impact of touring through a destination country, a destination region (for example Scandinavia) or entire Europe.

Cruises

Cruising is a combination of accommodation with transport. Most days of a cruise, passengers are not only staying on the ship, but at the same time travelling large distances on the oceans. In many cases passengers travel also long distances (in most cases by air transport) to reach the port of embarkation and to get back home from the port of disembarkation. For the UK market the share of fly-cruises is 72% of all cruises sold (PSA, 2004). Most of the fly-cruise embark from a Mediterranean port, but many are intercontinental as well.

A total of 255 cruise-ships sail the oceans, with a capacity of about 480,000 beds (Cruise Portal, 2004). Cruises have long been the market for the rich in the world, but now it seems to reach larger parts of the population. It still is a very luxury form of tourism. A typical cruise ship has all kinds of luxuries on board like swimming pool, sauna, cinema, whirlpool, massage and about one crew member per two passengers.

Cruising comprises two forms: ocean cruising and river cruising. The numbers of cruise passengers cruising on the oceans is much higher as for river cruising, but both are growing fast. World-wide over 11 million passengers cruised the oceans in 2002 (Peisley, 2004). This is 1.6% of all world-wide international tourism. Of these passengers 68% come from North America, 19% (or 2.1 million) from Europe, 3% from Japan, Australia and New Zealand and the remaining 10% from the rest of the world. Within Europe Figure 3-15 shows the UK dominates the market for ocean cruises.

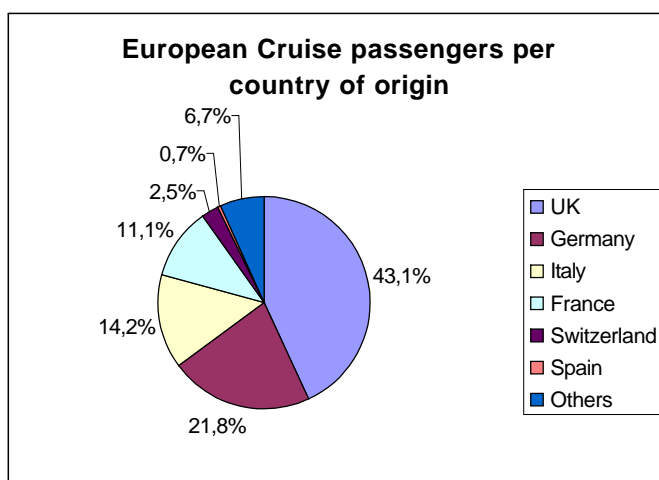


Figure 3-15: European cruise passengers per country of origin for 2001 (source: data based on Peisley, 2004).

Growth of the cruise industry is rapid, with an expected growth of the number of fleet beds by 78% between 2000 and 2010. This means, at the same utility of ships/beds, the total number of cruise passengers will grow to 18 million in 2010. From WTO data it can be seen the Mediterranean as a destination show strong growth over the period 1998 and 2003 (overall 50%). However the world geopolitical tension in 2001 has reduced growth for because the American market dropped strongly.

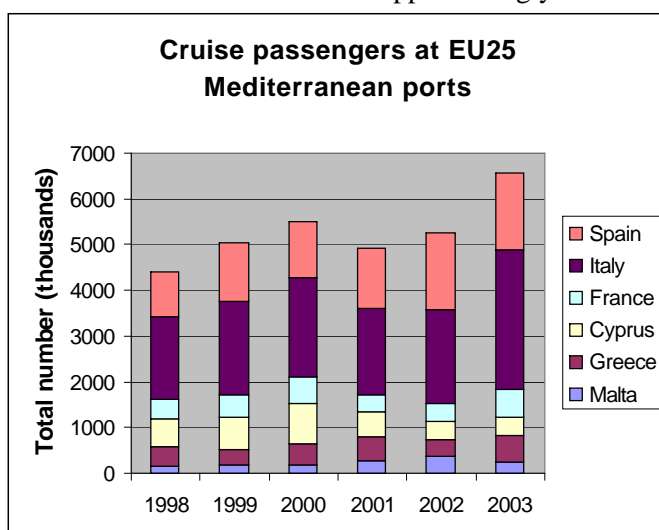


Figure 3-16: Cruise passenger (embarking/disembarking and calls) at EU25 Mediterranean ports (source: data compiled from WTO, 2003d).

The average length of a cruise seems everywhere to increase. In the UK the average has been up from 8.9 days in 2002 to 9.6 days in 2003. The average for Germany is estimated at 10.1 day. Most cruises are sold within the 5-7 day packages (about half), but the 8-14 days market takes about one third (figures for the UK).

It is difficult to get data on the revenues from cruising. The largest European market (the UK) sells her cruises at an average of €1600 (PSA, 2004). For Germany the average revenues were €2053 per cruise (Peisley, 2004). Generally prices are slowly falling: in the UK with 5% from 2002 to 2003. Total world revenues may be in the order of magnitude of €18-28 billion world-wide. This makes the share of cruising of all international tourism 3.5-5.5% (based on

WTO, 2003c). The European cruise market may receive revenues of about €3.5-4 billion per year (1.5%).

The main destination for cruises of Europeans is the Mediterranean (see Figure 3-17). World wide the Mediterranean gets about 11% of all cruises, while the rest of Europe receives another 11%. The Baltic is growing faster as a destination as the Mediterranean is at this moment. Barcelona is the most important cruise port in the Mediterranean (844,000 passengers), followed by Genoa (568,000) and Venice (508,000).

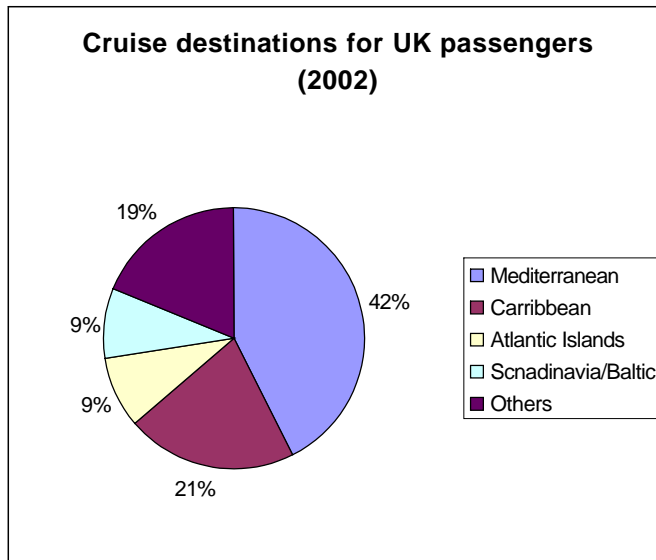


Figure 3-17: Cruise destinations for UK passengers in 2002 (source: Peisley, 2004).

River cruises attract about one million passengers per year world-wide (compiled on data from WTO, 2003d, Peisley, 2004 and PSA, 2004). The German market is number one within Europe, with a growth of 200% to 221,000 over the period 1996 – 2002. Most popular rivers among UK tourists are The Rhine (30,000), the Nile (25,500), Asian rivers (18,000) and Danube (12,200) on a total of 71,000 within Europe and 45,500 to the rest of the world. Interestingly, the river cruises sell for higher prices as the ocean cruises, with an average of €700 per trip. So the revenues from river cruises will probably have a higher share of the total cruise market as the passenger share of about 8%.

The fast growth of cruises has led to the problem of congestion on the main rivers. Ships are having difficulties to moor at the most popular destinations and at canal locks, where cruise ships still have priority at the cost of freighters. Concerns about the level of growth that will be sustainable is on the increase. The sharp growth of the last decade may not be sustainable. From data between 1994 and 2002 it may be concluded the market will become saturated soon (see Figure 3-18).

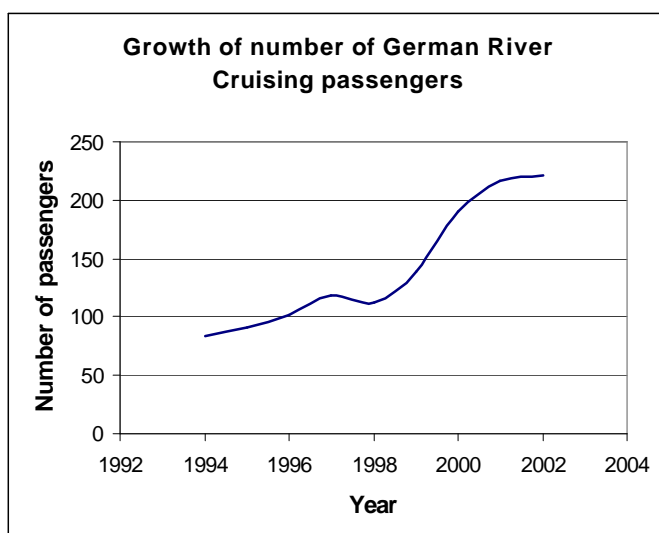


Figure 3-18: Development of number of German River Cruise passengers (source data: Peisley, 2004).

Residential tourism

With residential tourism the stay of tourists in second homes is meant. The tourist may either be the owner of the second home or a third party to which it is rented or lend. It is rather difficult to get data on the numbers of second homes and even more on the implications of them to transport and environment. These implications may be very large as is described for France by Ceron (Ceron and Dubois, 2003a): the total number of kilometres travelled by secondary home owners, using their homes regularly (including renting it to others), may be in the order of magnitude of the average kilometrage per year for the French (14,000 pkm). For tourism secondary homes are an important means kind of accommodation, producing 10% of nights for all trips of four or more nights (all EU15 tourists, source: European Commission, 2003). In France about 73% of all tourism beds are in second homes, though through low utilisation they represent 18% of all nights (EEA, 2003). Around 1995 over 12 million secondary dwellings were counted within the EU (Avramov,). Of all houses in Greece, Spain and Portugal about 30% were secondary homes. For France a number of about three million secondary homes in 1999 is indicated by Ceron and Dubois, 2003a. These receive a total of 220 million overnight stays or an occupancy rate of only 20%. Assuming an average length of stay of – for example – five days (most will be weekends, but also some longer vacations will be stayed at the second home), this means 44 million trips to these houses. This is the equivalent of 16% of all international tourism to the EU-plus, or about 8% of all domestic tourism within the EU-plus.

4 Tourism transport

Key findings:

- *For all intra-EU15 passenger transport (for all purposes and motives together measured in pkm), air transport plays a minor role with 8%; for tourism OD-transport this is 31%.*
- *For Intra-EU15 tourism transport the car has the largest share with 55%.*
- *Measured in number of trips for all trips of all EU-plus citizens the car has a share of between 68%, while air transport shows a share of 39%. Coach, ferries and rail show small shares. The modal split differs much for domestic compared to international tourism, with the latter showing a much higher share of air transport.*
- *The total intra-EU-plus OD-transport is 1240 billion pkm excluding intercontinental outbound and inbound tourism; including ICA total pkm amounts to 2711 billion pkm.*
- *The share of tourism for all intra EU15 transport is about 17% for all modes, except for air transport, where this amounts to about 80%.*
- *Systematic data on local transport at the destinations is not available. This is unfortunately, as the local impacts of transport (especially of car transport and to a lesser extend for air transport) may be very large and even damaging for the tourism industry itself.*
- *Seasonality has large implications for the efficiency of tourism transport and for the capacity of infrastructure including parking spaces.*

4.1 Introduction

Tourism depends by definition on transportation. Transportation is required between the normal place of domicile and the tourism destination and normally some transportation will be demanded at the destination during the stay. The first kind of transport has been defined as OD-Transport; the mobility on the destination as Local transport.

To find in general the impact of transportation two parameters are needed: the volume V of transport and the impact per unit volume β (see §2.2). The volume can be determined by the number of trips or the number of kilometres travelled. The total number of trips is equal to two times the number of tourist visits or arrivals, because a trip in transport terms is measured one-way. The number of kilometres travelled depends of course on the average distance of the trips. The number of trips is important to deduce the noise and – to some extent - safety impacts of air and sea transport and the capacity of stations and parking lots. But the number of kilometres travelled is the most important parameter determining emissions to the air, noise for land-based travel modes, congestion, and safety (land-based transport modes only). Detailed results for number of trips per transport mode and passenger kilometres can be found in Annex I and Annex II respectively.

4.2 OD-transport

Measured in *number of trips* the car is the most important mode of transport used for OD-transport or tourism by the inhabitants of the EU15. Figure 4-1 shows the share of journeys (trips) by car to be 68% for all outbound tourism (international plus domestic), while air takes 15%, coach 9%, rail 6% and ferries 2%. For domestic tourism the share of the car is much larger with 78%. The local effects of these cars, like the use of parking space for example, may be extensive. The share of coach is than 10%, for rail 6% and for air only 3%. For international tourism the picture is rather different with 47% car and 39% air transport.

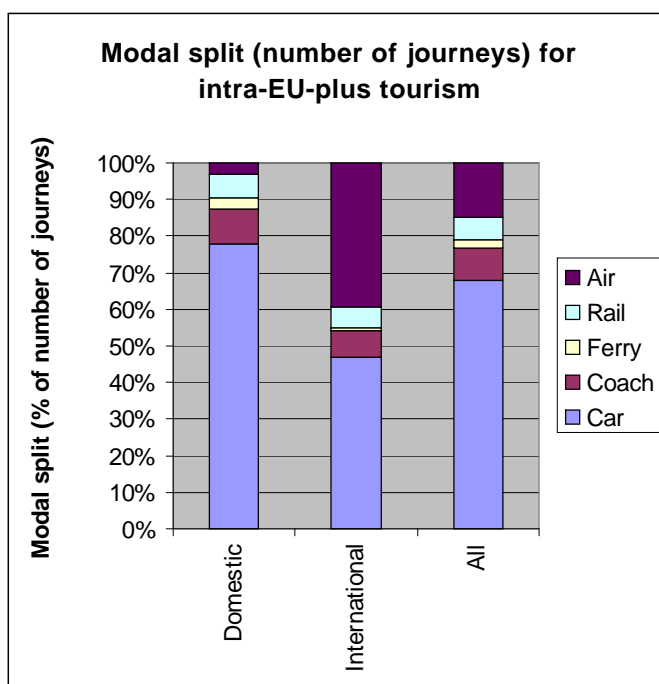


Figure 4-1: Modal split for number of journeys for tourism by EU-plus citizens in 2001 (source: MuSTT model).

The total number of passenger trips within EU15 for all motives including tourism, has been found to be almost 12,5 billion from TEN-STAC IWW data. However this is only traffic for inter-NUTS-2 regions, excluding intra-NUTS-2 traffic⁴. So it will be restricted to medium distance trips. The actual number of trips within the EU15 for all purposes may be derived from the average distance travelled per trip and the total kilometrage known. Taking the Netherlands travel behaviour as typical, the average trip length is 10 km per trip (CBS, 2003). The total mobility in passenger kilometres for EU15 was almost 5000 billion in 1999 (Eurostat, 2002). This means a total of 500 billion trips was made. The number of tourism trips between and within the EU15 has been estimated to be 228 million international plus some 513 million domestic. With these figures in mind the total of tourism OD-transport trips (one-way!) is 1.48 billion trips. So tourism takes only 0.3% of all trips.

However, the average distance tourists travel in their OD-transport of course is much higher than 10 km. With the MuSTT model the total number of pkm for intra-EU15 tourism has been calculated to be 1060 billion. This is 21% of the total passenger transport within the EU15.

For global impacts the number of kilometres is a better measure. Now the picture shifts much towards air transport, being the most important means of transport for tourism. For all intra-EU15 passenger transport the modal split (division over the different transport modes) measured in pkm is dominated by private car with 76%. Looking at intra-EU15 tourism OD-transport measured in passenger kilometres the largest share is still private car with 55%, but the second largest now is air transport with 31% (see Figure 4-2).

⁴ NUTS-2 regions are defined for European transport models and equal normally regions at the province or more detailed level.

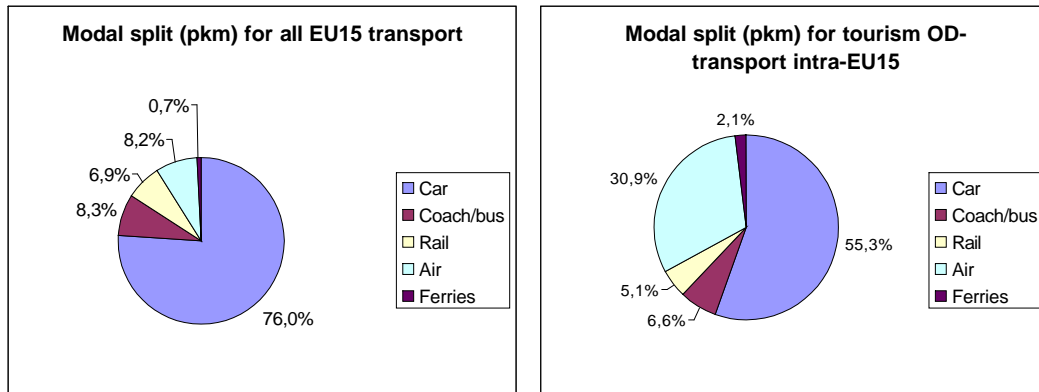


Figure 4-2: Modal split (for pkm) in 2001 for all intra-EU15 transport (left) and for tourism only (right) (source: based on Eurostat, 2003 for all transport and MuSTT model for tourism transport).

An interesting feature then is the share of OD-transport for tourism within total transport per mode. Using the above data Figure 4-3 makes clear air transport is to a large extent used for tourism, while for other modes, tourism has only a share around 17-18%. The figure is based on estimates, but is backed by data from the European Environmental Agency (EEA, 2003), who mention a share of 70% for holiday travel within air transport. As tourism includes business travel and the share of business in number of trips is about one quarter, it is most likely the total tourism share will reach even more than the 80% found so far. A main problem with current air transport statistics is their inability to distinguish same-day-returns. These figures are of importance to make estimates of the effects of shifts between modes within tourism transport on the total transport performance. It is also an important input for assessing the environmental and social effects of tourism OD-transport.

The share of less than 20% for coach seems at the low side: much of coach transport may be considered to be for leisure. However, a large share of this is not for tourism OD-transport, though still tourists may use the coach for this purpose. On the other hand: in the total for bus/coach urban and regional public transport by bus is included, which has relatively high shares of commuting, students-transport and same-day-returns for leisure and personal care.

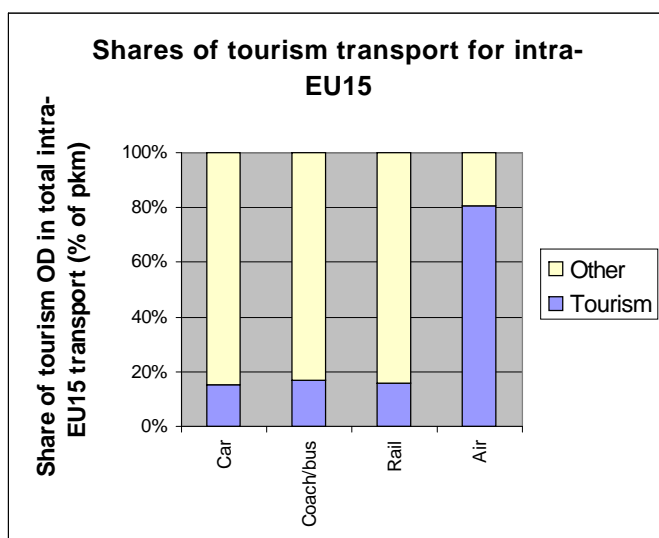


Figure 4-3: Shares of tourism OD-transport of total transport per mode in 2000 (source: based on Eurostat, 2003 for all transport and MuSTT model for tourism transport).

A modal split for tourism trips OD-transport has been given by Schmidt (Schmidt, 2002) and is summarised in Table 4-1. The highest and lowest shares for a single country have been highlighted with yellow respectively blue. These data have been used to construct the numbers of coach and ferry passengers.

%	Private vehicle	Air	Rail	Coach	Waterway
Belgium	58.5	29.6	4.5	6.2	1.1
Denmark	45.0	35.7	5.6	10.3	3.2
Germany	50.3	31.7	7.0	9.8	:
Greece ²	56.9	6.8	1.3	11.7	23.1
Spain	68.3	12.7	5.5	11.3	1.9
France ²	69.6	10.9	13.4	4.3	0.9
Ireland	:	:	:	:	:
Italy	61.8	16.9	10.5	5.3	5.4
Luxembourg	46.3	40.0	5.1	6.1	0.9
Netherlands	65.9	22.8	3.4	6.4	1.4
Austria	50.1	32.8	5.4	9.9	0.4
Portugal	69.0	15.8	3.4	10.0	1.5
Finland	53.5	23.9	11.1	5.6	5.2
Sweden ³	61.1	22.2	7.6	6.5	2.4
UK ¹	48.1	37.7	4.7	7.6	1.6

Table 4-1: Overview of the EU15 modal split (number of trips) for outbound plus domestic tourism in 2000 (source: Schmidt, 2002). Highest value per column is yellow, lowest blue. Notes: 1=1999, 2=1998, 3=1997.

With the MuSTT model a figure has been drawn on the modal split in number of trips for the five EU regions considered (see Figure 4-4). From this figure it is clear the EU10 tourists do not use air transport as much as the tourists from the EU15 countries. However, they do make more use of coach and rail transport.

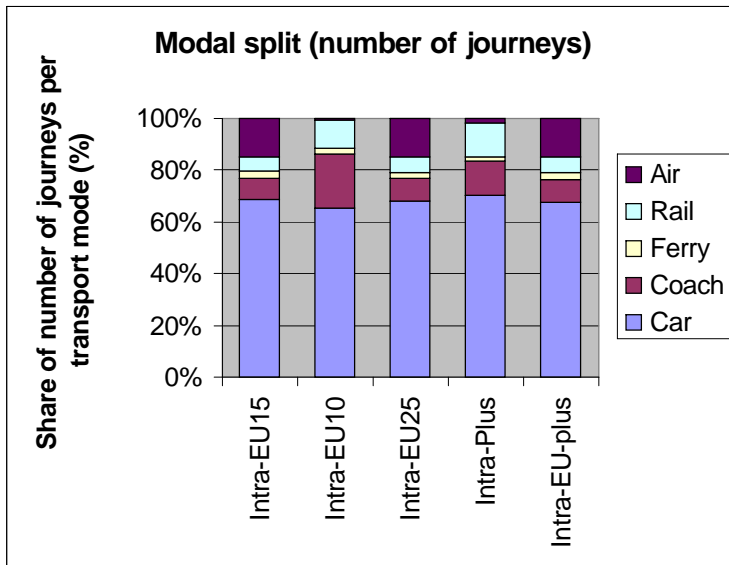


Figure 4-4: Modal split (number of journeys) for the different regions in 2001 (source: MuSTT model, coach and ferry estimated).

Finally from the MuSTT model calculations the total amount of intra-EU-plus kilometres travelled for tourism OD-transport is 1.24 billion pkm. Most of this is covered by car (about 0.8 billion for intra-EU-plus traffic).

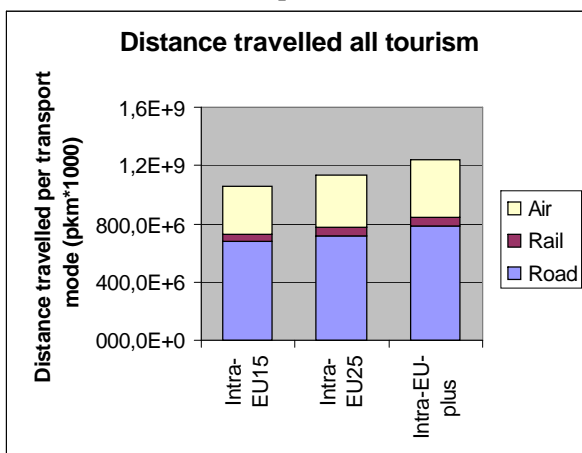


Figure 4-5: Total passenger kilometres travelled for tourism (source: MuSTT model).

In terms of kilometres travelled Figure 4-6 shows the share of domestic tourism reduces to 43% as compared to the domestic share of the number of journeys (68%). This is caused by the larger average distance travelled for international tourism, compared to domestic tourism.

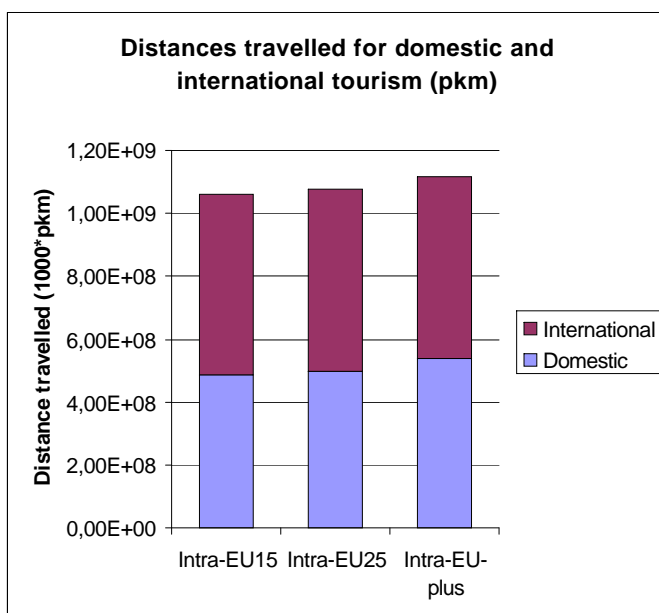


Figure 4-6: Passenger kilometres travelled for international and domestic intra-EU-plus tourism for 2001 (source: MuSTT model).

An important part of OD-transport has been left out in the above discussion: the extra-EU-plus transport and specifically the transport to other continents. The rough analysis is based on the number of trips made from EU-plus to other regions in the world given by WTO and an estimate of the average one-way distance flown between Europe and the country (see Table 4-2, shows the following:

- outbound ICA tourism: 446 billion pkm
- inbound ICA tourism: 505 billion pkm

World region	Average one-way distance (km) from EU-plus
Non-EU-plus	500
Europe	
Americas	7000
Asia and Pacific	9000
Africa	4000
Middle East	2500

Table 4-2: Estimated average distance travelled by tourists from the EU15 to other regions of the world

Figure 4-7 shows for outbound tourism OD-transport the total number of kilometres travelled by EU-plus citizens.

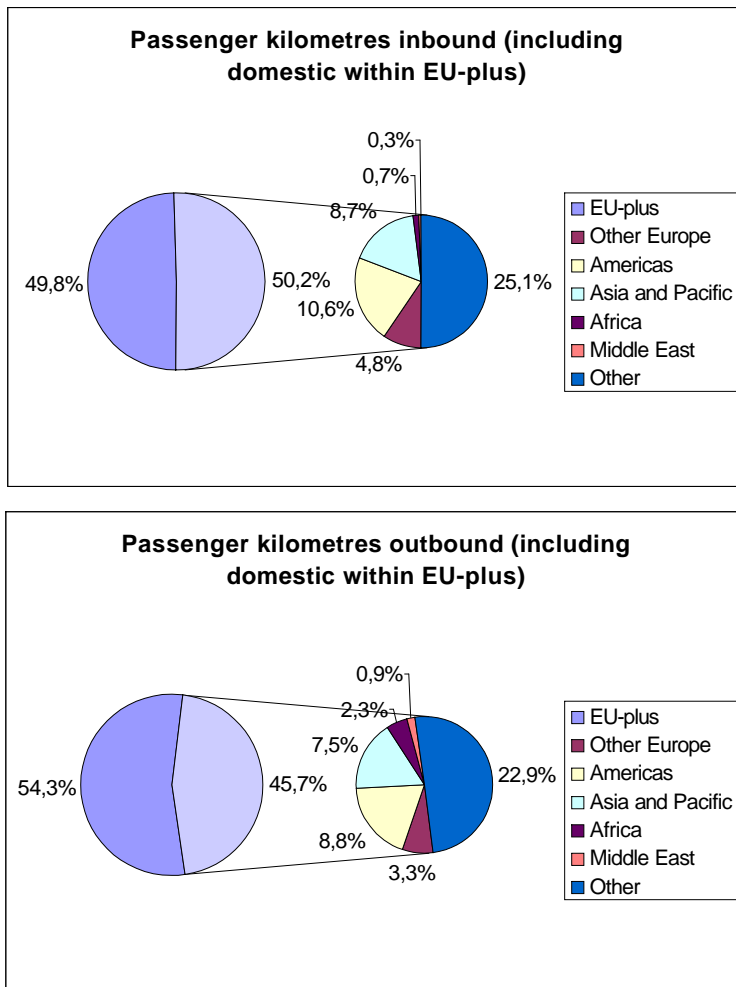


Figure 4-7: Tourism OD-transport (pkm) for inbound (upper graph) and outbound (lower graph) tourism (international plus domestic within EU-plus countries) to and from the EU-plus countries for 2001 (source: MuSTT model).

From the figure it appears the total amount of OD passenger kilometres travelled by EU-plus citizens will be 83% higher as travelled within the EU15. In total ICA plus ‘other Europe’ add 100% to the OD-transport passenger kilometres travelled for inbound tourism within the EU-plus region. When all OD-transport connected to the EU-plus region is summed the total share of intra-EU-plus transport remains to be only 31%, meaning the ICA plus other Europe transport more than triples the total intra-EU-plus tourism OD-transport. Though in terms of tourists arrivals tourism from and to outside the EU-plus region adds up to some 22%, the number of kilometres travelled for it almost doubles.

4.3 Transport maps

Figure 4-8 shows how the perspective changes if looking at number of tourists or looking at the number of pkm they travel between the most important origin-destination relations. Many thin lines become intermediate in the distance map, as are intermediate lines are becoming thick lines. The importance of the peripheral countries of the EU for the total number of pkm travelled is shown here to some extend.

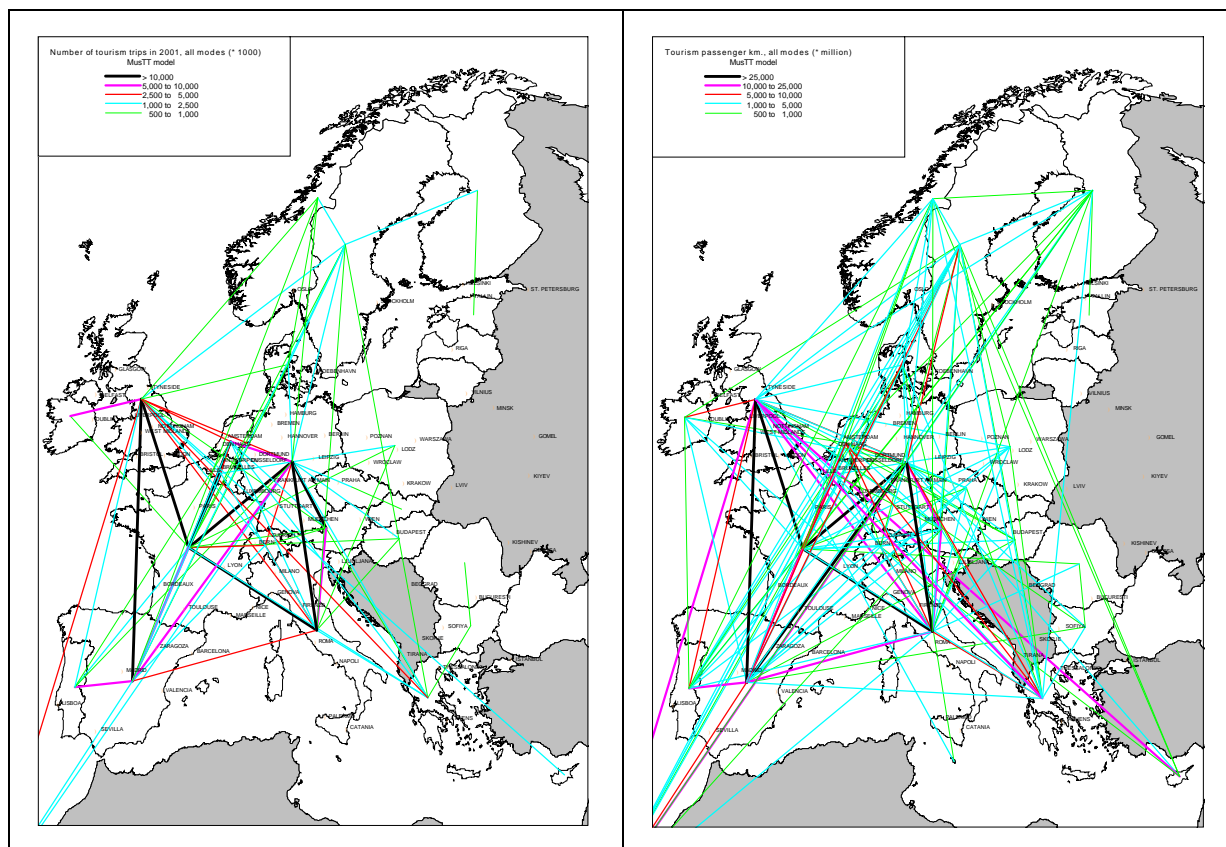


Figure 4-8: The maps show the tourism flows in 2001 by their numbers (left) and the total number of passenger kilometres travelled on the route (right) (source: MuSTT model).

4.4 Local transport

Local transport is the transport within the destination area⁵. The local transport issue is difficult to assess because of a shortage of reliable data. It is not measured by national statistics how much international holidaymakers or business people travel on their destination. Only some fragmentary data from some destination dedicated studies are available. It is therefore extremely difficult to get a Europe wide overview of the amounts of transport involved and their impacts. This will make it very difficult to estimate the impacts of local transport by visitors. An extra complication comes from most Americans, Japanese and Chinese, making large Europe tours, thus travelling quite some distances within Europe. No statistics on this phenomenon have been found. The TEN-STAC data do not include this kind of travel. Some analysis of cases may give some data on the impacts of local travel. For example for the Amsterdam inbound tourism case (Peeters, 2003b) local travel impacts (measured in energy consumption of total Amsterdam inbound tourism) was just 1-2% of the total impact. However, Amsterdam is a case for city-breaks tourism, which most probably shows a small local transport component, due to a high quality of public transport within the city and the rather very high density of sights within cities, reducing the distances to be covered between them.

From Austria a different picture has been drawn (Trafico, 2004):

“In the framework of the Austrian model project ‘Sustainable Mobility – Car-free Tourism’ a mobility analysis for the two model communities Bad Hofgastein and

⁵ Of course transfers from an airport or main railway- or bus-station to the accommodation is a kind of local transport, but this is considered to be part of the OD-transport chain.

Werfenweng was carried out in 1998. The results on local transport for Bad Hofgastein:

- *In summer season, the 6.000 inhabitants made about 18.200 trips per day. In the same time, the tourists (with overnight stays; Bad Hofgastein has about 8.000 accommodation beds, the focus lies on the winter season) made about 13.500 trips per day, among them 8.000 inside Bad Hofgastein and 5.700 O/D. 82% of those 8.000 trips were done by foot, only 8% by car. However, in O/D traffic, 43% were made by car, 30% by bus, 2% by rail and only 8% each by foot or bicycle.*
- *In winter, the tourists (with overnight stays) made about 22.500 trips per day, among them 20.700 inside Bad Hofgastein and 1.8000 O/D. 59% of the tourists' trips inside the community were done by foot, 17% by car. In O/D traffic, 60% were made by car, 24% by bus, 5% by rail and 11% by foot.*

However, this is the situation in a community with a pedestrian zone, a good ski-bus system and a tight city centre, where lots of activities can be reached by foot. It has to be assumed that in many other Alpine tourism resorts the situation is different and local transport with unsustainable transport modes is much higher."

Touring may add substantially to local transport within EU-plus. This subject is treated in the next section §4.5.

4.5 Special issues: seasonality, ferries, coaches and touring

Seasonality

Seasonality, the uneven distribution of tourism over the time of year, has an impact on the utilization rate of tourism facilities (accommodation, leisure) as on the share of tourism transport within all passenger transport. In §4.2 we showed for private car transport the average share for tourism OD-transport is about 17% of the total car transport. However, during the summer season (and at winter sports destination also the winter season) this share becomes much higher. Data from Eurostat suggest during the period July-august between 30% and 60% of all tourist trips is made, depending on the destination country (Schmidt, 2002). This means during these months the share of car transport is two to four times higher (between 34% and 68%) of total passenger transport by car in Europe. Because most holiday trips (about half to two-thirds of the tourism trips) are made within the weekend, it is clear the total amount of tourism OD-transport will be concentrated within only 35% of the days of the week. And again the share of tourism OD-transport by private car surges for the summer weekends by a factor of 2 and may reach much higher volumes than normal average traffic. Though normal traffic will be less than average during the season (you cannot travel simultaneously for your holiday and to your work), the amount of tourism travel on several days of the year may be huge and certainly cause serious road capacity and road safety problems.

Also the capacity use of airports and seaports are influenced by seasonality. Long waiting queues for ferries during season change place with less or no ferry services off-season. The traffic on airports is also affected by seasonality, though on a main hub like Schiphol Airport the busiest day generates about 40% more passengers as an average day. During the months June to august, 25% of the year, Schiphol handles 35% of all passengers.

Though the summer season is still most important for tourism, in countries with extensive winter sports, the winter season may give the same kind of problems. The impact of seasonality on transport may be listed as follows:

- serious main infrastructure capacity problems during several days of the year
- serious local and regional infrastructure capacity problems during several months of the year

- higher transport cost due to a lower utilization of the transport capacity
- high land-use due to large parking lots and extra infrastructure, that is used only during a small part of the year
- traffic safety and air quality problems during seasons

Current databases like TEN-STAC do not include the impacts of seasonality. It is recommended to include some module for this phenomenon.

Ferries and maritime tourism transport

It is difficult to get detailed data on maritime transport specifically for tourism. The TEN-STAC database does not make a distinction for maritime transport. Databases found with Eurostat do not make a distinction in travel purpose and also give only numbers of passengers embarking from European ports. The Panorama of Transport from Eurostat formulates it as follows (Eurostat, 2003, p. 56):

“For maritime transport, there is currently no data for passenger kilometres available (though developments are underway to make it available in the future).”

One of the reasons for this is, only passenger numbers per port are available, but not on routes between ports. Therefore it is in this phase 1 of the project not possible to get more than a first impression of the number of maritime passenger kilometres travelled by tourists. Also it is not clear what share of passengers takes their car with them on the ferries. This is important information because the environmental impact with car will be much larger as without. Finally the kind of vessel is unknown. A passenger ferry, not carrying cars, will be more fuel efficient as one carrying cars. Higher environmental impacts per passenger kilometre may be found for fast ferries compared to conventional ones. Technically maritime passenger transport may be very sustainable, but than probably only for conventional pure passenger ships. Some estimates have been published by Peeters, Peters et al., 1996. A pure conventional passenger ferry has the lowest energy consumption and CO₂ emission per seat kilometre as is shown by Figure 5-8 on page 52.

The total number of passengers for the EU-15 in ports have been found to be 357 million in 2001 (Eurostat, 2003). The development of passengers differs per country as is shown by

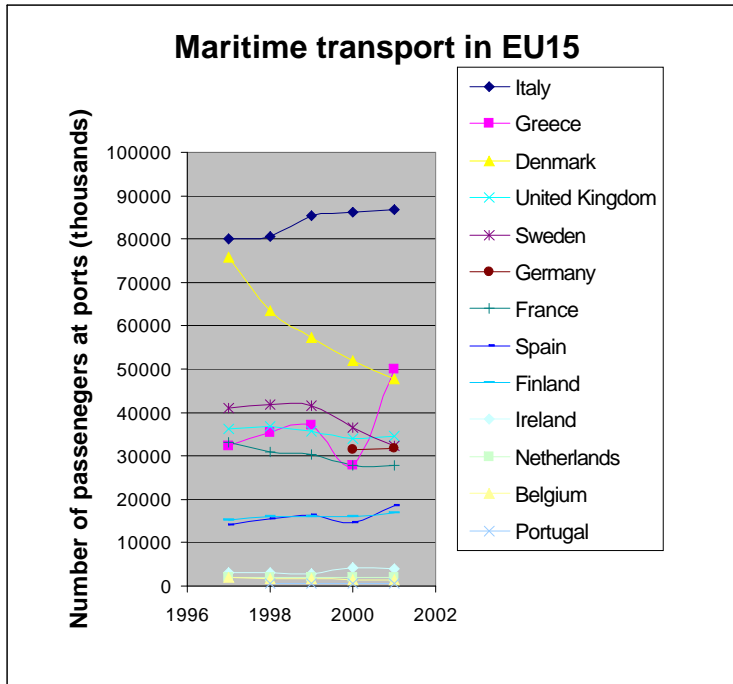


Figure 4-9: Number of passengers (dis-) embarking at EU-15 ports, including domestic, intra-EU15 international and extra-EU15 international (source: table 5.49 of Eurostat, 2003).

The strong growth for Greece is caused by the start of reporting by two very large lines. It is difficult to say something about the number of tourists using maritime transport. From Table 4-1 it appears the share of maritime transport in total tourism arrivals may differ very much per country (between zero and 23%), but most values are just a few percents. Probably most domestic passengers are no tourists, while most extra-EU15 international will be tourists. Intra-EU15 international may be is half for tourism purposes. This would result in some 50-60 million passengers for tourism, or about 10-15% of the total international tourist arrivals. Though most tourists are domestic, a value of 5-7% seems at the high end of probable estimates. Average distances covered are difficult to establish and may be everything between 100 and 500 km per trip, leaving maritime transport between 5 billion and 30 billion pkm. On a total of 615 billion this is only 1-5% of all intra-EU15 tourism OD-transport.

Figure 4-10 gives the division over the main maritime transport countries of the EU15. The largest markets are Italy, Greece and Denmark, accounting for over half of all passengers.

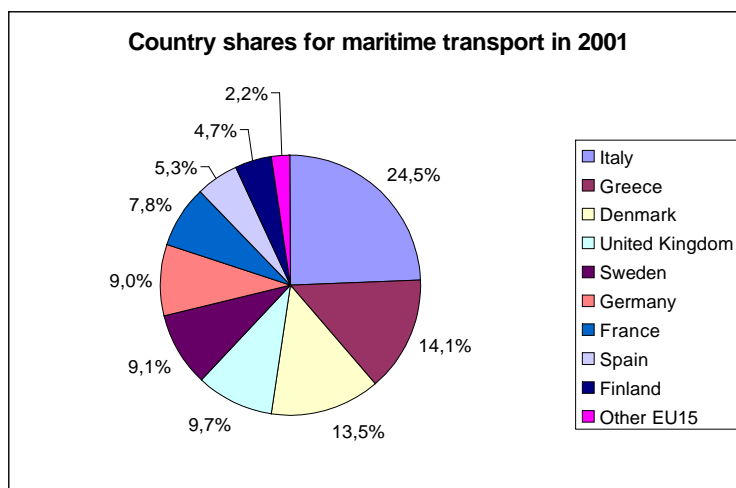


Figure 4-10: division of maritime passenger transport over the EU15 countries (number of (dis-)embarkations in 2001 per country for all domestic and international transport; source: Eurostat, 2003).

For tourism maritime transport is specifically important within the Mediterranean. Greece tourism depends for 23% on maritime transport, though almost all maritime transport in Greece (97%) is reported by Eurostat (Eurostat, 2003) to be on domestic routes (which of course will be used extensively by international tourists). But also cross-Channel traffic between the mainland and the British Isles is important for tourism as are the ferries on the Scandinavian waters.

Coaches

Coaches play an important role within leisure transport. But even for tourism OD-transport the share of coach is between 4% and 12% for the EU15 countries in 2000 (see Table 4-1). For the EU10 countries Estonia, Malta and Poland are the main players: together these countries take up 87% of all maritime passengers for the EU10.

Though the TEN-STAC database does not make a distinction between passenger road transport by car and by bus or coach and just gives the aggregated figures for the transport mode 'road', an estimate has been given for coach travel in the MuSTT model. This section has been drawn to clarify some data on the amount of coach transport for tourism. Generally coach transport is considered to be a rather sustainable mode of transport compared to most other modes.

Most statistics take coach and bus together, which are totally different markets. The total for EU15 is 413 billion pkm in 2000 (Page, 2003). But busses, serving local or regional public transport will probably not offer much tourism transport. Coaches may serve both scheduled international lines (like Eurolines), having probably a large share of tourism transport and non-scheduled buses for private hire. Overall the 535,000 busses/coaches used within EU15 in 2001 (Eurostat, 2002) served about 9% of all intra-EU15 passenger transport. From Table 4-1 it is clear the coach has a share of tourism 4% and 12% of all intra-EU15 tourism trips in OD-transport. Though the average is unknown, an estimate of 7% of total kilometres has been made, based on an estimated average travel distance of 500 km, which may be rather high. IRU reports 100-500 km as average, but this is including same-day-return leisure trips (IRU, 2001).

Touring

Many tourists visiting Europe from other continents do not stay at one particular destination, but make round trips through one or more countries. Also intra-European tourists may do

this, specifically those visiting the northern ports from Western Europe. But most likely to make a tour of Europe will be tourists from the US, Canada, Australia, New Zealand, Japan and some other emerging economies within Asia. The total number non-European visitors to Europe is 42 million (WTO, 2003d). If we assume half of them will be making a tour and an average tour within Europe comprises some 4000 km total, the total touring mobility within Europe will be 84 billion pkm. This is the equivalent of 14% of the total intra-EU15 OD-transport. The modal split of this transport is unknown, but probably has a relatively small share of car transport and high shares of air, coach and rail.

5 Environmental impacts

Key findings:

- *On average air transport shows the highest values of emissions per pkm, though maritime transport is highest for NO_x and car for PM emissions. Rather environmentally efficient are rail and coach transport.*
- *With respect to climate change air transport is dominating the EU-plus outbound and inbound tourism transport impact with 72% and for CO₂ emissions 50%. When considering only intra-EU-plus travel, car travel has a significant share of 62% of the CO₂ emissions and 41% for CO_{2-e} emissions. For the latter air transport shows the largest share with 56%.*
- *Cost for transport unsafety is with a share of 97.7% almost uniquely dominated by private car use.*
- *Direct land-use per passenger kilometre may be in the same order of magnitude for all modes. More differences between the transport modes exist in restricted areas, habitat partitioning and local impacts.*
- *Tourism transport noise nuisance is dominated by car (60% of the total number of people disturbed by noise) and air (32%). However, local effects within more natural areas (like the Alps) may experience severe effects from large amounts of car transport on noise, air quality and local energy consumption.*
- *Costs of less snow reliability in skiing resorts have already been measured in tens of millions and may amount to more than a billion by the year 2050 for Switzerland only.*
- *The total amount of CO_{2-e} emissions for EU15 tourism (in- and outbound) is estimated at 328 million tons, or 8% of the total of all EU15 CO_{2-e} emissions.*
- *Current passenger rail transport capacity of rolling stock is not used at its limits (on average seat occupancy rates are 25-35%), which means quite a lot of extra transport from tourism may be accommodated by rail without large (infrastructure) investments.*

5.1 Introduction

Sustainability comprises three elements: planet, people and profit. To make these elements measurable a Sustainability Impact Assessment (SIA) has been designed (see MusTT deliverable 4). In this paragraph we will describe the most important tourism transport impacts for the environmental or ‘planet’ issue of sustainability. These can be clustered into:

- global environment (emissions to the air)
- local air quality (emissions to the air)
- safety
- infrastructure impacts (like land use)
- noise and nuisance

Also we will give attention to ways to aggregate impacts.

One of the major production factors of tourism is the environment. Tourists seek clean swimming water, solitude, unspoiled nature, landscapes and cities, healthy air and a comfortable climate. Therefore the damage from environmental deterioration may be felt more by the tourism industry as by most other economic sectors. An example of this is

climate change, a topic recognised by the WTO in its 2003 First Conference on Climate Change and Tourism, issuing the ‘Declaration of Djerba’:

“In brief, this declaration marks an important stage in establishing that serious international attention, under the leadership of the World Tourism Organisation, is now being paid to this subject. The declaration calls upon all interested parties to continue research efforts, encourage sustainability in tourism, raise awareness of the issues involved and use the declaration as a framework for future action”
(WTO, 2003a)

Though currently the world climate has warmed by less than one degree Celsius on average, damage is already felt for example in the Alps. Costs of less snow reliability in skiing resorts have already been measured in tens of millions and may amount to more than a billion by the year 2050 for Switzerland only (Buerki, Elsasser et al., 2003). Recently evidence has been published on the detrimental effects of climate change on biodiversity (see for example Thomas, Cameron et al., 2004), which may affect large sectors of the tourism industry. On the other hand it is not unlikely some regions may benefit from climate change, giving for example warmer and more reliable summers in Western Europe. Much depends on the way how climate change will work out: with gradual changes these advantages may materialise, but when more abrupt changes take place, these advantages may be offset by larger damages.

5.2 Emission factors

The impacts of emissions to the air may be divided by the kind of impact: local air quality (like smog, ozone forming), regional (acidification) and global (climate change, ozone layer damage). For local air quality hydrocarbons, particles of soot (PM1, PM10, et cetera), sulphur oxides and nitrogen oxides are the most important emissions. The impact is directly on human health and also on the quality of ecosystems. Emissions of nitrogen and sulphur oxides are further responsible for the regional impact of acidification, affecting woods, lakes and moors. Climate change is caused by emissions of carbon dioxide and many other emissions like nitrogen oxides, methane and water vapour (at high altitude). A generally used indicator for climate change effects is the global warming potential. To find this parameter the emissions of all greenhouse gases (GHG’s) are expressed in kilograms of carbon dioxide equivalents (CO₂-e), causing the same global warming potential. For most transport modes the equivalence factor - the factor designating the ratio between the warming potentials of the CO₂ emissions of the transport mode and all GHG-emissions – is 1.05. For air transport a much larger factor has been found due to contrails and forming of extra cirrus clouds (Penner, Lister et al., 1999. Though still uncertainty exists around the exact magnitude of the equivalence factor for air transport – it has been found by the IPCC to be between 2 and 4, depending on the aviation growth scenario for 1995-2050 used – generally a factor of 2.7 is used as an average proxy (see for example Gössling, 2002; Wit, Dings et al., 2002; RCEP, 2003; Ceron, Dubois et al., 2004). A figure given by Schumann (Schumann, 2003) suggests the equivalence factor may be higher at 3.0. The proposed change is based on the latest knowledge on the net impact of aviation induced cirrus (higher) and contrails (lower). In this study we will use the conservative average of 2.7. For the two shortest block distances a smaller equivalence factor has been estimated as a relatively large part of these short flights will be flown below cruising altitude, for which the warming potential of the other GHG emissions will be much lower. The emission and equivalent factors used for the analysis of tourism OD-transport are given in Table 5-1. References for these values are given in 0.

Mode	CO ₂ factor	equiv. factor	CO ₂ -e	PM	NO _x
	kg/pkm		kg/pkm	gram/pkm	gram/pkm
Air <500 km	0.206	2.0	0.412	0.00175	1.028
500-1000 km	0.154	2.3	0.354	0.00135	0.716
1000-1500 km	0.130	2.7	0.351	0.00117	0.578
1500-2000 km	0.121	2.7	0.326	0.00111	0.522
>2000 km	0.111	2.7	0.299	0.00103	0.466
Rail	0.027	1.05	0.0284	0.013	0.16
Car	0.133	1.05	0.1397	0.0225	0.50
Ferries	0.066	1.05	0.0693	0.001	1.6
Coach	0.022	1.05	0.0231	0.0103	0.246

Table 5-1: Operational emission factors for tourism OD-transport modes⁶ (source: see Annex VII).

Figure 5-1 shows the differences between the ecological efficiency of the transport modes. From this graph it becomes clear on average air transport shows the highest values of emissions per pkm, though maritime transport is highest for NO_x and car for PM emissions. Rather efficient are rail (except for PM) and coach (except for PM). In both cases modern diesel railway cars and modern coaches perform much better than the average fleet in the EU15. The value for PM emission for ferries is relatively uncertain compared to the other values.

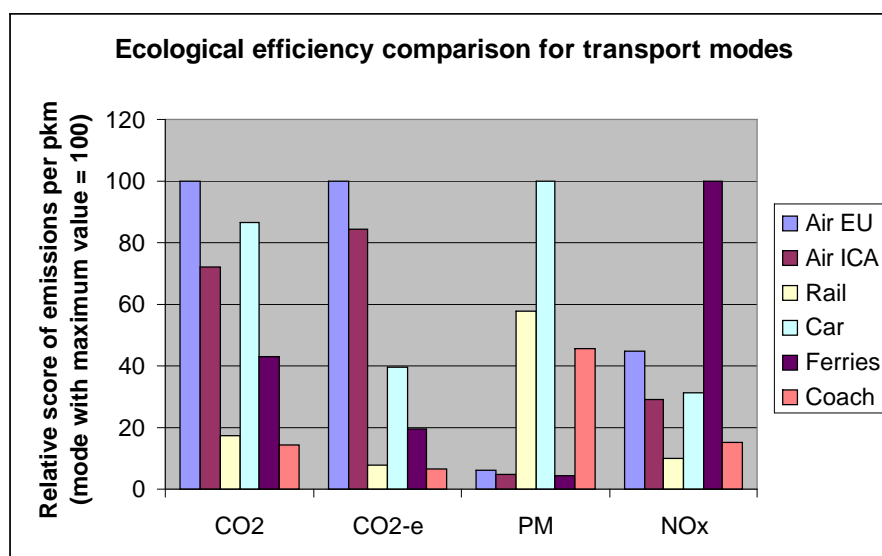


Figure 5-1: The relative emission factors for the transport modes used for tourism OD-transport for 2001. The mode with the maximum emission factor per kind of emissions has been given a score of 100 (source: MuSTT model).

⁶ The term 'tourism OD-transport modes' should not be misunderstood: these modes are not specifically for tourism transport. Still emissions factors have to be dedicated to the specific purpose of travel because the operational circumstances – like seat occupation rates, speeds, average distances travelled, specific types of vehicles used – may differ to a large extent. For example the average occupation rate for commuting by car in The Netherlands is only 1.1 person, while this is for leisure about double this value, causing the specific emission factor (g/pkm) for car commuting to be twice the value for car leisure.

5.3 Global emissions

The relative contribution of tourism OD-transport by EU-plus citizens on global impacts like energy consumption and climate change is given in Figure 5-2. Just over 50% of all CO₂ emissions are caused by air transport; for CO₂-e this figure rises to 72%, due to the large equivalence factor for air transport.

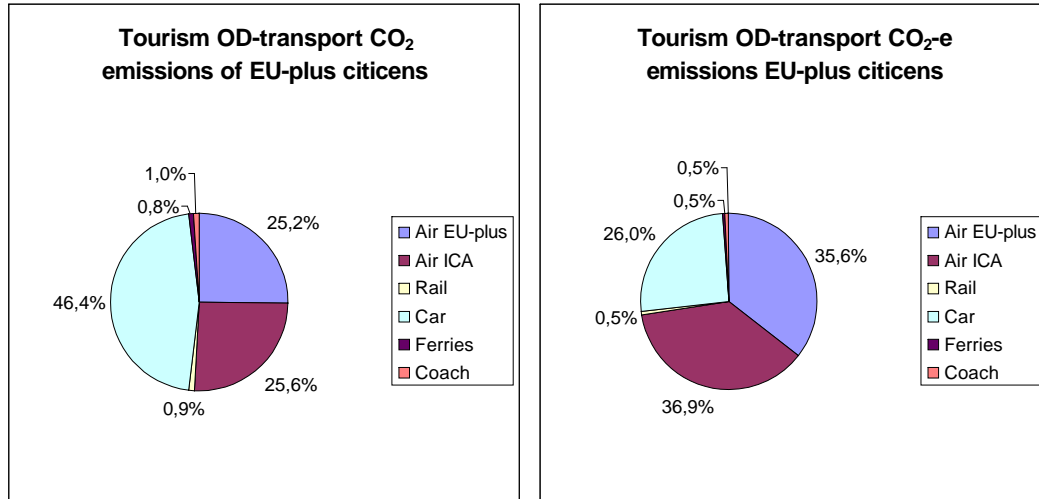


Figure 5-2: CO₂ emissions (left, as measure of energy consumption) and CO₂-e emissions (right, as measure for climate change) for tourism OD-transport by all EU-plus citizens for 2001, excluding trips to European non-EU-plus countries (source: MuSTT model).

The left graph of Figure 5-2 gives CO₂ emissions for EU15 tourism OD-transport (including domestic, intra EU and ICA). A total of 173 million tons of CO₂ has been calculated for the citizens of the EU15 alone, which is 5.5% of the EU15 total. The right graph in Figure 5-2 shows the results for CO₂-e emissions for all outbound tourism OD-transport of the citizens of the EU15. The total amount of CO₂-e emissions connected to outbound EU15 tourism OD-transport calculated at 328 million tons, or 8.0% of the total of all CO₂-e emissions within the EU15 (based on a total of 3100 million tons of CO₂ emissions - Eurostat, 2002 - times 1.3 equivalence factor for all sectors within the EU15). The dominance of the aircraft for climate change is obvious, even if ICA transport – the largest producer of GHG emissions from tourism, would be excluded (see also Figure 5-3).

Full results of MuSTT model calculations are given in Annex III for CO₂ and Annex IV for CO₂-e emissions.

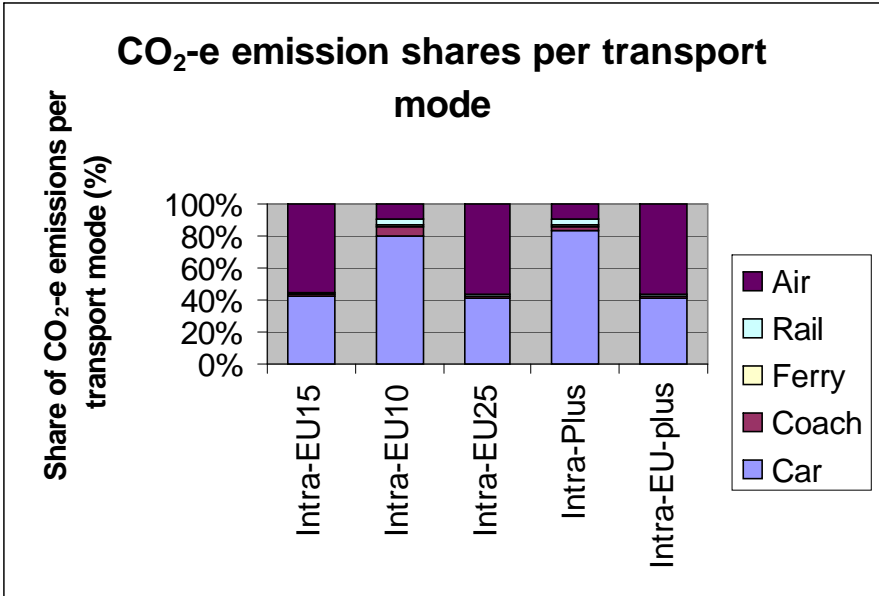


Figure 5-3: CO₂-e emissions - a measure for climate change - for the different regions and transport modes as calculated for 2001 (source: MuSTT model).

5.4 Local and regional emissions to the air

Local air quality is affected by transport mainly through the emissions of particles (like PM10). Figure 5-4 shows the results for the intra-EU-plus countries. The emissions from ICA transport have been left out as these do not have much influence on the air quality within Europe.

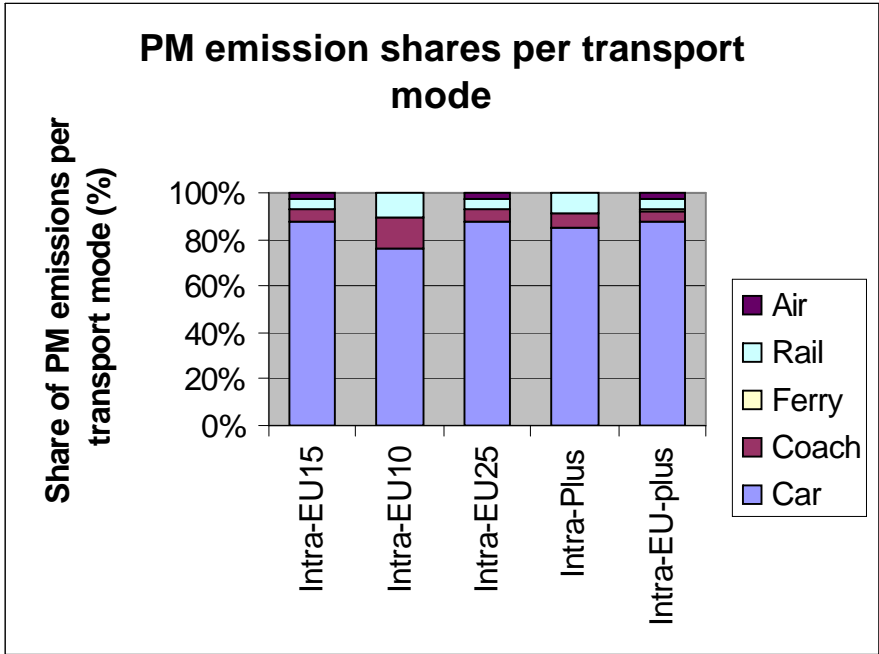


Figure 5-4: PM emissions for intra-EU-plus tourism OD-transport affecting air quality (data for 2001 based on MuSTT model).

The figure shows clearly the dominance of the private car for air quality. This is mainly attributable to the share of diesel cars within the passenger car fleet (about one third of all the passenger kilometres). Air transport does not have much influence in this case, though near main airports there may be a significant impact on the local air quality in the neighbourhood. See Annex VI for a full overview of the PM results from the MuSTT model.

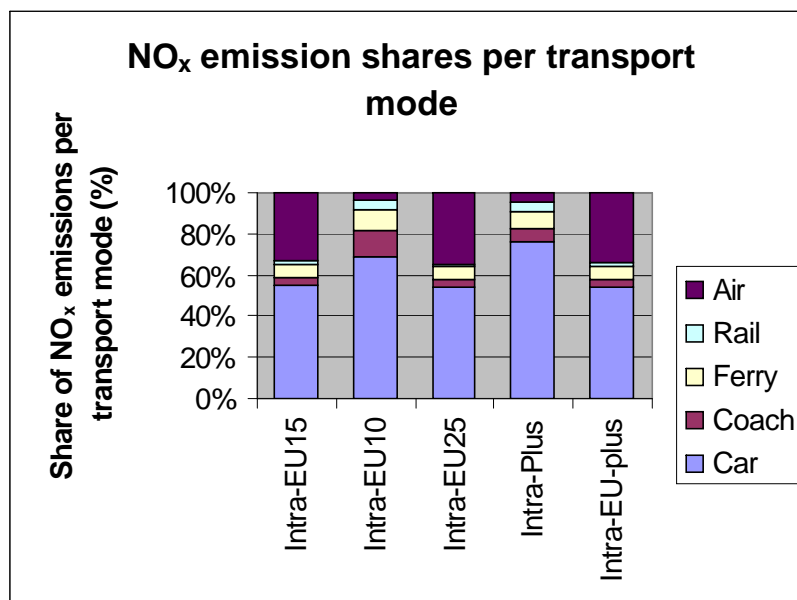


Figure 5-5: NO_x emissions for intra-EU-plus tourism OD-transport affecting air quality (data for 2001 based on MuSTT model).

For regional impacts from transport emissions (like acidification) NO_x emissions are a good measure. Figure 5-5 gives an overview for all intra-EU-plus tourism OD-transport. Though less strong, still car transport dominates these emissions. Interesting is to see now maritime transport cannot be neglected, as it was almost invisible on the graphs for the other emissions shown in this section and the former section. Also coach travel is relatively important. ICA air transport has been left out of the graph, though it may have some significant contribution. The idea is that air transport NO_x emissions at flight cruise altitude contribute mainly to climate change, which is already covered by the CO₂-e emission results.

5.5 Safety

Though many statistics on safety are available, safety still is a difficult subject to assess. While for example ground based transport modes generate in many cases more risk with increasing passenger kilometres travelled, for air transport this is not the case. Almost all accidents within air transport occur during landing or take off, so the number of accidents is related most to the number of trips. But even for ground transport like car traffic, many other factors, than the traffic volume, have a strong influence on safety. Per vehicle-kilometre main dual carriage roads are normally much safer as single carriage roads. Also travel speed is an important parameter as is the detailed design of the road.

Comparing transport modes is therefore difficult. It would involve finding equilibrium in the trip-based air safety and the pkm based road and rail safety figures. Another complicating factor is the way 'strong' and 'weak' modes are treated. The number of casualties per pkm for bicycles and pedestrians is much higher as for cars (30 per million pkm for cycling and 40 for walking, compared to 6 for cars, all intra-EU15 mobility, according to data from Eurostat). However, this should not lead to the conclusion that slow modes are the dangerous modes of transport, because the deaths of pedestrians and cyclists are almost uniquely caused by cars,

while almost no car drivers or passengers are killed by pedestrians or cyclists. A way to solve this issue might be to account all casualties to the transport mode that is responsible for it. Generally all slow mode casualties may be attributed to motorised traffic, as almost no pedestrian or cyclist will deliberately take the risk of dying. Another difficulty is how to assign victims to combined mode accidents, like road-rail accidents. In general rail passengers suffer only one fifth of the casualties as total railways involved casualties (Eurostat, 2002, pg. 85). Generally spoken (compared per pkm) safety of air transport is highest, followed by rail, coach and then private car.

Figure 5-6 gives in relative terms the average cost per pkm for accidents in 1995. It is clear private car transport has a very high accident cost, where coach, rail and air give very low values. The dedicated infrastructure and professional operation of air and rail transport sectors may play a role here.

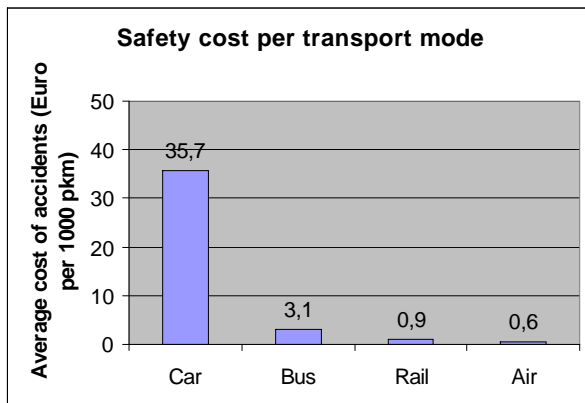


Figure 5-6: Average cost of accidents for the modes of transport for all travel purposes EU15 plus Norway and Switzerland for 1995 (source: IWW/INFRAS, 2000, pg. 60).

With these relative impact values the totals for tourism are dominated with 97.7% for car, 1.1% for coach and 1.0% for air and 0.2% for rail transport.

5.6 Infrastructure impacts

All transport modes need infrastructure. Infrastructure may have several kinds of impacts:

- direct land-use
- impacts on landscape quality
- partitioning of habitats and impacts on biodiversity
- separation effects in urban areas
- impacts on habitat quality due to impacts on (ground) water flows
- impacts on water quality due to run-off from building materials
- congestion and capacity impacts

The INFRAS study gives a quite extensive method for assessing the external costs of infrastructure impacts (IWW/INFRAS, 2000). The actual impacts depend very much on the local circumstances and the kind of impact under consideration. A complicating factor for infrastructure impact assessment is the multiple use of it. On rail both passenger and freight traffic is facilitated and within the passenger traffic most is not for tourism. On roads not only private cars, but also busses and coaches are driving as well as all kinds of freight transport vehicles. And again, most car traffic is not for tourism purposes. Only for air transport the majority of aircraft is for passenger transport and the majority of passenger transport is tourism related. This means large road to air shifts may only give minor reductions to the

impact of road infrastructure building. The same is true for rail. However, high speed rail is more dedicated to tourism transport as rail in general. But still then several new high speed rail lines within Europe will be combined with freight transport (for example Lyon-Turin-Venice-Trieste or München-Berlin, Eurostat, 2002). Another important aspect of current passenger rail transport is that the capacity of the infrastructure may be limiting, but the capacity of rolling stock is not used at its limits (on average seat occupancy rates are 25-35%), which means quite a lot of extra transport from tourism may be accommodated without large infrastructure investments.

Looking at impacts on landscapes, partitioning of habitats and biodiversity, at first sight it seems evident here air transport has an advantage as it uses only space at one spot, after which the aircraft takes to the air, not using any space on the ground. However, a preliminary analysis showed the direct space use of rail, road and air are in the range of 2.0 to 3.5 km²/billion pkm, with both rail and air at the low side. Of course long distance road and rail lines partition landscapes, though tunnels and (eco-) viaducts may mitigate the impacts of these on animal migration patterns.

Transport mode	length ⁷ km	width ⁸ m	area km ²	pax share ⁹ %	area km ²	volume ⁷ billion pkm	specific area km ² /billion pkm
rail	153,000	8	1222	70	855	343	2.5
motorway	51,000	25	1283	60	770	4000	3.5 ¹⁰
other road	1,380,000	12	16564	80	13252		
air ¹¹	57	10	570	90	513	260	2.0

Table 5-2: Assumptions and data for calculating the specific space use for the main transport modes¹².

However, an airport has not only the air-side transport infrastructure, but also the land side. At all main airports, very heavy road and rail infrastructure runs to all larger cities and towns in the region.

Another important effect of air transport to consider is the limitations on space use imposed on a wide zone around the airport. For example, the building height at the booming Amsterdam WTC-Zuid business park is limited because of operations from Schiphol Airport. Further noise zones of airports tend to be very large (up to one hundred or more square kilometres for the 66 dB (A) limit. This also poses restrictions on spatial use of this area. Further the largest problems with infrastructure capacity and congestion are generally to be expected around the concentrations of origins and destinations, i.e. main population and main destination areas. Therefore a distinction will be made for impacts en-route (pkm based) and impacts on the main areas of origins and destinations.

5.7 Noise and nuisance

According to the European Environment Agency (cited in Commission of the European Communities, 2001) some 3 million of people are disturbed by train noise, 24 million for road

⁷ Data for 2001 from Eurostat (2002). Panorama of transport. Statistical overview of transport in the European Union Luxembourg, Eurostat..

⁸ Estimated average width of the two way infrastructure; average area of a main airport estimated to be 10 km², based on Schiphol (27 km²) and Frankfurt (17 km²).

⁹ Educated estimate.

¹⁰ Calculated with the sum of the total area for motorways and other roads; excluding parking spaces.

¹¹ For air transport the number of large airports handling 80% of all passengers is given.

¹² Coach is not incorporated into this table, because it is difficult to distinguish its global impacts from car transport, both driving the same roads. However, as one coach with 45 passengers carries the number of travellers from 15 cars with 3 passengers each and as from road capacity calculations a coach takes the capacity equivalent of not more than 2.5 cars, it may be concluded transport by coach is six times more space efficient (with respect to roads) as is transport by car.

traffic and 40 million by air transport. For tourism OD-transport for intra-EU-plus the private car has the largest share of noise external cost for tourism transport as shown by Figure 5-7. Air transport contributes still a quarter, while contributions of coach and rail are relatively small.

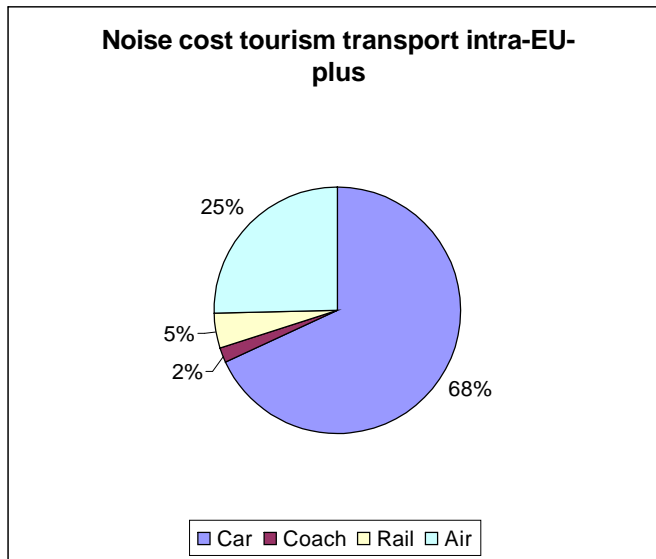


Figure 5-7: Noise (external cost) shares per transport mode for intra EU15 tourism OD-transport for 2001 (source: MuSTT model and IWW/INFRAS, 2000, pg. 77).

The above figure may give a somewhat distorted picture because noise nuisance depends not uniquely on traffic volume for road and rail, but also on the exact place and time of the traffic. This may reduce the nuisance of car transport as on the longer trips made by tourists; relatively more of it will take place within rural areas with a low population density. On the other hand, much of this traffic, specifically local transport and those who choose to drive 'tourist routes' to their holiday destinations, may disturb not only a small number of rural residents, but also a (larger number of) rest seeking tourists in these rural or natural surroundings. Extensive research on this is recommended.

A peculiar characteristic of noise is its logarithmic nature. Doubling the traffic intensity increases noise with only 3 dB (A), which is just about a perceptible change. This means modal shifts between modes with only a small share of tourism transport (like road and rail) and with a large share of freight traffic (also road and rail), means shifting all tourism transport away from these modes does not have any perceptible impact on noise levels in general. On the other hand, if tourism forms the largest share of the all traffic (as for air transport), than strong changes in volume may indeed have an impact on the noise levels. This means shifts from rail and road to air may have a perceptible influence on noise levels, while shifts between rail and road do not have much impact. Noise abatement seems best served with technical measures, like quieter cars, busses, trains and aircraft and direct measures at infrastructure.

Another consequence of the characteristics of noise is the effect of spreading noise sources or concentrating them. If for example 10% of the traffic of a main air transport hub like Frankfurt Airport is diverted to a small one in the neighbourhood, the total noise nuisance is likely to increase, even without growth of the total aircraft movements. The 10% decrease at Frankfurt would not be perceptible, where the increase with >50% at the smaller airport would.

Local effects of transport on tourist destination areas may be very large at certain seasons and time of the day or night. The links between tourism local and OD-transport are not very

strong, though the use of the private car for OD-transport may trigger much more traffic within the destination area as the use of coach or train.

But also some of the OD-transport flows may have large local impacts. The total Alpine region suffers the largest number of cars from tourism transit as is shown by the maps in MusTT Deliverable 3. The Alpine region is specifically vulnerable to low air quality and noise, with its concentrated population within the valleys and its dependency of woods on steep mountain slopes protecting the villages from avalanches and water floods. In many Alpine valleys the noise and nuisance of tourism car traffic may be much larger as the noise and nuisance from other traffic.

5.8 Special issues: cruises, ferries and coaches

Cruises

The environmental impacts of cruises may be divided into two areas: the emissions to the air connected with the consumption of fossil energy and the environmental problems associated with dumping waste materials into the oceans. To start with the last one: most cruise shipping companies have strict rules on waste, waste management and reverse logistics. Normally they perform better than international law requires. Most of waste and waste water is processed or recycled on-board and at purchasing goods, the waste part of the product cycle is taken into consideration. This performance, which is above standard legal requirements, is caused by economic considerations. The first one is, cruise passengers do not want to be faced with visible waste products on their cruise ships. They have come there for the glamorous atmosphere and waste on board or being thrown over board does not fit within this experience. A second reason is the very strict rule making in many ports, where high fines are imposed on even small cases of oil spillage or waste dumping into coastal waters. In some recent cases ships have been banned for ever after such incidents, which of course impose very high costs to both economics and image of the company involved. With this high risk at local ports, the general rule seems to have been adopted to spill nothing anywhere, even if the international MARPOL agreement allows it. The risk would be too high one crew member erroneously discharging something routinely at the wrong place.

The problem of energy use and emissions is something different. Cruises tend to be very luxurious and luxury costs energy. This luxury shows itself in the large ship tonnage per passenger (up to 40 tons per passenger) and one crew member per two passengers. Drinking water consumption can be higher than 500 litres per passenger per day. The average fuel consumption of cruise ships is unknown, but three examples give an idea. One is of the brand new Queen Elizabeth 2 operated by Cunard (Cunard, 2004b; Cunard, 2004a), the other is a 35 year old smaller vessel (Yachting Brokers, 2004), and the third is the Century operated by Celebrity Lines (de Wit, 2004).

Name	Fuel per day	Passengers	CO ₂ emissions	
	kg		kg/pkm	kg/pax-day
Queen Elizabeth 2	433,000	1791	0,52	750
Small ship	20,000	364	0,22	170
Century	100,000	2000	0,16	155

The table makes clear cruises consume probably lots of energy. Per travelled seat kilometre (or passenger kilometre at 100% occupation rate) the emissions of CO₂ of all three examples are higher than the operational values for any other mode of transport. Even short haul air transport at 70% seat occupation averages at 0.13 kg/pkm (or 0.09 kg/skm). Also other emissions like SO₂ are likely to be much higher as for other transport modes, as the fuels used on maritime engines contain often high rates of sulphur.

Another way of comparing holidays with cruises with other kinds of holidays is on the amount of carbon dioxide emissions per day. For cruises this appears to be between 150 and 750 kg per day on the ship. Added to this comes in many cases the emissions for the travel to the ports of embarkation and disembarkation. When this is air transport of 4000 km return distance, adding some 440 kg to the total. A typical cruise of averaging 10 days than emits between 2000 and 8000 kg of CO₂. The transport for a holiday from Western Europe to New Zealand emits 3260 kg for the air transport alone or 3880 kg including 21 days luxurious accommodation). This makes cruises ranking within the range of most energy consuming Total emissions of carbon dioxide of the 2.2 million European cruising passengers may be in the order of magnitude of 3 to 4 million tons per annum, or 1% to 2% of current total OD-transport related CO₂ emissions of EU-plus tourism.

Land-use of cruises comprises two elements. The first one is the space used by cruising terminals at cruise destinations. Statistics about this are unknown. The number of cruise ports and investments in new quays and berths is extensive throughout Europe. Only within the UK in 2003 41 ports served cruise ships. The expectation is the cruise ship capacity from these ports will hit another record level in 2005 (PSA, 2004). Investments in cruising ports are at an unprecedented level within Northern Europe (Peisley, 2004, pg. 19). Including the land-side infrastructure cruise ports may have locally an extensive impact on land-use.

Another land-use impact may be the impact on the land- and seascape quality of the remote natural areas cruises are sailing. This may be a problem for inhabitants of fjord-areas, but also for tourists visiting the land side of these regions looking for natural beauty and solitude. Sometimes a solitaire cruise ship may add to this, but it may be expected there is a threshold, in terms of number of ships within sight at one time and number of days with any number of ships above which the natural beauty of the destination is significantly reduced.

Ferries

EU15 ferries serve some 5 to 30 billion ferry passenger kilometres. The emissions of carbon dioxide depend strongly on the type of vessel used, see Figure 5-9, but may average somewhere at 0.033 kg/seat kilometre.

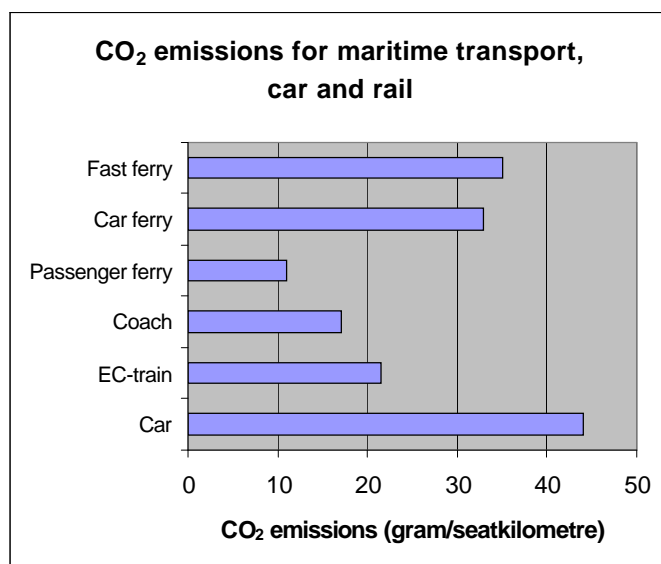


Figure 5-8: Relative emissions of gram CO₂ per seat kilometre of maritime transport, car and rail, technology level around 1995 (source: Peeters, Peters et al., 1996).

The occupation rate is not known, but assuming a rate of 50% this means the total emissions are between 0.3 million and 1.75 million tons or probably less than one or two percent of the

total OD-transport emissions for total EU-plus outbound tourism transport. The amount of ferry transport is declining: for the EU15 countries (excluding Germany) the number of passengers declined with 12% between 1997 and 2001 (Xenellis, 2003). Growth is shown by Italy, Denmark, Finland and The Netherlands. Therefore the total environmental impact of this transport mode probably will also decline. On the other hand, part of the losses of volume go to other modes like the low cost carriers, which have a higher emission of CO₂ and a much higher impact on climate change.

Coaches

Coaches are definitely on the sustainable site of transport modes available. For climate change they show the lowest average emissions per seat kilometre of all transport modes considered. With respect to air quality coaches are still performing at a lower level due to the common use of diesel engines. However, due to new European legislation and technological developments this problem may be solved within one or two decades. Soot filters are able to reduce PM10 emissions, the most important ones with respect to air quality, and the development of fuel cell driven busses may even eliminate most emissions.¹³ Also the high occupation rates in chartered coaches make this kind of transportation environmentally efficient. The total impact emission of CO₂ of current coach transport has been estimated to be less than one percent of the total tourism OD-transport related emissions (see Figure 5-2 on page 45).

5.9 External costs

A way to aggregate the total environmental impact of transport is to use the method of external cost or externalities. Externalities are often defined as being “present whenever some economic agent’s (Y’s) welfare (utility or profit) function includes real variables whose values are chosen directly by others (X) without particular attention to the effect upon the welfare of agent Y they affect” (Schipper, 1999, pg. 25). Or in other words: the economic activity of tourism transport causing general damages to third parties, without the object of doing so, are called external costs for these third parties, or the whole economy/community. Figure 5-9 gives an example based on an IWW/INFRAS study on external cost for passenger and freight transport for EU15 plus Norway and Switzerland (IWW/INFRAS, 2000). These figures are not dedicated to the characteristics of tourism transport. For air transport two columns are shown: one, designated ‘CO₂’ gives the IWW/INFRAS value for climate change based on CO₂ emissions only, while the GHG column gives the upper limit if the full equivalence factor for air transport is applied (based on Penner, Lister et al., 1999).

¹³ Though much the total life cycle impacts depend strongly on the method chosen to produce the hydrogen fuel required in fuel cell buses.

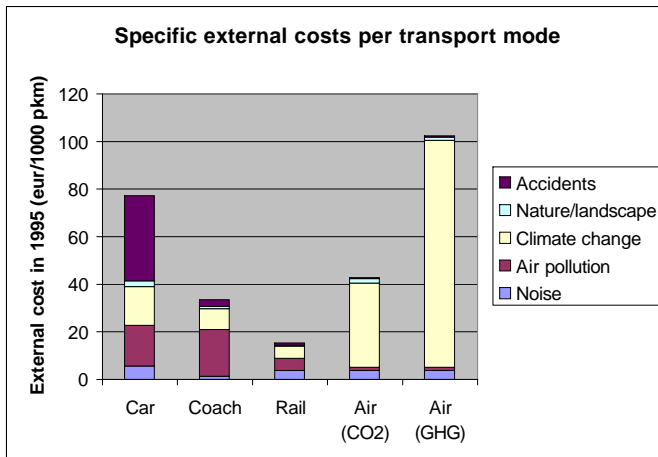


Figure 5-9: Specific external cost per transport mode, all travel purposes (for 1995 based on IWW/INFRAS, 2000).

Figure 5-10 gives the results for the total external costs of the intra-EU15 OD-transport. This amounts to €35 to €49 billion depending on taking CO₂ emissions or GHG emissions as a base for climate change cost. The total external costs are fully dominated by car and air transport leaving only 3.0% to 4.5% for coach and 1.0 to 1.5% for rail.

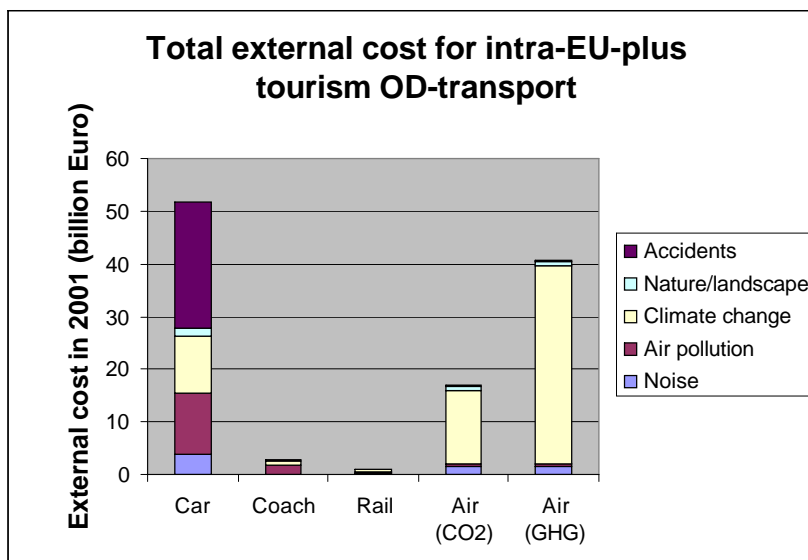
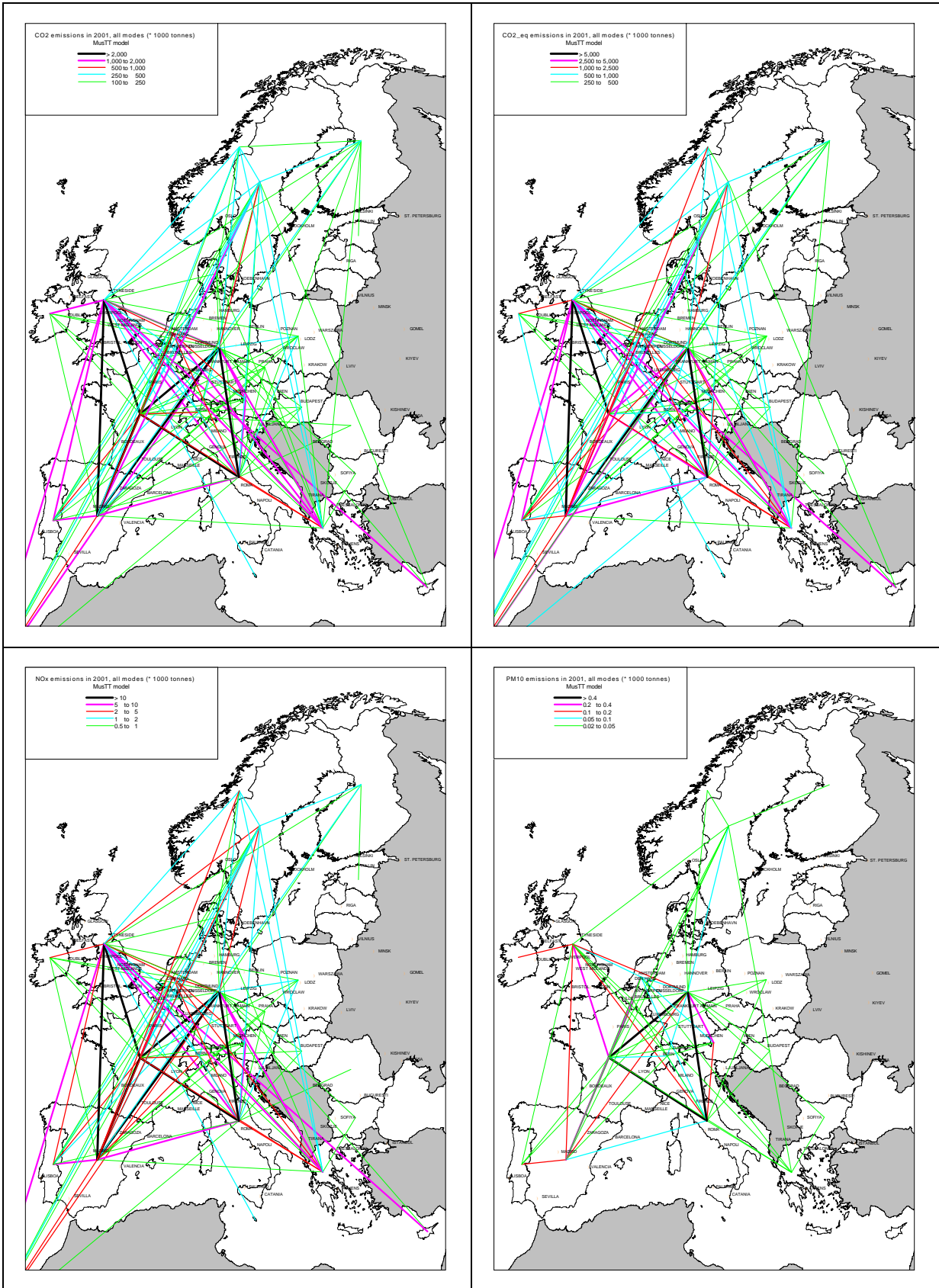


Figure 5-10: Total external costs for intra-EU-plus tourism OD-transport based on specific external cost factors from IWW/INFRAS, 2000 and transport volume for 2001 as calculated with the MuSTT model.

As these external costs may be unevenly distributed in space and time, the local costs may vary extensively. Further study is recommended to analyse external costs of tourism transport and its spatial distribution.

5.10 Impact maps

Finally some maps have been drawn from



Key findings:

- *The increased physical and economical availability of high speed transport is the main driver for the growth of tourism mobility.*
- *The total economic development of the tourism sector depends more on the individual leisure time budget and disposable income of tourists than on the distance between region of domicile and destination.*
- *Terrorism, war and diseases have currently only a regional and temporary impact on tourism development.*
- *The general trend in tourism towards more frequent, less long and further away trips has a strong impact on transport demand.*
- *Cheap air transport leads to a combined mode-destination shift which very strongly influences the environmental impact.*
- *The general trend within transport is a growth of kilometres travelled and a shift towards generally less sustainable transport modes. This effect is caused by the tendency towards shorter trips at larger distances per trip.*

6.1 Mechanisms

Tourism

Tourism development is a function of disposable income, accommodation cost, transport cost, amount of leisure time available and demographic developments. For the tourism industry the number of nights spent outside the regular place of residence is the main driver of the development of tourism volume. The economic revenues are of course determined by both number of nights and receipts per night. Parameters like the distance from home of the tourist and the mode of travel to the destination is of minor importance to the development of tourism receipts, though decreasing average length of stay (LOS) will have influence on service level and receipts for tour operators and travel agencies as their turnover depends also on the number of trips and the expenses on transport.

The number of nights is determined by the individual number of free days (apart from business travel): the time budget. The number of trips will be more or less a function of the disposable income and the travel and accommodation costs. But also the way school and bank-holidays are distributed over the year and the average length of these holiday periods may have some influence here.

The choice of destination will be a function of the combined transport and accommodation cost. In general on longer distances the cost per night for accommodation decreases sharply, while travel cost increases not proportionally with distance travelled.

For destinations in more remote areas also readily available information for the tourist might have its impact on destination choice. With the strong development of internet more and more exotic destinations become within apprehension of the would-be traveller and make it easier and more secure to go there. On the other hand, the tour operators develop all-in package tours to these exotic destinations. This of course will also reduce the threshold for choosing such exotic destinations. Another development may be caused by the increasing role of internet, making it easier for consumers to book their travels personally, without the help of tour operators, specifically for the short-haul markets. This may leave only the long-haul markets for the tourism industry to develop.

Transport

The number of trips people undertake has been shown to be almost constant, independent of the economy, population density, political system or climate of the region. So the total number of trips will be mainly a function of the population. However, the distance covered per trip is not at all a constant. From extensive research it has become known there are two budgets at stake: the money budget and the time budget. For travel time it appears the overall average time per day (on population level) is a constant (just over one hour, see Schafer, 1998; Schafer and Victor, 2000). This means the distance covered per day is a function of the average speed of the transport system available. Another constant appears to be: the money budget is a fixed share of disposable income (also on a population base). Therefore the average speed of transport is very much a function of the cost of the total economic development. Countries with a high GDP have the opportunity to invest in road, rail and air infrastructure and therefore increase the average speed of these systems. But, and that may be the more important effect, with a larger disposable income, the transport budget per person increases and that will increase access to cars, motorcycles, high speed rail and air transport. As a result of this the average speed of the transport system available to the people increases and then the travel distances start to rise.

For tourism the same mechanism might be at work. The cost for travel by air and car is decreasing, the number of cars available is increasing and so the average tourism travel speed increases and thus the total distance travelled. Building high speed railways may add to this development, but may also help to shift some of the growth of air transport to rail. Considering mode shifts another mechanism seems to be at work: with decreasing prices of air transport compared to rail, the shift will not only be from rail to air on specific destinations, but will also be a shift to other destinations. For example: the Thalys Amsterdam-Paris is currently losing passengers to low-cost air carriers, not between Amsterdam and Paris, but between Amsterdam and Barcelona or Malaga. One reason is the costs and travel time of these air trips are the about same as the rail trips. This combined mode-destination shift may have excessive impacts on the amount of transport generated per trip and the impact on the environment (per trip), but also may be affecting a balanced development of tourism regions within Europe.

Environment

For environment the impact of transport depends on the volume travelled measured in pkm and the mix of the modes of transport used and the organisational and technical characteristics of the individual modes. The combined mode-destination shift (from rail-short distance to air-medium distance) mentioned in the section above means for example for climate change an increase of about eight times due to the technological difference and three times due to the extra distance travelled, making the climate change impact of this kind of shifts, an increase by a factor of 24 per trip.

So environmental impacts should consider the following dimensions:

- volume (total distance travelled)
- technology (emission factors/space use/nuisance/accidents impacts per seat kilometre)
- operations (seat occupancy rate, time and place of performance)

The volume of travel for tourism depends strongly on the following parameters:

- number of tourist arrivals (trips)
- length of stay
- frequency of trips per year

For all modes rather large technological improvements are envisaged. The operational differences are large (like an occupancy rate for coach of almost 100%, for air transport of 70% and for rail about 35%; it seems possible to reach the same high figures for rail if the operational system and marketing strategy is changed to those used by bus or air companies).

Environmental development should consider also shifts in mode, distance (destinations), length of stay and trip frequency.

6.2 Trends

With respect to air transport WTO sees overall a development from traditional main air carriers to low cost carriers, one of the reasons total air transport did not suffer much from recent terrorism attacks, global diseases (SARS) and war outbreaks (WTO, 2003d). Also generally there has been recently a trend towards intra-European and domestic traffic. These changes are also reflected in a shift of focus within European tourism marketing strategies to closer and domestic markets. Within long haul traffic there is a shift from the traditional markets like the United States and Japan to emerging markets like China.

WTO data show the following trends for European *inbound* tourism (all European countries, but dominated by the EU15 plus Switzerland and Norway) between 1990 and 2001 (WTO, 2003d):

- International tourism arrivals grew with 40%, while tourism receipts more than doubled, increasing the revenue per trip.
- The fastest growing inbound market is 'Asia and Pacific' with 70% growth; the Americas showed only 18%. Still the major market (Europe itself) grows a little above average.
- Growth has been above average for Eastern Mediterranean (129%), Central/Eastern Europe (67%), Southern Europe (49%) and Northern Europe (44%), and below average for Western Europe (24%).
- Air transport benefits most from the growth of tourism, while road loses share and rail shows almost a stand-still. Trips by air showed the largest growth with 64%, water 40%, road (car plus coach) 33% and rail only 2%. The growth in terms of passenger kilometres will be distributed more unevenly over the modes, as the average distance travelled by air is higher as for the other modes.
- The purpose of trips shifts from leisure, recreation and holidays (9% growth) to business (126%) and visiting friends and relatives (86%).

WTO data show the following trends for European *outbound* tourism (all European countries, but dominated by the EU15 plus Switzerland and Norway) between 1990 and 2001 (WTO, 2003d):

- International tourism arrivals grew with 49%, while tourism receipts more than doubled.
- European destinations grew just below average with 49%, while the number of intercontinental destinations grew with 93%.

Though a large impact of world developments like terrorism and war on the relative shares of tourism between destination regions is evident, it can be shown these have almost no influence on the long term development (see for example Mowforth, 2003). When long haul travel suffers from war, SARS or terrorist attacks, the domestic tourism is gaining at the same time. World wide the sector only suffers within the transportation part of it.

The general trend within transport is a growth of kilometres travelled and a shift towards generally less sustainable transport modes. This effect is caused by the tendency towards shorter trips at larger distances per trip, though the European market remains the largest.

Key findings:

- *Tourism must be regarded as an integral element of modern life in most EU countries and as such is an inherent element of the economy of most European countries.*
- *The processes of decision-making are becoming routinised problem solving rather than extended, in particular when short breaks are concerned. The process of decision-making is more complicated by now than most other types of consumer behaviour and psychological risk assessment plays an even greater role in holiday-related decisions than in purchasing daily consumer goods.*
- *Tourism flows are extremely heterogeneous, concentration of accommodation and facilities pays: impacts of tourism are limited in space and are rather easily controllable as well.*
- *Concerning transport: the private car is mostly preferred. To many remote areas, like in nature tourism, the car is the only option. Low-cost carriers offer new opportunities nowadays for city trips to medium and even short haul destinations as extra holidays.*
- *The growth potential for most types of tourism is large: because of ongoing urbanisation and perhaps economic growth, more and more European citizens will adopt a modern consumer lifestyle. Urbanisation is both conducive to increasing hedonistic holiday expenses and the need to have a break from hectic and restless modern life.*
- *Tourists participating in city trips, nature and adventure and – to a lesser extend – winter sports, may be more susceptible for changing their behaviour. This change will not necessarily be one towards more sustainable transport.*

7.1 Typology of tourist behaviour

Tourism must be regarded as an integral element of modern life in most EU countries.

“Tourism is now so pervasive in modern society that, rather than conceiving tourism as a ‘departure’ from the routines and practices of everyday life, tourism has become an established part of everyday life culture and consumption” (McCabe 2002:63). Many Europeans have *learned* to desire holidays and have come to think of them as essential for their psychological well-being. *Modern consumer culture*, as described by Campbell (1987), is perfectly reflected in contemporary travel behaviour. According to Corrigan (1997) one of the essential characteristics of modern consumption is the continual transcendence of fixed levels and amounts of needs. Informed by consumer culture, modern consumers develop an abstract ability of ‘want to want’. Wang (2002:293) notes: “Tourism has been popular not merely because there has been improvement in living standards, but also because it is one of best spheres in which individuals can demonstrate their overcoming the limits of daily consumption. If material goods are relatively slow to innovate, then experiences, especially tourist experiences, are easy and quick to change. This situation makes tourism an exemplary domain to explore and satisfy the generalised consuming needs of modern consumers.” Modern consumer culture represents an urban rather than a rural lifestyle. Consequently, there is a strong correlation between living in high-rise cities, or in the sprawling suburbs, and participation in tourism.

The focus is here on leisure-related tourism, that is, holidays. Business visits, conference attendance, work placements, educational trips and many other kinds of trips are not so much

related to leisure time as they are work-related. Decision-making processes related to the latter types of trips have different characteristics and will not be discussed here consequently. Destination choice is highly dependent on the purpose of visit (beach holiday, city break, skiing, etc.). Some types of holidays reflect a hedonistic and consumptive lifestyle pre-eminently, others are expressions of more traditional value systems. Transport choice is dependent on either destination choice or possession of caravan, motor-home, bungalow tent, eventually private car. Unless mentioned otherwise the statistical data are from the *Country Reports* and the *Tourism and Travel Analyst of the Mintel Group* in London.

A convenient typology of tourist behaviour has been developed by Cohen (1972) and adapted by van Egmond (2001).

- An *organised mass tourist* buys a package from a tour operator in his home country. This package includes transport, accommodation, tour guiding. It concerns tours to destinations with a high level of facilities. These facilities are tailored to large quantities of tourists who rather seek the familiar than the unknown. Much of conventional European beach tourism to the Mediterranean belongs to this category.
- An *individual mass tourist* also looks for a destination with a high level of facilities that is geared to the mass arrival of tourists. He is a do-it-yourselfer. He only partially makes use of the services of a tour operator, if at all. He uses the same facilities on site as the organised tourists. A large share of conventional European beach tourism to the Mediterranean and European winter sports to the Alps can be characterised as individual mass tourism.
- An *organised traveller* wants to be a traveller, as opposed to a tourist. Similar to the organised mass tourist, this type of tourist books a package tour inclusive of all the ingredients. The difference lies in the fact that the destination involved here is not characterised by a high level of facilities, if anything, the exact opposite is the case. The programme is described in terms of 'unspoilt', 'to discover'.
- An *organised adventurer* books a package tour in which, in addition to transport and accommodation, a great deal of physical activities are included. He travels in a small group.
- An *individual traveller* or *backpacker* arranges the trip himself and mostly travels in a small group with his partner, a friend or an accidental fellow traveller. His journey is led by the travel literature, often in the shape of a 'travel bible', which describes where one can find certain types of accommodation, restaurants and which attractions 'must' be visited.
- A *pioneer* visits regions on which travel guides are not yet available. These regions have no tourism facilities, except for some simple hotels and guest houses that were mainly developed to cater for domestic use. Because most parts of Europe have been described well by now there are few opportunities left to explore.

7.2 Beach holidays

International beach holidays in Mediterranean areas (including Turkey, Tunisia, and Morocco) amounted in 2002 to an estimated 65 à 75 million (exc. Turkey, Tunisia, Morocco 50 à 60 million). Domestic holidays (mainly France, Italy, Spain) amounted to some 30 à 40 million.

The conventional beach holiday market is extremely competitive. Beach destinations are traditionally concentrated in Mediterranean areas. Northern European destinations are mainly destinations for domestic tourism and day trips. They are not competitive in the international beach tourism market, because of their unpredictable weather conditions. Consequently, international beach tourism originates mainly from the UK, Germany, Scandinavian countries, the Netherlands, Belgium. With the arrival of modestly priced charter flights to Caribbean destinations like Isla de Margarita, Cuba, Dominican Republic, etc. these

destinations have joined competition on the European market. Similarly, some African (e.g. The Gambia) and Asian (e.g. Pattaya, Phuket, Bali) destinations have become affordable alternatives. Whereas some European consumers return to European destinations because they are fed up with long distance charter transport, others grasp the opportunity to have an exotic beach holiday for a few dollars more.

Competition is on price. One of the reasons of the success of Spain's beach destinations in the early 1990s is due to the devaluation of the peseta against Northern European currencies. In recent years Turkey is extremely successfully promoting itself as a cheap non-Euro alternative to the expensive Euro countries.

Conventional beach tourism to long and medium haul destinations, as well as to Mediterranean islands is organised mass tourism, using air transport almost exclusively. Bookings are traditionally arranged through travel agencies, but in recent years both direct sellers and internet bookings are gaining share. Continental beach tourism within a reach of 1000 to 1200 kilometres is individual mass tourism predominantly. In peak years the *Spanish Costa Brava, Costa Dorada and Costa Blanca* attracted more than 17 million visitors, the vast majority of which arrived by private car. Alternatives to the private car are plane (in particular for the British) and shuttle bus service (in particular for non car possessing youth). For the connecting roads, the French *Autoroute du Soleil* in particular, these huge numbers of cars bring along congestion of dozens of kilometres in peak weekends (the 'black Sundays'). Conventional beach holidays –as opposed to a stay in quiet undeveloped beach destinations– are often main holidays, for young people and families in the peak season (summer) and elderly people in the shoulder seasons. The average length of stay is comparably long: one to two weeks. Winter sun holidays, e.g. to the Canary Islands, are often second or third ones. In recent year hibernation in Mediterranean areas by elderly Europeans from the UK and Northern European countries has grown significantly.

Key characteristics European beach tourism:

- International holidays in Mediterranean areas 2002 (incl. Turkey, Tunisia, Morocco): 65 à 75 million (exc. Turkey, Tunisia, Morocco 50 à 60 million)
- Domestic holidays (mainly France, Italy, Spain¹⁴): 30 à 40 million
- Type of holiday: main holiday
- Type of tourism: organised (long and medium haul, islands) and individual mass tourism
- Length of stay: one to two weeks
- Customers: young people, families in peak season, elderly in shoulder seasons
- Lifestyle: hedonistic expenditures
- Activities: relaxation, sports, shopping, dining, nightlife
- Loyalty: to facilities, mutual inter-changeability of resorts
- Main travel flows: domestic and Northern & Western to Southern Europe
- Main source countries: domestic, Great Britain, Germany, Scandinavia, the Netherlands, Belgium, Central Europe
- Main destination: Mediterranean
- Main competition factor: price
- Main tourists' interests: recreation facilities, accessibility
- Emerging competitors: Caribbean, Florida, Thailand, Brazil
- Most important mode of transport: car (domestic and continental <1200 km), plane (long and medium haul, islands)
- Accommodation: hotels, apartments (incl. all-inclusive resorts), camping sites
- Outlook: product renovation and innovation necessary to survive

In order to be competitive destination areas need good facilities like clean swimming water, clean beaches, accommodation, a diversity of restaurants, bars, fast-food outlets and all kinds of recreation facilities, including sports, nightlife and excursions. It must be accessible and easy to reach in terms of time and costs involved. Customers might be loyal to the facilities rather than the destination. Change in price level or in perceived quality of the facilities, however, easily influence customers' preferences. Because of the advanced standardisation of beach facilities destinations are more and more mutually interchangeable. Early concentrated beach destination development took place in the 1960s and 1970s, in Spain and Italy in the first place. The concrete constructions of the 1960s are slowly deteriorating and are in time only capable of attracting low-budget markets, unless massive investments in renovation and product innovation are made. Consequently: new locations are mushrooming next to the old ones, trying to meet the tourist's current desires.

Conventional beach tourists represent the modern consumer culture. Time and money can be spent in a hedonistic way simultaneously. As long as hedonism plays a major role in European lifestyle, conventional beach tourism will probably remain popular.

7.3 Winter sports

Europeans winter sports destinations are traditionally located in Alpine and other mountainous countries: Austria (40%), France (25%), Switzerland (16%), Italy (10%), Germany / Scandinavia / Andorra (4%), USA (3%), Slovakia / Spain (2%), Czech Republic / Spain / Canada (1%). Only recently USA and Canada became alternatives to the Alps. In Austria winter sports account for 4.5 percent of GDP. The winter sports market shows about 28 million tourist arrivals in 2001/2002, both domestic and international. In addition to that

¹⁴ A unfortunate peculiarity of the WTO publications is their failure to distinguish between Spain and the Canarian Isles. This is particularly important as the Canarians are a long haul destination within Europe and even within domestic tourism in Spain, making its transport and environmental impact characteristic differ much from mainland Spain tourism.

many more skiers and snowboarders are day-trippers. In all destinations traditional down-hill skiing has lost considerable share to snowboarding among the youngest age groups.

Participation in winter sports tourism in 2001 / 2002:

- French: 20 % (83 % domestic, 8 % Switzerland, 4 % Italy)
- Germans: 13 % (44 % Austria, 18 % Italy, 15 % domestic, 12 % Switzerland, 2 % France)
- Dutch: 9 % (56 % Austria, 21 % France, 9 % Switzerland, 5 % Germany, 3 % Italy)
- Spanish: 4 % (88 % domestic)
- British: 4 % (36 % France, 19 % Austria, 14 % Italy, 10 % Andorra, 8.5 % North America)

For domestic and continental transport the private car is preferred by many (e.g. on the Dutch market 76 % private car, 16 % touring-car / shuttle service, 6 % train, 2 % plane). Many cars are leased or company cars.

Due to the expenses involved with skiing in terms of specialist equipment and ski passes it is also a sport enjoyed more extensively by affluent European families as well as those from the younger age groups, particularly those under 44 due to its physical nature.

Winter sports reflect the modern consumer culture mentioned previously. 'Having fun' is the basic reason to go, although considerable differences can be found among winter sports tourists. Quite a few cross-country skiers are rather oriented towards quiet nature and beautiful scenery than fun, après-ski and nightlife.

Winter sports tourism can be characterised as individual mass tourism. Although quite a few customers book packaged tours, the vast majority organises the trip themselves by booking accommodation directly and going there by private car.

As a rule winter sports holidays are second or third holidays, not main holidays.

Consequently, stagnation of economic growth or even recession (Germany and the Netherlands 2003) in countries of origin will affect arrivals seriously.

Like the beach tourism market the winter sports market is extremely competitive.

Competition is not only between countries, but many valleys and villages are eager to get their hands on a share of prosperity that is produced by winter sports tourism. Competition is on accessibility, facilities and snow conditions rather than price. The result is continuous investment by both public and private sectors in the expansion of skiing facilities, quality improvement and capacity enhancement, even in times of stagnation in growth of arrivals. Because competition is on facilities, many destination areas are mutually interchangeable. Still, loyalty to destination and even accommodation is comparatively high among winter sports tourists.

Global warming affects the snow conditions. Satellites are already showing vast areas of the Alps losing up to four weeks snow cover compared to a decade ago. Artificial snowmaking can compensate for lower snowfalls to a certain extent but is not enough to cover slopes when there is no snow. The threat of little or erratic snow coverage leads to less skiers and reduced expenditures in lower Alpine regions. Consequently, the higher regions are getting more crowded. Moreover, many well-skilled skiers and snowboarders, young people in the first place, want a number of linked skiing areas with a considerable length and degree of difficulty or even prefer zipping downhill through virgin snow, outside prepared ski slopes. This also leads to a preference for high altitude areas. In this respect Austria and Germany compare unfavourably with a number of skiing areas in France, resulting in an ongoing shift from Austria and Germany to France. E.g. Dutch arrivals in France increased from 80,000 in

1990/1991 to 229,000 in 2001/2002, arrivals in Austria decreased from 620,000 to 612,000¹⁵, arrivals in Germany decreased from 216,000 to 44,000.

Strengths of Austria as compared to France are related to scenery and traditional hospitality ('Gemütlichkeit'). In Austria winters sports facilities are mainly village-based and have a 'Christmas-card'-like ambience in winter, whereas many French resorts have been developed in uninhabited mountainous areas. For consumers who are rather interested in après-ski than in long connected slopes the image of Austria is still quite favourable.

Key characteristics European winter sports tourism:

- International holidays in Alpine areas (2001/2002): 28 million (ca. 15 million international, ca. 13 million domestic)
- Main international destination: Alps (mainly Austria, France, Switzerland, Italy)
- Type of holiday: extra holiday
- Type of tourism: individual mass tourism
- Length of stay: one week or less
- Customers: affluent young people mostly < 44, affluent families
- Lifestyle: hedonistic expenditures
- Main activities: sports, après-ski, nightlife
- Loyalty to destination: high although resorts often mutually interchangeable
- Main travel flows: domestic and Germany / the Netherlands / Great Britain to Alps v.v.
- Main source countries: domestic, Germany, the Netherlands, Great Britain
- Main competition factor: skiing and recreation facilities
- Emerging competitors: Canada, USA, Eastern Europe
- Most important mode of transport: private car
- Accommodation: hotels, apartments
- Outlook: saturated markets, high impact global warming

7.4 City trips

The European city-break market has grown exponentially in the 1990s. This has been due to the growth in secondary and shorter holidays, the trend towards active 'see-a-lot, do-a-lot' holidays, growing interest in culture (cultural heritage, exhibitions, sightseeing), optimism of most European citizens about their future purchase power and, in recent years, the expansion of low-cost airlines. Current retardation of economic growth in several European countries might affect city-break tourism seriously.

City-breaks are popular among city-dwellers in the first place. The vast majority of city trips are taken domestically and have a duration under one week. As a rule they are extra holidays. Both domestic and international city trips are booked independently; with the elements booked separately either through a travel agency or with the supplier directly, often through the internet.

This type of extra holiday is most popular among the British (8.6 % of all EU15 countries), Irish (8.4 %), Dutch (8.0 %) and Italians (7.8 %). In these countries more than 50 % of the population has a second or third holiday per year. Comparatively speaking many trips of the Dutch are to foreign cities.

Some cities are 'must see' destinations by tradition, London and Paris far ahead. London had 76 million foreign bed-nights in 2001, Île-de-France (Paris) had 35 million, and Amsterdam 21 million, but Berlin only 3 million. Among cities that do not belong to the 'must see'

¹⁵ This information is based on MINTEL Country Reports. From the Austrian Federal Ministry for Economic Affairs and Labour, Department for Tourism and Historic Objects, we received as comment on the July draft version of this report the following figures: Dutch arrivals were counted to be in winter season 90/91 720,000 and in winter 0-1/02 some 782,800. This means actually a growth has been attained.

category competition is severe. Many European cities that previously were not considered holiday destinations are now trying to get their share of this profitable type of tourism. In 2001 international arrivals in the fifteen main European cities mentioned in Figure 1 totalled more than 55 million, making up for more than 200 million bed-nights. City tourism is a mixture of all above-mentioned types of tourism in terms of Cohen/van Egmond.

The hierarchical structure of the competitive position of European cities and towns at the beginning of the current century is demonstrated in Figure 7-1. The lower the position the more cities have to invest in product development and promotion.

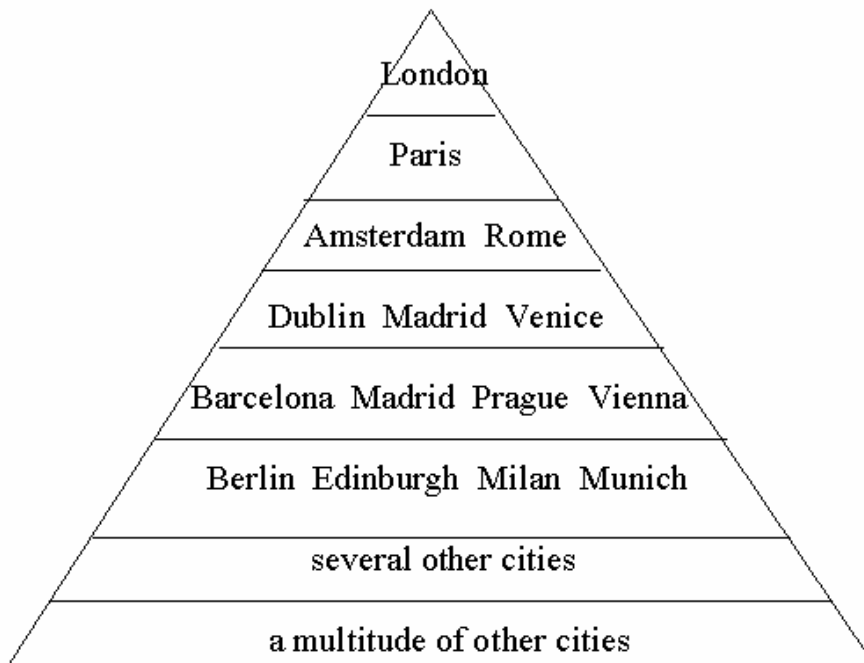


Figure 7-1: Hierarchy of city-break destinations.

Growing interest in cities in general and culture in particular has greatly contributed to restoration and preservation of cultural, often historical, heritage in almost any European city or town. In addition to that many cities and towns do their utmost to rejuvenate their centres and attractions.

Most city tourism is unorganised mass tourism. However, a big supply of organised city trips is on offer nowadays, especially aiming at the elderly segments of this market. Popular among packaged tourists is the coach, eventually in combination with air transport.

Air transport, both scheduled and charter, is the most popular mode of transport among unorganised city visitors. Low-cost airlines contribute greatly to this popularity. Table 7-1 shows the preferred modes of transport in some major source countries.

	France	Germany	Ireland	Spain	UK
Air (scheduled)	28	25	44	22	30
Air (charter)	7	20	5	6	6
Car in own country	21	19	N/A	30	30
Coach	N/A	16	7	16	8
Rail	16	9	7	12	9
Ferry (with car)	6	5	11	2	6
Ferry (without car)	6	1	1	1	3

Table 7-1: Preferred modes of transport in some major source countries (%) in 2001.

Many current trends and conditions are favourable for ongoing growth of city tourism in Europe. Only the economic conditions in some source countries (Germany, the Netherlands, and Italy) might act as a break on growth. On the other hand, China, and perhaps some other Asian countries, represent a huge potential for tourism to European cities, in particular to the top destinations in Figure 2. When EU countries are lifting their restrictions on inbound Chinese tourism, Chinese arrivals might grow exponentially in the years to come.

Key characteristics European city tourism:

- International arrivals in 15 main cities (2001): > 50 million
- Foreign bed-nights in 15 main cities (2001): > 200 million
- Main international destination: London, Paris, Amsterdam, Rome, Dublin, Madrid, Venice
- Type of holiday: extra holiday
- Type of tourism: individual mass tourism
- Length of stay: short, one week or less
- Customers: miscellaneous
- Lifestyle: miscellaneous
- Main activities: sightseeing, shopping, visiting attractions/events/exhibitions, dining
- Loyalty to destination: low
- Main travel flows: between major European cities
- Main source countries: city-dwellers, domestic, British, Irish, Dutch, Italian
- Main competition factor: position in hierarchy
- Emerging markets: China and other Asian countries
- Most important mode of transport: air, private car
- Accommodation: * to ***** hotels, hostels
- Outlook: high potential, especially on long haul markets, depending on economic prospects

7.5 Family Holidays

Using data from the various TGI Europe surveys the Mintel Group has been able to give a brief overview of the family holiday markets across Europe. Around half of the adults with families interviewed took a holiday in 2001. This ranged from 63% of British families down to 41% in Spain (see Table 7-2).

	Germany	Great Britain	Ireland	France	Italy	Spain
Any holiday	54	63	55	53	50	41
Highest income	74	81	86	72	81	68
Lowest income	50	34	48	43	38	32

Table 7-2: Family holiday participation for some countries (2001).

A holiday may be seen as a necessity by many families and it is becoming less of a discretionary item. Naturally enough, the most affluent households are far more likely to afford a holiday than the poorest. Mintel's life stage research in the UK market also points to other reasons for families not taking holidays away from home at all, even if they could easily afford one. The family 'life stage' is very different from the pre-family or post-family stages, in that it can be 'more trouble than it is worth' to organise a trip away from home for

both adults and children, especially when the children are very young. There are other priorities for family households, including taking the children to see other relatives, and these trips may be classified VFR (visiting friends and relatives) rather than holidays. Using VFR as the accommodation for a holiday is a popular halfway house between a full holiday and the ‘duty’ of keeping in touch with relatives when the children are young.

Even the more affluent families are tempted to economise on their family holidays, whereas the same adults in earlier or later life stages may spend freely on holidays to exotic destinations or luxury accommodation. Young children are easily satisfied by a beach or a ‘poolside’ holiday, so there is little point in travelling to destinations for sightseeing. Self-catering can also be less trouble for a family than using hotels, and the VFR option –as a choice or a duty- also cuts down on the overall cost of the holiday. The simplest option for a family, whatever its level of affluence, can be to pile everyone and everything into the family car and drive a reasonably short distance to a domestic resort or the home of a relative. TGI Europe reveals the dominance of ‘own car in own country’ among the means of holiday transport for the typical European family. Table 7-3 demonstrates the differences between countries in preference for domestic as opposed to cross-border holidays.

	Germany	Great Britain	Ireland	France	Italy	Spain
Domestic holiday	27	49	43	73	87	90
Flight	44	41	38	20	10	10

Table 7-3: Shares of domestic and international holidays for some countries (2001).

The choice of domestic holidays is much more common in southern Europe than among northern European families (the UK, Ireland, Germany, but also Scandinavia and Benelux). Northern families wanting to guarantee itself a week or two in hot sunshine is bound to head southward.

This also explains more frequent flying from northern countries.

Families living in any of Europe’s high-rise cities or in the sprawling suburbs are much more likely than those in rural areas to take a holiday away from home. Both escape from the stresses of modern urban living and the dominant urban modern consumer culture allow explanation of this correlation.

Key characteristics European family holidays:

- Total arrivals: over 100 million, half domestic, half international, roughly estimated
- Main international destinations: France, Italy, Spain
- Type of holiday: main holiday
- Type of tourism: organised and individual mass tourism
- Length of stay: generally longer holidays, one week, two weeks or more
- Customers: families from urban areas, higher income groups rather than lower
- Lifestyle: hedonistic, also escape motives
- Main activities: aimed at children’s’ activities at beach, poolside, camping site
- Loyalty to destination: high
- Main travel flows: domestic and from Northern, Western, Central European cities to France, Italy, Spain
- Main source countries: Germany, Great Britain, Scandinavia, France, Netherlands, Italy, Belgium
- Most important mode of transport: car, air
- Accommodation: hotel (HB/FB/B&B), bungalow, gîtes, bungalow tent, caravan
- Outlook: changing demographic trends reduce number and size of families

7.6 Nature tourism

Nature tourism is predominantly a matter for citizens of industrialised and urbanised areas who do not consider nature a source of threat any more, but who regard it as scarce and therefore valuable. Nature tourists are no discoverers or pioneers, but holiday-makers who make use of the fact that certain areas have become more easily accessible as a result of technological interventions.

In recent decades the British, Germans, Dutch and many other Europeans have developed an unprecedented affinity for day trips or holidays in natural areas. The UK, Germany, France, Belgium, Scandinavia, Switzerland, Austria boast a huge supply of hotels and boarding houses, camp sites, holiday cottages, country houses, farmhouses, gîtes in nature areas or in the countryside. These areas have been properly mapped or even signposted, so that the tourist does not need any scouting or explorative abilities. Camping or staying at farms (agritourism) meets part of this demand for nature. To the question of what the most important stimuli for going on holiday are, matters like 'nature', 'peace and quiet', and 'relaxation' rank high in all these countries.

In Southern Europe (Portugal, Spain, Italy) and a number of East European countries such as Poland, the Czech Republic, Slovakia, Slovenia and Hungary there is a growing awareness of their attraction to the nature tourist, as they are abundantly endowed with natural resources¹⁶. The development of accommodation and the supply of information are accorded an even greater priority. The advantage here is that – especially important in Eastern Europe – relatively modest investments are necessary. Tour operators in Western European countries are increasingly including nature trips in all shapes and sizes to these countries in their programmes. Whether nature tourism is equivalent to ecotourism depends on the definitions of both. The Declaration on Ecotourism 2002 from WTO/UNEP gives the following definition:

"Ecotourism embraces the principles of sustainable tourism... and the following principles which distinguish it from the wider concept of sustainable tourism:

- Contributes actively to the conservation of natural and cultural heritage;
- Includes local and indigenous communities in its planning, development and operation, contributing to their well-being;
- Interprets the natural and cultural heritage of the destination to the visitor;
- Lends itself better to independent travellers, as well as to organized tours for small size groups".

Contribution to conservation of nature and local economic development are essential elements of this definition. As nature tourism is defined here as all tourism within natural areas, it is clear not all nature tourism is ecotourism, though most ecotourism will be nature tourism.

Collecting accurate and reliable statistics is difficult because of the scattered and often unregistered character of nature tourism. When all staying in the above-mentioned types of accommodation in the countryside or nature areas is taken into account (including rural tourism, agritourism, green tourism, etc.), the numbers are huge, most probably exceeding beach tourism. Whereas European beach tourism is commonly densely concentrated, nature tourism is scattered to even the most remote areas of Europe. Consequently, although the total numbers of arrivals are very high, nature tourism cannot be labelled mass tourism, except perhaps some specific areas.

¹⁶ However, some of these countries have too high temperatures during the summer period for active holidays, and nature tourism may be more or less restricted to the shoulder seasons.

Most nature tourists go to the accommodation by private car. Many types of accommodation like camping sites, gîtes and farmhouses are in remote areas that are difficult to reach by other modes of transport. Nature tourism and family holidays strongly overlap, but are definitely not identical.

Obviously, nature tourists are not a homogeneous group. According to Lindberg (1991) at least four types of nature tourists can be distinguished:

- 'Hard-core' nature tourists are scientific researchers and special interest groups such as biologists, botanists, ornithologists and the like. They are highly educated tourists with a lot of cultural capital who visit nature areas either individually or on a small-scale package basis. The number of 'hard-core' nature tourists is very limited.
- 'Dedicated' nature tourists are people who set out especially for gathering aesthetic experiences in 'unspoilt' nature areas and who aspire to learn about nature and its plant and
- Animal life. In terms of Urry (1990, 2002), they represent the *Romantic Gaze*. They easily are annoyed by the presence of other tourists. They as well travel on a small-scale basis, packaged or otherwise, have a high cultural capital and a high level of education.
- 'Common' nature tourists are people who end up in a nature area because they desire an unusual holiday. Their primary concern is not nature, but the special experience. They are not interested in 'primitive' life in nature, but in good facilities and nature as a piece of scenery and something 'extra' rather than an end in itself. Being 'common' means that they represent the biggest group of nature tourists.
- 'Accidental' nature tourists wind up more or less accidentally in a nature area. They may be people who stay at a beach location and want to make one or more excursions to the inland region or they may arrive in a nature area because it is part of an organised trip. Being accidental visitors they most probably don't aspire to learn about nature, neither are they annoyed by the presence of other tourists. The recreational element dominates here. In Urry's term they represent the *Collective Gaze* rather than the *Romantic Gaze*.

7.7 Adventure holidays

'Adventure' tourism refers to those types of tourism that involve a purely physical activity and entail a certain risk which creates a feeling of excitement in the participant, both physically and mentally. This excitement coincides with an increased adrenaline production

Key characteristics European nature tourism:

- International and domestic arrivals: over 100 million
- Main international destinations: nature areas all over Europe
- Type of holiday: both main and extra holiday
- Type of tourism: individual tourism, sometimes organised (small groups)
- Length of stay: from short breaks to long holidays
- Customers: from 'hard-core' through 'dedicated' and 'common' to 'accidental'
- Lifestyle: on the average less hedonistic than most other types, sometimes ascetic
- Main activities: 'being in nature', hiking, cycling, canoeing, horseback riding
- Loyalty to destination: high
- Main travel flows: all over Europe
- Main source countries: Germany, Great Britain, Scandinavia, France, Netherlands, Italy, Belgium
- Most important mode of transport: car
- Accommodation: rural hotels and boarding houses, camp sites, holiday cottages, country houses, farmhouses, gîtes in nature areas or in the countryside; many private properties
- Outlook: huge growth potential because of ongoing (sub)urbanisation

in the body, which is also referred to as a 'kick'. Examples are mountaineering, abseiling, rafting, canoeing, white-water canoeing, deep-sea diving, ski or snowboard jumping, surfboarding, hang gliding, paragliding, parachuting, bungee jumping, mountain biking, motor-cross riding, rally riding and racing. A distinction between 'hard' and 'soft' adventure is commonly made, although this is rather a gradual than a dichotomous distinction. Hard adventure tourism involves activities with high levels of risk that require intense commitment and a high level of skill from the participant. Soft adventure tourism usually involves activities where the perceived risk is greater than the real risk and the participant does not need to have undertaken the activity previously.

'Adventure' is a very relative thing. What is an exciting experience for one person could be boring and predictable for another. Moreover, many kicks have a relative character in the sense that yesterday's kick becomes today's routine. A process of pushing back frontiers is set in motion. Ever higher summits, ever more difficult slopes, bigger jumps, higher speed. This type of tourism knows a clear status hierarchy among participants.

Hard adventurers are predominantly young males. Immediate danger has long disappeared from daily life in highly developed urban areas in Europe, where purchasing power and leisure time are guaranteed entitlements. Current life doesn't appeal any more to male biological equipment which has been instrumental evolutionary for survival and coping with danger. This biological equipment now turns out to be the *embarras de richesse* in highly developed countries. Young males start looking for kicks in order to compensate for lack of danger and risk in daily life and escape their sheltered existence. As such adventure tourism originates from the highly developed and urbanised parts of Europe, North America and Australia.

Adventure tourism is an expression of modern consumer culture pre-eminently. Some of the activities involved date from an earlier period, but in its current volume and shape, adventurous tourism is typical of the 1990s and the present decade. As for volume: the number of participants is growing rapidly in terms of percentage, but on the total tourism market they make up but a small part. Media coverage of this type of tourism is disproportionate. To European destinations 245,680 packages were booked in 2001 (0.06 % of European total) and 197,350 independent adventure trips (0.05 % of European total). As for shape: trendy activities are at issue here. They are 'in' just as swiftly as they become 'out'. A sizeable industry has materialised, producing outdoor clothing and equipment. Given their trendy character, most articles have American names, just like the commercials are in the English language.

Being an expression of modern consumer culture adventure tourism is both strongly dependent on trends in the consumer market and economic conditions in the main tourist generating countries.

More than half of all adventure trips are packaged tours in small groups. Tour operators and outdoor sports organisations have obviously discovered the adventure market. In a relatively short span, an abundant supply has developed, particularly aimed at young people, often by shuttle bus service, to places with conditions suitable for active adventures. This ranges from snowboard tours in winter and summer, canoe trips, mountain biking and wind surfing tours, paragliding packages, to glacier tours and survival trips, but often all kinds of activities are offered in one single programme (multi-sport tours). In Europe the Alps and the Pyrenees are the principle centres, next to canyons, white rivers and hills elsewhere.

Country	Market share (%)
Germany	23
Great Britain	16
France	7
Netherlands	6
Italy	5
Switzerland	4
Belgium	4
Sweden	3
Russia	3
Spain	3

Table 7-4: European adventure travel market, by generating markets in 2001 (% of total number of tourists of 443,000).

Together with Germany, the small Western, Northern and Central European countries are the most important generating areas, relatively.

Key characteristics European adventure tourism:

- International arrivals: 443.000
- Main international destinations: Alps, Pyrenees, hills, white rivers, lakes, canyons
- Type of holiday: extra holiday
- Type of tourism: organised (small groups) and individual tourism
- Length of stay: from short breaks to long holidays
- Customers 'hard' adventure tourism: young affluent males from urban Central, Western, Northern Europe; customers 'soft' adventure tourism: affluent 'baby boomers' from the same areas
- Lifestyle: hedonistic
- Main activities: all kinds of physical activities involving more ('hard' adventure) or less ('soft') risks
- Loyalty to destination: low
- Main travel flows: from Northern, Western, Central European cities to mountains and hills
- Main source countries: Germany, Great Britain, Scandinavia, France, Netherlands, Italy, Belgium
- Most important mode of transport: air, coach, car
- Accommodation: tents, huts, group accommodation
- Outlook: huge growth potential, depending on economic prospects

7.8 Cruise tourism

World-wide cruise tourism is booming. The number of passengers has grown from 2,750,000 in 1985 to 10,138,000 in 2000 and will rise to 19,080,000 in 2009. New ship orders have grown steadily throughout the 1990s, resulting in about 60 new ships delivered between 2000 and 2005. The world-wide berths capacity has grown from 241,000 in 2000 to 358,000 in 2004 and is supposed to be 450,000 in 2009. Cruise ships are calling at some 1800 ports world-wide.

The cruise market is dominated by American companies and American passengers. In 2000 6,882,000 passengers originated from the USA, 754,000 from the UK and 1,097,000 from continental European countries. As a result, destinations within reach from American ports are most frequently visited (e.g. Caribbean 46 percent). The share of Mediterranean

destinations was almost 12 percent (over 1.2 million) and the share of ‘other Europe’, including Scandinavia, was 7 percent (over 700,000). Although ocean cruise tourism is still less popular in Europe than in the USA, the numbers are growing, Germany, Italy and France (379,000, 220,000 and 266,000 respectively) being ahead of important tourist generating countries such as Scandinavia, Switzerland and the Netherlands. In 1999 more than 82 million Germans had 63.3 million holidays, of which 0.7% were cruises, of which 0.5% were ocean cruises and 0.2% were river cruises. However, about 7% of the Germans expressed their interest in having a cruise in the future.

Whereas American cruises turn to Northern American and Caribbean destinations predominantly, more than 60% of European call at European ports: Mediterranean (more than 32 percent), Northern Europe (Baltic / Scandinavia) (almost 20 percent) and Western Europe (more than 11 percent). Among Mediterranean ports Western ports are the most frequently visited, followed by Greek islands and Eastern destinations. The average age of cruise passengers in 2000 was 53.9 (UK, + 0.4 years compared to 1999) and 50.9 (Germany, - 1.7 years compared to 1999).

For Europeans deciding to have a cruise holiday is part of an extended problem solving process rather than a routinised process, because cruising is a relatively new phenomenon for most Europeans and prices are between 1500 and 2000 Euro on the average. According to the International Council of Cruise Lines (www.iccl.org) 9 out of 10 people who cruise say they will cruise again. Consequently, a certain routinisation of cruising may be expected.

The rising popularity of cruise tourism is due to several distinct factors. Like all-inclusive resorts (that are also booming), cruise ships offer a safe and predictable environment. American consumers in particular tend to look for safe and predictable holidays. Moreover, cruise ships offer comfortable, often luxurious facilities which give customers from hectic societies the opportunity to relax and have a temporary release from making decisions. Americanisation of consumption in Europe, together with the growing supply of cruise ships, might be responsible for a growing awareness among Europeans of cruising opportunities. The ageing process in both North America and Europe is definitely another factor contributing to the popularity of cruising, although in some countries (Germany rather than the UK) the average age of cruise passengers is slowly decreasing.

Key characteristics European cruise tourism:

- international arrivals about 2 million
- main destinations: Mediterranean, Caribbean, Northern Europe
- type of holiday: both main holiday and extra holiday
- type of tourism: organised mass tourism
- average length of stay: 9-10 days
- customers: well-to-do Europeans in their early fifties (average)
- lifestyle: hedonistic
- main activities: leisure activities on board, sightseeing, shopping, visiting attractions at the destination
- main travel flows: from Western Europe to Mediterranean, Caribbean, Northern Europe
- main source countries: UK, Germany, France, Italy
- mode of transport: cruise ship
- accommodation: cruise ship
- outlook: high growth potential

7.9 Decision-making

In most Central, Northern and Western European countries, and more and more in Southern European countries, people have long skipped the question of “Are we going on holiday or not?” in their decision process, which now begins with “Where are we going for holidays?” and “How often are we going?” Second, third and fourth holidays have joined the main one,

short breaks have grown exponentially during the 1990s, the distinction between short holidays, day trips and leisure in general is fading away. The decision-making processes are becoming more and more routinised. Howard and Sheth (1969) made a distinction between *extended problem solving (EPS)*, *limited problem solving (LPS)* and *routinised problem solving (RPS)*. In the 1960s, 1970s and for many consumers the 1980s both main holidays and extras were subject to EPS. The focus has shifted since to LPS and RPS.

Holiday participation is highest in the Central, Northern and Western parts of Europe, due to several factors, including minimum yearly holiday entitlements of more than 20 days, as compared to half of that in Asian and North American countries. According to the World Tourism Organisation (Tourism Market Trends: Europe 2002) these countries show the highest expenditure in international tourism per capita.

Country	Expenditure
Austria	1217
Iceland	N/A
Switzerland	N/A
Denmark	N/A
Sweden	N/A
Norway	N/A
Belgium	1063
Ireland	N/A
The Netherlands	840
UK	683
Germany	622
France	332
Italy	275

Table 7-5: Expenditures in international tourism per capita (Euro, 2001).

Although USA and Japan spend much in international tourism, spending per capita are much lower than in European countries: Japan 247, USA 170. The main reason is that most spending of Americans and Japanese are domestic and are not included in international statistics.

Figure 7-2 illustrates the circular course of the decision process. The original idea springs from one's personal holiday experiences. It is supplemented –or even corrected- by the direct social environment, consisting of relatives and in some cases neighbours, colleagues, peer groups and friends. In most traditional EU countries, as opposed to new members, consumers have acquired ample holiday experience: they know what they want and even better know what they do not want. This is at the basis of routinisation of decision-making.

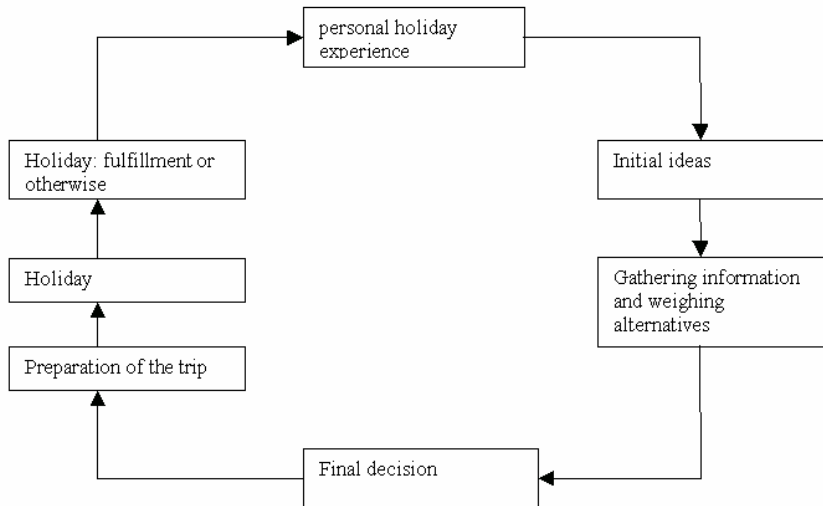


Figure 7-2: General model of tourists' decision-making.

Gathering information and weighing alternatives seems like a rational process preceding the final decision. Many, if not most, decisions are taken on the basis of emotions, however: we choose something to which we feel attracted, in which we feel 'at home' and which fits our self-image and our lifestyle. This excludes a great many things. Evidently, gathering information often has a defensive and selective character. Dealing with the gigantic flow of information in a selective manner is necessary, seeing that it is far too much to handle anyway. Generally speaking, the mass media demonstrate what is on offer, whereas the evaluation of the alternatives in terms of 'something for me' takes place in the informal circuit. This holds for both destination choice and choice of transport mode. It is this psychological element in decision-making and development of preferences that should be addressed when trying to influence these processes in a sustainable direction. In the 'decision tree' (see Figure 7-3) 'no holidays' is no option for most consumers, except for those with financial or physical constraints.

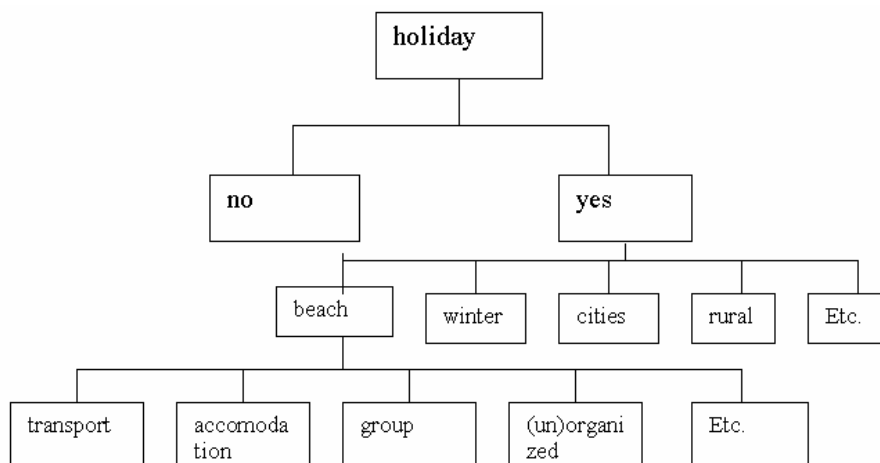


Figure 7-3: Proposal for a holiday decision tree.

The consumer's lifestyle and special interests play a major role in choice of type of holiday. A hedonistic and active lifestyle allows for active summer beach holidays, winter sports and adventure holidays. An ascetic lifestyle oriented towards quiet nature, beautiful scenery, hiking and avoiding the crowds doesn't allow for these types of holidays. Family conditions

like having little children easily lead to preferences for camping sites or all-inclusive resorts with a lot of facilities for children, often domestic holidays. Long haul cultural roundtrips are based on a long decision-making process (EPS), whereas short break, city trips in particular, are the result of short decision-making processes or even impulse decisions. Availability of private car or air tickets plays an important role in short-term decision-making. Not having a private car is the main determinant of choice of collective modes of transport like coach/bus or train. Young tourist who don't avail of a private car yet are the most important target group for shuttle bus services to winter sports and continental beach destinations. Elderly tourists who don't have a car any more are the most important target for organised coach tours, city tours in particular.

The conclusion is that the model of tourists' decision-making is specific per type of tourism and type of tourist. On one extreme end of the decision-making continuum there's the winter sports tourist who books each year the same hotel room for next year when leaving. On the other extreme there's the tourist who carefully plans to make a long individual journey, after much deliberation, weighing up all the pros and cons.

Several (perceived) risks are involved in decision-making. An important risk is the psychological risk: does this holiday fit our self-image and lifestyle? Do we feel at ease or even 'at home' at the destination? Repeat visits, loyalty to the destination and relying on our like-minded social environment are the major strategies to cope with this risk. Other risks are financial (costs involved), social (is this type of holidays 'approved' by our social environment?), functional (does it meet my expectations?), as well as risks related to physical activities (from physical injuries to sexually transmittable diseases).

7.10 Information systems for consumers

Any information system that aims at addressing contemporary holiday makers should take the heterogeneity of decision-making processes into account. Interventions by either authorities or the tourism and travel industry aiming at all consumers at the same time will not be effective. The more information systems are able to address the 'right' group of holiday makers with the 'right' message at the 'right' moment, the more effective they will be. The 'right' message is oriented towards the holiday maker's specific interests and concerns. Appealing to specific interests might mean that environmental concerns and issues don't have to be communicated explicitly, as Table 7-6 demonstrates.

Consumer's motivation	Communication by the industry	
	implicit	explicit
intrinsic	(1) 1. bus/coach 2010 2. 'eco-chicken' 3. green funds 4. Toyota Prius	(2) 1. Blue Flag 2. 'Holle Bolle Gijs'
extrinsic	(3) Not relevant for tourism	(4) 1. Trees-for-Travel/Cool Flying 2. many <i>do's</i> and <i>don't's</i>

Table 7-6: Communication strategies (source: CSTT).

Consumer behaviour can be intrinsically or extrinsically motivated. Intrinsically motivated behaviour is in itself rewarding; activities are conducted because they are satisfying by themselves; it is 'fun' doing so. Extrinsically motivated behaviour is not in itself rewarding; it is controlled by external factors; activities are conducted because they are compulsory or because they are instrumental to reach goals that are external to the activity. Eating 'eco-chicken' because these chickens are supposed to be tastier than 'industrial' ones is intrinsically motivated. Buying 'eco-chicken' to contribute to more environmentally friendly production methods is extrinsically motivated.

Consumer-directed communication that refers to environmental aspects is called ‘explicit’ communication; in ‘implicit communication’ the sender refers to the quality of the product without reference to environmental aspects.

The first quadrant refers to consumers who buy products because they are ‘nice’, ‘tasty’, ‘sexy’, etc. Suppliers can address consumers in terms of the intrinsic qualities of their products; they don’t have to refer to environmental issues. Because of these intrinsic qualities consumers are easily inclined to buy these products. Most transport is not ‘fun’ in our present days. When train or coach companies will succeed in improving the perceived quality of their modes of transport, customers will choose these modes because of their intrinsic qualities rather than because of their relatively low environmental impacts.

The second quadrant refers to products that have intrinsic value for consumers, but suppliers communicate explicitly that they are environmentally friendly. The most obvious example is the *Blue Flag*, which communicates to consumers that beaches, seas, marinas that are awarded with this ecolabel are clean and meet consumers’ needs for quality. The Greek *Grecotel* on Crete has a turtle protection programme. The turtle beaches are a tourist attraction, because many tourists like to watch turtles coming ashore and laying their eggs or young turtles waggling to the sea (intrinsic motivation). *Grecotel* gives extensive information about the endangered turtle species (explicit communication) and, in addition to that, offers facilities to watch turtles without disturbing them. In the Dutch amusement park the *Efteling* children voluntarily collect waste to put it into the mouth of *Holle Bolle Gijs*, a fairytale person who is calling “papier hier” (“paper here”). His “thank you” is rewarding for the children, who might quite well be aware of the rationale behind it.

Much communication aims at influencing consumer behaviour by telling what’s done and what’s not done. It represents the fourth quadrant. By trying to prevent consumers from skiing outside the designated slopes, touching vulnerable coral, buying and importing forbidden souvenirs, etc. this communication is explicitly referring to environmental issues, but doesn’t appeal to any intrinsic motivation. Trying to persuade consumers to buy certificates (*Trees for Travel*, *Cool Flying*) to compensate for pollution caused by holiday transportation means explicitly referring to environmental issues. For the consumer, buying certificates doesn’t bring along intrinsic rewards, except perhaps a “good feeling”. Having consumers ‘adopt’ trees or forests might increase the intrinsic value of buying certificates. Generally speaking, trying to influence consumer behaviour by persuasive communication is less effective than appealing to intrinsic motivation. Consequently, any producer of tourist services, be it public or private, who wants to influence consumer behaviour to be more environmentally friendly, should consider aiming at intrinsic rather than extrinsic motivation.

7.11 Opportunities for change

Following tables give an overview of the findings. First a cross-table of tourist behaviour typology and holiday types in Table 7-7.

	Beach	Winter sports	City trips	Family holidays	Nature tourism	Adventure holidays
Organised mass	+			+		
Individual mass	+	+	+	+		
Organised traveller					+	+
Organised adventurer					+	+
Individual traveller/backpacker					+	+
Pioneer						+

Table 7-7: Proper combinations of holidays types and tourist behaviour types (+ means common combination).

With respect to the freedom of choice for the different holiday types Table 7-8 gives some preliminary results. This table makes clear best chances for change may be found with city trips, nature and adventure tourism and – to a lesser extent – winter sports. However, this is only about change, not about change into the right direction. For example family holidays do have already longer stays, a lot of camping and not too luxury accommodation, fully loaded cars, and so on. An environmental assessment of these groups may help to find the groups with the best ecological performance and those with the best opportunities to improve the ecological performance.

	Beach	Winter sports	City trips	Family holidays	Nature tourism	Adventure holidays
Distance choice	+	-	+	-	+	+
Period choice	-	-	+	-	+	+
Length of stay choice	-	-	+	-	+	-
Mode choice	+	+	+	-	+	+
Accommodation choice	-	-	-	+	+	+
Organisation choice	+	+	-	-	-	+
Price choice	-	+	+	-	+	+
Volume (international+ domestic)	100	28	>50	>100	>100	0.4
Possibility for change	-	0	+	-	+	+

Table 7-8: Choices to be made for the holiday types (+ means choice is more or less free and may be changed during the choice process; - means choice is fixed).

7.12 Conclusions

Types of tourism have not been given an exhaustive treatment. Still, the major travel flows have been discussed. Tourism must be regarded as an integral element of modern life in most EU countries and as such is an inherent element of the economy of most European countries. The processes of decision-making are becoming routinised problem solving rather than extended, in particular when short breaks are concerned. “No holidays” is no option for most European citizens, in particular in Central, Northern and Western parts of Europe, except for those with financial or physical constraints. The process of decision-making is more complicated by now than most other types of consumer behaviour, because holiday-related decisions involve a chain of products, including organised versus not organised, destination, transport, accommodation, company, activities, etc., in combination with all kinds of additional financial, social and psychological considerations. Psychological risk in terms of “does this holiday fit our self-image and lifestyle?” plays an even greater role in holiday-related decisions than in purchasing daily consumer goods.

Tourism flows are extremely heterogeneous, from densely concentrated forms of mass tourism to small-scale scattered tourism to the most remote rural areas of Europe.

Concentration of accommodation and facilities pays: impacts of tourism are limited in space and are rather easily controllable as well. As far as transport is concerned: the private car is mostly preferred. To many remote areas, like in nature tourism, the car is the only option.

Low-cost carriers offer new opportunities nowadays for city trips to medium and even short haul destinations as extra holidays.

Tourists’ decision-making processes are extremely heterogeneous as well. Any information system that aims at addressing contemporary holiday makers should take this heterogeneity into account. Interventions by either authorities or the tourism and travel industry aiming at all consumers at the same time will not be effective. The more information systems are able to address the ‘right’ group of holiday makers with the ‘right’ message at the ‘right’ moment,

the more effective they will be. The 'right' message is oriented towards the holiday maker's specific interests and concerns.

The outlook for most types of tourism is very positive: because of ongoing urbanisation and perhaps economic growth more and more European citizens will adopt a modern consumer lifestyle. Urbanisation is both conducive to increasing hedonistic holiday expenditures and the need to have a break from hectic and restless modern life.

8 Recommendations

Is it possible to increase the competitiveness and sustainable development of European Tourism and its enterprises and in the same time to uncouple growth of tourism and of transport related environmental degradation? Can this be done by encouraging innovative practices that enhance sustainable production and consumption patterns?

The answers to these questions must be seen within a long term perspective. The MuSTT project tries to find out if it is feasible to generate the answer and realising a sustainable development by a Multi-stakeholder Action and by setting up guidelines for future actions. In this deliverable a subject matter review is given on the entire tourism and transport related activities and its impacts. What lessons does this provides us?

First of all we must conclude there is a need for getting better adjusted information. The main data sources are World Tourism Organisation (WTO) data and European transport models like one of the most recent TEN-STAC model. The main problem of two kinds of databases is their incompatibility of definitions of tourism and the incompleteness of the WTO base on transport related data and of the transport data on specific tourism related data.

A general problem with the used WTO data is the rather high number of missing data fields. A lot of these missing data fields could be filled in by using other sources like the TEN-STAC database. But nevertheless the need for extra data is still eminent. Especially for important tourism destinations as Malta, Cyprus, Croatia and Turkey. A second gap which needs attention is the lack of information on a lot of different items like coach travel, maritime transport, multi-day roundtrips, local transport, and transfer tourist per country who just stay one night, residential tourism and even tourists visiting friends and relatives.

Systematic data on local transport at the destinations is not (yet) available; therefore local transport has been so far treated partly in a qualitative way. This is unfortunately, as the local impacts of transport (especially of car transport and to a lesser extend for air transport) may very large within typical tourism destinations and a thread for the tourism industry itself.

Current limitations of the TEN-STAC data are its shortcoming on about ICA travelling, wrong definition of tourism, lack of distinguishing business tourism and visiting relatives and friend as tourism. We recommend finding solutions through incorporating other data sources within the model. For instance: the ICAO data, information of the World Bank or American and Asian tourist's boards. Also the transport mode ROAD of TEN-STAC should be diversified to private car, coach and ferry. Information about the use of caravans and roof-luggage might be of interest to the future use of the model as a tourism transport policy instrument.

To fill in all these gaps we recommend setting up a standardised survey system. This survey should be held within each EU25-plus country on a regular base. The gathered information should then together with the TEN-STAC en WTO data be used to set-up a tourism transport model. A first round of the survey could be part of phase 2 of the project, while developing the model is the subject of a recommended phase 3.

A general problem seems to be the emission factor and specific energy consumption as well as specific data on safety, noise, land-use and infrastructure habitat fragmentation for transport modes as operationally used within tourism. Though quite a lot of literature is available on most of these subjects, the results are scattered widely and need some way of standardisation. By doing this it is possible to better investigate and evaluate environmental problems.

Furthermore we recommend to:

- Study in more detail the direct space use and the impact of the partitioning effects of infrastructure instead of the indirect space use.
- Make a distinction between business tourism, leisure tourism and visiting of friends and relatives, because the impact on the environment and also on the economy differs a lot

between these types of tourism. Furthermore the opportunities to change the activity patterns differ a lot. For example: the possibilities to influence business tourism are very limited for the core target group of this study, the National Tourism Administrations.

- Realise that only for air transport the tourism share is dominating the use of this mode. For the other transport modes tourism comprises only 15-20% of the total kilometres travelled. All in all it is important to realise that solutions to unsustainable growth are only available if the transport sector itself will develop in a sustainable way.
- Another issue of vital interest for the economic, social and ecological situation in Europe, is the fact that no coherent information on holiday periods in Europe is available in advance and co-ordination is non-existent. This causes serious economic, social and ecological problems, because planning for the industry is impossible. We recommend to incorporate within the before mentioned survey to also look at the seasonal dimension of tourism transport as well as its implications on the environment and on the individual tourist and the tourism industry. Because a detailed focus on tourist flows at particular week-ends in high seasons could help to overcome the burden of the bottle necks in Europe or the increased safety problems on for instance the black Saturdays.
- Further we recommend expanding the EU-plus definition with Turkey and Croatia, because these countries are holiday destinations of increasing importance for Europeans.

The final conclusion is the sustainable development of tourism needs to have better data on the relations between tourism, transport and the impacts thereof and therefore justifies further efforts. The MuSTT model shows in a preliminary way the possibilities of a new model and the data gaps to be filled with a European survey.

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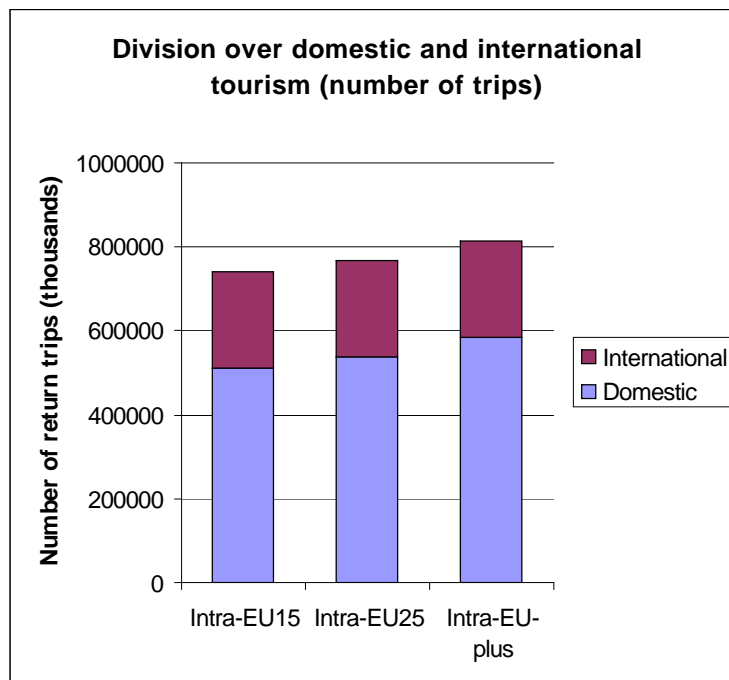
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This annex gives the results of the model for the number of journeys (i.e. return trips; the number trips therefore is double the number of journeys; the number of passengers as counted at airports, harbours etc is four times the number of journeys, when counting every arrival and departure). The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

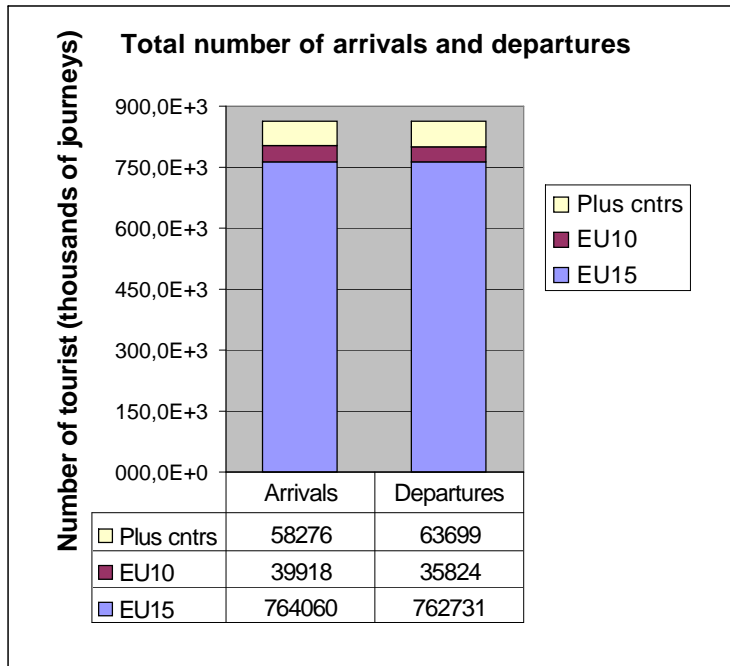


Figure A. I: Total number of tourists showing the numbers of arrivals and departures for the three different groups of EU countries for 2001.

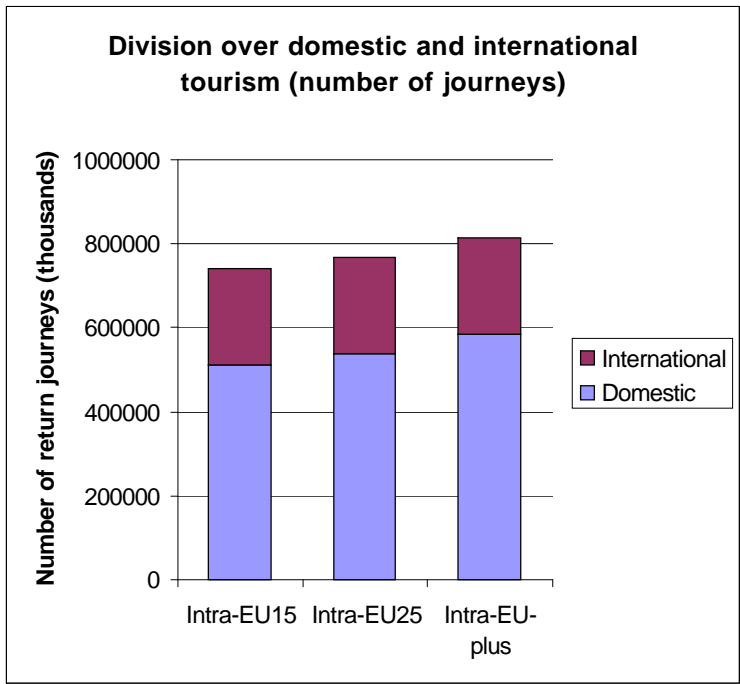


Figure A. II: Division of number of tourist journeys over domestic and international for the three different groups of EU countries for 2001s.

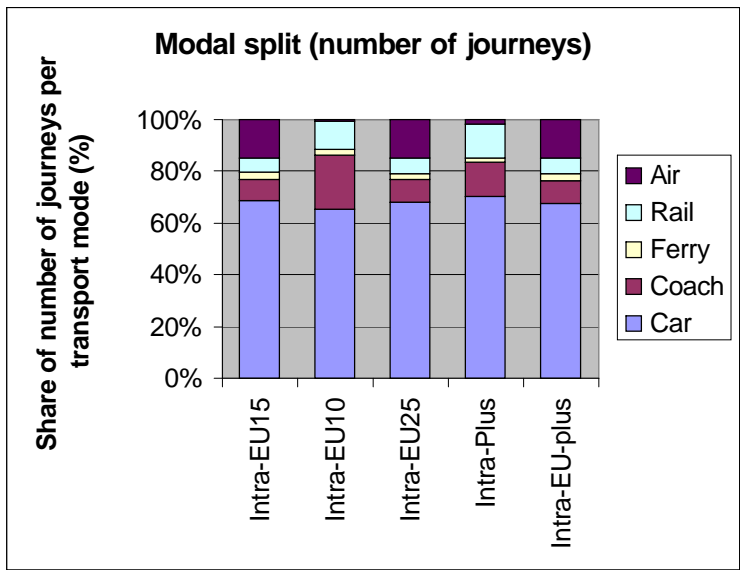


Figure A. III: Modal split in terms of number of journeys for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

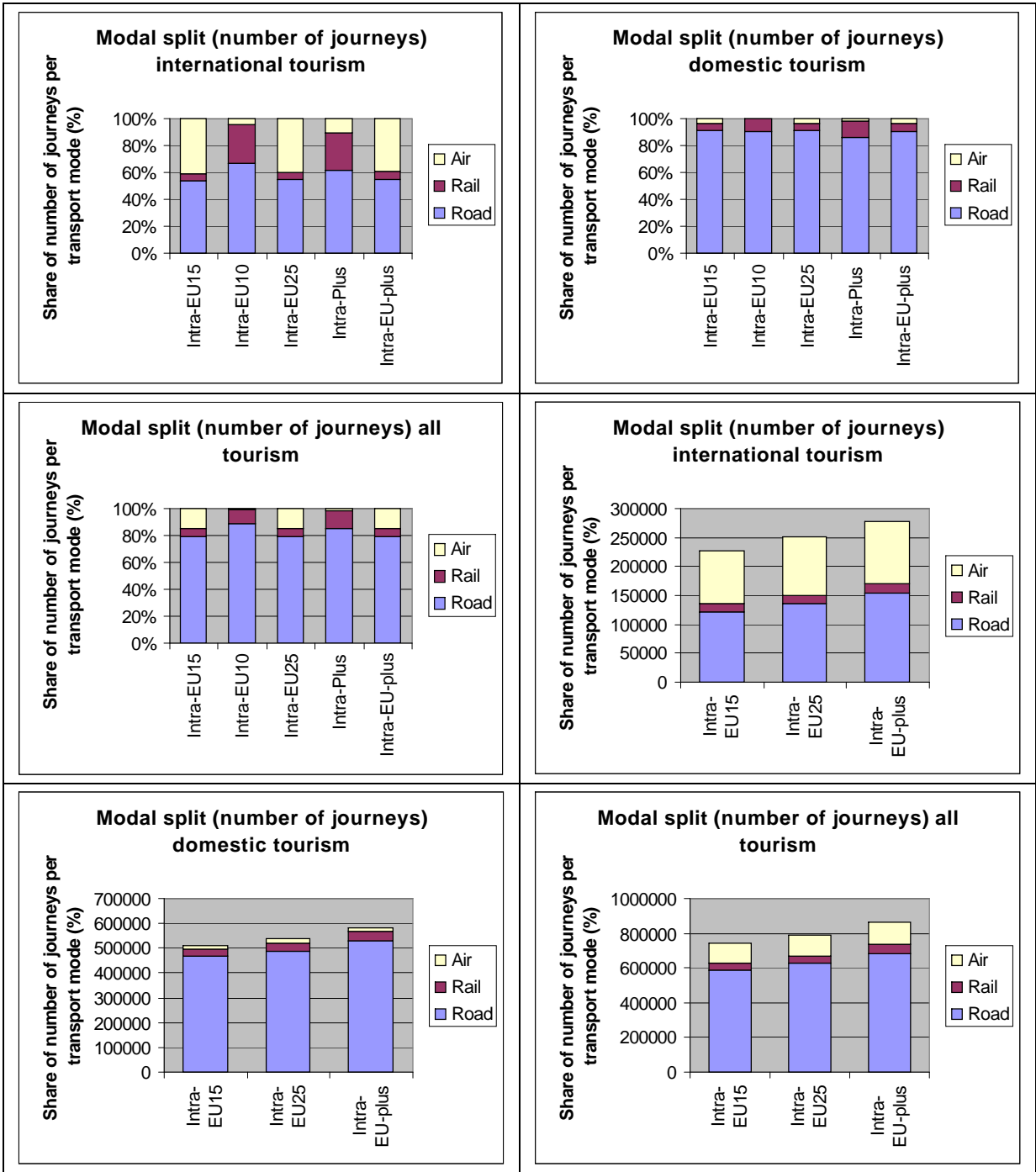


Figure A. IV: Modal split per group of countries in percentages and absolute number of journeys as calculated from the model (road includes car, coach and ferries).

Annex II

Results for passenger kilometres travelled by tourists

This annex gives the results of the model for the number of passenger kilometers (pkm) travelled by tourists. The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

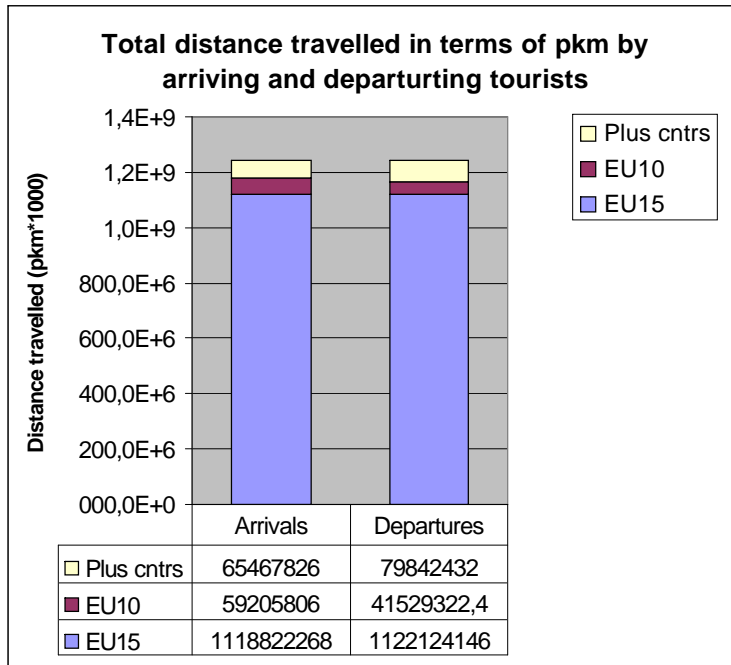


Figure A. V: Total number of passenger kilometers showing the numbers for arrivals and departures for the three different groups of EU countries for 2001.

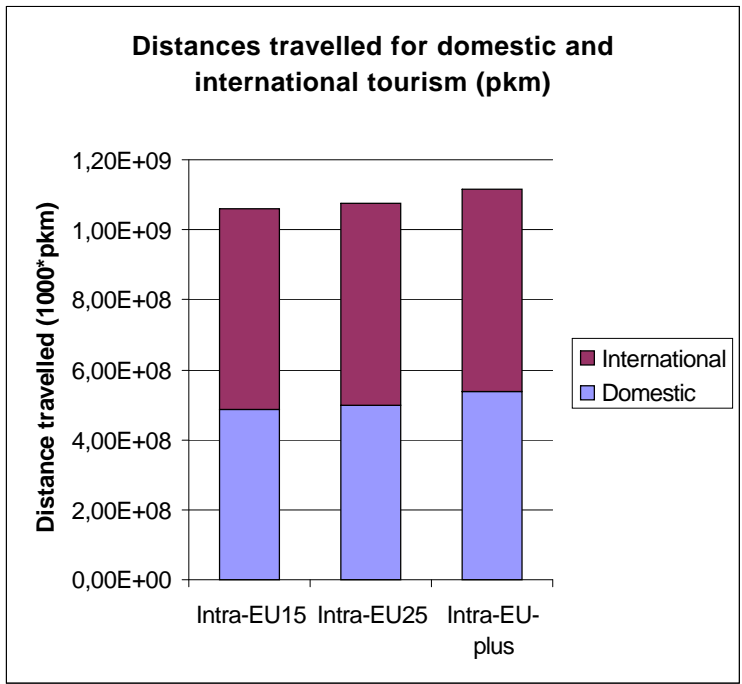


Figure A. VI: Division of number of passenger kilometres over domestic and international for the three different groups of EU countries for 2001s.

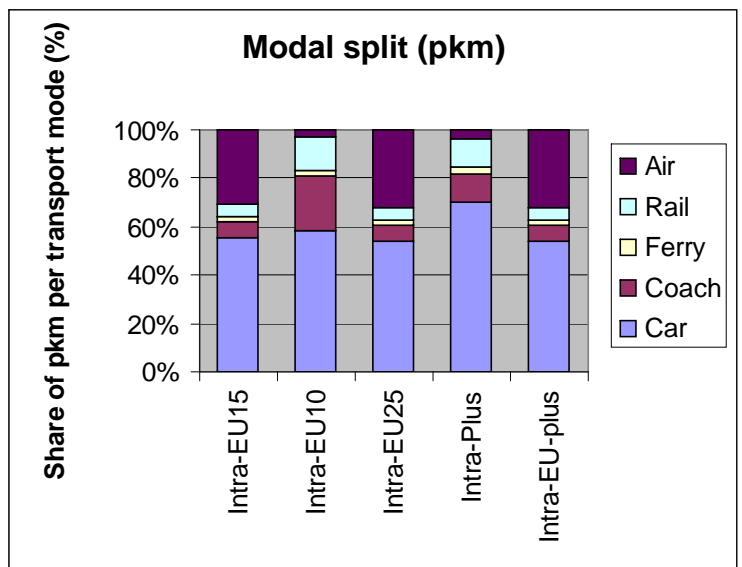


Figure A. VII: Modal split in terms of number pkm for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

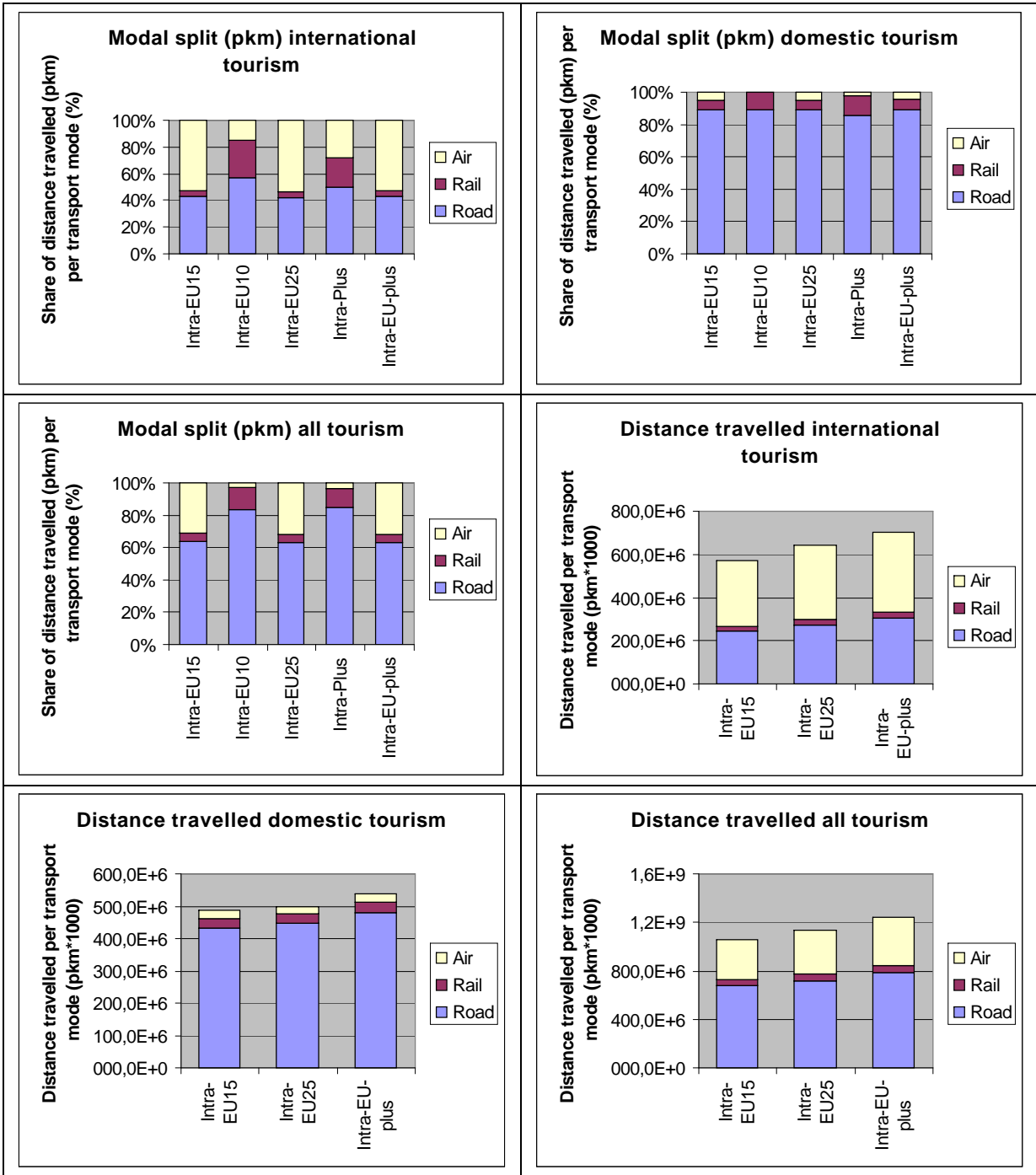


Figure A. VIII: Modal split (pkm based) per group of countries in percentages and absolute number of pkm as calculated from the model (road includes car, coach and ferries).

Annex III Results for CO₂ (carbon dioxide) emissions

This annex gives the results of the model for the emissions of carbon dioxide (CO₂) from tourism transport. The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

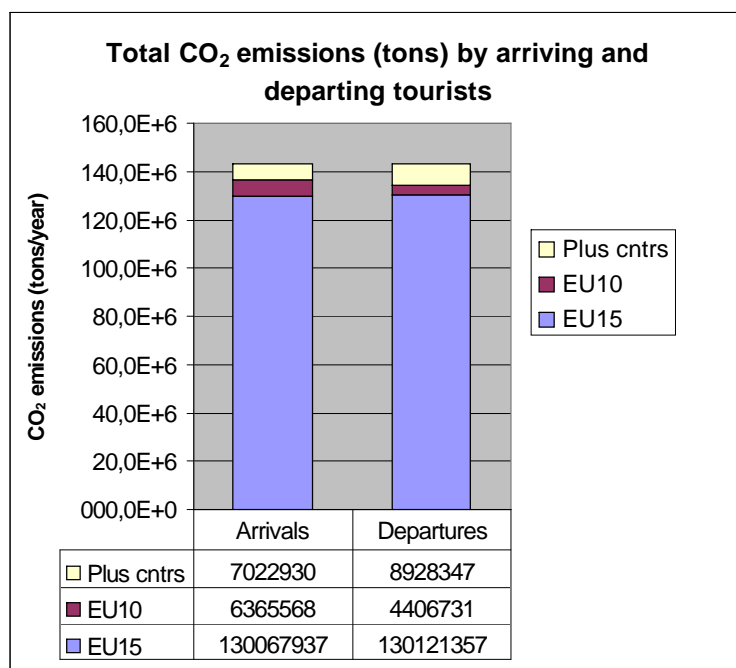


Figure A. IX: Total emissions of CO₂ showing the amounts for arrivals and departures for the three different groups of EU countries for 2001.

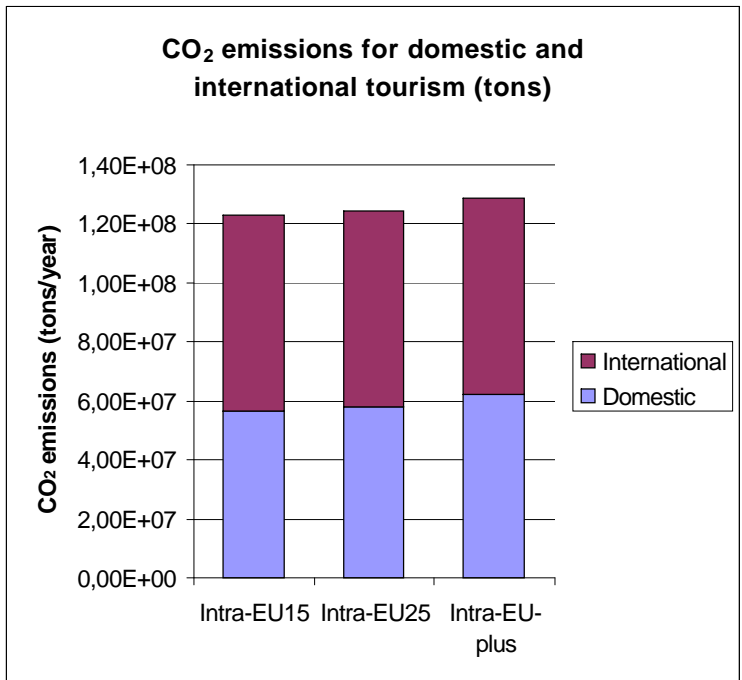


Figure A. X: Division of emissions of CO₂ over domestic and international for the three different groups of EU countries for 2001.

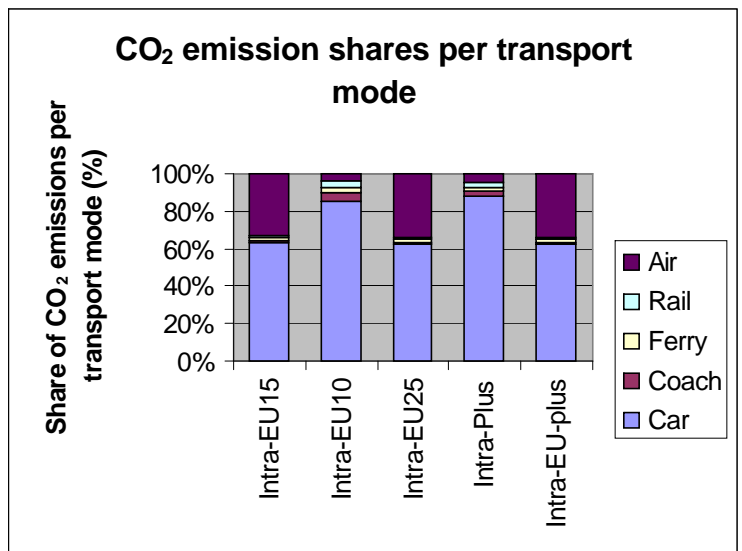


Figure A. XI: CO₂ emissions per mode of transport for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

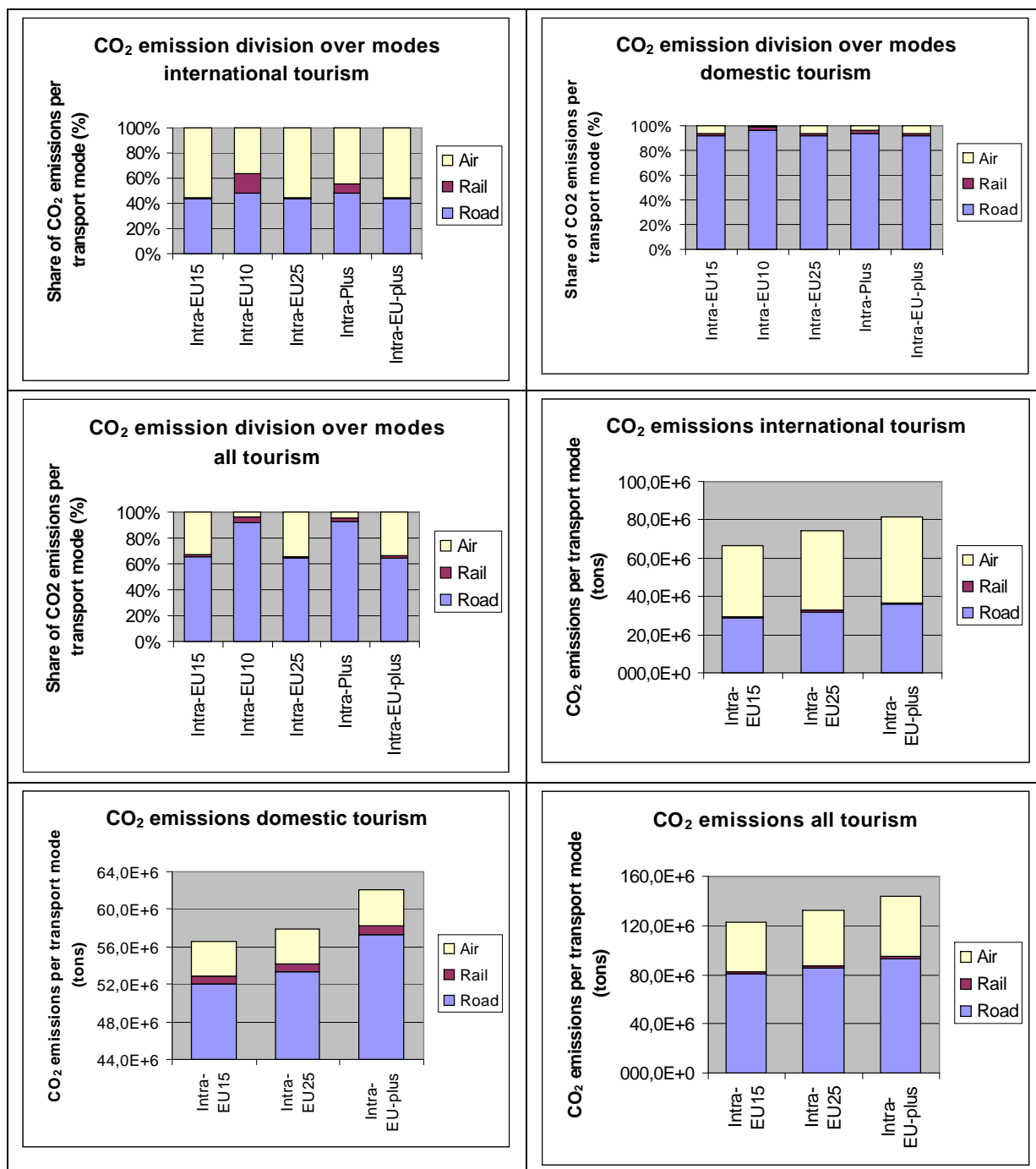


Figure A. XII: CO₂ emissions per transport mode per group of countries in percentages and absolute amount (tons) as calculated from the model (road includes car, coach and ferries).

Annex IV Results for CO₂-e (carbon dioxide equivalent) emissions

This annex gives the results of the model for the emissions of carbon dioxide equivalent (CO₂-e) emissions from tourism transport. CO₂-e is an indicator for climate change impact. The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

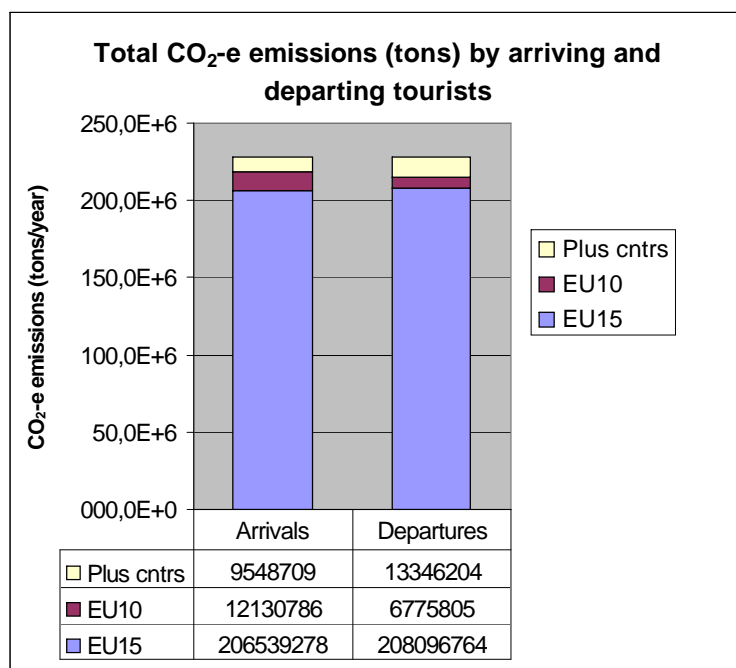


Figure A. XIII: Total emissions of CO₂-e showing the amounts for arrivals and departures for the three different groups of EU countries for 2001.

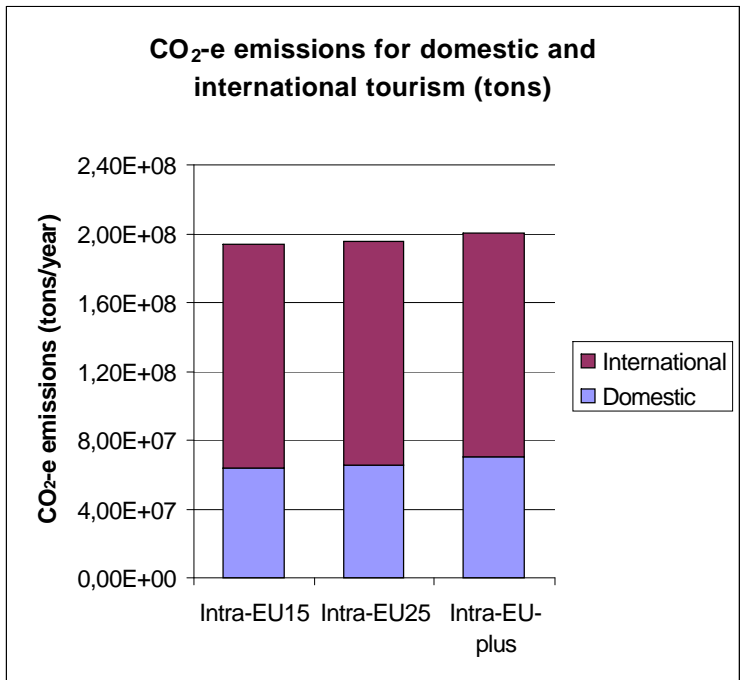


Figure A. XIV: Division of emissions of CO₂-e over domestic and international for the three different groups of EU countries for 2001.

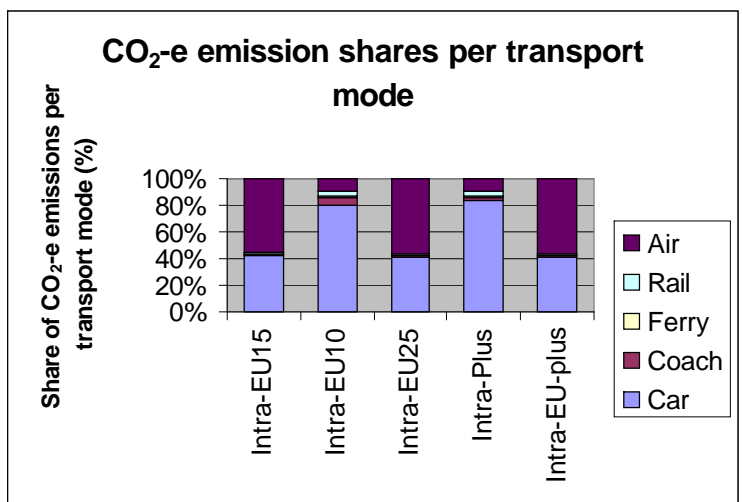


Figure A. XV: CO₂-e emissions per mode of transport for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

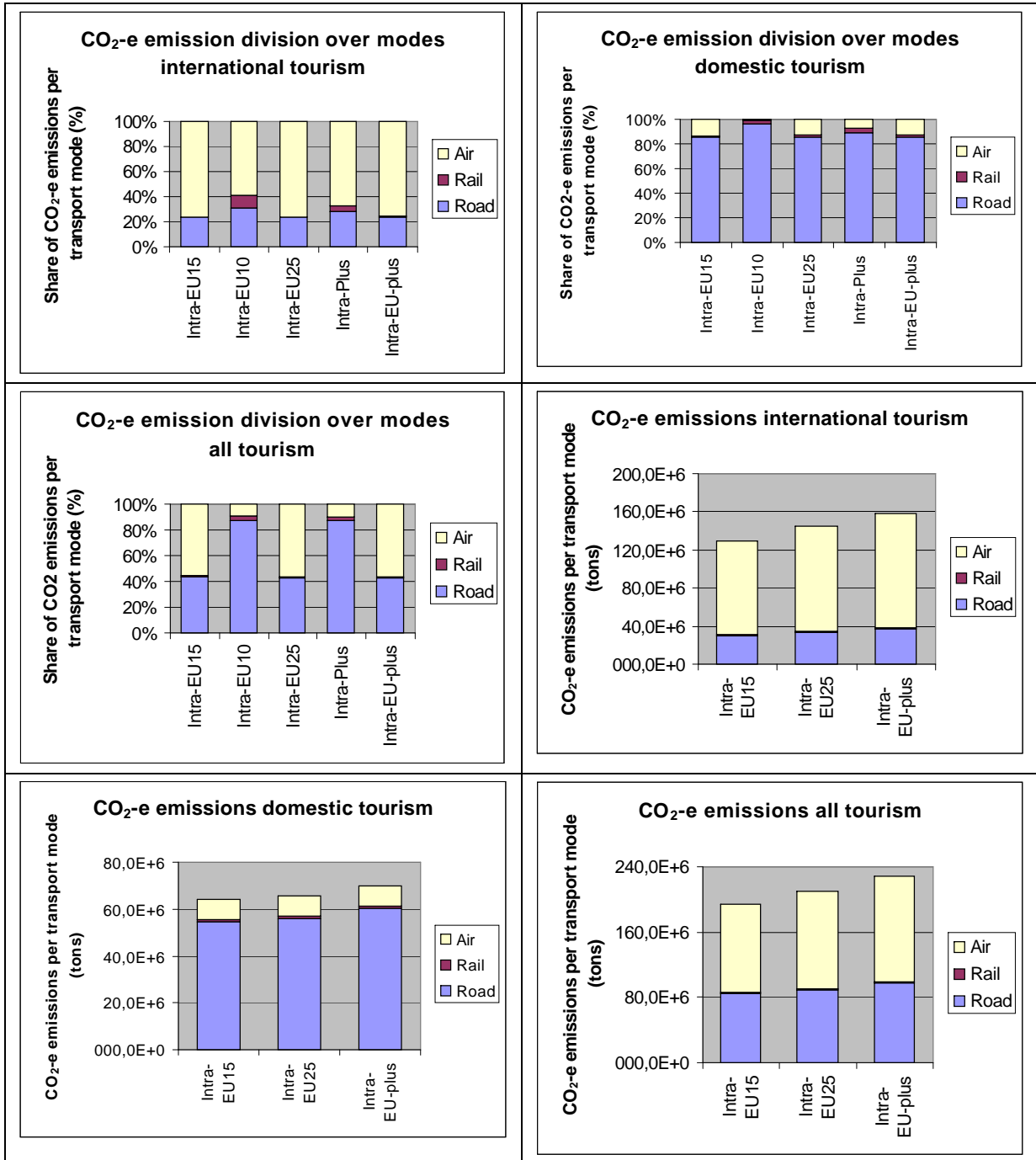


Figure A. XVI: CO₂-e emissions per transport mode per group of countries in percentages and absolute amounts (tons) as calculated from the model (road includes car, coach and ferries).

This annex gives the results of the model for the emissions of carbon dioxide equivalent (NO_x) emissions from tourism transport. NO_x is an indicator for acidification and plays a role in the forming of ozone (summer smog) and air quality. The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

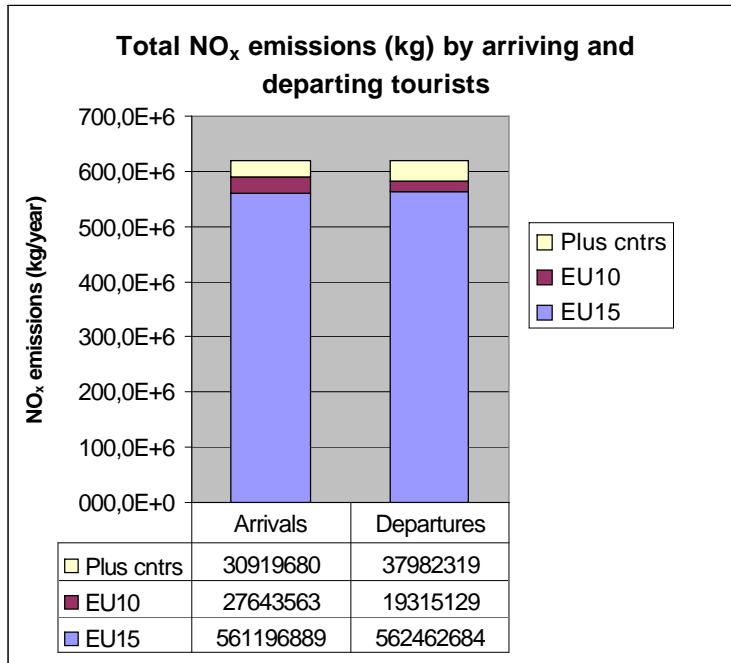


Figure A. XVII: Total emissions of NO_x showing the amounts for arrivals and departures for the three different groups of EU countries for 2001.

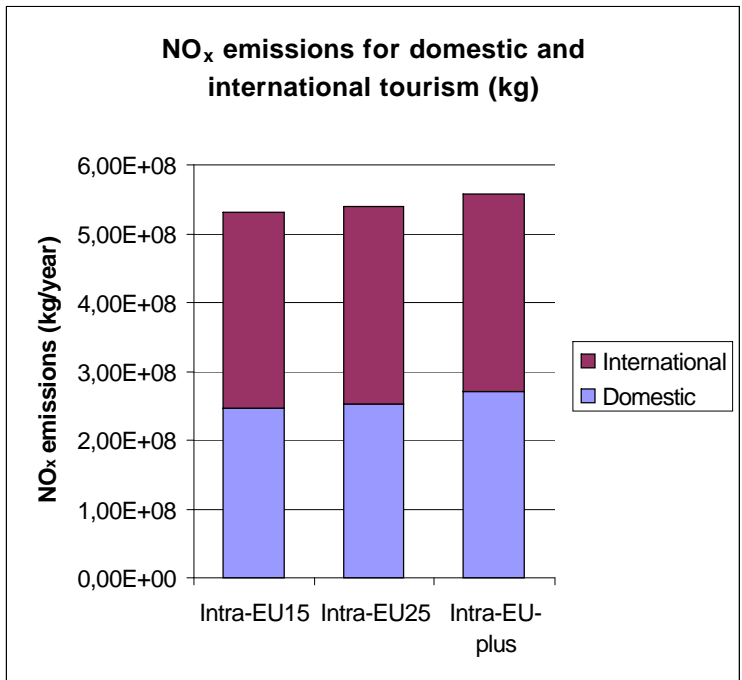


Figure A. XVIII: Division of emissions of NO_x over domestic and international for the three different groups of EU countries for 2001.

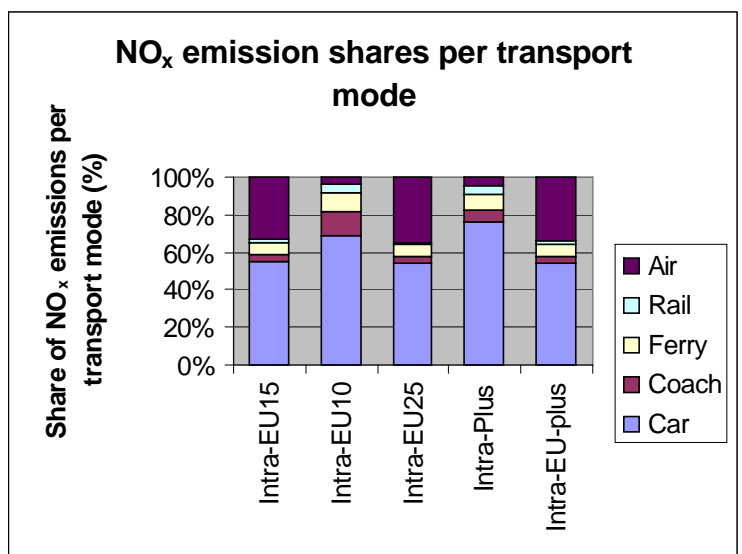


Figure A. XIX: NO_x emissions per mode of transport for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

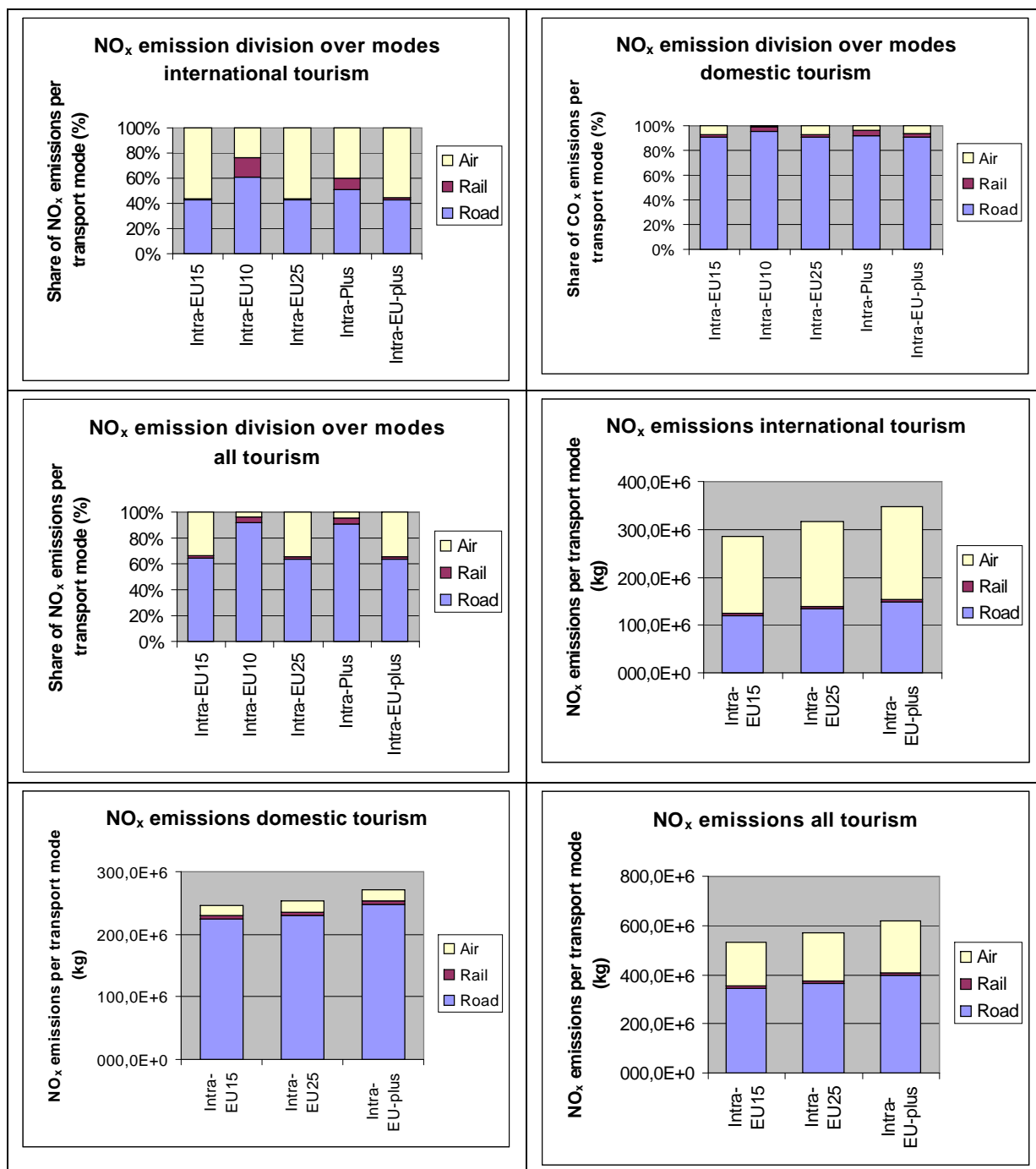


Figure A. XX: NO_x emissions per transport mode per group of countries in percentages and absolute amounts (kilograms) for 2001 as calculated from the model (road includes car, coach and ferries).

This annex gives the results of the model for the emissions of particle matter or soot (PM) from tourism transport. PM is a strong indicator for air quality and health impacts. The modal split figures for coach and ferries are based on estimates. Road, rail and air modes are covered by the MuSTT model database calculations. Road combines car, coach and ferries.

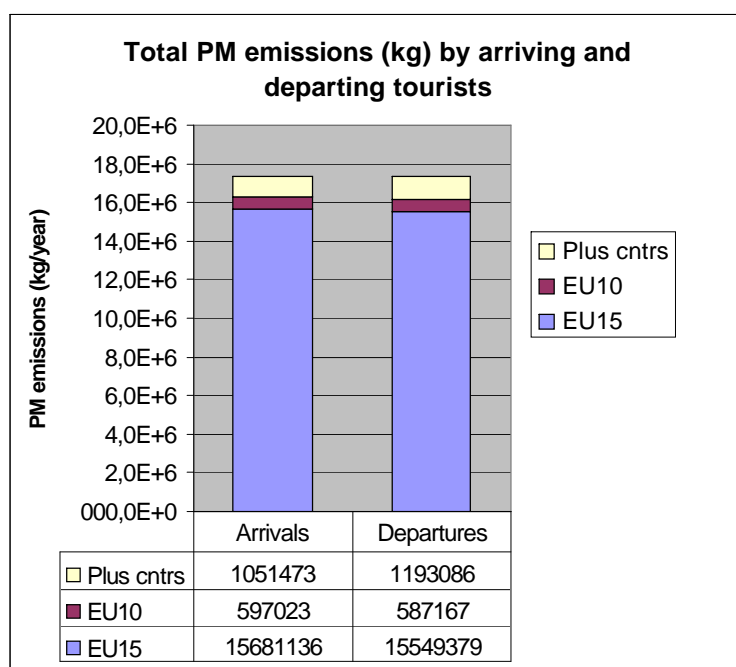


Figure A. XXI: Total emissions of PM showing the amounts for arrivals and departures for the three different groups of EU countries for 2001.

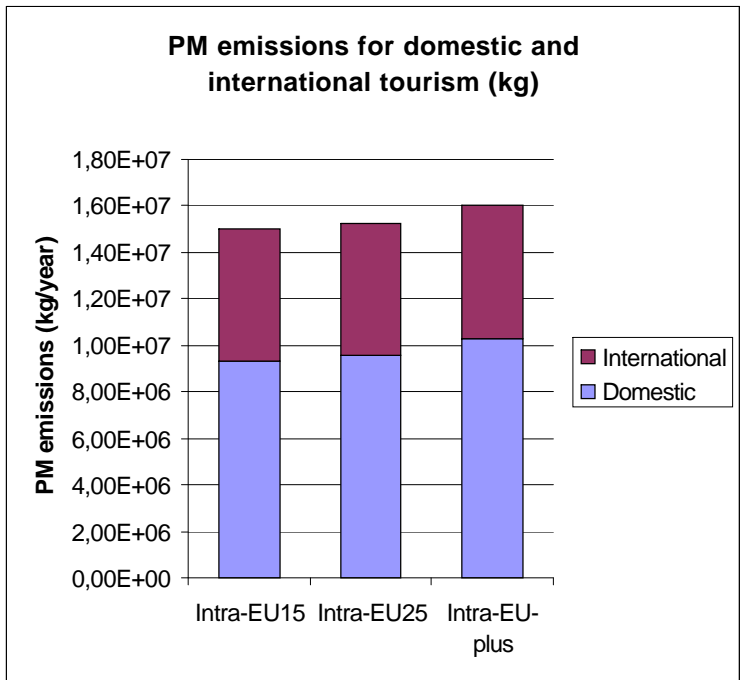


Figure A. XXII: Division of emissions of PM over domestic and international for the three different groups of EU countries for 2001.

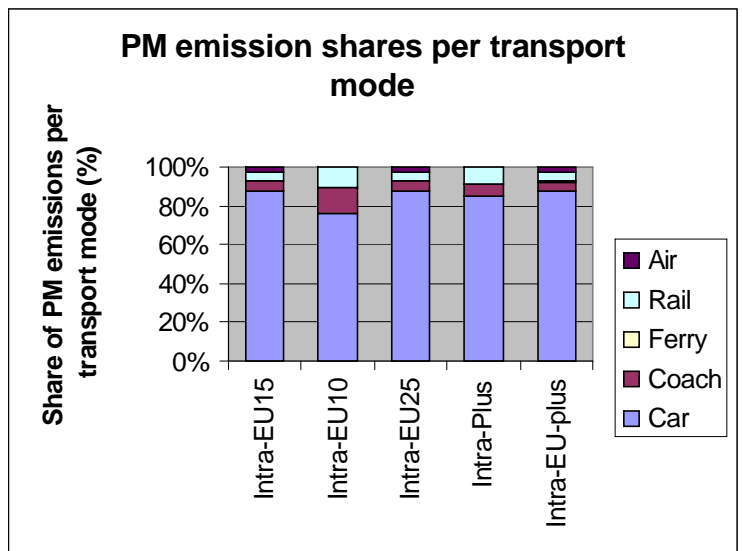


Figure A. XXIII: PM emissions per mode of transport for 2001. Ferry and coach are estimates based on the calculated total for road (car+coach+ferries).

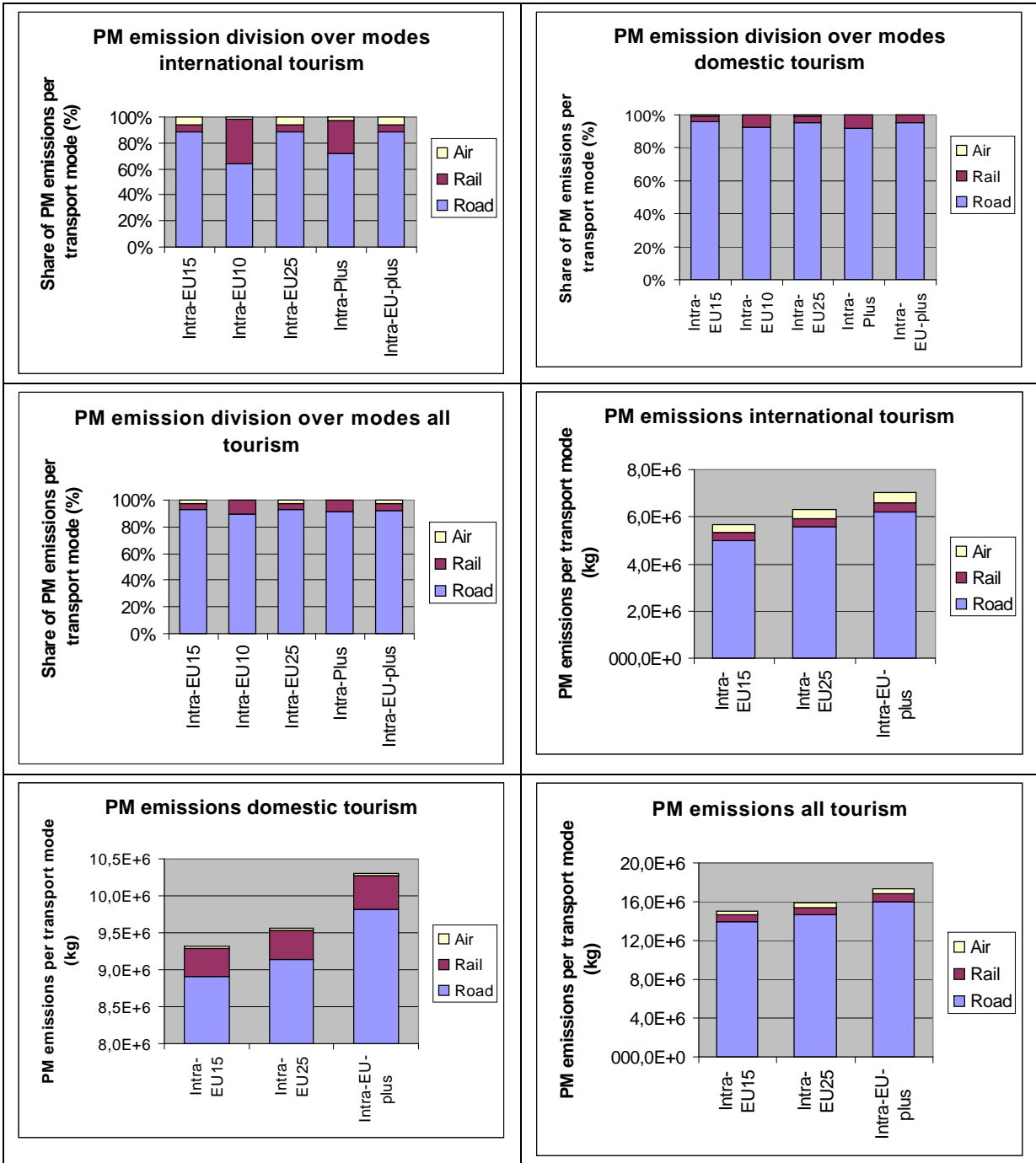


Figure A. XXIV: PM emissions per transport mode per group of countries in percentages and absolute amounts (kilograms) for 2001 as calculated from the model (road includes car, coach and ferries).

Introduction

To find emission factors¹⁷ (emissions in kg or gram per pkm) two approaches may be used: a bottom up and a top-down. With the bottom-up approach the actual fuel consumption and emissions of individual vehicles are assessed first for an average mission (speed, distance, load factor). Then the average is found based on the actual composition and use of the fleet. With the top-down method the totals for energy consumption and connected emissions as statistically measured, is divided by the total measured transport performance (pkm), to give average values for emission factors. In the following sections both methods will be used as far as appropriate within the context of this preliminary study.

Car

The TREMOVE database as published by June 2004 on the website for the EU15 countries gives emissions and passengerkilometers from which the top-down emission factors have been calculated (TREMOVE, 2004). As the emission factors are given by the TREMOVE output table for diesel and petrol cars separately, the distribution of vehicle kilometres for these two types has been used to add the two figures (33% diesel and 67% petrol).

TREMOVE average car emissions EU15 (2 persons/car)		
CO ₂ emissions	NO _x emissions	PM emissions
g/pkm	g/pkm	g/pkm
115	0,43	0,0195

The question now is if the average car fleet is used for tourism OD-transport, if the occupancy of two persons per car is the average and if no other circumstances increase or reduce these emissions.

First the occupancy rate. Generally OD-transport for holidays (leisure tourism) will tend to be higher than average, as many families will use together a car. The family size has been decreasing for a long time, specifically in the holiday source countries like Germany (2.2) and The Netherlands (2.3) (both based on data from Eurostat <http://europa.eu.int/comm/eurostat/>). This will of course affect the number of occupants at family holiday OD transport. For business tourism may have rather low occupancies, somewhere between 1 and 2 occupants per vehicle. All considering an occupation rate of two persons per car has been chosen.

The impact of attributes like caravans and external roof luggage has been taken from a recent bottom-up analysis of emission factors by MilieuCentraal (www.MilieuCentraal.nl). From this study following fuel consumption factors have been found for:

- external roof luggage: 1.2
- Caravan: 1.6

The share of cars with caravan or roof luggage is unknown within the MuSTT study. We assume a conservative 5% increase for this kind of effects.

Another influence may be the non-average car fleet composition. The assumption here is for long distance tourism OD-transport, most people will tend to choose for their larger car, in case they own more than one car. Larger cars use more fuel and create more emissions per pkm. In The Netherlands 25% of all car owning households possess more than one car. Based on this figure the some 25-35% percent of small cars may be not used for tourism OD-

¹⁷ Only direct emissions for operation have been taken into account; including also indirect emissions may increase emissions between a few percent to 20-30% extra. These increases may differ between different transport modes. It is without the scope of the MuSTT Phase I study to account for these.

transport. A conservative estimate of the impact on fuel consumption and emissions now is 10% extra due to fleet composition.

MuSTT average car emissions EU15 (2 persons/car)		
CO ₂ emissions	NO _x emissions	PM emissions
g/pkm	g/pkm	g/pkm
133	0,50	0,0225

Coach

The emissions for coach have been entirely based on the data given by the TREMOVE 2.0 EU15 output generated in June 2004 (TREMOVE, 2004). The database gives the total amounts of emissions for 2001 for coaches (as distinguished from busses) and the total vehicle kilometrage of coaches. Assuming an occupation rate of 75% and a coach seat capacity of 45 on average the following figures have been found:

CO ₂	NO _x	PM ₁₀
g/pkm	g/pkm	g/pkm
22	0,246	0,0103

Rail

Railway emissions have been based on the current status of TREMOVE de Ceuster, van Herbruggen et al., 2004, which refers to the former TRENDS study (LAT, DTU et al., 1998). The TRENDS data have been published in 1998 and are based on the year 1995. However, rail emissions tend not to change very fast due to the long operational life of most rolling stock and the slow developments of electricity generating capacity. From the data given in the TREND report for both electric and diesel passenger trains for the EU15, it appears the average country emission factors vary over a factor ten. This is mainly due to the share of diesel (high emissions if high share) and of nuclear electricity generating plants (low emissions if share is high). The average for the EU25 might be a bit higher due to a lower nuclear share in the EU10 countries compared to the EU15. The results for EU15 (1995) is:

CO ₂ emissions	NO _x emissions	PM emissions
g/pkm	g/pkm	g/pkm
53	0,31	0,025

From a bottom-up analysis for the Dutch Railway Company (NS) by the RIVM (Gijzen and van den Brink, 2002) it appears emissions factors for CO₂ vary between 28 g/pkm for an intercity (at 45% occupancy rate) and 78 g/pkm for diesel local train (at 35% occupancy rate). The Dutch average is 42 g/pkm. These figures are valid for all rail transport, including short distance commuters. For tourism OD-transport generally a larger than average share of long distance IC/EC trains will be used. Assuming the Intercity to be the main transport mode and assuming several holiday trains to reach much higher occupancy rates than the average the values of TRENDS have been reduced with the ratio of the Dutch IC and regional train emissions for electric trains (28/55=0,51).

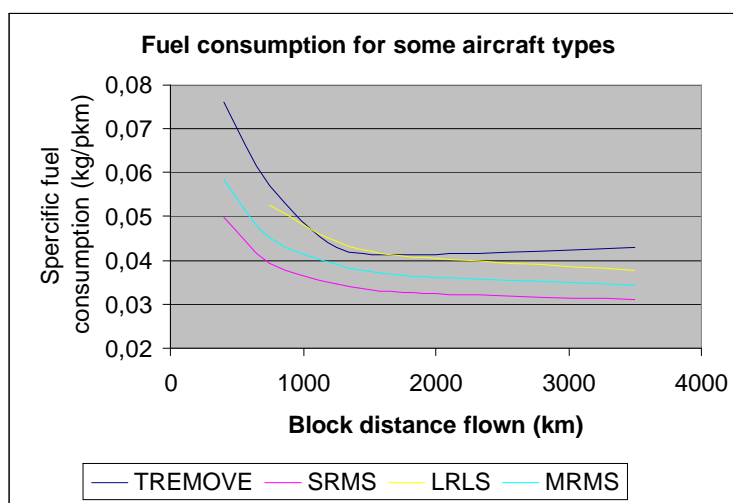
Thus the final values become:

CO ₂ emissions	NO _x emissions	PM emissions
---------------------------	---------------------------	--------------

g/pkm	g/pkm	g/pkm
27	0,16	0,013

Air

For TREMOVE some average fuel consumption and emission data as a function of the distance flown (the block distance) have been published. The general trend is a reduction of specific fuel consumption with increasing block distance. From a bottom-up approach of air transport emissions based on the APD-model created for the ESCAPE project (Dings, Peeters et al., 2000) and a report to DG-TREN (Wit, Dings et al., 2002) the same trend has been found, though more steeply and with a minimum value at a higher block distance. Further it appears the values from TREMOVE are much higher as from the bottom-up calculation for three very commonly used aircraft types. Only the long range large aircraft has rather high specific fuel consumption, but this aircraft is not optimised - and therefore not much used - on distances shorter than 4000 km.



Annex figure I: Specific fuel consumption as function of block distance for short range small size (SMSR), long range large size (LRLS), medium range medium size (MRMS) and as given by TREMOVE (de Ceuster, van Herbruggen et al., 2004).

Average values have also been found from scenario studies with the AERO model (Pulles, Baarse et al., 2002). From these data and extrapolating linearly between the 1995 base year value and the 2010 AERO medium economic growth prognosis a value of 0,036 kg/pkm for 2001 has been found. This is near the value for the medium range medium size aircraft at around 2000 km block range, which may be seen as a reasonable average. Therefore we have used these values in stead of the TREMOVE data, which may be considered too high and not accurate at the relation with block distance.

The APD-model basically evaluates the full flight path for a given mission and finds the fuel consumption, mission time and emissions of carbon CO₂ and NO_x. The calculations have been calibrated to real flight mission measurements. With the MRMS aircraft type as typical average the emissions of CO₂ and NO_x have been calculated for the distance classes (the average of the class boundaries, except for the class of <500 km, for which 400 km has been chosen).

Emissions of PM are not included in the APD model. A recent measurement showed a typical emission factor for PM of 0.03 g/kg fuel burned (Boudries, Wormhoudt et al., 2003). This

value has been used to fill the table for the different distance classes as a first approximation of PM emissions.

Ferries

Unfortunately TREMOVE does not give information on this subject; only maritime freight transport is covered. Only one older studie (Peeters, 1996) is known to the authors from which the folowing data have been established, assuming an occupation rate of 50%:

CO ₂ emissions	NO _x emissions	PM emissions
g/pkm	g/pkm	g/pkm
66	1,6	0,001