gtz Transport Policy Advisory Services

Facts and Figures on Transport

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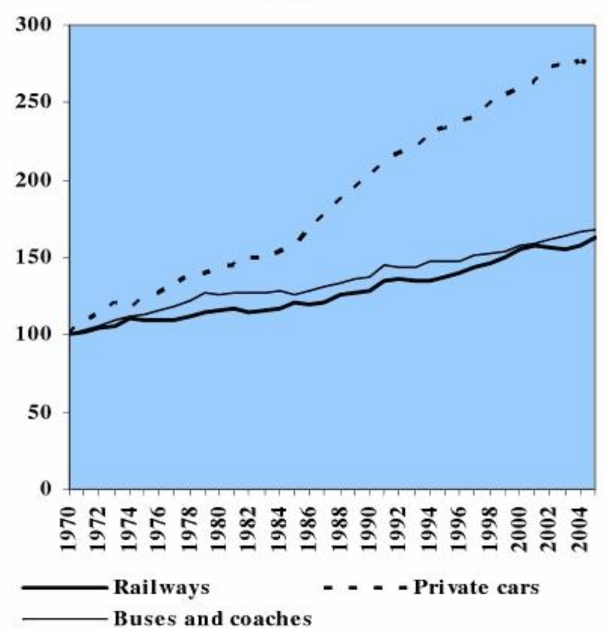
Content

1. Introduction: Transport since 1970

Fact Sheet 1: Transport volume

- Passenger and goods transport activities have grown rapidly since the 1970s.
- They are projected to continue growing, driven primarily by rapid growth in real per capita income.
- Transport activity growth will be especially rapid in developing countries.
- According to Sustainable Mobility Project calculations (WBCSD 2004), annual growth in passenger transport activity over the period between 2000 and 2030 is estimated to be at an average of approximately:
  - 3% in China and Latin America;
  - 2% in the Former Soviet Union, India, and the Middle East;
  - 1% or less in the three OECD regions including Europe.
- A large “mobility opportunity gap” will persist between developed countries and developing countries.

Trends in passenger transport (passenger-kms) – Western Europe – 1970=100

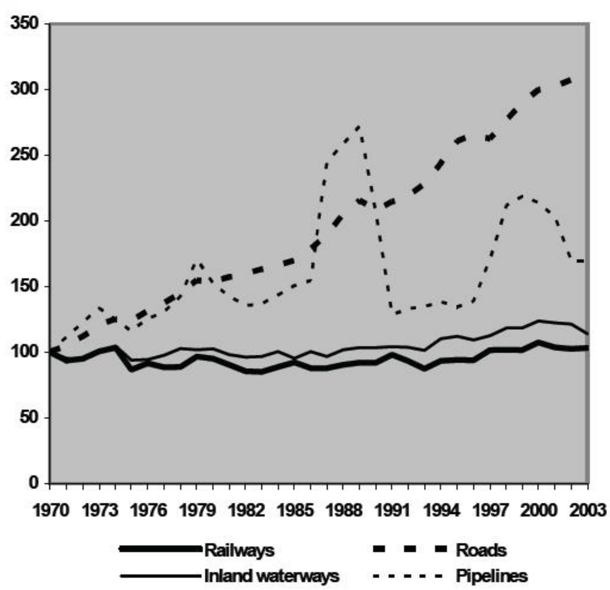


Source: ECMT

Railways,	18 countries : AUT,BEL,CHE,DEU,DNK,ESP, FIN,FRA,GBR,GRC,IRL,ITA,LUX,NLD,NOR, PRT,SWE,TUR
Private cars,	15 countries : BEL,CHE,DEU,DNK,ESP,FIN, FRA,GBR,GRC,ISL,ITA,NLD,NOR,PRT,SWE
Buses and coaches,	15 countries : BEL,CHE,DEU,DNK,ESP,FIN, FRA,GBR,GRC,ISL,ITA,NLD,NOR,PRT,SWE

Source: ITF / ECMT 2007 , Trends in the Transport Sector

Freight transport trends (tonne-kms) -Western Europe – 1970=100

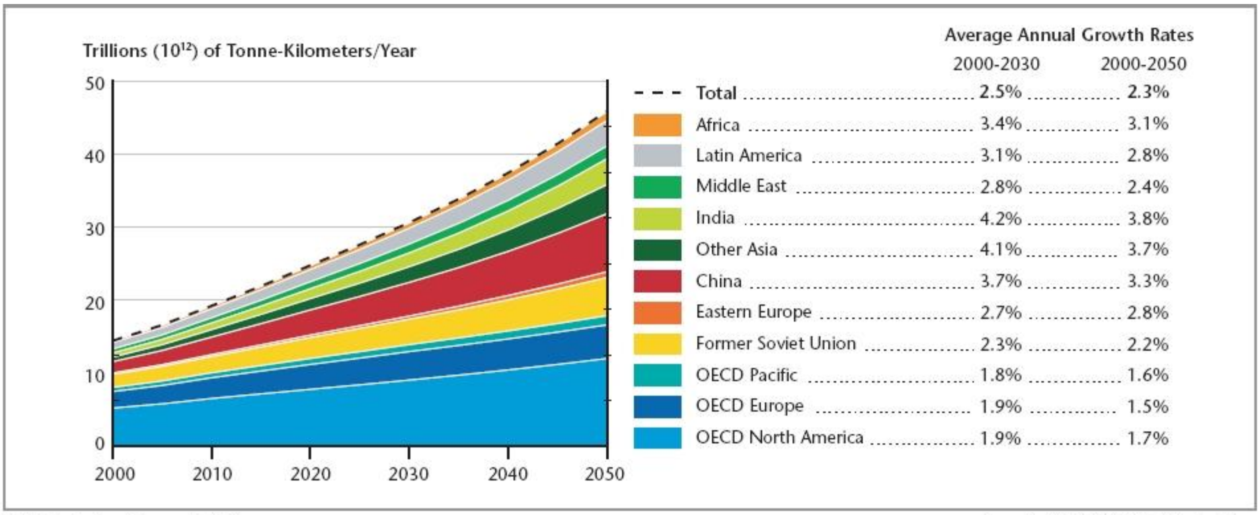


Source: ECMT

Railways	18 countries : AUT,BEL,CHE,DEU,DNK,ESP,FIN, FRA,GBR,GRC,IRL,ITA,LUX,NLD,NOR,PRT,SWE, TUR
Roads	16 countries : AUT,BEL,CHE,DEU,DNK,ESP,FIN, FRA,GBR,GRC,ITA,LUX,NLD,NOR,
Inland waterways	10 countries : AUT,BEL,CHE,DEU,FIN,FRA,GBR, ITA,LUX,NLD
Pipelines	12 countries : AUT,BEL,CHE,DEU,DNK,ESP,FRA, GBR,ITA,NLD,NOR,TUR

Source: ECMT 2003 , Trends in the Transport Sector

Projected freight transport activity by region

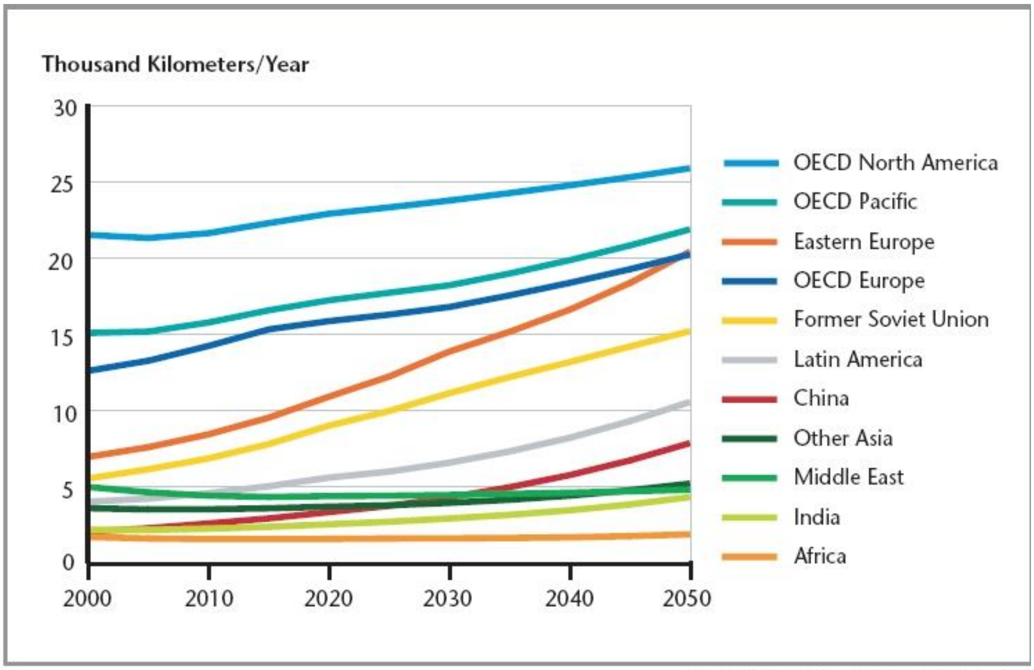


Note: Excludes air, waterborne and pipeline.

Source: Sustainable Mobility Project calculations.

Unless indicated otherwise, all figures in this document taken from the Sustainable Mobility Project Full Report 2004 are based on the SMP reference case projections, which rely on IEA projections, but substantially increased modal and regional detail using information from public sources and information supplied by SMP member companies. They also incorporated data and relationships reflecting aspects of sustainability that the IEA does not address including transport-related "conventional" emissions, safety, and materials use.

Projected per capita transport activity by region



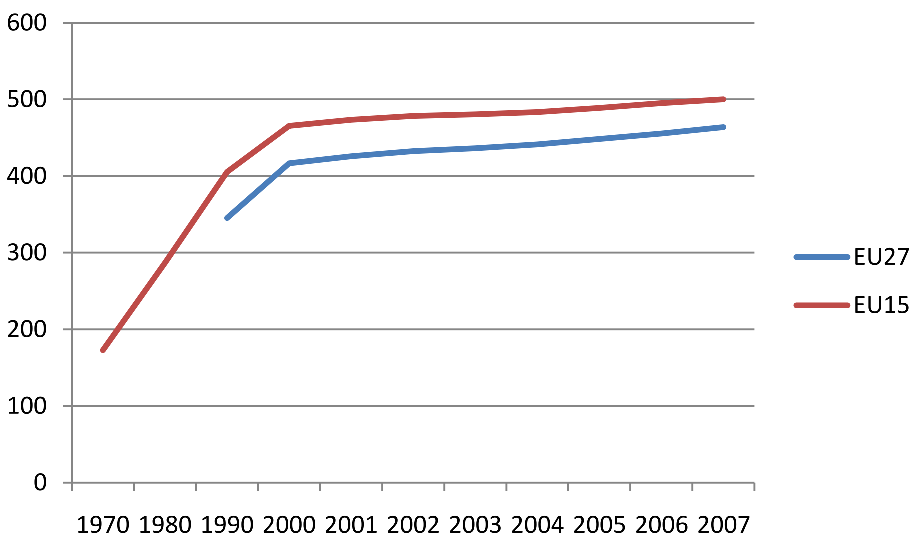
Source: Sustainable Mobility Project calculations.

Source (both figures): The Sustainable Mobility Project Full Report 2004

Fact Sheet 2: Motorization

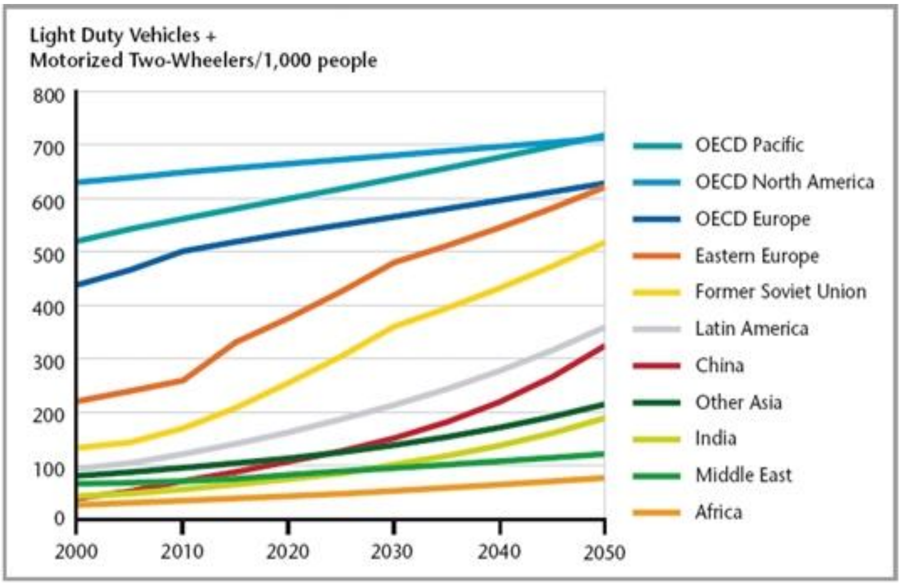
- The overall number of cars is rising continuously – in the European Union as well as worldwide. This also applies private motorized vehicles ownership per capita (measured in terms of vehicles per 1000 persons).
- In the industrialized countries, motorization will mainly consist of increase in passenger cars and light duty vehicles, while in Asia a significant share of increased "motorized two-wheelers (WBCSD 2004, *see figure on next page and Fact Sheet 4)* will be seen.
- By 2050, private motorized vehicle ownership (vehicles per 1,000 persons) in Eastern Europe and the Former Soviet Union will be higher than those in OECD Pacific or OECD Europe today. Ownership in Latin American and China will be approaching those achieved now in OECD Europe (WBCSD 2004).

EU: Number of passenger cars per 1000 inhabitants



Source: EU DG TREN, 2009

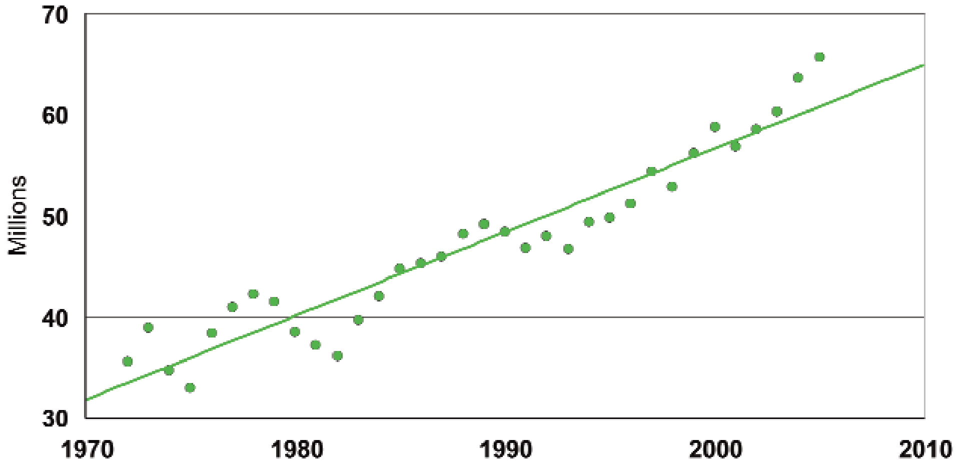
Projected growth in private motorized vehicle ownership



Source: WBCSD: 2004

Annual production of cars, trucks, and buses

- “Growth in motor vehicle production since 1945 has been dramatic, rising from approximately 5 million vehicles annually to more than 60 million. Between 1970 and 2005, approximately 1 million more vehicles have been produced each year compared to the year before, with almost 66 million vehicles produced in 2005 alone.
- Since vehicles have been produced at a faster rate than they have been scrapped, the global vehicle fleet has steadily grown (see Figure 2). The global vehicle population exceeded 1 billion in 2002 and continues to rise. Since 1990, approximately 27 million more vehicles are on roads and highways each year compared to the previous year.” (Source em • feature Michael Walsh, page 11)

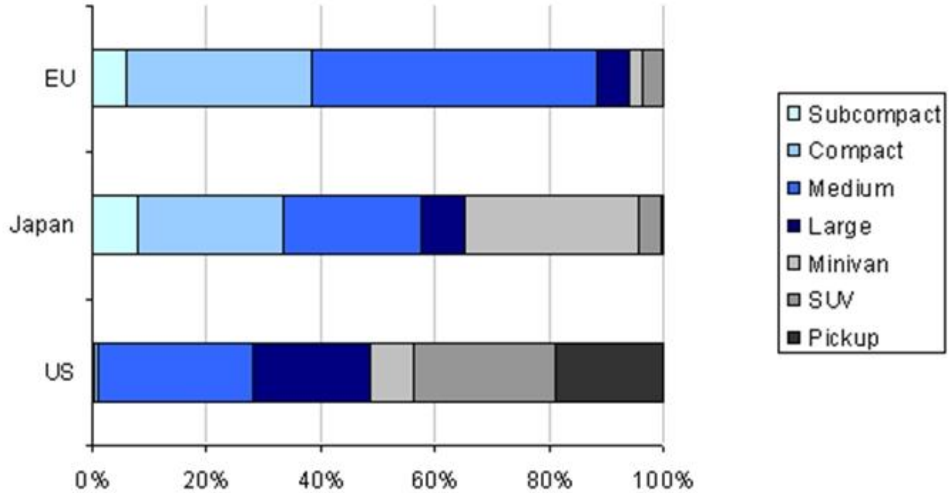


Source:. em • feature Michael Walsh Moving Toward Clean Vehicles and Fuels A Global Overview; Page 11

Fact Sheet 3: Market share of vehicles

- Small and medium cars account for the vast majority of cars in Europe and, to a somewhat lesser extent, in Japan. The market share of SUVs, Pickups and large cars was at only slightly more than 10 percent in 2002. Trends in the past few years may have altered this pattern. However, current data for Germany, the most important market for vehicles in the EU, largely confirm the 2002 patterns.
- The US relies heavily on large cars and Pick-ups with high energy consumption.
- Maintaining fleet patterns such as in the US implies serious obstacles for GHG emission reduction via car-based technological improvements.

Market share of vehicles, 2002



Source: Adapted from Austin and Sauer 2003, Chapter Three of *Changing Drivers: The Impact of Climate Change on Competitiveness and Value Creation in the Automotive Industry.*
http://earthtrends.wri.org/features/view_feature.php?theme=5&fid=53

Vehicle stock in Germany by category, as of 1/1/2009

Category	Mini	Small	Compact	Medium	Upper Medium	Upper	SUV/ 4WD	Vans	Light Utility Vehicles	Others
Share in %	5,4	19,9	27,9	20,1	5,9	0,5	3,2	8,0	3,0	6,2

Source: Kraftfahrzeugbundesamt Online Datenbank, 2010

Fact Sheet 4: Length of roads and railways

- The length of motorways in the EU has been growing constantly in the past 20 years. This applies to the EU-15 as well as to the new member states. Overall, the length of motorways in the EU-27 has risen by 51% during the period from 1990 to 2006.
- In contrast, the rail network has been shrinking during the same period, especially in the EU-12. This reflects the abandoning of a large number of secondary lines especially in rural areas, as well as the rapid reduction of feeder lines to and from former cargo customers which now rely on road transport. The railway network in the EU-27 as of 2007 is 8% smaller than in 1990, with the reduction in EU-12 even amounting to more than 11% of the respective network.
- An opposite trend can be observed for high-speed rail networks, whose overall length has increased by more than 800% since the mid-1980s. This growth is also mirrored with regard to geographic coverage. While high speed rail systems could only be found in very few countries in the 1980s, they have now spread to all major European countries.

Length of motorways in the EU

	km (at end of year)						
	1990	1995	2000	2003	2004	2005	2006
EU-27	41 885	47 970	54 700	58 850	60 100	62 000	63 400
EU-15	39 616	45 468	51 471	55 292	56 294	58 000	59 205
EU-12	2 269	2 502	3 229	3 558	3 806	4 000	4 195

Length of overall road network the EU

	km (at the end of 2006)
EU-27	1 561 948

Note: Number is based on the sum of motorways, main/national roads and secondary/regional roads. Due to differences in the definitions of road types, other roads are not included in the above calculated sum. In general, the number should be interpreted with caution due to statistical problems (also compare with numbers cited in the figure on 'Transport-related infrastructure' on the next page).

Length of railways in the EU

	km						km	%
							OF WHICH: ELECTRIFIED 2007	
	1990	1995	2000	2005	2006	2007		
EU-27	231 582	227 105	217 349	215 542	215 856	212 336	109 564	51.6
EU-15	162 132	160 000	151 938	153 515	154 087	150 763	82 505	54.7
EU-12	69 450	67 105	65 411	62 027	61 769	61 573	27 059	43.9

Source: EU Energy and transport in figures – 2009 Pocketbook, pp.147

Length of high speed railway network in the EU (Vmax > 250km/h)

							km (at end of year)
	BE	DE	ES	FR	IT	UK	EU
1985	-	-	-	417	224	-	641
1990	-	90	-	699	224	-	1 013
1995	-	447	471	1 220	248	-	2 386
2000	58	636	471	1 278	248	-	2 691
2001	58	636	471	1 573	248	-	2 986
2002	120	833	471	1 573	248	-	3 245
2003	120	875	1 069	1 573	248	74	3 959
2004	120	1 202	1 069	1 573	248	74	4 286
2005	120	1 202	1 090	1 573	468	74	4 527
2006	120	1 291	1 272	1 573	562	74	4 892
2007	120	1 300	1 516	1 893	562	113	5 504
2008	120	1 300	1 594	1 893	744	113	5 764

Comparison of transport-related infrastructure: EU and worldwide

TRANSPORT INFRASTRUCTURE					
	EU-27	USA	JAPAN	CHINA	RUSSIA
1 000 km	2006	2006	2006	2006	2006
Road network (paved)	*5 000*	6 463	1 190	2 283	755
Motorway network	63.4	95.3 (1)	7.4 (2)	45.3	29.0
Railway network	215.9	203.6 (3)	27.6	77.1	85.5
Electrified rail lines	108.2		15.7	23.4	42.3
Navigable inland waterways	*43.0*	41.8	*1.8*	123.4	102.0
Oil Pipelines	*33.6*	272.5	*0.2*	24.1 (4)	46.7 (5)

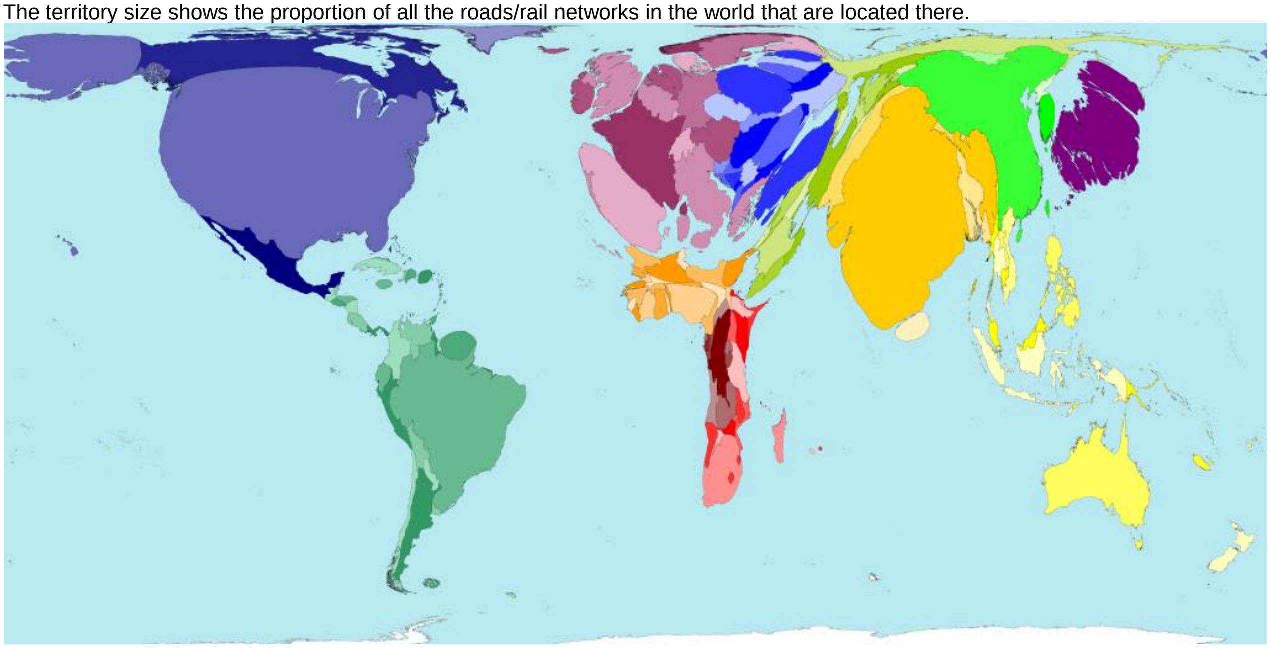
Notes: (1) **USA**: 2007: divided highways with 4 or more lanes (rural or urban interstate, freeways, expressways, arterial and collector) with full access control by the authorities.
(2) **Japan**: national expressways. Length of roads with a central zone: 17 000 km.
(3) **USA**: a sum of overlapping networks.
(4) **China**: 2007: Crude oil pipelines. Refined oil pipelines: 2005: 5 443 km.
(5) **Russia**: Oil pipelines. Oil products pipelines= 16 000 km.

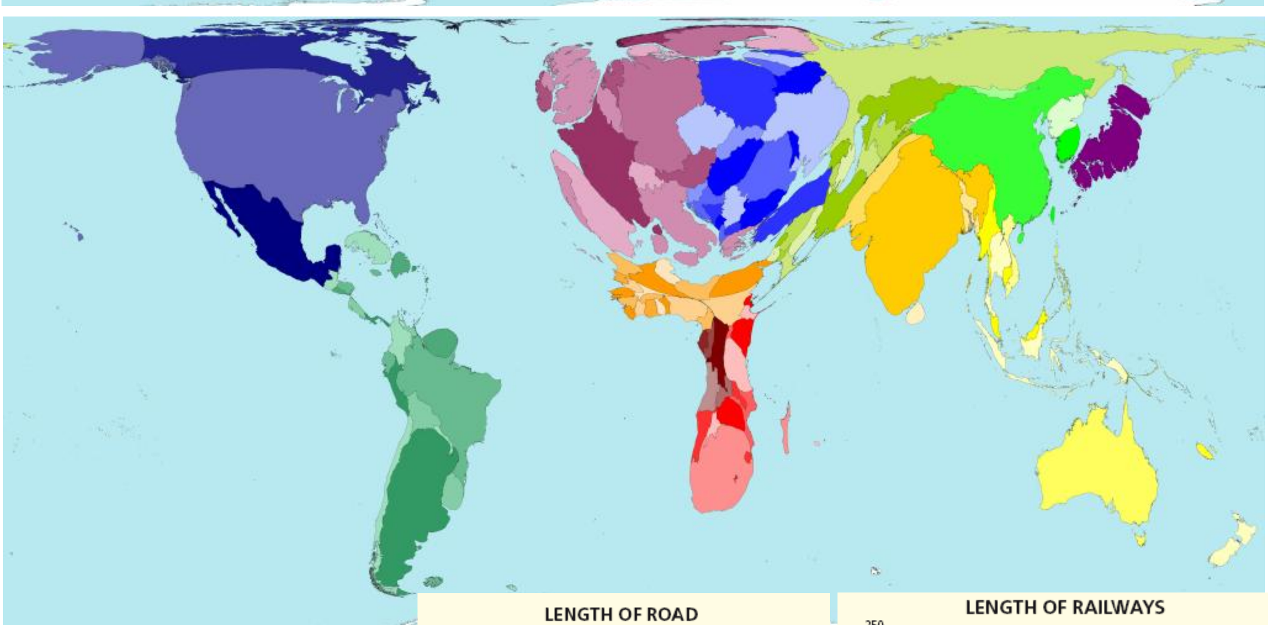
Data for Road Network (paved) include Motorway network, Railway network includes Electrified rail lines.

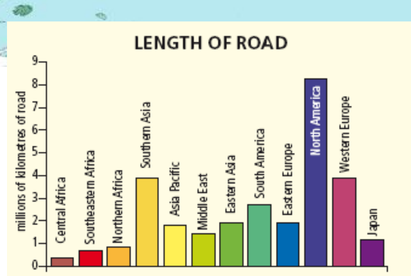
Source (both figures): EU Energy and transport in figures – 2009 Pocketbook, p.105/p.150

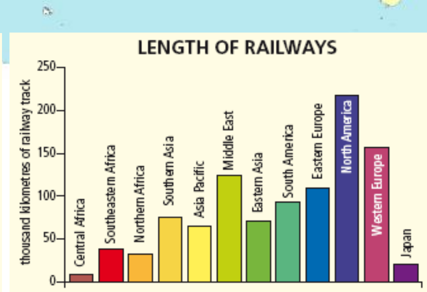
- There is an uneven distribution of world road (above) and rail (below) networks. In 2002 there were 29 million kilometres of road and one million kilometres of railway in the world.
- “Regionally the highest number of roads per square kilometre are found in Japan and the lowest in the Middle East, where most of the world’s petroleum is extracted and where some of the oldest cities are sited. Many of the territories without a rail network are relatively small islands.
- Of the seven territories with the largest land areas, six also have the longest distances of railway.” (Source: 2006 SASI Group)

The territory size shows the proportion of all the roads/rail networks in the world that are located there.







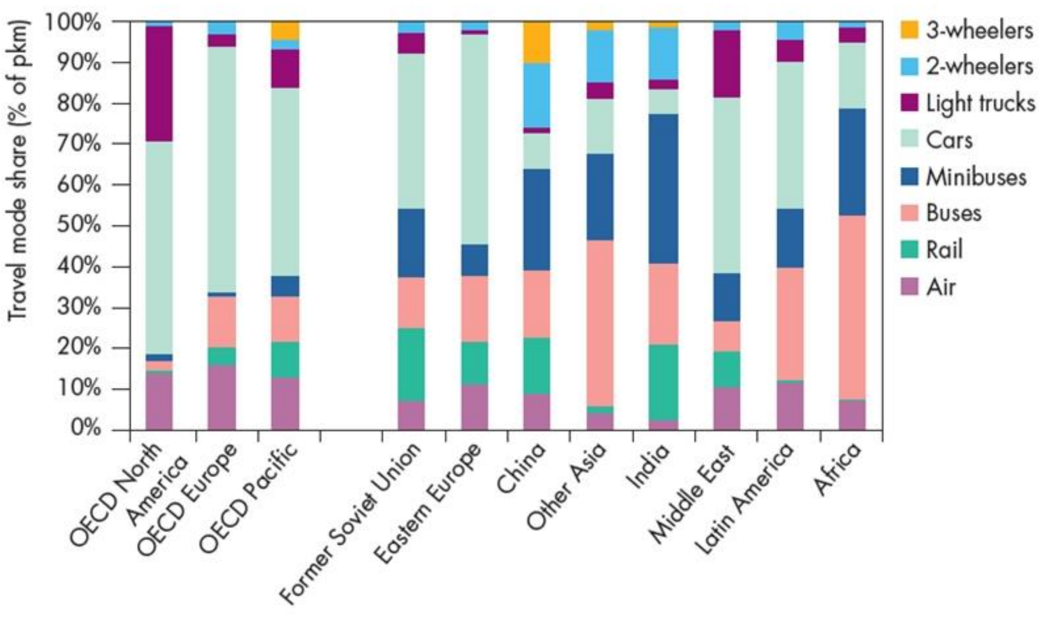


Source 2006 SASI Group (University of Sheffield) and Mark Newman (University of Michigan)
(both maps): Worldmapper
http://www.worldmapper.org/display.php?selected=35

Fact Sheet 5: Modal Split

- Global passenger transport modal spilt shows significant regional difference.
- Private motorized transport with cars and light trucks dominates in highly developed OECD countries, but also in Eastern Europe and the Middle East.
- Cars dominated with 74 % the passenger transport (pkm) in EU 27 in the year 2006. (Air 9%, Railway 7%, Tram and Metro 1 % Bus and Coach 9%)
- "In the EU-15 the modal shares of road and rail freight stayed almost constant. At the same time, the modal share of rail and road in the EU-10 diverged as the removal of trade barriers and liberalisation of markets led to a decline in heavy industry, which prompted increased demand for road transport. A change in the geographic orientation of trade (from east to west) has also contributed to the shift because the new markets are not connected by rail links and offer much more flexible road transport connections as an alternative. At the present rate of change, the balance of rail and road freight transport in the EU-10 will be similar to the EU-15 within a decade" (Term 2008 page 13)
- In most Asian and African countries large and small public buses dominate passenger transport.
- Retaining the larger share of public transportation modes in developing countries is important: Once the transport system is centered on private motorized transport modes, it may become persistent.
- Until 2050, freight transport will triple (based to the year 2000), mainly driven by heavy duty trucks
- In passenger transport the main growth is in road and air transport.

Global motorized passenger travel by modal split, 2005



Source: IEA Mobility Model database estimates.

Persistent percentage: Share of cars in total passenger travel, EU-15

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
84%	*84%*	*84%*	*85%*	*85%*	*84%*	*85%*	*85%*	*85%*	*85%*	*85%*	*85%*	*85%*	*85%*	*84%*	*85%*	*84%*

Source: EUROSTAT

Modal split in selected Asian cities

Table 3 **Mode Split In Selected Asian Cities** (ADB, 2001)

	Private Automoible	Train, Tram, Light Rail	Bus	Motorcycle or Three-Wheeler	Bicycle, including pedi-cab	Walking	Others, including Boat, Taxi, Animal, etc.
Bangalore	11%	7%	38%	18%	11%	16%	0%
Bishkek	10%	60%	20%	2%	1%	7%	0%
Cebu	4%	0%	60%	0%	0%	0%	36%
Colombo	4%	4%	71%	13%	0%	6%	2%
Dhaka	3%	0%	9%	3%	1%	60%	24%
Hanoi	NAV	NAV	9%	59%	29%	4%	0%
Hohhot	2%	0%	2%	4%	91%	1%	0%
Hong Kong	8%	34%	53%	0%	0%	0%	5%
Kathmandu	NAV	NAV	4%	33%	0%	0%	63%
Lahore	18%	NAV	15%	19%	19%	17%	12%
Mandaluyong	22%	1%	7%	17%	3%	13%	37%
Medan	5%	NAV	86%	8%	0%	0%	0%
Melbourne	55%	40%	2%	1%	1%	1%	1%
Naga	19%	0%	58%	19%	4%	0%	0%
Phnom Penh	10%	0%	15%	60%	2%	3%	10%
Seoul	20%	32%	29%	NAV	NAV	NAV	19%
Bangalore	11%	7%	38%	18%	11%	16%	0%
Bishkek	10%	60%	20%	2%	1%	7%	0%

NAV – not available

Source: Victoria Transport Policy Institute; Transportation Statistics; TDM Encyclopedia :http://www.vtpi.org/tdm/tdm80.htm; original from: Asian Development Bank (ADB) Urban Indicators for Managing Cities

Key Transport Statistics 2008

International Transport Forum

Countries	RAIL Goods Transport (million T-km) National 2008	Δ% 08/07	RAIL Goods Transport International 2008	Δ% 08/07	RAIL Passengers Carried (million P-km) 2008	Δ% 08/07	ROAD Goods Transport (million T-km) National 2008	Δ% 08/07	ROAD Goods Transport International 2008	Δ% 08/07	ROAD Traffic (million V-km) 2008	Δ% 08/07
Albania												
Armenia												
Australia			-	-					-	-		
Austria	4 349	19.1	11 086	-3.4			10 753	-3.2	15 033	-13.5		
Azerbaijan	1 728	-10.7	8 294	-1.7	1 047	-5.6	9 705	9.0	242	6.1		
Belarus												
Belgium	2 047	19.3	5 291	-2.1	9 467	4.2						
Bosnia-Herzegovina												
Bulgaria	3 336	-14.4	1 357	1.0	2 335	-3.6	5 326	25.1	5 854	-6.8	1 314	7.2
Canada											243 774	-3.2
Croatia	620	-5.3	2 733	-5.8	1 794	16.5	6 447	25.9	4 598	-14.5	21 861	1.2
Czech Republic	6 520	-12.5	9 022	-1.9	6 794	-1.5	15 755	-0.2	35 122	8.5		
Denmark	134	-8.2	1 815	11.1	6 471	2.2	10 719	-9.1	9 435	-20.0		
Estonia	763	-11.1	5 236	-27.9	273	0.7	2 386	-4.6	6 507	-20.2		
Finland	7 589	0.1	3 189	11.8	4 053	7.3	27 614	6.4	3 421	-11.3	52 980	-0.5
France	16 731	-4.5	11 583	-16.9	73 621	6.5	181 951	-5.0	13 385	-12.1		
FYROM	15	-44.4	728	-3.1	148	35.8	2 812	-38.4			232	-27.3
Georgia	6 516	-5.9			675	-12.8	601	1.1				
Germany	55 928	4.0	59 724	-1.8	60 663	2.2	201 775	3.1	54 552	-2.0		
Greece												
Hungary	1 320	2.4	8 497	-4.0	8 304	-5.1	13 024	-1.1	22 709	0.3	43 247	4.4
Iceland	-	-	-	-	-	-			-	-		
Ireland	103	-19.5			1 975	-1.6						
Italy	12 127	-4.1	7 991	-6.6	45 767	-0.5					77 097	-0.6
Japan	23 211	0.0	-	-	406 941	1.0			-	-		
Korea	11 566	5.8	-	-	54 997	-1.4			-	-		
Latvia	334	-10.9	17 370	6.2	950	-3.5	2 536	-14.3	9 807	-3.7	1 030	-7.3
Liechtenstein	-	-	-	-	-	-						
Lithuania	3 654	23.5	11 093	-2.8	397	-2.9	2 559	-5.4	17 858	1.6	1 644	-3.8
Luxembourg	65	-5.8	215	-1.4	345	9.2						
Malta	-	-	-	-	-	-			-	-		
Mexico	74 583	-3.4			224	166.7						
Moldova												
Netherlands												
New Zealand			-	-			19 538	1.6	-	-		
Norway	2 454	1.2	905	-1.5	3 040	1.6	12 668	10.6	3 034	2.0		
Poland	23 688	-11.0	15 676	-7.3	17 703	3.6	80 720	34.4				
Portugal	2 342	1.5	208	-25.2	3 816	2.8	13 309	-4.4	17 680	-14.1		
Romania	9 123	1.2	2 725	-2.2	6 877	-7.3	18 551	1.0	27 341	-0.1		
Russia	2 116 240	1.2			175 872	1.0	216 276	5.1	4 803	66.0		
Serbia	446	-26.3	3 880	-2.1	592	-14.1	427	-2.5	686	-5.0	97	7.8
Slovakia	1 081	-2.0	8 199	-2.9	2 296	6.1	6 325	12.5	22 769	6.5		
Slovenia	741	10.5	2 780	-5.2	834	2.7	2 021	10.0	10 027	20.8		
Spain	9 734	-7.1			22 072	10.4	170 860	-7.9	67 794	-0.7		
Sweden	15 831	1.0	7 412	-2.1	11 017	7.3	27 916	3.0	3 420	13.2	52 255	-0.9
Switzerland	2 750	8.4	9 766	-9.8	16 112	6.5						
Turkey	9 117	8.0	1 342	2.0	5 134	-7.5						
Ukraine	92 982	-11.1	164 025	3.9	53 225	0.3						
United Kingdom	21 079	-0.9			50 442	4.3					507 400	-1.1
United States	2 523 786	-1.3			9 943	6.8					4 665 201	-3.4
EU	198 618	-1.3	190 468	-3.9	336 471	3.4	794 100	0.5	342 714	-2.1	736 967	-0.7
OECD	2 828 875	-1.3	164 700	-4.3	822 030	2.0	794 948	0.7	278 381	-1.8	5 641 955	-3.1
ITF	5 064 631	-0.5	382 141	-0.8	1 066 215	1.7	1 062 574	1.6	356 077	-1.7	5 668 133	-3.1

Countries	ROAD First Registration (number) Private Cars 2008	Δ% 08/07	ROAD First Registration Goods Vehicles 2008	Δ% 08/07	ROAD Fuel Deliveries (1 000 t) Motor Petrol 2008	Δ% 08/07	ROAD Fuel Deliveries Motor Diesel 2008	Δ% 08/07	ROAD Road Accident Fatalities (number) 2008	Δ% 08/07
Albania										
Armenia										
Australia										
Austria	293 697	-1.5	37 485	2.2					679	-1.7
Azerbaijan	79 320	9.7	7 332	-29.7	920	16.5	900	36.4	1 052	-5.0
Belarus										
Belgium	540 542	2.2	70 497	-1.3						
Bosnia-Herzegovina										
Bulgaria	5 365	16.2	13 642	11.6						
Canada										
Croatia	75 756	6.5	8 363	-7.5					659	6.5
Czech Republic	141 626	2.2	58 896	-14.9	2 020	-3.3	4 040	0.5	1 076	-11.9
Denmark	150 661	-7.3	40 372	-36.0					392	-3.4
Estonia	24 590	-20.5	4 277	-32.4					132	-25.8
Finland	139 661	11.2	20 733	-4.6	1 770	-5.3	2 250	2.7	342	-10.0
France	2 050 283	-0.7	57 504	9.5	9 040	-8.3	32 530	-0.7	4 261	-7.8
FYROM										
Georgia	76 585	47.8	9 160	40.2					867	17.6
Germany	3 090 040	-1.8	275 050	0.1					4 467	-9.7
Greece	293 768	-7.0	50 391	-6.4					1 566	-2.9
Hungary	176 622	-9.7	36 419	-4.1					996	-19.2
Iceland	9 025	-43.4	289	46.9	200	0.0	60	0.0	12	-20.0
Ireland	151 610	-18.7	33 558	-32.2	1 730	-5.5	2 580	-4.1	279	-17.5
Italy	2 161 302	-13.3	222 281	-8.7	11 040	-7.1	26 730	2.4		
Japan	4 194 240	-3.9	801 081	-10.1					6 021	-9.3
Korea	1 089 418	0.0	166 166	-14.0						
Latvia	19 778	-39.7	3 993	-40.3	420	-2.3	770	1.3	313	-25.3
Liechtenstein										
Lithuania	191 768	-12.9	16 132	-30.1					498	-32.7
Luxembourg	52 359	2.0	5 582	12.8			1 800	3.4		
Malta	4 589	-15.3	453	-0.2					16	33.3
Mexico	589 176	-8.1	482 734	-4.8	45 330	4.2	19 000	5.6	4 051	1.1
Moldova										
Netherlands	497 032	-1.7								
New Zealand	187 345	-16.8	6 696	-21.1	2 360	-2.5	2 390	-0.8	366	-13.3
Norway	110 617	-14.4	6 528	4.3	1 340	-7.6	2 570	3.6	258	10.7
Poland	317 912	14.5	82 188	8.4	4 180	1.0	10 590	11.9	5 425	-2.3
Portugal	213 386	5.7	61 616	-17.7	1 490	-6.3	5 100	-1.4		
Romania	586 476	34.4	98 241	5.5					3 040	8.9
Russia					31 400	7.0	31 560	7.3	29 936	-10.1
Serbia	36 084	10.4	8 372	13.0			320	10.3	897	-6.7
Slovakia										
Slovenia	71 037	4.8	9 446	3.2	700	12.9	1 460	25.9	196	-33.1
Spain	1 185 258	-27.5	236 956	-43.6	4 758	-5.8	18 825	-2.0		
Sweden	276 344	-18.4	48 016	-10.3	3 680	-5.2	3 190	-2.4	412	-12.5
Switzerland	287 971	1.4	29 706	5.9	3 380	-2.0	2 190	10.1		
Turkey	353 168	-0.1	216 291	-9.2					4 307	-13.9
Ukraine									7 690	-19.8
United Kingdom	2 111 998	-11.6	46 978	14.3	16 460	-6.4	20 780	-1.2		
United States										
EU	14 747 704	-7.0	1 530 706	-14.8	57 288	-5.8	130 645	0.8	24 090	-7.0
OECD	20 736 098	-6.7	3 103 459	-12.0	109 478	-1.8	156 085	1.5	35 106	-7.8
ITF	21 836 409	-5.8	3 273 424	-11.6	142 218	0.2	189 635	2.6	80 206	-9.4

Countries	INLAND WATERWAYS Goods Transport (million T-km) National 2008	Δ% 08/07	INLAND WATERWAYS International 2008	Δ% 08/07	ECONOMY Trade in billion EUROS Imports (CIF) 2008	Δ% 08/07	ECONOMY Exports (FOB) 2008	Δ% 08/07
Albania	-	-	-	-	3	9.7	1	25.0
Armenia	-	-	-	-				
Australia			-	-	136	16.7	134	29.3
Austria	84	-37.5	2 113	0.0	119	4.6	117	3.1
Azerbaijan	5	79.3	6 073	1.0	5	26.3	33	687.5
Belarus								
Belgium					265	13.4	261	10.9
Bosnia-Herzegovina	-	-	-	-	3	6.2	1	9.1
Bulgaria	322	401.6	572	-40.1	25	15.9	15	13.3
Canada					285	0.8	316	-0.3
Croatia	31	-1.9	48	-38.4	21	10.6	10	6.2
Czech Republic	13	-19.2	15	-19.2	98	14.0	101	13.2
Denmark	-	-	-	-	75	5.6	79	6.3
Estonia	-	-	-	-	11	-4.7	8	5.5
Finland	80	-21.3	-	-	62	3.7	66	-0.2
France	4 419	0.9	3 028	-4.4	466	5.1	412	2.1
FYROM	-	-	-	-	5	21.8	3	9.4
Georgia								
Germany	8 971	1.4	39 748	-0.9	819	6.0	995	2.7
Greece	-	-	-	-	61	8.6	17	0.6
Hungary	6	-9.4	2 246	1.8	70	1.0	70	1.0
Iceland	-	-	-	-	4	-17.4	4	16.2
Ireland	-	-	-	-	57	-8.9	86	-2.7
Italy					377	1.0	366	0.3
Japan	-	-	-	-	522	18.8	536	6.3
Korea	-	-	-	-	299	22.1	291	13.9
Latvia	-	-	-	-	10	-5.2	6	9.9
Liechtenstein	-	-	-	-				
Lithuania	12	16.8			21	19.2	16	28.8
Luxembourg			369	7.1	17	5.6	12	0.8
Malta	-	-	-	-	3	13.3	2	5.3
Mexico	-	-	-	-	50	-3.8	167	-9.8
Moldova					3	25.9	1	10.0
Netherlands					330	7.6	373	7.2
New Zealand	-	-	-	-	26	13.3	23	18.3
Norway	-	-	-	-	59	2.2	111	13.5
Poland	709	-11.4			137	15.0	113	11.1
Portugal					61	7.3	38	1.1
Romania	1 951	10.0	1 945	-17.9	55	8.5	33	12.6
Russia	52 737	-24.1	15 962	-50.4	201	30.7	324	33.1
Serbia	414	-5.9	955	-16.5	16	15.3	7	15.6
Slovakia	5	40.5	845	17.5	50	5.0	50	4.9
Slovenia					23	7.0	20	2.1
Spain	-	-	-	-	282	0.7	188	3.7
Sweden	-	-	-	-	117	5.5	129	4.8
Switzerland	44	0.5	1	-43.0	118	5.5	130	8.6
Turkey	-	-	-	-	138	11.4	91	16.7
Ukraine	1 050	-23.5	14 761	-14.2	59	41.1	46	35.9
United Kingdom					444	-2.6	323	0.2
United States					1 442	7.5	893	11.8
EU	16 573	2.7	50 882	-2.1	4 056	4.7	3 894	3.8
OECD	14 332	0.0	48 366	-0.6	7 008	6.9	6 509	5.6
ITF	70 853	-19.0	88 682	-18.3	7 450	7.8	7 016	7.3

Aggregates only include countries for which data is available | Blank: Data is not available | -: Data is not applicable | Sum of 3 quarters | Sum of 11 months | Estimates | For country notes see www.internationaltransportforum.org/statistics/statistics.html

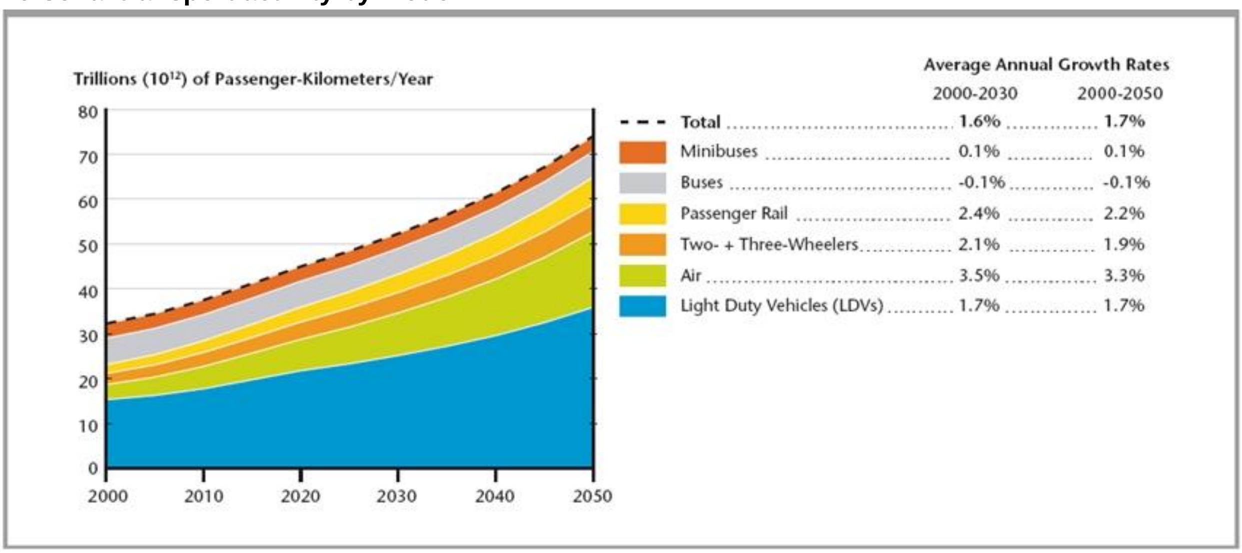
Source: OECD: Key Transport Statistics *2008 page 3* http://www.internationaltransportforum.org/

Transport Policy Advisory Services

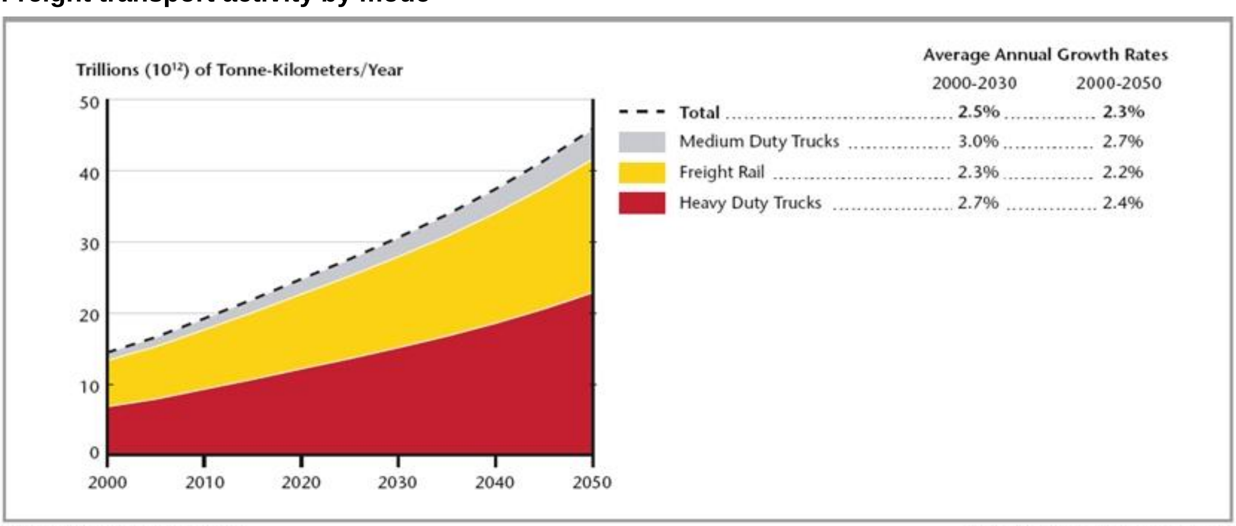
Projections for global freight and passenger transport growth (Source: WBCSD)

- World Business Council for Sustainable Development (WBCSD) projects (if the present trends continue) that personal transport activity (measured in terms of passenger kilometers traveled) grows at an average annual rate of 1.7% per year worldwide between 2000 and 2050.
- Growth rates differ widely by region (period 2000 through 2030): 3% in China and Latin America; 2% in the Former Soviet Union, India, and the Middle East; and about 1% per year or less in the three OECD regions.
- Air transport will be the fastest growing mode of personal transport. The second most rapidly growing rate will be passenger rail, followed by travel by two- and threewheelers. Though travel by light-duty vehicle represents by far the largest component of personal transport demand.
- Freight transport is projected to grow 2,3% per year.

Personal transport activity by mode



Freight transport activity by mode



Note: Excludes air, waterborne and pipeline.

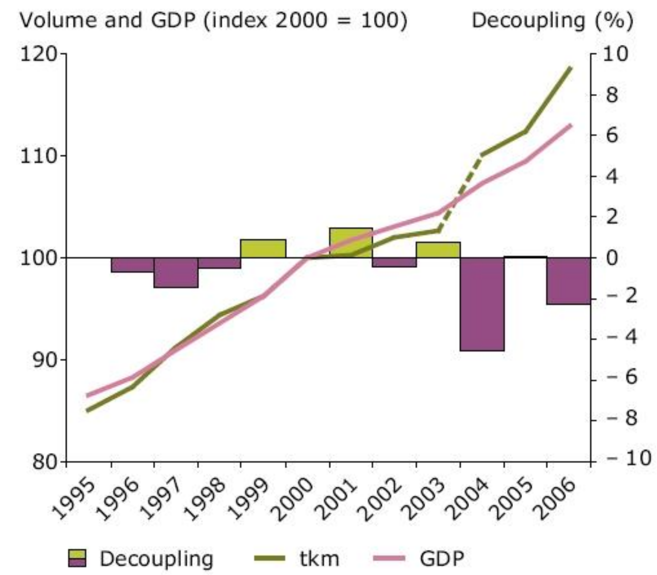
Source: Sustainable Mobility Project calculations.

Source: The Sustainable Mobility Project Full Report 2004, based on Sustainable Mobility Project calculations, page 30 – 31.

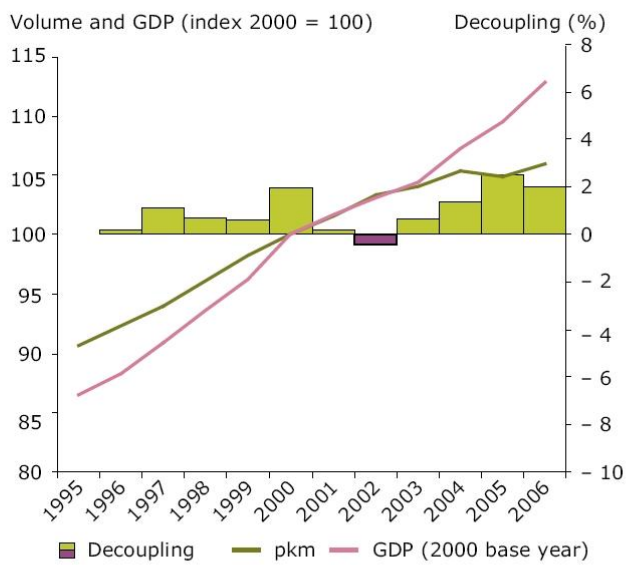
Fact Sheet 6: Transport and GDP

- There is a strong correlation between growth in transport activities and economic indicators such as GDP.
- Growth in freight transport in the EU since 2003 has been even stronger than corresponding GDP growth.
- In contrast, passenger transport in the EU has already “decoupled” from GDP growth for several years, with only minor exceptions.
- The most significant “driver” of personal transport activity is growth in household disposable income – the income remaining to a household after payment of taxes.

Freight (left) and passenger (right) transport volumes in the EU: Passenger transport decouples from GDP growth, freight transport increases more than proportionally



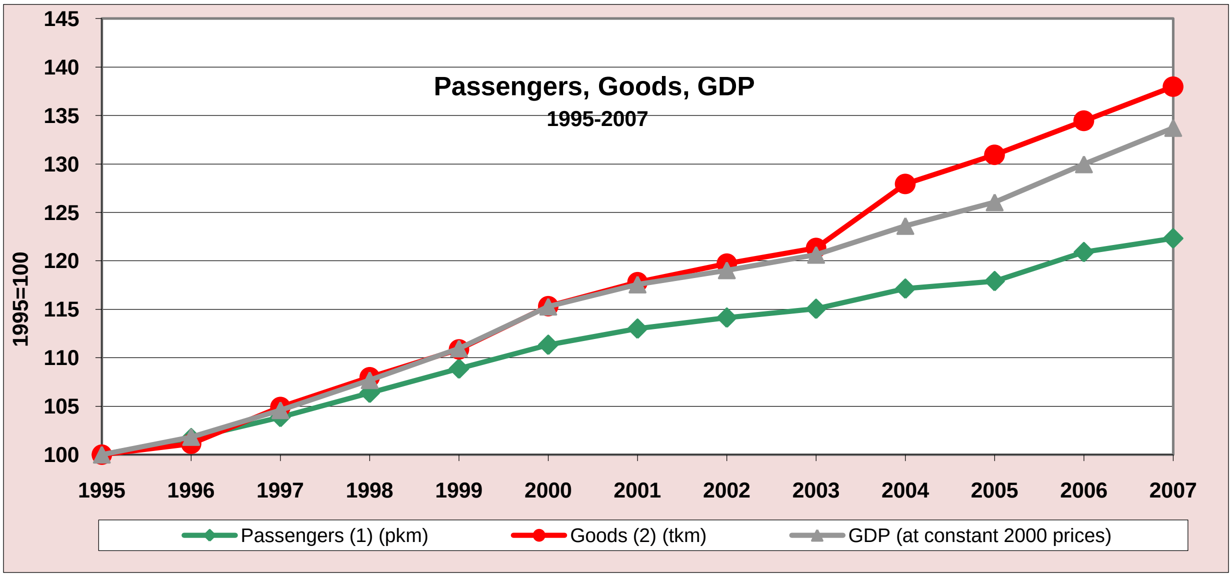
Note: The two curves show the development in GDP and freight transport volumes, while the columns show the level of annual decoupling. Green indicates faste growth in GDP than in transport while purple indicate stronger growth in transport than in GDP. The large change in 2004 appears to be tied to a change in methodology but no correction figure exists. See Annex 1 on metadata for details.



Note: The two curves show the development in GDP and passenger transport volumes, while the columns show the level of annual decoupling. Green indicates faster growth in GDP than in transport while purple indicates stronger growth in transport than in GDP. A number of countries have changed accounting methodology or have incomplete time series but no correction factor exist. See Annex 1 on metadata for details.

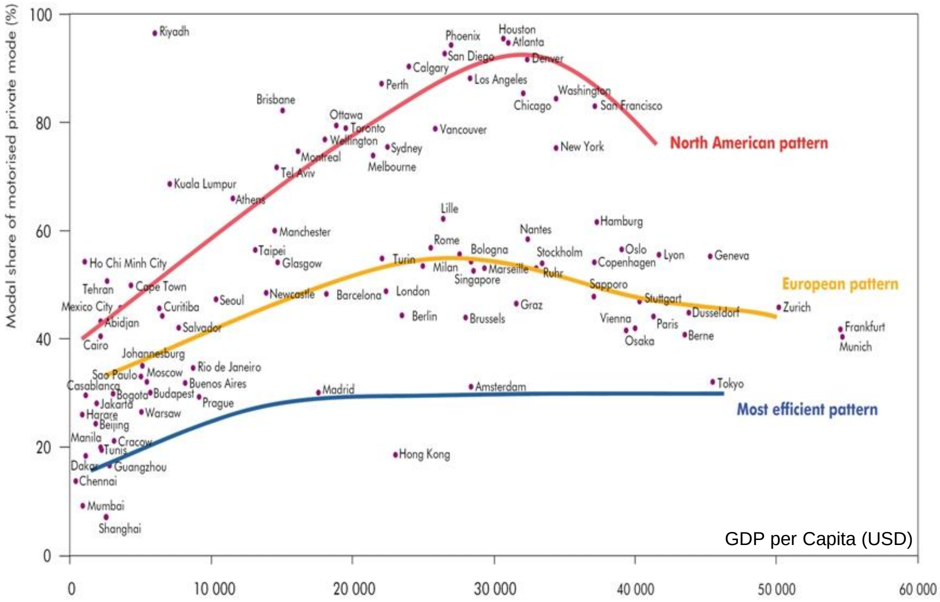
Source: EEA 2009, based on EUROSTAT 2008

Transport Growth in EU27



Source: EU Energy and Transport in Figures, 2009

The relationship between GDP and motorized personal transport



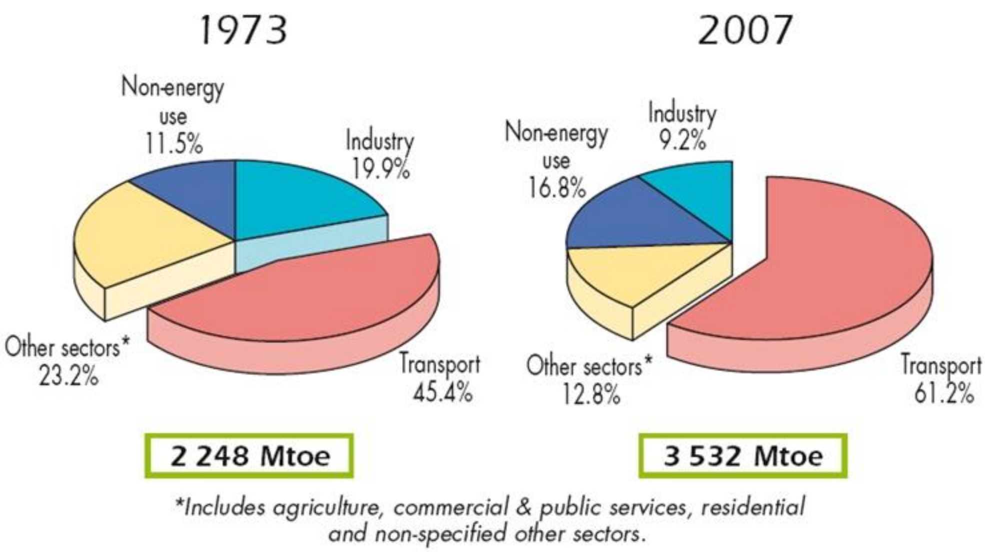
Source: IEA, Energy Technology Perspectives, Paris 2008, based on UITP 2006

- To a certain extent, the modal share of motorized personal transport in cities is tied to the level of GDP. However, this trend is generally stopped and, in some cases, reversed above a certain GDP threshold.
- Two major variations of this trend can be observed: A North American and a European pattern. The modal share of motorized personal transport rises much faster in North American cities, reflecting land use patterns and car-based 'way of life'. In contrast, European cities show a significantly slower rise of motorized personal transport modal shares. Above the 30,000US$/capita GDP threshold, its share remains stable or even decreases, as illustrated by the examples of Zurich, Frankfurt and Munich.
- Some cities, such as Tokyo, show a very efficient modal split with a low level of motorized personal despite a high level of GDP/capita. This shows that more sustainable urban transport patterns can be maintained even in high income agglomerations.

Fact Sheet 7: Oil consumption

- Energy security and dependency from oil is a major problem for many countries
- Oil will remain the leading energy source, but...
  - The era of low oil price has seen an end, although price volatility will remain
  - Oilfield decline is the key determinant of investment needs
  - There is no consensus, when peak oil will be achieved.
- Most of the world oil production is used as a energy source for transport.
- The transportation sector is most vulnerable to a supply shortage or a strong oil price increase.

1973 and 2006 transport shares of world oil consumption



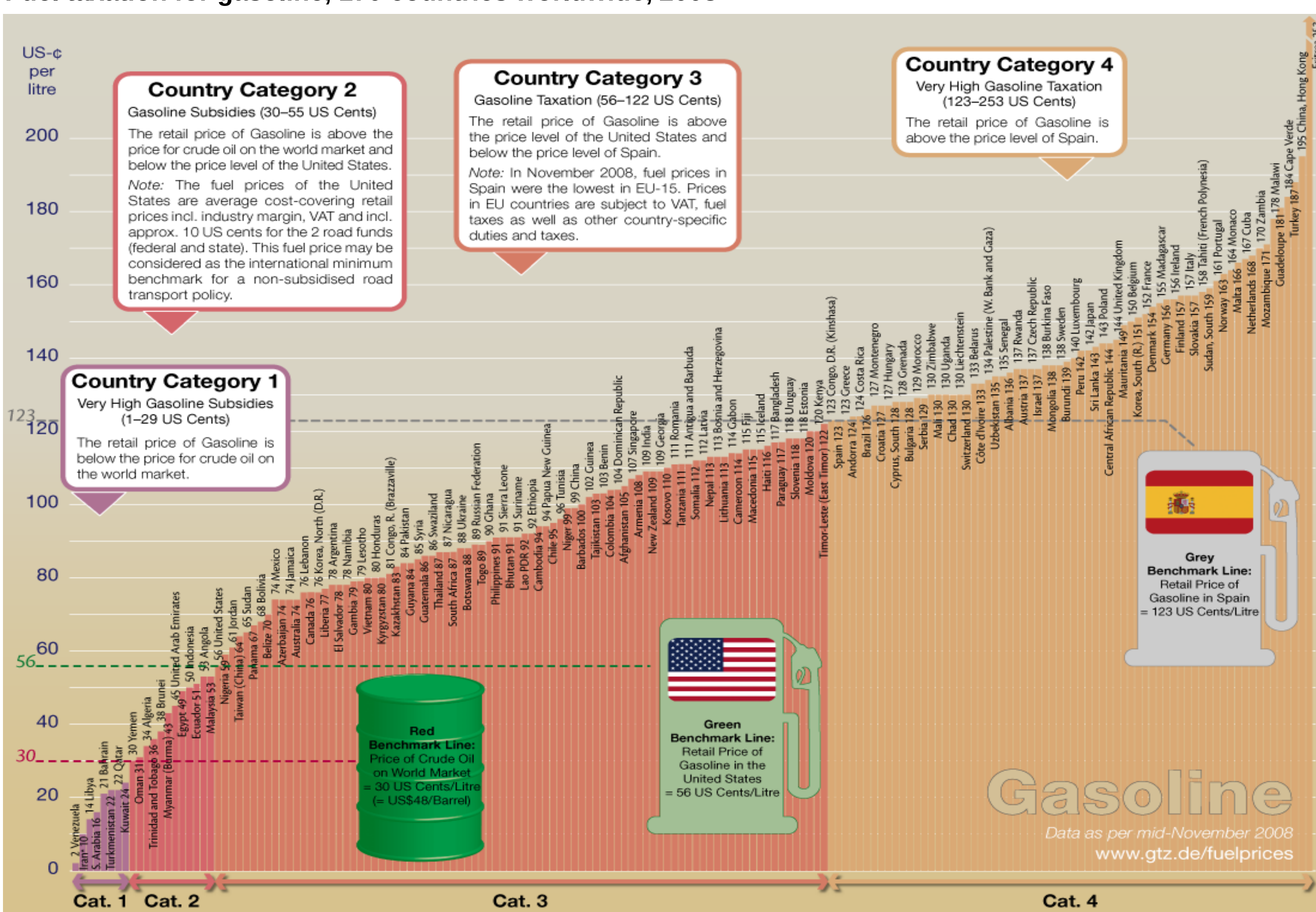
Source: International Energy Agency, Key World Energy Statistics 2009, page: 33

Fact Sheet 8: Fuel taxation for gasoline

- Fuel taxes are an important source of revenue for the financing of the transport sector in that they charge road user the costs of transport infrastructure. Numerous countries earn revenues through taxation on petroleum products, which can be used for reducing public transport fares or providing social services such as schools and healthcare. In line with the polluter pays principle, fuel taxation can shift the burden of the so-called external costs of transport (such as environmental pollution, noise, congestion costs, etc.) onto transport users.

- Four different country categories can be distinguished: Countries highly subsidizing gasoline (retail price below price for crude oil; mainly in Middle East oil exporting countries such as Saudi Arabia, Bahrain etc.), countries with gasoline subsidies (retail price above crude oil price, but below the benchmark US retail price; several developing countries including Malaysia, Ecuador, Oman), countries with some gasoline taxation (retail price above the US level, but below the Spanish level; includes most of the developing world plus some OECD countries such as Canada, Australia and New Zealand), and finally countries with high gasoline taxation (retail price above the Spanish price level; includes most members of the European Union and Japan, but also some developing countries)

Fuel taxation for gasoline, 170 countries worldwide, 2008



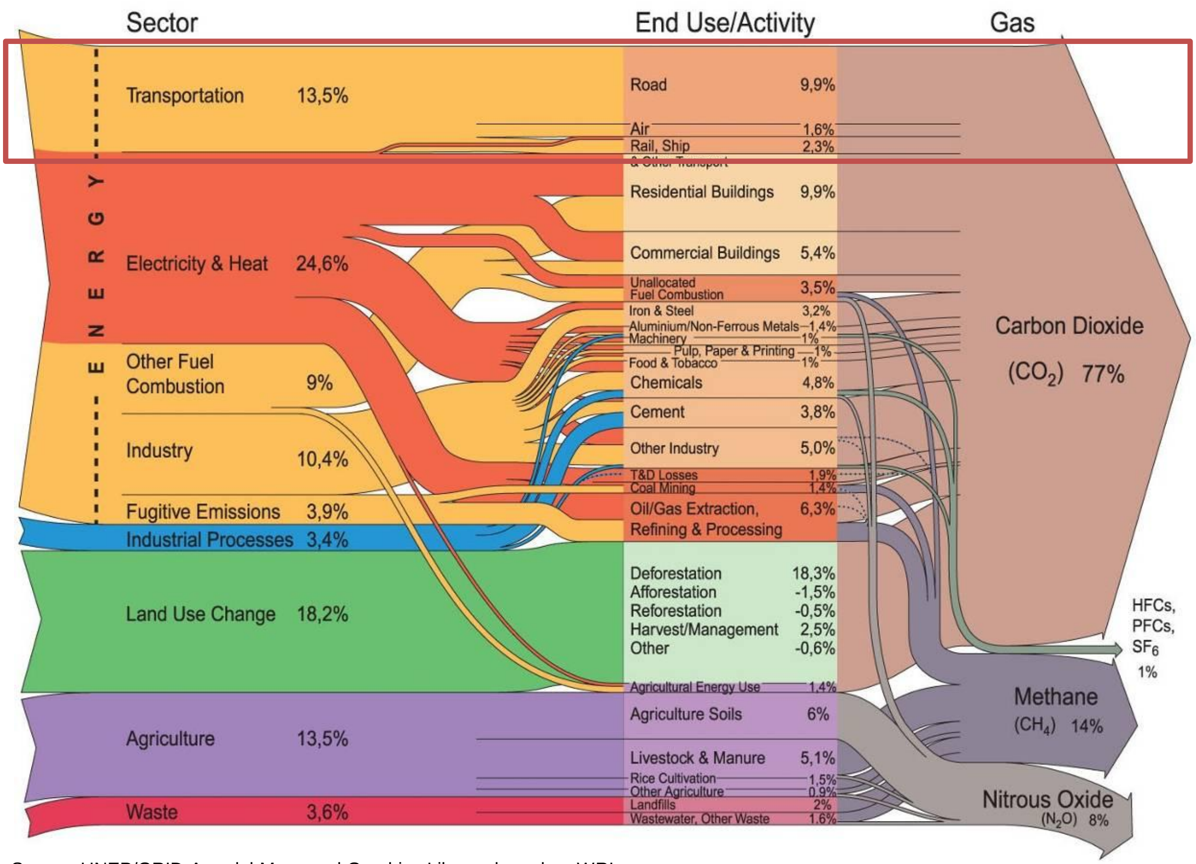
Source: GTZ 2009

2. A key challenge: Climate change

Fact Sheet 9: GHG Emissions

- Transportation plays a significant role in global GHG emissions, with most of its share originating from burning of fossil fuels. The largest contributor by far is road transport.
- Overall, transportation is responsible for 13% of global GHG emissions and 23% of energy-related CO_2 emissions. These numbers do not consider the fact that the climatic effect of GHG emissions from aviation may be larger than their nominal share due to the emission in upper layers of the atmosphere.
- Industrialized countries are currently the main contributors for overall GHG emissions, but:
  - a 2-4 % increase per annum in global south is projected;
  - 80% of projected increase until 2030 is related to road transport in developing countries, mainly the countries with emerging economies like e.g. China.
- Transport emissions in developing countries will exceed industrialized countries before 2030.

World Greenhouse gas emissions by sector

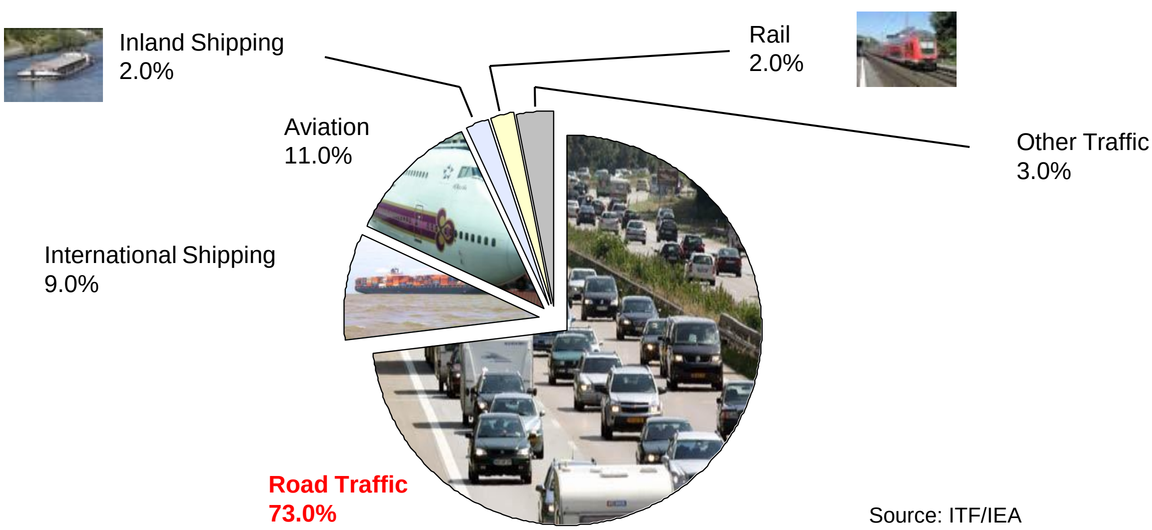


Source: UNEP/GRID-Arendal Maps and Graphics Library, based on WRI.
http://maps.grida.no/go/graphic/world-greenhouse-gas-emissions-by-sector

Fact Sheet 10: Energy Related Transport CO_2 Emissions

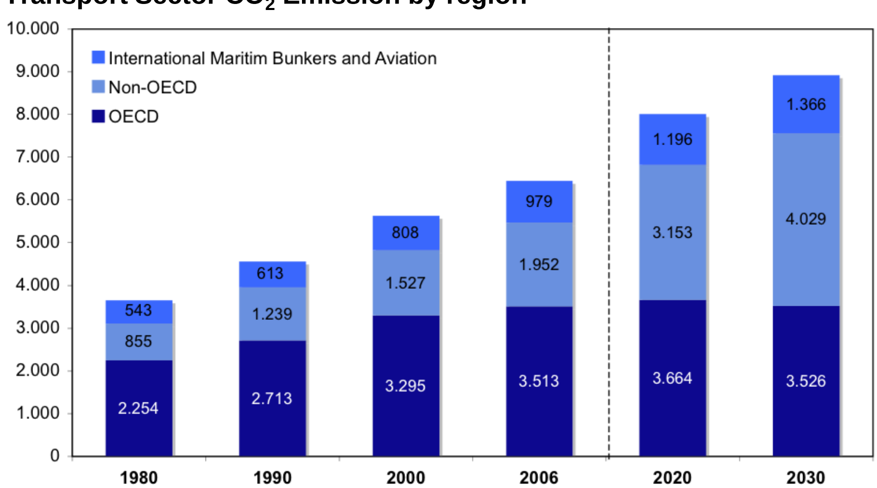
- Road traffic is responsible for the largest share of emissions.
- The dependency on fossil fuels poses a serious challenge: The short- to medium-term prospects for shifting to other energy sources are limited.
- In the EU, growing transport volumes have driven emissions up by 28 % between 1990 and 2006 (excluding the international aviation and marine sectors). In contrast to a reduction of 3 % in emissions across all sectors (Term 2008).
- Very few countries managed a decrease in transport emissions. Germany achieved a change of the trend in 2000 and subsequently reduced GHG emissions from transport to about 99% of 1990 levels.

Worldwide Transport CO_2-Emissions by mode, 2005



Source: ITF/IEA

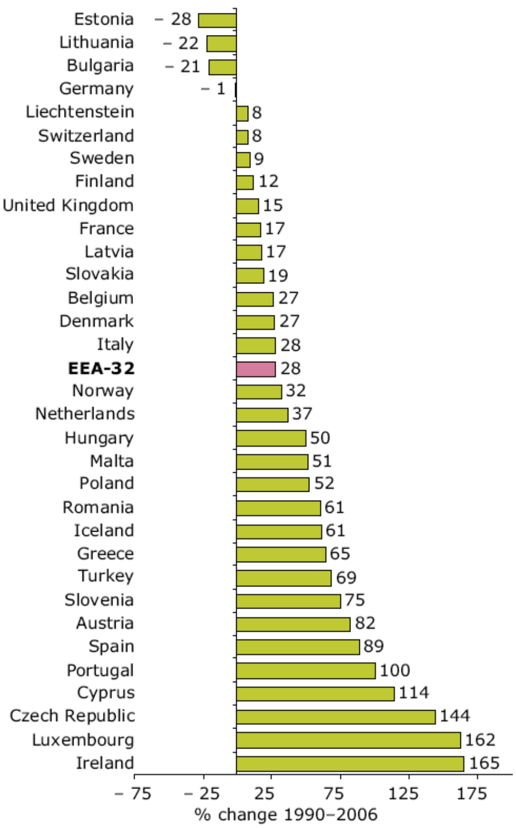
Transport Sector CO_2 Emission by region



Note: WEO Reference Scenario, 1980-2030, in million tonnes
Source: based on IEA 2009

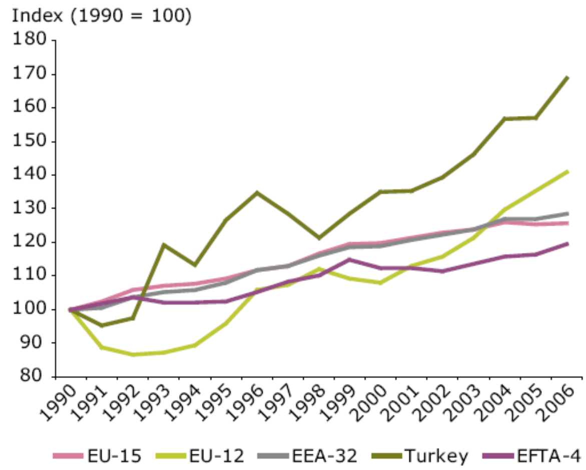
Trends in transport sector greenhouse gas emissions by country 1990–2006

Trends in transport sector greenhouse gas emissions by country 1990–2006



Source: European Topic Centre for Air and Climate Change, 2008.

Transport sector greenhouse gas emissions 1990–2006



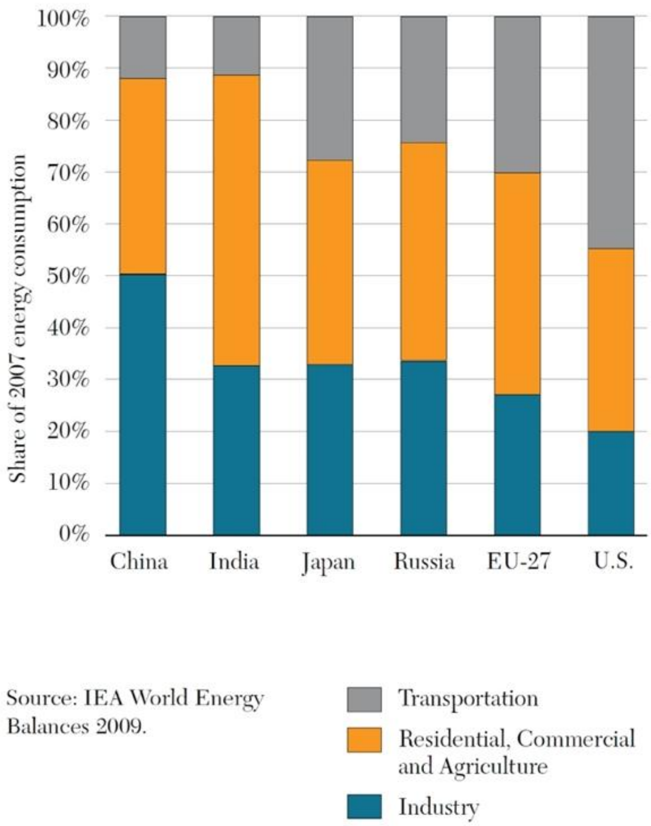
Source: European Topic Centre for Air and Climate Change, 2008.

Source: Transport at a crossroads indicators tracking transport and environment in the European Union (TERM 2008) page 17

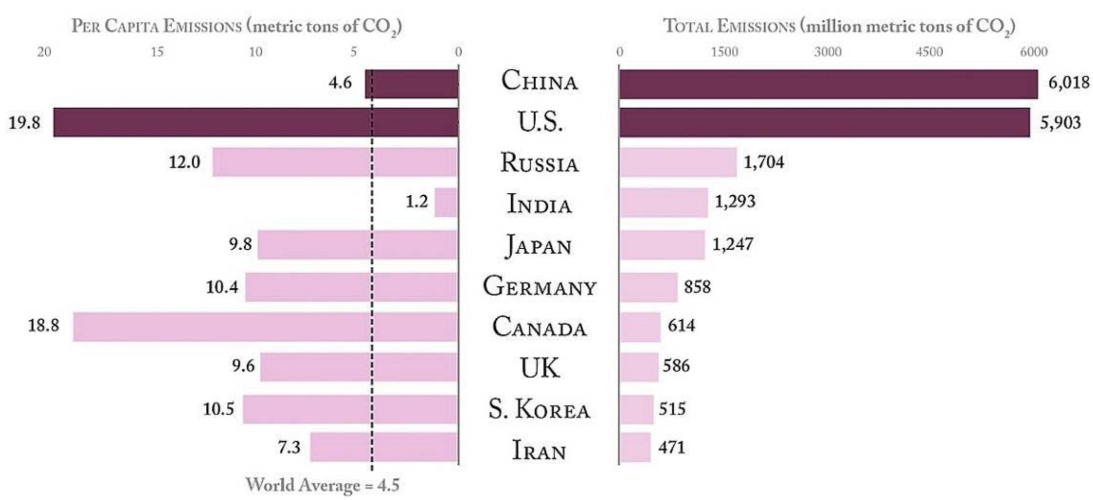
Fact Sheet 11: Per Capita GHG Emissions

- European countries emit about 10t CO_2e per capita;
- 2-3 tons are related to transport;
- Due to limited motorization, this is much lower in developing countries;
- The currently relatively modest share of transport energy use in countries like China or India is likely to grow in the future.

Energy consumption by sector,



Per capita emissions of Top Ten global CO_2 emitters, 2006



Source: WRI, based on IEA International Energy Annual 2006

Fact Sheet 12: Development of CO_2e concentration

- "Stabilization at 450ppm CO_2e is already almost out of reach, given that we are likely to reach this level within ten years and that there are real difficulties of making the sharp reductions required with current and foreseeable technologies.
- The concentration of CO_2e of maximum 500 ppm can be reached fast, before it stabilizes at 450 ppm, and the annual reduction rate would drop from 7% to 3% if the emissions will reach their maximum till 2010. Excess curves, however represent a big risk to the outcome.
- Weak action in the next 10-20 years would put stabilization even at 550ppm CO_2e beyond reach – and this level is already associated with significant risks." (source Stern Review page 200)
- More than 3 % of CO_2 reduction per year is unlikely to reach.

Illustrative Emissions Paths to CO_2e concentration stabilization

Stabilisation Level (CO_2e)	Date of peak global emissions	Global emissions reduction rate (% per year)	Percentage reduction in emissions below 2005* values	
			2050	2100
450 ppm	2010	7.0	70	75
	2020	-	-	-
500 ppm (falling to 450 ppm in 2150)	2010	3.0	50	75
	2020	4.0 - 6.0	60 - 70	75
	2030	*5.0[1] – 5.5 [2]*	*50 - 60*	*75 – 80*
	2040	-	-	-
550 ppm	2015	1.0	25	50
	2020	1.5 – 2.5	25 – 30	50 – 55
	2030	2.5 – 4.0	25 – 30	50 – 55
	2040	3.0 – *4.5 [3]*	*5* – 15	50 – *60*

Notes: overshoots: [1] to 520 ppm, [2] to 550 ppm, [3] to 600 ppm. 2005 emissions taken as 45 $GtCO_2e$/yr.
Source: Generated with the SiMCaP EQW model and averaged over multiple scenarios (Meinshausen et al. 2006)

Source: The Stern Review on the Economics of Climate Change, Page 200

Fact Sheet 13: Objectives for GHG reduction

- A major decarbonisation of the world's energy system is necessary to avoid and "abrupt and irreversible" climate change.
- Limiting temperature rise to 2 C will require significant emission reductions in all regions & technological breakthroughs.
- The following table provides an indicative range of likelihoods of exceeding a certain temperature change for a given stabilization level (in CO_2e).
- At a stabilization level of 550 ppm CO_2e, there is a chance of 63 - 99 % for exceeding a warming of 2C relative to the pre-industrial level and a chance of 21 – 69 % for exceeding a warming of 3 C relative to the pre-industrial level. (Source: Stern Review)

Likelihood of exceeding a temperature increase at equilibrium

Stabilisation Level (CO_2e)	Maximum	Hadley Centre Ensemble	IPCC TAR 2001 Ensemble	Minimum
Probability of exceeding 2℃ (relative to pre-industrial levels)				
400	57%	33%	13%	8%
450	78%	78%	38%	26%
500	96%	96%	61%	48%
550	99%	99%	77%	63%
650	100%	100%	92%	82%
750	100%	100%	97%	90%
Probability of exceeding 3℃ (relative to pre-industrial levels)				
400	34%	3%	1%	1%
450	50%	18%	6%	4%
500	61%	44%	18%	11%
550	69%	69%	32%	21%
650	94%	94%	57%	44%
750	99%	99%	74%	60%
Probability of exceeding 4℃ (relative to pre-industrial levels)				
400	17%	1%	0%	0%
450	34%	3%	1%	0%
500	45%	11%	4%	2%
550	53%	24%	9%	6%
650	66%	58%	25%	16%
750	82%	82%	41%	29%
Probability of exceeding 5℃ (relative to pre-industrial levels)				
400	3%	0%	0%	0%
450	21%	1%	0%	0%
500	32%	3%	1%	0%
550	41%	7%	2%	1%
650	53%	24%	9%	5%
750	62%	47%	19%	11%

Source: The Stern Review on the Economics of Climate Change, page 57

Fact Sheet 14: The challenge

General:

- “The World is expecting a double danger for the power economy against: First of all, inability of a sufficient and safe energy supply at an affordable price. And secondly, the ecological risk due to over consumption” (IEA WEO 2007)
- “Current energy trends are patently unsustainable - socially, environmentally, economically
- Oil will remain the leading energy source but the era of cheap oil is over, although price volatility will remain
- To avoid "abrupt and irreversible" climate change we need a major decarbonisation of the world’s energy system
- Limiting temperature rise to 2°C will require significant emission reductions in all regions & technological breakthroughs
- Mitigating climate change will substantially improve energy security
- The present economic worries do not excuse back-tracking or delays in taking action to address energy challenges” (IEA WEO 2008)

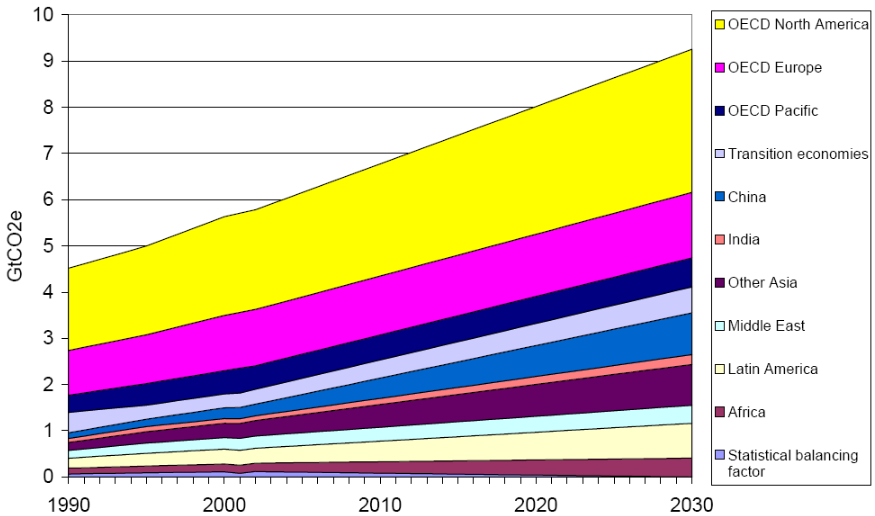
Transport System (Source: WBCSD) :

- The transportation sector is most vulnerable to a oil price increase
- Greenhouse-gas emissions mitigation possibilities in the transport sector are:
    - Reducing the amount of greenhouse-gas emissions per unit of transport activity:
        1. Energy necessary to perform a given amount of transport activity
        2. Greenhouse-gas emissions produced by the production, distribution and use of a unit of transport fuel
    - Reduce the vehicle kilometres travelled:
        - 1. Volume of transport activities
        - 2. Modal-split changes

Fact Sheet 15: Regional Differences

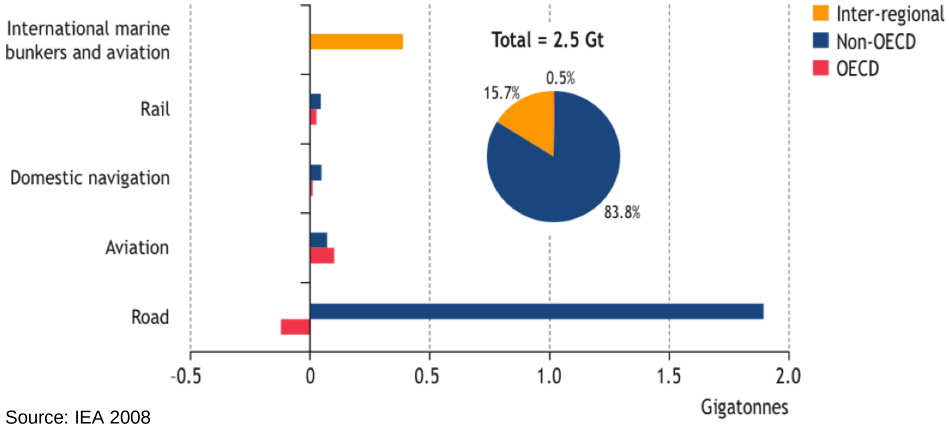
- OECD countries are projected to stabilize their transport-related emissions from now on (except international air travel),
- Emissions in Non-OECD members will rise dramatically if no countermeasures are taken.

Transport emissions by country (1990-2030)



Source: The Stern Review on the Economics of Climate Change Annex 7.c Emissions from the transport sector

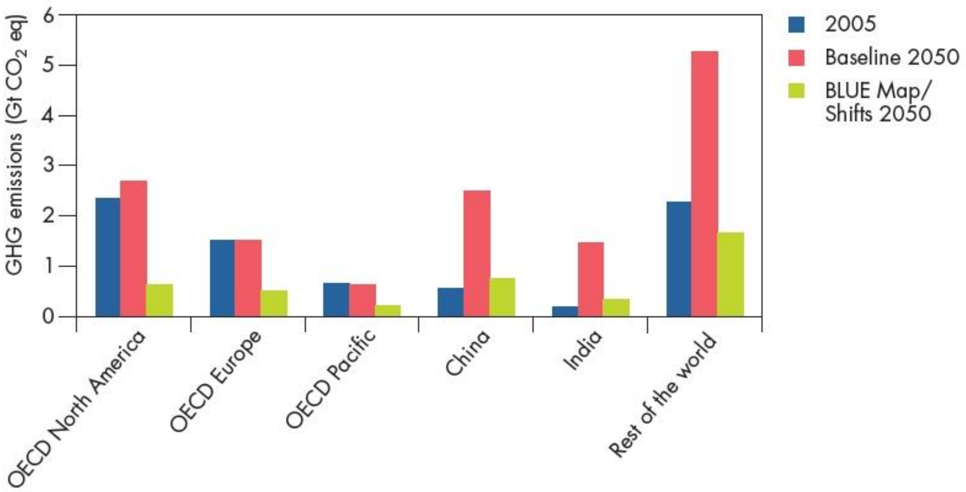
Transport Sector CO2 Emission by Mode and Region, Changes 2006-2030
(WEO Reference Scenario)



Source: IEA 2008

- According to the IEA estimates (WEO Reference Scenario), the annual GHG emissions of the transport sector in 2030 will be 2.5 Gigatonnes higher than in 2006.
- Most of this increase can be contributed to emissions from road transport in non-OECD countries. Inter-regional emissions from aviation and the maritime sector are second.

IEA transport related GHG emission projections for 2050

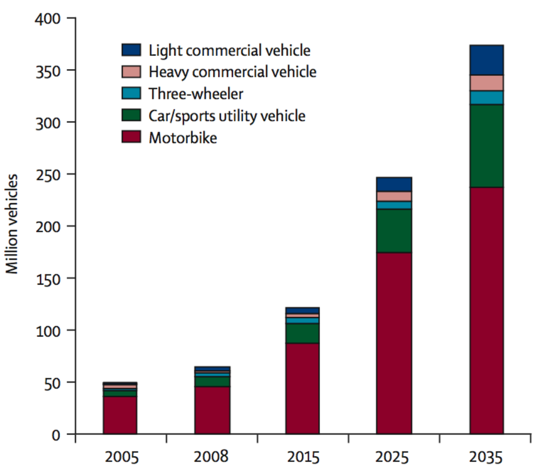


Source: IEA 2009

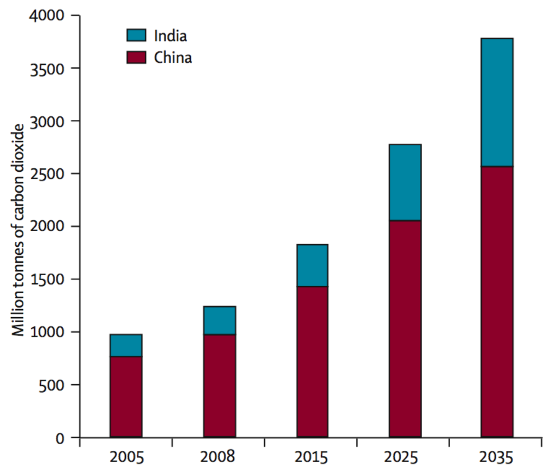
Note: For a description of assumptions and trends underlying different scenarios used by the IEA please see the second page of Fact Sheet 17 in this document.

In the absence of new policies (Baseline scenario), IEA estimates show that transport-related GHG emissions in emerging economies such as China and developing countries like India will rise dramatically until 2050, equaling or even surpassing emissions from Europe and North America. Emissions from other developing countries are also estimated to more than double until 2050 under the Baseline scenario. The BLUE Map/Shifts Scenario assumes emission reductions against the baseline in both developed and developing countries.

Vehicle populations forecast in China (ADB baseline scenario)



Carbon dioxide emissions (well to exhaust) from on-road vehicles: India and China (ADB baseline scenario)



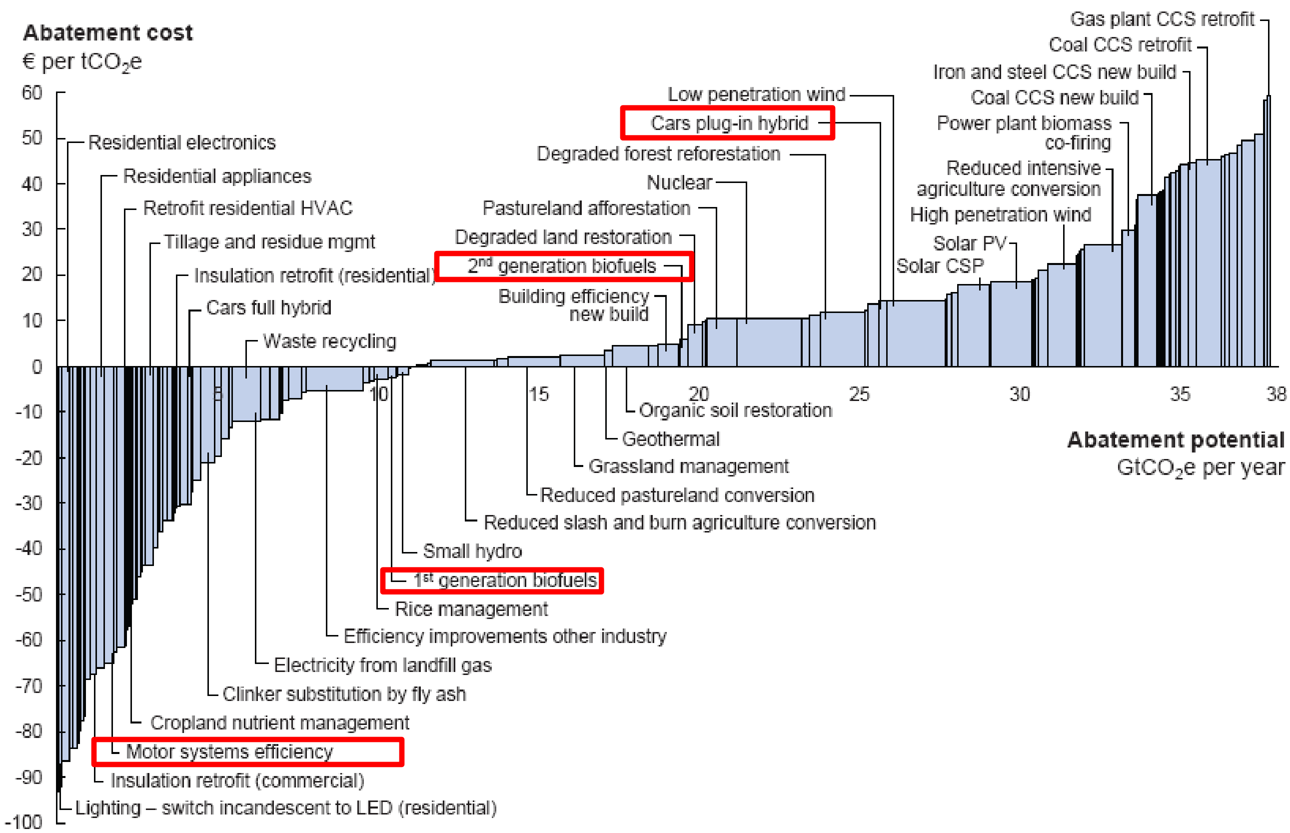
Source: Asian Development Bank (2006)

- Estimates by the Asian Development Bank (ADB) show that the total vehicle population in China is estimated to grow almost eight-fold from 2005 to 2035.
- CO_2 emissions are projected to triple in China, and to rise four-fold in India.

Fact Sheet 16: The knowledge gap

- There is a knowledge gap regarding the reduction potential beyond technology measures.
- The popular abatement cost curve provided by McKinsey illustrates this, as shift or distance reduction are not considered.
- There is a serious knowledge gap regarding the emission reduction potential in the transport sector. This, among others, are caused by the following facts:
    - Most information available is related to technological solutions, i.e. energy efficiency improvement, fuel switch and introduction of plug-in hybrids and electric vehicles (e.g. McKinsey Cost curves).
    - There is hardly any information available in terms of land-use change. This includes major difficulties. The US study “Moving Cooler” indicates possible options by calculating the reduction in distances.

Global GHG abatement cost curve beyond business-as-usual – 2030

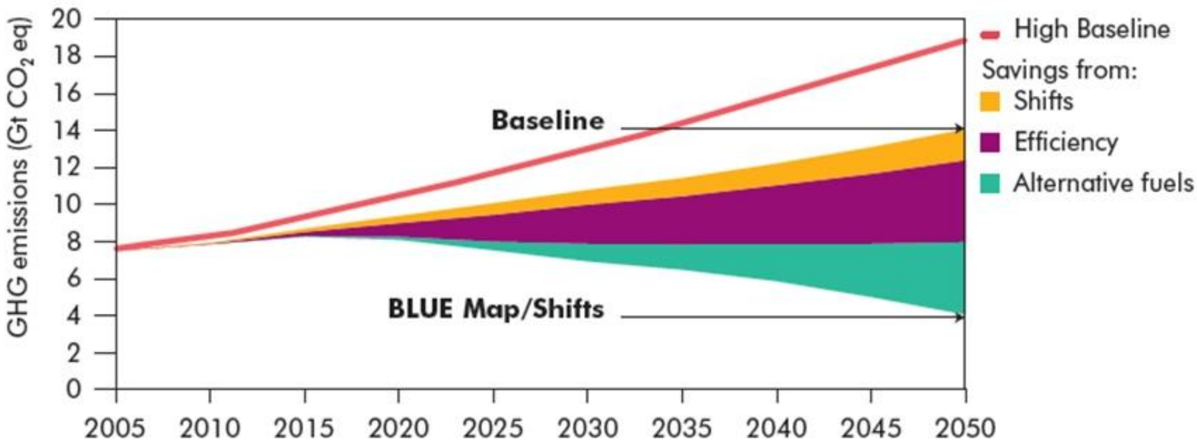


Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

Fact Sheet 17: IEA GHG Reduction Scenarios

- With regard to Public Transport, the IEA recently published a study including a calculation for potential modal shift reduction. There are also project based experiences calculating the energy savings (and GHG reduction) of modal shift projects (e.g. CDM, Bus-Rapid-Transit projects, European bus companies etc.).
- The IEA argues that based on 2005, a 50 percent reduction of total transport GHG emissions is possible.
- The IEA projections include relatively optimistic assumptions on GHG reduction potential from alternative fuels.
- As far as electric vehicles are concerned, however, these reductions can only be achieved if the necessary energy is produced in climate friendly ways.
- This entails the use of nuclear energy and the CCS technology, which is currently only in a developing stage.
- Nevertheless, the IEA study also sees significant potential for modal shift towards alternative passenger and freight transport modes.

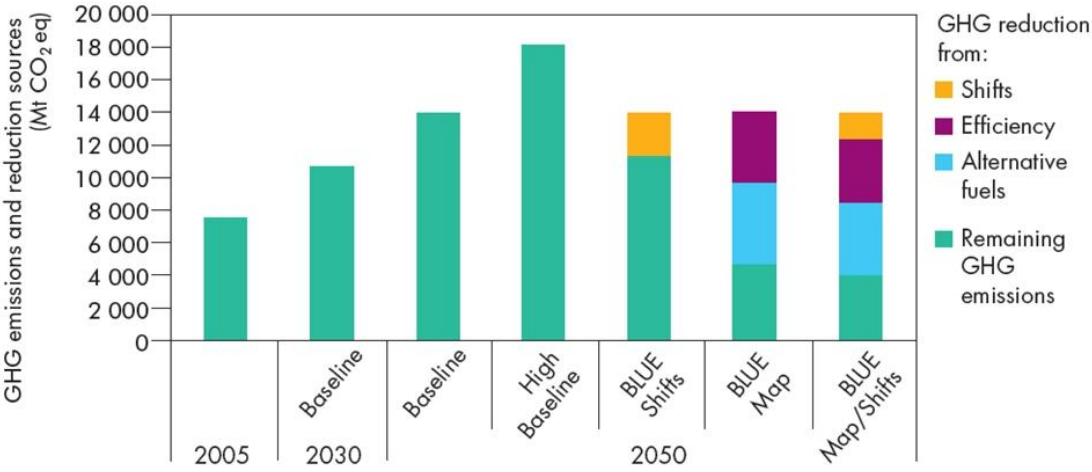
GHG reduction potential (IEA 2009)



Source: IEA 2009

Note: For a description of assumptions and trends underlying different scenarios used by the IEA please see next page of this document.

GHG reduction potential, according to different strategies



Source: IEA 2009

The IEA scenarios

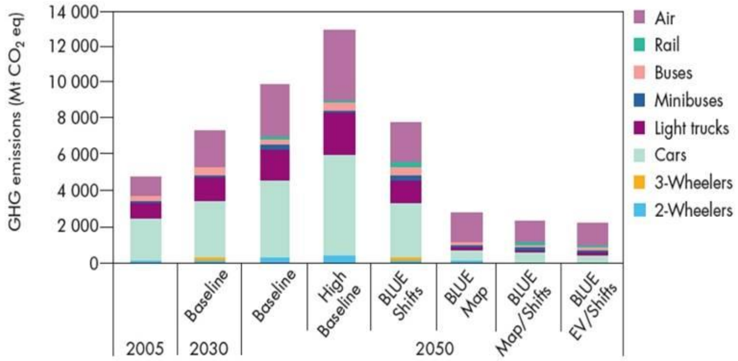
Baseline: follows the IEA World Energy Outlook 2008 (WEO 2008) Reference Case to 2030 and then extends it to 2050. It reflects current and expected future trends in the absence of new policies.
High Baseline: this scenario considers the possibility of higher growth rates in car ownership, aviation and freight travel over the period to 2050 than occur in the Baseline.
BLUE CO2 reduction scenarios: these scenarios update those presented in the IEA Energy Technology Perspectives 2008 report. The BLUE variant scenarios are developed based on achieving the maximum CO2 reduction in transport by 2050 using measures costing up to USD 200 per tonne. These scenarios will require strong policies to be achieved.
BLUE Map: this scenario achieves CO2 emissions by 2050 that are 30% below 2005 levels. It does this via strong improvements in vehicle efficiency and introduction of advanced technologies and fuels such as plug-in hybrids (PHEVs), electric vehicles (EVs), and fuel cell vehicles (FCVs). It does not envisage significant changes in travel patterns.
BLUE EV Success: Similar to BLUE Map and achieving a similar CO2 reduction, but with electric and plug-in hybrid vehicles achieving greater cost reductions and better performance to the point where they dominate light-duty vehicle (LDV) sales by 2050, to the exclusion of fuel cell vehicles.
BLUE Shifts: this scenario focuses on the potential of modal shift to cut energy use and CO2 emissions. Air and LDV travel grow by 25% less than in the Baseline to 2050, and trucking by 50% less. The travel is shifted to more efficient modes and (for passenger travel) to some extent eliminated via better land-use planning, greater use of information technology, and other measures that reduce the need for motorised travel. Compared to the Baseline in 2050, BLUE Shifts results in a 20% reduction in energy use and CO2.
BLUE Map/Shifts: this scenario combines the BLUE Map and BLUE Shifts scenarios, gaining CO2 reductions from efficiency improvements, new vehicle and fuel technologies, and modal shift. It results in a 40% reduction in CO2 below 2005 levels by 2050.

Source: taken from IEA 2009, 30

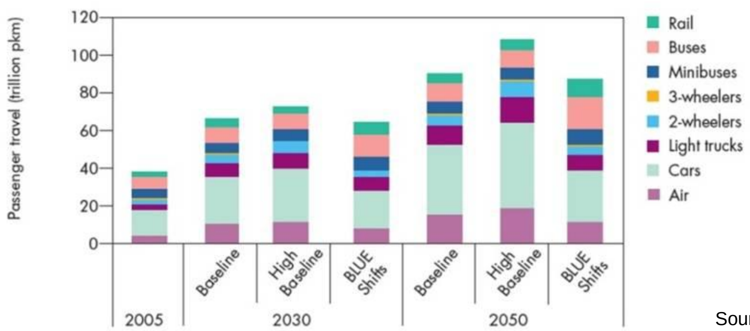
Fact Sheet 18: Modal Shift in the IEA Scenario

- Shifting from high to low energy-intensive transport modes can significantly reduce GHG emissions (for details see box 'The IEA scenarios ' above).
- The shift scenario can be realized at relatively low costs.

IEA Scenarios: GHG intensity in passenger transport

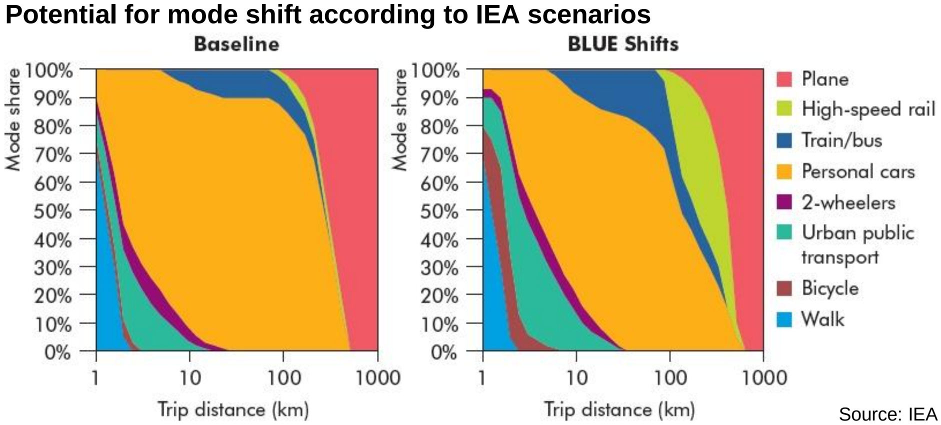


IEA Scenarios: Passenger travel by mode



Source: IEA 2009

Potential for mode shift according to IEA scenarios



Source: IEA 2009

Two major options for emission reduction through mode shift emerge from the IEA calculations:

1. Fostering non-motorized transport (especially cycling) and urban public transport for short distances, and
2. Shifting short flights and medium- to long-distance car trips to (high speed) rail and bus services. The resulting reduction in mode shares for personal cars and aviation is reflected in the smaller orange and red areas in the above illustration.

3. Global, national and local challenges

Fact Sheet 19: Millennium Development Goals (MDG)

- Transport affects health, the environment, the quality of life and the air quality especially in urban agglomerations.
- In a wider perspective, transportation – managed in a sustainable way – can contribute significantly to the achievement of the Millenium Development Goals (MDGs, see below). In 2000, 191 member states of the United Nations agreed on a catalogue of eight such goals in the UN Millennium Declaration. The eight MDGs are divided into 18 further subcategories/targets with according indicators. Most of the goals have quantifiable target values, which are to be achieved by the year 2015 (with the year 1990 as baseline).
- With regard to the national and local perspective, there are four major challenges: Air pollution, noise, road safety and economic effects.

Global perspective: Transport and the MDGs

	Target	Major contributions of transport
MDG 1	Eradication of hunger and extreme poverty	• Making transport accessible to the poor • Improving transport infrastructure to foster market access and rural-urban linkages
MDG 2+3	Universal primary education and gender equality	• Reducing transport costs to facilitate higher school enrollment • Improving transportation to reduce the workload of women
MDG 4+5+6	Reduce child mortality, combat malaria and other deseases, […], reduce road accidents	• Improving road safety • Tackling the role of transportation in spreading HIV/AIDS • Improving transport infrastructure for better access to medical facilities
MDG 7	Ensure environmental sustainability	• Reduction of air pollution • Avoiding damage to ecosystems

Source: Based on GTZ 2005, 'Why transport matters'

Fact Sheet 20: Air pollution

- Transport activities generate a wide range of other relevant emissions, which tend to influence air quality rather on a local but on a global level. They have various detrimental effects on human health and the environment.

General Trends (based on WBCSD projections):

- Transport-related conventional emissions (emissions of NOx, VOCs, CO, and particulates) will decline sharply in developed countries over the next two decades reflecting more stringent emissions standards, improved technology, and relatively slow increases in total vehicle numbers.
- In urbanized areas of many developing countries, emissions are likely to grow in the next few decades before declining, reflecting rapidly increasing numbers of vehicles.

Regional Disparities:

- Emissions of regulated air pollutants from vehicles continue to fall across EEA member countries but concentrations remain high in some urban areas.
- Despite reduced road transport exhaust emissions across Europe, there have been no significant improvements in concentrations of PM10 and nitrogen dioxide (NO_2).
- However, the highest concentrations of the "classical" indicators such as PM10 and sulfur dioxide are found in Africa, Asia and Latin America.
- The highest levels of secondary pollutants such as ozone and nitrogen dioxide are measured in Latin America and in some larger cities and urban airsheds in the developed countries.

Ranges of annual average concentrations (µg/m^3) of selected pollutants and one-hour average maximum concentrations of ozone for different regions

Region	Annual average concentration			Ozone (1-hr max. concentration
	PM_{10}	NO_x	SO_2	
Africa	40 - 150	35 - 65	10 - 100	120 - 300
Asia	35 - 220	20 - 75	6 - 65	100 - 250
Australia / New Zealand	28 - 127	11 - 28	3 - 17	120 - 310
Canada / United States	20 - 60	35 - 70	9 - 35	150 - 380
Europe	20 - 70	18 - 57	8 - 36	150 - 350
Latin America	30 - 129	30 - 82	40 - 70	200 - 600

Source: Air Quality Guidelines Global Update 2005, p. 31.
Note: Based on selected urban data

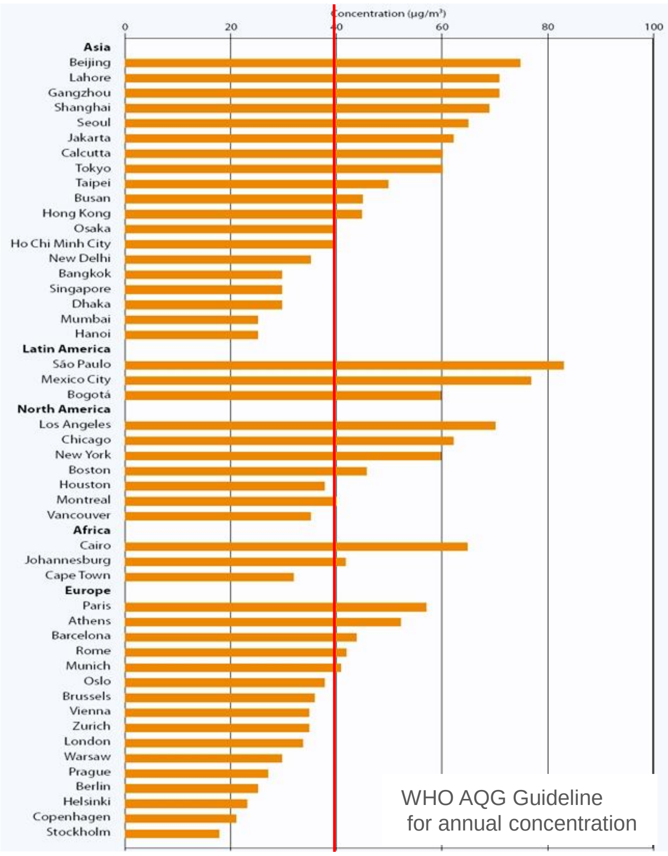
Overview: Origins and effects of transport-related pollutants

Pollutant	**Origins (transport-related)**	**Selected effects on health and environment**	**WHO AQG guideline limit** (µg/m³)
Nitrogen Oxides	High combustion temperatures causing bonding of nitrogen and oxygen	Causes changes in lung function for people with asthma, contributes to acid rain, and is a precursor of ground level ozone	40 (*NO_2, average per year)*
Carbon Monoxide	Motor-vehicle exhaust	People with chronic heart disease may experience chest pain when CO levels are high	.
Volatile Organic Compounds	Vehicle exhausts and fuel tanks, petrol refining, fuel storage	Eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to liver, kidney, and central nervous system; some are suspected or known to cause cancer. Major contributing factor to ozone	.
Ozone	Emissions of motor vehicle traffic	Damage to the cell membrane of plants, interruption of photosynthesis, destruction of cell structures. Health effects include spasms, reduction in lung volume (athletes, babies, sick persons) and continuous irritation of the respiratory tracts	100 *(average per 8h, daily maximum)*
Particulate Matter (PM)	Combustion of fossil fuels, biomass fly ash, abrasion of the street and tyres. Diesel-fuelled and two-stroke engine gasoline vehicles are two significant sources of PM emissions	Chronic bronchitis, asthma attacks and other forms of respiratory illness, and premature death from heart and lung disease	20 *(PM10, average per year)* 10 *(PM 2,5, average per year)*
Lead	Use of leaded gasoline	Affects intellectual development of children; many other adverse effects	.
Sulphur Dioxide	Motor fuels	Causes changes in a lung function with asthma and exacerbates respiratory symptoms; contributes to acid rain	20 *(Average per 24h)*

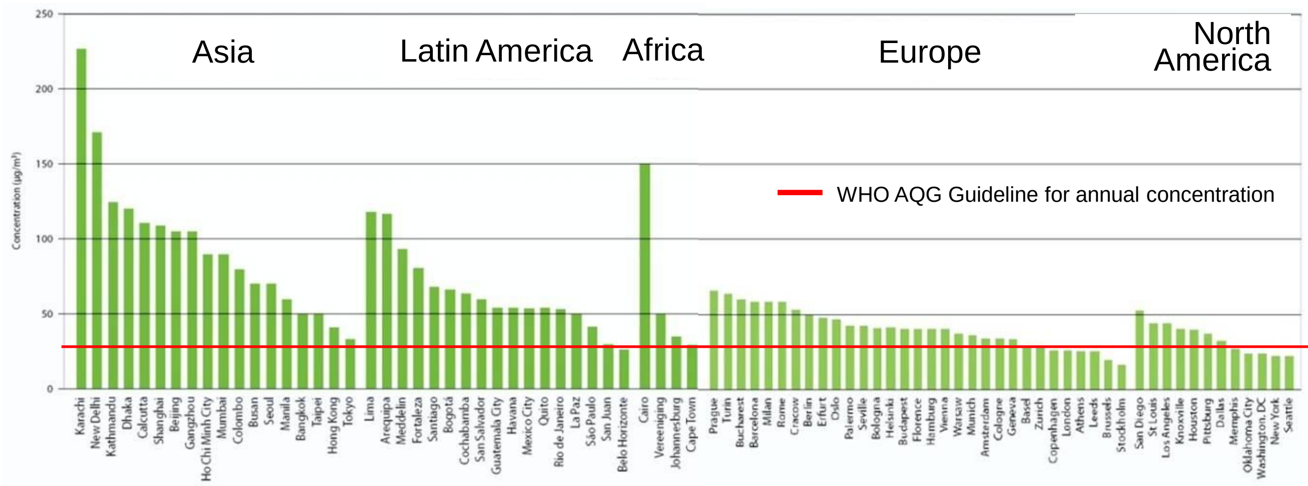
Two indicators (NO_x), PM_{10}) illustrate global differences.

- Average national nitrogen dioxide concentrations have generally not declined, except in the United States.
- PM_{10} levels had decreased in Europe by the end of last century but have the tendency to rise again (partially explained by changing weather conditions).
- Large Asian and Latin America cities still experience high levels of PM, even though the former have seen a slight reduction in PM_{10} levels over the last few decades.

Annual average NO_2 concentrations in selected cities worldwide, 2000-2005



Annual average PM_{10} concentrations in selected cities worldwide



Source: Air Quality Guidelines Global Update 2005, p. 39

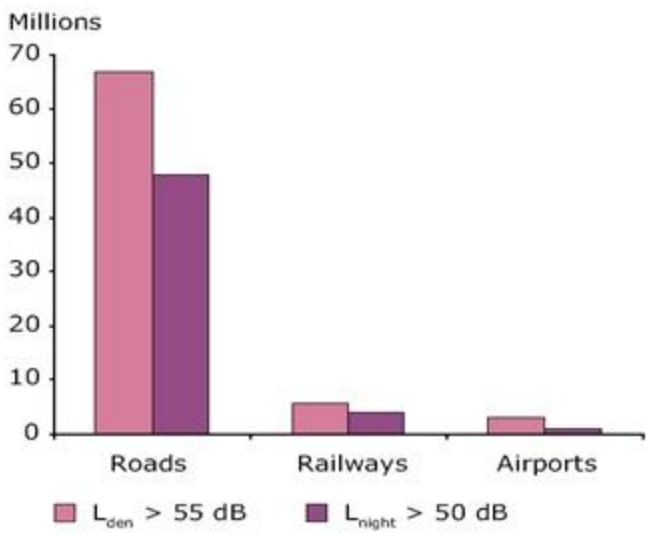
Fact Sheet 21: Noise

- Traffic noise has severe impacts on health and quality of life not only in cities, but anywhere near major transport infrastructure.
- Health effects:
  - from 65 to 75 dB(A): stress, increased blood pressure, disorders of cardiovascular system, heart attack
  - from 85 dB(A): impairment of hearing, for short-time impact, e. g. hammering, temporary hearing threshold shift, long-time or short-time very loud noise impact, e. g. noise exceeding 120 dB(A): permanent shift of hearing threshold

Targets and limits in the EU:

- The current EU policy framework sets general objectives for reducing exposure to transport noise (Directive 2002/49/EC).
- It does not, however, establish any time-related or measurable targets on the number of people exposed to transport noise.

People affected by transport noise in agglomerations > 250 000 inhabitants (EU-27)



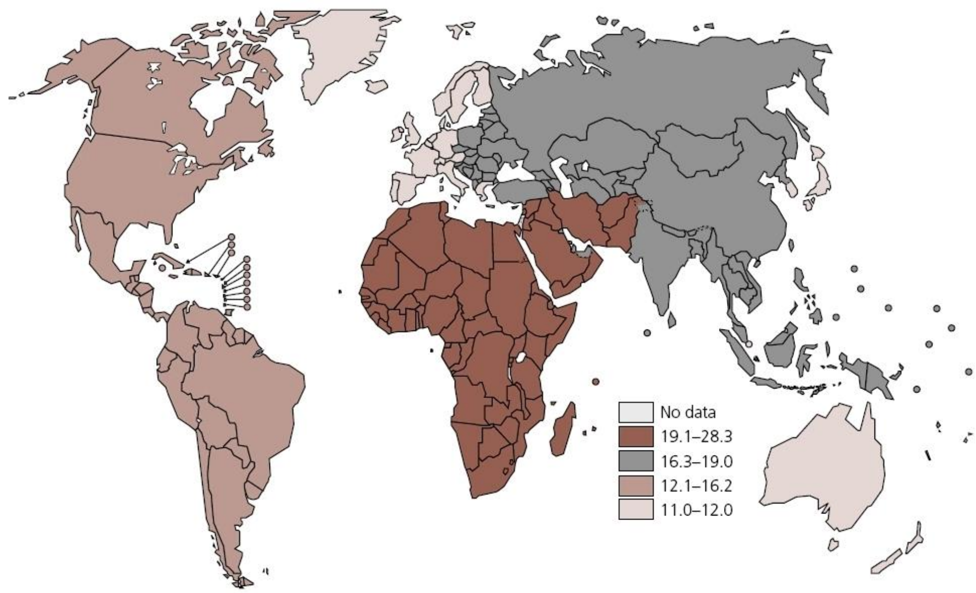
Source: Page 23: Transport at a crossroads; TERM 2008: indicators tracking transport and environment in the European Union; EEA Report No 3/2009.

(Page 23 TERM 2008 “The set of data on noise exposure in major agglomerations and along major infrastructures reported to the European Commission in 2007 comprised information on 162 agglomerations (with more than 250 000 inhabitants), roughly 82 000 km of major roads, approximately 12 000 km of major railways, and 74 major civil airports (DG ENV, 2008a). The analysis below is based on those data and therefore does not depict the full exposure to transport noise in Europe”).

Fact Sheet 22: Road safety

- High income countries are likely to further reduce the number of persons killed in traffic accidents.
- In contrast, the number will rise dramatically in low and middle income countries if no countermeasures are taken.

Road traffic injury mortality rates (per 100 000 population) in WHO regions, 2002



Source: WHO, Global burden of disease, www.who.int/topics/global_burden_of_disease/en/

Ten leading causes of burden of disease, world, 2004 and 2030 (projection)

2004 Disease or injury	As % of total DALYs	Rank	Rank	As % of total DALYs	2030 Disease or injury
Lower respiratory infections	6.2	1	1	6.2	Unipolar depressive disorders
Diarrhoeal diseases	4.8	2	2	5.5	Ischaemic heart disease
Unipolar depressive disorders	4.3	3	3	4.9	Road traffic accidents
Ischaemic heart disease	4.1	4	4	4.3	Cerebrovascular disease
HIV/AIDS	3.8	5	5	3.8	COPD
Cerebrovascular disease	3.1	6	6	3.2	Lower respiratory infections
Prematurity and low birth weight	2.9	7	7	2.9	Hearing loss, adult onset
Birth asphyxia and birth trauma	2.7	8	8	2.7	Refractive errors
Road traffic accidents	2.7	9	9	2.5	HIV/AIDS
Neonatal infections and other[a]	2.7	10	10	2.3	Diabetes mellitus
COPD	2.0	13	11	1.9	Neonatal infections and other[a]
Refractive errors	1.8	14	12	1.9	Prematurity and low birth weight
Hearing loss, adult onset	1.8	15	15	1.9	Birth asphyxia and birth trauma
Diabetes mellitus	1.3	19	18	1.6	Diarrhoeal diseases

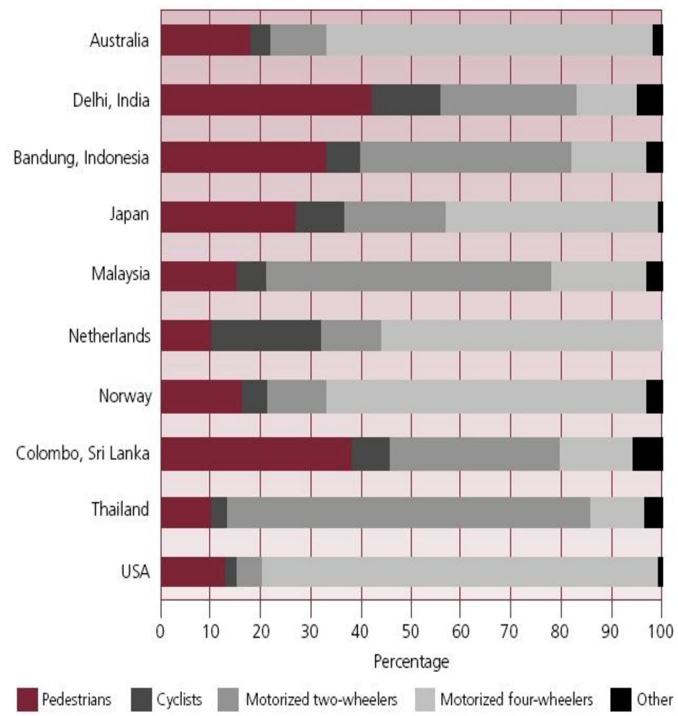
Source: WHO, Global burden of disease, www.who.int/topics/global_burden_of_disease/en/

Note: The WHO global burden of disease (GBD) measures burden of disease using the disability-adjusted life year (DALY). This time-based measure combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health.

Fact Sheet 23: Road safety

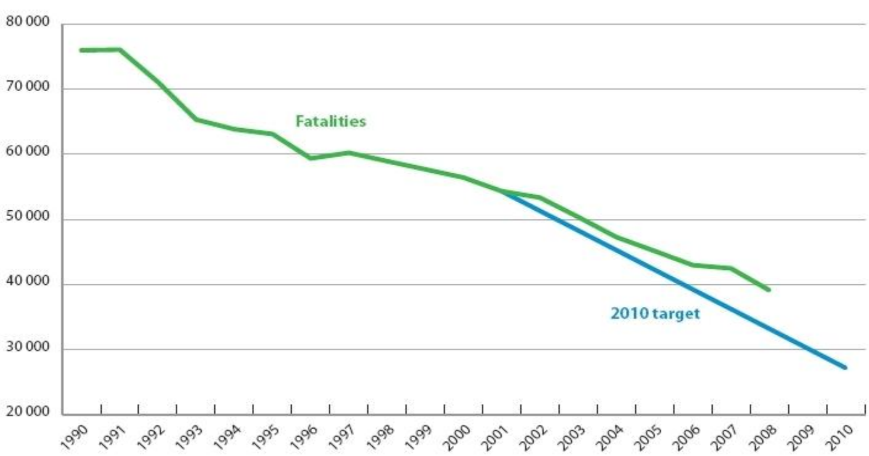
- Road traffic accidents are likely to become the 3rd important cause of deaths and injuries by 2030.
- Victims include a large number of pedestrians and cyclists, especially in developing cities.
- Roads in the EU have become safer. The number of casualties has dropped by 44% in the period from 1991 to 2007. The EU aimed to reduce their number by 50% until 2010 (based on the 2001 number of fatalities), as outlined in the 2001 'White Paper on the European transport policy for 2010'. Despite significant progress, this goal will probably not be achieved (EU 2009, 'A sustainable future for transport').
- Thailand also aims to reduce road casualties by 5,000 until 2012 (out of the current 13,000 annual deaths), as stated in the 'Thailand Road Safety Manifesto'.

Road users killed in various modes of transport as a proportion of all road traffic deaths



Source: WHO, World report on road traffic injury prevention, 2004, p. 42

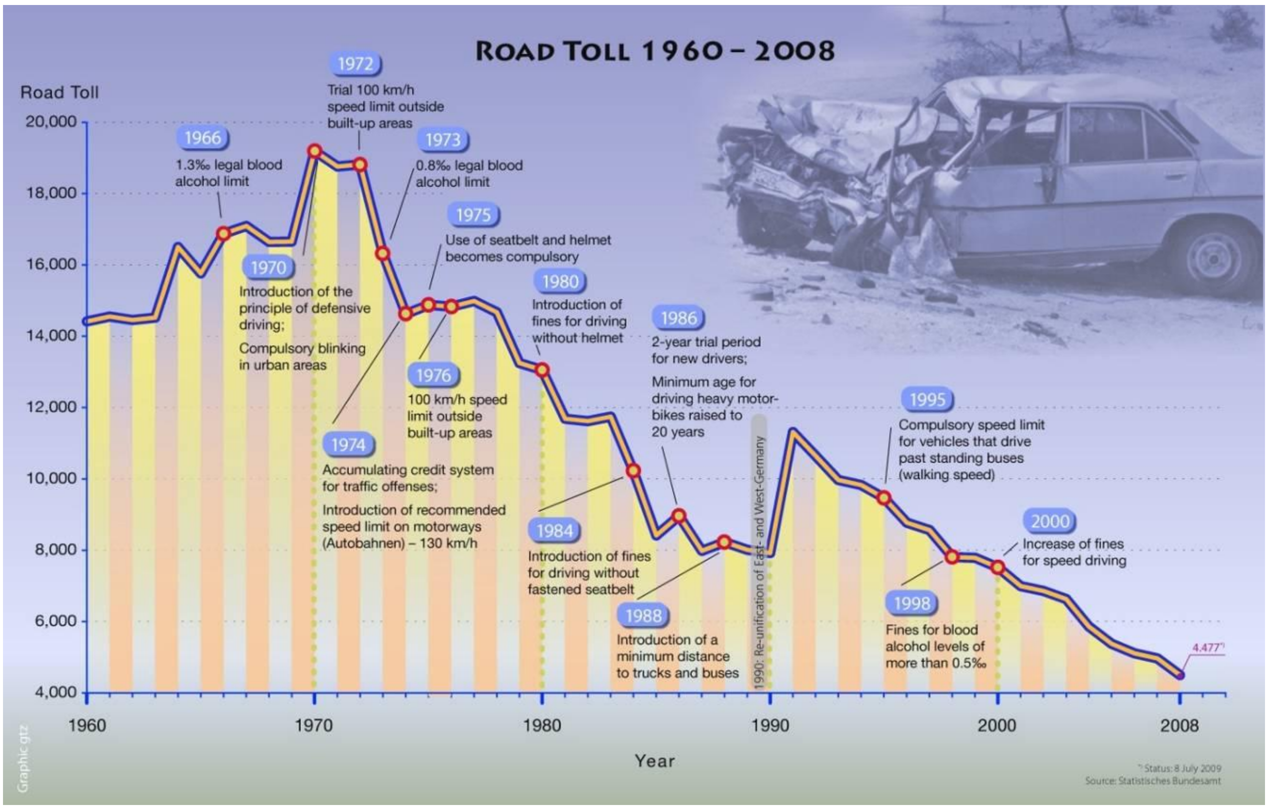
Road fatalities in the EU-27 since 1990 and 2010 reduction target



Source: EU report ‚A sustainable future for transport, based on CARE database, national data

- Germany has succeeded in significantly reducing the number of people injured and killed in road traffic. Since the 1970s, a wide range of measures has contributed to this development. Most important are several legislative regulations with regard to safety for car occupants (e.g. mandatory safety belt), speed limits, and fines for traffic offences. In addition, these measures (shown below) were supported by raised safety standards for vehicles, as well as improvements in rescue services and medical treatment.

Road fatalities in Germany from 1960 to 2008

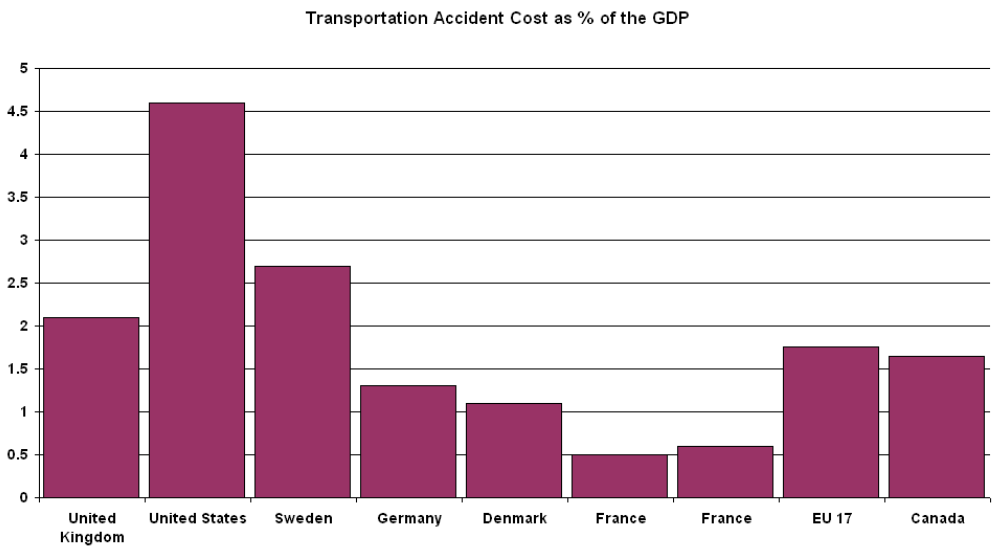


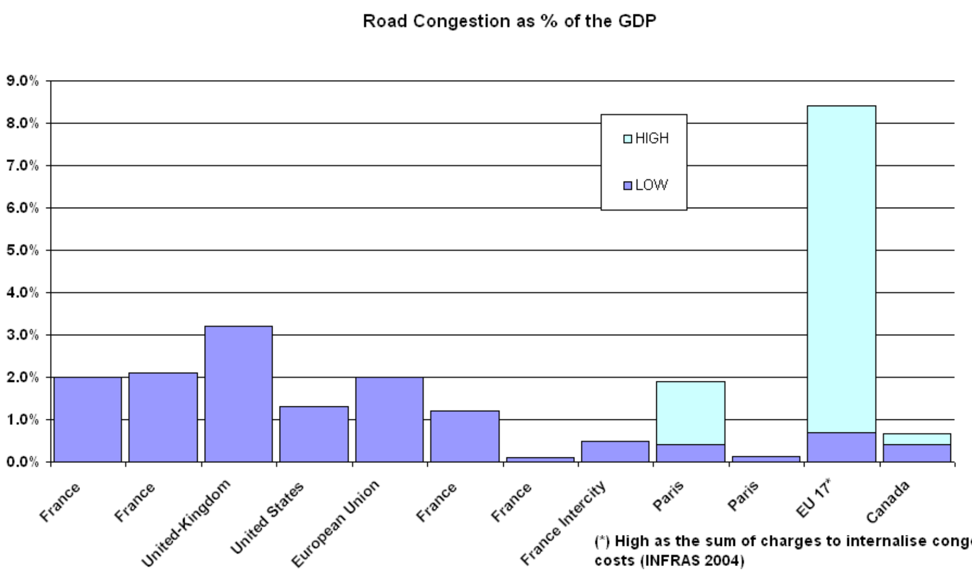
Source: Statistisches Bundesamt Germany

Fact Sheet 24: Economic and social costs

- Transport activities cause different kinds of negative economic and social costs, often summarized under the term ‚external effects'
- Such costs arise if the society has to bear the monetary costs impaired by transportation. This is the case if such costs are not factored in the costs of transportation service providers. Estimations of true external costs are difficult due to methodological problems.
- The international comparison of various external costs of transportation shown in the following figures is based on studies which used different methodological calculation approaches. Therefore the figures should be interpreted with caution.

International Comparison of various external costs of transportation

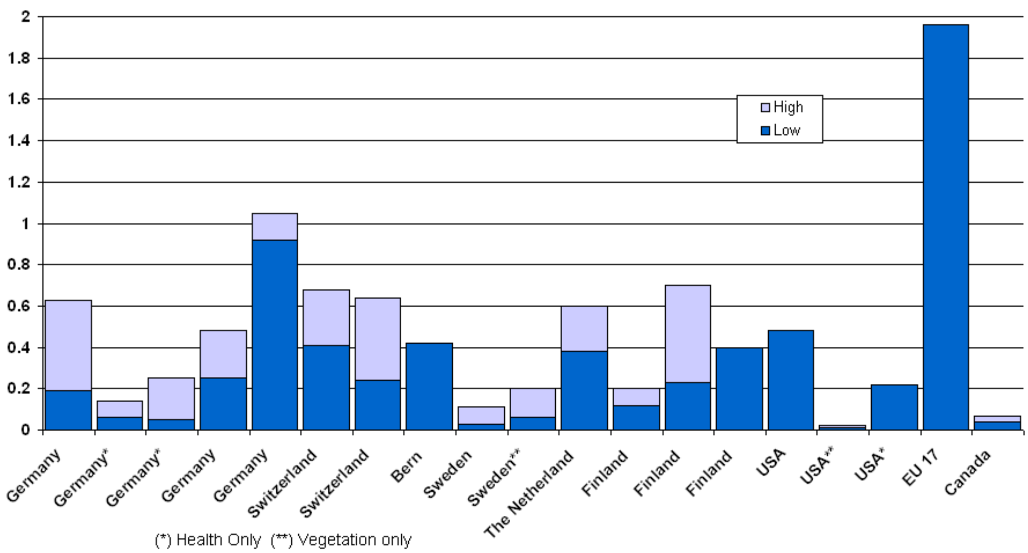




(*) High as the sum of charges to internalise congestion costs (INFRAS 2004)

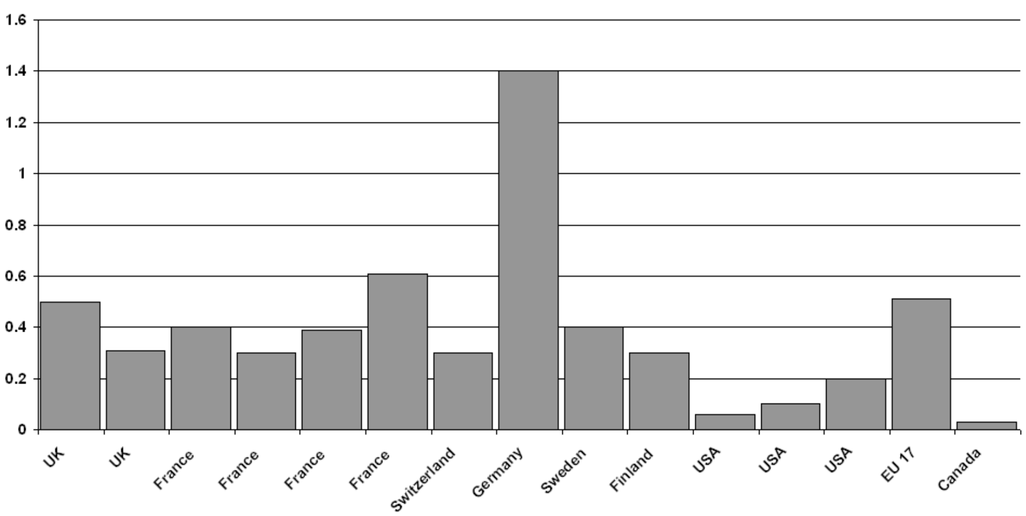
Source: Transport Canada 2008, , Estimates of the Full Cost of Transportation in Canada'

Transportation Air Pollution as % of the GDP



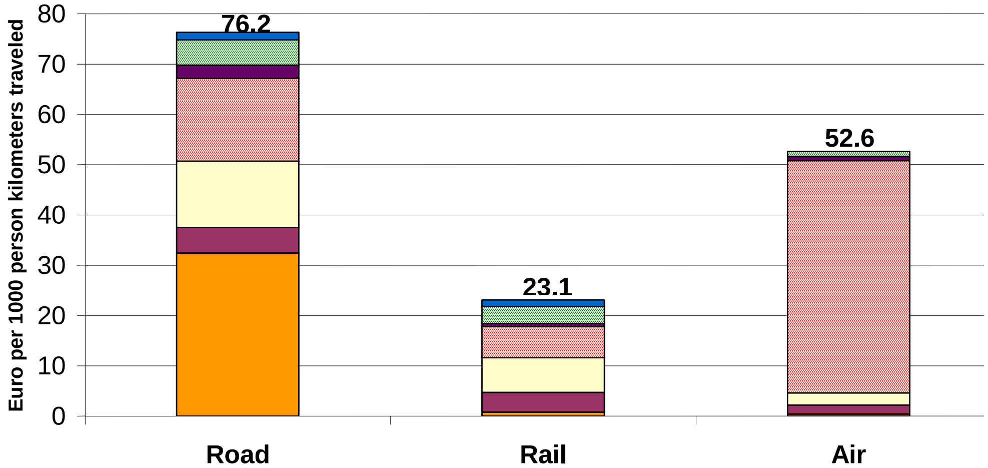
(*) Health Only (**) Vegetation only

Transportation Noise Costs as % of the GDP

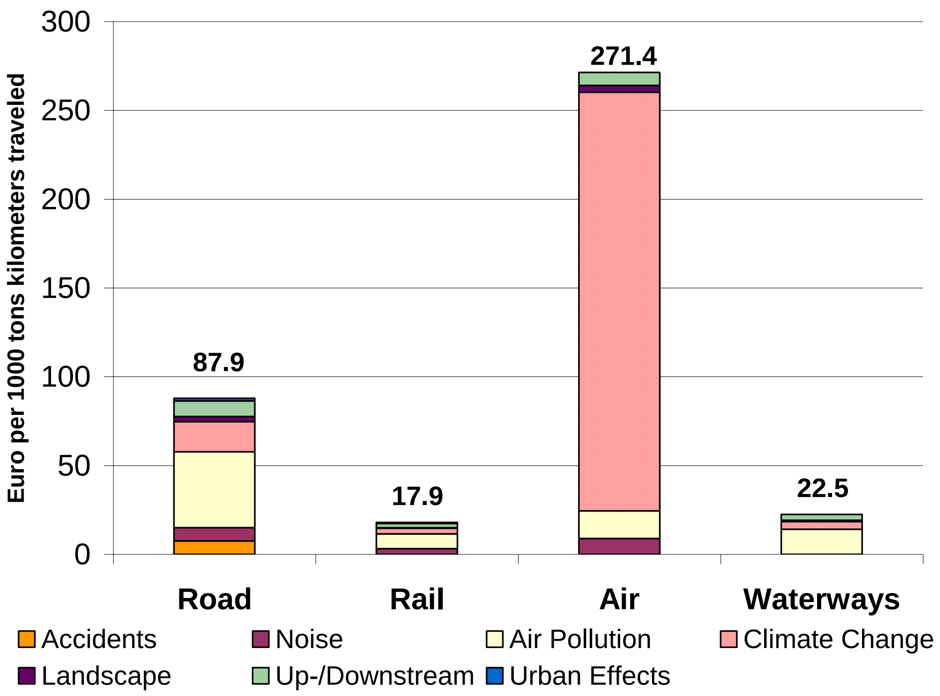


Source: Transport Canada 2008, , Estimates of the Full Cost of Transportation in Canada'

Average External costs in Western Europe in 2000 Passenger Transport (without congestions)



Source: INFRAS/IWW, October 2004, External Cost of Transport, Summary, Study financed by the International Union of Railways; Internet: www2.uic.asso.fr/d_environnement/ envissues/ext-cost-summary_en.pdf



Source: INFRAS/IWW, October 2004, External Cost of Transport, Summary, Study financed by the International Union of Railways; Internet: www2.uic.asso.fr/d_environnement/ envissues/ext-cost-summary_en.pdf

Deadweight loss, charging revenues and delay costs in road transport 2000

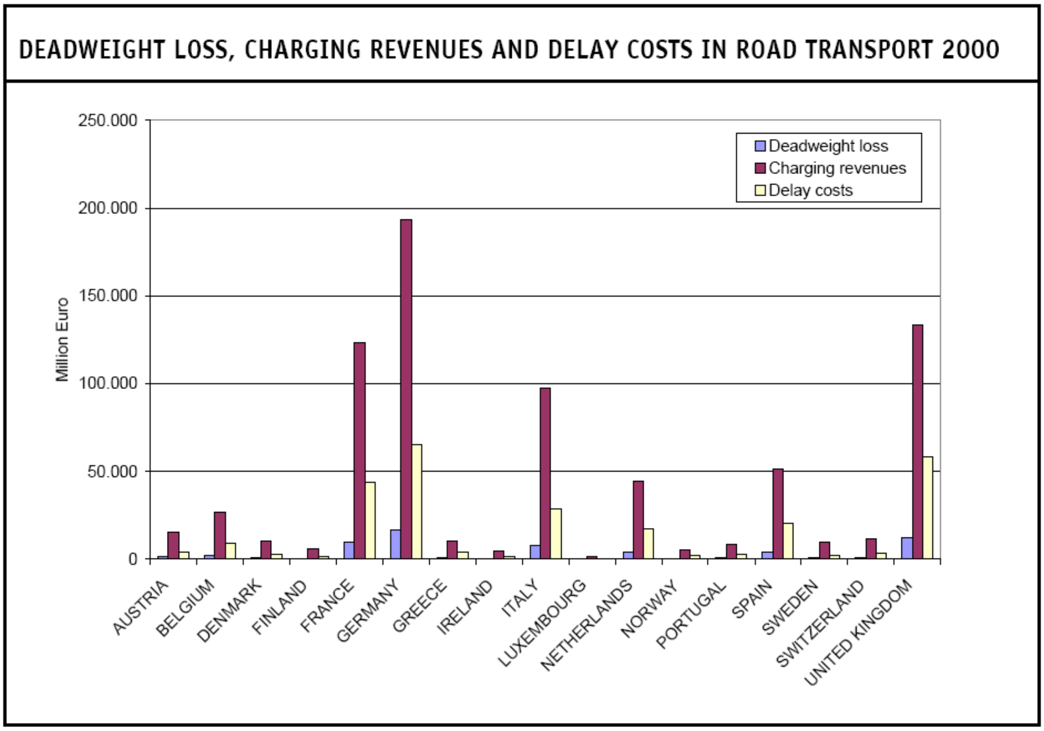


Figure 5 Comparison of the results (2000) based on different congestion cost estimations.

Source: INFRAS/IWW, October 2004, External Cost of Transport, page 19
http://www.uic.org/html/environnement/cd_external/docs/externalcosts_en.pdf

- “The deadweight loss reflects the economic costs in relation to an optimal traffic situation. The costs are roughly 63 billion Euro.
- The two other approaches show the following results for 2000:
    - Revenues from optimal congestion pricing amount to 753 billion Euros (8.4°/o of GDP).
    - Additional time costs amount to 268 billion Euro (3.0°/o of GDP).” (INFRAS/IWW page 19)

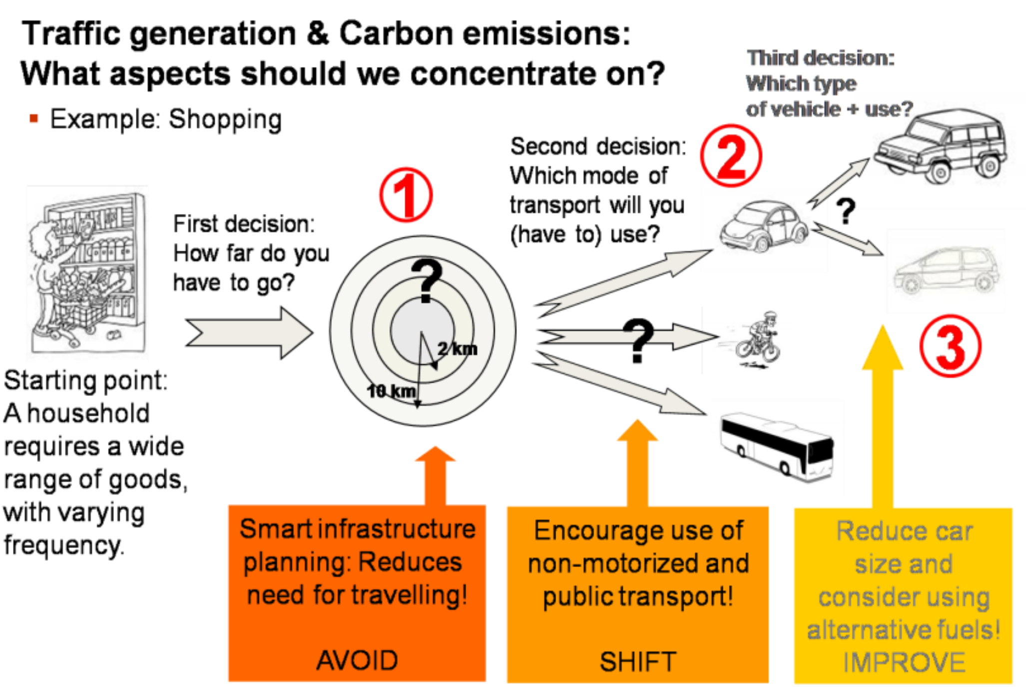
Source: INFRAS/IWW, October 2004, External Cost of Transport, Summary, Study financed by the International Union of Railways; Internet: www2.uic.asso.fr/d_environnement/ envissues/ext-cost-summary_en.pdf

4. Reaping benefits
The ‚avoid-shift-improve‘ approach

Fact Sheet 25: The ‚avoid-shift-improve‘ approach

- In contrast to other sectors, transport includes small and mobile sources of GHG emissions.
- Mobility policies involve a large number of stakeholders.
- To achieve GHG emission reductions, it is necessary to combine instruments intelligently, forming policy packages which often require coordinating action on both national and local level.

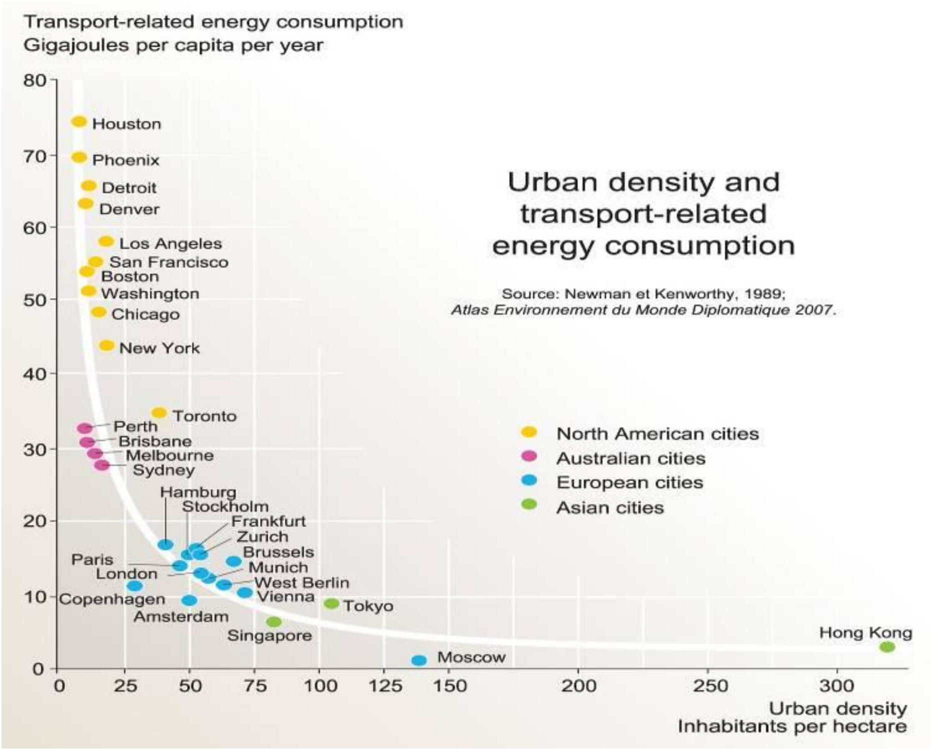
AVOID	SHIFT	IMPROVE
Reduce or avoid travel or the need to travel	Shift to more environmentally friendly modes	Improve the energy efficiency of transport modes



Source: GTZ/Schmid 2008

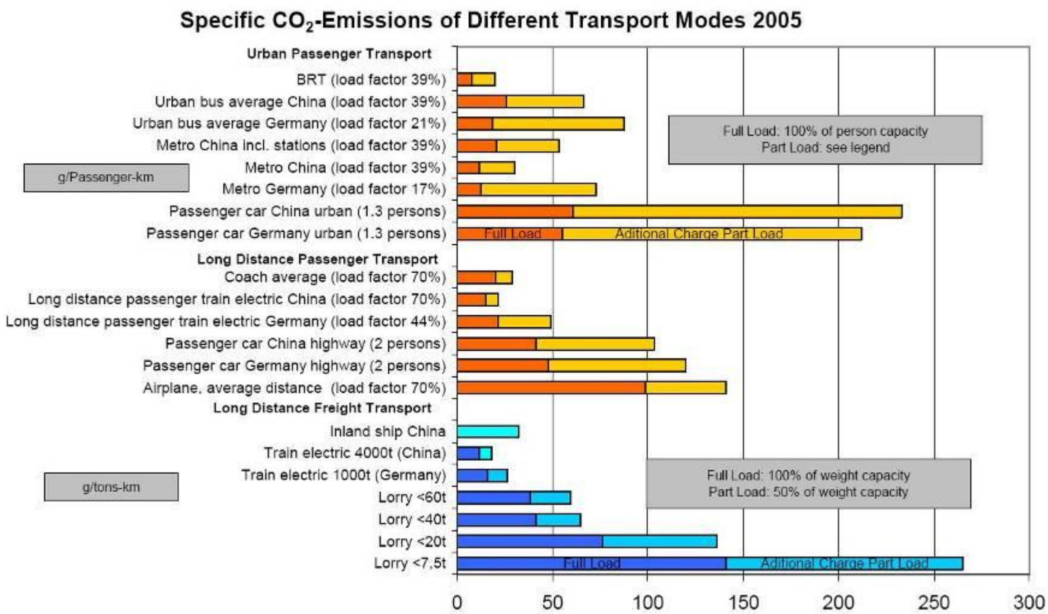
Fact Sheet 26: Urban Density & Energy Efficiency

- The way cities are build our influences many aspects of people's lifestyle.
- By integrating shopping and leisure areas into residential areas, the need for daily travels decreases.
- Mode shifts to non-motorized transport is facilitated.
- Reducing urban sprawl and making inner cities more attractive for urban dwellers has direct effects on commuting distances.
- Modal split patterns vary among different regions, even if they are at equal levels of GDP per capita.
- North American patterns, resulting from low-density urban development, are most unsustainable in the long run.
- European cities generally fare better, even though there still remains ample space for improvement.
- Decoupling the share of private motorized transport from GDP values is possible.



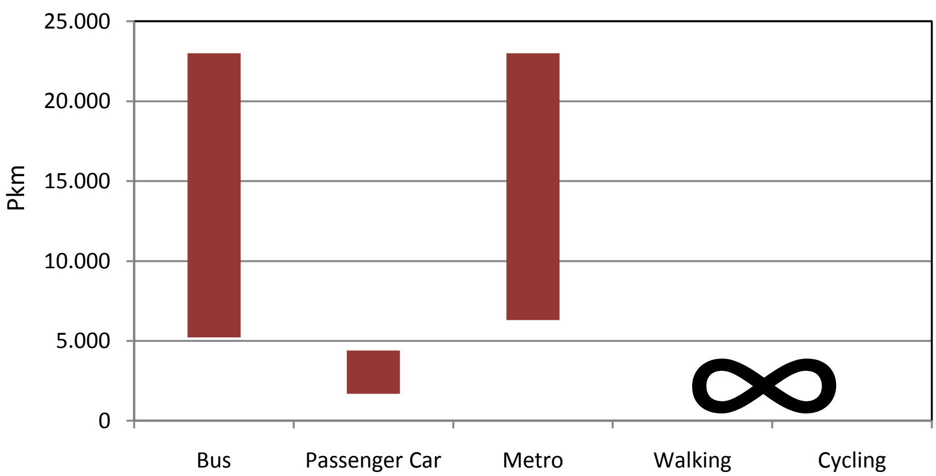
Fact Sheet 27: Energy efficiency of different modes

- The first table shows the performance in specific CO2 emissions per Person or ton kilometre of different transport modes in Germany and China (i.e. energy efficiency). These are highly dependent from load factors. While the dark part of figures (orange/dark blue) describes the full load, the light part (yellow/light blue) assumes a country specific average.
- Shift to low carbon modes have a great potential to reduce GHG emissions. In average, Public Transport and freight trains&ships are more efficient by factor 2-4 and sometimes even above.
- Rebound effects like induced travel have to be considered when evaluating effects



Sources: KfW: Transport in China: Energy Consumption and Emissions of Different Transport Modes, Final Report, ifeu – Institute for Energy and Environmental Research Heidelberg

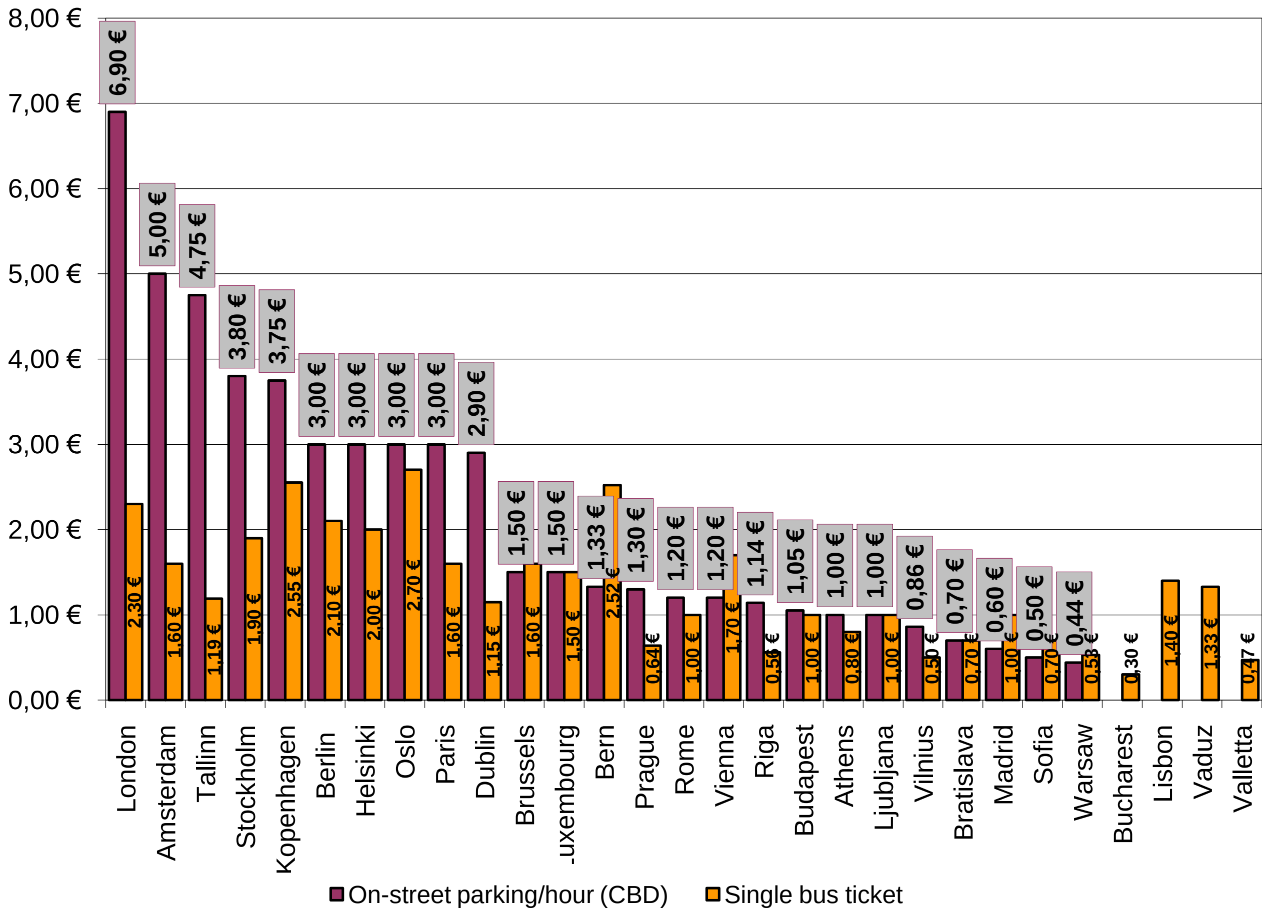
How far can you travel with 460kg CO_2?* (460kg CO_2 are 23 percent of 2 tons = today's transport share in CO2 applied to the average CO_2 emissions per person in 2050, as recommended by the IPCC in 2007)



* Ranges depend on different countries, technologies and load factors
Source: GTZ 2009, own calculation based on KfW/IFEU 2007

Encouraging mode shift: Making public transportation more attractive and competitive in comparison with individual motorized transport

Comparison of parking fees in European cities (On-street per hour, CBD) with costs of single bus fare



Source: GTZ 2009