Challenges for the European transport infrastructure

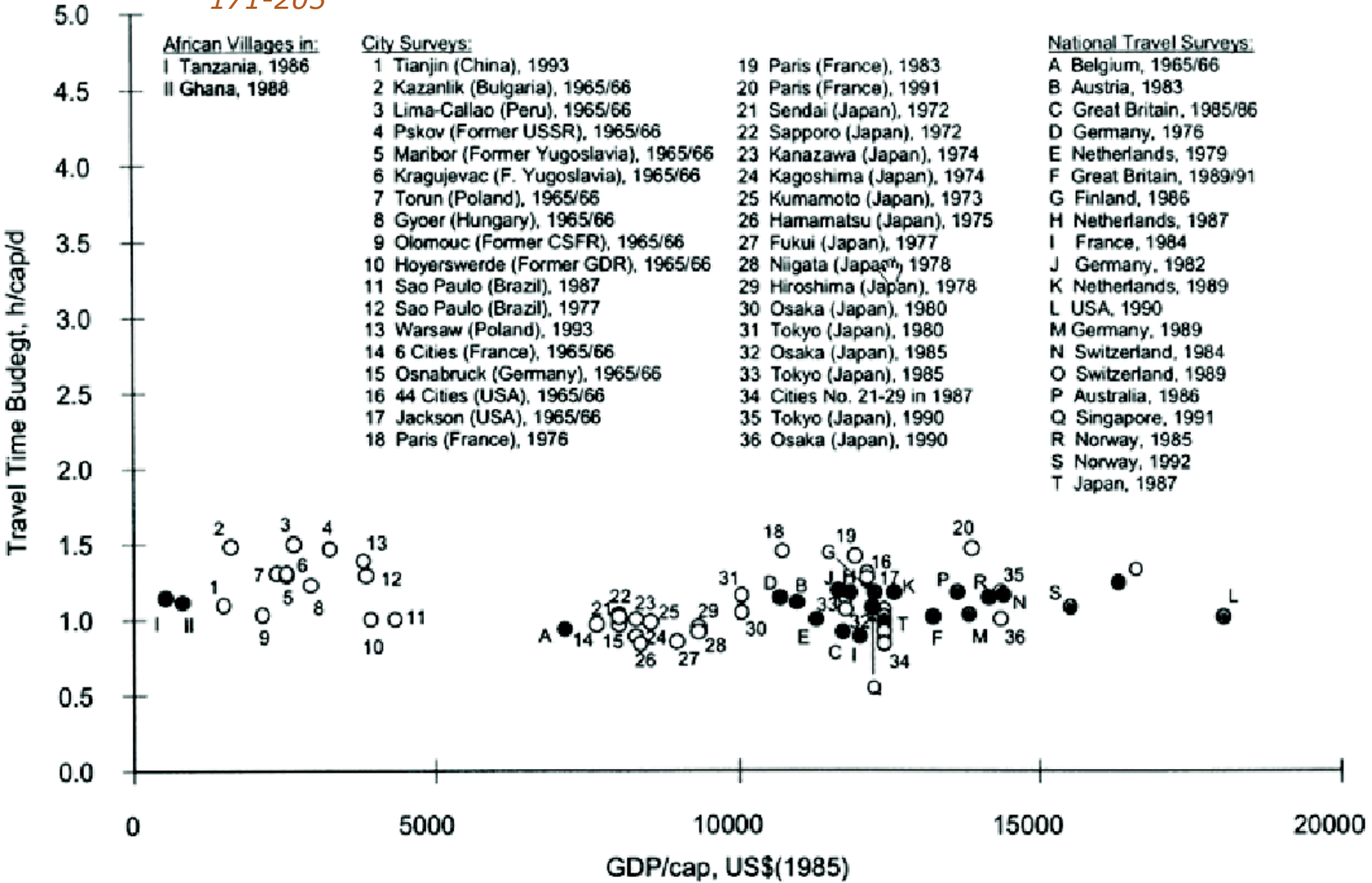
Griet De Ceuster

Challenges for the European transport infrastructure

- Transport growth drivers
- Differences between countries
- Reliability and time losses
- Efficient and effective?
- Sustainability effects
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

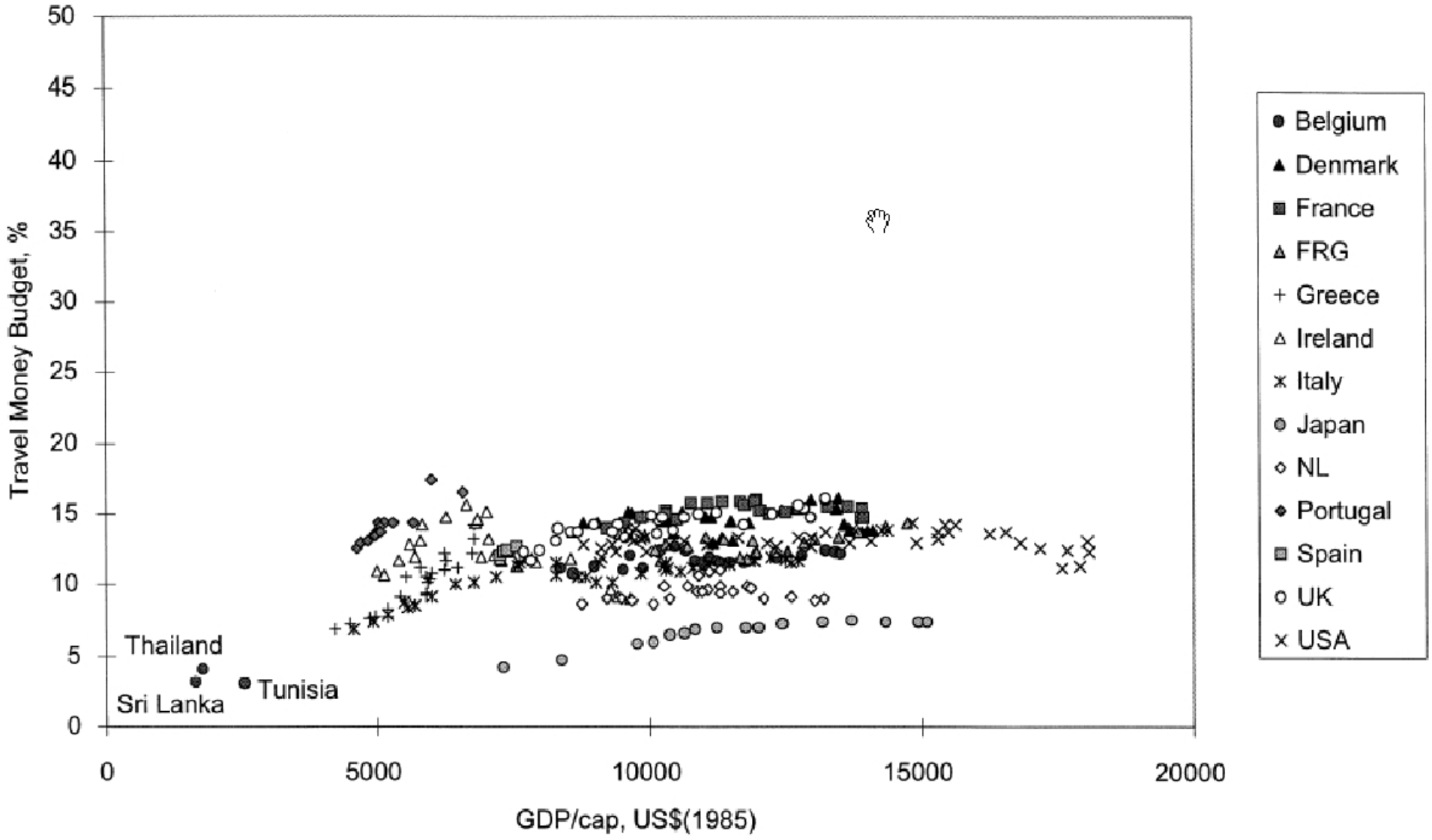
people travel 1 hour per day

source: A. Schafer, D.G. Victor, Transportation Research Part A 34(3) (2000) 171-205



people spend 10% of their budget on transport

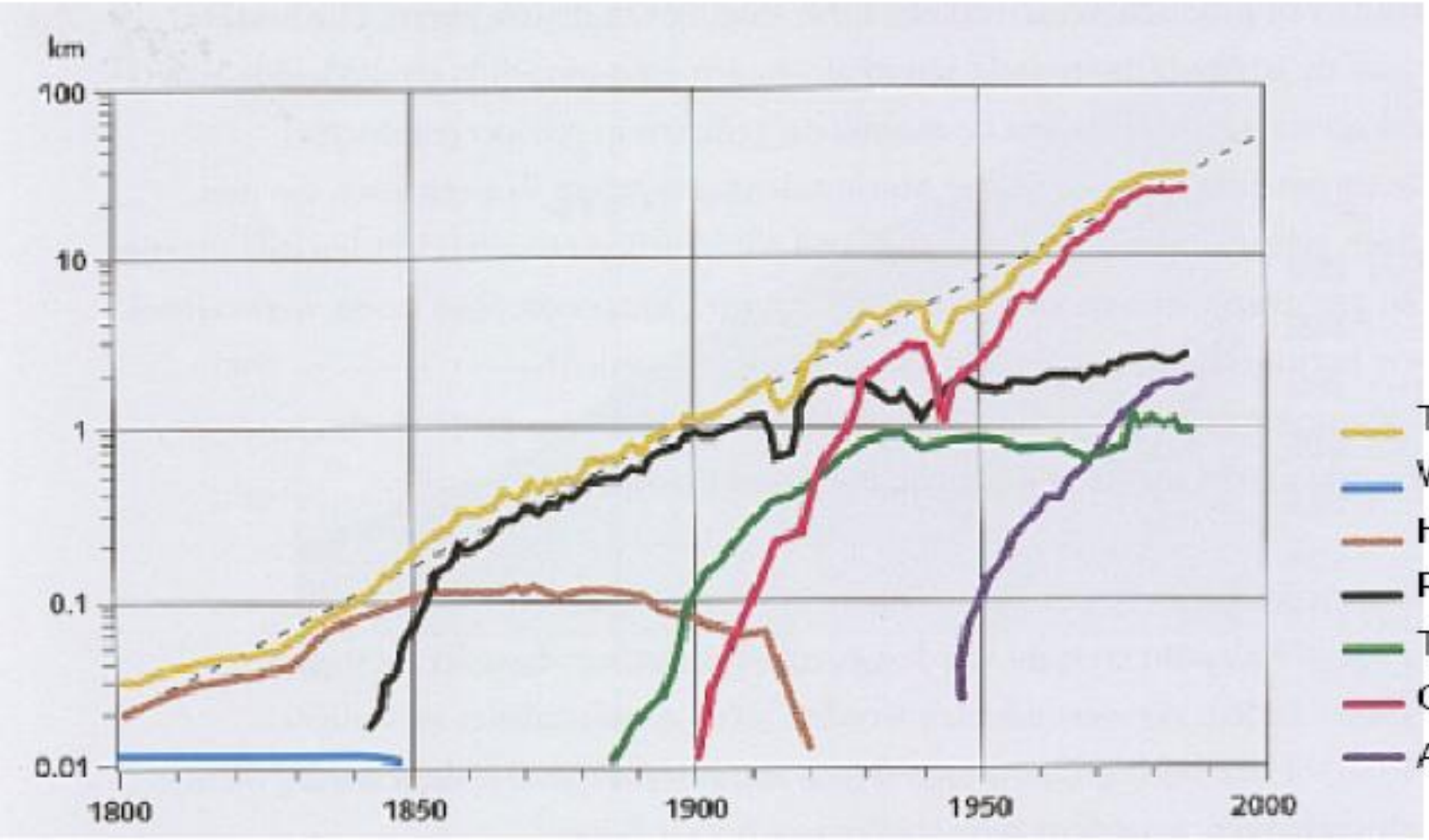
Source: A. Schafer, D.G. Victor, Transportation Research Part A 34(3) (2000) 171-205



people travel further and further

source: A. Grübler, The Rise and Fall of Infrastructures, 1990

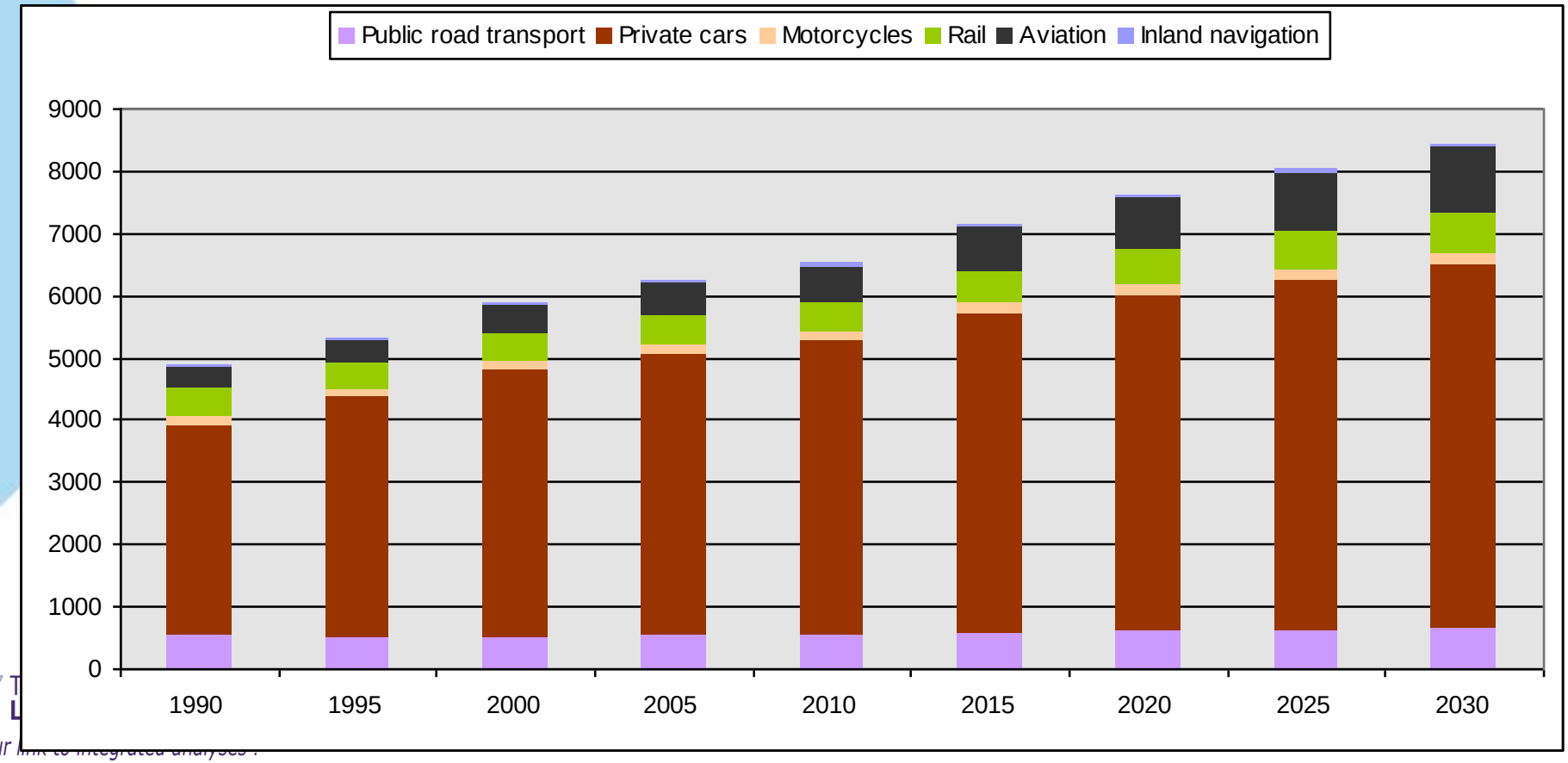
Figure 1. **Daily distance travelled per person 1800-2000 (excluding walking ; France)**



billion passenger-km in EU27

source: Primes Ver. 4 Energy Model, February 2010

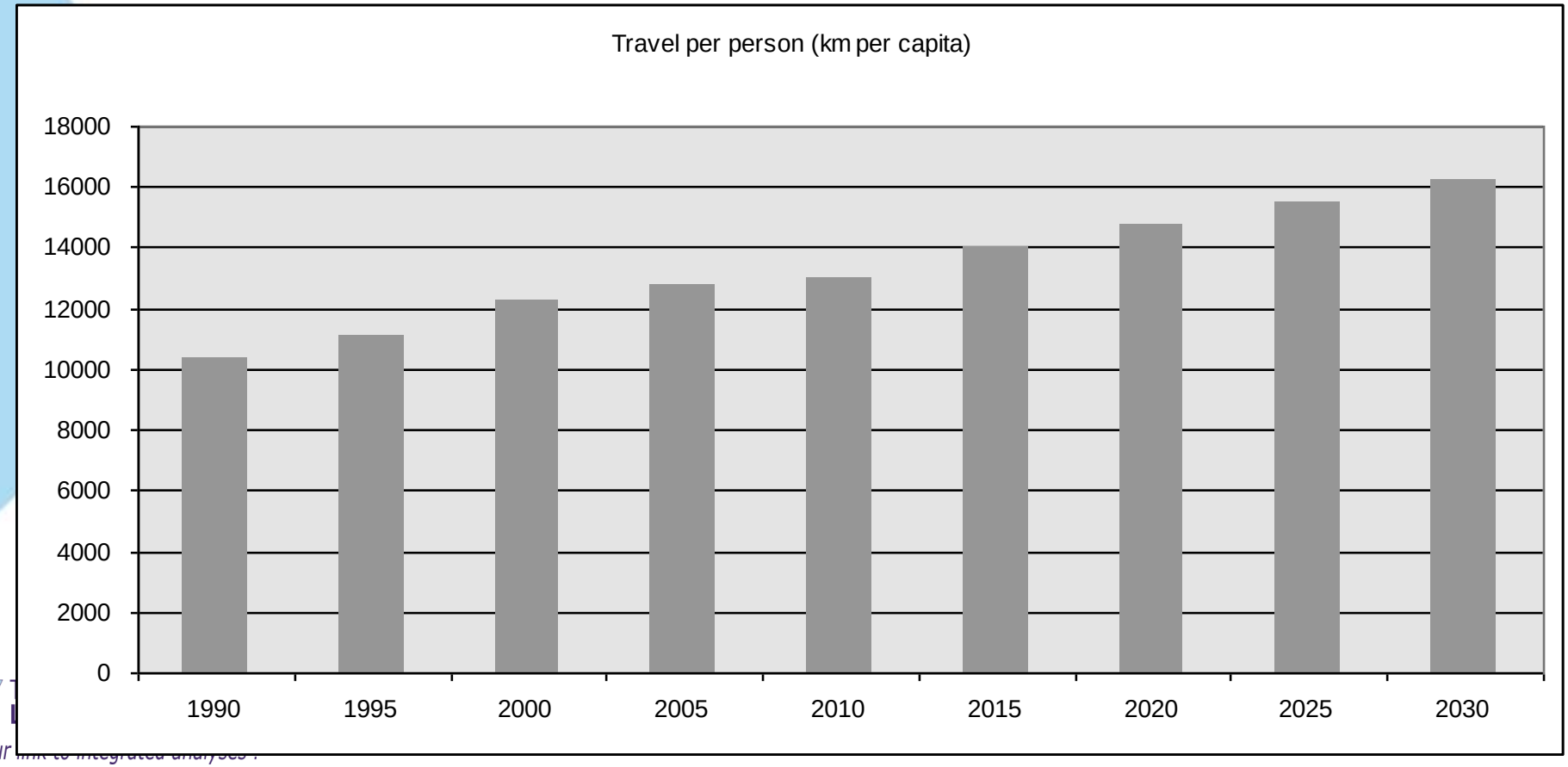
Doubles: 1990-2036



passenger-km per person in EU27

source: Primes Ver. 4 Energy Model, February 2010

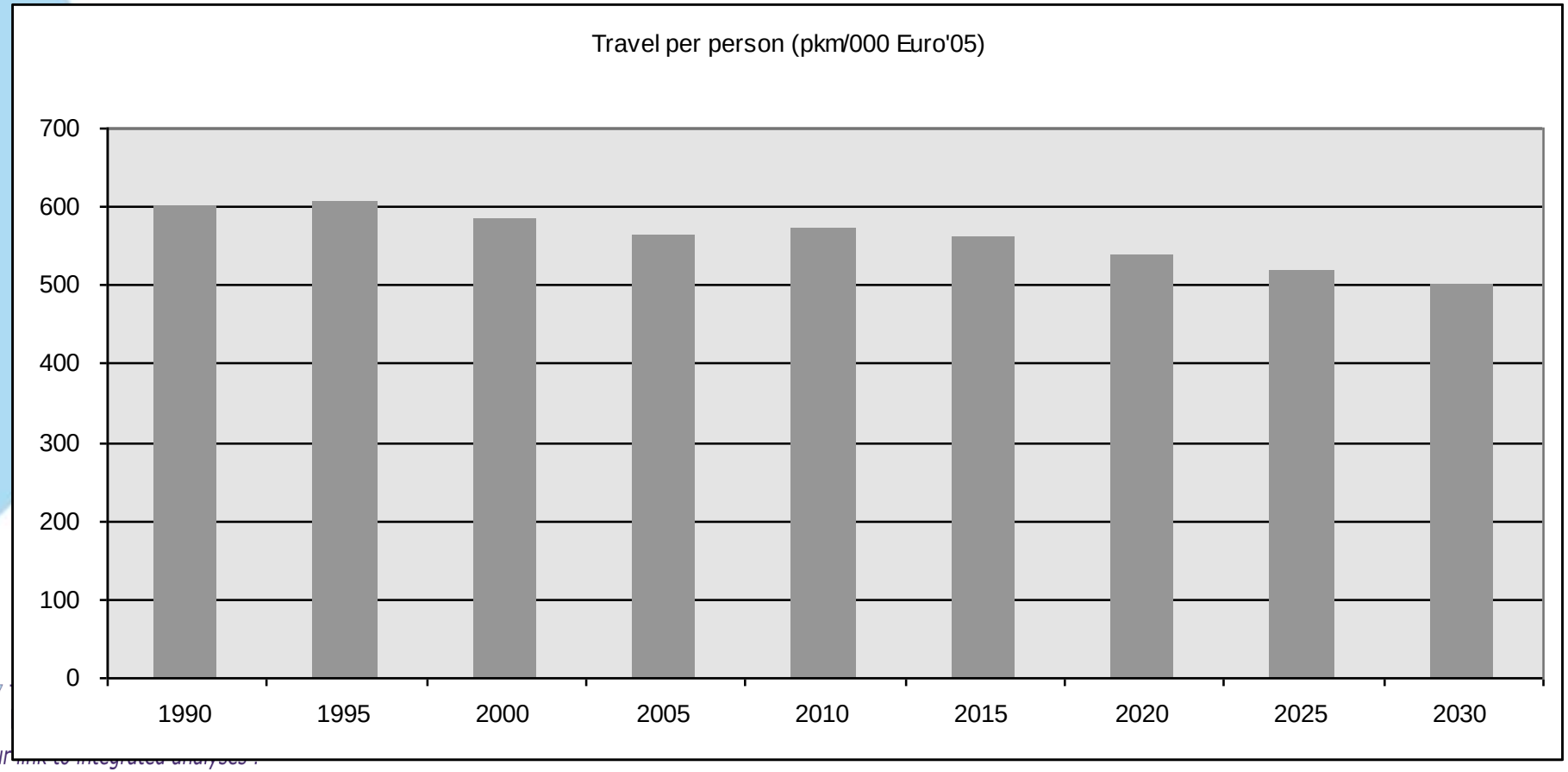
Slower than total growth
(population grows)



passenger-km per 1000 euro in EU27

source: Primes Ver. 4 Energy Model, February 2010

Slow decoupling from gdp growth

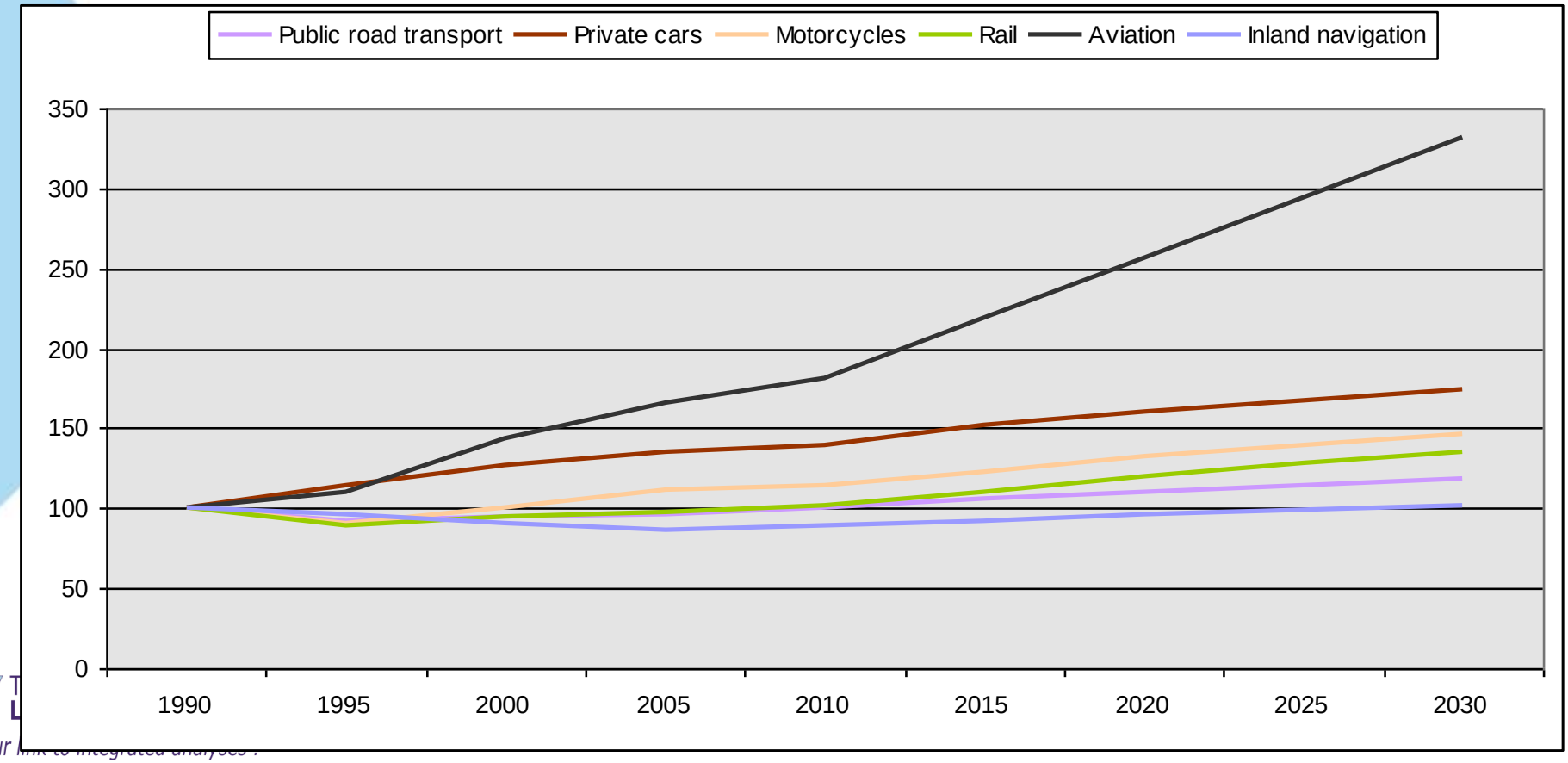


passenger-km 1990=100

source: Primes Ver. 4 Energy Model, February 2010

Car growth slower than before 1990

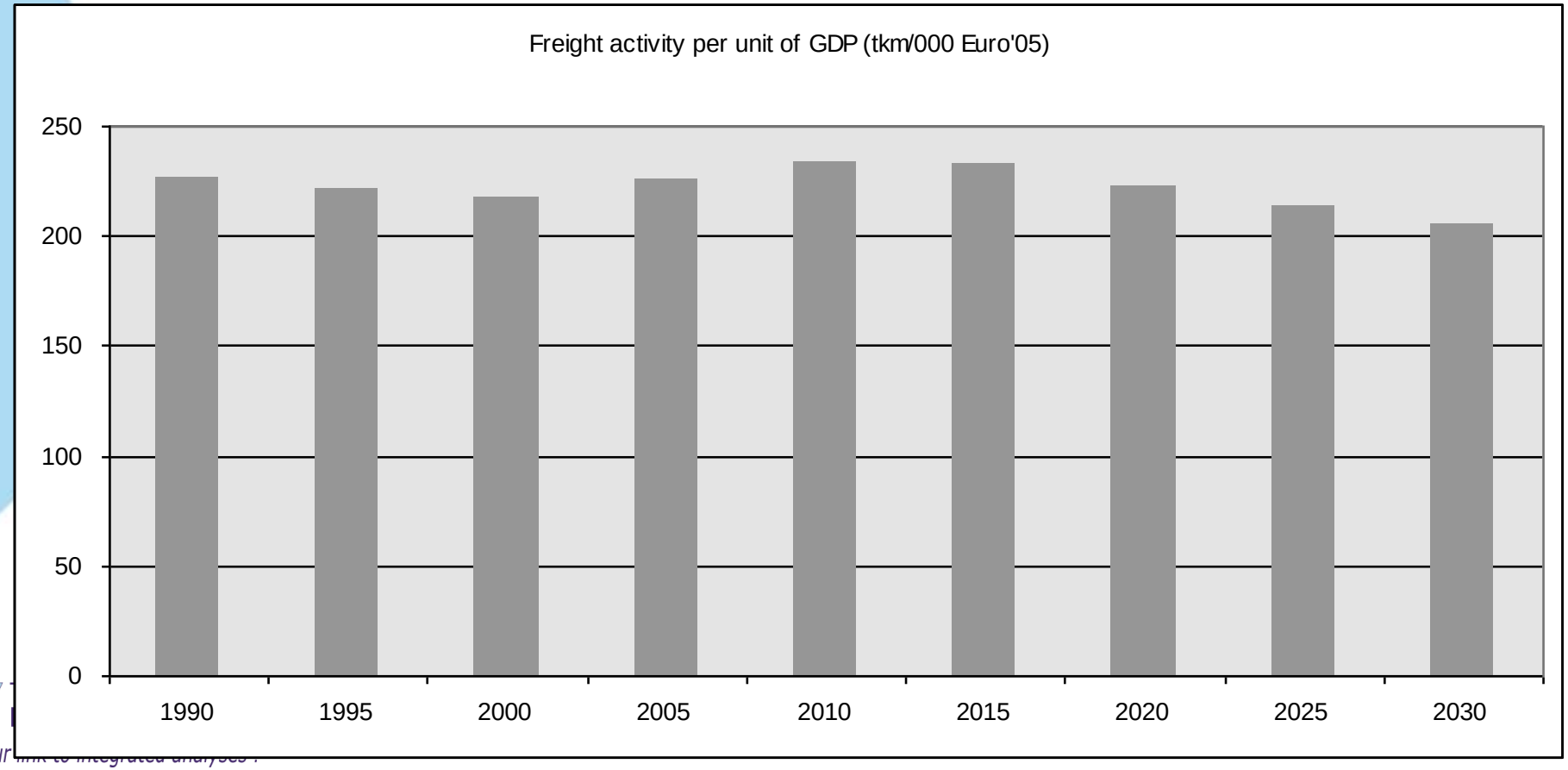
Faster modes: planes, and hst



tonne-km per 1000 euro in EU27

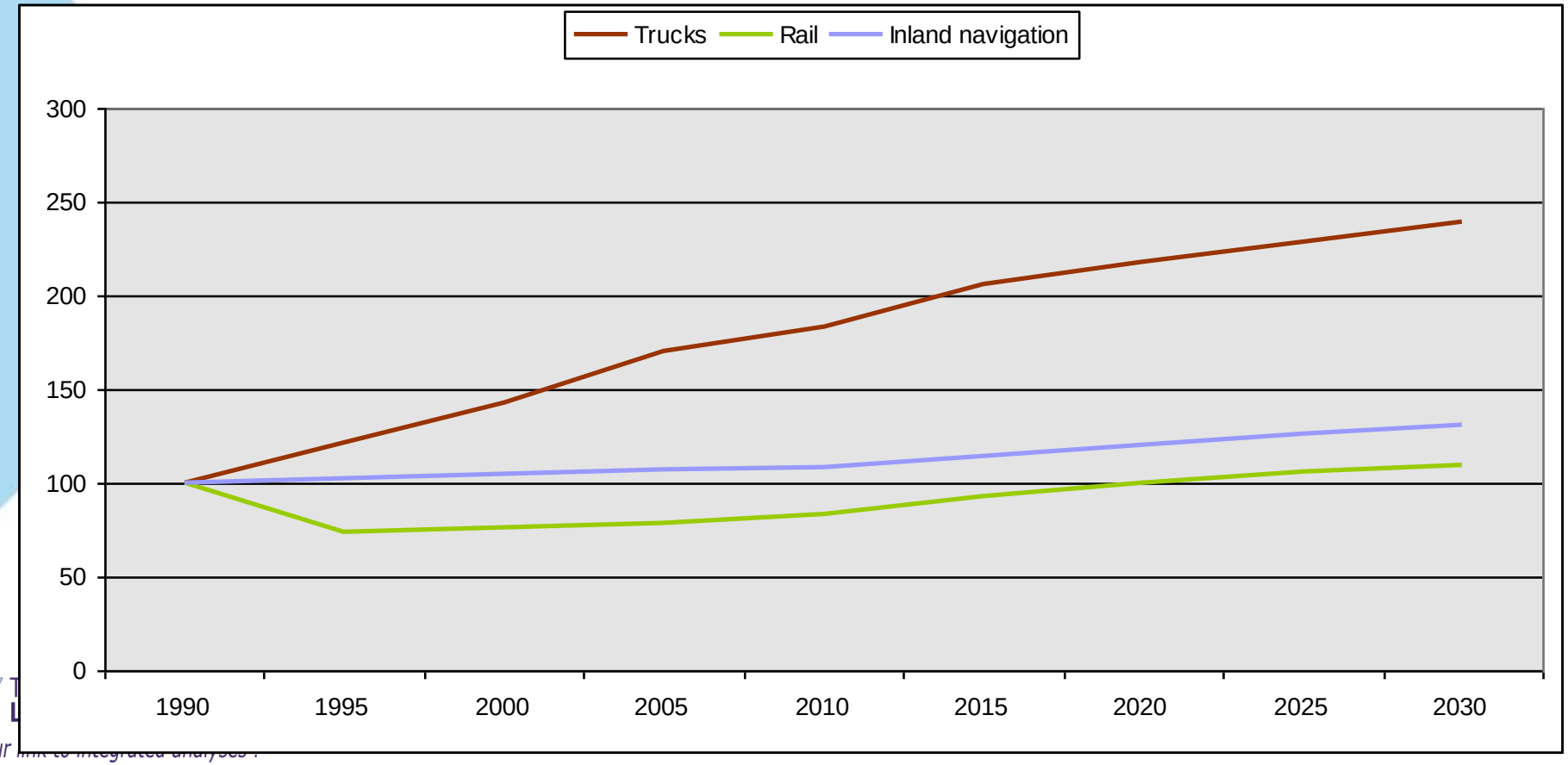
Source: Primes Ver. 4 Energy Model, February 2010

Maybe decoupling from gdp growth



tonne-km 1990=100

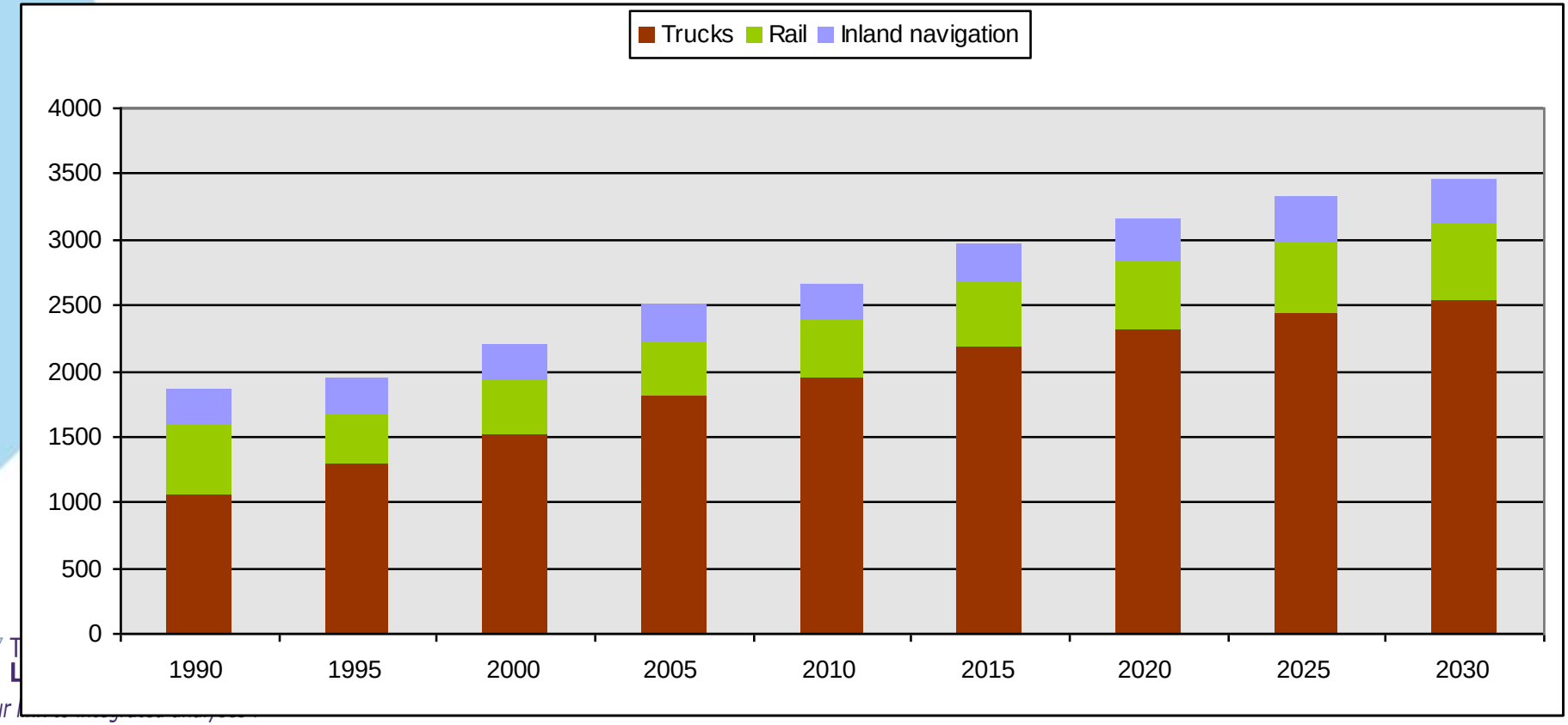
source: Primes Ver. 4 Energy Model, February 2010



billion tonne-km in EU27

source: Primes Ver. 4 Energy Model, February 2010

Doubles: 1990-2033

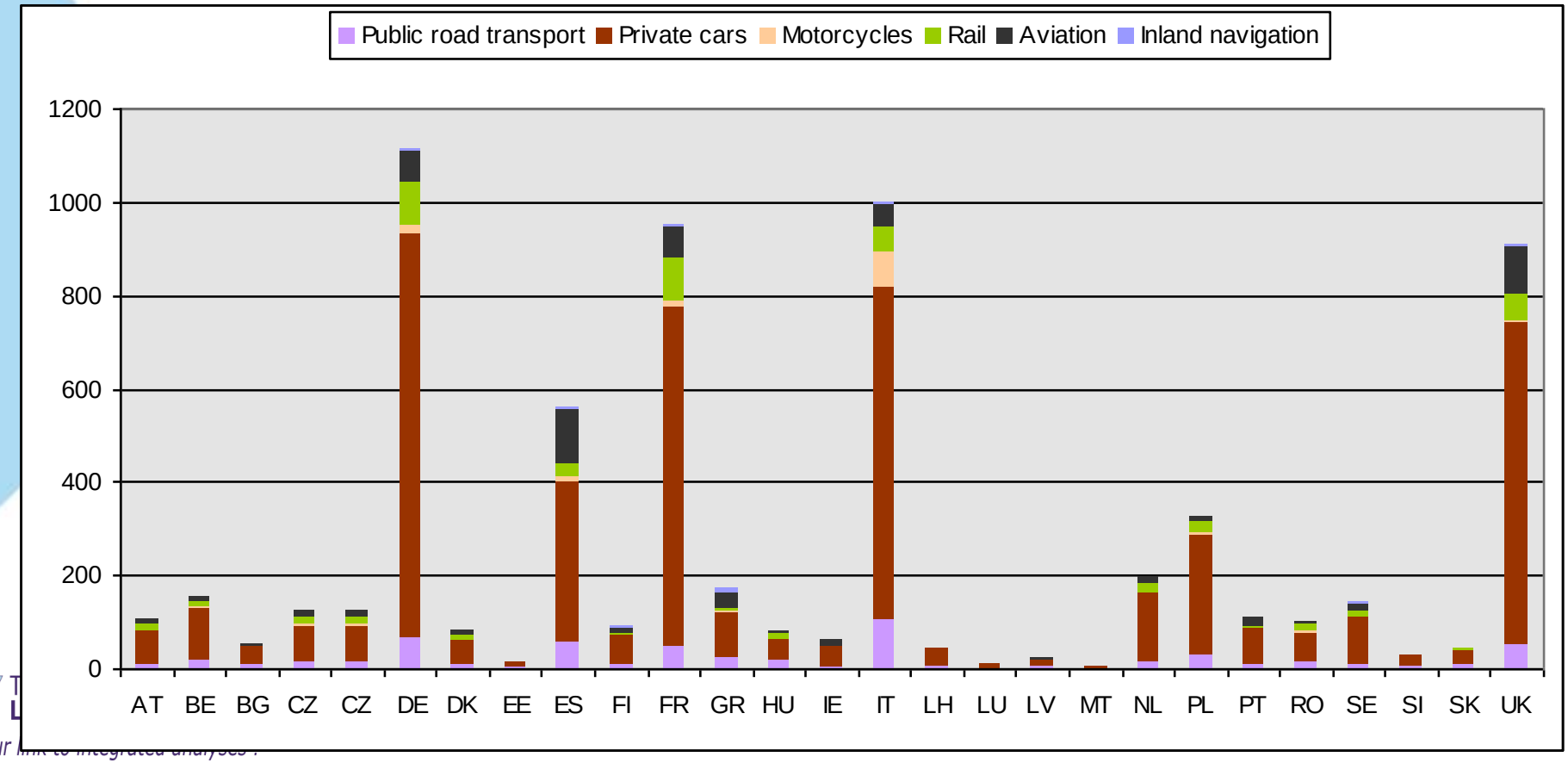


Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Differences between countries
- Reliability and time losses
- Efficient and effective?
- Sustainability effects
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

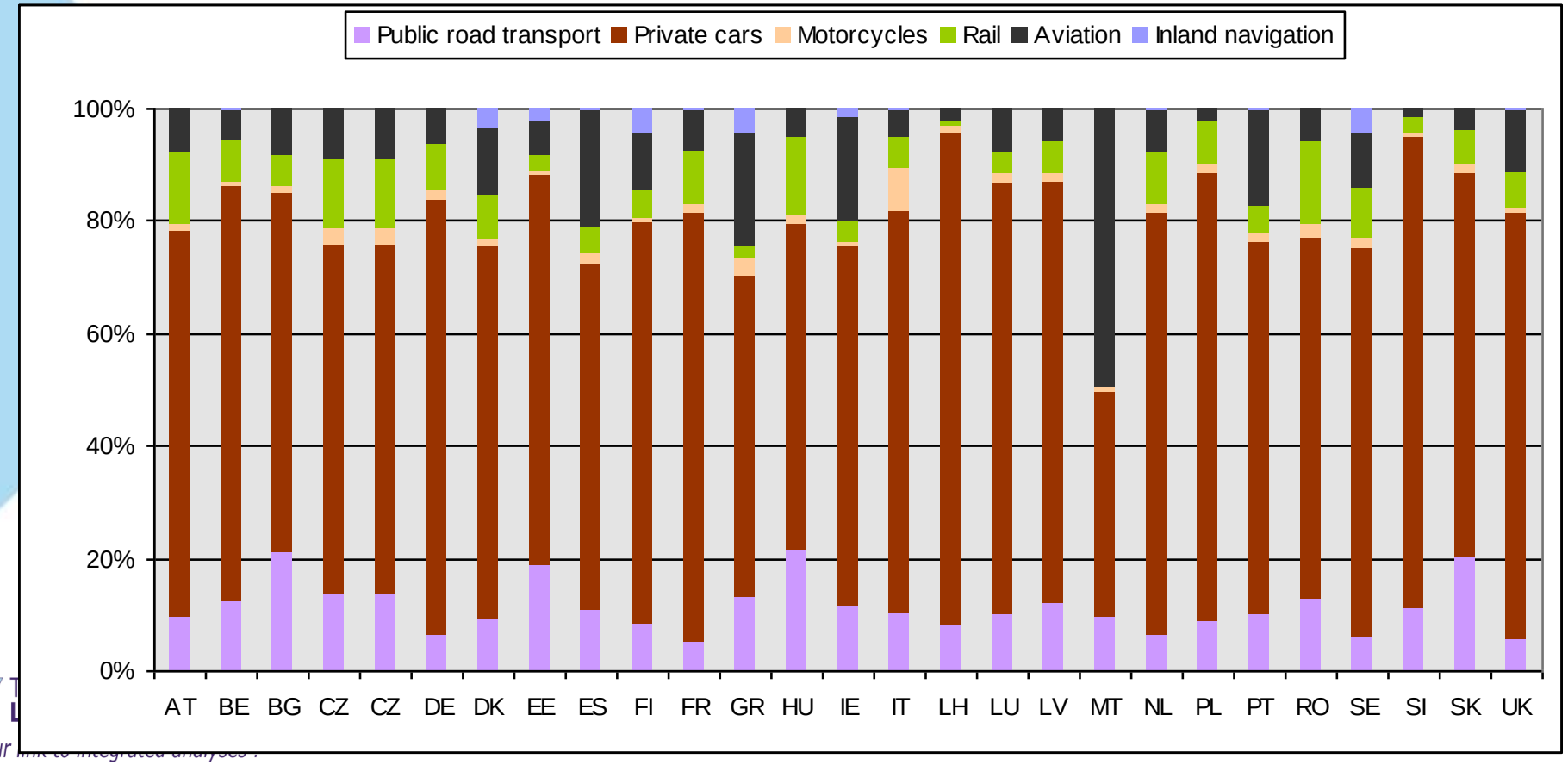
billion passenger-km in 2010

source: Primes Ver. 4 Energy Model, February 2010



modal share for passenger-km in 2010

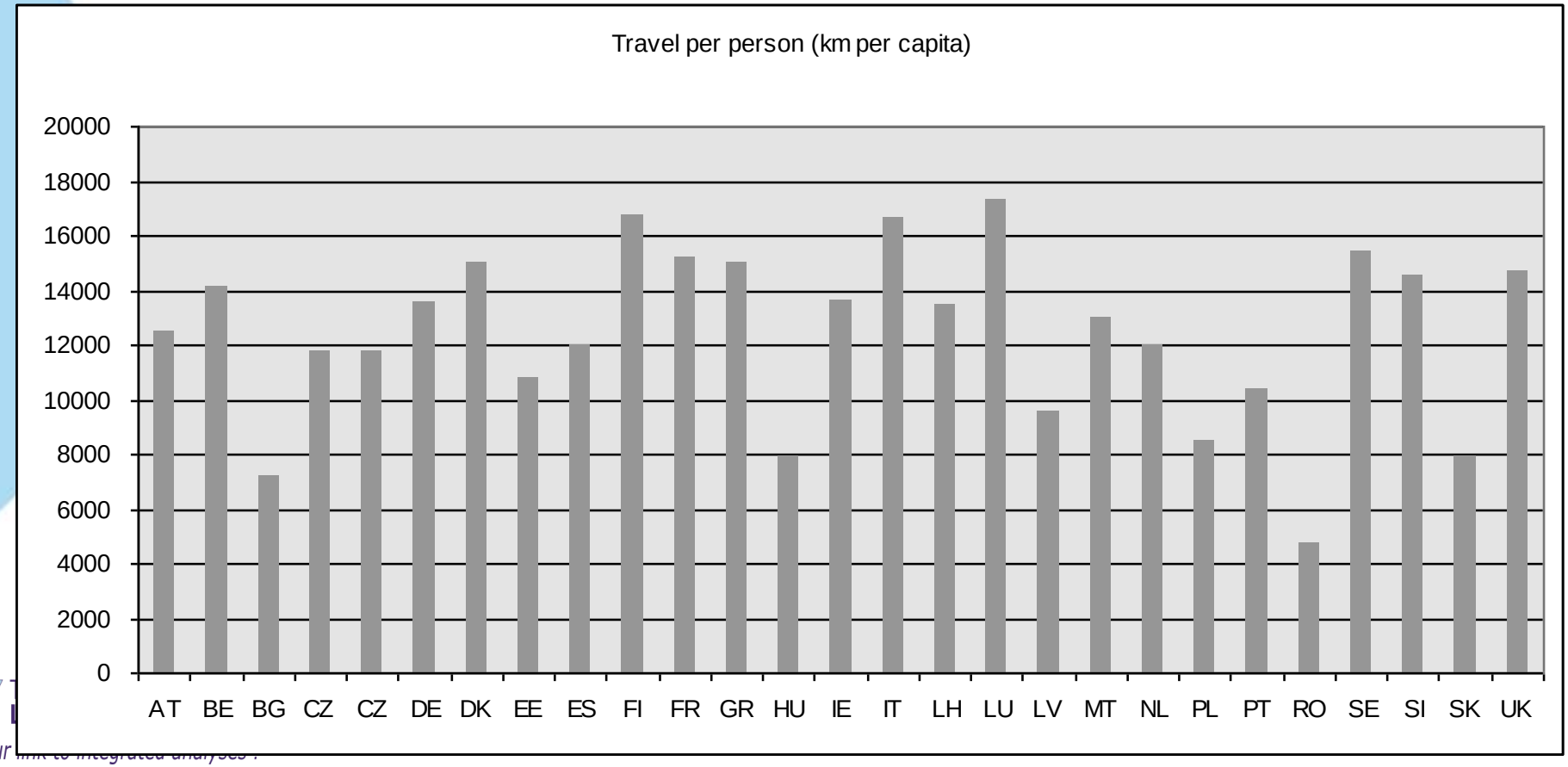
source: Primes Ver. 4 Energy Model, February 2010



passenger-km per person in 2010

source: Primes Ver. 4 Energy Model, February 2010

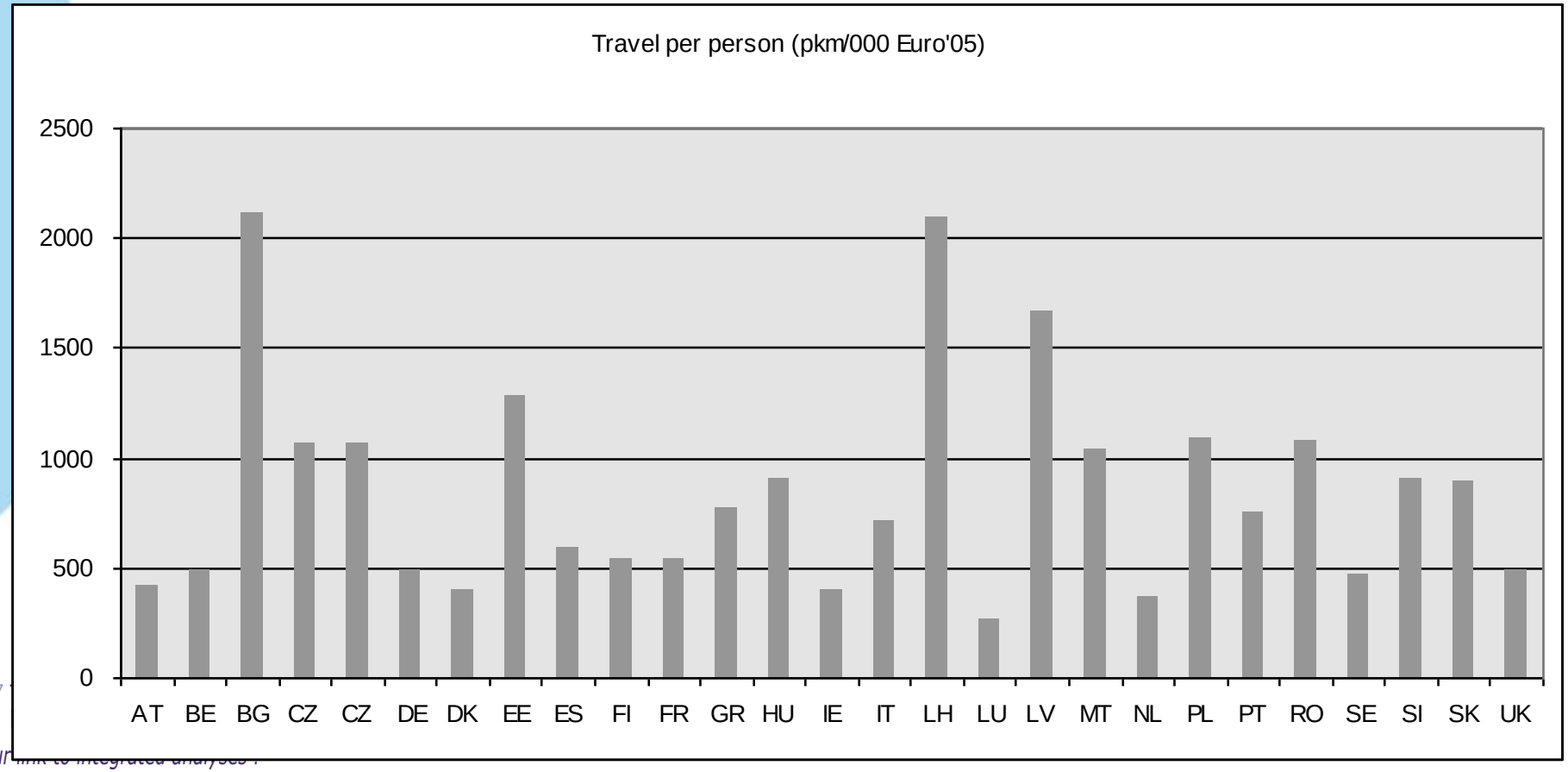
People in poor countries travel less



passenger-km per 1000 euro in 2010

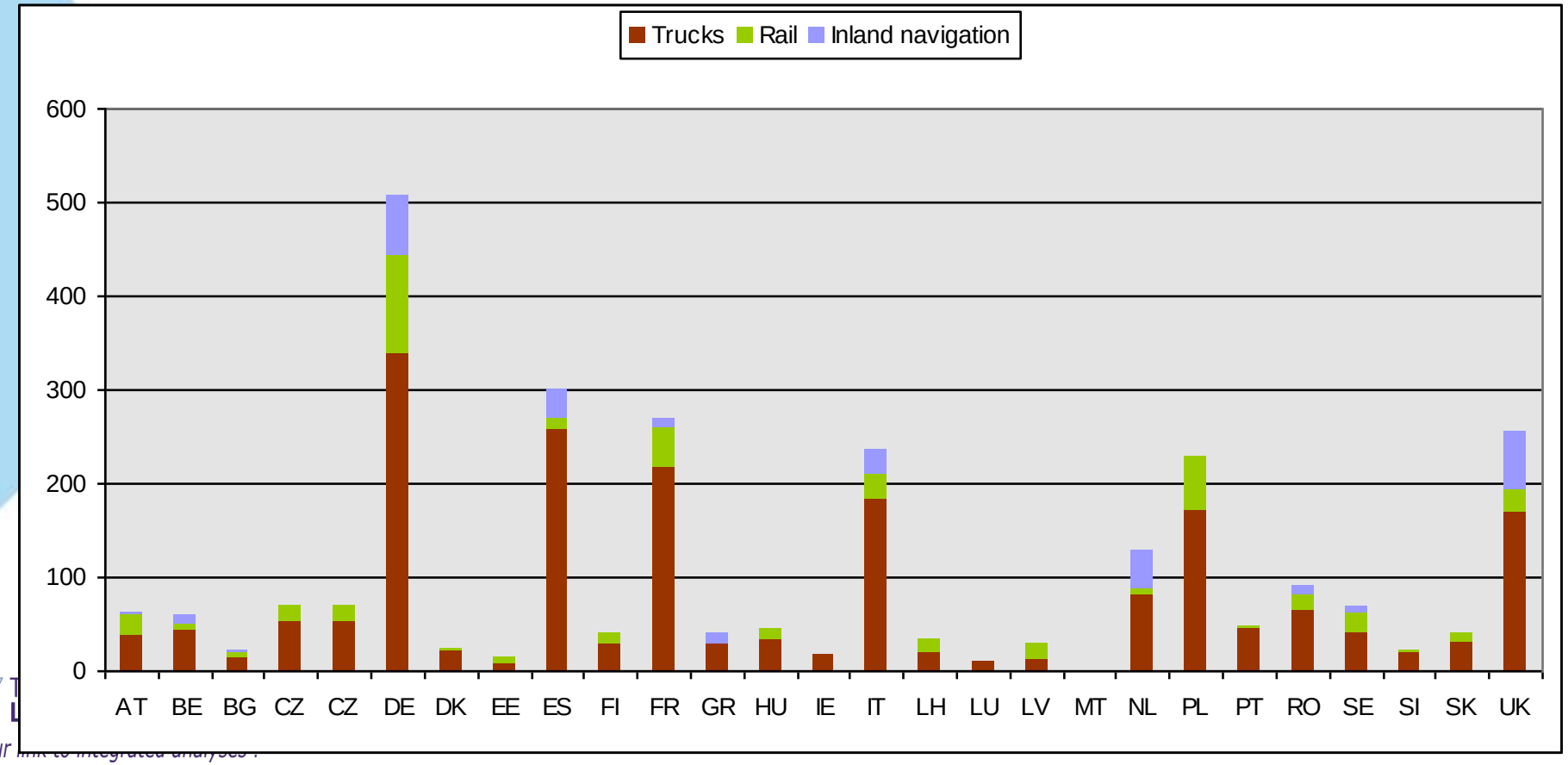
source: Primes Ver. 4 Energy Model, February 2010

People in poor countries travel less,
but spend a lager share of their gdp



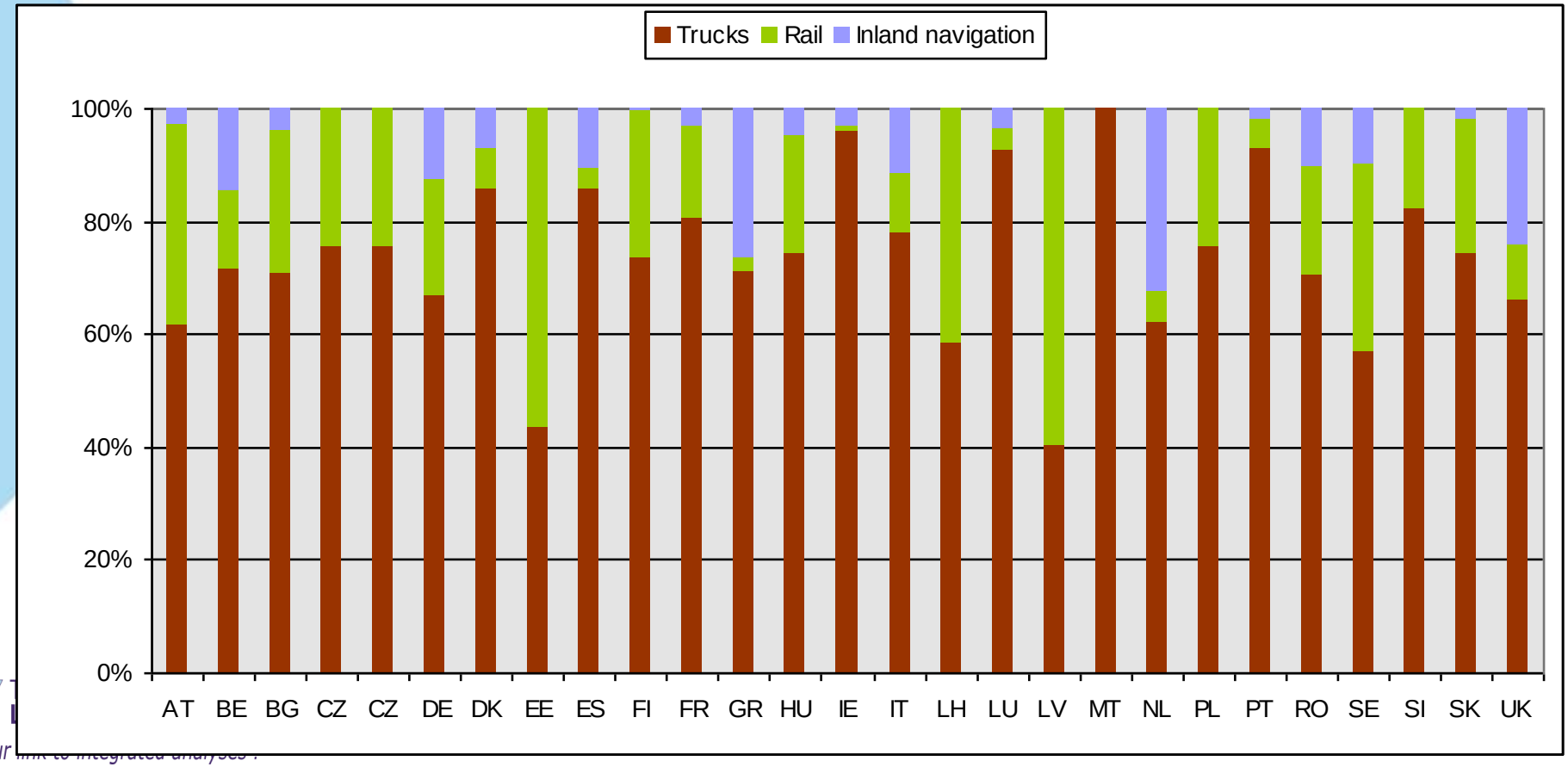
billion tonne-km in 2010

source: Primes Ver. 4 Energy Model, February 2010



modal share for tonne-km in 2010

source: Primes Ver. 4 Energy Model, February 2010

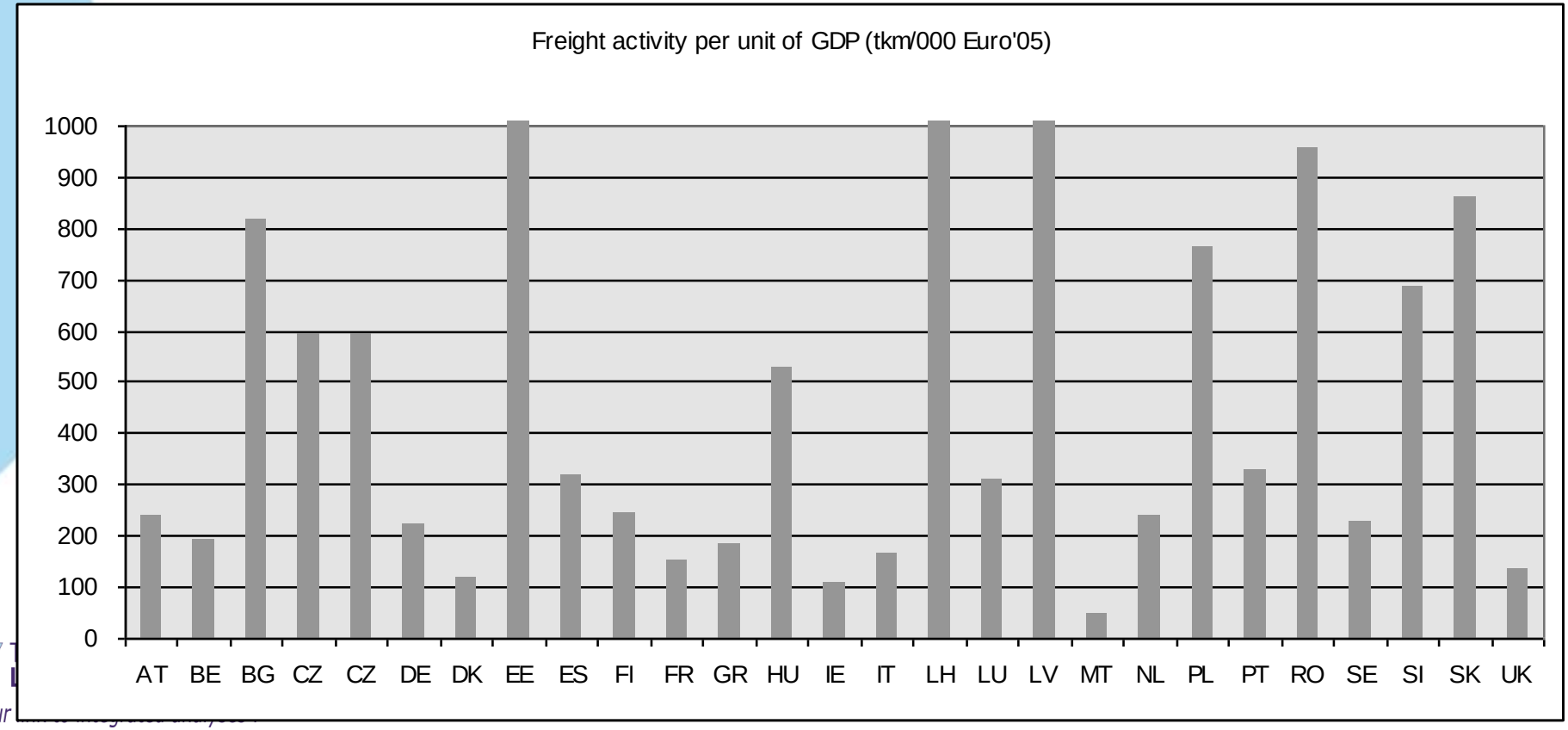


tonne-km per 1000 euro in 2010

Source: Primes Ver. 4 Energy Model, February 2010

People in poor countries spend a lager share of their gdp

Service economies spend less on freight transport than industrial economies



Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have "too much" freight+passenger transport, service economies have less freight transport.
- Reliability and time losses
- Efficient and effective?
- Sustainability effects
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

EU27 transport networks in 2007

source: Transport in Figures 2009

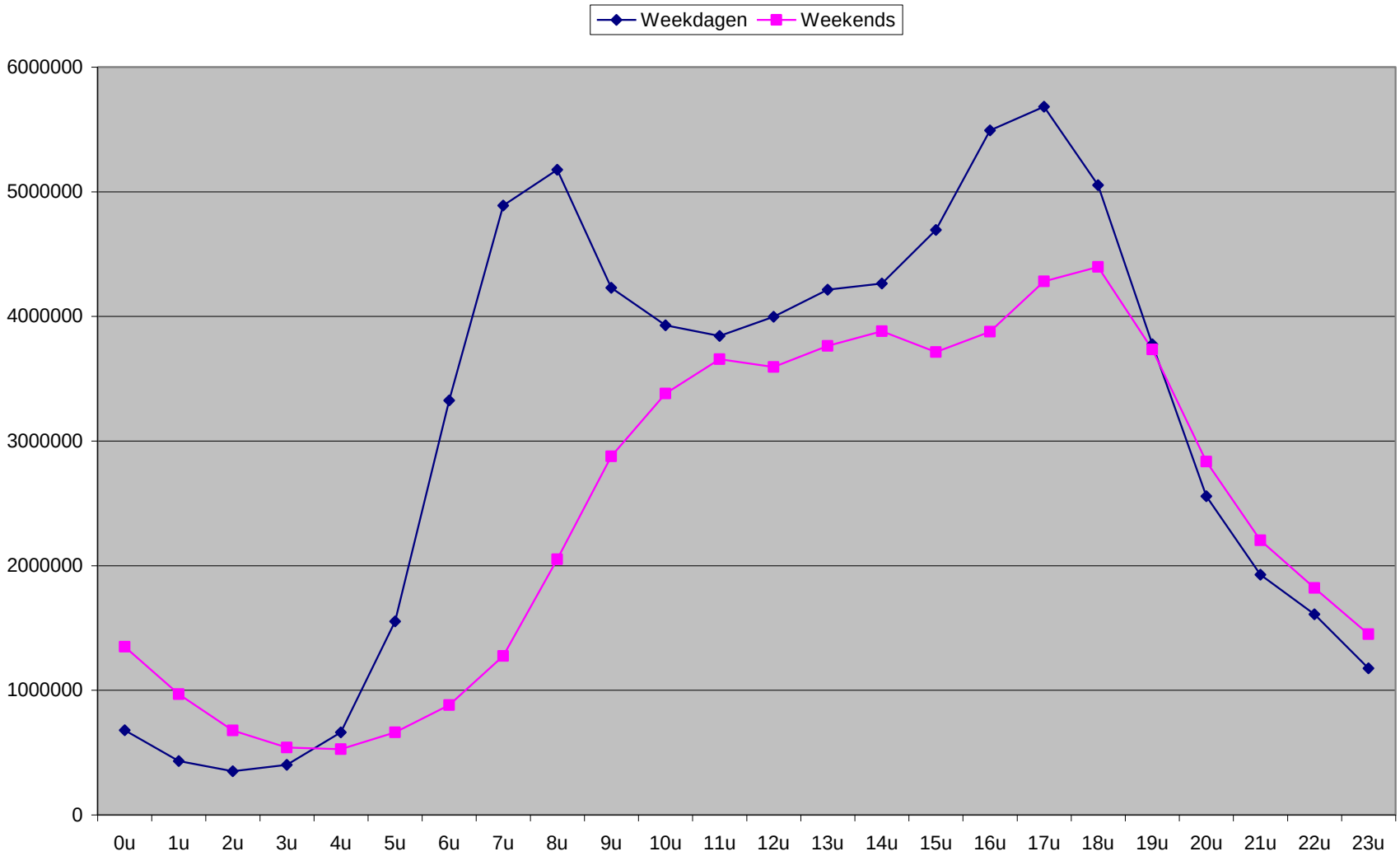
Do we need more infrastructure?
We already have plenty of infrastructure.

	Length (km)	Nodes	Node distance (km)	Inhabitants/node
Road network (all)	5 000 000	417 354	4	1 187
Road TEN-T network	98 500	162	203	3 059 676
Road motorway network	63 000	66	317	7 479 400
Railway network (all)	215 900	778	92	636 858
Rail TEN-T network	97 600	159	205	3 116 364
Navigable inland waterways	43 000	31	464	16 055 024

traffic on working days and weekends

motorways in Belgium 2007-2008

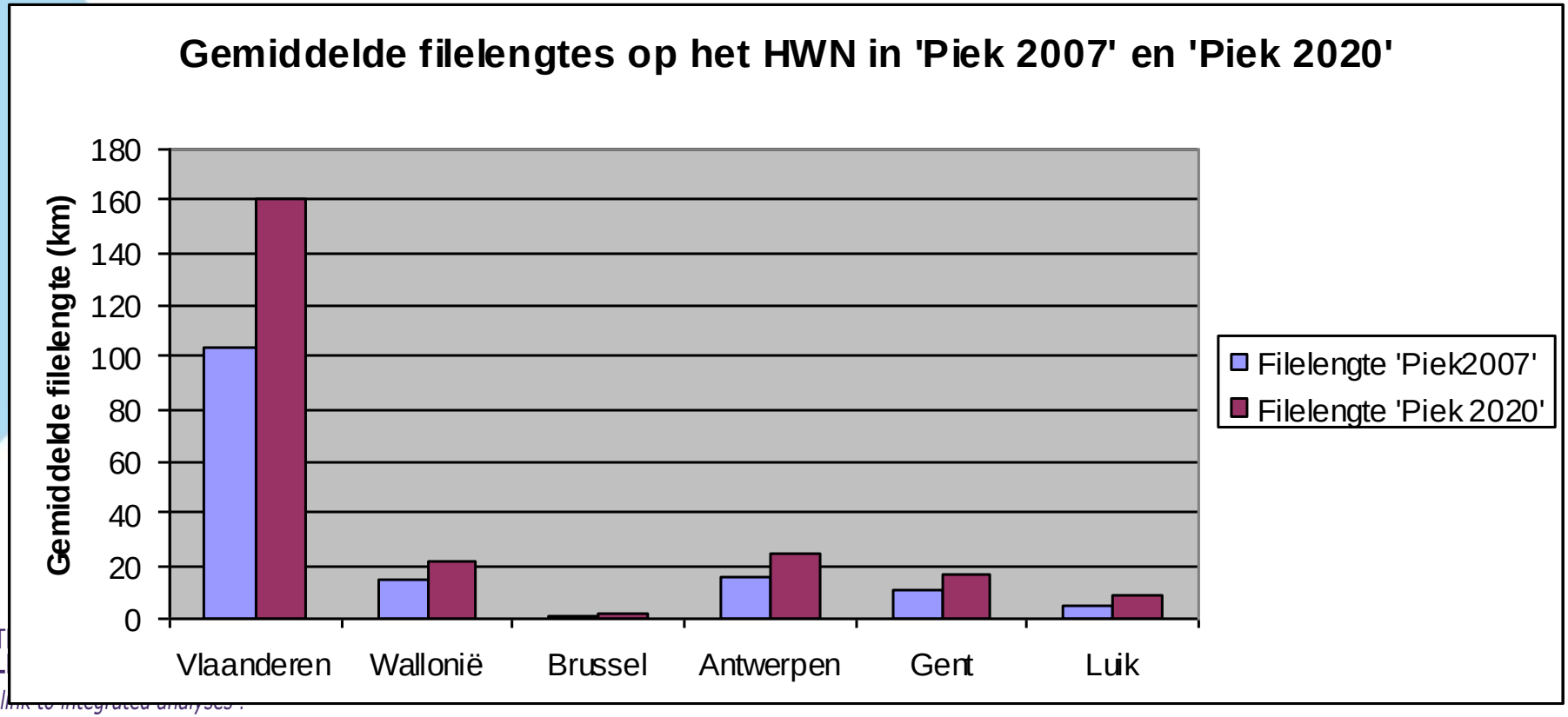
Infrastructure is not used the whole day



traffic jam lenghts during peak hour

motorways in Belgium in 2007 and 2020

Traffic jams are not everywhere.
Congested motorways: 100-200 km
Total motorway lenght: 3500 km (1750x2)



reliability versus time losses

- Low speed (low accessibility): increasing speed is the most efficient
- High speed (but traffic jams): increasing reliability is the most efficient

Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have "too much" freight+passenger transport, service economies have less freight transport.
- New infrastructure can solve accessibility problems, but solving all traffics jams comes at a high cost.
- Efficient and effective?
- Sustainability effects
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

the questions

- 1) What is the problem?
- 2) Are TEN effective is tackling the problem?
- 3) Is TEN efficient – the best solution?
  - Are there any CHEAPER measures with the same effect?
  - Are there EQUALIY PRICED measures with a better effect?

some solutions

- flexible use of motorway lanes
- increasing load factors
- better scheduling
- speed management
- parking management
- time-of-day management
- better information (weather, jams,…)
- ITS
- traffic management
- improving reliability
- internalisation of external costs
- road pricing

Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have "too much" freight+passenger transport, service economies have less freight transport.
- New infrastructure can solve accessibility problems, but solving all traffics jams comes at a high cost.
- Other measures like internalisation of external costs can already solve part of the problem.
- Sustainability effects
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

Effects of new long distance infrastructure

	Traffic increase	Shift from local network or other modes
CO2	+	-
Air quality	-	++
Noise	o	+
Accidents	-	++

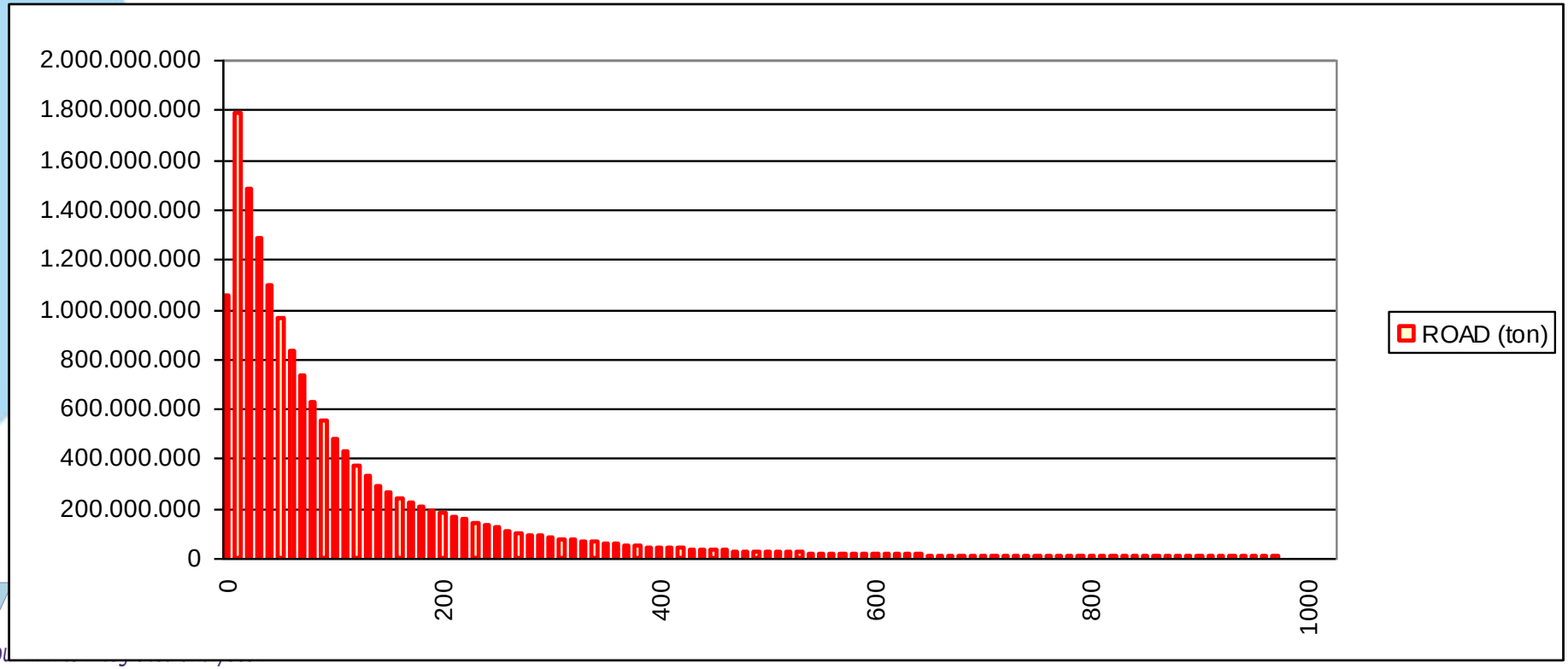
Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have "too much" freight+passenger transport, service economies have less freight transport.
- New infrastructure can solve accessibility problems, but solving all traffics jams comes at a high cost.
- Other measures like internalisation of external costs can already solve part of the problem.
- Large positive effects on the local network, smaller negative effects on the EU scale.
- EU level versus local level (and the financing issue)
- Top down approach versus project assessment

tonnes by distance, EU27

source: Trans-Tools & ETIS, 2005

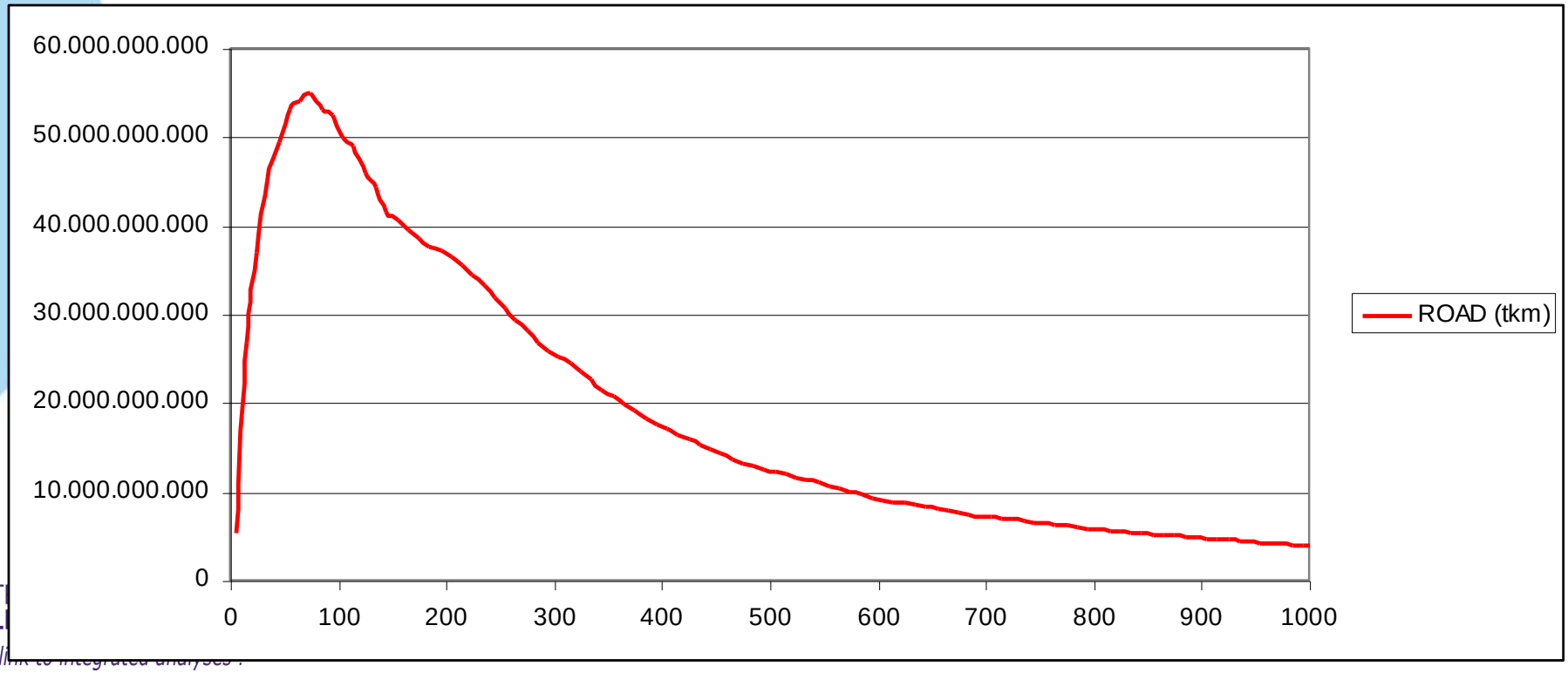
Most tonnes are transported over a very short distance. But the tonnes that are transported over a large distance spend a lot of km on the network.



tonne-km by distance, EU27

source: Trans-Tools & ETIS, 2005

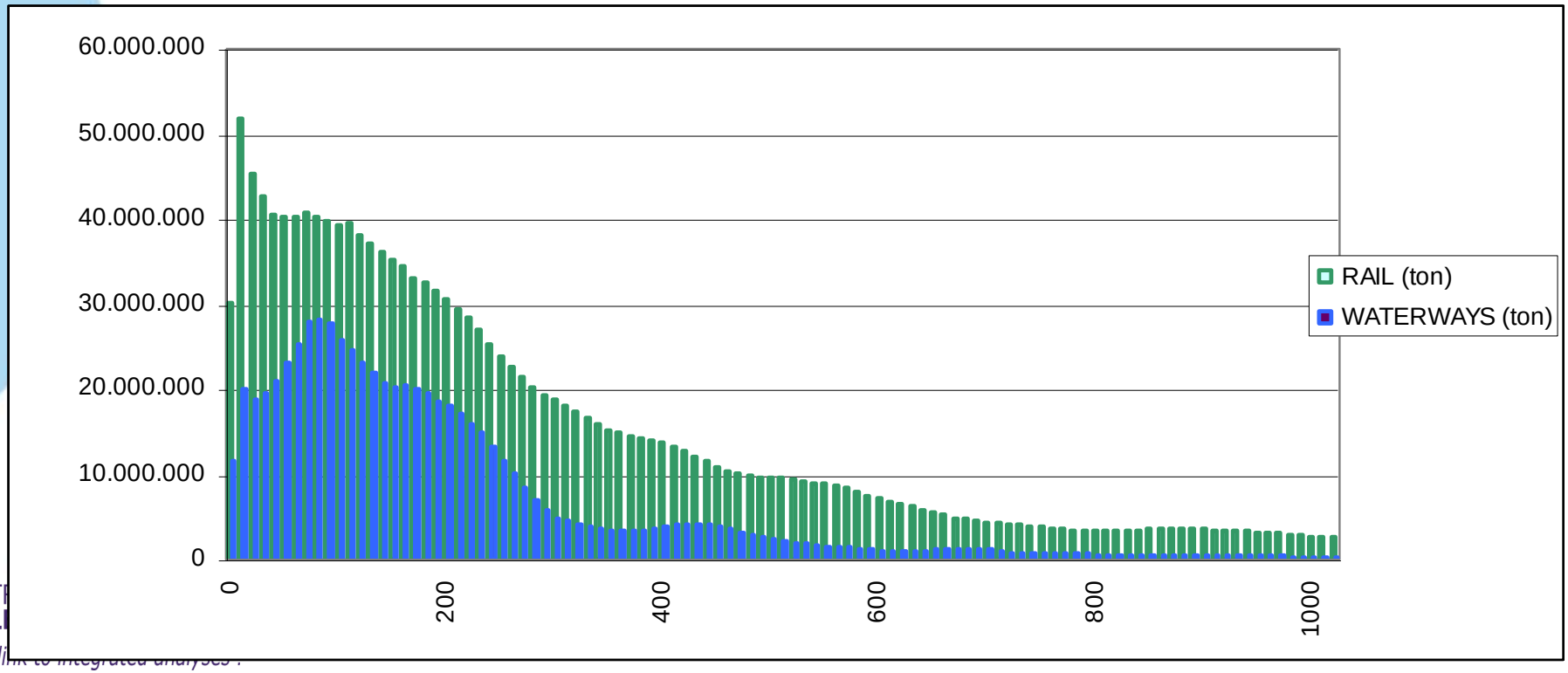
The median distance of the tonne-km transported in Europe by truck is 270 km.



tonne-km by distance, EU27

source: Trans-Tools & ETIS, 2005

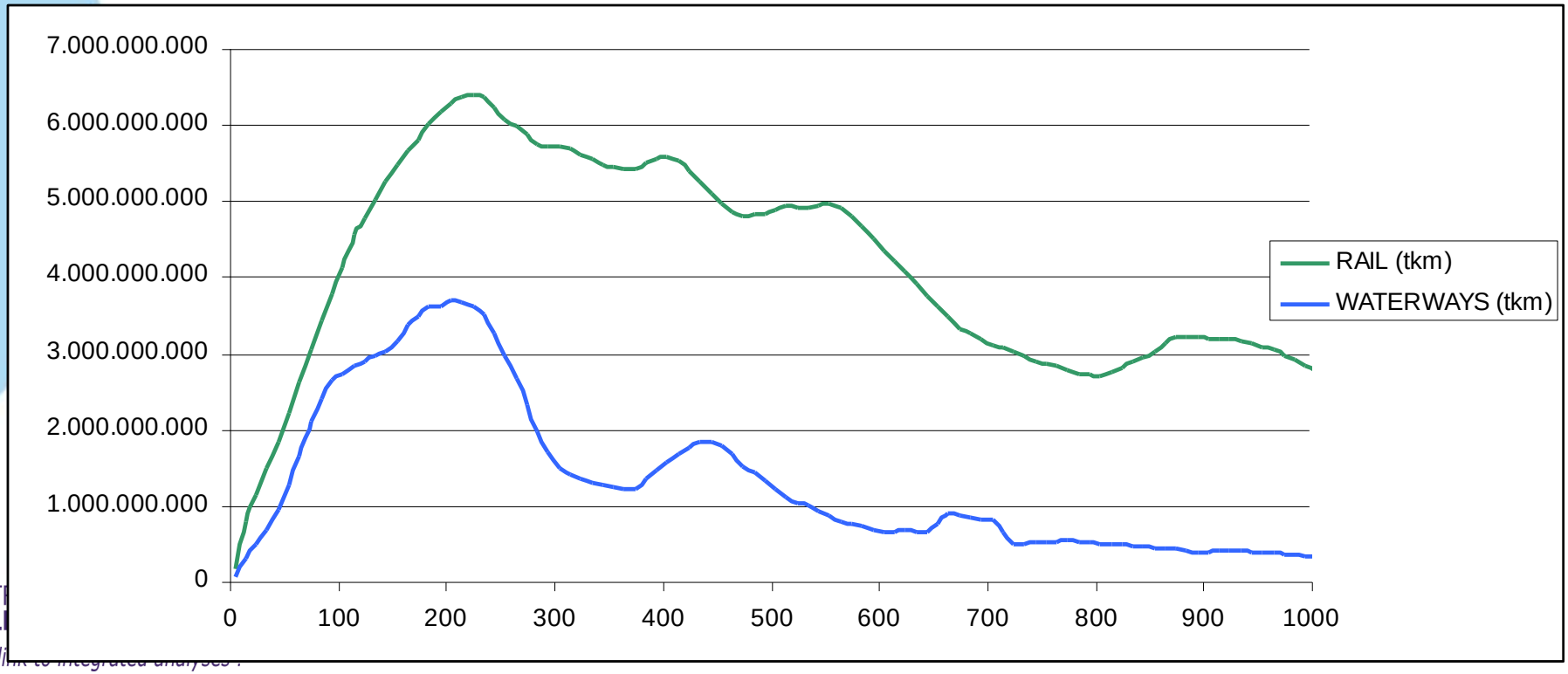
Most tonnes are transported over a short, but a larger distance than for trucks.
And the tonnes that are transported over a large distance spend a lot of km on the network.



tonne-km by distance, EU27

source: Trans-Tools & ETIS, 2005

The median distance of the tonne-km transported in Europe
by rail is 775 km.
by inland ship is 290 km.



EU27 transport networks in 2007

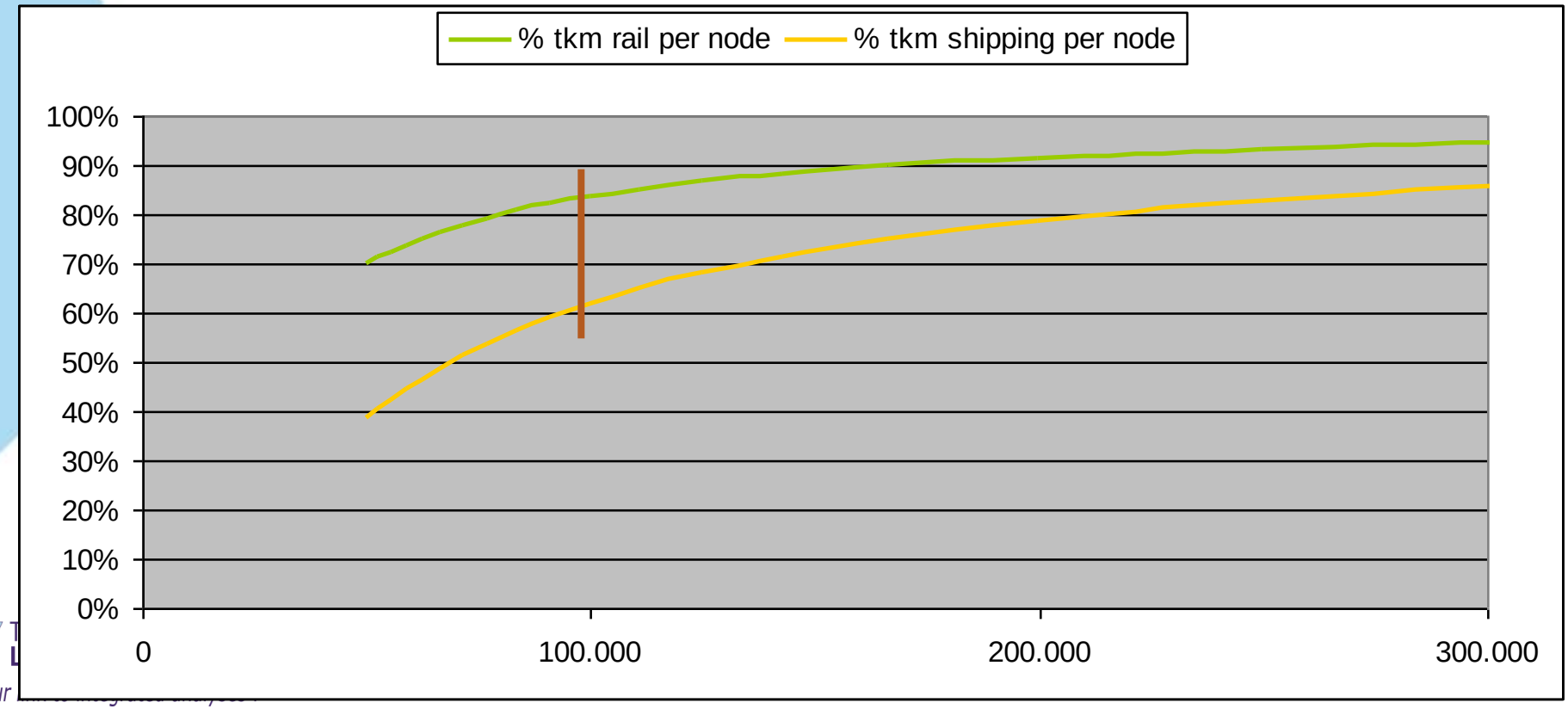
source: Transport in Figures 2009

We already have plenty of infrastructure.

	Length (km)	Nodes	Node distance (km)	Inhabitants/node
Road network (all)	5 000 000	417 354	4	1 187
Road TEN-T network	98 500	162	203	3 059 676
Road motorway network	63 000	66	317	7 479 400
Railway network (all)	215 900	778	92	636 858
Rail TEN-T network	97 600	159	205	3 116 364
Navigable inland waterways	43 000	31	464	16 055 024

share on network versus total network lenght (km)

now on the TEN -> 60% (road) to 80% (rail) of tonne-km
doubling the TEN -> 80% (road) to 90% (rail) of tonne-km

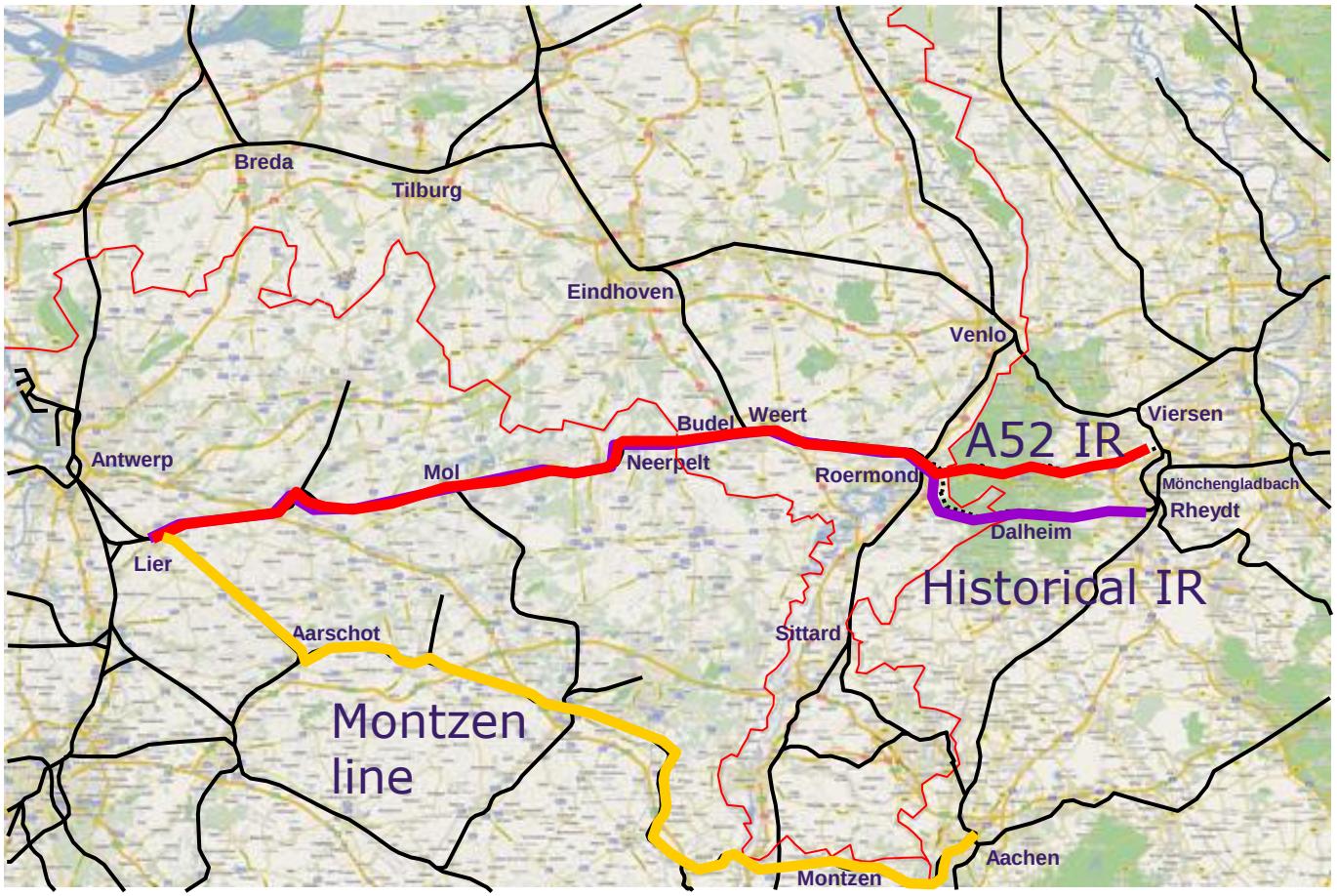


Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have “too much” freight+passenger transport, service economies have less freight transport.
- New infrastructure can solve accessibility problems, but solving all traffics jams comes at a high cost.
- Other measures like internalisation of external costs can already solve part of the problem.
- Large positive effects on the local network, smaller negative effects on the EU scale.
- EU has to decide on the size of the TEN network.
- Top down approach versus project assessment

Example: Iron Rhine

Map


Breda
Tilburg
Eindhoven
Venlo
Budel
Weert
Viersen
A52 IR
Antwerp
Mol
Neerpelt
Roermond
Mönchengladbach
Rheydt
Dalheim
Lier
Historical IR
Aarschot
Sittard
Montzen
line
Aachen
Montzen

Results (1/2)

		Total	In Belgium	In The Netherlands	In Germany	In others countries
Direct effects on freight rail market						
Direct effect on consumers	Consumer surplus	94.21	48.4	0	32.83	12.98
Direct effect on infrastructure manager	Infrastructure fee	-6.85	-19.92	20.62	-7.56	NA
	Costs renewal	-15.9	0	-15.9	NA	NA
	Costs maintenance	31.29	91.34	-60.05	NA	NA
External effects related to the building and use of the rail						
Effect on society	Emissions	-138.2	-19.28	-10.48	-39	-69.44
	Noise	24.79	8.12	3.29	13.39	NA
	Accidents	16.94	11.75	3.83	1.36	NA
	External safety	-0.01	NA	-0.01	NA	NA
	Recreation	-5.63	-0.41	-3.14	-2.08	0
	Vibrations	0.12	0.65	-0.77	0.24	0
	Loss of living environment	0	0	0	0	0
	Landscape	0	0	0	0	0
	Ecology	-3.48	-3.48	0	0	0
	Soil and water	3	0	3	0	0
	Agriculture	0	0	0	0	0
Effects on passenger rail						
	Delay time	-7.12	PM	-7.12	0	0

Results (2/2)

		Total	In Belgium	In The Netherlands	In Germany	In others countries
Effects on the road market						
Indirect effect on road users	Congestion time	18.73	4.4	2.35	11.98	NA
	Time at crossings	12.71	7.46	4.4	0.86	NA
	Taxes paid	-8.71	-0.98	-0.58	-7.15	NA
Effect on society	Emissions	2.89	0.37	0.22	1.51	0.81
	Noise	1.67	0.21	0.34	1.12	NA
	Accidents	1.8	0.58	0.18	1.04	NA
	Wear & tear	2.11	0.3	0.13	1.68	NA
Effects on the iww market						
Indirect effect on iww users	Taxes paid	-0.07	-0.01	0	-0.06	0
Effect on society	Emissions	0.48	0.03	0.06	0.22	0.18
Effects on the government						
Indirect effect	MCPF correction	PM	PM	PM	PM	PM
Effects on other sectors						
Indirect effect		PM	PM	PM	PM	PM
SUBTOTAL		**24.8**	**129.54**	**-59.64**	**10.39**	**-55.48**
Effects on the government						
Direct effect	Investment costs	-486.5	-0.9	-391.04	-94.56	0
TOTAL		**-461.7**	**128.63**	**-450.69**	**-84.17**	**-55.48**

negative SCBA

Challenges for the European transport infrastructure

- A higher gdp leads to faster passenger modes, and more truck transport: infrastructure has to accommodate x2 in 40 years.
- Poor countries have “too much” freight+passenger transport, service economies have less freight transport.
- New infrastructure can solve accessibility problems, but solving all traffics jams comes at a high cost.
- Other measures like internalisation of external costs can already solve part of the problem.
- Large positive effects on the local network, smaller negative effects on the EU scale.
- EU has to decide on the size of the TEN network.
- Europe should support on the connection level, countries to decide the actual project using an SCBA.

Thank you