“Sustainable” Transport

TranSust meeting sept 2007

Stef Proost

KULeuven - Belgium

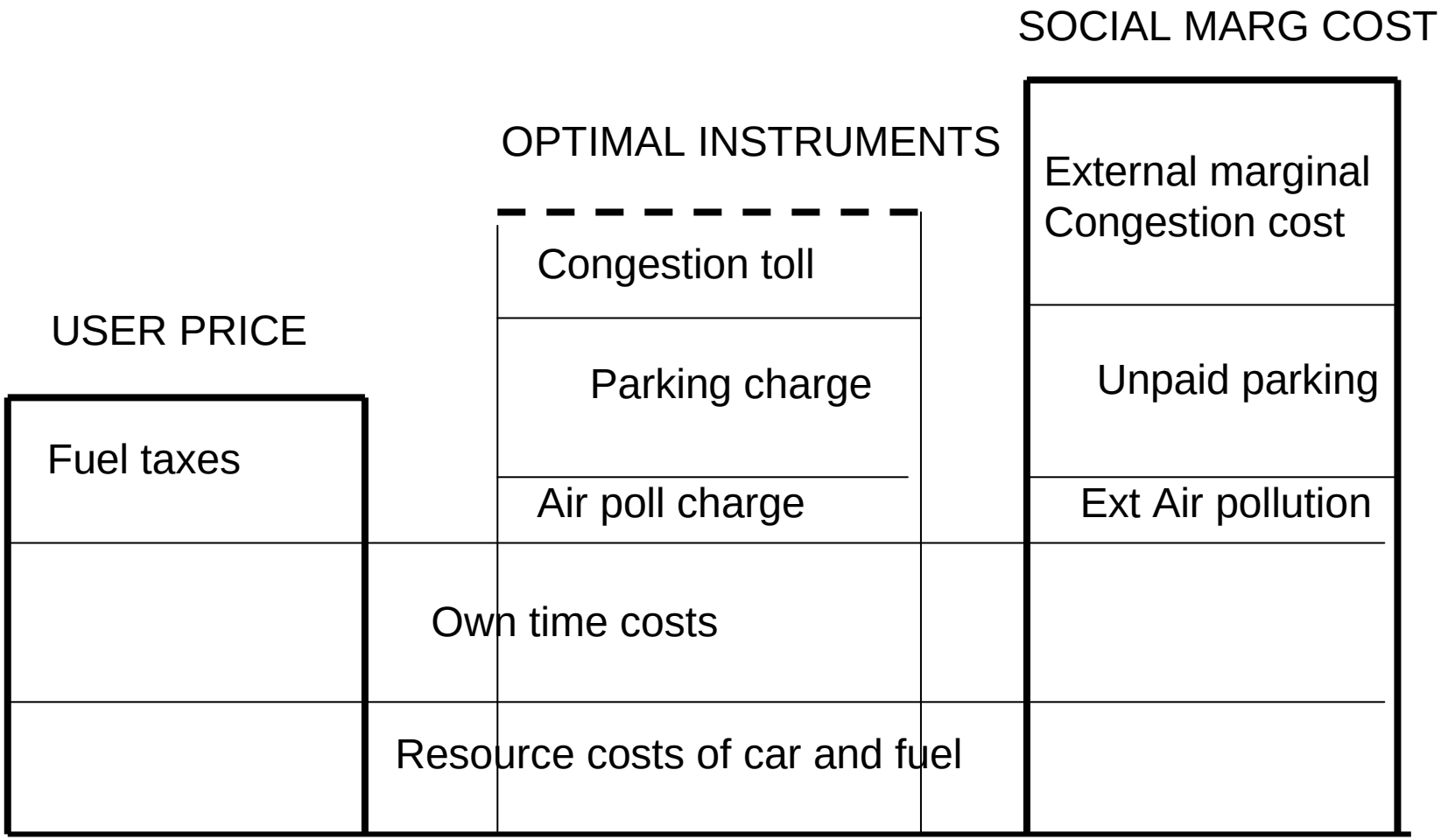
Outline

- “Sustainable”
  = adjust for external costs with particular emphasis on climate climate change
- What are current (2000-2020) EU policies?
  - Conventional emission regulation
  - Fuel efficiency regulation cars
  - Air transport joining emission trading scheme
  - Subsidies for modal shift in Freight sector
  - Subsidies for modal shift from Air to HSR
- Assessment of current policies
- Long term developments (2020 – 2050)
  - New technologies etc.

Some data

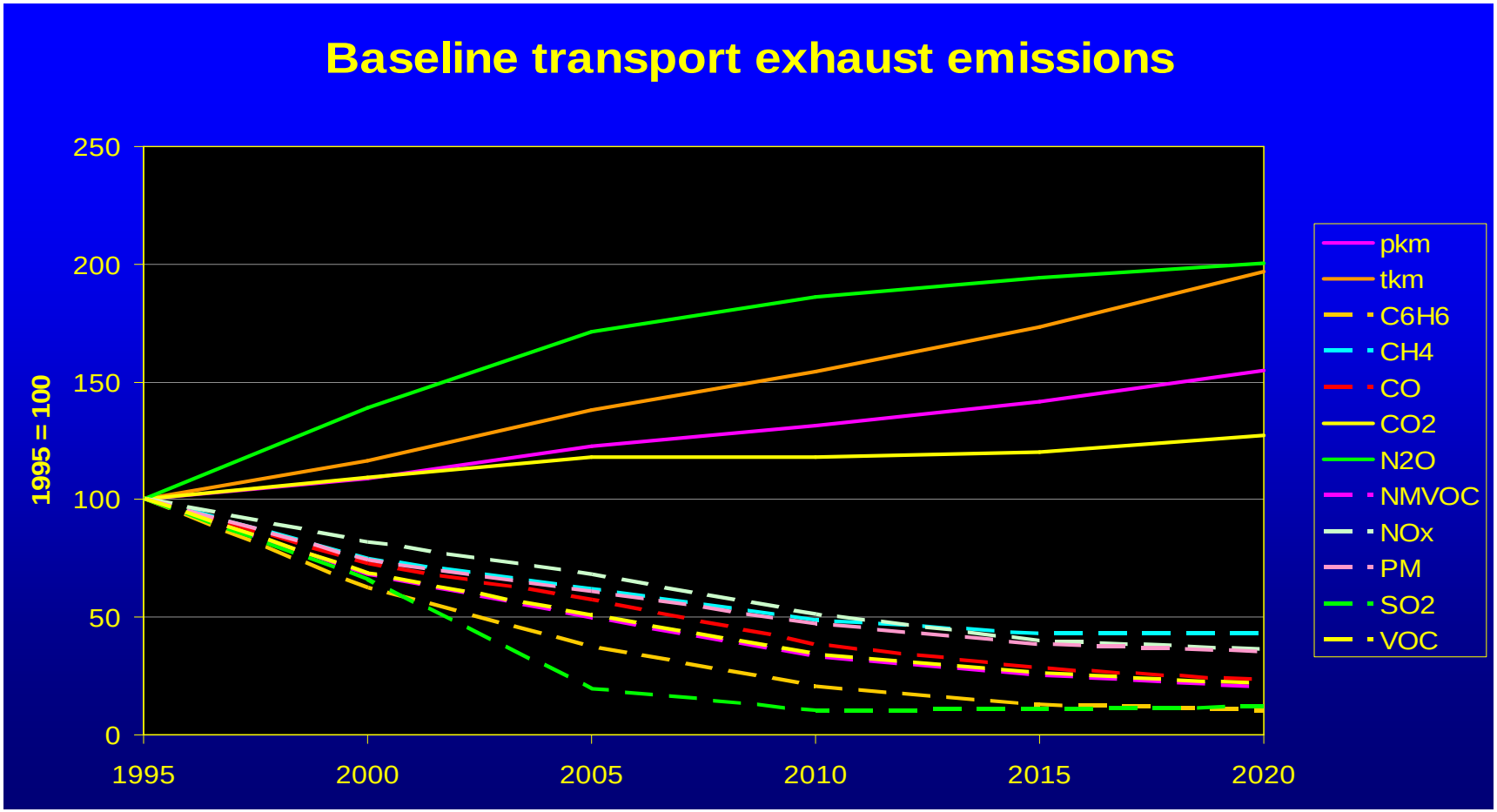
- Transport is some 15 to 30 % of total CO2 emissions in EU but growing
  - Cars are 60 %
  - Trucks are 30 %
  - Aviation is 7 % + strong growth
  - Rest is small %

How important are the problems:
costs of a car trip in city



Conventional emissions EU 1

source: TREMOVE model



Conventional emissions EU - Assessment

- Success
- Rather cost effective technology regulation because there were easy technological fixes
- Emphasis shifts now to non-road modes
  - Ships
  - Rail
  - aviation

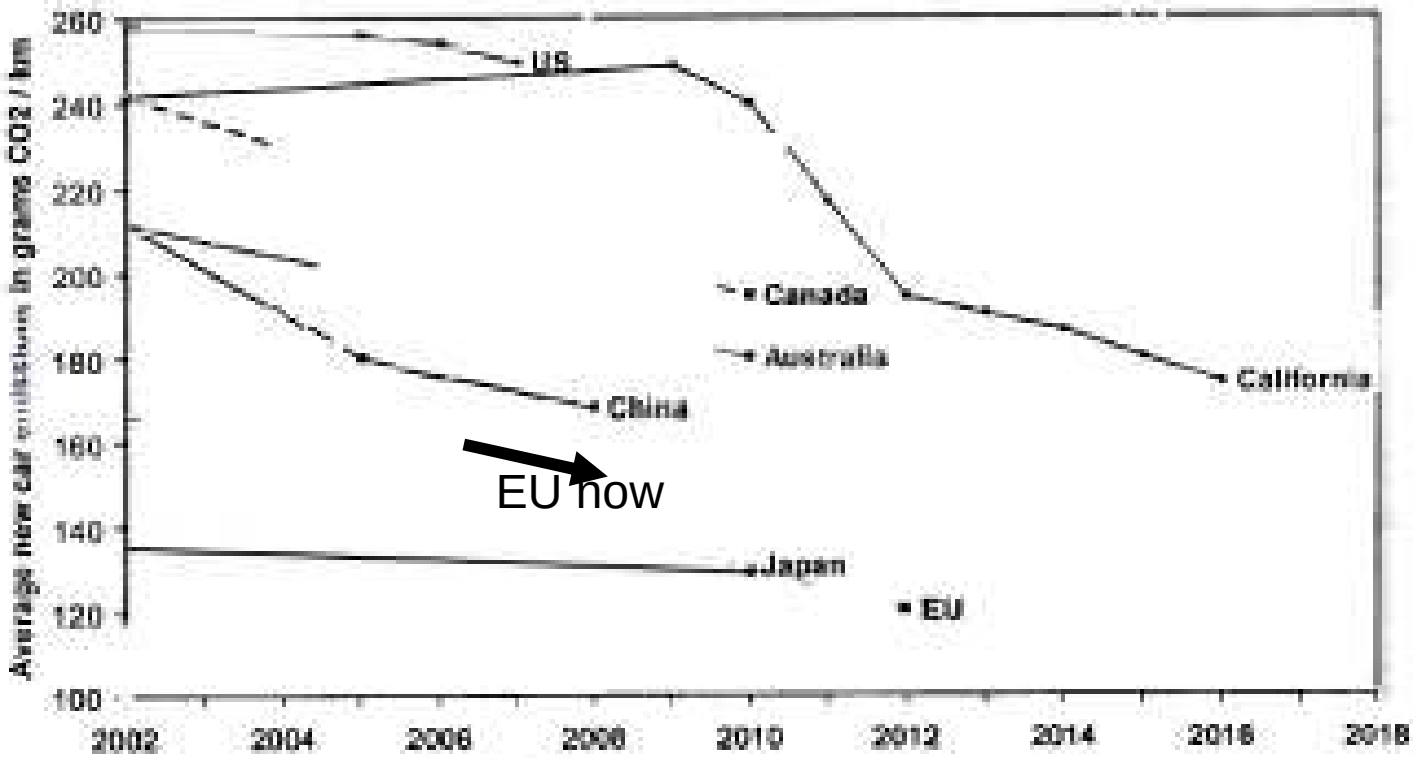
Current policies – fuel efficiency of cars, motivated by Climate policy

- Fuel efficiency regulation of cars in EU
  - Volontary agreement to reach 140 g/veh km for new cars in 2008
  - EC would like to impose max 120 g/veh km (= 5 litre/100 km) in 2010-2012 and even less in future
- The debate is not new:
  - First study in 1997 where one wanted to impose 120 g/vehkm regulation for 2000..
  - US has a fuel efficiency in place for cars since long but wants to strengthen it… but starting at 250 g/veh km….

Car Fuel efficiency regulations in the world

Figure 11. Worldwide passenger car fuel economy and CO_2 emissions standards and average new car emissions in 2002

Grams CO_2/km, normalised on the basis of the New European Driving Cycle test



Note: Dotted lines indicate proposed standards or targets.

Source: Comparison of passenger vehicle fuel economy and greenhouse gas emission standards around the world, Feng An and Amanda Sauer, PEW Center on Global Climate Change, 2004.

Fuel efficiency regulation cars Assessment 1

- Elementary economics (competitive supply of car services and rational consumers):
  - Car Manufacturers offer cars that, for given quality level, minimize user costs of a car
  - Gross Cost of saving 1 litre of fuel in car services = price of fuel
  - Price of gasoline in EU = 1.4 Euro/litre = 0.5 resource cost + 0.9 taxes
  - Welfare cost of saving 1 litre of gasoline

    > [0.9 Euro – saved external air pollution costs]

    this is lower bound on welfare costs

    Because you impose an extra constraint on production process of car services

Fuel efficiency regulation cars Assessment 2

- Example for a medium sized car that consumes 6.5 litre/100km and is forced to consume only 5 litre
  - discount rate 10%, 10 year technical lifetime
  - assumption: average user cost for car does not change (lower bound on costs)
  - Example: 6.5 l/100 km to 5 l/100km gives

  300 to 600 Euro/ Ton CO2 depending on the rebound effect: whether more fuel efficient cars lead to more or less driving, more driving means more mileage related externalities

WELFARE COST OF FUEL EFFICIENCY STANDARD

FOR A MEDIUM SIZED CAR ON ANNUAL BASIS USING LOWER BOUND ON COSTS	
INCREASED PRODUCTION COST CAR	+ 332 Euro
SAVED FUEL RESOURCE COSTS (EXCL. EXCISES)	- 138 Euro
SAVED OIL SUPPLY COSTS (10% premium)	- 14 Euro
INCREASED EXTERNAL CONGESTION AND ACCIDENT COSTS DUE TO REBOUND EFFECTS	+ 119 Euro
EXTRA COST OF PUBLIC FUNDS (MCPF=1.5 so 50%)	+ 97 Euro
TOTAL WELFARE COST PER CAR AND PER YEAR	= 374 Euro
TOTAL CO2 QUANTITY SAVED PER YEAR	0.614 Ton
COST PER TON OF CO2 SAVED	**609 Euro**
MARKET PRICE CO2 PERMITS	**5 à 30 Euro**

Fuel efficiency of cars – Assessment 3

- When a fuel efficiency policy is effective, it can not be cost efficient because there is already a high gasoline tax (= CO2 tax) in place
- Defendants of this policy have used arguments that are not convincing:
  - Myopic consumers (empirical evidence points to the contrary)
  - Oil security and monopsony premium: is small, better use import tax & stockpiling than fuel efficiency policy
  - One needs to control other problems in use of cars and this requires strong measures to discourage car use
    - Yes but fuel efficiency policies tend to increase total car use.
    - better targetted policies as road pricing or PAYD insurance are much more effective as they tax mileage directly

Fuel efficiency of cars – Assessment 4

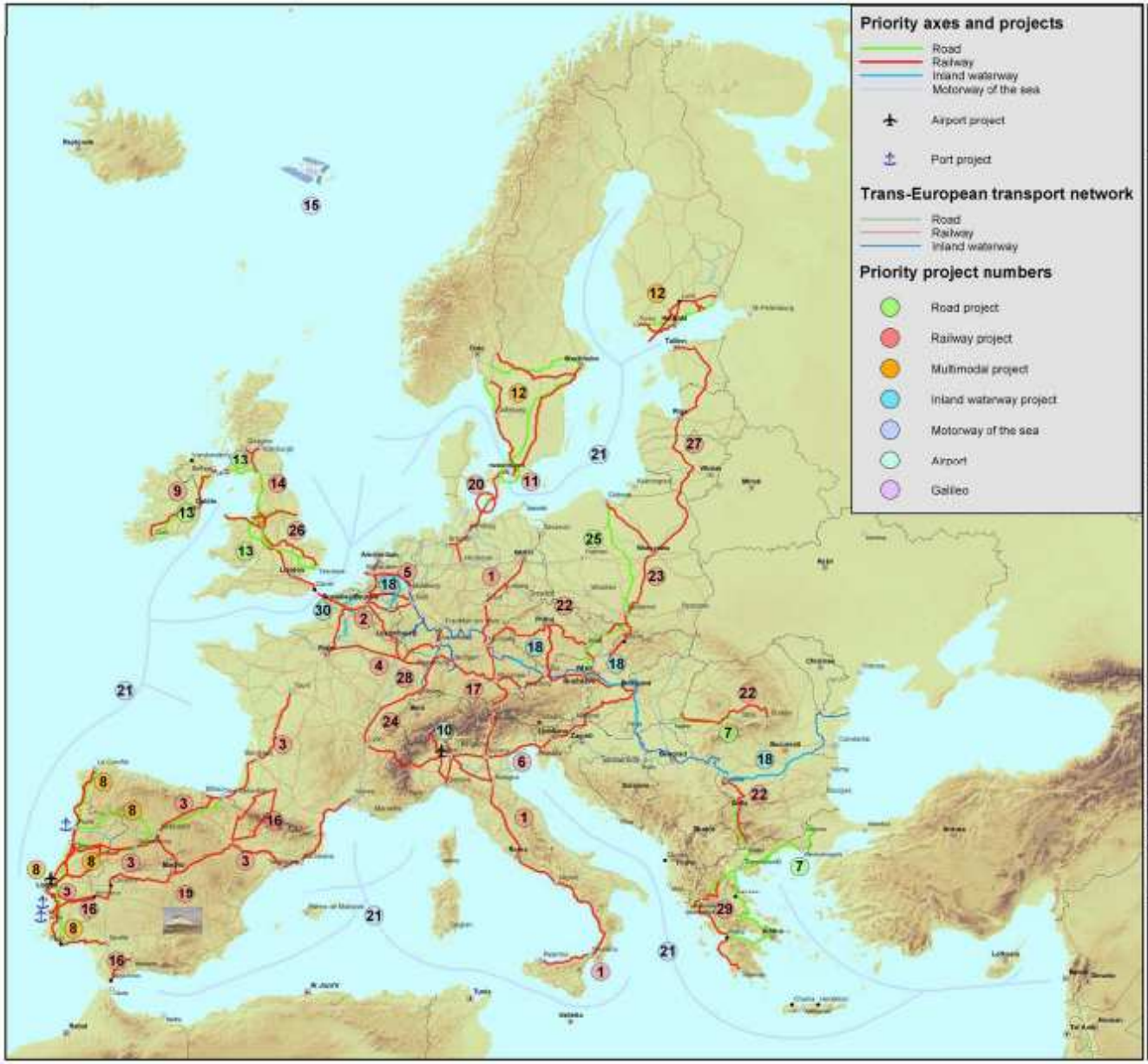
- Other considerations:
  - Technology transfer to countries that have no fuel tax (China) or low fuel tax (US) and are not yet in a global international agreement
  - Preference for high fuel taxes as long as there are no other instruments (road pricing) to limit traffic growth in congested areas?
    - Yes, but discourage fuel efficiency improvements

What can we do about pricing inefficiencies and does it really matter?– illustration for Brussels -

Policy	**Relative Efficiency**
Benchmark	0%
Higher Fuel taxes	5%
Public Tr.Pricing	5-10%
Parking Charges	30%
Cordon Pricing	52%
Social MC pricing	100%

Subsidies to modal shift in freight transport

- Has been policy line at EU level for years and one of the major official drivers for the big EU subsidies to transport infrastructure
- Based on fallacy:
  - “if it costs 2 Euro to transport a ton by truck, and a ship or train can do it for 1 Euro, it is beneficial”
  - Principle implicit in several cost benefit guidelines used by international institutions
- World is different Last 10 years, rail freight has been losing market share
- We are having more efficient road freight
- FUNDING consortium: Rate of return of TEN projects tends to be low , examples:
  - Betuwe rail line
  - Messina bridge



Trans-European transport network (TEN-T)
Priority axes and projects

1. Railway axis Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo
2. High-speed railway axis Paris-Bruxelles/Brussel-Köln-Amsterdam-London
3. High-speed railway axis of south-west Europe
4. High-speed railway axis east
5. Betuwe line
6. Railway axis Lyon-Trieste-Divača/Koper-Divača-Ljubljana-Budapest-Ukrainian border
7. Motorway axis Igoumenitsa/Patra-Athina-Sofia-Budapest
8. Multimodal axis Portugal/Spain-rest of Europe
9. Railway axis Cork-Dublin-Belfast-Stranraer (completed 2001)
10. Malpensa (completed 2001)
11. Öresund fixed link (completed 2000)
12. Nordic triangle railway/road axis
13. UK/Ireland/Benelux road axis
14. West coast main line
15. Galileo
16. Freight railway axis Sines/Algeciras-Madrid-Paris
17. Railway axis Paris-Strasbourg-Stuttgart-Wien-Bratislava
18. Rhine/Meuse-Main-Danube inland waterway axis
19. High-speed rail interoperability on the Iberian peninsula
20. Fehmarn Belt railway axis
21. Motorways of the sea
    - Motorway of the Baltic Sea (linking the Baltic Sea Member States with Member States in Central and Western Europe, including the route through the North Sea/Baltic Sea Canal (Kiel Canal);
    - Motorway of the sea of western Europe (leading from Portugal and Spain via the Atlantic Arc to the North Sea and the Irish Sea);
    - Motorway of the sea of south-east Europe (connecting the Adriatic Sea to the Ionian Sea and the Eastern Mediterranean to include Cyprus);
    - Motorway of the sea of south-west Europe (western Mediterranean), connecting Spain, France, Italy and including Malta, and linking with the motorway of the sea of south east Europe.
22. Railway axis Athina-Sofia-Budapest-Wien-Praha-Nürnberg/Dresden
23. Railway axis Gdansk-Warszawa-Brno/Bratislava-Wien
24. Railway axis Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen
25. Motorway axis Gdansk-Brno/Bratislava-Wien
26. Railway/road axis Ireland/United Kingdom/continental Europe
27. "Rail Baltica" axis Warszawa-Kaunas-Riga-Tallinn-Helsinki
28. "Eurocaprail" on the Bruxelles/Brussel-Luxembourg-Strasbourg railway axis
29. Railway axis of the Ionian/Adriatic intermodal corridor
30. Inland waterway axis Seine-Scheldt

Important cities

- Capital
- > 500,000 inhabitants
- 100,001 - 500,000 inhabitants
- 50,001 - 100,000 inhabitants
- < 50,000 inhabitants

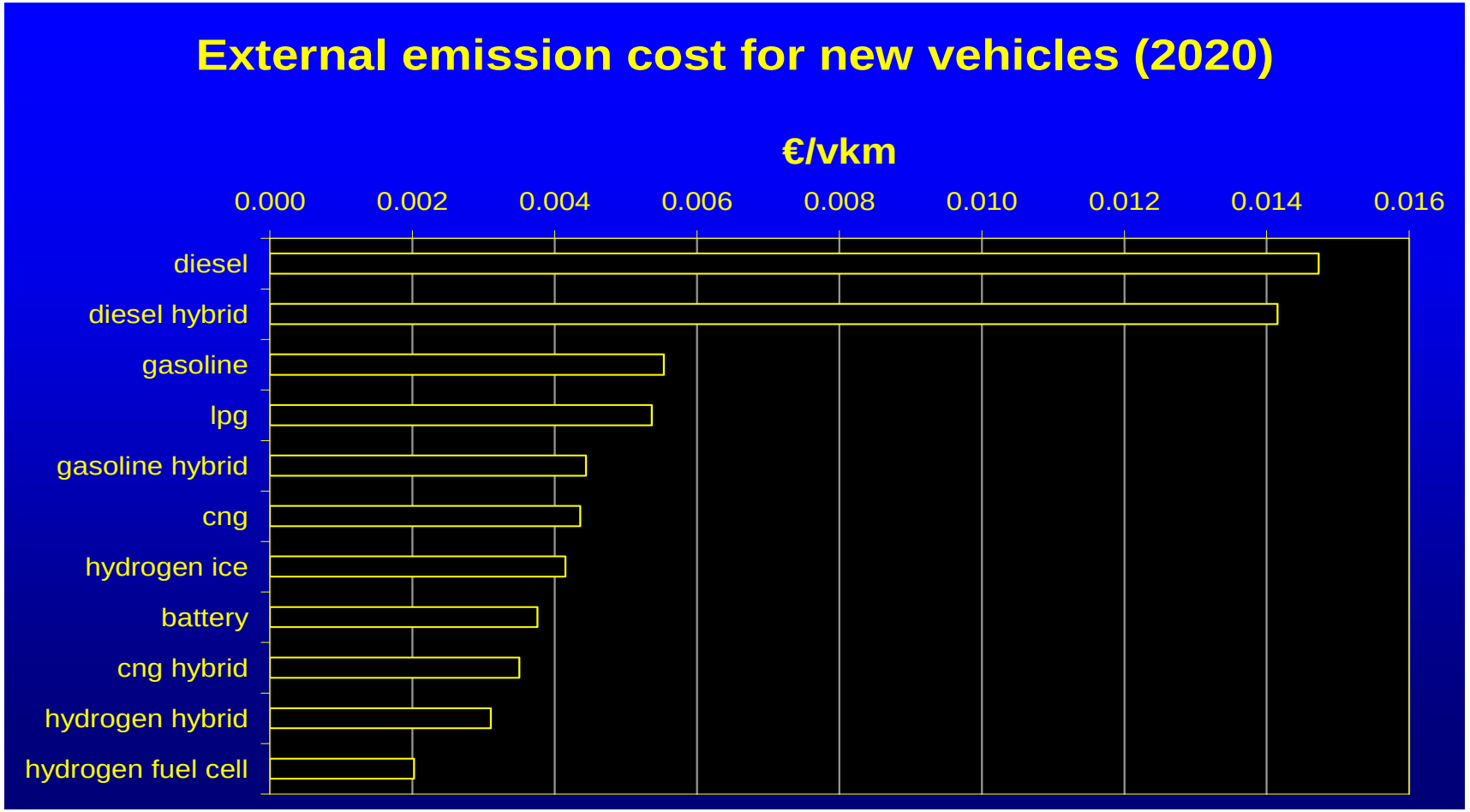
Encouragement of modal shift from air to High Speed Rail

- TEN subsidies for High speed Rail
- Potential market share in medium to long distance market remains small for rail
  - FUNDING consortium: some 15 to 30% for High speed Rail and high environmental levies on air do not help very much
  - These policies tend to increase overall transport volumes and energy consumption

Long term technologies

- no miracles
- Many new technologies are inferior to improved gasoline and diesel cars and to Compressed Natural Gas
- Hydrogen and electric battery are not yet there
- Other developments could be more important: electric bike, logistics, ..

Damage of Alternative Technologies (CO2 at 20 Euro/ton)



Transport by car- technologies CO2 -20% in 2020 (MARKAL)

Process	Reduced cost (keuro)	Share to investment
TCARDST101 [Car.DST.EURO4]	0.1	1%
TCARGAS101 [Car.GAS.CNG]	0.6	3%
TCARHYBGSL101 [Car.GSL.EURO4.parallelhybrid]	1.0	6%
TCARHYBGAS101 [Car.GAS.CNG.parallelhybrid]	2.9	13%
TCARBDL101 [Car.Biodiesel]	3.2	21%
TCARHYBDST101 [Car.DST.EURO4.parallelhybrid]	3.4	18%
TCARLPG101 [Car.LPG.EURO3]	4.0	22%
TCARELC101 [Car.Electric.Battery]	6.5	41%
TCARCH2101 [Car.Hydrogen.Combustion]	10.5	56%
TCARHYBH2101 [Car.Hydrogen.Hybrid.Combustion]	12.8	57%
TCARFCH2101 [Car.Hydrogen.FuelCell]	13.8	58%
TCARFCHYBH2101 [Car.Hydrogen.Hybrid.FuelCell]	15.7	59%

“Conclusions”

- Some of the current policies are not cost effective (fuel efficiency regulation) or do not work (Modal shift in freight)
- Technologies: improved gasoline car will stay around for long time
- Policies
  - Stick to high fuel prices if nothing else is around
  - Switch to road pricing etc. this may generate some small free CO2 emission reductions