Energy efficiency indicators for transport

EPE-GIZ training on indicators

EPE, Rio de Janeiro , September 13-16 2011

Bruno Lapillonne, Vice President, Enerdata

Prepared with the support of GIZ

1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. Annex: Data issues

Basic indicators in transport

Indicator	Comment
Energy consumption of transport per capita	Very aggregate ; includes change in vehicles ownership
Energy intensity of transport to GDP	Very aggregate ; measures the relative variation between energy use and GDP
Energy consumption of road transport per vehicle	Includes change in mix of vehicles
Gasoline consumption of transport per gasoline vehicle (including biofuels)	Includes change in mix of vehicles
Diesel consumption of transport per diesel vehicle (including biofuels)	Includes change in mix of vehicles
Energy consumption of road transport per car equivalent	Cleaned from changes in mix of vehicles ➔ in ODYSSEE

Advanced indicators by mode in ODYSSEE

Indicators	Type
Energy consumption of air, water and rail transport per unit of traffic (passenger-km or tonnes-km)	SEC
litres/100 km for cars, trucks, light duty vehicles	SEC
litres/100 km and gCO2/km for new cars	SEC
goe/passenger-km for cars, buses, rail transport	SEC
toe/car , toe per truck, toe per light duty vehicle	SEC
Energy consumption of goods transport by road per ton-km	SEC
Share of public transport for passenger and transport of goods	Diffusion
Energy savings by mode and by component of savings	Savings
Decomposition of energy consumption variation by mode	Decomposition

SEC: Specific Energy Consumption

1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. Annex: Data issues

- **Cars**
  - •Specific energy consumption (l/100km) of new cars
  - •Specific emission of CO2 of new cars
  - •Specific energy consumption of the stock average (l/100km)
  - •Average distance travelled by car
  - •Variation of the energy consumption of cars: role of energy savings

Specific/unit consumption to assess technical energy efficiency of cars

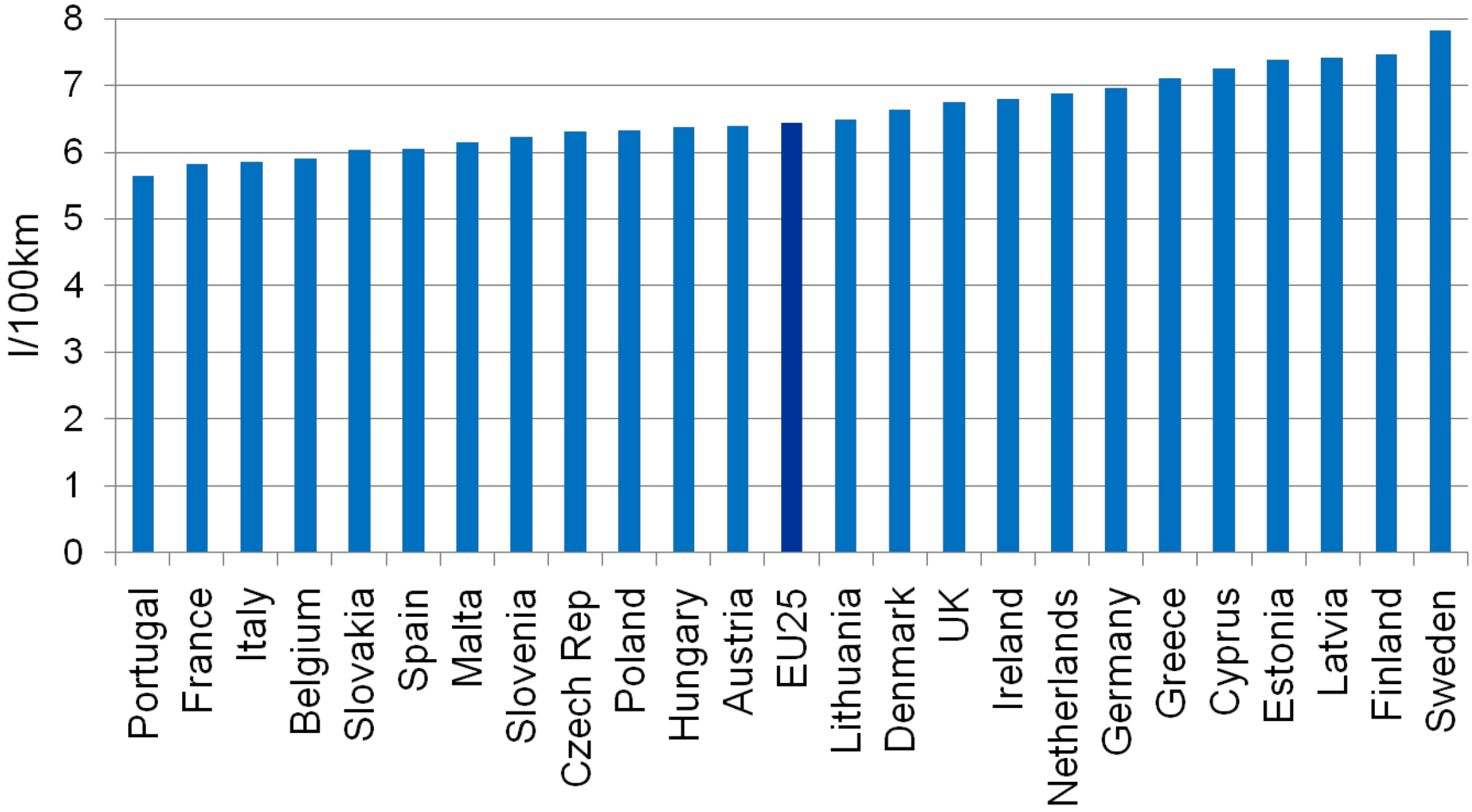
- Definitions:
  - Specific consumption: for new cars, average test value given by car manufacturers (European cycle); for average car, weighted average of test values of cars across time
  - Unit consumption per 100km: ratio calculated from the total consumption of cars, the stock of cars and the average distance travelled by year by car
- Calculation:

cstocvpc=toccfvpc/(nbrvpc*kmvpc)*100 (l/100km)

  - toccfvpc: total consumption of cars (Mm3)
  - nbrvpc : stock of cars (millions)
  - kmvpc: average distance travelled per year per car (thousand km)

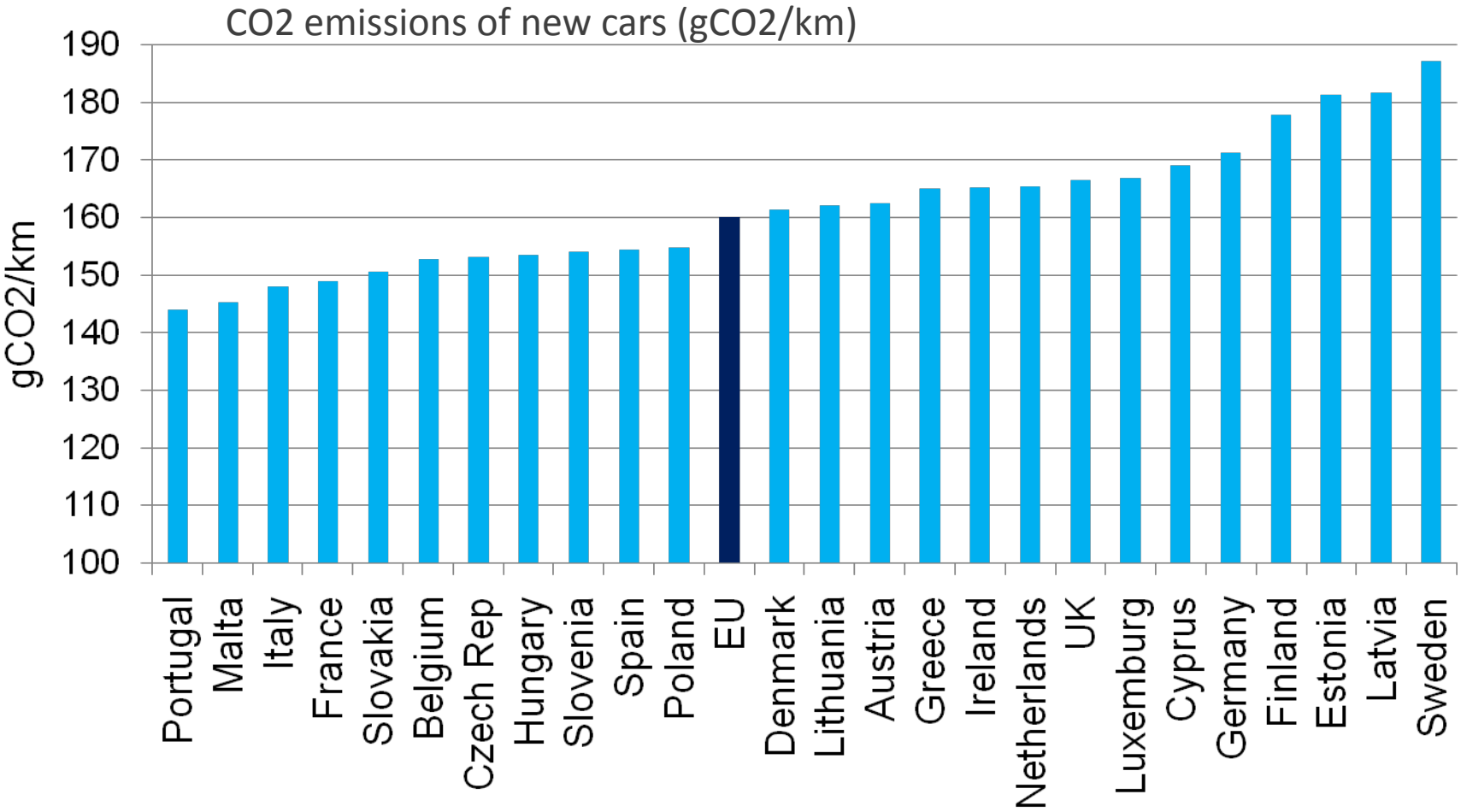
Large discrepancy in the specific consumption of new cars among countries: difference of 2 l/100km between Portugal or France (5.8 l/100km) and Sweden (7.8 l/100km) ➔ range of 40% .

Specific consumption of new cars (litres/100km)



Source: estimation ODYSSEE from ACEA, KAMA, JAMA

Large discrepancy in the specific emission of new cars among countries; lower difference however as for the specific fuel consumption: range of 30% for CO2 between Portugal and Sweden compared to 40% for the fuel consumption; 5 countries below 150 g CO2/km and 4 above 170 g CO2/km. In 2008 Portugal and France at 140 gCO2/km, target of the agreement with car manufacturers

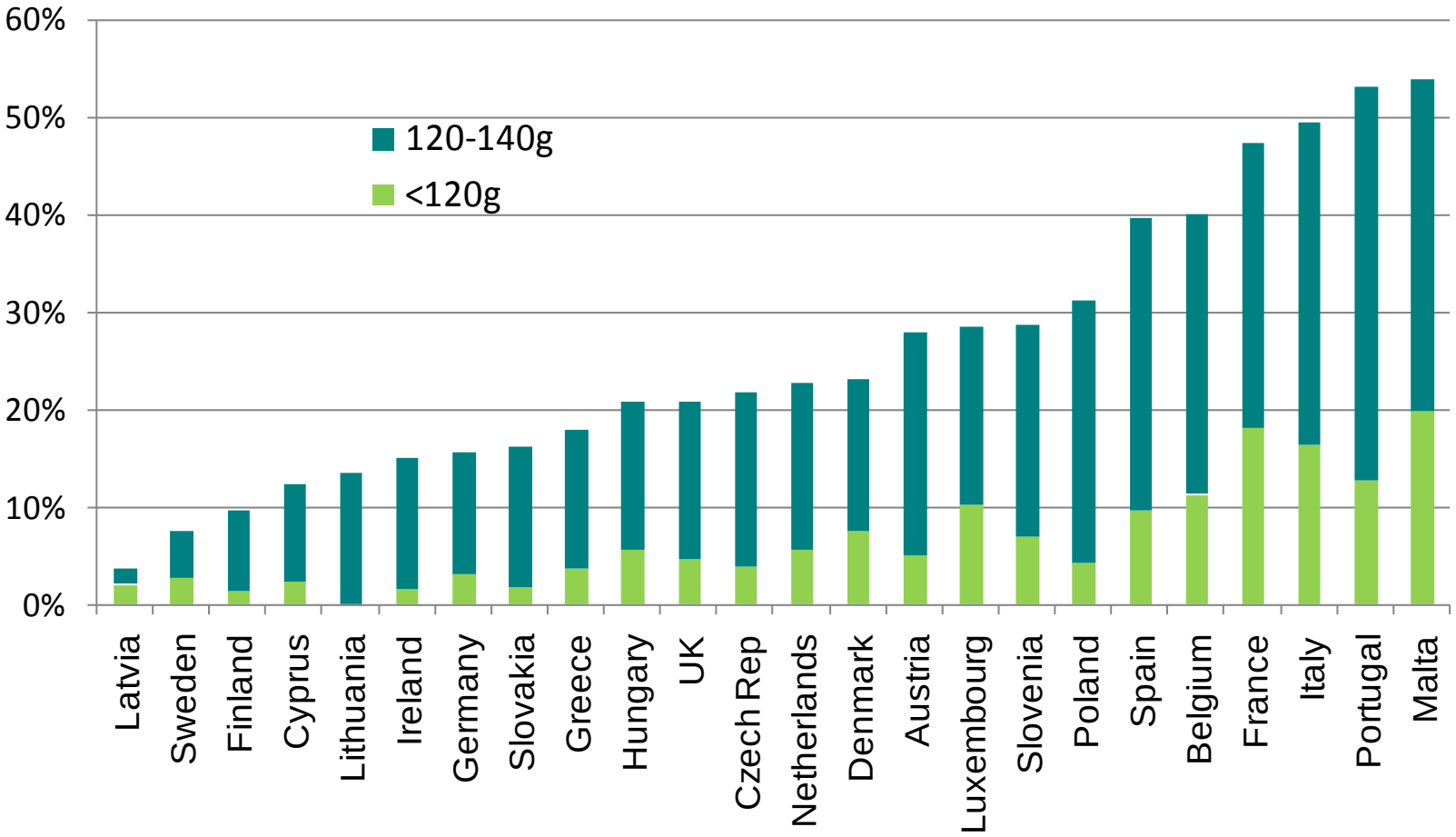


Source: estimation ODYSSEE from EU monitoring report

More than 40% of new cars < 140g CO2/km in France, Italy, Portugal and Malta and almost 20% < 120g in these countries

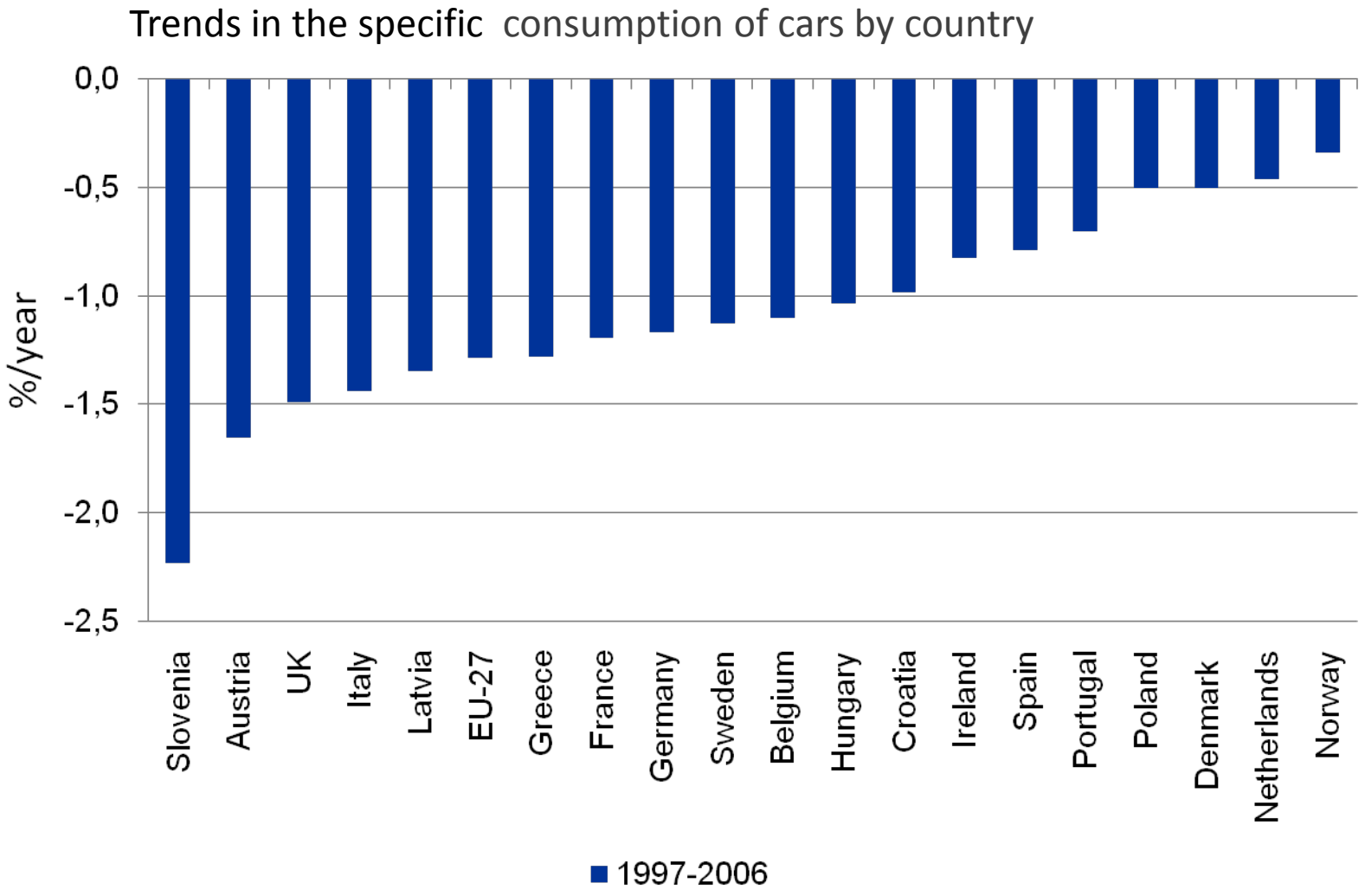
Around 12 countries with less than 20% of new cars <140 g CO2/km

Emission of new cars: % of cars below 120-140 gCO2/km (2006)



Source: Enerdata from EU Commission report

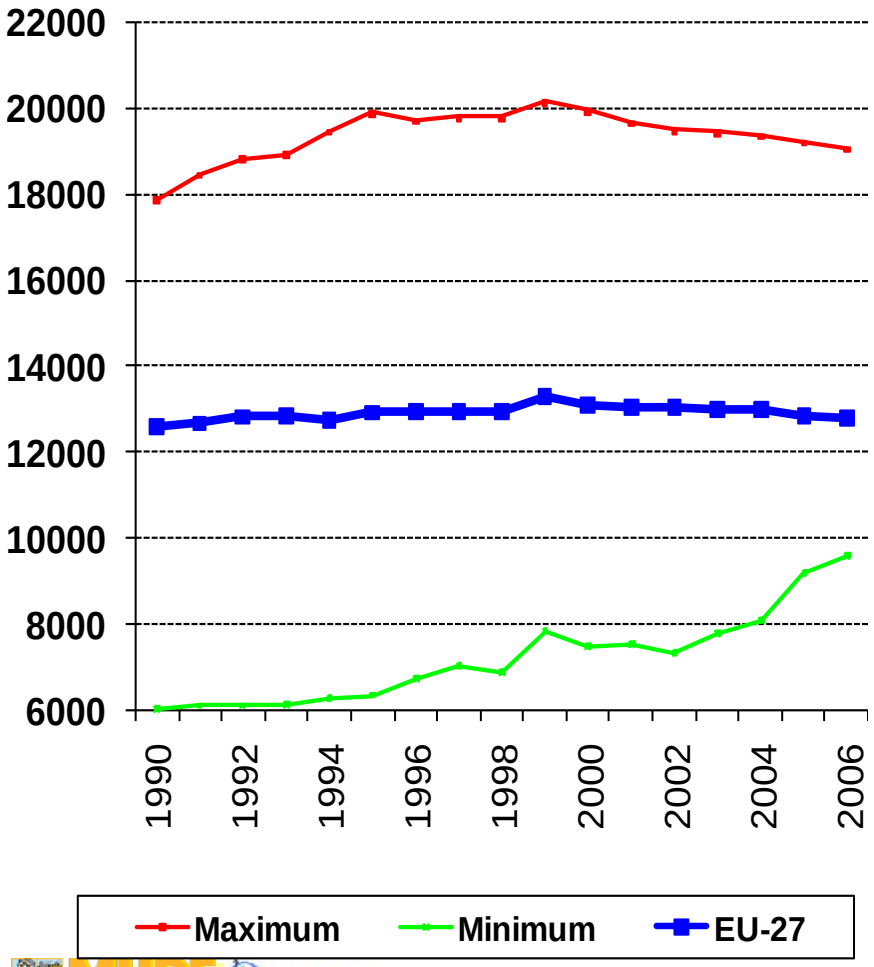
Decrease of the average specific consumption of the car stock (l/100km) in all countries; different trends across countries (between –0.3 and –2 %/ year) and -1.3%/year on average for the EU-27

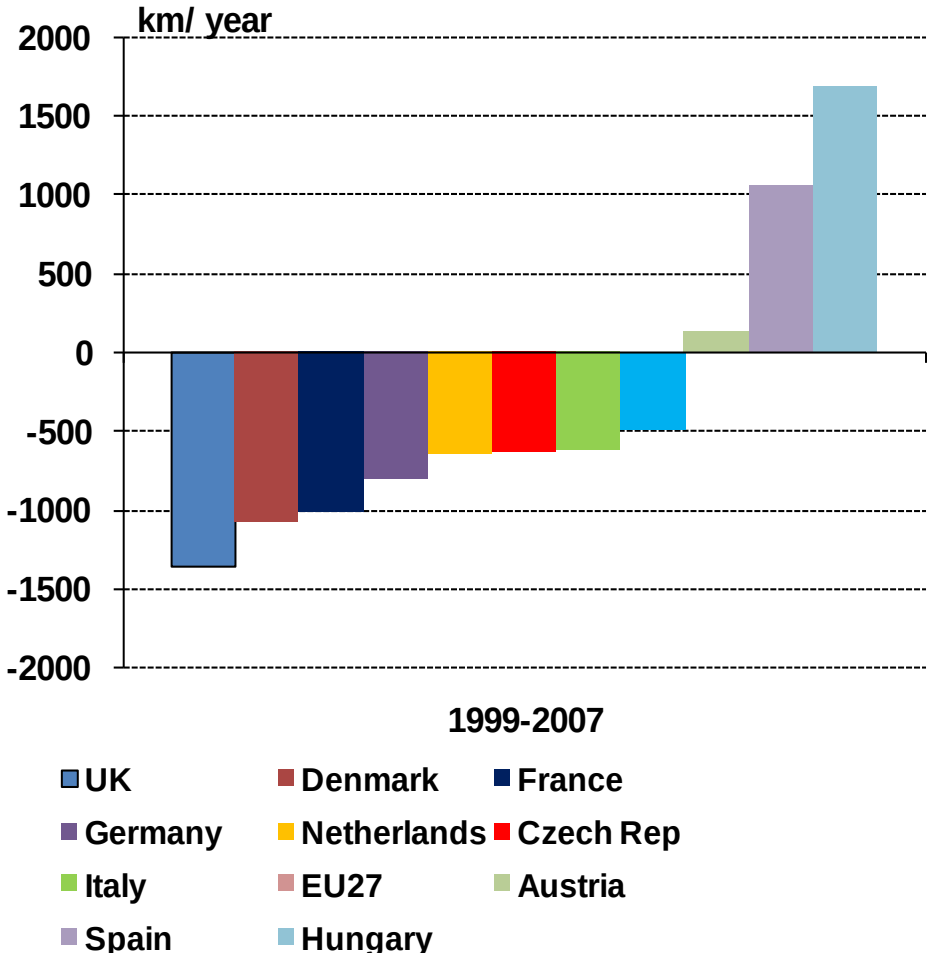


Source: estimation ODYSSEE

Large discrepancy between countries, on average 12800 km/year for the EU-27
Decrease in almost all EU 15 countries after 1999, as a result of the sharp increase in motor fuels prices (- 500 km for EU-27). However progression in some countries.

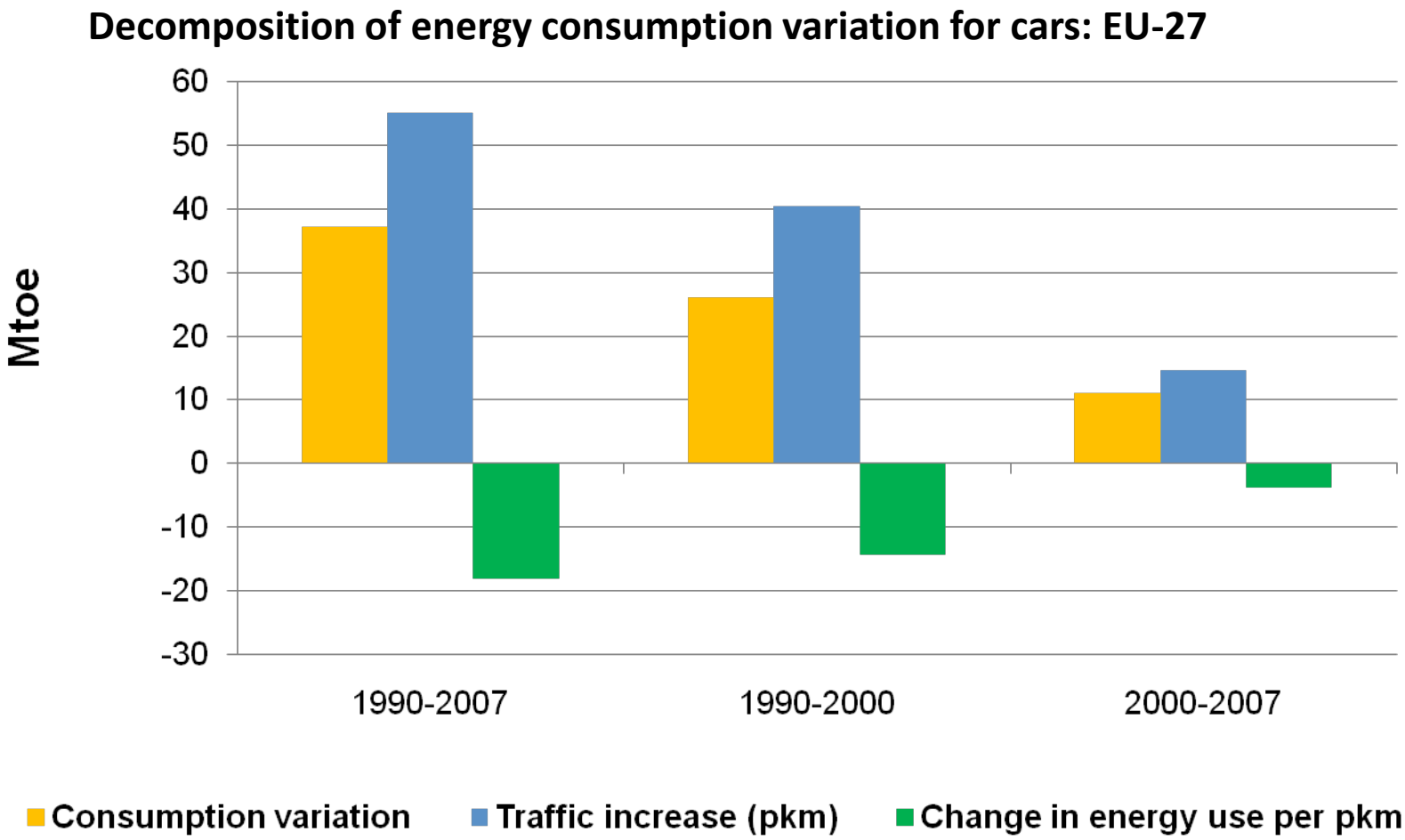
Change in distance travelled by car km/ year



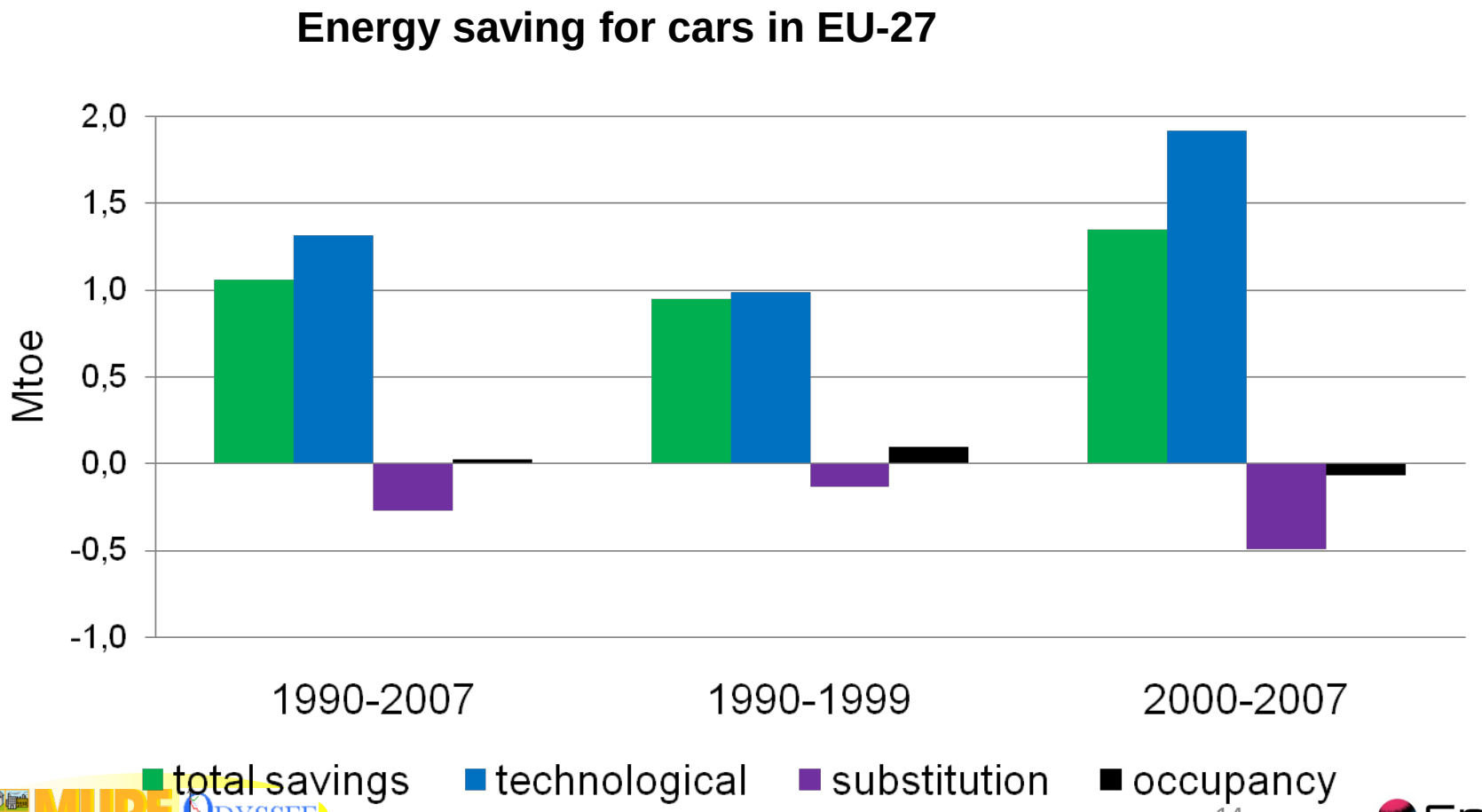


The increase in car traffic should have raised the energy consumption of cars by 55 Mtoe (27%) between 1990 and 2007. This effect has been partially offset by a reduction in the energy consumption per unit of traffic (-18 Mtoe) resulting in a net increase of the energy consumption of cars of only 37 Mtoe.

Slow down in energy savings since 2000 (0.5 Mtoe/year against 1.4 Mtoe/year before)



- Total energy savings for cars can be decomposed into 3 types of savings:
  - Savings due to a reduction in the specific consumption in l/100km (1 to 1.5 Mtoe/year) (mainly technological; also include change in driving behaviour and car size)
  - Negative savings due to an increase in the average heat content of one litre of motor fuel due to the shift to diesel and in recent years to biofuels
  - Savings linked to an increase in the average occupancy rate of car (person/car)
- Technological savings are increasing (almost 2 Mtoe/year over 2000-2007)



Odyssee indicators in transport and evaluation of policies

➢**New cars**: test specific consumption in litres/km ➔ *shows the impact of labelling, of efficiency standards, Voluntary Agreements and other policies to promote efficient cars, and prices*

➢**Cars**: specific consumption in litres/km, toe/car, toe/passenger-km ➔ *shows the same impact of policies as for new cars, plus the effect of other factors depending on the indicator (see section 4)*

Energy efficiency of cars (stock average): pros and cons of different indicators

	l/100 km*	toe/car	toe/pkm
Pros	• Gives the closest measure of the technical efficiency of cars •Reflects also the impact of driving behaviour (ecodriving, speed limit) and shift to smaller cars	•Indicates how efficient is the use of cars (technical, efficiency plus reduced mileage •Combined with l/100 km enables to separate technical and behavioural savings	•Indicates how efficient is the mobility by car •Reflects the increase in car pooling
Cons	•Exclude part of behavioural savings (reduced use of cars and increased use of public transport)	•Does not separate technical and behavioral savings	•Data on passenger-km uncertain

1. Overview of indicators from ODYSSEE
2. Cars
3. **Road transport of goods**
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. Annex: Data issues

Specific/unit consumption to assess energy efficiency of trucks: technical and pattern of use

- Definition:
  - Specific consumption: ratio calculated from the total consumption of trucks, the stock of trucks and the average distance travelled by year by truck
  - Annual unit consumption: ratio calculated from the total consumption of trucks and the stock of trucks
- Calculation:

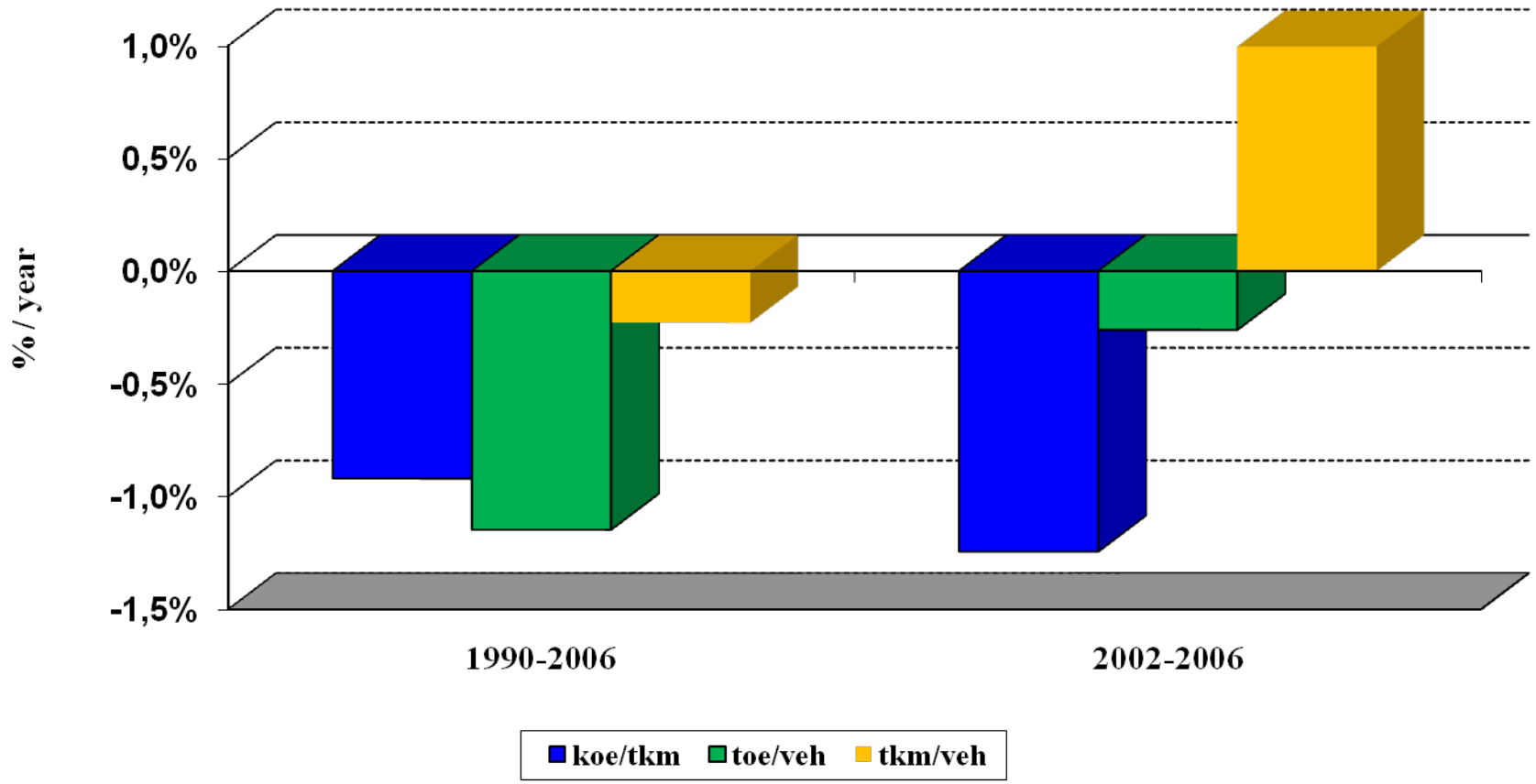
cstoccam=toccfcam/(nbrcam*kmcam)*100 (l/100km)

cutoccam=toccam/nbrcam (toe/truck/year)

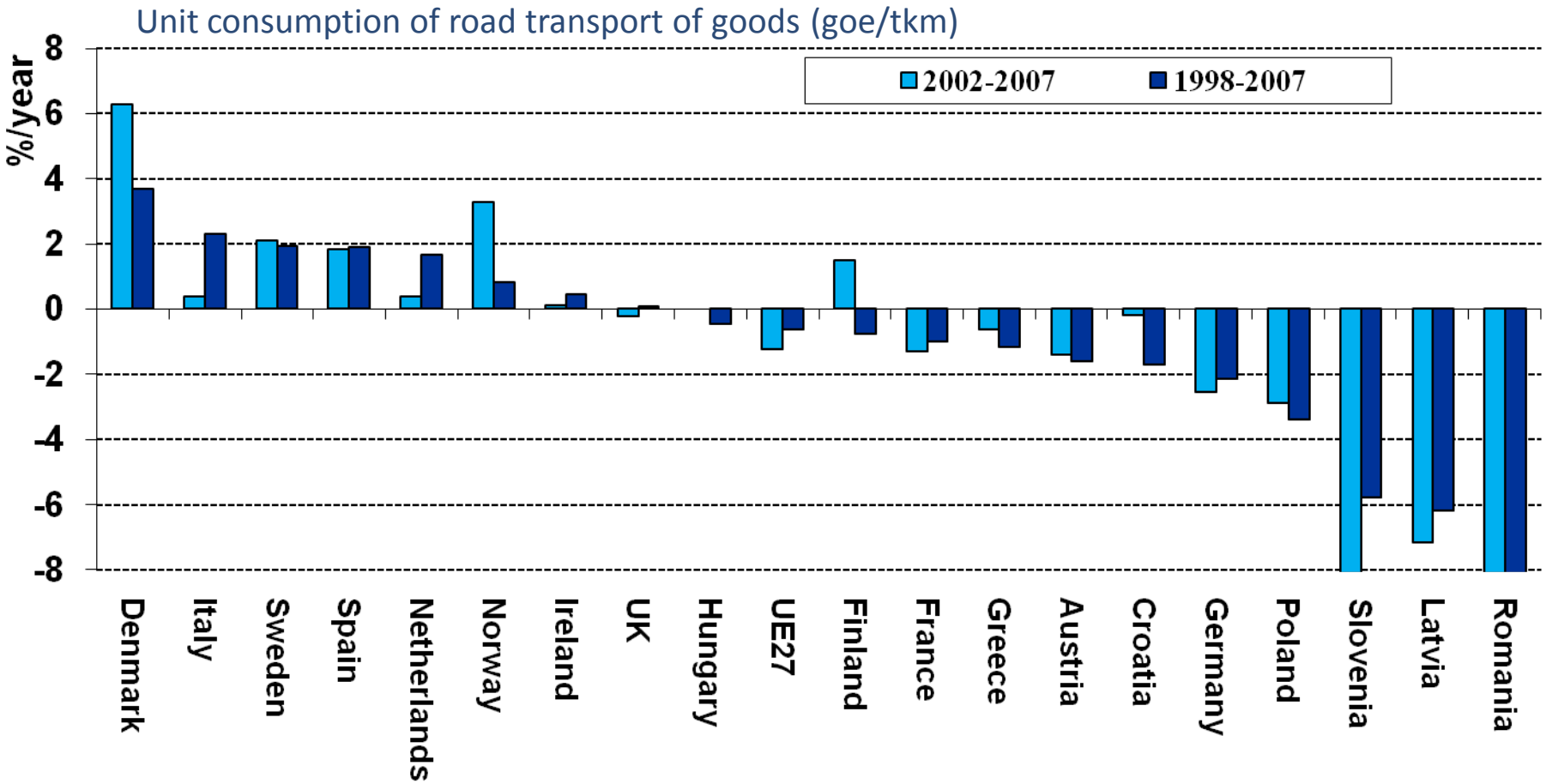
  - toccfcam: total consumption of trucks (Mm3)
  - toccam: total consumption of trucks (Mtoe)
  - nbrcam : stock of trucks (millions)
  - kmcam: average distance travelled per year per truck (thousand km)

Decrease of the energy consumption per ton-km between 1 and 1,5%/ year ➔ energy savings; mainly because of a better management of the traffic load (increase in ton-km/vehicle) over the recent period (‘2002 and 2006); since 1990 mainly because of a reduction of the average energy consumption per vehicle

Unit consumption of road transport of goods (EU-27)



Decrease of the consumption per ton-km in most countries 1998 because of better management (increase in ton-km/veh); strong reduction In Germany, Poland, Slovenia, Latvia and Romania ➔ energy savings.
Increasing trends in some EU 15 countries(maybe linked to an increase in foreign traffic for which the consumption is not accounted for?)



Energy efficiency of road transport of goods: pros and cons of different indicators

	l/100 km	toe/ton-km
Pros	• Gives the closest measure of the technical efficiency of vehicles; •Reflects also the impact of driving behaviour (ecodriving, speed limit)	•Indicates how efficient is the transport of goods by road •Reflects the effect of technical and non technical measures
Cons	•Excludes non technical savings linked to better management and organisation of transport (increased load factor, reduction of empty mileage	

Examples of Odyssee indicators in transport (2/2)

➢**Share of rail and water for the transport of goods** ➔ *shows the impact of policies to promote non road transport (mainly support to the development of infrastructures) or to increase the cost of road transport (tolls, taxes)*

➢**Share of public transport (rail, buses) for passenger transport** ➔ *shows the impact of policies to promote public transport (mainly support to the development of infrastructures) and to tax the use of cars (urban tolls, tax increase)*

1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. **Energy efficiency trends**
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. Annex: Data issues

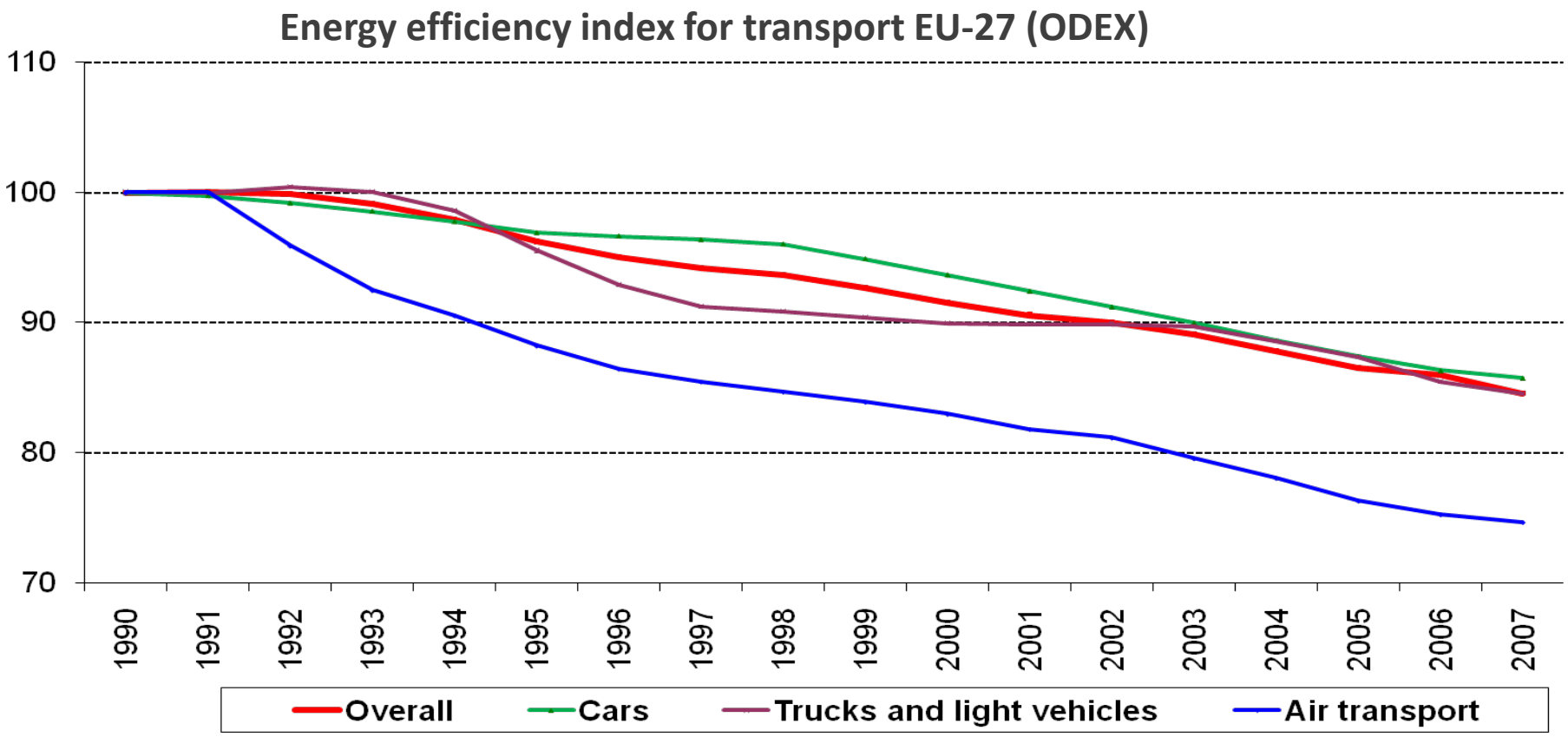
Energy efficiency index for transport (ODEX)

ODEX calculated on 7 modes:

- cars (litres/km),
- trucks & light vehicles (toe per tkm),
- air (toe per passenger);
- rail ,water (toe/ tkm or pkm); motorcycles,
- buses (toe/vehicle)

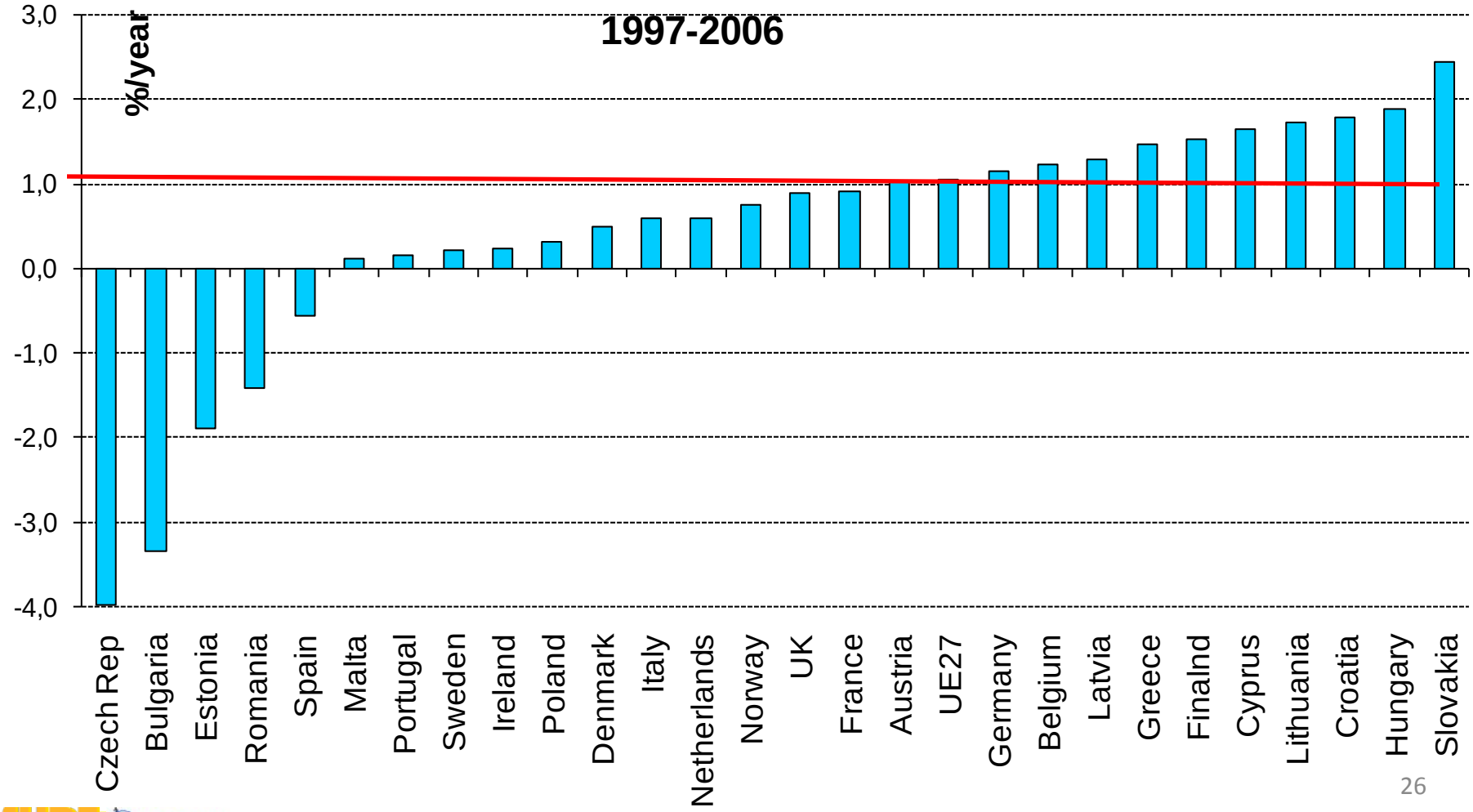
Regular improvement of the energy efficiency of transport by 15% since 1990

Slow down in efficiency of trucks and light vehicles since 1999



Improvement in energy efficiency in almost all the countries, except for 7 countries (mainly due to goods road transport): 12 countries with a rate of energy savings above 1%/year. Trend rather regular

Energy efficiency trends in transport (as measured from the variation of the ODEX)



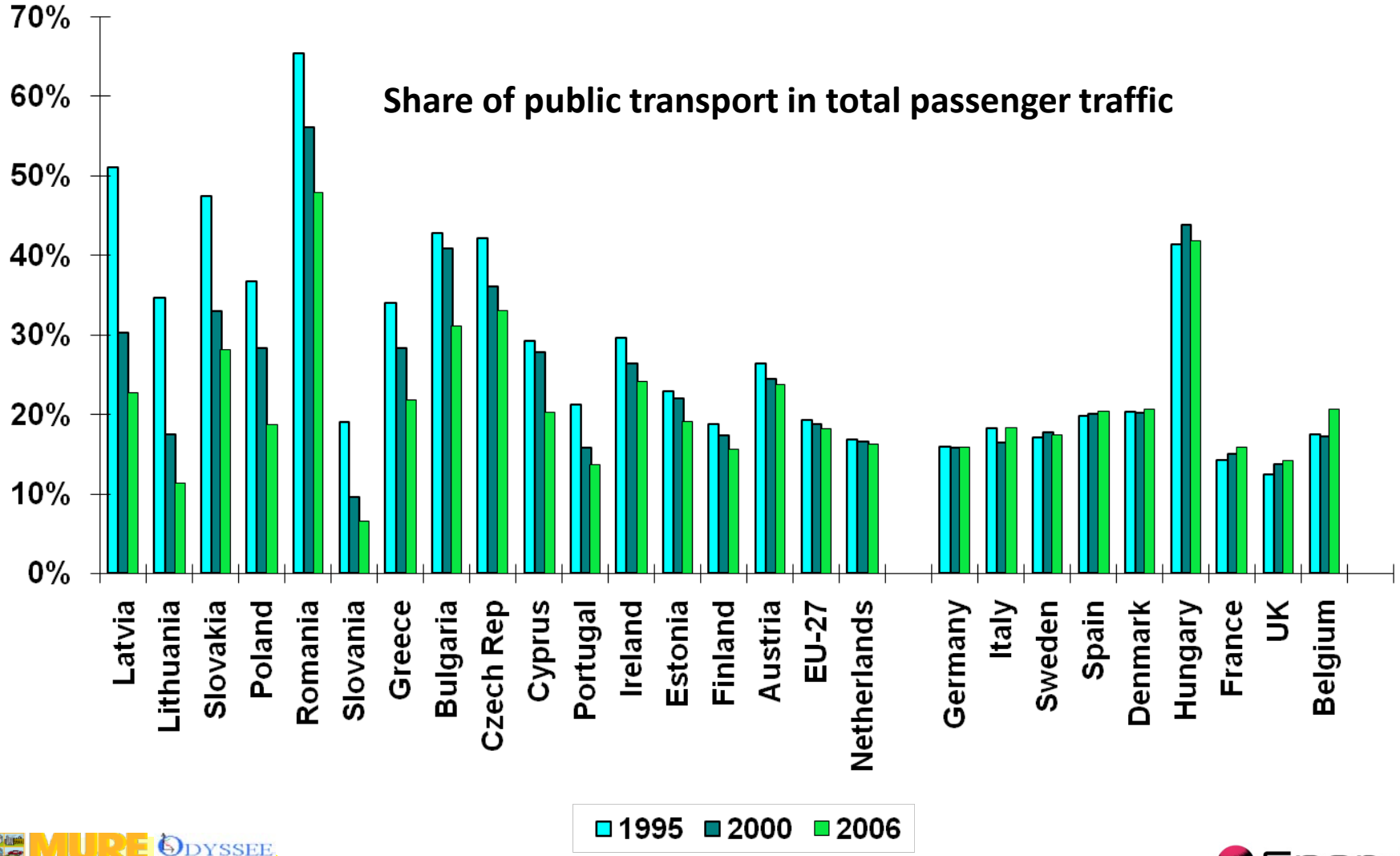
1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. **Modal shift for transport of passengers and goods**
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. Annex: Data issues

Odyssee indicators in modal shift in transport

➢**Share of rail and water for the transport of goods** ➔ *shows the impact of policies to promote non road transport (mainly support to the development of infrastructures) or to increase the cost of road transport (tolls, taxes)*

➢**Share of public transport (rail, buses) for passenger transport** ➔ *shows the impact of policies to promote public transport (mainly support to the development of infrastructures) and to tax the use of cars (urban tolls, tax increase)*

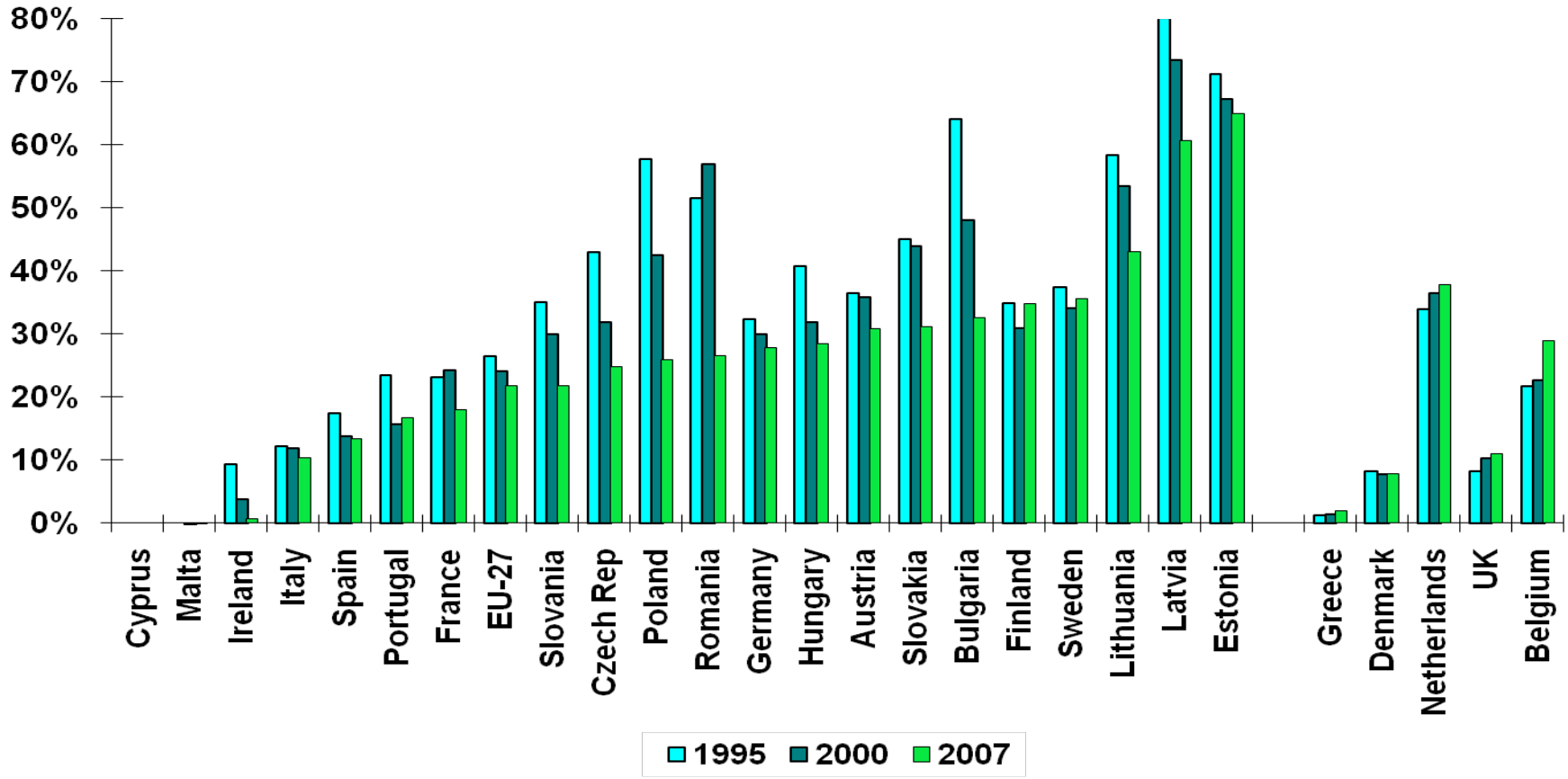
Increasing share of public transport in passenger traffic in for 4 countries only (Spain, France, UK and Belgium) and stabilisation for 4 other countries (Spain, France, UK and Belgium) . Strong reduction of the role of public transport in new EU member countries in 4 others most of countries



Increasing share of rail and water transport of goods in 3 countries only: Netherlands, Belgium and UK

Large discrepancies between countries : from less than 10% for Italy, Ireland to 60-65% for Estonia and Latvia

Share of rail and water in total goods traffic

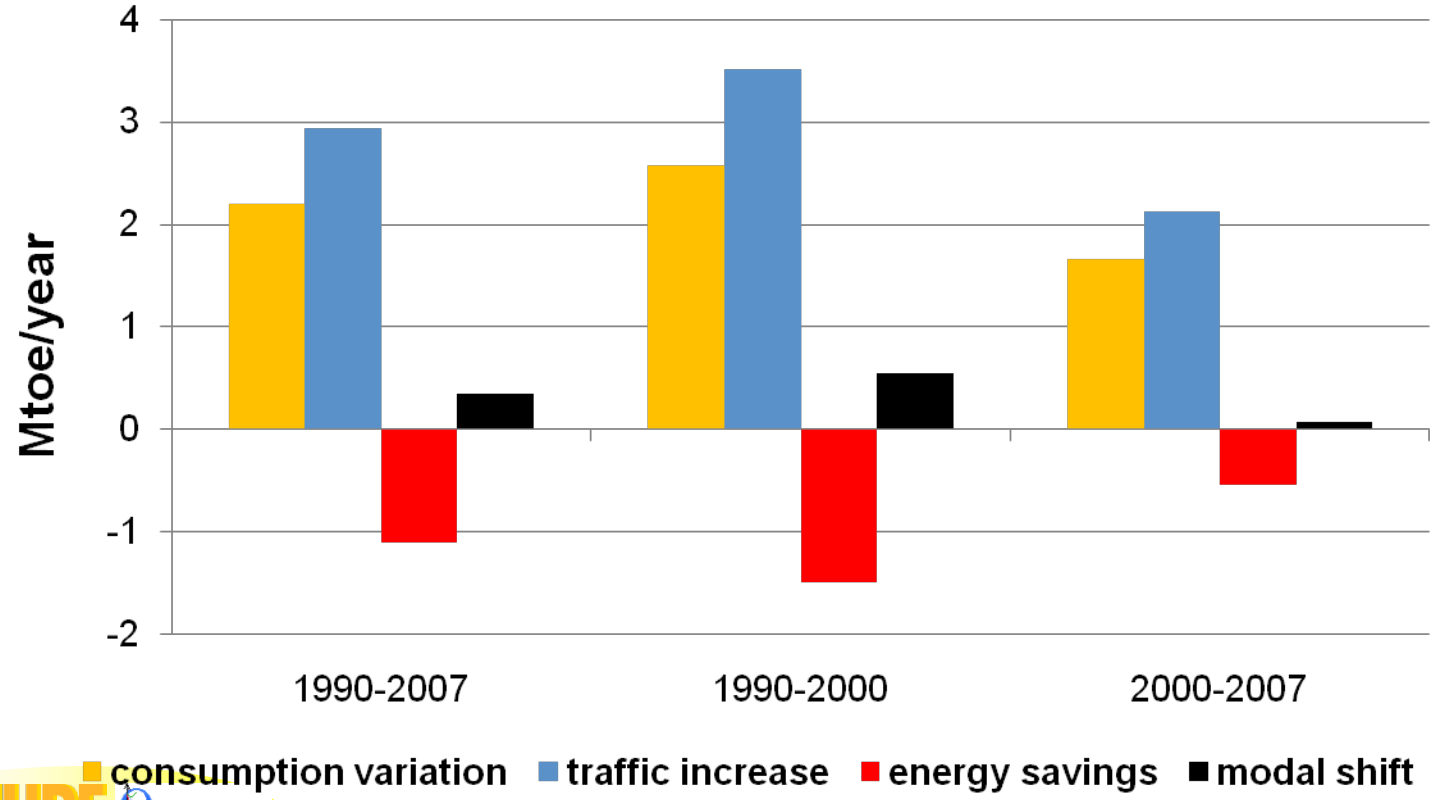


1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. **Interpretation of energy consumption variation**
7. Consumption of road transport per car equivalent
8. Annex: Data issues

The increase in the energy consumption of passenger traffic (around 2 Mtoe/year) is mainly to due a growth in passenger traffic (~3 Mtoe/year) . The decreasing share of public transport (modal shift) also contribute to increase the consumption (up to 0,5 Mtoe/year over 1990-2000, much less since 2000).

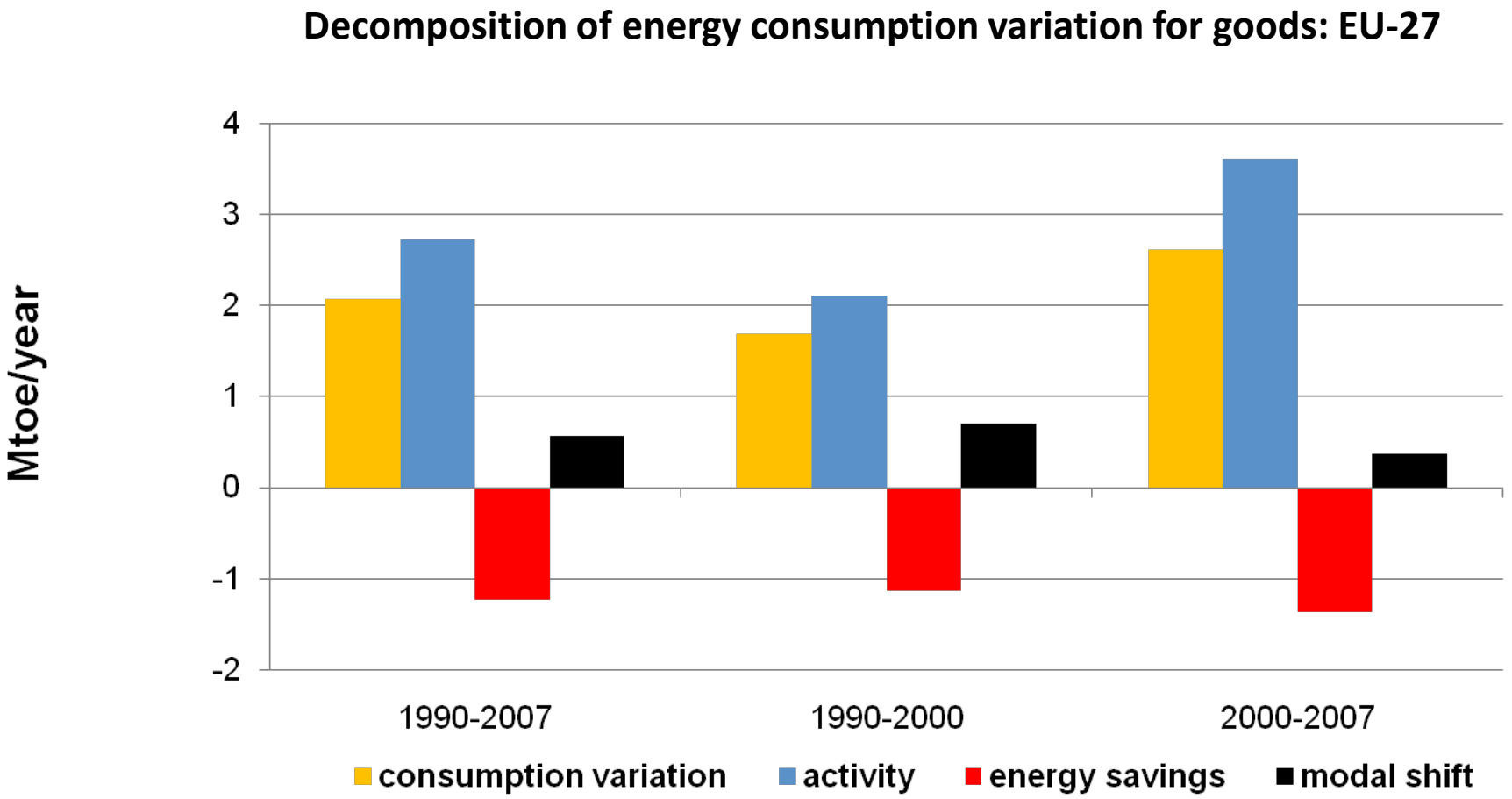
Energy savings of 1 Mtoe/year due to a reduction of the specific consumption per unit of traffic) offset the effect of traffic increase and modal shift and limit the progression of energy consumption. These savings mainly come from cars . There is a slow down in energy savings since 2000 (0.6 Mtoe/y against 1.5 Mtoe/y from 1990 to 2000)

Decomposition of energy consumption variation for transport (air excluded) EU-27



The energy consumption of goods transport has increased by 2 Mtoe/ year on average since 1990 (or 35 Mtoe in total). Increase in traffic and modal shift (are responsible for an increase of respectively 2,7 and 0,6 Mtoe/year (45 and 10 Mtoe cumulated)

Energy savings are around 1 Mtoe/year

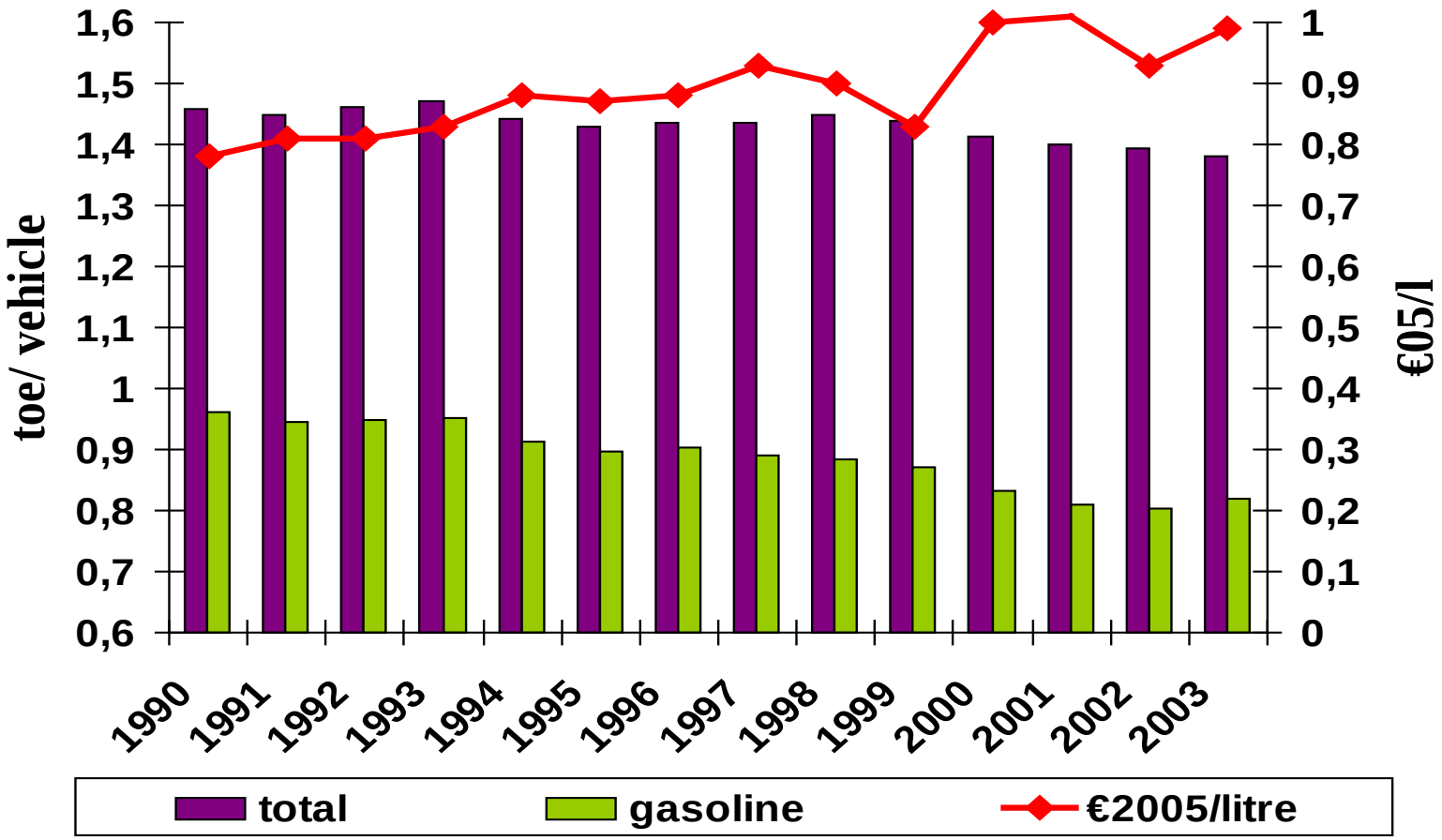


1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. **Consumption of road transport per car equivalent**
8. Annex: Data issues

Consumption of road transport per car equivalent to assess overall energy efficiency of road transport

- Some countries do not have data breaking down the consumption of road transport by type of vehicle
- Calculation of a unit consumption of road transport per equivalent car that relates the total consumption of road transport to a fictitious stock of vehicles, measured in terms of numbers of equivalent cars.
- Converting the actual stock of vehicles into a stock of equivalent cars is based on a coefficient reflecting the difference in the average yearly consumption between each type of vehicle and a car. If, for instance, a motorcycle consumes 0.2 toe/year on average and a car 1 toe/year, one motorcycle is considered to be equivalent to 0.2 cars. In the same way if light vehicles and trucks consume on average 5 toe/ year each vehicle for road transport of goods is equivalent to 5 cars

Evaluating the combined effect of technology and pattern of use of vehicle with consumption per road vehicle (equivalent car, EU-15)



1. Overview of indicators from ODYSSEE
2. Cars
3. Road transport of goods
4. Energy efficiency trends
5. Modal shift for transport of passengers and goods
6. Interpretation of energy consumption variation
7. Consumption of road transport per car equivalent
8. **Annex: Data issues**

Data on energy consumption

- Data for energy consumption by main transport mode: rail, air, waterways & sea transportation and road usually directly available in statistics
- Data for energy consumption of road transport raises two issues:
  - use by foreign vehicles and border trade
  - accounting correctly for biofuels
- Data for energy consumption of road transport by vehicle types and services usually not directly available in the statistics, but through estimates

Data on traffic

- Data for traffic in pass-km and ton-km are recorded and available only for traffics paid on a km basis: non urban rail, waterways and road transport services mainly➔ relate to traffic of domestic vehicles (national and international)
- Data for traffic in passengers and tons moved are recorded and available in two cases
  - tickets purchased (urban transport services)
  - passengers/tons loaded/unloaded (air and sea)
- Data for traffics in cars in pass-km are not recorded but estimated on the basis of traffic in vehicles-km, i.e. from the stock of cars and annual distance driven.

Data on vehicle stocks (road transport)

- Data for vehicle stocks may have several sources, not necessarily consistent:
  - records on first registrations minus destructions
  - annual tax on vehicles in use
  - insurance…
- The main issue: total vehicle stock or vehicles in use? The discrepancy can reach 30%
- Attention: data on vehicle stocks, annual kilometer driven and specific consumption must be consistent!!

Data on vehicle use (road transport; km/year)

- Data for vehicle use (km/vehicle/year) requires dedicated surveys; several methods:
  - household surveys
  - panel of representative vehicle owners (Reference: “Fuel consumption survey for french cars: Secodip »)
  - surveys at gas stations…
- The main issue: consistency between the population surveyed and the vehicle stock
- Methods based on vehicles meters are more reliable

Data on specific consumption (road transport)

- Vehicle manufacturers usually provide information on the theoretical specific consumption of the vehicles commercialised, according to european measuring standard (european cycle)
- Data monitored by the European Commission since 1995 , processed by Enerdata and included in the international statistics on web site; often with delay
- For new cars, the actual recorded specific consumption on normal traffic conditions is higher than the theoretical value ("gap factor)

Reference: "Transport indicators: gap factor by Cazzola, IEA

- Actual specific consumption in normal traffic conditions requires dedicated surveys (usually the same than for vehicle use)

Reference: "Fuel consumption survey for french cars: Secodip »

- Methods based on refueling records more reliable

- Data issues
  - Border trade and foreign vehicles
  - Estimation of road consumption data by mode

Border trade and foreign vehicles

- Why the issue? to have a better measurement of the consumption by domestic vehicles, i.e. the consumption of "domestic road transport" to get indicators related to national vehicles only (consumption in litre/100 km, per car, per passenger-km)➔ consistent boundary for the numerator (energy consumption) and the denominator (stock of vehicle or traffic)

- What is border trade (also called "fuel tourism")?

  - ✓consumption by domestic vehicles that purchase motor fuels across the border when fuel much cheaper than in own country

  - ✓ or foreigners purchasing fuels at the border

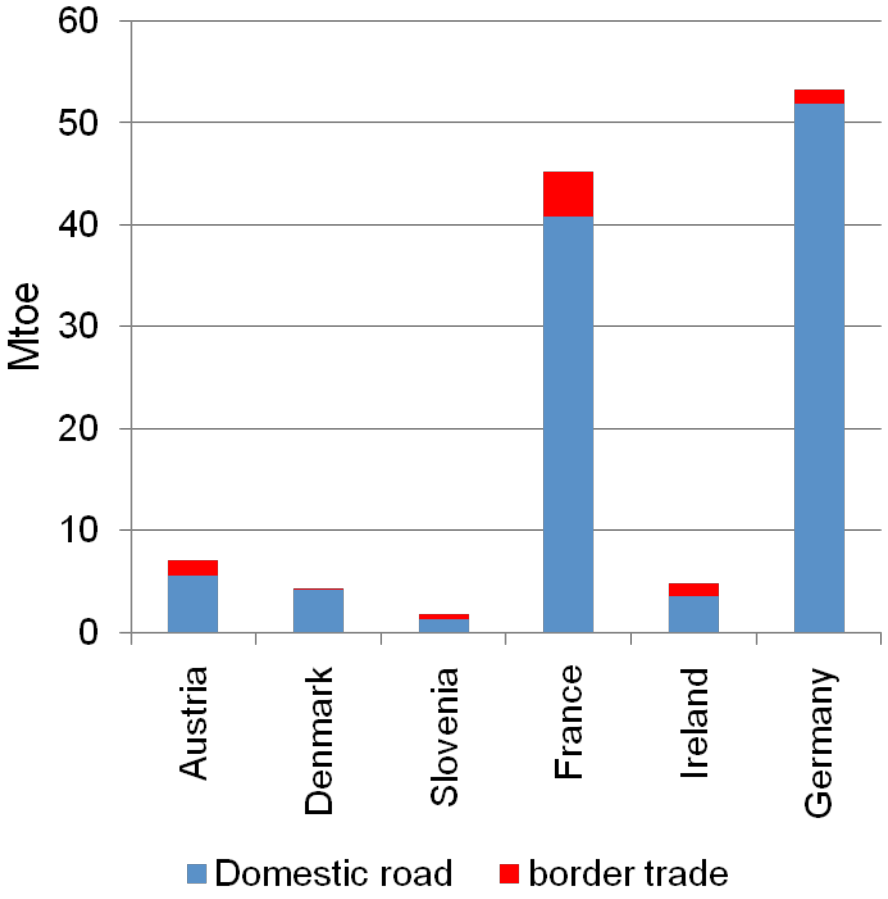
- Many countries do a correction to remove from road transport the consumption from foreign vehicles ; adjustment important for some countries (up to 10-20% of the consumption);

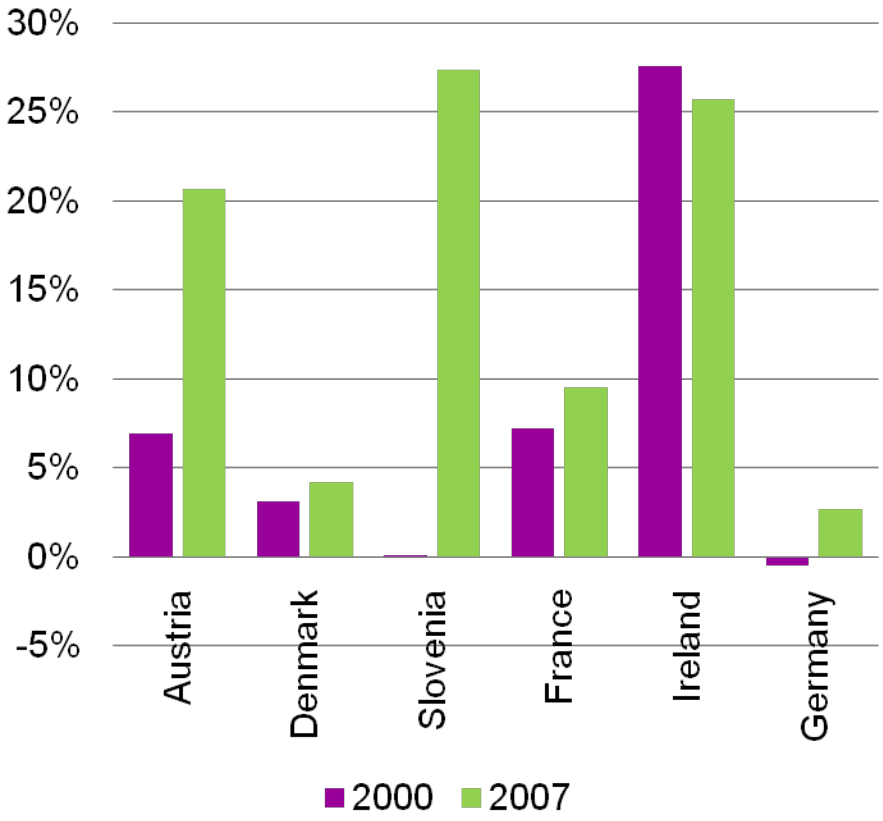
- Difference with official data on road transport ➔ need to well separate in Odyssee a total road transport (as in Eurostat) and "domestic road transport";

- References: Austria "Fuel tourism"

Domestic road transport consumption is lower than the energy consumption of road transport shown in statistics as the consumption of foreign vehicles ("border trade", transit) is deduced ; the difference can reach 25% in Slovenia and Ireland, 20% in Austria and 10% in France. Its magnitude is increasing since 2000.

Share of border trade in road consumption





Data issues: estimate of road consumption by mode

- Use of all available data on:
  - Consumption by type of motor fuel (gasoline, diesel, LPG, including biofuels (with possibly corrections for foreign vehicles)
  - Stock of vehicle by type and motor fuel/engine (e.g. gasoline, diesel, LPG)
  - Traffic and mileage
  - Specific consumption (e.g. specific consumption of cars: to be based on surveys or estimated from the test value for new cars and a stock model)

$$(\text{Energy use})_m = \sum_{\substack{k=\text{vehicle type} \\ j=\text{immatriculation year}}} (\text{Specific consumption})_{kj}(\text{Vehicle})_{kj}(\text{Average travel})_{kj}$$

- Estimation of the less reliable data
- Guarantees the consistency of traffic statistics and energy statistics
- Reference: Integrated statistics of traffic and fuel consumption in France

Calculation: case of France (1/1)
(separate tables for diesel and gasoline)

	Stock of vehicles	Average km	Traffic (veh * km)	Unit cons. (l/100 km)	Consumption (m^3)
Personnal cars	CCFA registration + taxes + modelling	Panels	calculated	Panels	calculated
Light commercial vehicles	CCFA registration + taxes + modelling	Survey (/5 years) + estimation	calculated	Survey (/5 years) + estimation	calculated
Lorries	TRM Survey	TRM Survey	calculated	TRM Survey (additional question)	calculated

Calculation: case of France (2/2)
(separate tables for diesel and gasoline)

	Stock of vehicles	Average km	Traffic (veh * km)	Unit cons. (l/100 km)	Consumption (m^3)
Buses and coaches			Survey (/5 years) + estimation	estimated	calculated
Motorcycles and others					estimated
Lorries (foreign)	TRM foreign surveys	TRM foreign surveys	calculated	estimated	calculated
Cars and light commercial vehicles (foreign)			Surveys (tourism) + estimation		calculated
TOTAL	Addition		Addition		**Energy statistics**

SUSTAINABLE ENERGY IRELAND | Energy Policy Statistical Support Unit

Data gaps and barriers

Experience from Ireland

Martin Howley & Dr Brian Ó Gallachóir

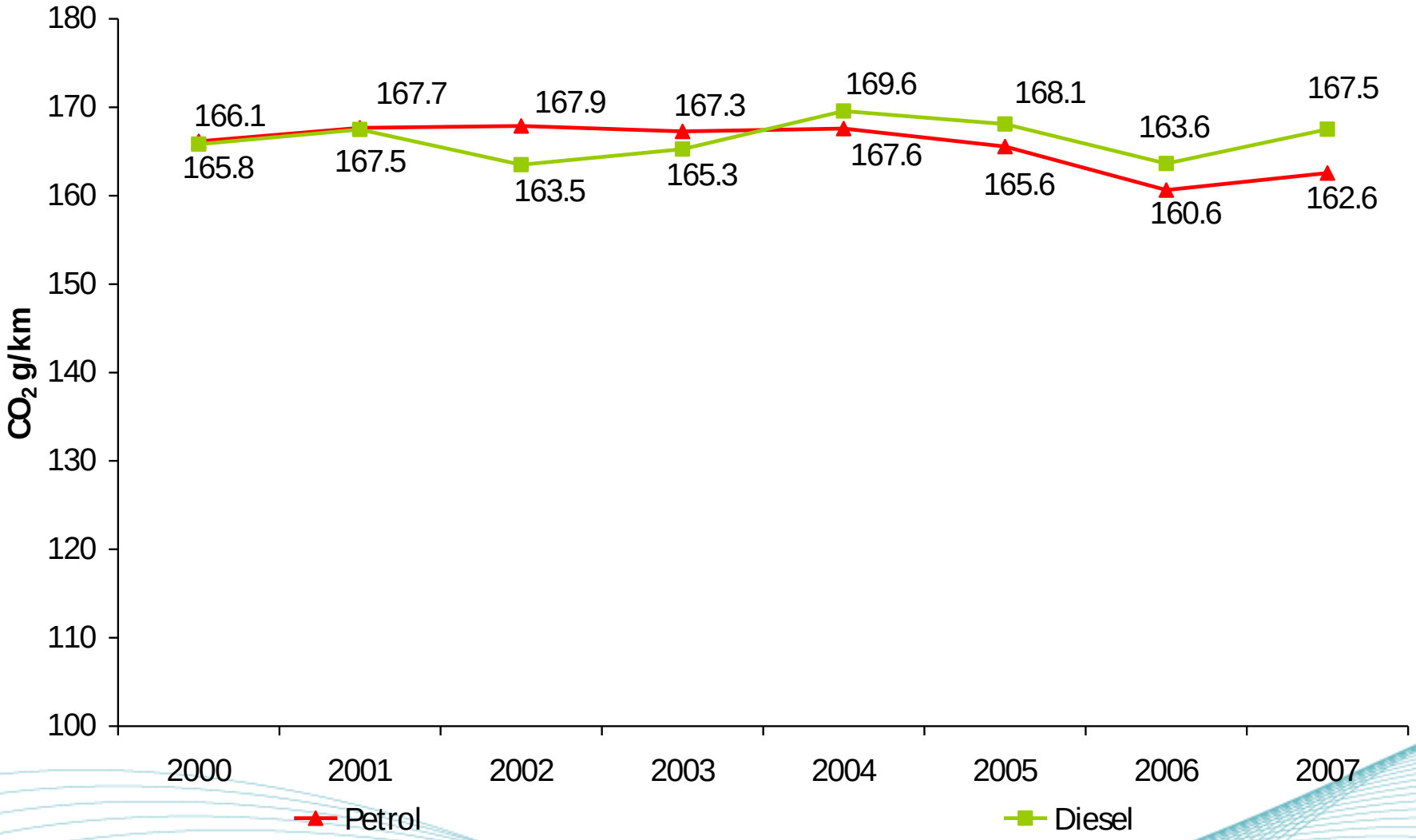
SEI is funded by the Irish Government under the National Development Plan 2007 – 2013 with programmes part financed by the European Union.

Case Study Private Cars

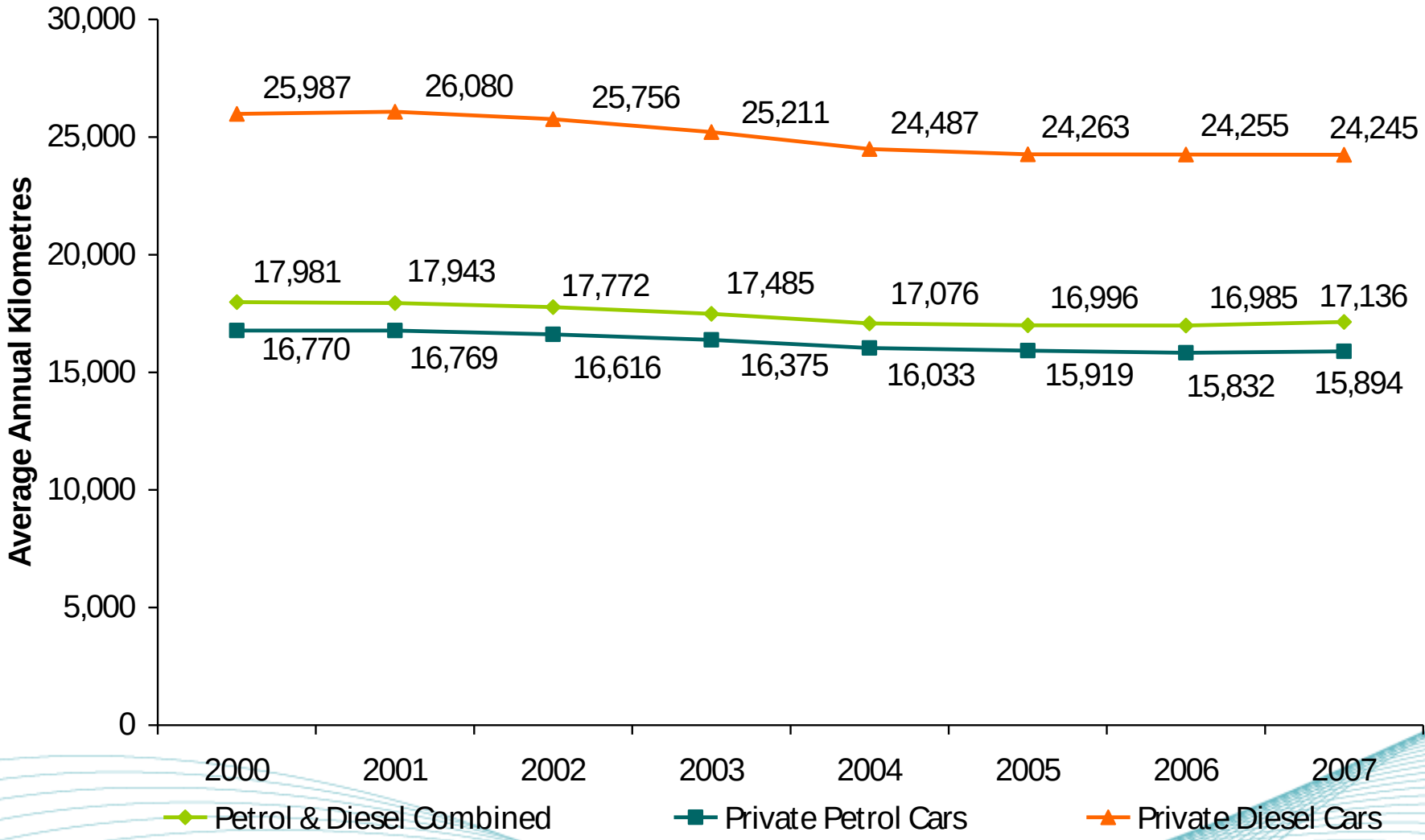
- Vehicle Registration Database
  - Detailed database on vehicles by size, fuel, use etc
  - Weighted fuel efficiency & CO_2 emissions by engine size by linking with car test database
- National car test – introduced in 2000
  - Mileage recorded first after 4 years and then every 2 years thereafter
  - Possible to calculate average annual mileage by engine size from database
- Bottom-up estimate of petrol & diesel consumption
  - annual mileage x fuel efficiency x estimate of on-road adjustment of fuel efficiency
- Similar calculation for taxis
  - Taxis tested annually and mileage recorded

Indicator 1 - Specific Fuel Consumption of New Cars

Indicator 2 - Specific CO_2 Emissions of New Cars



Private Car Mileage



Model Energy Use in Private Cars

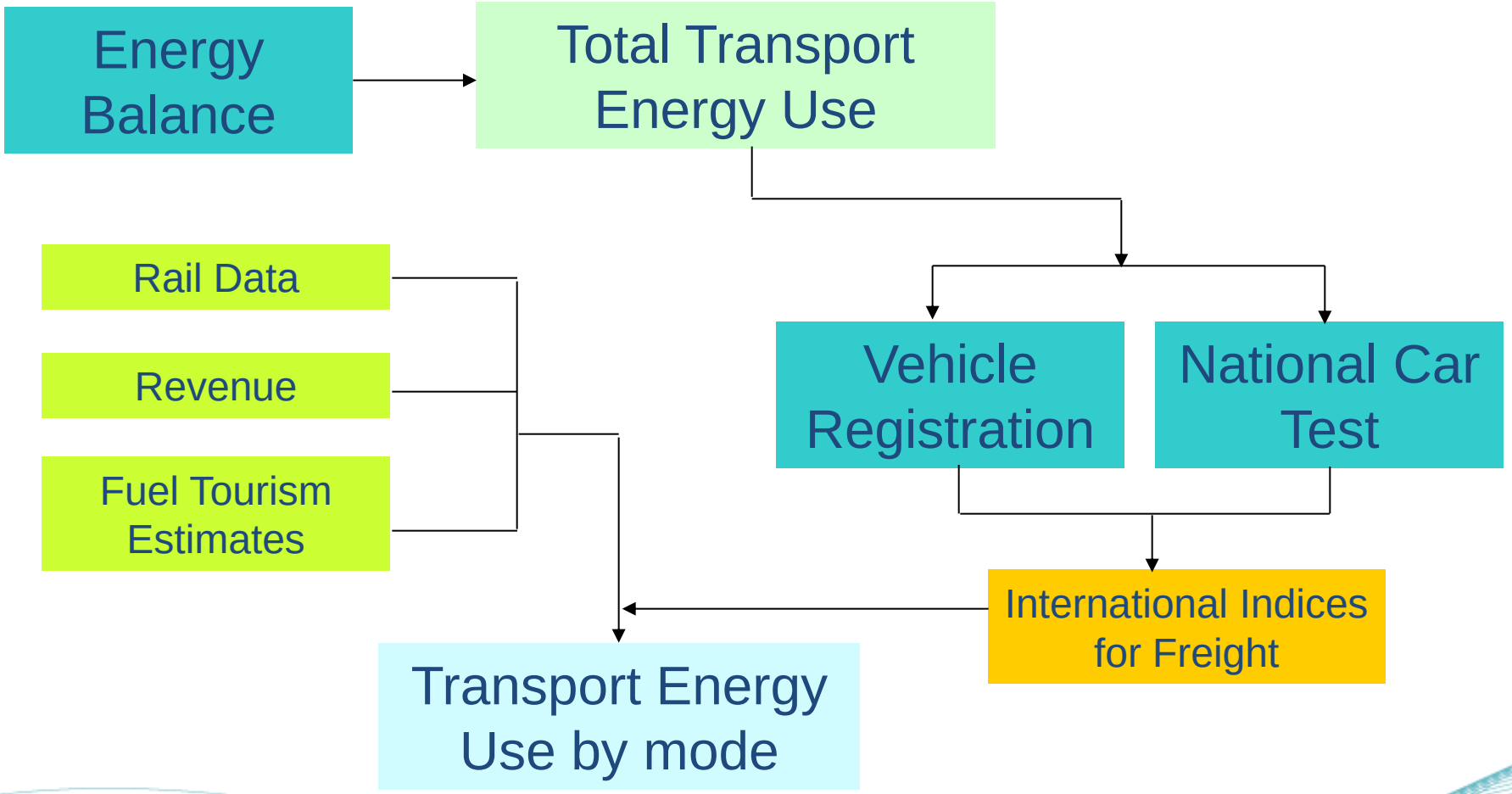
Annual Mileage by engine size and fuel X Fuel Efficiency of new cars by engine size X Fuel Efficiency inflated by 20% for on-road X Numbers of cars in each engine size band

= Petrol & Diesel consumption in private cars

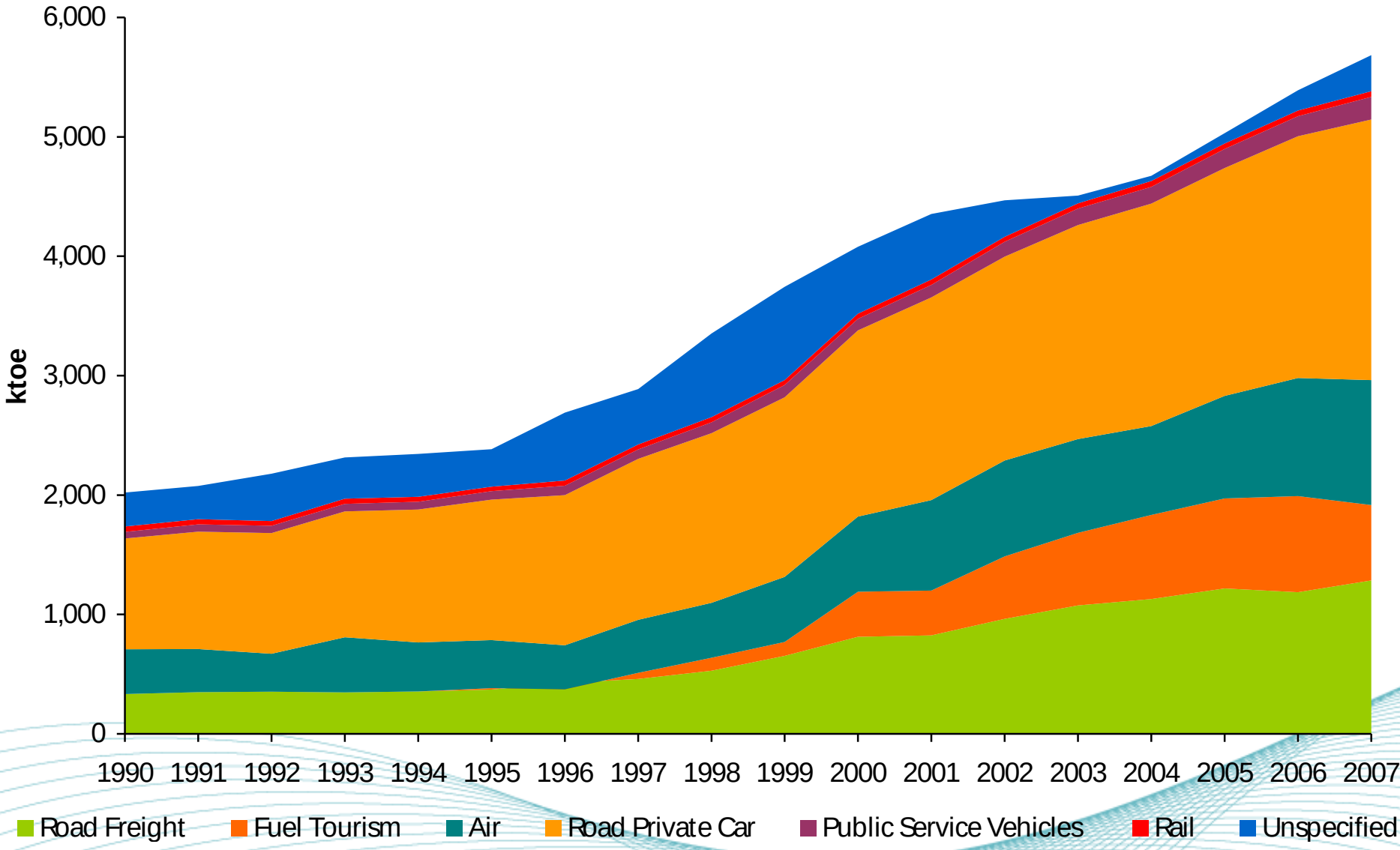
Road Freight Transport

- Vehicle registration data
  - Numbers of vehicles by unladen weight
- Annual Road Freight Survey (Statistical Office)
  - Vehicle kilometres
  - Tonne kilometres
- Used international estimates of fuel use per tonne kilometre and vehicle kilometre to estimate energy use

Putting it all together



Transport Demand by Mode



Costs & Barriers – Car Study

- No additional surveys conducted
- Value added from administration data
- Cost?
  - 3 person months (student work placement)
  - plus database development
- Data access
  - initial resistance
  - bona fida established and added value recognised
- g CO_2/km now recorded on the vehicle file

Next steps / improvements in Transport data

- Passenger travel by car – occupancy rates
- On road fuel efficiency of private car fleet
- Comprehensive transport survey?
- Include fuel consumption questions in road freight survey
- Improve fuel tourism estimates
- Utilise improved data on air travel patterns
- Start new data collection on domestic navigation

Fuel consumption survey for french cars: Secodip

Didier bosseboeuf (ADEME)
with the participation of Roland Curtet (OE)

Various objectives from transport to energy
Various contributors

- Yearly monitoring of the on road specific consumption and mileage for private cars since 1988
- Fuel purchased by vehicle, fuel expenditure per household
- Market shares of fuels by distributors
- Seasonal variations

- Co- funding administrations (industry, transport, environment) and ADEME + oil companies for additional questions
- 130 000 euros annually

The fuel consumption panel for cars (Secodip), Methodology « Frenchs like panels »

- 3300 private véhicles, représentatives of the stock
- Voluntary drivers issued from a 8000 households panel, représentatives of the french population
- Questionnaire (on board sheet), twice a month, on fuels purshases, meter mileage and road type
- **Response rate : 84 %**

Methodology : Criteria of representativeness

12 Criterias of representativeness (controled every trimester) of the household panel, but no explicit criteria of recruitement for the fuel panel

- **Géo socio-démographic**
  - region; localisation; household size (5); age of the driver; P-Scategories (8); household income;
- **Relative to the vehicle :**
  - age; power (5); fuel (5); brand (3), ownership

Methodology : The « big runner » issue

- Due to the constraint of the on board sheet data collection by the driver, the « big runner > 20000 km » are not properly surveyed.
  - Underestimation of mileage,
- Only private cars, and domestic cars
  - no overall coverage of the car consumption, no perfect adequacy with fuel sales

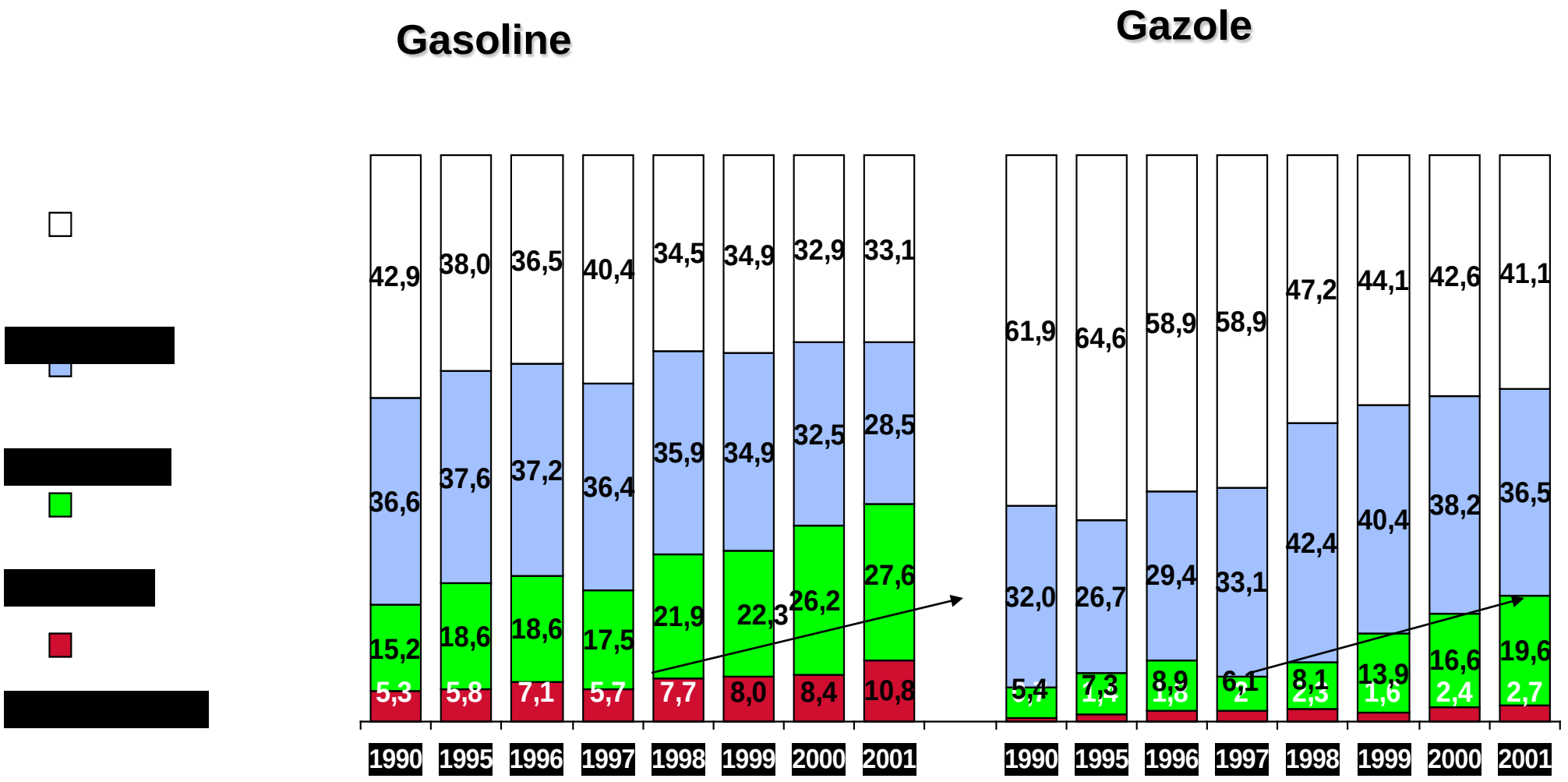
Methodology : Mileage assessment

- The following-up of the mileage variation through metering is difficult :
  - Number of panelists decreases along the year
  - New panelists, new cars etc.
- Mileage assessment is obtained by indirect calculation
- l/100 km = $\frac{\text{Purchased quantity of fuel}}{\text{mileage traveled between the refuelings}}$
- average mileage : $\frac{\text{Purchased quantity in one year}}{\text{L/100 km}}$

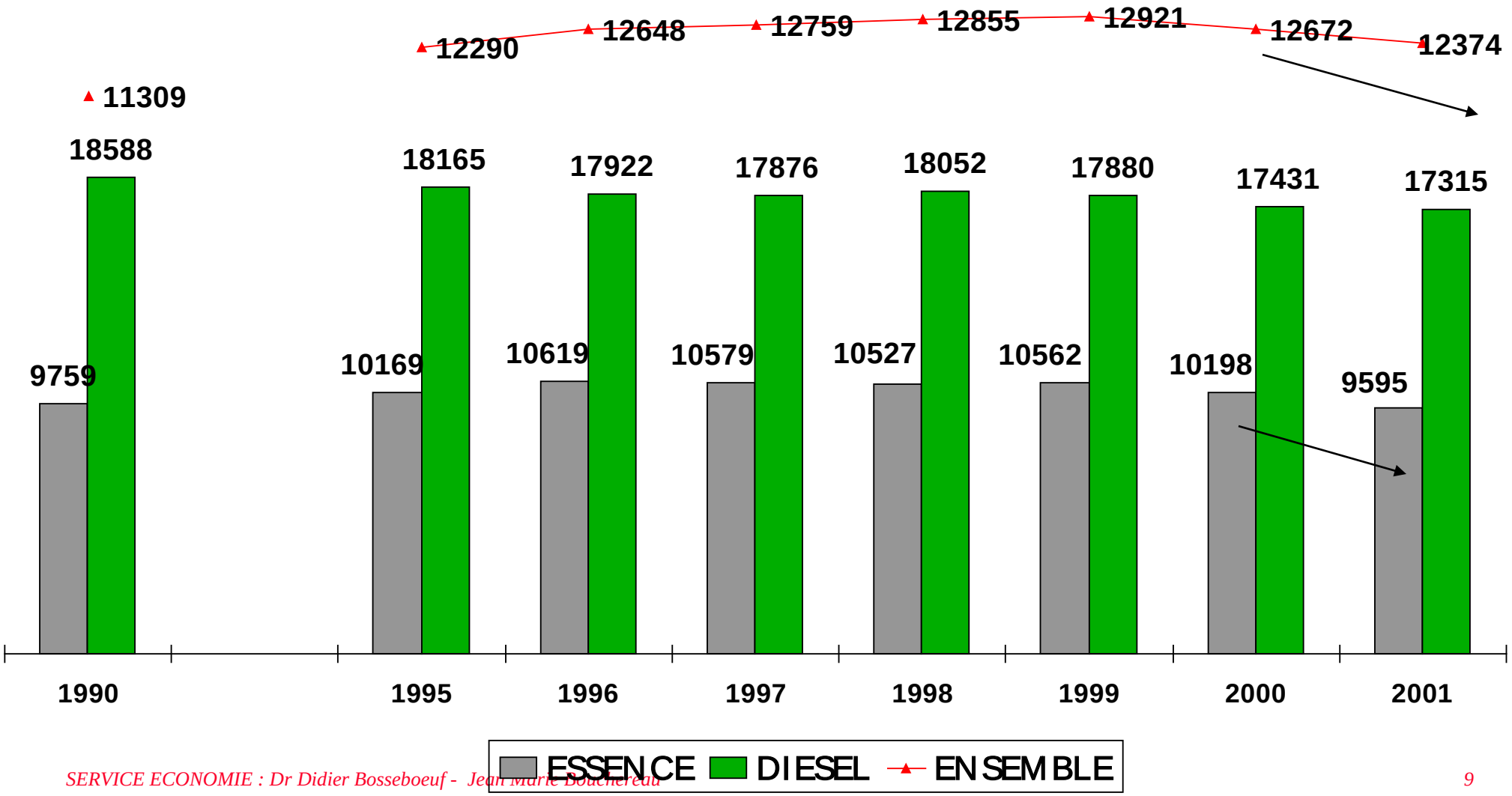
A large diversity of outputs

- Market share by fuel types; by distributors
- Stock of private cars by fuels, by vehicle/drivers, household caracteristic
- Yearly mileage per car by by fuels, by vehicle/drivers, household caracteristic, by trafic, region, monthly variation, ownership
- L/100 km per car by fuels, by vehicle/drivers/ household caracteristics, by ownership
- fuel quantity purshased(abroad 3%) , Consumer prices and household expenditure,

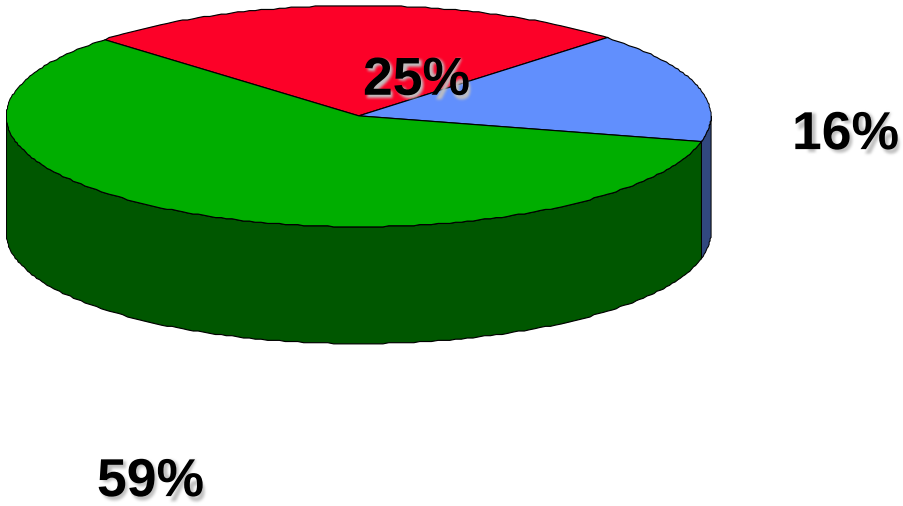
Stock of cars by vehicle age



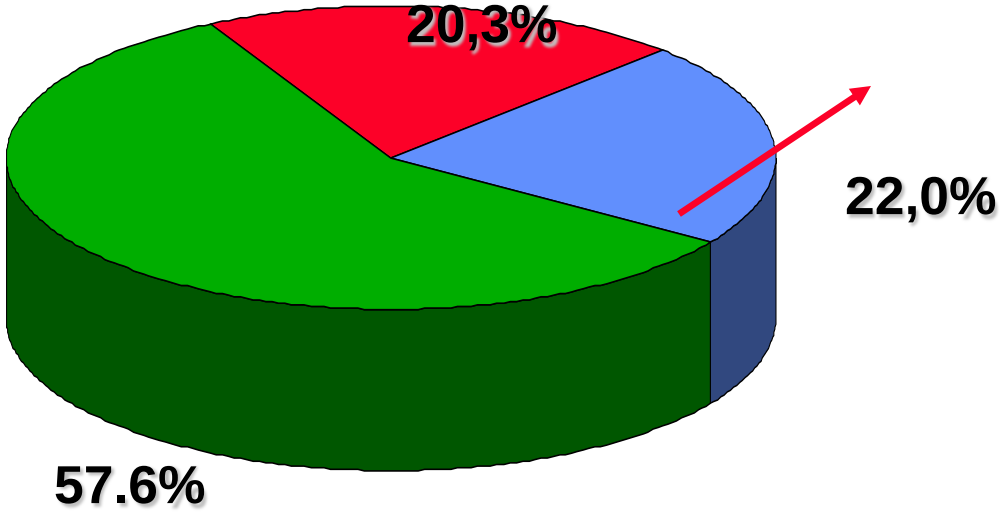
Yearly cars mileage by fuel types



Yearly car mileage by type of infrastructures: more and more highways

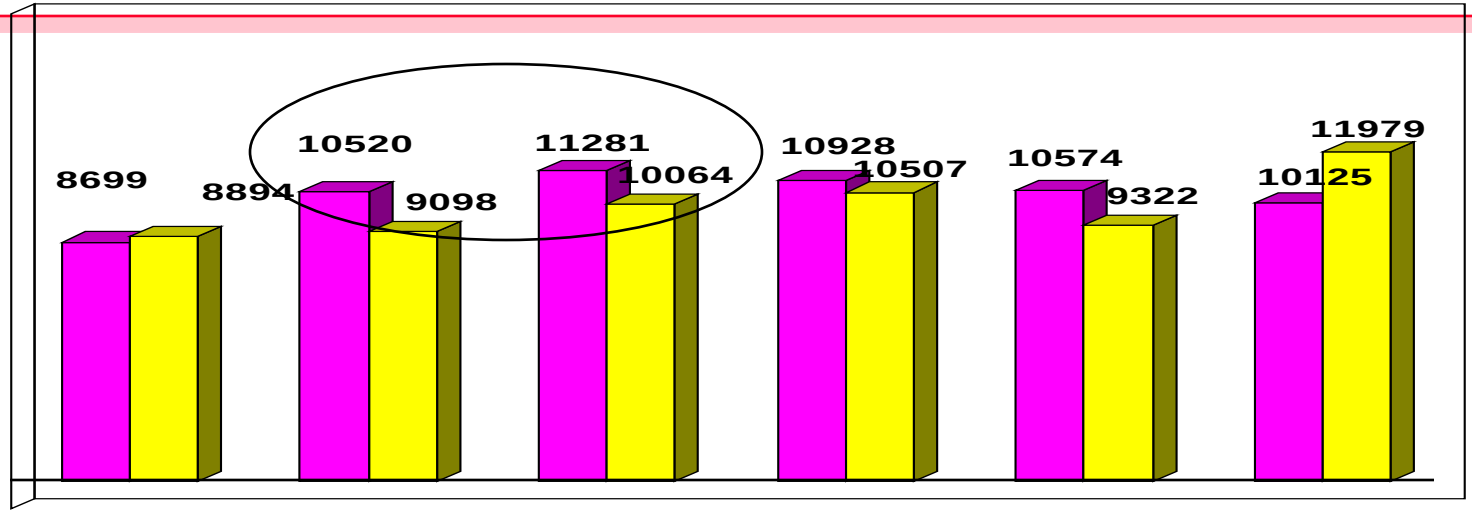


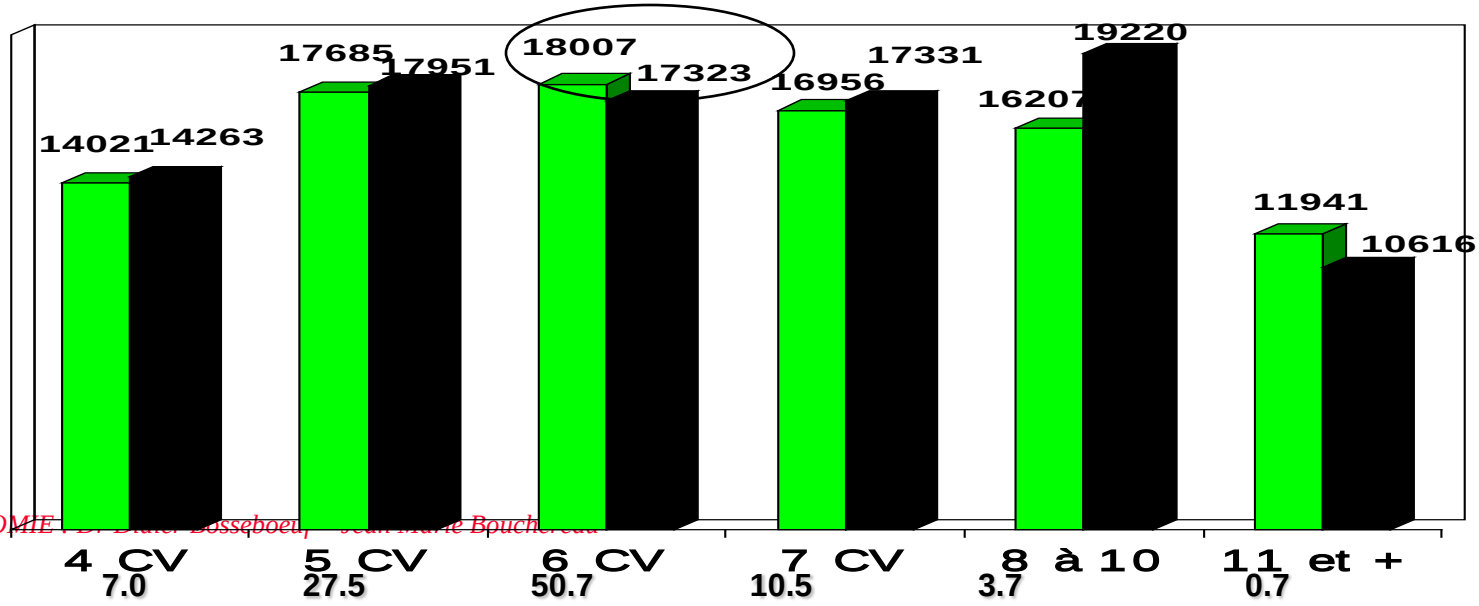
Year 1990



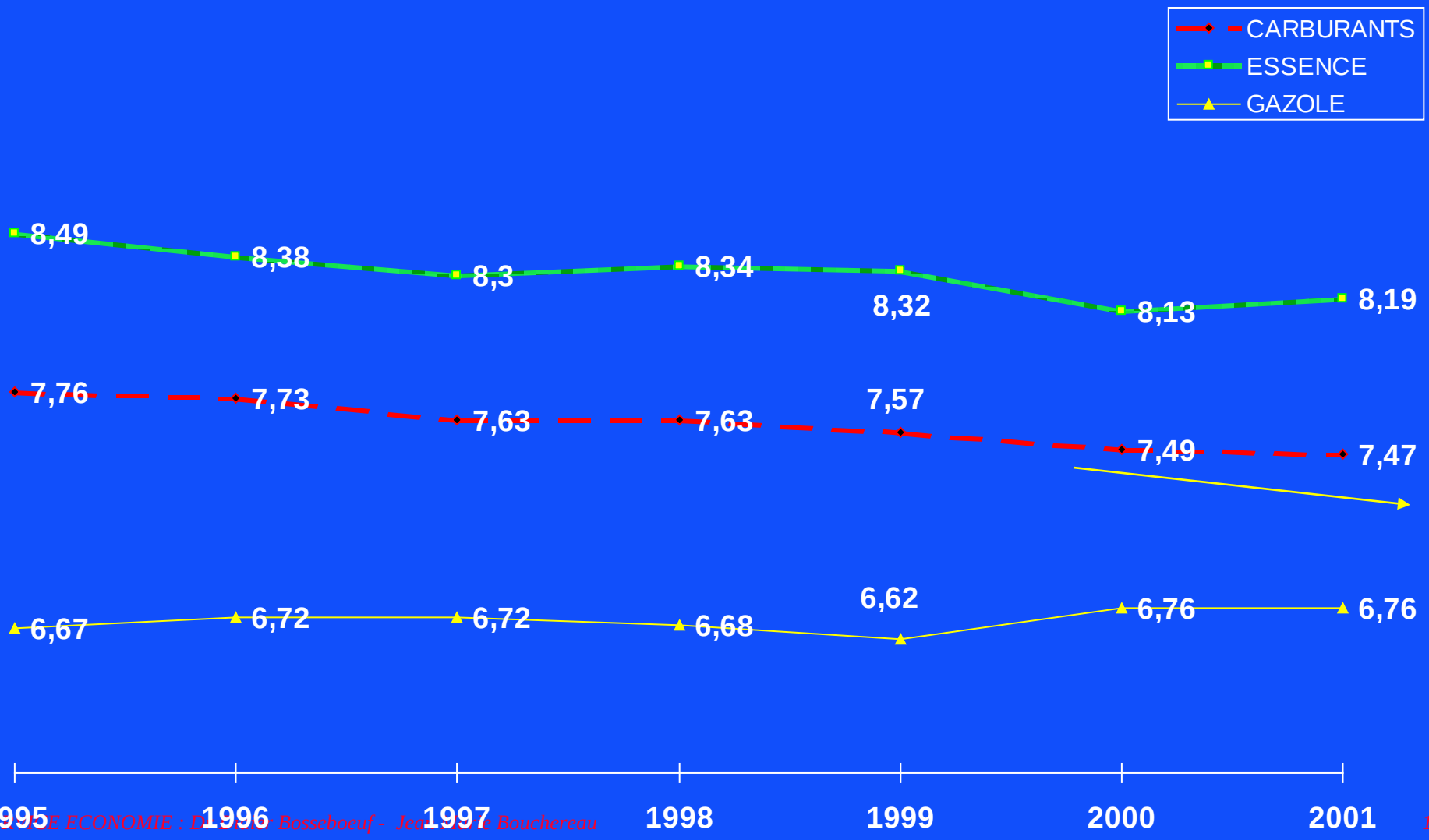
Year 2001

Mileage decrease for small cars

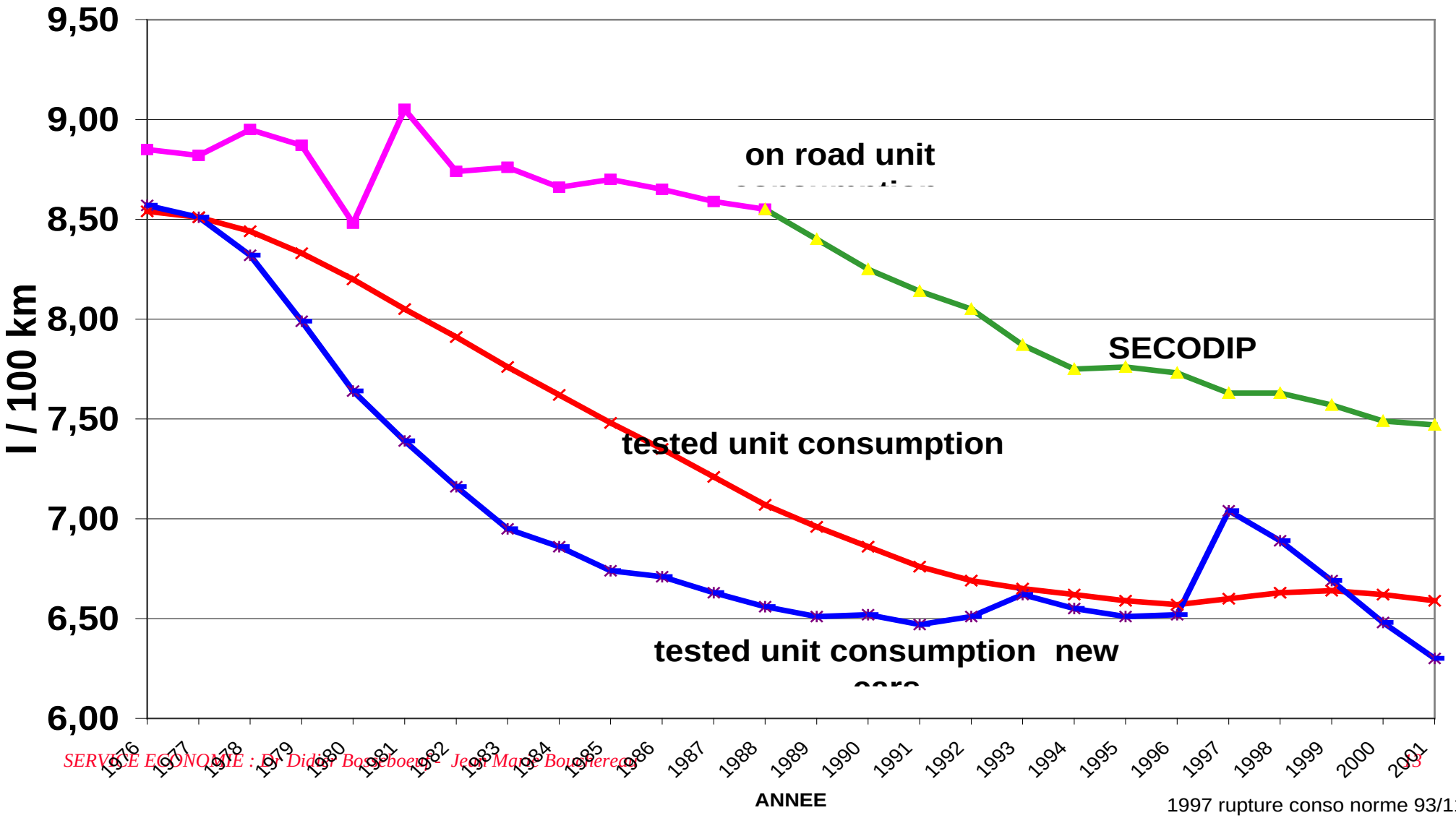




On road Specific Consumption for cars (l/100 km)

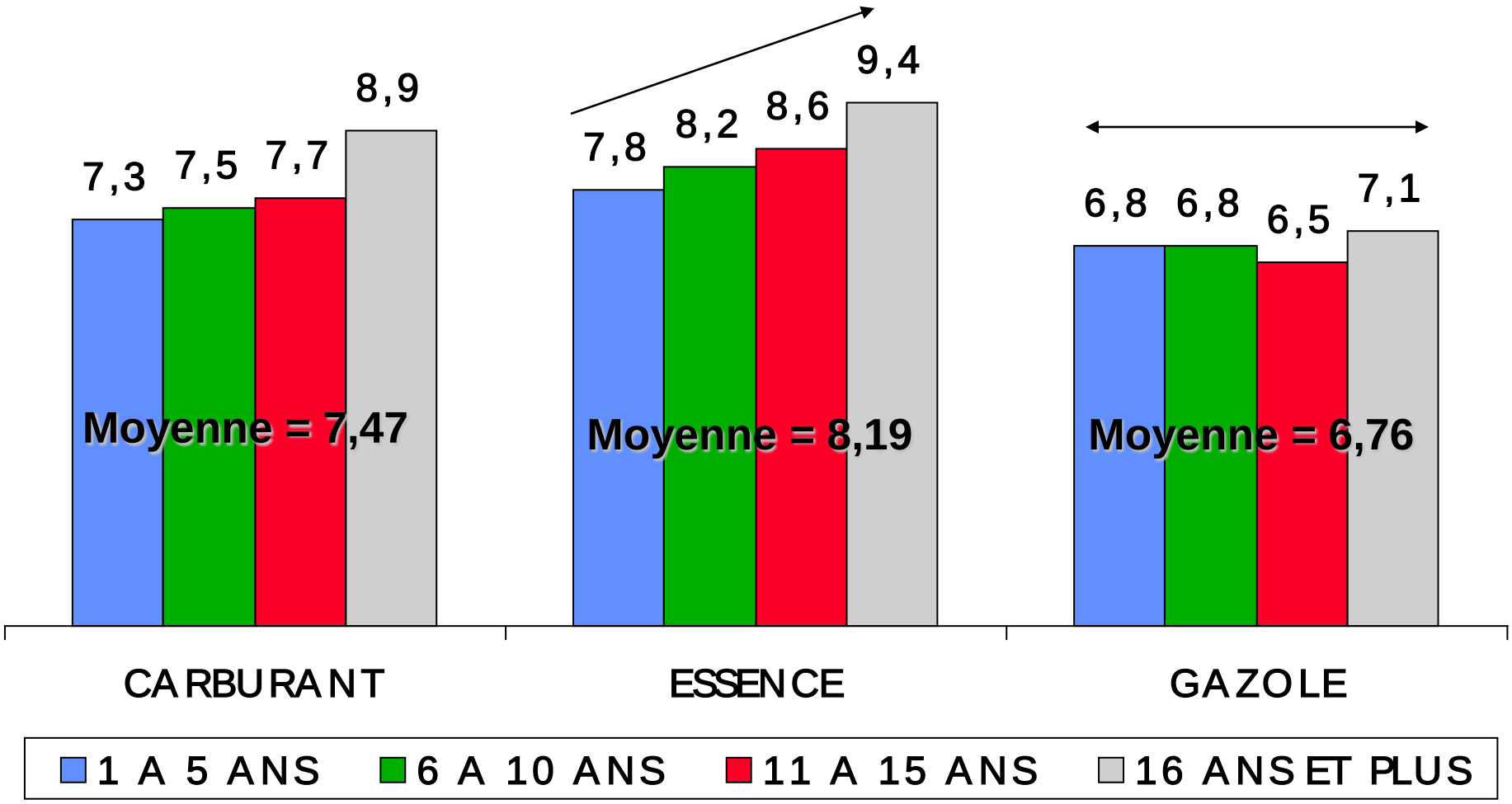


The long terme trend of improvement of the specific consumption for cars



1997 rupture conso norme 93/116

Influence of the vehicle age on the specific consumption in litres/100 km



Conclusion (1)

- Original information particularly on specific consumption on road (compared to tested consumption)
- Stock, mileage and UC are crosschecked with vehicle caracteristics and socio economic caracteristics of the household
- Ensures a coherence in terms of nomenclature of the 3 determinants of the fuel consumption
- Do not assess the overall consumption (transit professional etc.)

Conclusion (2)

Is it cost effective?

- Pragmaticaly **yes** because still the administration pays for that.
- **Yes** because its answers to various issues (traffic, energy etc)
- **Yes** if we can attrack others sponsors (car makers, insurance etc.)
- **Yes** because cost are infinitesimal compared to the energy bills

Conclusion (3)

- But is is complicated to manage
- But its understimates the role of the big runner
- But « Frenchs » like panels (84% response rate)

- Why do not start with a fuel gaz station survey as a first proxy?