

Energy efficiency in transport: successes and failures

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Carine Sebi and Bruno Lapillonne, Enerdata

About Enerdata: a global energy intelligence company

- **Independent** research company **since 1991**
- International team of **experienced** analysts & economists in
 - Global energy market analysis & modelling
 - Energy efficiency & demand
- Leveraging globally recognized **databases & forecasting models**
- Headquartered in the Grenoble (French Alps) with offices in Paris and Singapore



Source of information

- The materials gathered for the webinar relies on various projects coordinated by ADEME dealing with energy efficiency indicators and policy evaluation:
 - The European [ODYSSEE](#)/MURE energy efficiency project;
 - The World Energy Council (WEC) project on energy efficiency with a report and two data bases: [WEC Indicators database](#) and [Policies & Measures](#) database;
 - [The G20](#) project of IPEEC including also a data base on indicators and one on policy ([G20 policy database](#));
 - A review of [EE Policies in Europe](#) (EnR brochure).
- Most of these projects include all sectors and not only transport.

A-Main energy efficiency trends

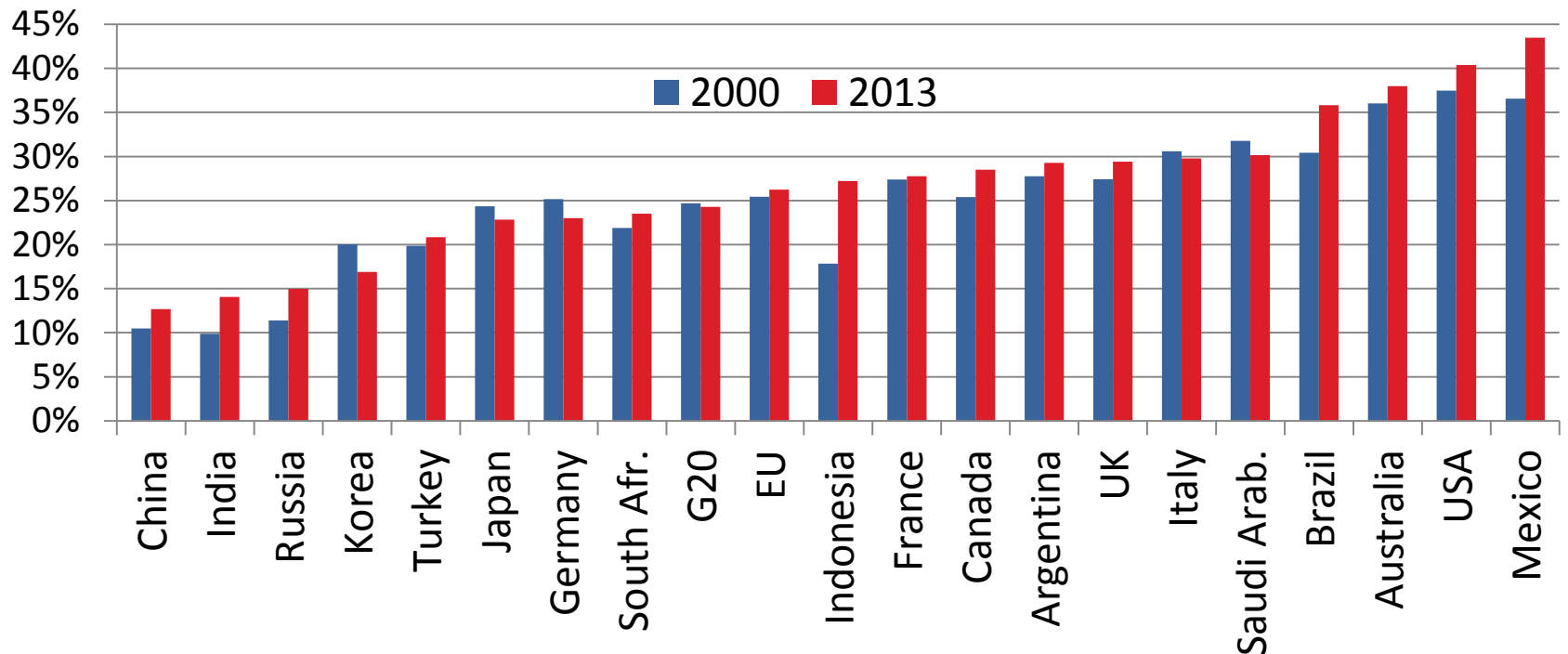
Transport : ~ ¼ of G20 energy consumption



But there exists strong discrepancies as to the importance of the sector:

- Increasing in non-OECD countries, with a low share in some emerging countries (China or India) (below 15%)
- Decreasing in some EU countries (like Germany and Italy) and in Japan or Korea
- High and increasing share in Brazil, Australia, USA and Mexico (above 35%)

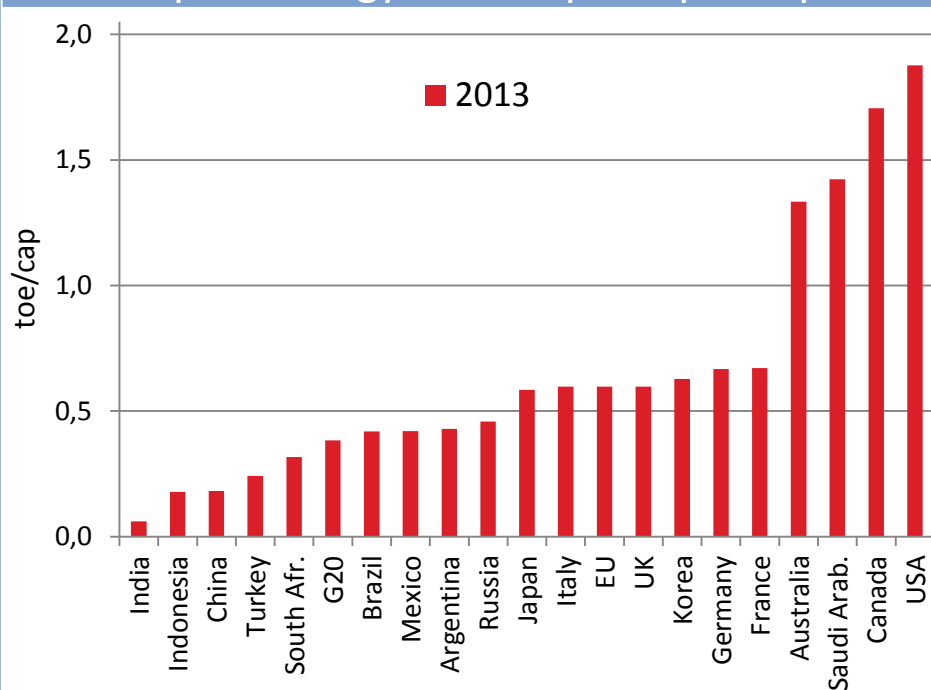
Share of transport in final energy consumption in G20



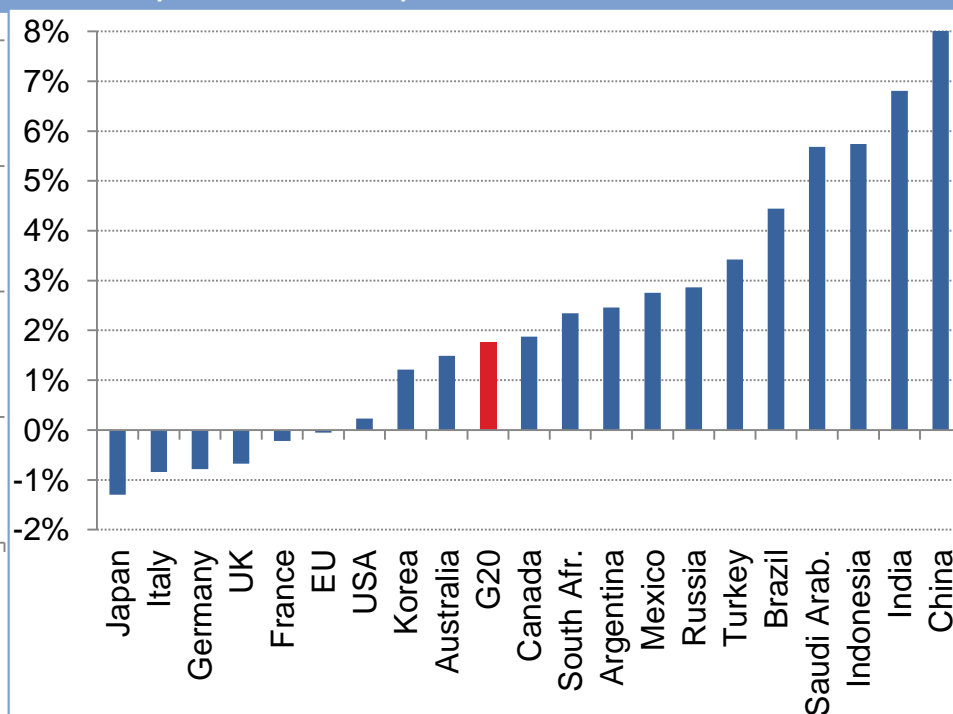
A large potential of growth

- Large disparities in transport consumption per capita among G20 implying a large potential of growth in non-OECD countries, from 0.2 to almost 2 toe/cap.
- Increasing trends in transport consumption in non-OECD countries led by higher ownership of cars and increased traffic (> 5%/year in Asia);
- Decreasing trends in EU countries, Japan, USA, partly thanks to energy efficiency improvements

Transport energy consumption per capita

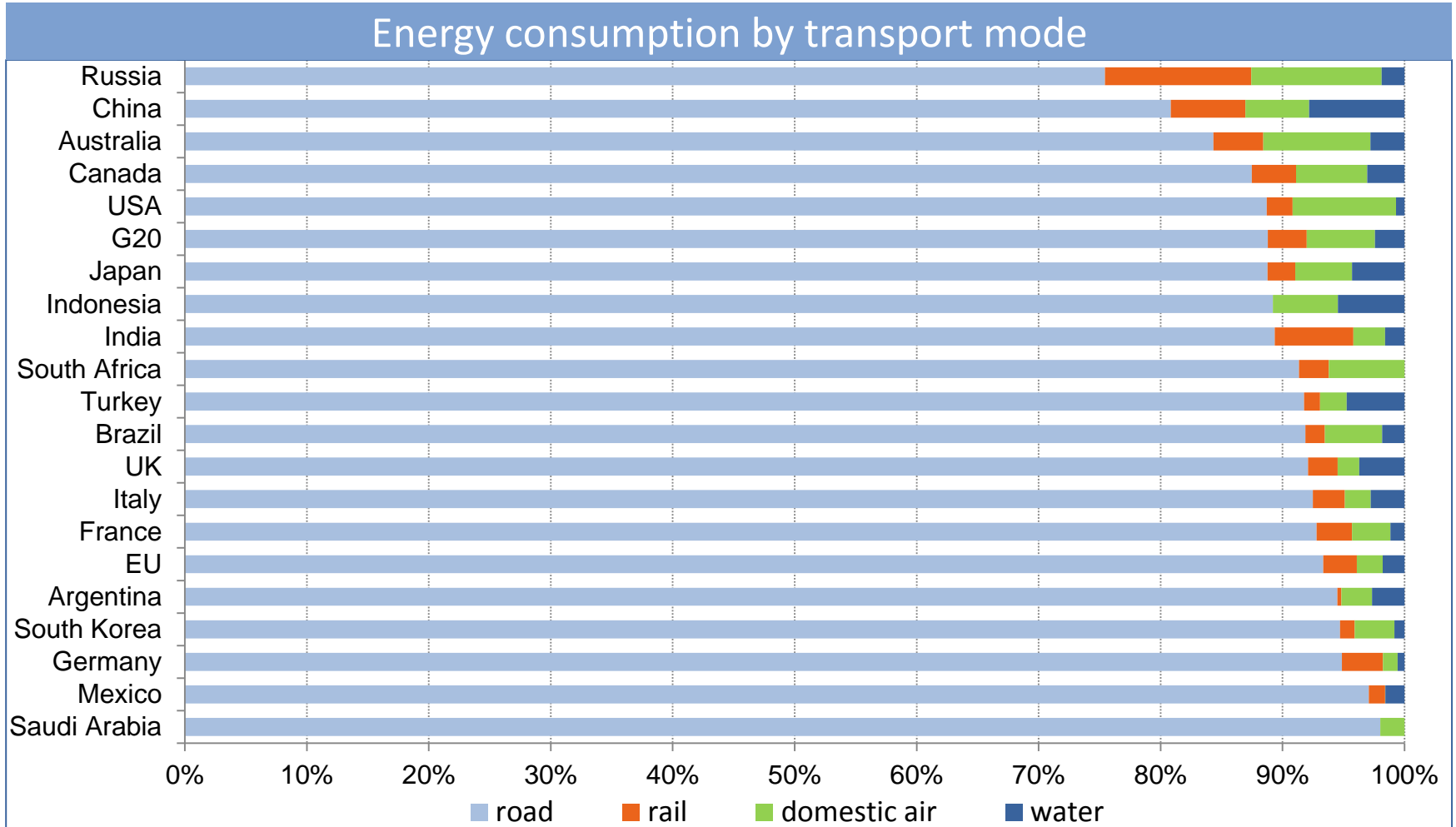


Transport consumption trend over 2000-2013



Road is predominant in all countries

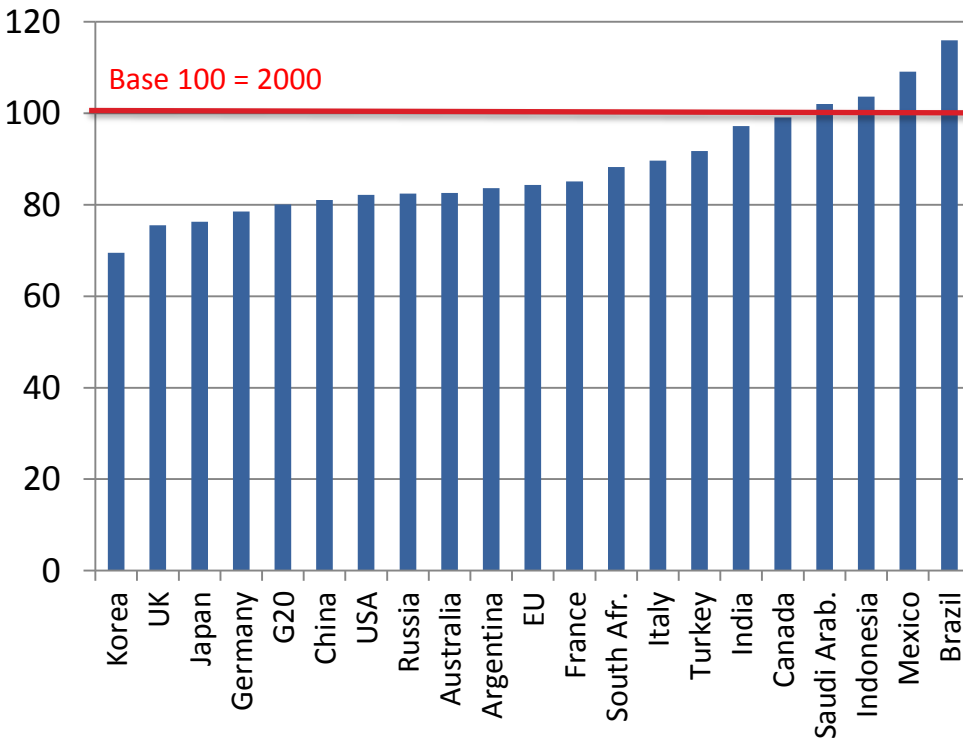
~ 90% of total consumption in G-20. Rail transport is quite important in Russia (12%), China and India (6% each).



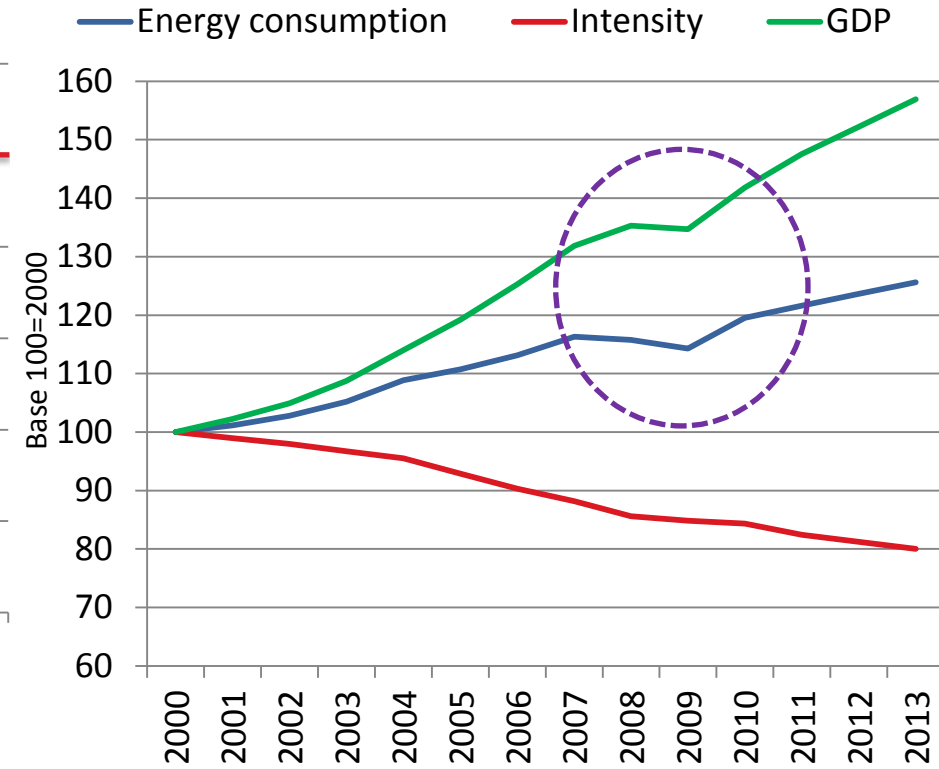
Transport consumption is decoupled from economic growth

- In most countries (except Mexico, Brazil and Indonesia), economic growth requires less and less energy consumption in transport → transport intensity is decreasing
- Different level of transport intensities: a factor at ppp 4 between India and Canada.

Transport intensity trends (2013 with 2000= 100)



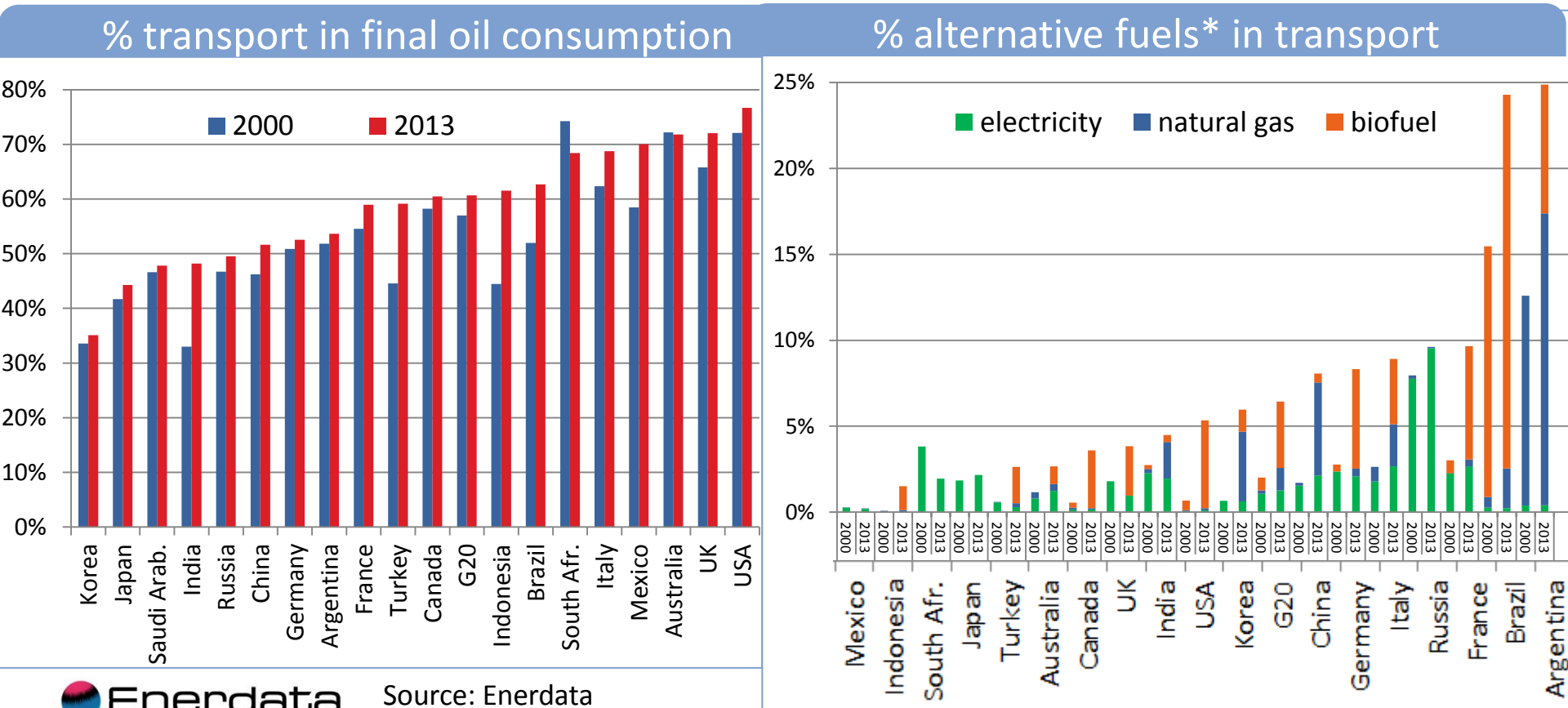
Energy consumption, intensity transport, GDP (G20)



A strong relation with oil



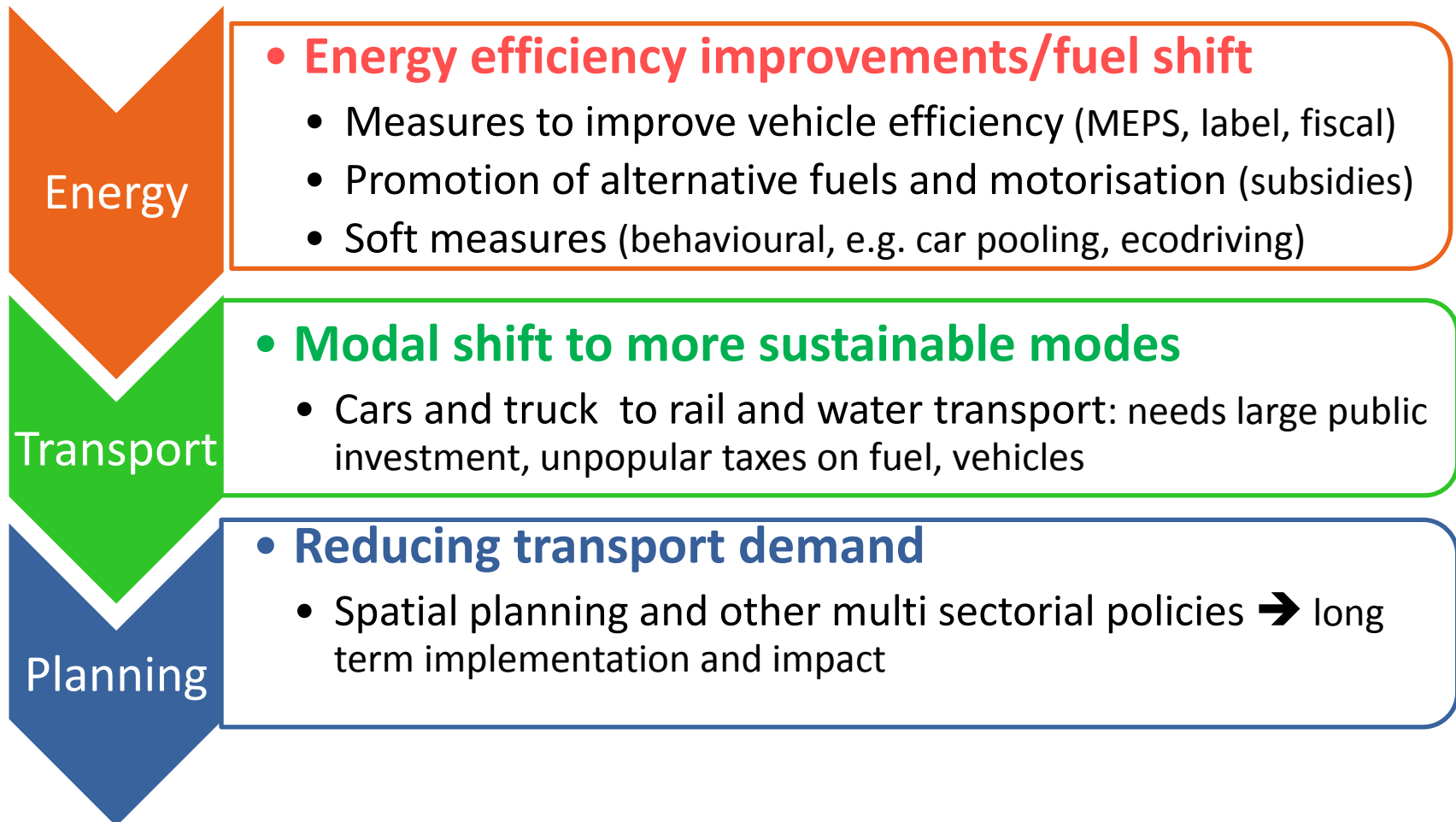
- Increasing share of transport in total oil consumption → increasing influence (and dependence) of the sector on international oil market and price
- Despite a general progression of alternative fuels (biofuels and natural gas), the dependence of the sector on oil is still above 90% at G20 level.
- However there is a strong progression of these alternative fuels



B-Energy efficiency policies and their impacts

- ▶ **1. Energy efficiency policies**
- 2. Energy efficiency improvements:
 - Cars
 - Transports of goods
- 3. Modal shift

Large scope of policies needed: from energy efficiency policies to broader policies (transport, planning)



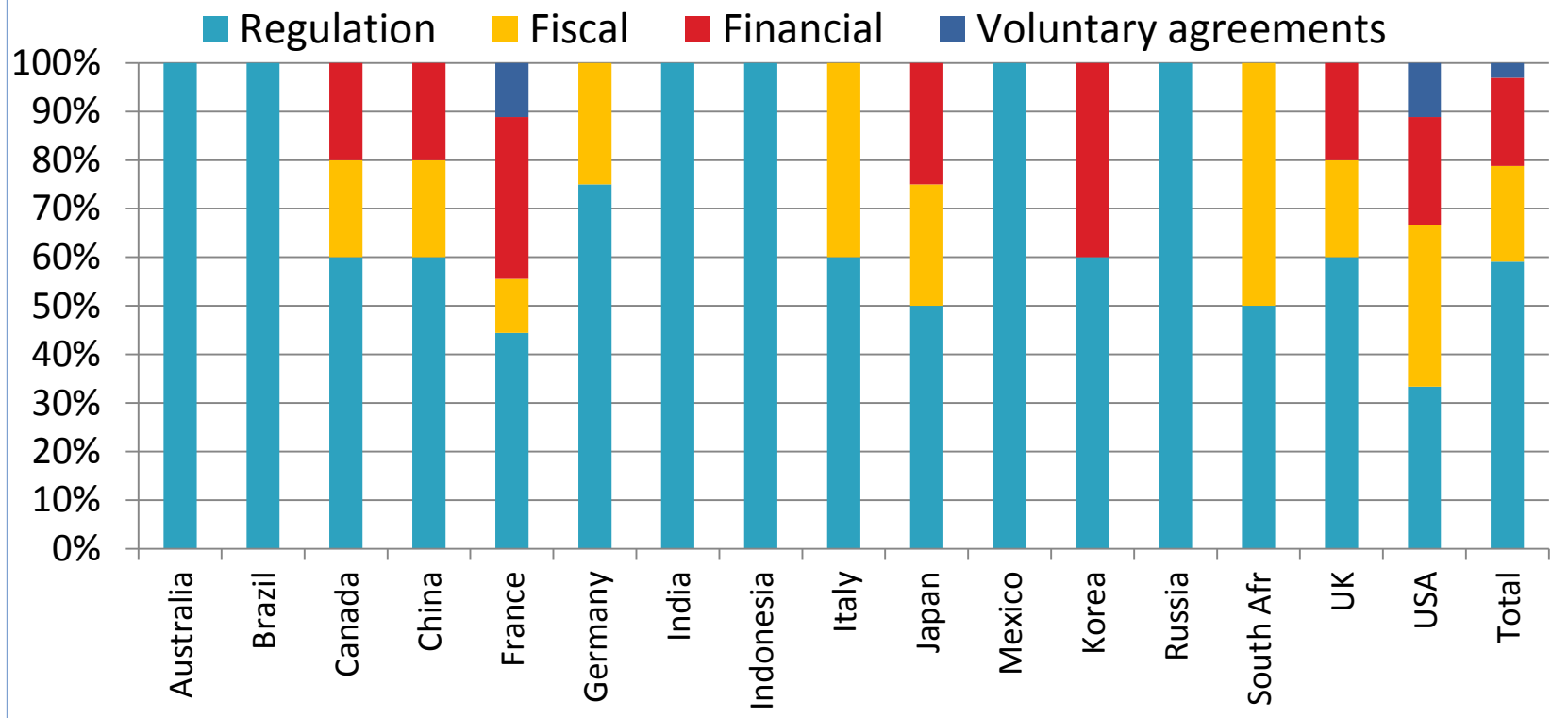
Dominance of measures on energy efficiency improvements, especially regulations

Regulations (e.g. labels and MEPS for cars) are largely dominant.

Financial and fiscal measures represent each on average 20%.

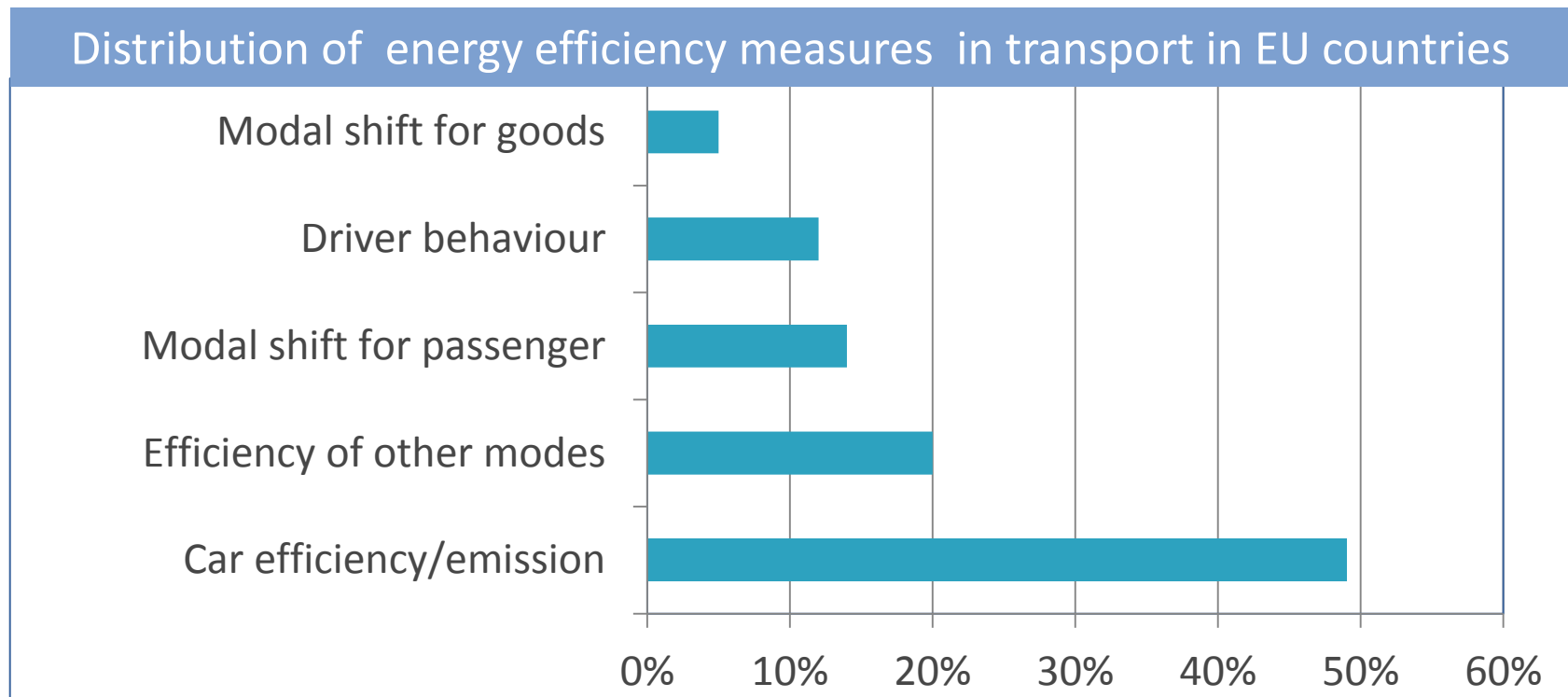
Are not included here fuel pricing and taxation: a prerequisite for the success of any energy efficiency policy in transport.

Distribution of transport measures by type in selected G20 countries



In EU countries, around half of measures targeted to increasing energy efficiency of cars

- Around 15% of measures are targeting modal shift to public transport;
- Few measures for the transport of goods ;



1. Energy efficiency policies

2. Energy efficiency improvements:

- **Cars**
- Transports of goods

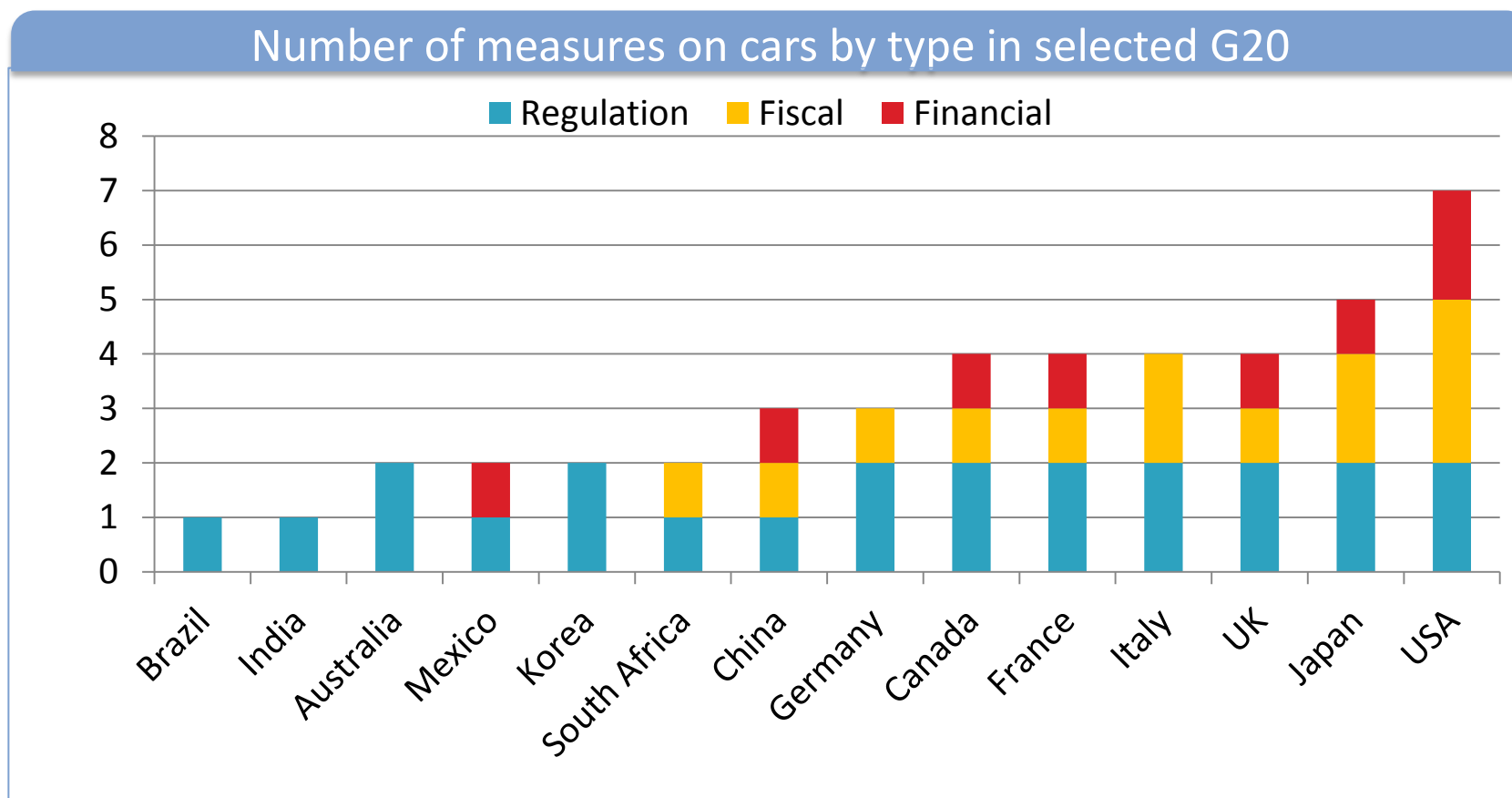
3. Modal shift

Measures aiming at improving energy efficiency of cars

- A combination of measures increasingly conceived as **packages**
- **Labelling**: i.e. information on energy efficiency/CO₂ emissions of new vehicles; comparative/absolute labels with band (e.g. A, B) and/or values, spreading in larger number of countries around the world
- **MEPS** (Minimum Energy Performance standards) or CO₂ emissions limits to ban inefficient vehicles.
- **Subsidies** for alternative motors (mainly hybrid and electric vehicles)

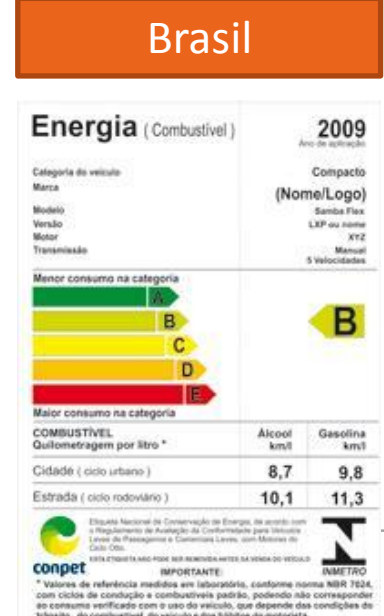
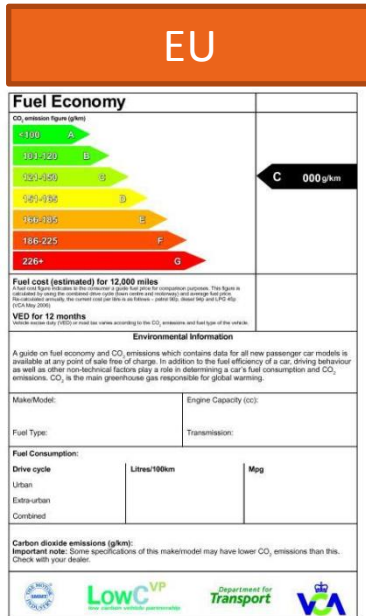
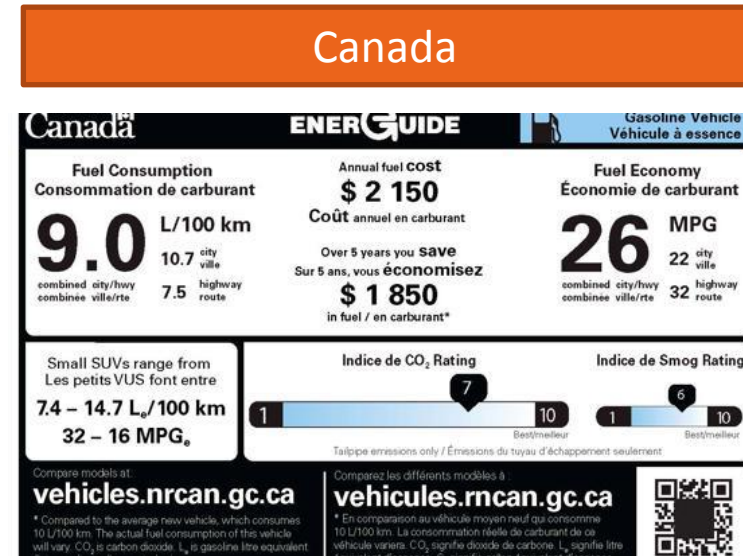
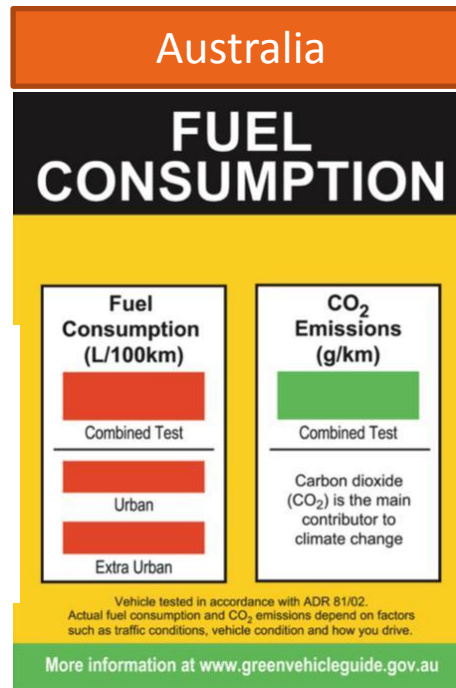
Predominance of MEPS & labels

Regulations on labeling or efficiency/CO2 standards are the dominant measures followed by fiscal measures (tax).



Example of energy labels for cars

Increasing awareness about vehicle energy performance and allowing comparison across models



New developments of cars regulations

- Energy/CO₂ labelling
 - Extension to vans (e.g. Denmark and planned in France)
 - Extension to used cars (e.g. voluntary in UK, Finland)
 - Extension to car components (e.g. tyre in EU from 2012)
 - Labelling in monetary unit (e.g. UK, New Zealand)
- Other regulations:
 - Extension of MEPS to other vehicles than cars (e.g. vans in EU from 2017 or heavy duty vehicles in Canada, China, Japan and USA)
 - Mandatory gear shift indicators, tyre pressure monitoring-TPMS (e.g. EU, USA, Korea, Russia in 2016)

Financial and fiscal incentives boost the car market

- Fiscal incentives have become frequent after 2000 to promote purchase of efficient cars and discourage acquisition of cars with low fuel efficiency:
 - Higher tax for the purchase of fuel-inefficient vehicles applied at purchase in many countries ;
 - Combined tax and subsidy scheme (“bonus/malus” in France) : significant impact of the measure in 2008 and 2012
 - Most EU countries applies a reduction of annual registration tax based on CO2 emission of the car
 - Registration tax exemption applied for electric cars during 5 years in Italy
 - New cars with extra emission over 120gCO₂/km are taxed at a rate of US\$9 per extra g/km (South Africa, since 2010)
- Many countries have implemented subsidy scheme for electric and hybrid cars or even efficient cars (Japan, China, UK)
- Scrappage schemes (grants offered to owners of old cars that buy new efficient ones) also accelerate efficient car market but only temporally

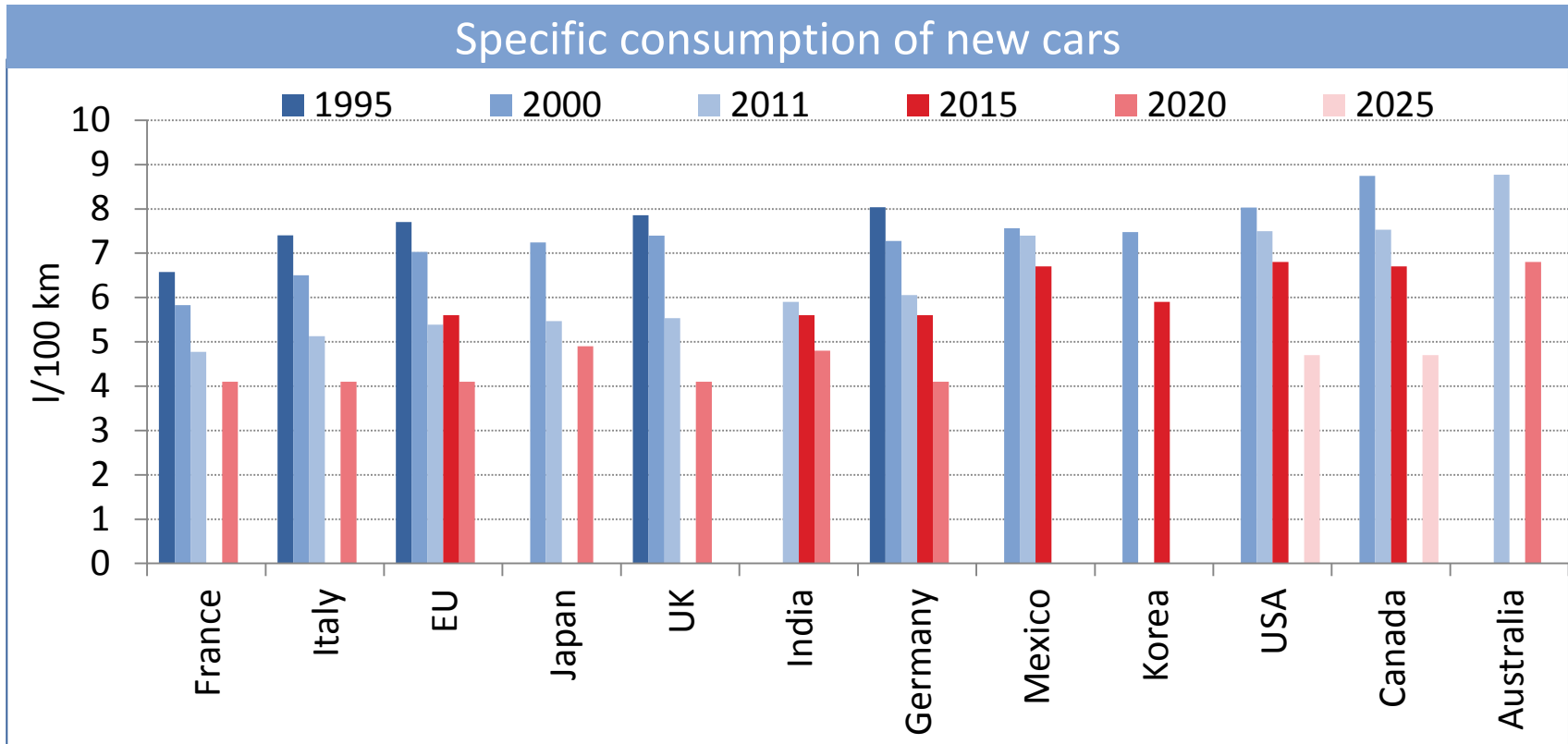
Effect of Bonus Malus program - Evolution of CO2 emissions (in gCO2/km) of the new cars between 2003 – 2013



Source: MEDDE

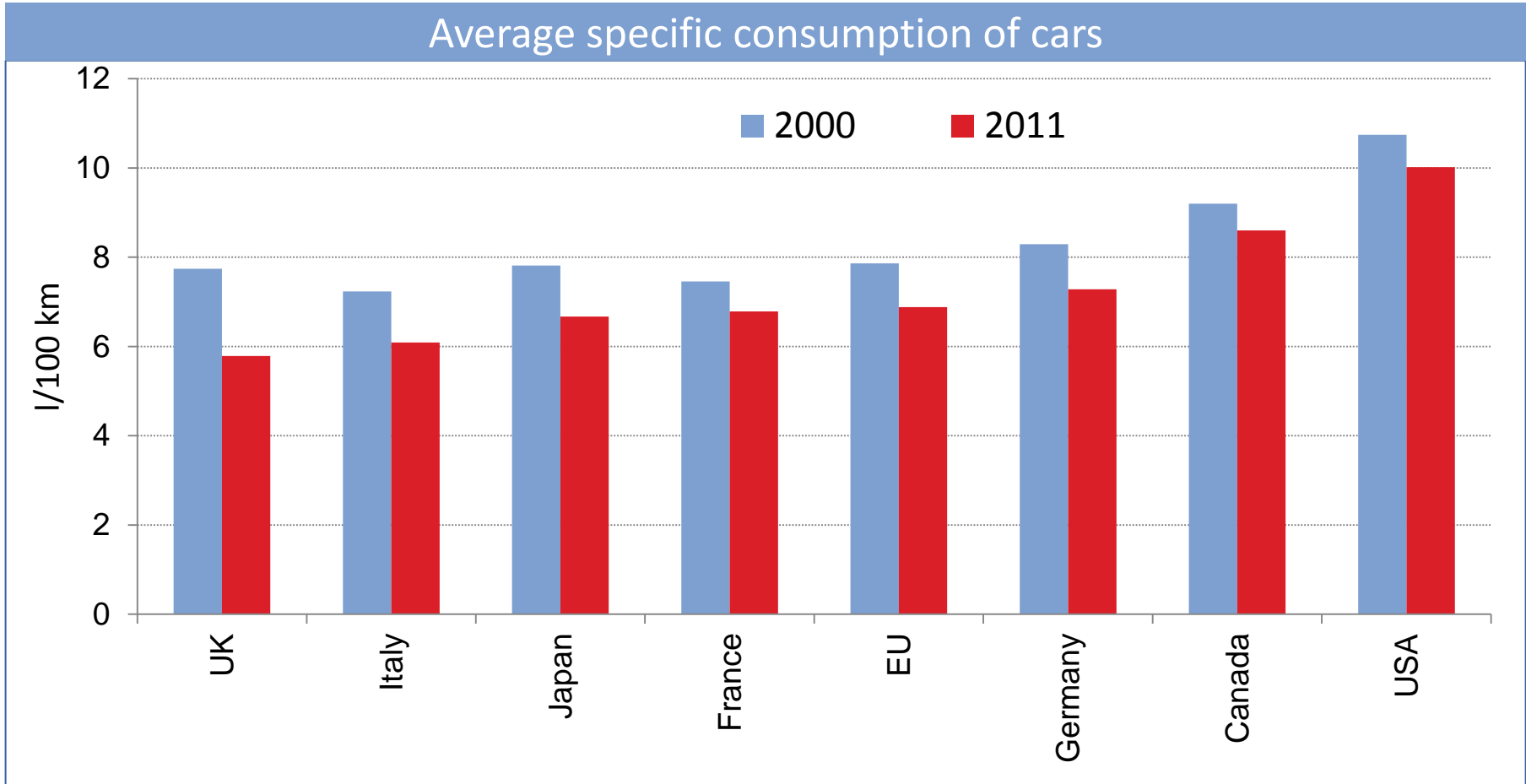
Positive impact of standards and incentives on new cars...

There is a rapid decrease of the specific consumption of new cars in most G20 countries due to efficiency/emission standards for new cars, as well as tax incentives. This trend will continue in the next decade given the existing and planned standards.



Source: ODYSSEE, EU Commission, IEA; targets from ICCT global vehicle standards 2014

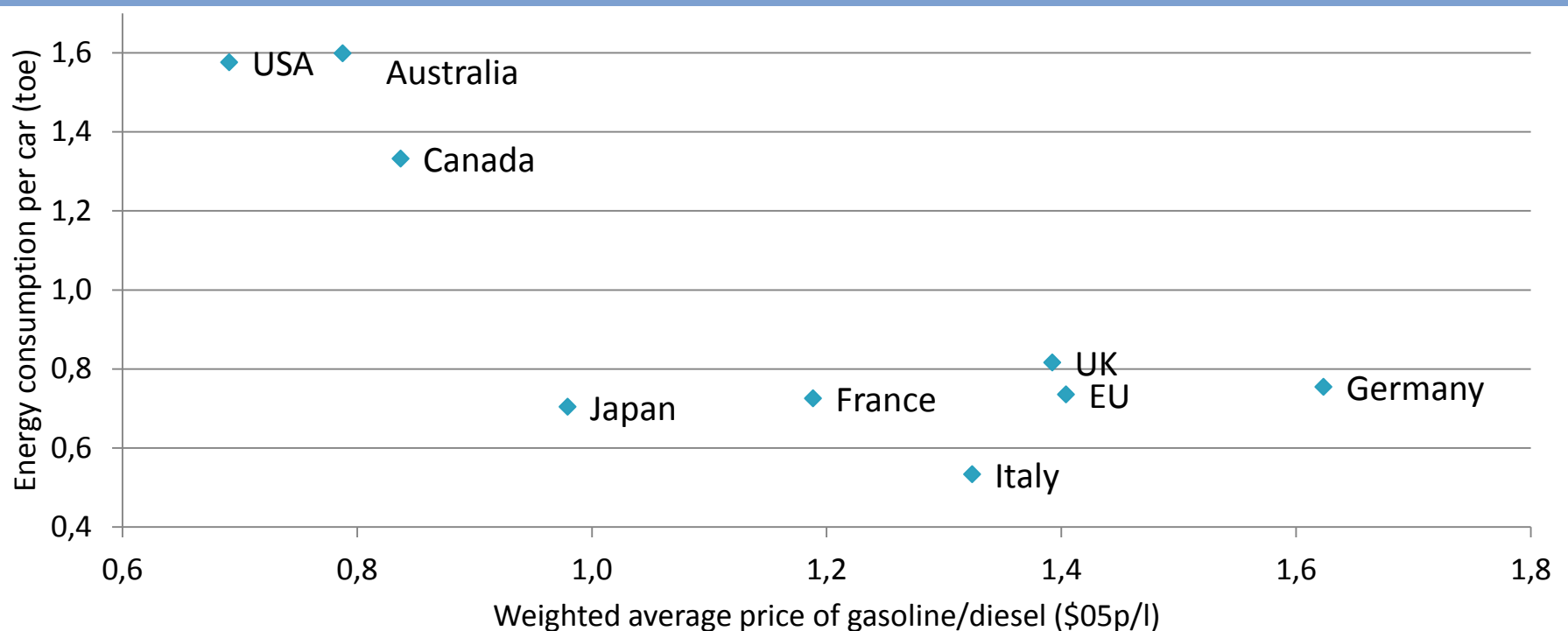
...And on the car stock: decrease of the average specific consumption of the car stock (l/100km)



In addition to regulation and taxes on vehicles, the energy consumption of cars is also driven by prices

Obvious negative correlation between energy prices and average consumption per car: higher fuel prices imply more energy efficient cars and lower distance travelled per car. In EU has significantly higher prices than in other countries and the lowest energy consumption per car.

Energy consumption per car and fuel prices (2010)



1. Energy efficiency policies

2. Energy efficiency improvements:

- Cars
- **Transports of goods**

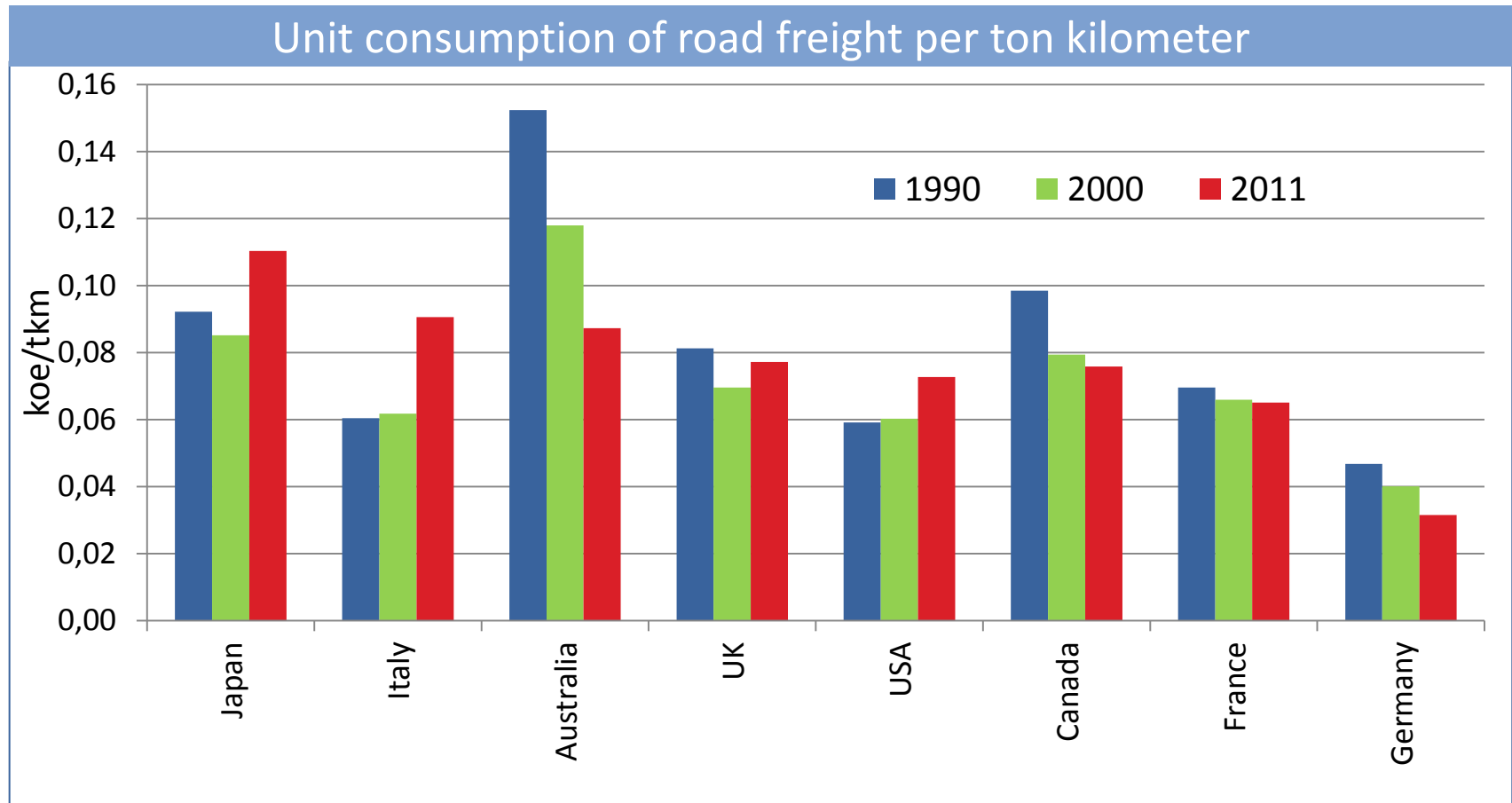
3. Modal shift

Regulation aiming at improving energy efficiency of transport companies



- Mandatory energy managers, audits, energy saving plan
- Mandatory eco-driving training, awareness campaign (USA, Canada, Japan, Korea, Germany, France and UK)
- Energy efficiency obligations for oil companies (e.g. France)
- Voluntary agreements with transport companies: programs towards optimisation of supply chains and carry-more approaches (France charter “Target CO2 Carrier undertake”, 2008)
- Tolls for trucks function of the efficiency /emissions of vehicles (e.g. Germany, Switzerland, Latvia or Poland)
- Increasing fleet efficiency by increasing the authorized capacity and size of trucks and optimised routing-USA, Canada and Australia have (which are more than 25 meters and carry 60 tons at a time)

There is decreasing trends in unit consumption of road freight in most countries: freight transport by road is becoming more efficient thanks to more efficient vehicles and a better vehicle fleet management (increased load factors). There has been recently a reverse trend in some EU countries such as UK and Italy or in USA since 2007 because of the economic recession.



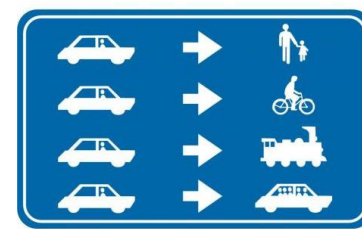
1. Energy efficiency policies

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▶ **3. Modal shift**

Modal shift to more efficient modes



- Many countries aim at shifting part of the passenger traffic from cars to public transport, such as development of urban rail transport (metro, tram, etc.), rapid bus systems, or high speed trains.
- They also implement measures to shift part of the freight traffic from trucks to rail and water transport through the development of infrastructures for combined rail/road or water/road transport (e.g. Germany, France, Italy) but there exist strong barriers not allowing this change to happen easily.

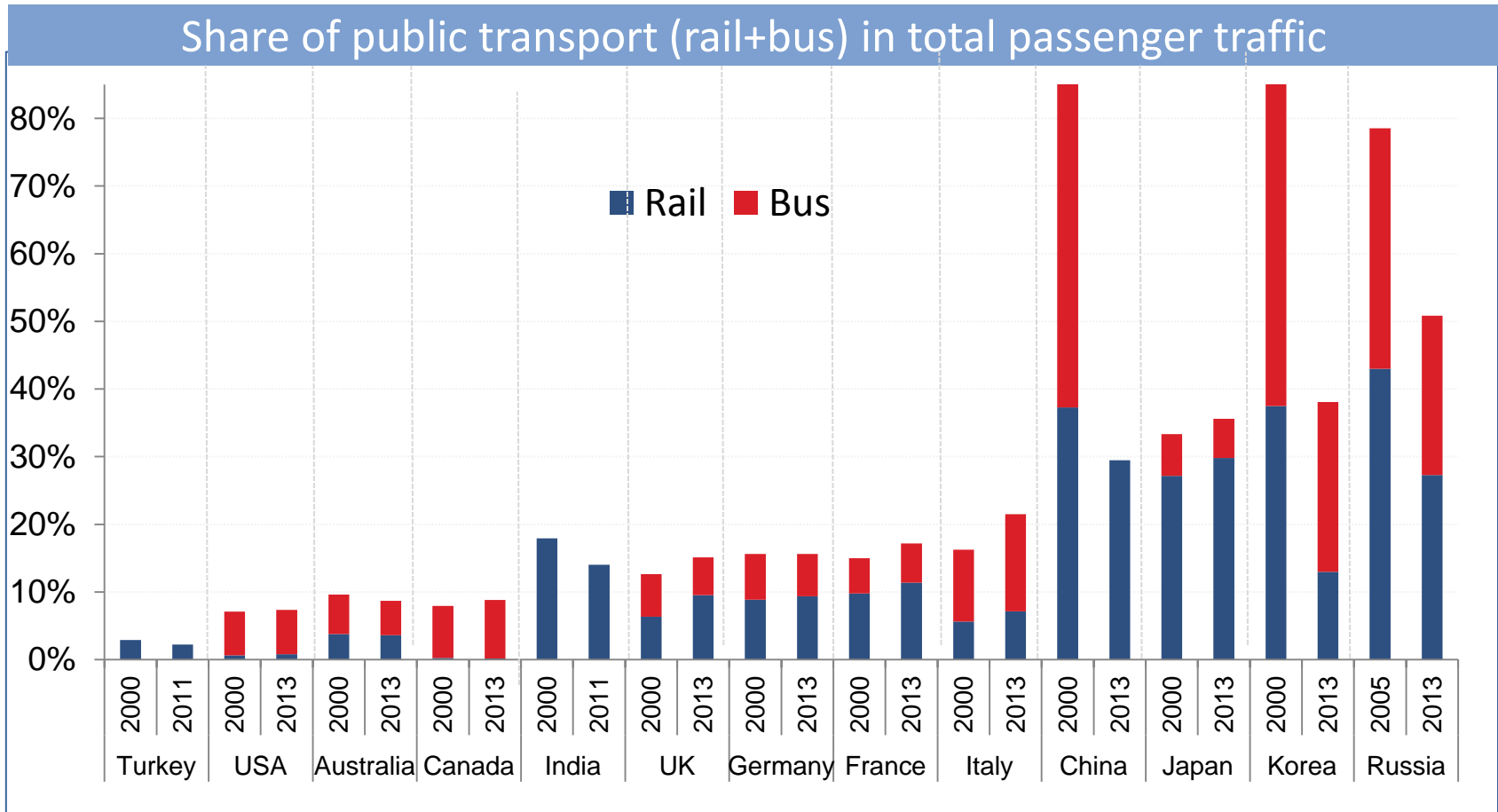
Measures to promote modal shift?

- Limit the use of cars and/or private car ownership:
 - Limit cars use (e.g. fees to enter the city center (e.g. London); disincentives to cars (e.g. restricting parking, bus lanes, parking charges);
 - Incentives to car pooling and car sharing (still limited but encouraging impact)
 - Limiting car ownership (e.g. in in Beijing city in China with the License Plate Lottery System of very high tax in Denmark)

- Incentives to water and rail transport for the transport of goods:
 - Toll system for trucks (tax on per km driven) (e.g. Germany, Switzerland, Latvia or Poland);
 - Incentives to companies to use railways instead of road (eg Australia);

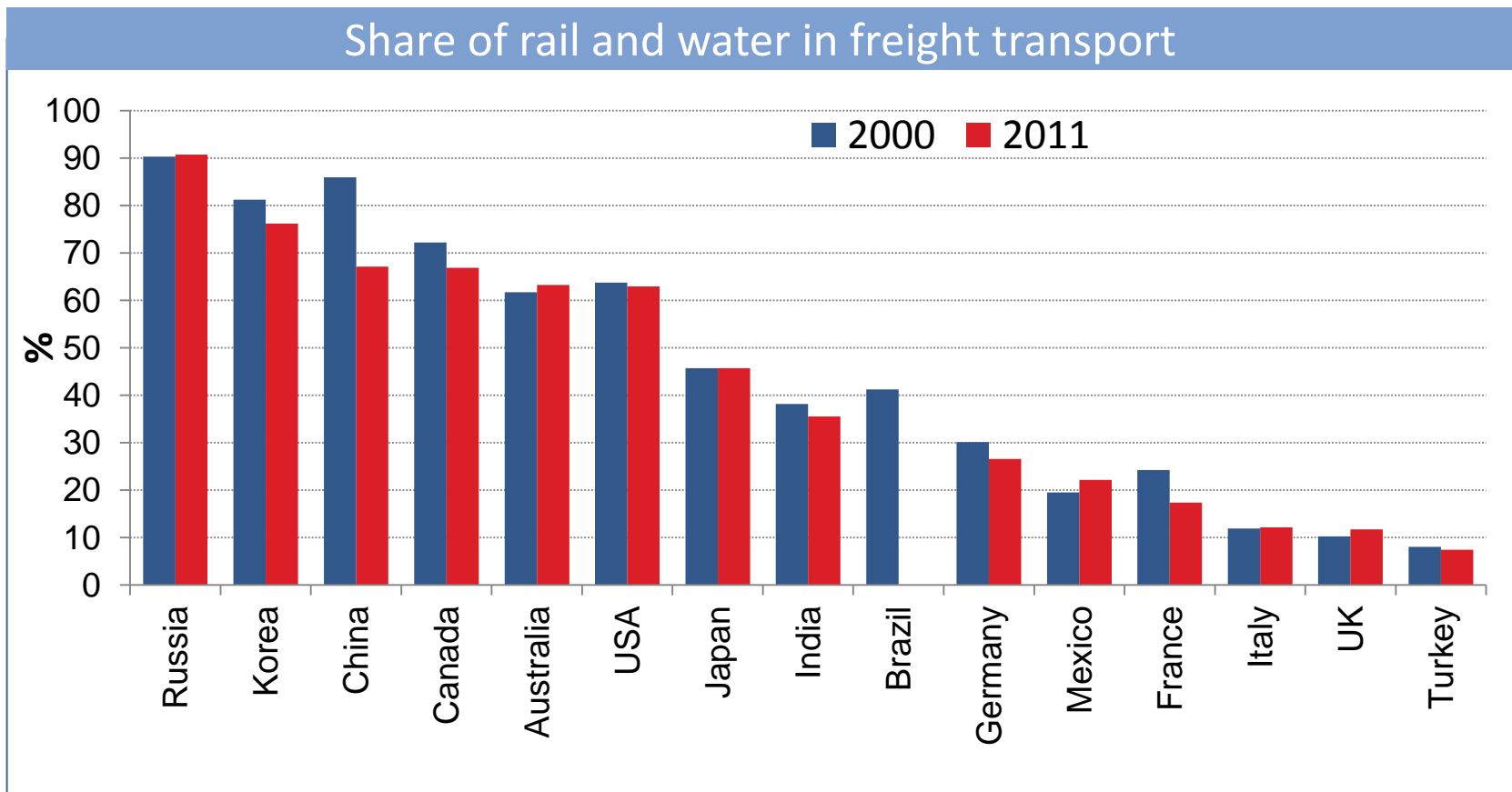
- Expansion/improvement of rail network (e.g. development of high speed trains to substitute air transport); however some countries still have limited railway transportation given their size (Brazil, Australia).

- Limited impact so far of modal shift for passengers : positive trend in Italy, France, Japan, Canada or UK but still the share of public transport remains low.
- However, decreasing share of public transport in passenger traffic in most countries.



As for passenger traffic there is a decreasing share of rail and water traffic in most countries

The traffic of goods by rail or water transport represent more than 60% of total freight traffic in Russia, Korea, Canada, USA and Australia: this is due to the size of the countries and the nature of goods (e.g. coal in Russia, India or China).



Conclusions

Successes and failures

Successes

Decreasing energy consumption trend in most OECD explained by energy efficiency, lower distance travelled and lower activity.

The penetration of alternative fuels to oil is increasing

Strong and regular progression of cars' efficiency (as a result of regulations and taxes)

Measures have mainly focused on improving the efficiency vehicles.

Failures

Increasing trend in non-OECD fueled by the economic growth , in particular the increase in car ownership

Still a strong relation to oil in transport consumption; electrification of transport is still a myth (less than 2% in 2012)

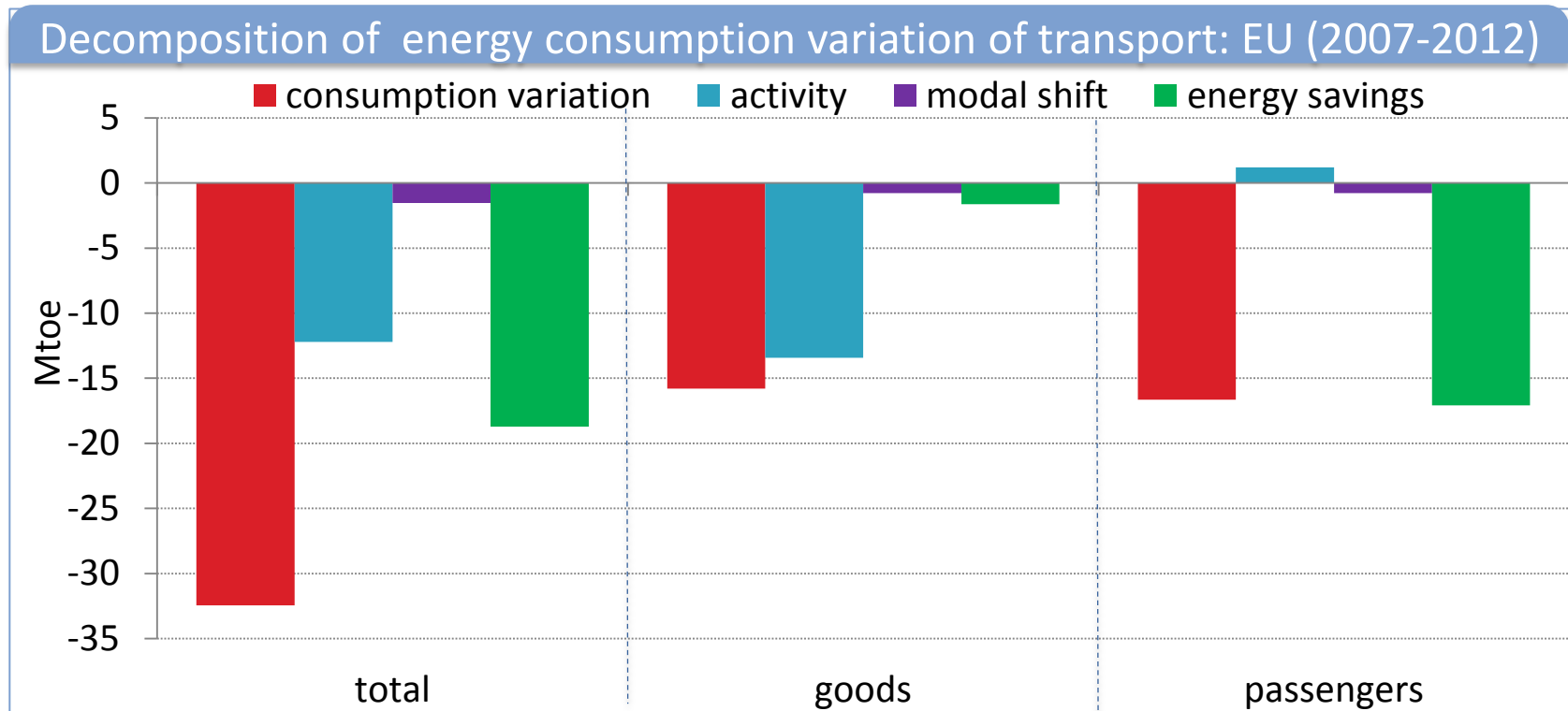
Less progress for other vehicles

Reducing the share of road transport is still far ahead for both passenger and freight: it is only visible in a few countries.

Few measures for reducing demand transport.

60% of the decreasing consumption in EU countries due to energy efficiency ?

- Decreasing consumption of transport since 2007 by more than 30 Mtoe at EU level
- Around 40% of that reduction is due to the economic recession, with a decrease in freight traffic and the stability of passenger traffic, and almost 60% to energy savings, mostly for passenger cars.
- Almost no efficiency improvements for road freight transport since 2007, because of the reduction in traffic and the increase in empty running.





Thank you for your attention !



www.enerdata.net

Contact:

Carine Sebi

Carine.sebi@enerdata.net

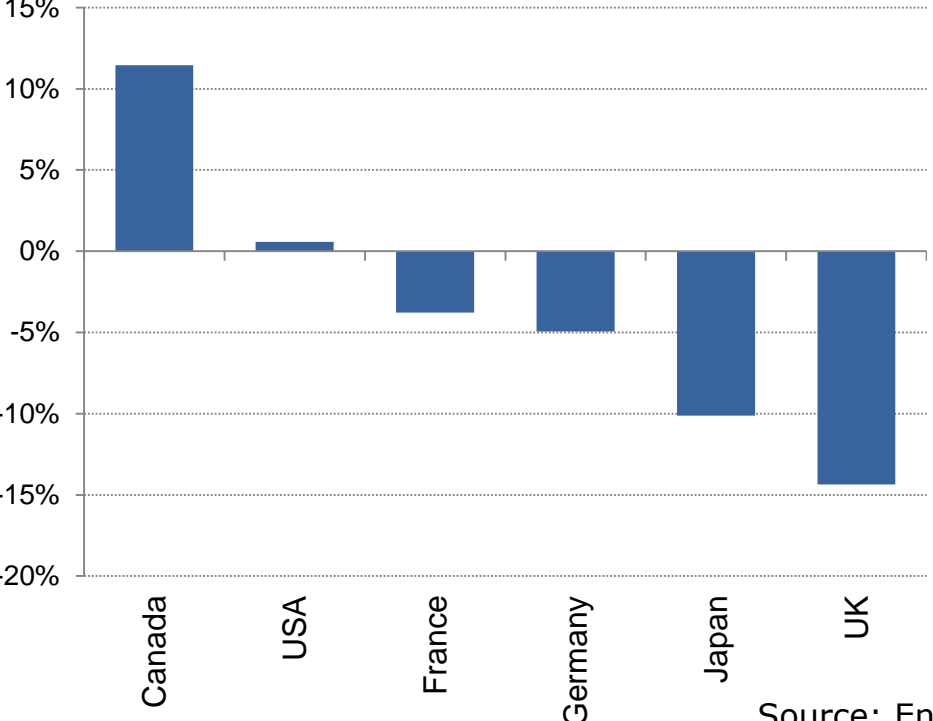
Bruno Lapillonne

Bruno.lapillonne@enerdata.net

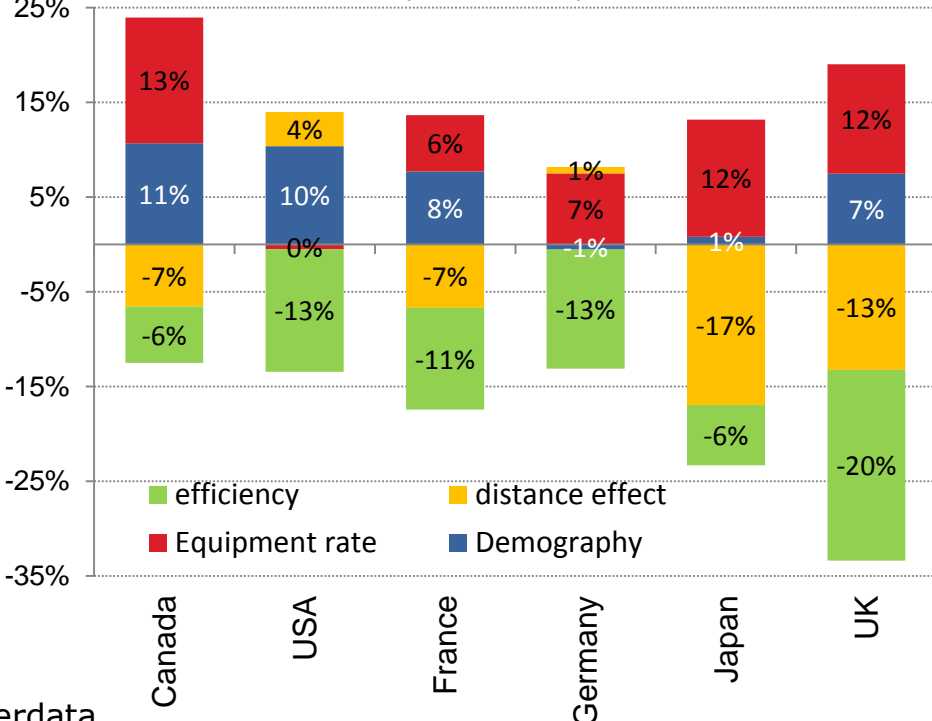
How to explain the decrease in the energy consumption of cars

- Cars represent around half of transport consumption in OECD countries;
- In most OECD countries (except Canada), the energy consumption of cars is decreasing despite the increase in the number of cars (demography and equipment effect)
- Such a trend is driven by energy efficiency and a decrease in the annual distance travelled.

Evolution of cars' energy consumption (2000-2011)



Decomposition of cars' energy consumption variation (2000-2011)



Source: Enerdata