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a look at ...

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Road passenger transport policies in Europe

For a long time synonymous with independence and freedom, the car and its different uses are now increasingly controlled — or even constrained — by European governments. In the most recent example, on 8 December 2014, the Mayor of Paris Anne Hidalgo stated her wish to eradicate diesel from the streets of Paris (in the next five years) to combat air pollution. Going beyond the impact of the announcement itself, this pollution prevention plan comes on top of a whole series of measures recently implemented in Europe: reduction of the speed limit, congestion charging in London and Stockholm, eco-tax in France, "environmental bonus" for electric vehicles, etc. These different policies, which are not always clearly aligned, aim to reduce the nuisances caused by road transport without compromising mobility. This note aims to explain them by offering an overview of the main transport policies in Europe.

Is the car a victim of its own success? While it is important to underline the crucial role that can be played by road transport in the economic development of a given city, region or country — and that it must continue to play by favouring mobility —, more and more voices are now being raised in condemnation of the different nuisances accompanying road transport and in favour of limiting their impact.

These include of course traffic accidents, the deterioration of road infrastructures inherent to traffic and congestion in major urban areas. But the transport sector, a major consumer of fossil energy *via* fuels, is also responsible for much of the energy dependency and the oil bill of European countries. Lastly, and perhaps most importantly, this sector generates many environmental externalities, the most significant of which is air pollution.

Road traffic is increasingly held largely responsible for detracting from air quality in urban environments. In Paris for example, a recent study showed that in 2010 the threshold for fine particles ($PM_{2.5}$) set by Europe[1] had been exceeded for nearly 160 days along the ring road. Practically all vehicles now run on gasoline or diesel. These vehicles emit significant quantities of fine particles and nitrogen oxide (NOx), which cause respiratory diseases and cancer[2]. This observation is of course particularly true for older vehicles running on diesel since at equal capacity, although they emit less CO_2 than gasoline models, they produce considerable quantities of fine particles. The latest generation diesel engines are certainly recognized unanimously as much "cleaner", but it takes time to renew an entire automobile fleet.

Local pollution caused by road transport is not the only reason put forward by the authorities to justify their policy measures. It should be remembered that in 2009 the transport sector alone accounted for approximately 30% of the European Union's CO_2 emissions (EC, 2012)[3]. Note too that this is the only sector that has seen its emissions increase in Europe since 1990 (+26% between 1990 and 2007), while those of other industrial sectors fell by approximately 15% over the same period (EEA, 2011).

Faced with this situation, and due to this sector's high dependency on fossil fuels, the European Commission (EC) has set itself the target of reducing the greenhouse gas (GHG) emissions of transport by 20% by 2030 by comparison with their 2008 level. In addition, within the

(1) The European standard sets this threshold at 50 millionths of a gram of particles in suspension per m^3

(2) The World Health Organization (WHO) has recognized the carcinogenic nature of fine particle emissions. NOx emissions are highly irritant for the airways

(3) 72% of these emissions were directly due to road transport

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framework of its 2050 roadmap (EC, 2011), the EC has identified a potential reduction of GHG emissions by 60% compared with 1990[4].

As we can see in our current context of energy transition, road transport is perceived by the public authorities as one of the key sectors in the fight against climate change. However due to abatement costs that are higher than in other sectors, this transition to clean transport, sustainable transport or again low carbon mobility can only be driven and supported by the public authorities. The development of innovative transport resources, including for example the emergence of new types of travel, especially in cities, and the deployment of better adapted vehicles such as hybrid or electric cars, will not happen without genuine political will.

Whatever the term used, all these formulae aim to translate the determination of the public authorities to change the current trend by implementing policies to reduce pollutant emissions due to road transport, both local and global, while favouring mobility in the broad sense of the term. This is achieved by a combination, or a mishmash as the more critical will say, of incentives (the famous "price signal" dear to economists) and/or restrictive measures aimed at improving the energy efficiency of transport and increasing the proportion of renewable or non-fossil energies in this sector.

This overview outlines the main types of public policy implemented in the European road transport sector. Before describing the different public policy tools available to public decision makers, we introduce road transport with a few figures. The aim is to give a better idea and understanding of the significance of the challenges and the reforms in progress in this sector.

Road transport in Europe

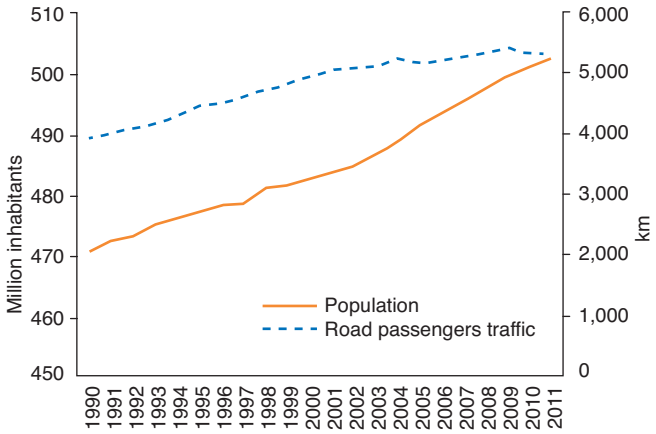
The two main drivers of growth in demand for road transport are economic activity and development of the population. The richer and more populated the country, the bigger will be its automobile fleet. If road transport has developed significantly in recent years, it is first and foremost for those two reasons.

Road traffic trends in Europe

In Europe, passenger mobility is mainly based on road and rail transport.

Figure 1 shows the growth of the population and road traffic in the EU (EU-27) between 1990 and 2010.

Fig. 1 – Population and road traffic trends in Europe (EU-27)



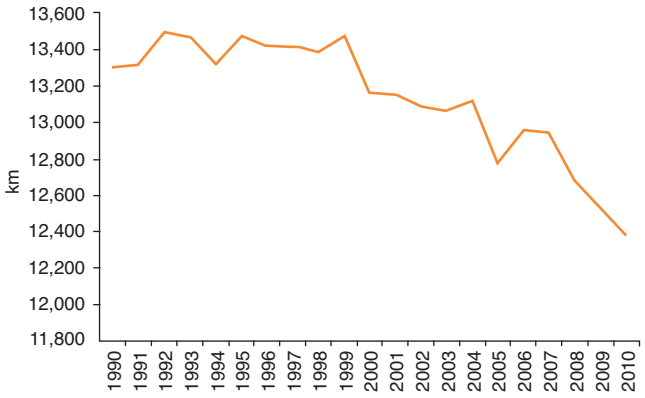
Source: Odyssee, Enerdata[5]

This figure shows that road traffic (VKT[6]) in Europe (EU-27) increased considerably between 1990 and 2010 (+44%), with however more marked growth in the first decade (+2.6%/yr) than in the second (+0.6%/yr). At the same time, the population of Europe increased year on year at the rate of 3.2%/yr. The rate of road traffic growth was therefore lower than the rate of population growth in this area.

Trends in annual distance travelled by car

In 2010, the average annual distance travelled by car was between 8,070 km (Poland) and 17,050 km (Ireland), or a European average of approximately 12,380 km. This average has however been decreasing since the 2000s in most European countries, as shown in Figure 2.

Fig. 2 – Average annual distance travelled per vehicle in Europe



Source: Odyssee, Enerdata

(4) France, for its part, has set itself the target of a 30% reduction in consumption of fossil fuels by comparison with 2012, and inclusion of 15% biofuels (S. Royal law on energy transition, adopted by the National Assembly on 14 October 2014)

(5) Enerdata manages this database on energy efficiency indicators on behalf of the European Commission

(6) VKT, for Vehicle-Kilometres Travelled. This term corresponds to the total number of km travelled per private car in a year and for a given road network

European automobile fleet trends

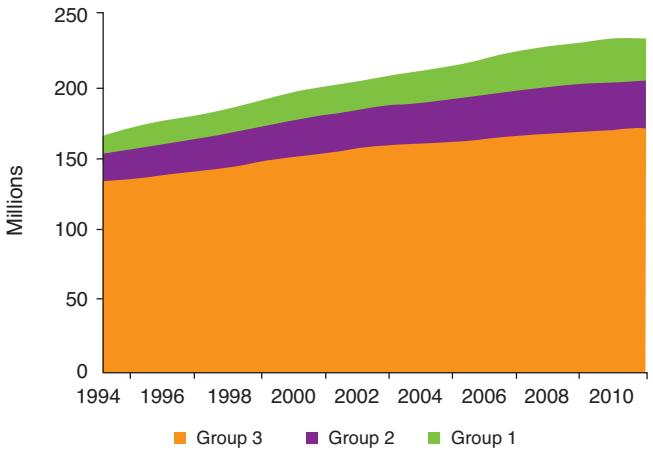
The EU holds the record for the number of private cars: nearly 235 million in 2011, up by 40% since 1994.

Given the great disparity between countries in Europe, we have chosen to categorize them in three slightly more homogenous groups according to their level of economic development and the degree of maturity of their automobile market[7]:

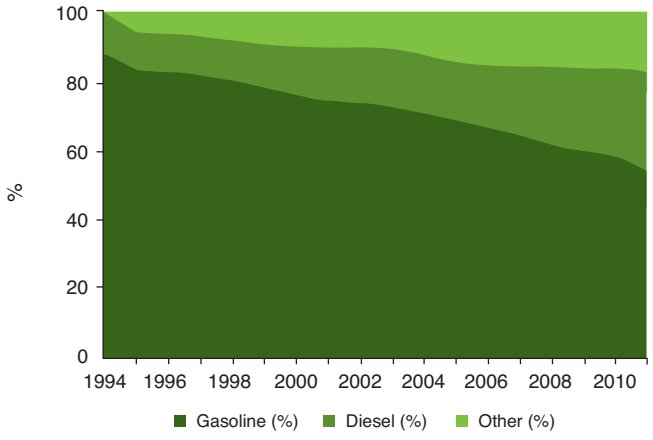
- group 1: Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania;
- group 2: Cyprus, Czech Republic, Greece, Malta, Portugal, Slovakia, Slovenia, Spain;
- group 3: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Sweden, United Kingdom.

Fig. 3 – Development of the total stock of cars (chart a.) and breakdown by type of motorization for each group of countries (charts b., c. and d.) in Europe between 1994 and 2011

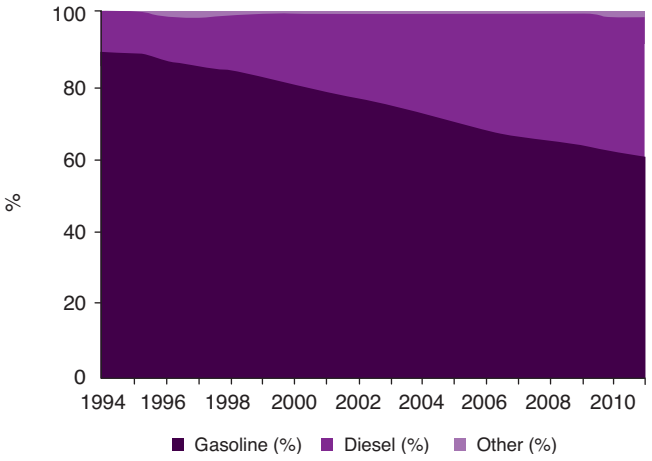
a. Total number of cars per group of countries



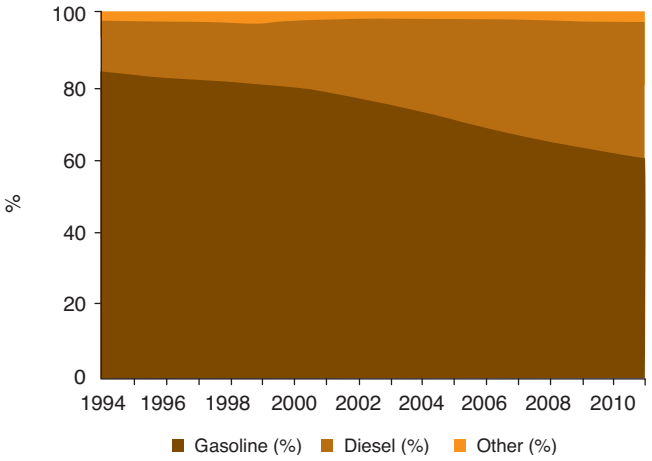
b. Breakdown by vehicle type for group 1 countries



c. Breakdown by vehicle type for group 2 countries



d. Breakdown by vehicle type for group 3 countries



Source: authors, based on Odyssee, Enerdata

The German fleet is the biggest (with just over 42 million vehicles in 2011) and the Polish fleet is growing fastest (+73% between 2000 and 2010). Figure 3 shows that the vast majority of European vehicles are still running on gasoline or diesel today. Other vehicles — whether hybrid gasoline or diesel, electric or run on LPG — represent at the very most around 5% of the European fleet. This figure also shows the rise in diesel vehicles over the past twenty years. Between the early 1990s and today, their market share has effectively risen from around 13% to almost 40%. However not all European countries have seen this development, as shown in Figure 4.

How can we explain this great disparity between the different European countries in terms of the development and composition of the automobile fleet? This is the issue we examine now by describing the different public policy tools available to the public authorities to regulate road transport.

(7) Countries were grouped via a PCA (Principal Component Analysis)

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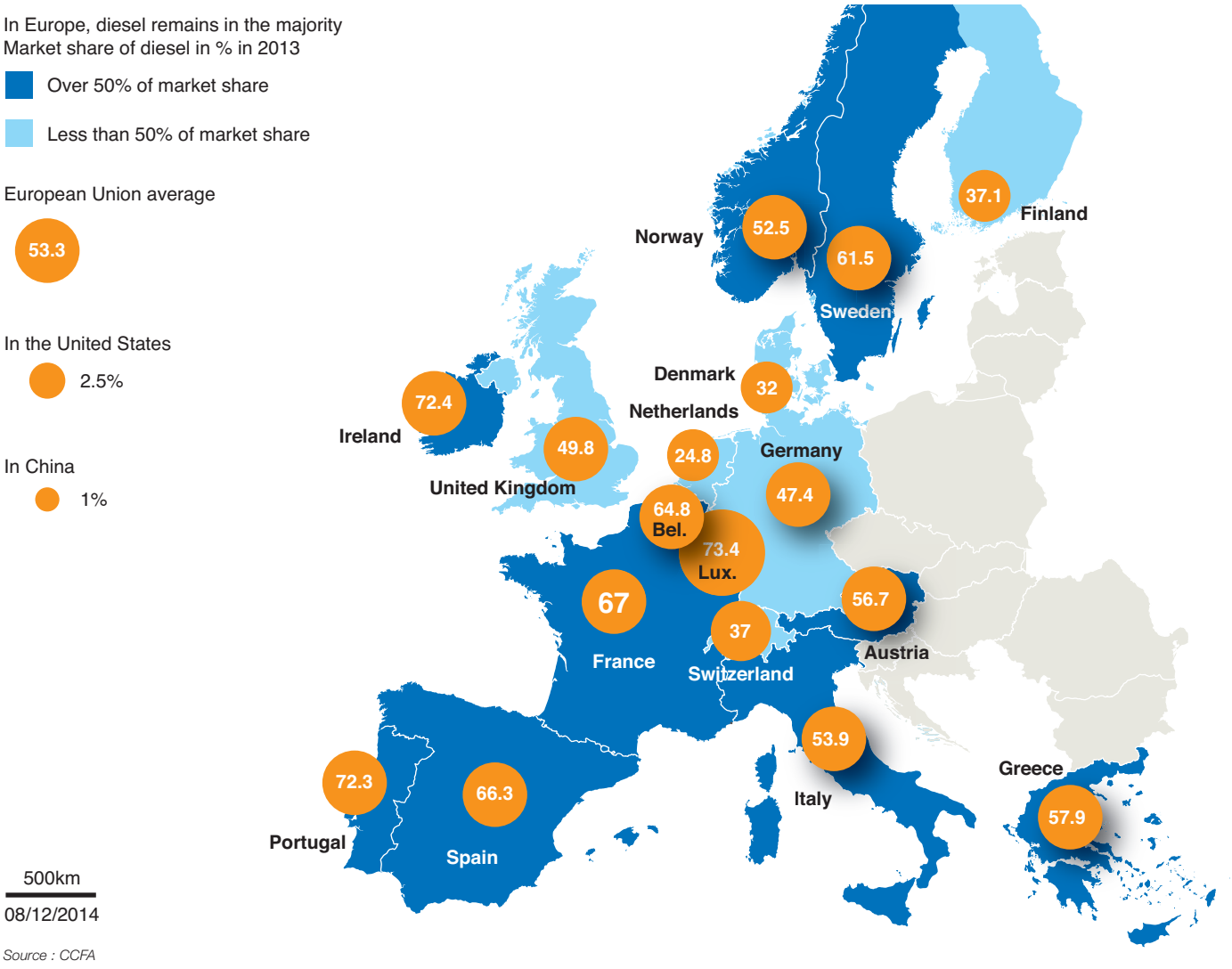
Fig. 4 – Market shares of diesel vehicles in Europe, 2013



Source : CCFA

Public policy tools

When analyzing the European road transport system, we cannot but recognize its great complexity. As highlighted by Meurisse and Papaix (2013), it is effectively "*multi-purpose, multi-externality, multi-sector, multi-scale and multi-player*". It is this complexity that explains not only the plurality and diversity of public policies in this sector, but also the difficulty of their implementation, their consistency and their alignment.

Public policy tools are generally classified according to their modes of application and the more or less binding nature of the requirements they impose on road transport players. A distinction is usually drawn between binding regulatory measures (emissions standards and speed limits for example) on the one hand, and economic incentive type tools (such as taxes or feebate schemes) on the other[8]. These different types of policy are not all aimed at the same uses or the same players in the transport sector, and are not taken by the same public decision makers. Depending on the circumstances, these tools may therefore tend to be associated with road transport supply or demand policies and may be applied at different levels (urban, inter-urban, national, international).

Table 1 summarizes the different public policy tools in road transport in Europe.

We describe them briefly below, presenting them according to their level of application.

(8) In addition to these two main types of public policies there are collaborative initiatives and information/communication campaigns

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Table 1

Summary of different road transport policies in Europe

Command and Control	Demand-side	■ Speed limit ■ Low Emission Zones ■ High-Occupancy Vehicles lanes ■ Parking access management
	Supply-side	Related to CO_2 emissions: ■ CO_2 emissions standards for new passenger cars and light-duty-vehicles Related to biofuels: ■ minimum of biofuel content in fuels Related to EV charge plug: ■ norms on publicly accessible infrastructures ■ obligation of EV charge plug in buildings
Economic Instruments	Demand-side	Automobile purchase pricing schemes: ■ bonus-malus ■ scrapping premium ■ VAT and income tax reduction ■ CO_2-tax for used pollutant passenger cars Automobile ownership fiscal schemes: ■ annual tax for company vehicles ■ annual tax for pollutant vehicles Automobile use pricing schemes: ■ fuel pricing (Fuel tax, Tax exemption for biofuel, Carbon tax) ■ road user charge (Urban toll, Major roads and highways toll) ■ parking pricing ■ free access to public transport
	Supply-side	■ Investment in R&D ■ Investment in infrastructures

Source: Extract from Papaix and Meurisse (2013) and Leurent (2011)

Tools at urban and inter-urban level

Since local authorities do not have the resources to take action on the supply, they instead seek to modify road transport demand behaviours to reduce the associated nuisances (mainly local pollution and congestion). This generally involves binding control measures (speed limits and reserved lanes) although some urban areas no longer hesitate to implement incentive-type economic schemes (congestion charging).

Speed limits

In most cases, speed limits are applied nationally to improve road safety. But some European cities also apply them on a temporary basis to limit air pollution, either in the event of a peak in pollution or permanently. Barcelona, for instance, has reduced the speed limit to 80 km/h on its major roads within a radius of 80 km around the city since December 2007, while Paris has reduced the speed limit on its ring road from 80 km/h to 70 km/h since 1st January 2014.

High-occupancy vehicle lanes

The aim of these reserved lanes is to reduce urban congestion by limiting the number of cars in circulation. By reserving some of their lanes for High-Occupancy Vehicles (HOV), urban areas aim to increase the number of passengers per car (carpooling) and to encourage the use of public transport in order to maintain and increase the capacity for passenger travel on the motorways and main arteries. In Europe this type of lane is generally reserved for buses and taxis, for example.

Low emission zones or congestion charging

To reduce air pollution in dense sectors of their territory, urban areas can define zones in which access by the most polluting vehicles is restricted or banned *via* a congestion charge or tax disc system. These Low Emission Zones (LEZ) now exist in over 70 cities and 10 countries in Europe, although the congestion charging scheme in London (created in 2003) has certainly received the most media coverage. The emissions targeted are mainly NOx, fine particles and, indirectly, ozone and CO_2. Within the framework of its energy transition bill for green growth, France is currently conducting studies on this subject with the establishment of restricted traffic zones[9]. For instance, experimental congestion charging schemes are allowed in urban areas with over 300,000 inhabitants, with an Official Traffic Access Plan (PDU). The tolls collected must finance PDU operations and therefore encourage the development of public transport.

Low emission zones, where they restrict access for all or some vehicles *via* a congestion charging scheme, are classified as incentive-type economic tools. They differ from high-occupancy vehicle lanes in that they discourage the use of private cars, not by reducing the capacity of the transport network but by increasing the cost of using this means of transport *via* a toll charge.

Road and/or motorway toll charges, if they are to be considered as economic tools, are mainly aimed at financing infrastructures. They are related to the use of (some) roads but are different from congestion charging schemes whose main aim is to prevent congestion.

(9) www.assemblee-nationale.fr/14/ta-pdf/2230-p.pdf

Tools at national level: taxes hitting the demand for transport

There is a wide variety of fiscal instruments in the road transport sector. These include grants, income tax or VAT reductions and taxes. Taxes constitute the vast majority of these instruments and are an important source of revenue for the States[10]. They may be related to purchase of a new car, to its simple possession/ownership or again to its use. Most of these taxes are "pure return" taxes, but some of them have an incentive element aimed at sending out a price signal designed to modify the demand behaviour of economic agents.

Fiscal instruments related to car purchase

This is the category that includes the most incentive-type schemes. By encouraging people to buy cleaner cars, these policies aim to improve the energy efficiency of the average automobile fleet.

For instance car scrappage schemes encourage owners to scrap their old cars, in return for a bonus, and replace them with new, more efficient models. This system, although costly, has the benefit of a direct impact on fleet composition by replacing the oldest and therefore most polluting vehicles.

Feebate schemes combine grants and taxes in the same system. Under such a scheme, the purchase of a new car is subject to either a rebate (a grant which only concerns a few models) or a fee (a tax of broader scope) depending on its energy efficiency and therefore its CO_2 emissions. This system has the advantage of being self-financing, on condition of course that the amount of rebates granted is exactly equal to the amount of fees collected.

Note too that in some countries VAT reductions (in Norway for example) or income tax credits (in Belgium and Sweden in particular) are granted to new acquirers of an electric vehicle.

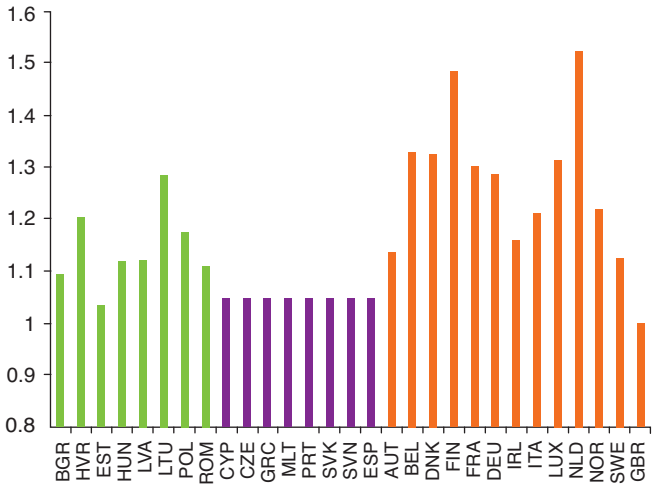
Fiscal instruments related to car possession/ownership

These fiscal measures take the form of an annual tax, a tax disc for example, collected to allow vehicles to use the road network. The level of tax is usually related to the vehicle capacity, its CO_2 emissions or the type of fuel it uses.

Fiscal instruments related to car use

Taxes on fuels — in France the National Tax on Consumption of Energy Products (TICPE)[11] are a significant source of annual revenue for public finances. While the primary aim of these taxes is income for the State, they can nevertheless act as an incentive in the short term (a rise in prices at the pump will reduce the annual distance travelled by vehicles by a few kilometres) and in the long term (buying more energy-efficient cars and reducing the number of car owners). The pump price differential between gasoline and diesel is an illustration. Figure 5 shows that all European countries except the United Kingdom apply a higher level of tax to gasoline than to diesel (since the ratio is greater than 1). This differential will globally increase depending on whether the countries belong respectively (see paragraph "European automobile fleet trends") to group 1 (in green), group 2 (in purple) or group 3 (in orange). By comparing the figure below with figure 4, we see that the market share of diesel cars is higher on average in countries that apply the highest differential.

Fig. 5 – Gasoline/diesel indirect tax ratios in 2011



Source: authors, based on Global Energy & CO_2 Data, Enerdata

The carbon tax is another example of a fiscal instrument related to vehicle use. Unlike the previous tax, this tax pursues an environmental aim by linking its payment to the CO_2 emissions produced by the vehicle over a year. In France, this type of tax is the subject of strong opposition, despite the constant efforts by governments to introduce it (the first project dates from 2009 with the "Climate-Energy Contribution"). However several countries do apply it, such as Denmark (since 1992), Finland (since 1990), Ireland (since 2010), Norway (since 1991) and Sweden (since 1991) with amounts per ton of CO_2 emitted between €13 for Denmark and €108 for Sweden, as at 1st January 2010. In France, the entry into force on 1st January 2015[12] of the Climate-Energy

(10) In 2008, taxes on the transport sector in France amounted to €38.6 billion
(11) Formerly National Tax on Consumption of Oil Products (TIPP)

(12) Decided in 2013, it was implemented in the 2014 budget in the form of a "carbon component" proportional to CO_2 emissions in taxes on fossil fuels. Since it was initially offset by the equivalent decrease in another tax in 2014, it will only really take effect from the beginning 2015

Contribution (CEC) can also be seen as a form of carbon tax in that it partly links taxes on energies to their emissions of carbon dioxide. The CEC should rise over time: its rate, set at €7 per ton of CO_2 in 2014, should increase to €14.50 in 2015 and €22 in 2016. According to the French Ministry of Ecology, Sustainable Development and Energy, implementation of the CEC should increase the price of gasoline by approximately €2 cents per litre, and that of diesel by €2.38 cents per litre (if the VAT increase to 20% is also taken into account).

In terms of supply, we note the policies in support of R&D *via* financing of research programmes and investment in infrastructure. These supply support policies must not be ignored. For example, to promote the emergence of a new technology such as the electric vehicle, the States are financing research programmes on electromobility and will then have to invest in infrastructures to make a significant number of charging points available to consumers.

Europe-wide tools

Whether they concern standards for CO_2 emissions or binding targets for inclusion of biofuels and the development of charging points for electric cars, all these binding control measures are aimed at impacting the supply.

CO_2 emission standards

These emission standards concern private cars and Light Commercial Vehicles (LCV).

Directive 443/2009/EC of the European Parliament and the European Council of 23 April 2009 set a target for private cars of 130 g CO_2/km by 2015 for the European fleet[13]. This target is 18% below the 2007 average emissions but only 4% below the 2011 average. A target of 95 g CO_2/km by 2020 is also specified within the framework of directive 143/2013/EC of 19 February 2013.

Concerning light commercial vehicles, the European Union Council regulation 510/2011 of 11 May 2011 limits CO_2 emissions from new light commercial vehicles to an average of 175 g CO_2/km from 2017 and sets a target of 147 g CO_2/km by 2020. These are average figures for new light commercial vehicles, leaving manufacturers room for manoeuvre according to the vehicle dimensions.

Binding targets for inclusion of biofuels and the development of charging points for electric cars

In order to increase the share of renewable energies used in the transport sector (4.7% in 2010), Europe has chosen to support the emergence of two technologies in particular — biofuels and Electric Vehicles (EV)[14] — by setting binding development targets for them.

Firstly concerning biofuels, the European Commission directive 2003/30/EC on promotion of biofuels set minimum targets for inclusion of biofuels in fuels, of 5.75% for 2010 and 10% for 2020. This entails incorporation of ethanol in gasoline, and fatty acid methyl esters in diesel. The French biofuel plan is more ambitious, with a target of 7% for 2010 and 10% from 2015.

As with any new technology, the excessively high price of electric vehicles is explained by the low demand. If consumers are still reluctant to buy this type of vehicle, it is firstly because their price is not competitive enough and secondly because there are not yet sufficient accessible charging points. To break this vicious circle the European Commission has proposed a development target of around 8 millions charging points for electric vehicles by 2020 in Europe, 10% of which must be freely accessible (EU, 2013). This development effort will vary according to the countries concerned, to take account of different degrees of country maturity.

Conclusion

As we have seen, it is not always easy to understand the purpose of road transport policies, firstly because they are not all decided on at the same level, then because they do not all have the same goal, and lastly because they are not all aimed at the same type of player.

This plurality gives rise to issues concerning the consistency and alignment of different public policies with one another. The continuing rise in the CO_2 emissions of this sector is an argument in favour of the necessary rationalization of the present system between binding control measures on the one hand and economic tools on the other. The aim, we must remember, is to encourage the emergence of more energy-efficient technologies and to significantly reduce the proportion of fossil fuels used in transport.

For many economists, decarbonization of this sector entails a far-reaching overhaul of the fiscal structure of transport, with in particular introduction of a carbon tax that increases continuously, like taxes on cigarettes for example[15]. Such a reform would then send out a price signal that would encourage the economic agents to modify their decisions in favour of reducing CO_2 emissions due to transport, subject of course to price elasticity of the

(13) This emissions level is equivalent to a fuel consumption of 5.6L/100 km for gasoline vehicles and 5L/100 km for diesel vehicles

(14) While it is true that electric vehicles do not emit any pollution locally, the definitively "clean" nature of this technology does of course also depend on the energy mix of the power grid

(15) Remember, for all practical purposes, that when we buy fuel "taxes account for two-thirds of the price we pay"

energy demand in this sector. We must emphasize however that even if this condition were verified — the debate is ongoing between economists — this type of measure nevertheless has the disadvantage of first affecting those on the most modest incomes. More generally speaking, any fiscal measure concerning pollution by vehicles gives rise, for this reason, to increasingly fierce opposition in French society, as illustrated by the Breton red caps' protest movement at the end of 2013. Since there is a certain reluctance to use the tool of taxation for incentive purposes, it should be accompanied by redistribution policies which remain to be devised in terms of the demand for transport ... and maybe above all by binding control measures that favour the emergence of a truly innovative transport supply from an energy and environmental perspective.

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Benoît Chèze – benoit.cheze@ifpen.fr
Pascal Gastineau – pascal.gastineau@ifsttar.fr
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