THE IMPACT OF ECONOMIC INSTRUMENTS ON THE AUTO INDUSTRY AND THE CONSEQUENCES OF FRAGMENTING MARKETS – FOCUS ON THE EU CASE

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SUMMARY

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1. ABSTRACT

For several years now, numerous states and regions have developed policies to reduce CO_2 emissions from the transport sector. More precisely, CO_2 emissions reductions from cars were in most cases the first target of these policies. Over the last two years, policymakers have tightened the rules currently in force and developed new regulations, in line with public concern about climate change and the growing importance of energy policies.

Policymakers can use a variety of instruments in implementing policies. We can identify in particular: regulations, taxation and incentive schemes, consumer information, or a combination of these.

This paper will focus on taxation issues addressing CO_2 emissions in the European Union. When observing the different systems in place, a very broad diversity appears, even with a cursory first glance. Actually, the diversity of taxation schemes among the Member States is such that it jeopardizes the concept of a Single Market in the European Union. Furthermore, this tax environment is not predictable. Even if the question of the efficiency of using such taxes to reduce CO_2 emissions is put to one side, cost-effectiveness is an important issue, including in terms of the consequences for vehicle and component manufacturers.

This paper is divided into three sections. First, the diversity of the schemes will be analysed in terms of intensity and predictability in order to identify the key consequences for manufacturers. This will be illustrated with different examples. The second section comprises a short description of how the OEM can deal with the diversity and unpredictability of taxation. In the third section, a specific analysis of policies addressing "electric vehicles (EVs) and very low CO_2 emitting vehicles" will be presented.

This paper is developed from a manufacturer's rather than a policymaker's perspective. It intends to give a practical understanding of the diversity of economic instruments from a manufacturer's point of view and to examine how an OEM (Original Equipment Manufacturer) can try to manage this diversity. The paper does not attempt a complete political and economic evaluation of the various policy options, which would be a very complex exercise, considering the different and cumulative instruments applied simultaneously on car markets and the dynamics of the wider economic environment, including the impact of both the current economic crisis and the evolution of oil prices.

For manufacturers, the key issues regarding taxation are twofold:

– Mid- and long term, when defining the product plan and designing new vehicles and new powertrains: how to anticipate the fiscal environment of the vehicles in a time frame of up to 10 years, as CO_2 taxation will impact the competitiveness of the product, and even possibly accelerate its obsolescence; how fiscal measures and regulations will interact together; and how to arbitrate between costs and CO_2 performance of a car in a highly competitive market.

– Short term: how to prepare or adapt the marketing of vehicles in each country to CO_2 taxation, which weighs on the market and competition more than ever, with effects that differ with customers.

Key conclusions are:

– The current economic instruments applied in the EU do produce a strong environmental incentive, driving a decrease in CO_2 emissions of the new car fleet.

– The current fragmentation of regulations and taxes seriously complicates manufacturing decisions and represents a significant cost.

– Incentives should be designed to correlate as closely as possible to CO_2 and other aspects of the environmental performance of vehicles.

– In this very mature industry, new, innovative technologies will require extensive support from national governments, with legitimate potential benefits for climate change policies.

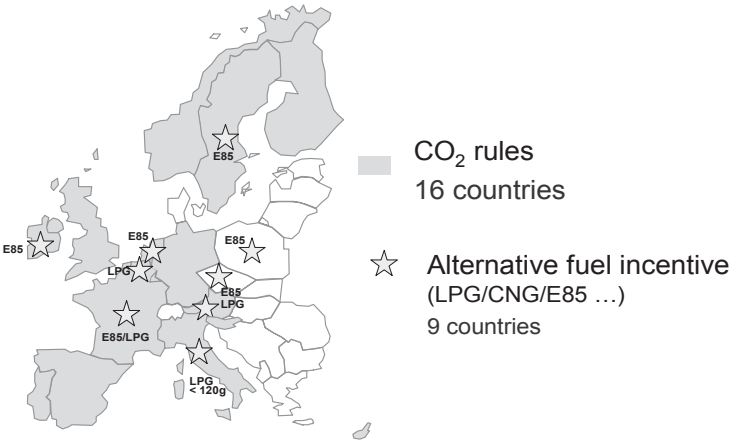
2. OVERVIEW OF FISCAL MEASURES IN THE EUROPEAN UNION FOR REDUCING CO_2 EMISSIONS FROM CONVENTIONAL CARS

2.1. Some elements of context

As from the beginning of 2010, 16 EU Member States have put in place one or several economic measures intended to reduce CO_2 emissions from cars. Most of them were introduced in the last three years.

A large number of these policy developments were simultaneous with, or close to the period where the EU regulation on car CO_2 emissions reductions was discussed and adopted, and close to the end of the Voluntary Commitments made by three car manufacturer associations in 1998-99. The Voluntary Commitments set a target of 140 g/km for the average CO_2 emissions of the new car fleet, by 2008 for ACEA, 2009 for JAMA and 2009 for KAMA. After agreeing the industry's commitments, the Commission suggested in its recommendations that the Member States establish taxation schemes based on CO_2 emissions to provide a demand-side incentive for meeting the target; this was not effective at the beginning of the period of the commitments, as governments were slow to either differentiate existing taxes according to CO_2 emissions or introduce fee bates. Only much later did momentum build for tax differentiation, by which time it already appeared that a regulatory EU standard for CO_2 emissions was inevitable, in response to a period of slower than hoped for progress in reducing average CO_2 emissions from the new car fleet.

Figure 1. **European fiscal context on CO_2, beginning 2010**



It is also important to note that, in 2005, the Commission adopted (Community reference: COM(2005)0261/Final of 5 July 2005) a draft for a Directive on car taxation addressing CO_2 emissions, but finally this draft was never adopted by the European Council. *Vis-à-vis* CO_2, the draft contained two main elements: all or a major part of the taxation of cars should be based on the CO_2 emissions of the vehicle, and the taxes on vehicles should be based on ownership and annual taxes, rather than on purchase.

When analysing taxation and its effects, one should admit that 2008 and 2009 were not "normal years" with respect to the car market. The setting and the impacts of tax differentiation schemes cannot be analysed independently of two key elements – with deep impacts on the economy as a whole, on purchasing power, on key patterns of consumption, on mobility and on the car industry itself:

1. *The evolution of the oil price, with its impacts on fuel costs in 2008*. This element itself impacted purchasing patterns of both private and professional buyers, as it made clear that the part of fuel cost in mobility was highly variable and likely to increase. This certainly induced changes in the market, as consumers now bear in mind that the fuel price is an uncertain and major part of their transport costs. (Transport costs represent, on average, 12% to 15% of household consumption in the EU.)

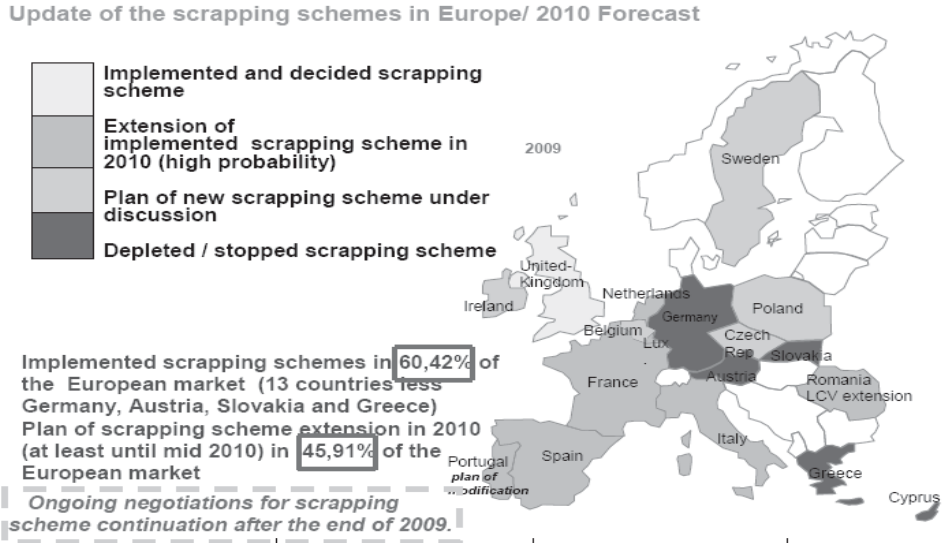
2. *The crisis in 2008-2009*, *with its direct impact on markets, distribution networks, industry and the economy as a whole, on purchasing power and on consumer confidence*. The crisis deeply affected the market and the automotive industry as a whole (see Table 1). Due to the importance of this sector for the economy, it forced governments to adopt specific measures to support distribution networks and the automotive industry – manufacturers and suppliers – in numerous countries in the EU. By mid-2009, 17 EU countries, representing more than 85% of the new car market, had specific schemes in place, some of them having decided on, and others still considering, extension of their measures in 2010. Many of these schemes took the form of incentives for purchasing a car and scrapping an old one; others took the form of loans for car purchase. They presented a large diversity in monetary value, criteria and duration.

Table 1. **Production of cars worldwide**
Comparison 3 quarters 2008-2009

CARS only	2008 Q 1+2+3	2009 Q 1+2+3	VARIATION 09/08		PdM 2009	Change PdM 09 / 08
EUROPE	**14 853 930**	**10 970 307**	**-26,1%**		**33,7%**	**-3,0%**
FRANCE	1 773 633	1 288 878	-27,3%		4,0%	-0,4%
GERMANY(1)	4 350 927	3 610 993	-17,0%		11,1%	+0,3%
ITALY	556 660	498 603	-10,4%		1,5%	+0,2%
ROMANIA	185 027	201 545	+8,9%		0,6%	+0,2%
TURKEY	**524 329**	**374 927**	**-28,5%**		**1,2%**	**-0,1%**
AMERICA	**7 224 017**	**4 901 673**	**-32,1%**		**15,1%**	**-2,8%**
- NAFTA	**4 789 546**	**2 730 427**	**-43,0%**		**8,4%**	**-3,5%**
USA	2 956 456	1 520 946	-48,6%		4,7%	-2,6%
SOUTH AMERICA	**2 434 471**	**2 171 246**	**-10,8%**		**6,7%**	**+0,6%**
ARGENTINA	315 445	257 276	-18,4%		0,8%	+0,0%
BRAZIL	2 096 618	1 898 486	-9,5%		5,8%	+0,6%
ASIA-OCEANIA	**18 083 252**	**16 525 265**	**-8,6%**		**50,8%**	**+6,0%**
CHINA	5 187 998	7 155 866	+37,9%		22,0%	+9,1%
INDIA	1 451 391	1 565 985	+7,9%		4,8%	+1,2%
JAPAN	7 699 319	4 709 218	-38,8%		14,5%	-4,6%
SOUTH KOREA	2 566 899	2 195 137	-14,5%		6,7%	+0,4%
AFRICA	**266 131**	**157 667**	**-40,8%**		**0,5%**	**-0,2%**
SOUTH AFRICA	243 462	155 402	-36,2%		0,5%	-0,1%
TOTAL	**40 427 330**	**32 554 912**	**-19,5%**		**100,0%**	**+0,0%**

Source: OICA.

Figure 2. **Scrappage schemes in EU, December 2009**



Source: Renault.

In summary, average CO_2 emissions from the new car fleet in the EU decreased in 2009 by 7 g/km, following a decrease of 5 g/km in 2008 compared to 2007 (*source*: AAA, preliminary data for 2009 that might be refined in the coming months). Compared to the trend over recent years, this

represents a rapid acceleration. All the elements above – taxation, scrappage schemes, oil prices – have influenced this significant decrease in new car emissions.

When considering the different EU countries, we can observe in the 2006-2009 period very different evolutions in the emissions of new cars: from -24 to -7 g in absolute values, from 15% to 4% relative to 2006. Also we can still observe a very large range of CO_2 fleet average values, from 165 to 134 g/km in 2009 (this range narrowed from 45 g to 30 g in recent years). The ranking below is based on the percentage decrease in emissions between 2006 and 2009.

Table 2. **EU15 – Average fleet CO_2 value 2006-2009 and evolution (absolute and %)**

Country	A 06	A 07	A 08	A 09	Decrease 2009 - 2006	Decrease % 09/06
GRECE	169	167	163	162	7	4,3%
BELGIQUE	153	153	149	145	8	5,1%
ITALIE	149	147	146	141	8	5,3%
PORTUGAL	144	143	138	136	8	5,4%
LUXEMBOURG	165	164	160	155	10	6,1%
AUTRICHE	162	162	159	151	11	6,9%
ESPAGNE	156	157	152	145	11	7,2%
Europe 15	**161**	**159**	**154**	**147**	**14**	**8,7%**
ALLEMAGNE	172	170	165	154	18	10,4%
ROYAUME-UNI	167	164	159	150	17	10,4%
PAYS BAS	165	164	157	148	17	10,5%
FRANCE	150	149	140	134	16	10,5%
SUEDE	188	182	175	165	23	12,5%
FINLANDE	179	178	162	157	22	12,5%
IRLANDE	166	165	159	145	21	12,5%
DANEMARK	163	157	146	139	24	14,9%

Figure 3. **New car fleet, CO_2 average, 2006-2009; EU 15 average**

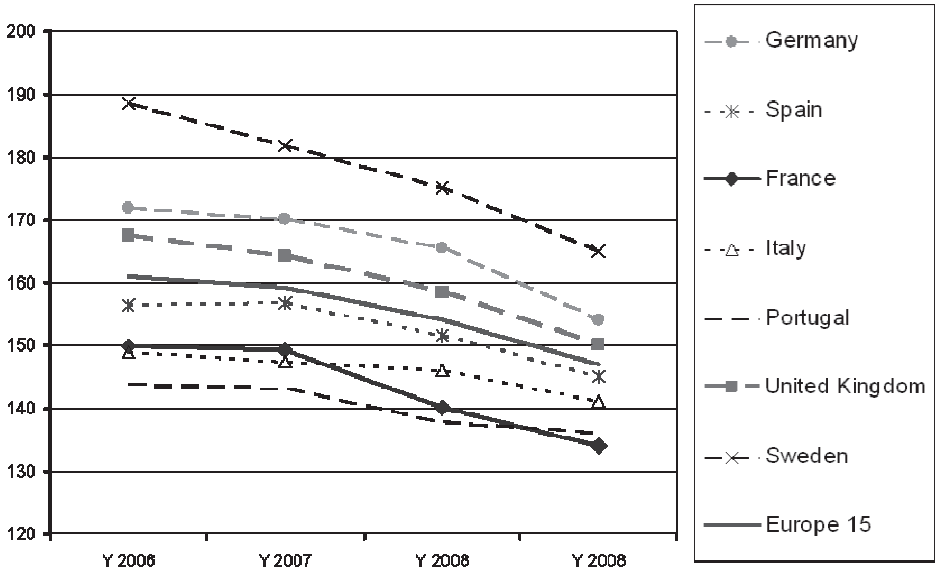
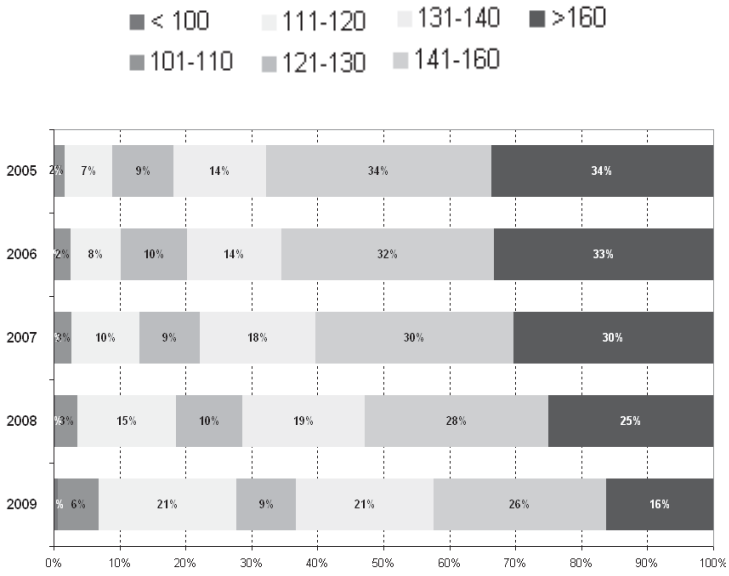


Figure 4. **New car fleet, CO_2 per class of CO_2, 2005-2009; 5 main EU countries, average**



2.2. Diversity of economic instruments addressing cars' CO_2 emissions

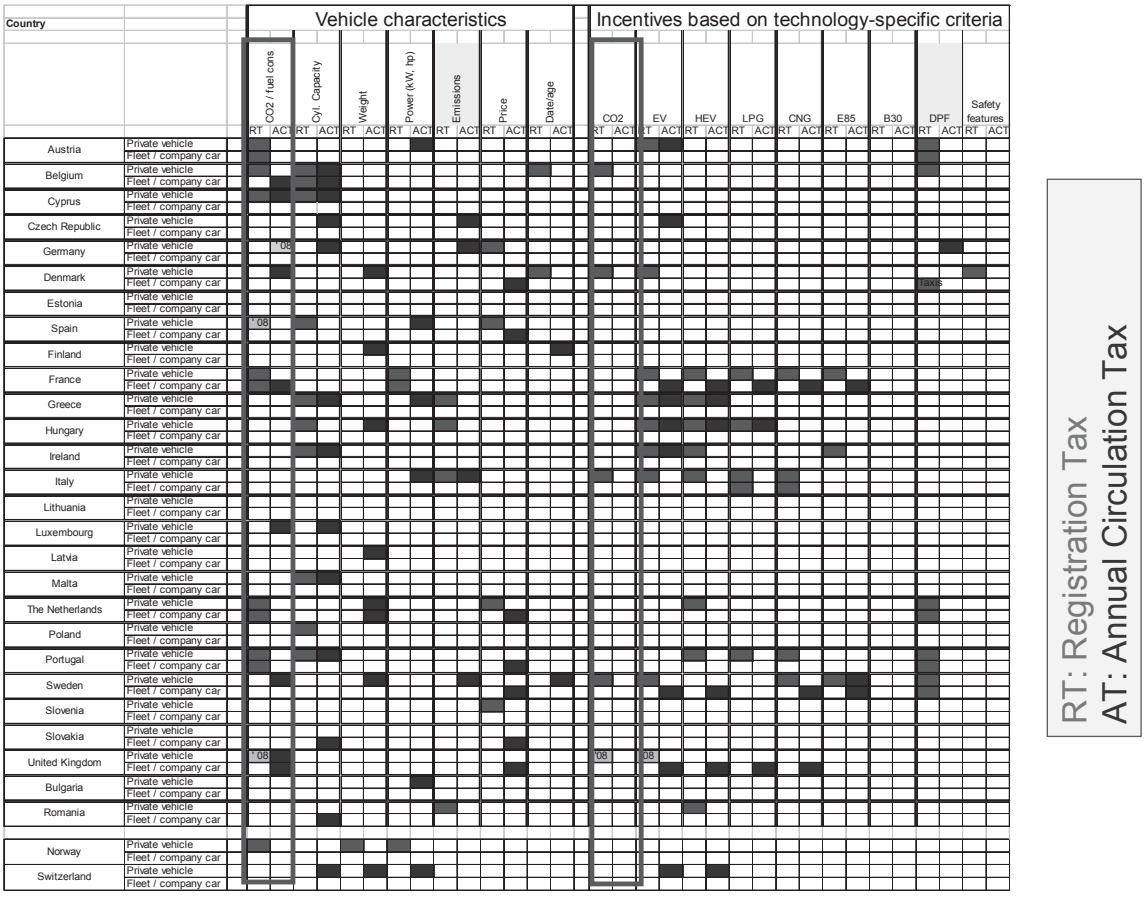
2.2.1 Overall development in recent years

Car taxation in the EU is very diverse and complex. As an illustration of this point, the table below indicates some of the criteria already used in 2007 for determining taxation for EU countries; this has since become even more complex.

The taxation specifically related to CO_2 emissions is in itself very complex: it associates numerous parameters that are managed independently by the EU Member States and which will be described below. It is also very unpredictable: Member States may change these parameters on a time-frame that is very short in comparison to product planning and industrial planning cycles for the car industry, or even compared to yearly sales and marketing planning.

This diversity, along with the high level of unpredictability, creates a real difficulty for manufacturers. Sixteen EU Member States have currently put in place one or several fiscal dispositions intending to reduce the CO_2 emissions of the car fleet. These elements were mainly adopted in the last three years. Their setting was quite simultaneous with, or close to, the period where the EU Regulation on car CO_2 emissions reductions was negotiated and adopted. When it agreed to the industry CO_2 commitments, the European Commission suggested that the Member States develop taxation schemes based on CO_2 emissions. Further to that, the Commission adopted in 2005 a draft for a directive relative to car taxation, addressing their CO_2 emissions, but no text was finally adopted by the Council due to objections from some of the States. *Vis-à-vis* CO_2, the draft contained two main elements: all or a major part of the taxation of cars should be based on the CO_2 emissions of the vehicle; and the taxes on vehicles should be based on ownership and annual taxes, rather than purchase.

Table 3



Comparing when EU Member States introduced their economic instruments addressing CO_2 emissions, some of them acted rather early (Portugal, France, the UK, the Netherlands), others have only just adopted or started implementing new schemes (Germany, Slovenia,…) and some are still only at the stage of contemplating or studying introduction. Those with a scheme in place implemented them progressively.

2.2.2 Criteria for CO_2 taxes and incentives

Independently of measures adopted to address the crisis, the diversity of forms of CO_2-based taxes and incentives is obvious. The criteria on which incentives are based can be categorised as follows:

– Form of taxes on conventional cars: on new cars at purchase (Registration Tax, RT), on the fleet (Annual Circulation Taxes, ACT) or on usage (Fuel taxes, Carbon Tax; in the future, "pay as you drive" or even possibly "congestion charges"). (We do not deal with taxes related to registration of second-hand cars here, with specific issues for imported vehicles.)

- The move from RT to ACT, which was a target of the draft directive of the Commission related to car taxation, is not generally seen as a result of the changes in taxation.

- Instead, countries tend to retain their existing systems of taxation and replace parameters like engine capacity or price with taxes based on CO_2, totally or partially (Portugal, The Netherlands, Germany, for instance).

– Who bears the cost of the tax?: the owner in most cases, the user in some cases (i.e. UK company car tax). But note that different types of customer for the same segment or product can bear a very different level of tax in the case of company cars.

– What is the basis for establishing the monetary level of the tax paid? The criteria for CO_2 is quite systematically the CO_2 certification value corresponding to the NEDC (New European Driving Cycle) used for type approval of new vehicles. The value itself can depend only on the CO_2, or on a calculation that can include the price – or the engine capacity in some cases, even if this criteria is becoming less frequent:

  - The value of the tax/incentive is directly related to tested CO_2 emissions ratings in France, the UK and Portugal. (Progressive implementation, initially a tax based on engine capacity only.)

  - The tax is a percentage of the price determined by CO_2 emissions ratings in Spain, the Netherlands (progressive implementation) and Belgium.

  - The rate of tax is determined by a mix of criteria such as CO_2 and engine capacity; an example is the new taxation scheme in Germany.

– The system can be "fuel neutral", or otherwise:

  - The system can be based specifically on the CO_2 certification value, which is neutral *vis à vis* fuels, or differentiated among fuels. This adds much complexity for manufacturers: very different fuel mixes exist among EU Member States, even at segment level, independently of differences in fuel prices.

  - This policy choice, fuel neutral taxation or not, is often driven by considerations of non-CO_2 emissions. We can anticipate that the difference in non-CO_2 emissions between gasoline and diesel ought to narrow in the future with Euro 5 and Euro 6 standards.

In terms of format, these systems are not linear and rarely continuous. Most of them include thresholds, with sometimes highly discriminating gaps when passing from one band to the next (i.e. on registration taxes: for instance, up to 1 000 EUR in France, up to 1 500 EUR in Spain for a 30 000 EUR car passing a threshold adding 5% to the tax rate). These thresholds are not co-ordinated among Member States at all. They create strong discrimination between products and versions of vehicles, and are the source of an extreme diversity in EU markets. They are one of the most complex issues for manufacturers because of the following factors:

– Optimisation in the different countries is quite impossible, as it requires specific adaptations of the vehicles;

- No, or limited, visibility exists on these thresholds, except for some countries. Therefore, product planning cannot be established on the basis of a robust scenario related to taxation and incentives, including for relatively low-volume products like LPG or CNG requiring specific investments -- a current example: discussions in Italy on thresholds for CNG and LPG, and for a scrappage scheme.

- Such thresholds can have a very strong effect on consumers, who either want to reduce the cost of vehicle ownership and usage, or in some cases place a specific importance on avoiding paying a tax, in particular if the threshold acts as a "lower trigger" for the tax; you pay nothing if you are below, you pay the full tax if you are above the threshold. This is the case in the Netherlands and Germany, and to a lesser extent in France and Spain.

- The way they impact the market is very uneven between the different car segments of a given market, as well as on a given segment between the different markets.

  - In the case where a significant threshold cuts a product segment in two parts, it can fully orient demand to the lower CO_2 vehicles.

  - When thresholds are established or changed, they can cause versions or even the model line to become instantaneously unmarketable. Such policy instruments may accelerate the obsolescence of products, and manufacturing capacities for vehicles or engines.

- Some examples of thresholds:

  - *Spain*: Registration tax rate of 0%, 5%, 10%, 15% of the price of the car, depending on the CO_2 value: lower than 120g; between 121 and 159, or 160 and 199 g; or higher than 199 g.

  - *France*: the different fiscal instruments on cars – TVTS (ACT for company cars), bonus/malus, technology incentive for HEV/LPG/CNG among others – have thresholds. (Note: the thresholds of the Bonus/Malus, the TVTS and for CO_2 labelling are not the same, and they do not evolve consistently; this complicates communication towards customers on CO_2.)

  - *Germany*: continuous ACT, but a low trigger, that significantly influences competition in the lower (A/B/C) classes.

- A number of specific cases for passenger cars (M1 vehicles) among EU countries:

  - Technology incentives for hybrid or alternative energies (CNG, LPG in particular) that are sometimes very high and directed to specific products, with or without CO_2 criteria.

  - Specific incentives on cars compatible with certain biofuels or on environmentally friendly vehicles.

  - Exemption of taxes or fees related to the usage of the vehicles; i.e. exemption for "clean vehicles" from the congestion charge in London or from the public parking fee and congestion charge in Stockholm.

– Additionally, Light Commercial Vehicles (LCV/N1 vehicles) are, so far, rarely subject to CO_2 taxation in the EU. For professional users, the importance of the cost of usage, whichever way they assess it, and the share of fuel cost in the global cost ownership create a strong incentive towards fuel economy for LCVs. Therefore CO_2 taxation of the LCV/N1 segment would not have as great an effect in stimulating fuel efficiency as for private cars. In the EU, some small LCV vehicles and the powertrains of most of the LCV are derivates of M1 vehicles/powertrains, and benefit from their improvements directly.

2.2.3 Great diversity in the intensity of tax incentives

From a manufacturer's perspective, two key parameters emerge from a taxation scheme: the overall level of the taxation and the intensity of the CO_2 differentiation. The rhythm of evolution varies also along Member States. The net effect on markets and customers results from the sum of these intensities combined with fuel prices, which also depend on taxes and vary quite widely between countries and between fuels.

Overall level of taxation

Depending on the country, the level of average tax per vehicle can vary considerably, as well as the level of CO_2 tax. Examples:

– Some countries have particularly high registration taxes that are not CO_2- related: Denmark and Greece, for example.

– In the Netherlands, the average level of RT is high; it combines a high percentage (27.4% in 2010) of the retail price, elements related to energy and emissions, and a share based on CO_2 that will progressively increase. This is also the case of the RT in Portugal that is indexed on CO_2 mainly.

– On the contrary, in France, the only heavy economic instrument that applies to cars owned by private customers is a registration fee/rebate. The "bonus/malus" system eventually led in 2009 to a public expenditure of more than 500 million EUR, equivalent to 0.5 % of the total turnover of the new car market.

CO_2-related or not, the large differences in levels of tax affect the manufacturers in terms of product development and marketing, as they modify the retail price of the same vehicle from one country to another, and therefore the mix of products and fuels demanded, as well as the rhythm of renewal of the fleet. To illustrate and quantify this effect, in the Renault case, two examples based on the above-mentioned countries follow:

– The taxes on a Twingo (gasoline version /1.2 l/120 g/km) range in 2010 from a bonus of 700 EUR (France) to a cost of 1 800 EUR (NL), including a CO_2 part of 340 EUR. The total difference of 2 500 EUR for a car of around 10 000 EUR, that is, 25% of the basic retail price, makes the marketing of this simple vehicle very different in the two countries.

– The same year, the taxes on a Scenic (diesel version /1.4 l/135 g/km) are in a range of 0 EUR (France) or 120 EUR (UK) to 7 500 EUR (NL), i.e. 30% of the basic retail price of the car.

Intensity of CO_2 differentiation

This parameter is of utmost importance, as it drives the choice at the point of purchase, and can even drive the decision to purchase a new car to replace an existing high emission vehicle: whether the differentiation is strong or not, it impacts the choice of new cars, with various ways of evaluation by customers.

Comparison of incentives cannot be direct because of the wide differences between national systems. But starting from estimations of the slope in EUR/g of CO_2 at certification, one way to compare incentives consists in defining the equivalence of a taxation in EUR per tonnene of CO_2 saved, on the basis of some simplifying assumptions: taking a range of CO_2 values covering most of the market, i.e. 100 to 200 g/km, for cars driven mileages of 200 000 km over the average vehicle life-time and 15 000 km/year. This does not take into account effects of thresholds on specific segments or products, but allows a first, simple comparison among countries and between measures.

Measures exist already that are very intense and highly discriminating in the market. In some cases, they correspond to a value of the tonne of CO_2 much higher than in current trading systems, and up to EUR 1 000. In summary:

- Spain, Portugal and the Netherlands apply, on average, high registration taxes, with significant intensity amplified by thresholds making their effect stronger and uneven among segments.

- France and the UK apply high company-car taxes, in a range of EUR 1000/tonne. While the intensity in France is quite even among segments, this may not be the case in the UK, with a high intensity on upper segments resulting from the application through personal income taxes.

Some examples:

- In France, the purchase bonus/malus is a registration tax equivalent to 150 EUR/tonne, and the TVTS tax on company cars (paid by the companies) reaches EUR 3 400/year for vehicles emitting 200 g/km, and even EUR 2 400/year for those emitting 160 g/km. It is equivalent to EUR 1 000/tonnes of CO_2.

- In the Netherlands, a complex registration tax scheme is being introduced progressively, with a CO_2 share that is today equivalent to 200 EUR/tonne, but that will become three times higher by 2013. For a gasoline car, this CO_2 part is today EUR 0 for CO_2 if $CO_2 \leq 110$g, EUR 2 400 if $CO_2 = 180$ g, EUR 7 000 if $CO_2 \sim 220$g; and in 2013, EUR 7 000 if $CO_2 \sim 180$ g.

- In Portugal, where the registration tax based now on CO_2 and engine capacity reaches EUR 10 000 for a diesel car emitting 200 g/km, the intensity of the RT is estimated as high as ~ 500 EUR/tonne on diesel and ~ 300 EUR/tonne on gasoline.

This level of differentiation: (1) may change in time – this was the case in Portugal, with a progressive shift from a tax based on engine capacity and energy to a CO_2-based one; and (2) has to be appreciated in connection with other taxes/incentives applying in the country, as some of them have settled a package of measures, including different tax policies on fuels.

2.2.4 Technology incentives

Depending on national policies, we can identify technology incentives in particular for hybrid vehicles. As a matter of principle, technology incentives are not generally supported by manufacturers, because they discriminate among technologies without considering their actual efficiency, and because they may impede the development of other, possibly more promising, technologies in competition with those benefiting from the incentives. (Issues related to very low CO_2 and electric vehicles are developed in Section 3.)

In some cases, evaluating the value of the CO_2 attached to these incentives reveals very high levels (France: EUR 2 000 for a hybrid car corresponds to more than 600 EUR/tonne of CO_2, compared to similarly CO_2-efficient vehicles, when comparing CO_2 emissions with life-time usage).

A large diversity of such incentives exists in the EU, with a wide range of values. This diversity does not help the development of these cars. Market penetration is low and the product offer has been slow to develop despite high levels of incentive: these policies are not very effective.

Furthermore, the potential of technology incentives for CO_2 improvement remains questionable in the EU where a majority of the market is for small and medium-sized cars, with already a high CO_2 efficiency and quite low prices. In such conditions, massive CO_2 reductions rely basically on improving the CO_2 efficiency of conventional vehicles, with technologies that are affordable, in a very competitive market where prices are the major deciding factor for most customers and fuel efficiency the second most important criterion.

2.3. Visibility or not?

2.3.1 Why visibility is crucial for manufacturers

For manufacturers, taxation becomes a major driver regarding product planning, marketing, manufacturing investment and production:

- in the mid- and long term, when defining the product plan and designing new vehicles and powertrains: how to anticipate the fiscal environment of the vehicles in a time frame up to 10 years is crucial, as CO_2 taxation will impact the competitiveness of the product or possibly render some products unsellable. How fiscal measures and regulations will interact together is also key;

- in the short term, when preparing the marketing of the vehicles in each country, as CO_2 taxation now weighs on the market and competition more than ever, and in different ways depending on customers.

2.3.2 Unpredictable procedures

Depending on the countries and the kinds of measures, the legal form of schemes can be very different. This form can be either a law or another form of government decision, such as a decree. As an example, in France, the "bonus/malus" system requires two different texts: a law, adopted under the annual fiscal law, for the "malus", which is a tax and a decree for the "bonus", which is not a tax but an incentive and does not need a law in order to be set up.

Lack of visibility is a direct consequence of this diversity in the nature of texts and procedures. Car taxation, as with other laws related to taxation, is often established or revised in the annual fiscal budget under the full control of parliament. This procedure means that manufacturers only receive the information belatedly, and it remains subject to last-minute changes, in some cases after adoption of the budget in principle. Other government initiatives can render the preparation of measures more transparent.

In some cases, due to the nature of the measure, the government may delay the announcement of its intentions; this can even happen in agreement with manufacturers and distributors if the measure is expected to have a strong, negative impact on the market. In Spain, a new format for the registration tax, to be applied as from January 2009, was announced in September 2008, and manufacturers were required to offer compensation to new car buyers until the end of 2008, for a future bonus for lower CO_2 emitters.

2.3.3 Improvements to visibility: dates and thresholds

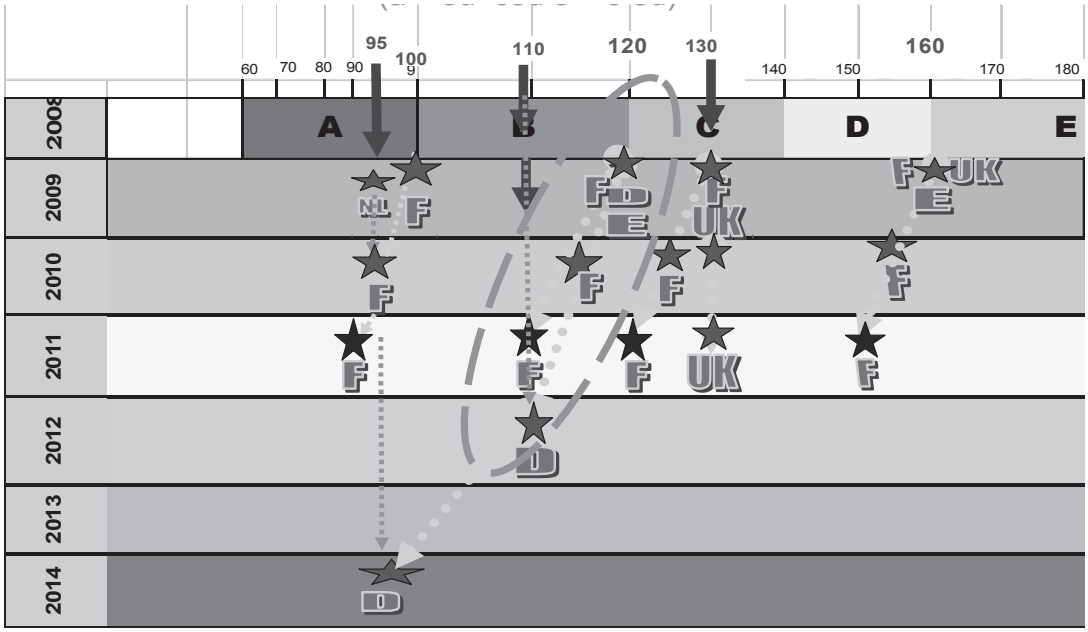
From a manufacturer's perspective, predictability is vital. Manufacturers experience the most predictability in a strong policy setting, and the countries below have announced plans for their schemes in advance:

- Germany: up to 2014.
- The Netherlands: elements announced up to 2013.
- France: from 2008 to 2012.
- UK: from March 2011 to March 2014.

In these cases, the key thresholds structuring the schemes have been defined for several years (see Figure 5 below). But note that, for instance, France has recently modified elements (values and, more important for manufacturers, thresholds) that were fixed end-2007 for application in 2012, in order to limit the cost of the "bonus/malus" system to the State. In the end, there is no such thing as full regulatory certainty for these schemes.

It is also worth mentioning that some convergence is apparent on lower thresholds, which might have been influenced by the 2020 target value adopted in the EU regulation on car CO_2 emissions reduction – a target of 95g/km, subject to review before it becomes binding. Several countries use 95 g/km as a criterion in their taxation, in the same way as some countries earlier used 120 g/km, as a point of reference. The graph below indicates how the thresholds in some key EU countries will move, between 2008 and 2014, insofar as they are defined today.

Figure 5. **Thresholds sliding in France, UK, Germany, the Netherlands**
(announced or voted)



2.4. Why this diversity?

Without contesting the total sovereignty of European Member States for fiscal and taxation policy, this diversity merits question. To date, the bodies and institutions with legal rights in regard to taxation have worked without considering that their individual policies would totally fragment the market, with a risk for the possible efficiency and effectiveness of their CO_2 policies, or at least of high costs for the industry.

2.4.1 European level

With the exception of the 2005 draft directive, the European Commission has not appeared to consider convergence among Member States to be important. The draft directive contained three items:

- Move taxation of vehicles from current criteria to CO_2 emissions, with reference to the type approval test certification value;

- Use annual taxes on vehicles rather than purchase taxes; this is considered by many politicians to be more effective towards CO_2 emissions reductions, and more consistent with the Single Market;

- Install a system of compensation payments when people move from one EU Member State to another, in order not to impair the free mobility of goods in the Union.

This third, very specific item relative to the Single Market probably made the Commission's proposal unnecessarily complex, and did not help during the later discussions.

While manufacturers systematically requested that the diversity of taxation schemes across the EU be reduced, they did not obtain any support, in particular from EU bodies, for such a reduction. In terms of institutional procedure, one way forward could be through a sufficient number of countries accepting to establish "concerted co-operation".

2.4.2 National developments

In some cases, a fiscal scheme based on CO_2 has been developed as a continuation of an existing system. This is particularly the case in Portugal and to a lesser extent in Spain, with a shift from one previous criterion, often engine capacity, to CO_2. Therefore, the earlier diversity among countries continues even if they modify their schemes.

However, in a number of countries, the CO_2 scheme was developed independently of a previous system. This was the case in France, Belgium and Slovenia. In these cases, systems were established without any concern for consistency or similarities with other countries, thus leading to this vast diversity of schemes.

2.4.3 Regional implications

Additionally, other diversities sometimes appear at regional level. This leads to even more fragmented markets, with quite unique specificities.

In Belgium, there is one system at the national level and another at the level of the Wallon region.

In some countries, taxes rates differ by region. This most often concerns registration taxes but generally differences are not very significant. However, this may have some impacts at the marketing level for distribution companies.

2.5. Specific and new domains of taxation on vehicles

In addition to the above items, there are other elements subject to economic incentives or taxes, with an impact on the orientation of markets. These cover alternative fuel vehicles and taxation of fuels, in particular in connection with biofuels. These two items impact significantly on manufacturers because they require specific development of engines, with resource implications. The visibility of these policies is rather low, and they correspond to national choices creating further significant fragmentation in the EU market.

2.5.1 Alternative fuel vehicles

Numerous countries have specific incentives for alternative fuel vehicles, without any common scheme, resulting in a very fragmented market among the EU states. The continuation and ending of such schemes is a permanent uncertainty, in particular when state budgets are constrained drastically.

The motivations for Member States to develop these fuels are either:

– energy diversification, in particular in countries that have specific energy resources; or

– environmental benefits. It is to be noted that certain alternative fuels allowed significantly lower polluting emissions in the past, but the difference with conventional fuels was reduced after introduction of the new Euro standards.

Alternative-fuel vehicles remain not actually marginal, but represent low volumes in these countries in most cases. It is difficult for manufacturers:

– to anticipate which policies the Member States will implement, and to what extent these policies will be robust and continuous, leading to a viable market or not, with several examples of aborted alternative fuel policies (biofuels, CNG, LPG);

– to arbitrate in their development of engines, in a context of limited resources both in the work force and for investment. Eventually, they are forced to adopt strategies limiting market risks, which may be far from optimal.

2.5.2 Energies, biofuels taxation developments

Road fuel taxation brings in important tax revenue for EU Member States, with commonly two-thirds to three-quarters of the final fuel price being made up of taxes. Fuel prices vary considerably, however, between countries, with specific policies and exemptions adapting to national situations, i.e. lower-than-average purchasing power, or specific dependency on road transport for essential citizen mobility, or national energy sourcing policies. Depending on the country, differences among fuel prices, i.e. between gasoline and diesel, or between LPG and gasoline, can vary significantly among countries, some having specific policies for or against a given fuel, beyond average fuel taxation.

Fuel prices directly influence the cost of vehicle use, and are therefore an important criterion for customers, while manufacturers permanently monitor and forecast them in order to assess their impact on the competitiveness of their products.

The purpose here is not to oppose fuel taxation, which is unavoidable for various reasons, but to reaffirm that a minimum of visibility on fuel prices and consistency within the European Union regarding the taxation of the different fuels is important for manufacturers, independently of the impacts of oil price variations. This parameter indeed directs the balance between types of powertrain on the market, sometimes over the short term, and manufacturers feel the impacts in terms of both engineering and marketing.

The overall tax rates on the major fuels do not usually show strong variations over time in most countries but the oil price itself strongly adds to the instability of fuel prices. Regarding taxes on and the price of road fuel, three evolutions are currently possible, which eventually would have significant impacts.

Taxes supporting biofuels

Consistent with EU climate policy, Member States are implementing policies to develop biofuels. Without expanding on the controversial subject of biofuels, or on the car technology aspects related to them, it is worth mentioning that:

– There is no common or visible policy in the EU in regard to these fuels, except for average incorporation targets to be met at national level;

- The existing standards for biofuels, in particular for blending biodiesels in diesel fuel, are insufficient to guarantee a sufficient fuel quality;

- As a consequence, various fuels, not always fulfilling all standards, are already distributed in the EU, and manufacturers are forced to develop their product offer without being able to anticipate the future development of the market. Examples are B 7 and even B 20 or E 10, which are available in some countries.

- In some countries, biofuel development policy relies on tax/penalty systems that ultimately increase fuel prices: for example in France, where the UFIP (*Union Française des Industries Pétrolières*, French Federation of Oil Industries) indicated that prices would increase by 0.02 to 0.03 EUR/litre in 2010.

Commission draft amending the Directive on Energy Taxation

Current taxation of energy in the EU is based on a specific Directive (2003/96/CE) from 2003, which fixes minimum taxation levels for each type of fuel. The Commission is currently preparing a draft revision of that Directive, with a view to aligning taxation with the overall CO_2 emissions reduction policy.

Some elements have already been discussed. In particular, the taxation of road fuels would be based on two parameters: the carbon content and the energy content of the fuel, on a volumetric basis. A progressive alignment of national taxation would therefore be required.

This evolution would lead to a significant increase in diesel prices, which is counterproductive to CO_2 emissions reduction. Basically, taxing road fuels on the basis of energy/litre or carbon/litre disregards the significantly (15 to 20%) higher energy efficiency and energy density of diesel. Even if the performance of gasoline vehicles is expected to improve in the coming years through new injection technologies, they are not expected to equal the performance of diesel.

This revision of the Energy Directive might therefore induce significant changes in the medium term in fuel prices; this would add to the difficulties experienced by manufacturers in their planning and investments for reducing CO_2 emissions.

Carbon tax

Several EU Member States have set or are setting "carbon taxes" that also weigh on fuel prices: Sweden, Denmark, Finland, and now France. The concept consists in applying an additional tax, correlated with the CO_2 emissions of the energy used by the consumer. This is an additional price signal for CO_2 emissions reduction. Exceptions exist: for example, industries, including those eligible for inclusion in the European Emissions Trading System (ETS), can be exempted.

This tax raises several issues:

- Competition effects compared to imported products. It should be considered, however, that this would not be the only regulation possibly creating distortions of competition and hampering the competitiveness of the EU.

- Visibility for economic operators, either in the energy supply or with energy-intensive activities. In France, the initial level is set at 17 EUR/tonnes of CO_2, but the initial

recommendation was for more than 30 EUR/tonne, and it might reach much higher figures in the middle of the decade.

2.6. Some elements of their effects and some concrete examples

2.6.1 The effects of economic instruments on CO_2 emissions

As mentioned in the introduction, after a certain stagnation since the middle of the decade, average CO_2 emissions from new passenger cars have decreased in the EU since 2007 much more quickly than previously. They decreased by 7 g/km in 2009 compared to 2008, and by 5 g/km in 2008 compared to 2007 (*source*: AAA, preliminary data for 2009, which might be refined in the coming months). Compared to the previous trend, this is a rapid acceleration, as the decrease was previously close to 1 g/year.

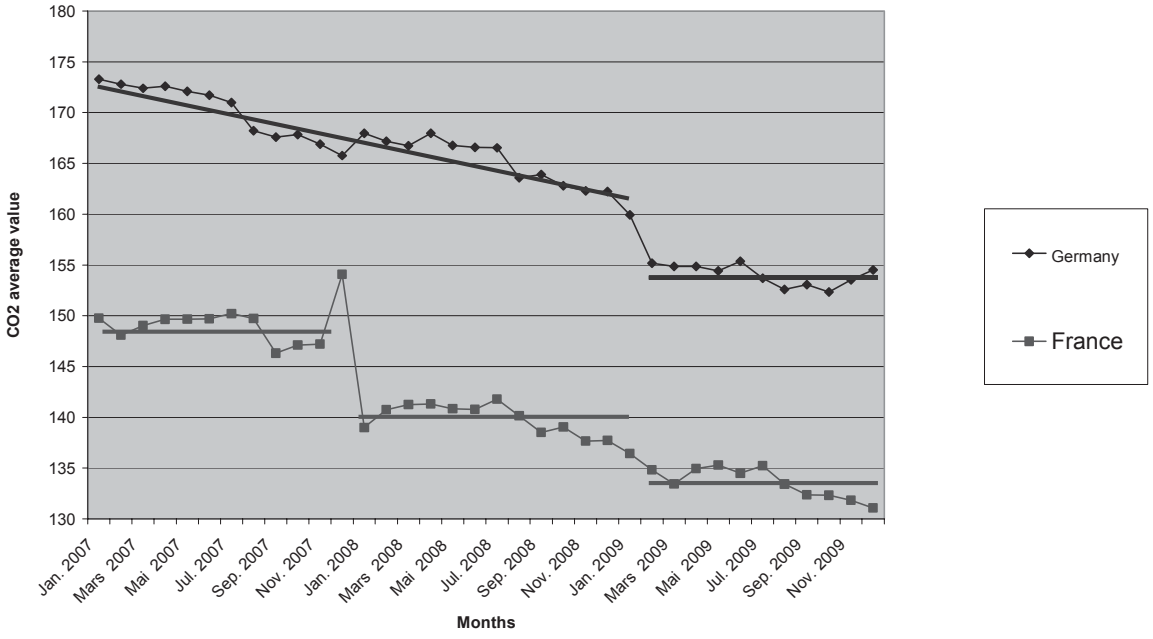
All the elements above – taxation, scrappage scheme, oil prices – have contributed to this significant decrease, and the contribution of each of them is not directly measurable. However, in some countries, several direct effects can be appraised. Two examples are given below, based on monthly average CO_2 figures (see Figure 6).

In Germany, while a significant decreasing trend was visible over 2007-2008, a gap of about 8 g/km can be observed at the setting of the scrappage scheme in early 2009, even if the scheme was not based on CO_2. It will be of interest to monitor how CO_2 will evolve when this measure ends.

In France, the introduction of the bonus/malus and the setting of the scrappage scheme at the end of 2008 are visible, even in a car market with already very low average CO_2 emissions: about 9 g for the bonus-malus, with an additional 6 g for the scrappage scheme.

In both cases, the decrease was mainly linked with a change in technologies. It can be estimated that in 2006-2009, improvements in technology were responsible for approximately two-thirds of the CO_2 reduction in Germany, and three-quarters of the improvement in France, the remainder coming from the change in product mix in the market. What cannot be identified among these decreases is the effect of fuel prices, in particular with the peak of Summer 2008.

Figure 6. **Monthly evolution of CO2 G and F, 2007-2009**



2.6.2 France: multiple developments since 2007, a complex imbroglio

France has introduced several new instruments since 2007. Before this period and since 2002, there was neither a purchase nor an annual circulation tax, only a limited registration tax. The current package of taxes treats private owners and companies on a different basis due to a very significant additional tax on companies.

France has defined a target for the total vehicle fleet on the roads of 120 g/km in 2020, compared to approximately 180 g/km in 2007. The different measures are designed with a view to reaching that level.

Table 4 summarizes the key tax elements that apply to gasoline and diesel passenger cars:

Table 4

	2006	2009	2010	Projections
TIPP (60 ct / l)	200 € / t	200 € / t	200 € / t	Risk with consumption reduction?
TVTS on company cars		1000 € / t	1000 € / t	Maintain revenues?
Bonus / Malus	0	150 € / t	150 € / t	Continuity / reinforcement and thresholds' evolution?
Carbon Tax	0	0	17 € / t	35 € / ton in 2012 and 60 to 100 € / ton in 2020?
Total without TVTS Total with TVTS	200 € / t 200 € / t	350 € / t 1350 € / t	370 € / t 1370 € / t	

2007: TVTS

The annual TVTS tax applies to passenger cars (M1) owned by companies, with various, total or partial exemptions (i.e. single person or small companies). It replaced an earlier tax in 2007 that was based mainly on the "*puissance fiscale*" (administrative power), a coefficient based on a mix of Engine Power and CO_2 emissions, that discriminated between vehicles relatively lightly, with a threshold approximately in the D class. TVTS is exclusively based on CO_2.

It is highly discriminating as, on the overall market, it is equivalent to EUR 1000/tonne of CO_2 (100 g/km → 400 EUR/year; 200 g/km → 3 400 EUR/year). Furthermore, it is strongly discontinuous, with steps of 800 EUR/year at 160 g, and 700 EUR at 140 g.

It slightly reduced sales of D/E classes (upper and upper-medium class cars) in its first year. Combined, from 2008 onwards, with the bonus/malus, it has since significantly impacted upper category car sales, and changed policies towards company cars in large businesses.

TVTS makes no distinction between diesel and gasoline, with the consequence that almost all vehicles sold in D and upper E classes are now diesel fuelled.

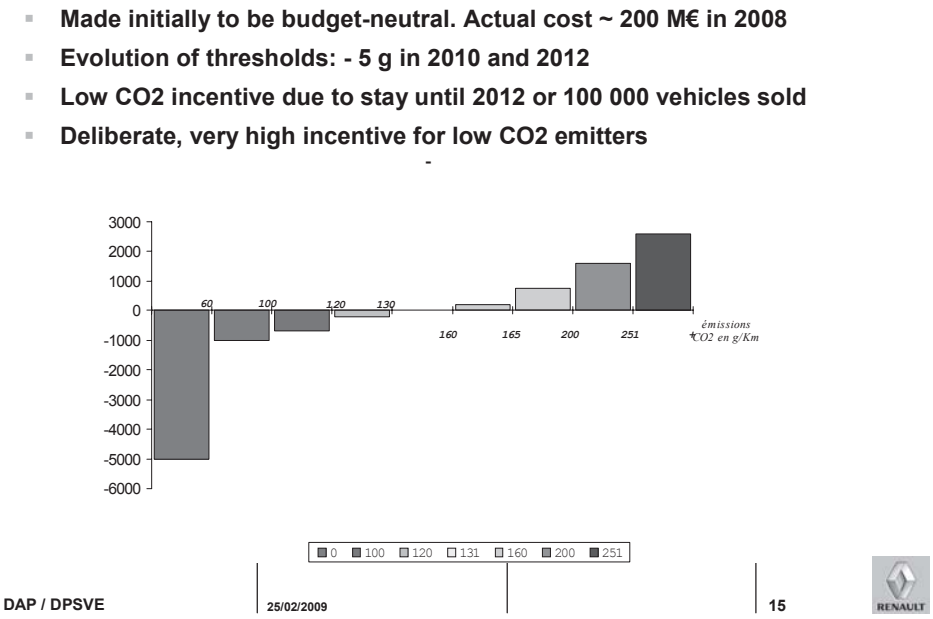
2008: Bonus/malus

This "penalty and incentive" (or fee-bate) purchase tax was introduced on 01/01/2008, following the "*Grenelle de l'Environnement*" of 2007, a broad consultative political forum that addressed numerous environmental policies. The measure was designed to cover an initial period from 2008 to 2012, with a lowering of all the thresholds set by 5 g/ km every two years to preserve incentives and fiscal balance as the new car fleet adapts. Lowering the thresholds has been brought forward; the average CO_2 emissions from new cars has fallen faster than anticipated, creating a significant budgetary cost.

Bonuses and penalty charges apply upon registration of new M1 vehicles. They are set as absolute values that depend only on the CO_2 type approval test emissions figure. Charges range from a

bonus payment of 1 000 EUR for cars rated < 100 g/km, to a fee of 2 600 EUR for cars rated > 250 g/km. A bonus payment of 5 000 EUR applies for M1 and N1 vehicles with a CO_2 emissions value below 60 g/km.

Figure 7. **France: 2008 Bonus-Malus System**



The incentive provided by the bonus/malus system is broadly equivalent to 150 EUR/tonne of CO_2. But the thresholds, with large bonus or tax steps, have caused major shifts in the market, with (1) downsizing in the segment mix; (2) downsizing in power; and (3) a move to diesel in certain segments, as the system is based on CO_2 certification values. The share of diesel engines in the new car market has attained more than 70%.

The system demonstrated high effectiveness: in 2008, CO_2 emissions from new vehicles in France fell by 9 g compared to 2007, falling from 149 g/km to 140 g/km, most of the decrease resulting from the bonus/malus system. The measure has turned out to have a net cost for the State, as the shift in the market was higher than anticipated: the budgetary cost was ~EUR 200 million in 2008 and ~EUR 500 million in 2009. The measure successfully helped stimulate the market for low carbon vehicles, but created too great a change in the mix of products, with cost implications for industry.

2009: Scrappage scheme with CO_2 criterion

Due to the economic crisis, France introduced a car scrappage scheme at the end of 2008, which was quite early compared to other EU countries. One criterion for access to a 1 000 EUR subsidy for the purchase of a new car was CO_2 emissions of below 160 g/km.

In 2009, CO_2 emissions in France reduced by 6 g compared to 2007, from 140 to 134 g (the lowest level in the EU).

During the year with this scrappage measure, the market increased in volume (+10.7%) while segment mix and CO_2 emissions significantly declined. But it is not certain that the CO_2 threshold

itself actually had an effect, as the other CO_2 measures already existed, and beneficiaries of the bonus/ malus system were essentially buying low-range cars also eligible under the scrapping incentive.

2010: A carbon tax, still under consideration for 2010

The law to introduce a carbon tax, agreed at the *Grenelle de l'Environnement*, was passed by parliament but its introduction has been delayed by the Constitutional Council, not for reasons of principle but because its implementation would add to the cost of car use.

Other economic instruments: technology incentives, biofuels, additional CO_2 malus

- A technology incentive of 2 000 EUR for hybrid (HEV), CNG and LPG cars, with CO_2 emissions below 140 g/km;

- Biofuel measures for E 85 and first-generation biofuels, driven by a target for biofuels to comprise 7.5% of auto fuel sales (by energy content) in 2010. For the EU, the target is 5.75%. Measures to ensure compliance include financial penalties for distributors. This has resulted in (limited) fuel price increases in 2009 and possibly in 2010;

- In addition to the bonus/malus system at registration, an annual malus was introduced in 2009 for vehicles with CO_2 emissions higher than 250 g/km. However, the share of such vehicles in France is extremely limited, less than 2% of sales, and the effectiveness of the measure can therefore be questioned.

Effects on CO_2 and on the market?

The chart below presents the evolution of the car market by segment in France in recent years. A significant downward trend is obvious, starting in 2008. The share of "D and above" cars fell from ~22% to ~16%, the share of A+B increased from 46% to 58%.

While environmental effects are well identified with CO_2 reductions there are also other important impacts:

– Economic effects, as the average price of vehicles fell 8% between 2007 and 2009;

– Industrial effects for local manufacturers, in plants that were producing "D and above" cars;

– To a certain extent, trade balance effects as, for reasons of competition, local manufacturers had relocated production of A and B cars to other countries.

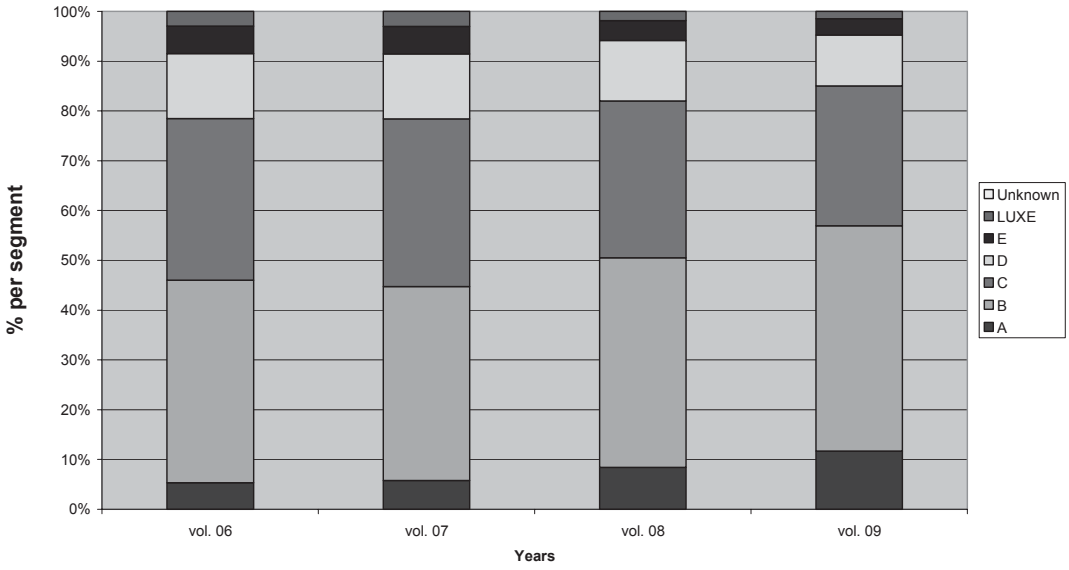
To be noted: the scrappage scheme in France (1 000 EUR for the purchase of a new car emitting less than 160 g/km and the scrapping of a car older than 10 years) had a very positive effect on the volume of cars sold, with the 2009 new car market up 11% on 2008.

How might these taxes evolve?

With the range of economic instruments introduced in the past three years, the question of their evolution is crucial for car manufacturers, and particularly those for which France is a major market.

The bonus/malus system is planned to keep its current configuration until 2012. This stability is very helpful, despite the recent decision to advance the date for lowering the limit values. For other components of the package there is no indication of the extent to which they will remain unchanged, or be strengthened; and if strengthened, by how much. Manufacturers have to analyse the possible evolution of these instruments at their own risk (see 3.2).

Figure 8. **Evolution of the mix of sales on 2006-2009: France**



2.6.3 Germany: a long-awaited, cautiously prepared evolution of the current scheme

Former system

German car taxation formerly relied on an annual circulation tax, proportional to engine capacity, the value of which is correlated with the emissions standards and fuel type, with significantly higher taxes for diesel vehicles. No company car tax exists in Germany, a major difference to France and the UK.

The rate of the tax is linked to the Euro emissions class of the vehicle and effectively links it to the age of the vehicle, as Euro standards are revised every few years. The tax therefore provided an incentive for renewing the oldest vehicles.

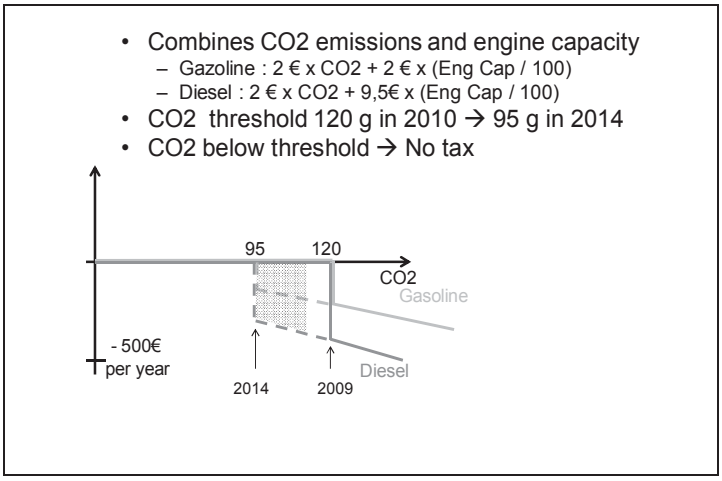
New system

The new tax systems rely on both CO_2 and engine capacity, with a differentiation between diesel and gasoline. The CO_2 part remains relatively low compared to the part related to engine capacity, in particular for diesel vehicles.

A threshold acts as a "trigger": vehicles below that level pay no tax at all. This threshold starts at a level of 120 g/km and will decrease with time, to 95 g/km in 2014. This provides visibility until 2014. Except for the threshold, the scheme provides linear incentives.

Looking at the way this scheme will function for manufacturers, the threshold will discriminate only between segments and products that reach it and those that do not: in the short term, A, B and C. Some higher range vehicles may fall below the threshold in the future (Hybrids or Plug-in Hybrid Electric Vehicles) that might anyway be more expensive. This scheme might therefore strongly increase the competition in the lower range of products, eliminating those that exceed the trigger value, with a potential effect of "dieselization" in that segment.

Figure 9. **Germany: New Annual Circulation Tax**



2009 scrappage scheme

In response to the economic crisis, a car scrappage and replacement scheme was introduced in 2009, which had a powerful effect in boosting sales on the German market:

- Support was provided for the purchase of 2 million vehicles, leading to a new car market of 3.8 million, whereas initial forecasts were in the order of 3 million vehicles.

- There was a strong impact on the mix of vehicles sold, with A+B cars close to 40%, compared to below 25% in previous years, and "D and above" below 30% instead of nearly 40% of the market, with corresponding impacts on manufacturers' economic and industrial organisation.

- Comparing the second half of 2008 to the average for the year 2009, we observe a decrease of 9 g/km in the specific CO_2 emissions of new vehicles sold.

Figure 10. **Germany: Monthly average CO2 emissions – mid 2008 to end 2009**

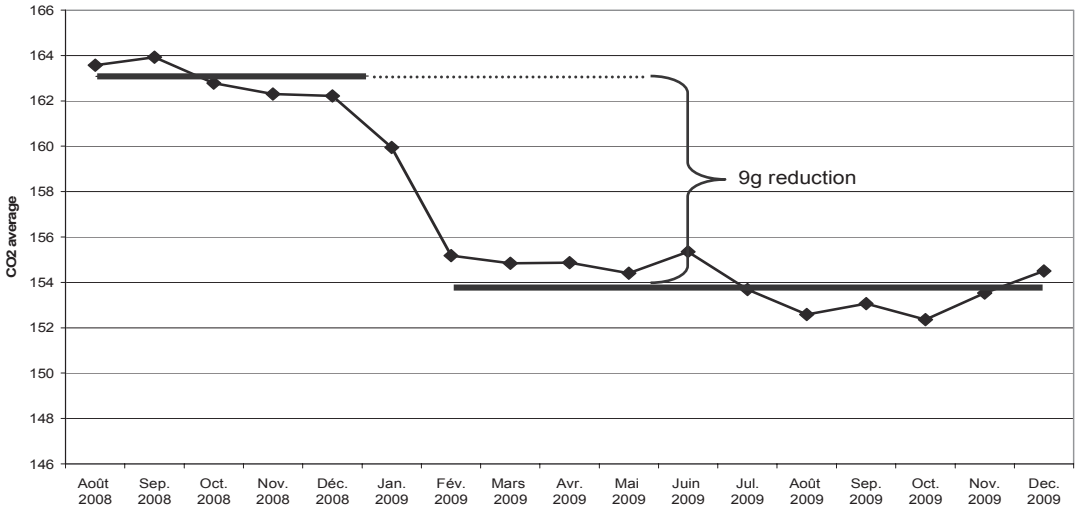
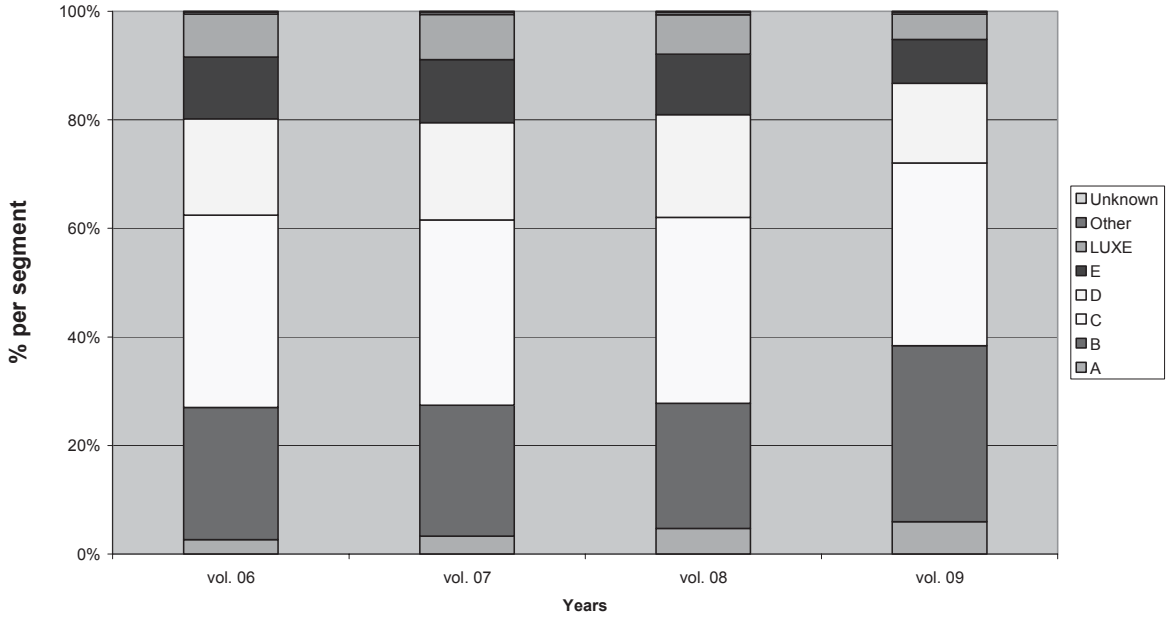


Figure 11. **Evolution of the mix of sales, 2006-2009: Germany**



2.6.4 UK: a strengthening of the current ACT and a tough company car tax

Two elements characterise car taxation in the UK: an annual circulation tax and a company car tax.

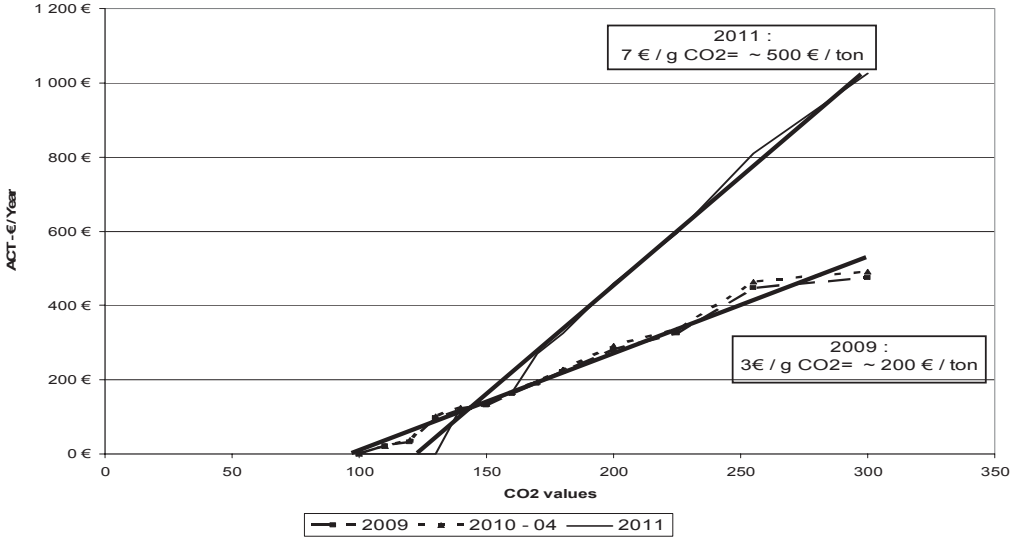
The annual circulation tax is scheduled to be significantly reinforced for vehicles first registered in 2010, especially for vehicles rated above 160 g/km.

Currently, the ACT has increased progressively from 100 g/km to beyond 255 g/km, with the slope of the increase corresponding to approximately EUR 3/g, that is equivalent to ~ EUR 200/tonne (see Figure 12 below).

The threshold for the new scheme has been increased to 130 g/km with a significantly steeper slope, corresponding to approximately EUR 7/g, equivalent to ~EUR 500/tonne.

Company car tax in the UK applies on the person benefiting from use of the vehicle. Its calculation depends on the retail price of the vehicle, on its CO_2 emissions and on the income tax band to which the beneficiary is subject, which depends in turn on revenue. Making some assumptions for these parameters, the intensity of car company tax is estimated on average at around ~ EUR 1 000/tonne, but is significantly lower on smaller vehicles and higher on D and upper segments.

Figure 12. **UK: Annual Circulation Tax Evolution**



2.6.5 The Netherlands announce several steps towards a radical change in road pricing until 2013

For several years, the Netherlands has implemented environmental policies for cars with a strong influence on the market. Several instruments are employed, including a labelling scheme and a tax on high CO_2 emitters. The main instrument is a registration tax (BPM) as well as an annual circulation tax (MRB). In the last three years, average emissions from new cars sold decreased by 17 g, from 165 g/km to 148 g/km.

Overall taxation is high compared to other EU countries, France and Germany in particular. The registration tax system is shifting from a tax based on the retail price to a tax based only on CO_2 with a high intensity. The change will be implemented progressively between 2009 and 2013. BPM was set at a basic rate of 40.2% in 2009. In 2010 this was reduced to 27.4%, with the difference taken up by a

CO_2 element. The average intensity based on the CO_2 share is expected to grow from ~150 to ~500 EUR/tonne CO_2 between 2009 and 2013,

The annual circulation tax will increase in the coming years, and the Netherlands is considering moving to a kilometre-based, so-called "pay as you drive" tax.

The system is currently strongly divided between diesel and gasoline vehicles, with significantly higher taxes on diesel; this distinction will continue and increase in the future. The system is characterised by a "trigger" threshold of 110 g/km for gasoline and 95 g/km for diesel.

If vehicles are under that threshold, they are not subject to the tax (27.4% of the retail price plus CO_2 charge). Therefore the trigger effect produces vehicles that are in fact fuel efficient but, when just above the CO_2 threshold, unmarketable.

2.6.6 Other countries with interesting features

Portugal

Portugal has developed its registration tax with a progressive shift of the basis of taxation from engine capacity to CO_2 emissions, with a high diesel/gasoline differentiation. The CO_2 incentive is intense, pushing products with medium or high CO_2 emissions out of the market.

Purchasing tax on a diesel car emitting 200 g is as high as EUR 10 000. At these levels, some products are no longer marketable and some customers cannot afford products to meet their requirements. The intensity of the Portuguese registration tax corresponds approximately to EUR 500/tonne, which is very high in relation to the modest purchasing power of the population.

Spain

At the end of 2008, Spain introduced a new registration tax. The previous system was based on engine capacity classes; the new system is based on CO_2 classes, with more differentiation. It is difficult to analyse the effect in 2009 due to the crisis that strongly affected the market, but 2009 showed renewed improvement in CO_2 emissions from new cars (2006-2008: -4 g; 2008-2009: -7 g).

Belgium

Without entering into details, it is worth mentioning that the two Belgian regions have each adopted different fiscal rules in relation to CO_2. This makes the selling of vehicles in that small market more complex and the rules possibly less efficient.

2.7. Conclusions

In summary, taxes can be a powerful tool to reduce CO_2 emissions but, as they are not managed with a view to harmonization in the EU, they render the idea of a single market for cars in the Union meaningless. They generate high costs and perturb manufacturers' planning to such an extent that cost-effectiveness is seriously undermined.

In terms of the effect on competition, models that are brand new and recently engineered can benefit from CO_2 incentives as long as they fall the right side of thresholds and steps in the system of incentives. Consider now a manufacturer selling in a particular country a model engineered some

years ago but still with a planned life-time of several years. New tax rules may force either additional investment to adapt the car, or a decision to stop the sales of the model there. In either case, the manufacturer will endure an economic loss on that model as a result of a tax that was unknown at the time the car was designed. This is an example of an unpredictable, very severe change that accelerates drastically the obsolescence of vehicles, with negative economic and commercial impacts on the Original Equipment Manufacturer (OEM).

Taxes impact manufacturers very differently, depending on their mix of products, of customers and of the markets in which they operate. They cause CO_2 competition particularly in the lower vehicle ranges, which tend to be more price-sensitive. In some cases, high taxes favour upper-range vehicles, as customers for these vehicles have fewer budgetary constraints.

Manufacturers accept taxation on the basis of CO_2 emissions, but contest the way taxes have been implemented nationally with a diversity that generates economic inefficiency, and not only from an industry perspective. What is required of CO_2 taxation is linearity, continuity, transparency and harmonization.

3. HOW CAN OEMs MANAGE THE TAXATION?

Markets are now strongly orientated by the very diverse economic instruments implemented by a majority of Member States in the EU. Three issues require attention in analysing how manufacturers respond: how customers behave in response to taxation, how manufacturers adapt in the short term, how manufacturers try to adapt to uncertainty over the evolution of taxes in the future.

3.1. Diverse customers with very diverse behaviours in relation to CO_2 incentives

3.1.1 Customer diversity

The first issue for manufacturers is to analyse how customers will evaluate taxation and incentives related to CO_2 emissions in their purchasing decision process, in addition to the effect of the fuel costs, which are also CO_2 related.

Professional users and leasing companies are “simple customers”:

- They base their assessments on systematic, predictable, rigorous assessment processes, including all the costs of usage of the vehicle and assumptions on the resale value based on statistics. The resale value also depends to a degree on fuel consumption and fuel prices.

- They base this assessment on given ownership duration and mileage. In their assessment, they usually include what they know about current taxation, and about future values if available.

– Most of the professional users and leasing companies keep their vehicles for about three years, in order to optimize the resale or buy-back value against maintenance costs.

In contrast, private users are "very diverse and complicated customers":

– They do not have precise assessment methods, and have very different ownership duration and mileage patterns, which vary by country and product segment.

– They tend not to weigh annual taxation and even fuel consumption over their total ownership period in their purchase decisions, which makes registration taxes much more important in their decisions than fuel or annual taxes.

– More importantly, for most of the buyers of lower-range and economical cars, the purchase price will outweigh a fully rational, economic assessment, in an EU market where competition is very broad and price competition on these products very stiff.

– The economic situation of buyers strongly influences purchase patterns, in particular when considerations of social status play a role.

3.1.2 The impact of economic instruments

CO_2 vehicle tax incentives affect costs for motorists in EU markets as much as fuel prices. In other words, a consumer purchasing a car should assume on average that CO_2 taxes can cost as much as fuel tax. But if this is valid on average, some customers may pay no tax beyond fuel tax, while others may have to multiply what they pay in taxes by more than three or four to arrive at what they will pay in fuel tax and CO_2 vehicle tax together.

3.1.3 Diversity of customers in relation to price and affordability

In lower segments, the dominant purchase criterion for customers is price. This leads the large number of manufacturers competing on the lower range of the market to fight firstly on costs, to optimise the affordability of their products. Upper segments are driven by performances, safety, technology and, to a lesser extent, overall cost of ownership and use more than price, in particular for company cars.

As a consequence, in countries that have adopted high intensity CO_2 taxation, there is more response in upper range cars with versions strongly improved regarding CO_2 emissions, sometimes at significant additional cost with the price premium off-set by taxation benefits. Rapid improvement of upper range vehicles is a significant trend that will merits attention in CO_2 monitoring in the future).

3.2. How to adapt in the short term

3.2.1 Continuous monitoring of taxation in all countries

Due to the weight of the economic instruments on markets and their unpredictability, manufacturers must continuously monitor policy in the EU countries. They can rely either on consulting companies for this service, or use their own organisations and distribution networks. Results are considered commercially sensitive.

This kind of monitoring may involve different departments of OEMs in particular finance and public affairs departments. Depending on the size of the country, on whether the OEM is important or not, in particular whether he has industrial activities, the monitoring can be easier.

One recurrent difficulty is qualifying the accuracy of information as the process from proposal to entry into force of a new tax is often long and uncertain. When marketing or engineering decisions are dependent on a new tax or changes to an existing tax accuracy is critical and requires sufficient understanding of the decision making process and of the grounds for the taxation. Some decisions are hidden and made in a very short time, others are the result of a long public consultation process. Examples of both are cited above.

3.2.2 Short term adaptation to taxation

Industrial lead-times are well understood and vary little. With current trends in regulation, and to respond to the economic crisis, the engineering departments of OEMs have significant workloads, if they are not overloaded. Challenges include Euro 5/6 regulations, CO_2 regulation requiring thermal engine downsizing and new emission control technologies. OEMs can adapt their products, but rarely have a large potential for adapting to short term changes that hamper product competitiveness. In some markets where the volume to production of a vehicle or a version is limited, there is no economic justification for an engineering investment to adapt the vehicle to new regulations.

To a certain extent, manufacturers are forced to adjust to short-term changes in taxation. Several responses are possible: changes in the mix of the products or in the mix of versions within a product line; increase or decrease of manufacturing capacities; adjustment of retail prices or commercial policy. In these cases, taxation's role as an economic agent determining company behaviour is direct and profits decline if products do not fit the new market conditions.

Not only is there an effect on product margins but on engineering and industry planning costs. This makes unpredictability in changes in taxation a significant burden on industry, and in particular on OEMs more involved in the lower range of the market where cost and price competition reduces the flexibility to anticipate changes.

3.3. How to deal with economic instruments in the future?

3.3.1 Projections

Looking at products entering the product planning and the engineering departments today:

- Their sales will start in three years, end of 2012/beginning of 2013, at the time of the start of implementation of EU CO_2 emissions standards for fleet average of new cars (130 g/km from 2012 with a phase-in period to 2015).

- Their sales will end, normally, 6 to 7 years later, close to 2020. This is the date for the long term target for average new car fleet emissions in the EU, set at a level of 95 g/km, associated with penalties of 95 EUR/g/km for each vehicle, equivalent to ~ 500 EUR/tonne of CO_2 approximately.

This illustrates how the car landscape might evolve in the next ten years, with high risks for OEM in particular regarding the commercial life of their products: if taxation and oil prices increase

significantly, products might become obsolete much quicker than in previous periods, with significant consequences for profitability and industrial restructuring.

Economic instruments have demonstrated their effectiveness in the EU market, particularly over the past two years: they significantly oriented the market towards low CO_2 emitting vehicles, accelerating the trend in reducing average new car emissions. They acted in parallel with other key drivers: the crisis, measures to support industry pass through the crisis, oil prices, the growing awareness of citizens and consumers about climate change and oil price risks.

These different criteria will continue to weigh on the market and fuel competition. Among these drivers, taxations and incentives related to CO_2 may become dominant. No one anticipates a weakening of policies to limit CO_2 emissions from transport.

Manufacturers must define their product and technology policies with very thorough economic assessment and complex arbitrages: they have limited resources; the competitiveness of the market does not allow for overburdening the cost of producing vehicles, particularly in low range segments. Therefore, manufacturers must anticipate the potential impact of economic instruments over the longer term, and try to protect themselves against the uncertainties that result from these public policies.

3.3.2 Own appraisal of possible changes

For a manufacturer, its evaluation of the future evolution of taxation is confidential and has competitive value, as it drives product, technology and marketing strategy. When looking at the CO_2 strategies of OEMs for products launched over the past two years, very different strategies can be identified, some of which benefit greatly from recent tax changes. This is particularly visible for groups operating in upper segments with more flexibility on prices.

Because information on potential changes is not available, some car manufacturers elaborate scenarios for future taxation, to provide guidelines for the engineering of future products. When analyzing potential evolution of taxation in a country, different criteria can be taken into account, depending on local circumstances:

- Factors for the continuity of policies, in terms of schemes and levels of taxation: stability of revenues for the State, management of the cost of mobility for citizens that is politically sensitive, importance of the car industry in the country.

- Factors for increasing the stringency of the policies: climate policies; potential increase need for tax revenues (but even maintaining tax revenues may require increased stringency as products change and markets shift to lower carbon vehicles; energy policy and trade balance; willingness to progressively restrict individual mobility for several reasons encompassing various environmental and transport concerns.

Significant changes in the structure of taxes are very difficult to anticipate, and can require more lead-time for their implementation than simpler tax evolutions. This is true of new policies like the future introduction of congestion charging. This does not mean that all severe changes can be anticipated. In France, the TVTS, stringent Company Car tax, was defined late in 2006 for quite immediate implementation.

In general manufacturers do not anticipate a decrease in the intensity of the CO_2 taxation, and consider that a progressive increase in the overall taxation on CO_2 will be driven by both the

strengthening of climate policies and compensation for an overall reduction in fuel consumption in transport.

4. ECONOMIC INCENTIVES FOR FUTURE EVs AND VERY LOW CO_2 VEHICLES?

4.1. Policies regarding very low CO_2 vehicles

Numerous national governments and regions worldwide have announced support measures for the development of Electric Vehicles and low CO_2 emitters. These measures address, depending on the countries, some or all of the different items that will contribute to market take-off: R&D, engineering, industrialization, for electric vehicles (EVs) and plug-in hybrid electric vehicles (HEVs), charging infrastructure and batteries. As with economic instruments for conventional vehicles, there is already a wide diversity of measures:

- Support for market development (numerous countries);
- Development and industrialisation of batteries (France, Portugal, the UK, Germany);
- Development and industrialisation of vehicles and their specific components (France, Germany and, to a lesser extent, Spain);
- Network deployment (numerous countries, but also regions and cities);
- Experimental programmes (numerous countries, but also regions and cities).

Depending on the particular state, measures rely on direct aid (most cases of market support), financing of R&D and engineering for vehicle development, components and batteries, or loans for specific, heavy investments such as infrastructure and battery manufacture. The choice by Member States as to whether to support one or another item depends on a variety of elements:

- The ambition of the country regarding low CO_2 car development;
- Its situation in terms of engineering and manufacturing of vehicles, and its vision and interest for the future automotive industry;
- The mix of energy supply performances, in terms of CO_2 emissions, involved in its energy production and capacity in renewable energies, in particular for electricity.

Levels of support from economic instruments for these vehicles also vary widely, from nothing to incentives as high as EUR 9 000 for an electric vehicle in Belgium, and even more in Denmark with tax relief at purchase.

4.2. How incentives will impact the EV and low CO_2 car market

4.2.1Which comparison is relevant?

Incentives supporting the development of sales of low CO_2 cars differ from one country to another. What is important for market introduction (and for the manufacturers) is not the incentive itself, but the difference in incentive between EVs and P-HEVs and its competitors on the market. For instance, looking at a B-segment EV, the difference of taxes with the most efficient B car on the market is the figure that matters.

To illustrate the point:

- In France, all cars with CO_2 emissions below 95 g/km at present, 90 g/km in 2011-2012, will benefit from a 1 000 EUR incentive, reducing the real value of the 5 000 EUR incentive available for an EV to 4 000 EUR.

- In Spain, the most recent Spanish tax scheme exempts cars emitting less than 120 g CO_2/km from the registration tax. As can be seen in Figure 13 below, the more the car emits and is expensive, the higher the tax advantage. That makes incentives very attractive for expensive/upper range cars, while the market for low-emission vehicles receives smaller incentives, comprised of:

  - An incentive for electric vehicles, representing 15% of the retail price;

  - Differentiated registration tax, which is also proportional to price, and at the same time increases with CO_2 emiss**ions.**

Figure 13. **EV versus conventional cars, 2009 Spanish tax regime**

Retail price of vehicles (EUR)		CO_2 emissions from conventional vehicles as a reference							
		< 120g		120g >160g		160g>200g		200 and more	
		0%		4.75%		9.75%		14.75%	
10 000	Registration Tax of conventional cars	0	1500	500	2000				
	Fiscal Incentive for Electric Vehicle	1500		1500					
15 000	Registration Tax of conventional cars	0	2250	750	3000	1500	3750	2250	4500
	Fiscal Incentive for Electric Vehicle	2250		2250		2250		2250	
20 000	Registration Tax of conventional cars	0	3000	1000	4000	2000	5000	3000	6000
	Fiscal Incentive for Electric Vehicle	3000		3000		3000		3000	
30 000	Registration Tax of conventional cars	0	4500	1500	6000	3000	7500	4500	9000
	Fiscal Incentive for Electric Vehicle	4500		4500		4500		4500	

Uneven incentive per tonne of CO_2 reductions depending on the car segment

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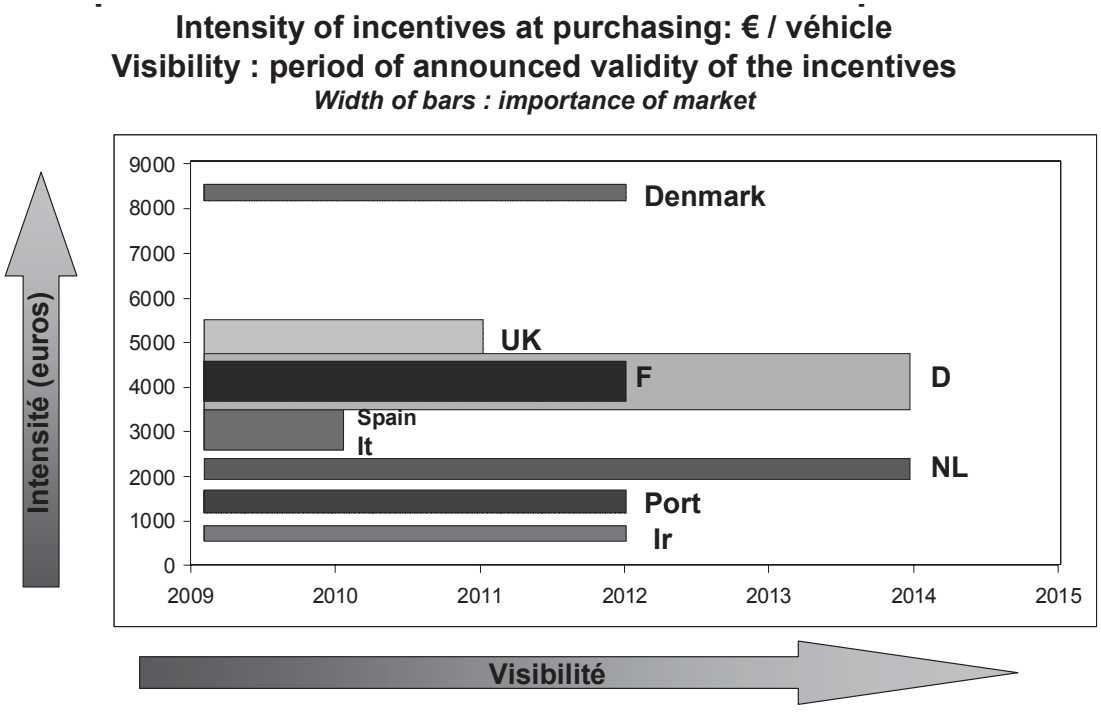
4.2.2 Already a great diversity of incentives

As mentioned above, a large diversity in incentives is already anticipated. To illustrate this diversity, Figure 14 below presents current expectations in nine EU countries in relation to two criteria:

- Vertically, the intensity of the incentive for purchasing an electric vehicle ("zero emissions from tank to wheel") as against the comparably CO_2-efficient ICE vehicle, usually among diesel vehicles with low CO_2 emissions, which currently either benefit from incentives or are minimally taxed.

- Horizontally, the expected duration of the incentive. This point is crucial for manufacturers as durable incentives are essential for creating a market for low-CO_2 vehicles.

Figure 14. **Comparisons of incentives for buying comparable EV and ICE cars**



4.2.3 Many uncertainties for the future

For manufacturers involved in developing very low CO_2 vehicles and EVs, three uncertainties are cumulative when assessing the impact of economic instruments:

- How will the economic instruments for EVs evolve? As seen in the above figure, countries are planning policies up to 2012 or 2014. EVs will start to enter the market by late 2010 or 2011, and significant volumes are not expected until 2012.

- How will economic instruments for conventional, CO_2 efficient vehicles evolve? If significant incentives are maintained, the attractiveness of EVs may be reduced.

- How will oil prices, taxes on fuels and total fuel prices evolve? Again, this parameter might impact on the attractiveness of the EV.

But most importantly, a key parameter is transparency on how long the economic instruments will continue to operate:

- While the first electric vehicles will be launched in Europe in 2010 in limited volumes, the EV market will only really stabilize later, by 2015 at the earliest.

- The engineering and other investment costs for vehicles, batteries, infrastructure and new components will be extremely high and the decision to produce EVs represents business risks requiring sufficient transparency and, probably, public support.

4.3. How states should evaluate the policy value of these vehicles

When considering support for EVs and P-HEVs, governments must assess whether long-term support is justified on the basis of direct environmental benefits. This does not seem necessarily to be the case.

Beyond conventional assessment, a study was made by the CIRED (*Centre International de Recherche sur l'Environnement et le Développement*, Paris) at the end of 2009, under the guidance of Dr. Jean-Pierre Hourcade, on the effects of a policy anticipating the introduction of EVs. This study was based on modelling analysis (Model IMACLIM-R). It concluded that supporting anticipated EV deployment would provide high benefits through the potential effects that such a policy would have on climate change. The risks of deploying these vehicles quickly would be largely offset by the gains of achieving earlier emissions reductions (always assuming EVs use low carbon electricity). There may be benefits from ambitious strategies for the deployment of EVs and very low CO_2 emitters in terms of alleviating mitigation measures in the long term.

4.4. Which public policies to support the deployment of very low CO_2 vehicles and EVs?

At this stage, considering that the development of EVs and very low CO_2 emitters will start soon, and assuming that governments confirm the benefits of accelerating deployment, three key recommendations should be taken into account by states that intend to develop these products, when setting their incentive policies:

- Sufficient visibility as to the duration of incentives. The development of these vehicles in competition with products that are economically and technically optimized will depend on progressive cost reductions of key new components. Considering the likely production volumes of these vehicles, sufficient market and fleet size does not seem likely by 2012 or even 2015. Long-term policy incentives are therefore indicated.

- Sufficient incentives for these vehicles in comparison to conventional cars. Schemes should provide sufficient incentives for EVs and very low emitters to make them attractive in comparison with the most CO_2-efficient ICE vehicles. These conventional vehicles will also improve over time.

– Link incentives directly to the CO_2 benefits resulting from using these vehicles. The form of incentives/taxes should relate more to the benefits expected than the cost of a product or a specific technology. The effectiveness of a policy will depend on massive development of efficient products.

With the changes that will occur in the market regarding lower CO_2 emissions from conventional cars and the emergence of very low or zero CO_2 emitters, current economic instruments need a profound review to adequately support new products and at the same time maintain balance in state budgets.

5. CONCLUSIONS

This paper describes key features of EU car taxation and its consequences for manufacturers. Some elements of the analysis, in particular those related to very low CO_2 emitters, are also valid for other countries. Some conclusions can be drawn.

– **Current economic instruments create strong environmental incentives, generating a decrease in CO_2 emissions from the new car fleet.**

In sum, the various taxes applying to fuels and vehicles create a strong economic incentive to reduce CO_2 emissions. The size of incentives is much higher than the comparable policy instruments applied to other sectors of the economy. In some cases, they can be considered disproportionate.

Beyond its role of generating revenue for state budgets, the taxation of fuels represents the first element weighing on vehicle choice and vehicle mileage.

The total cost of taxes on automobiles varies by country across a very wide range. New, average car CO_2 emissions vary according to the intensity of incentives in comparison to national incomes and income distribution. The recent economic crisis and the measures implemented to limit its impact on industry induced a strong acceleration in new car CO_2 emissions reductions, which might partially reverse in the short term.

Trends in EU Member States reveal the strong effectiveness of taxes in advance of any effect from the EU Regulation on new car CO_2 emissions, finalised in late 2008 for implementation from 2012. If tax incentives had been developed more widely early after the industry's Voluntary Commitments had been agreed, they would have greatly enabled the efforts of industry. The absence of fiscal incentives in most EU Member States between 1998 and 2008 weighed against effective CO_2 reduction, in the absence of regulatory CO_2 limits during that period.

– **The current fragmentation of incentives has a significant cost**

The diversity of incentives created by economic instruments within the EU is such that no "single market" for cars exists from an OEM perspective: products and marketing strategy require differentiation between Member States.

Due to the diversity of instruments and the unpredictability of changes in taxes and tax systems, OEMs have no robust basis on which to arbitrate between the costs and benefits of investing in CO_2 and fuel consumption reductions in their project planning. The first purchase criterion for a majority of consumers remains the price of a car, particularly in the lower segments of the market.

This unco-ordinated situation forces OEMs to implement short-term adaptations in marketing for CO_2 improvements that are not cost-effective for industry. Competition between OEMs has driven down CO_2 emissions, but a more predictable framework with co-ordinated incentives would have been certainly less costly and possibly resulted in larger emissions cuts.

– **Incentives should, as directly as possible, correlate with the CO_2 and environmental performance of vehicles**

Taxes and environmental performance are not always systematically linked, in particular incentives for specific technologies or alternative energies. In the long run, instruments that are not calibrated to benefits fail to be cost-effective *vis-à-vis* environmental results.

The various thresholds introduce discontinuities that do not correspond to the functioning of the industry, which is basically linear, and can create market disruption.

Bonuses related to the retail price of a vehicle may introduce bias, as they over-incentivise more expensive vehicles, which in some cases is not consistent with the intended policy – one example is provided by the system of registration taxes and bonuses in Spain.

When considering CO_2, incentives and taxes, in particular on fuels, one should not disregard the intrinsic efficiency of diesel technology. Current projects to base taxation of fuels on energy per litre will work against CO_2 reduction.

– **In a mature industry producing competitive conventional vehicles, new, innovative technologies will require extensive support**

Electric and very low CO_2-emitting vehicles will enter the market in the next two years in competition with conventional vehicles at an advanced stage of development. The new products will require new batteries and components that will compete with extremely optimised, mass-produced vehicles.

The initial cost of these new vehicles will be significantly higher than conventional vehicles and the pace of cost reduction is unpredictable. The overall initial expenses to ensure their launch and market development will be extremely high.

Member States that (1) fight for EV industry localisation in the future and (2) foresee considerable benefits from accelerated deployment of these vehicles, should consider continuous, long-lasting support policies. They may ultimately have to consider rebalancing their fiscal systems to finance such support in a period where fuel consumption should start decreasing with the improvement of the average CO_2 efficiency of the whole vehicle fleet.