Industry In-Depth

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CO_2 — A New Auto Investor Issue for 2007

Time to Take Note of Mix Threat to European Automakers

- **What's New** — The EU Commission's belated review (this month?) of car CO_2 performance is likely to flag a new tax-based approach to persuading consumers into more economical vehicles. Meanwhile, local CO_2-based taxes threaten to proliferate. This report reviews the possible impact on car manufacturers.
- **CO_2 the New Tax Base** — EC Commissioner Dimas looks set to demand legislative action as ACEA's Voluntary Commitment to achieve 140g CO_2/km by 2008 looks doomed. Exactly how EU regulation will promote tougher CO_2 standards remains open, but under any scenario, carmakers need to be close to compliance. A bevy of local actions (eg UK, Spain, Ireland) seem to be reinforcing CO_2's role.
- **Mix is at Stake!** — The dominant impact of regulation on a three-year view is likely to be found in mix, as the highly profitable (and recently growing) top slice of high-powered and heavy vehicles suffer disproportionately. Most exposed are BMW, Porsche and DCX. Smaller cars may flourish in the new environment, with significant potential benefits to small-car 'kings' Fiat and PSA in particular.
- **Investment Implications** — In separate notes today we cut BMW to Hold/ Medium Risk (2M; new target €46, was €50) and raise PSA Peugeot Citroën to Buy/ High Risk (1H; new target €61, was €43), partly motivated by 'order of magnitude' CO_2 impacts of €0.5bn negative (BMW) and €0.3bn positive (PSA).

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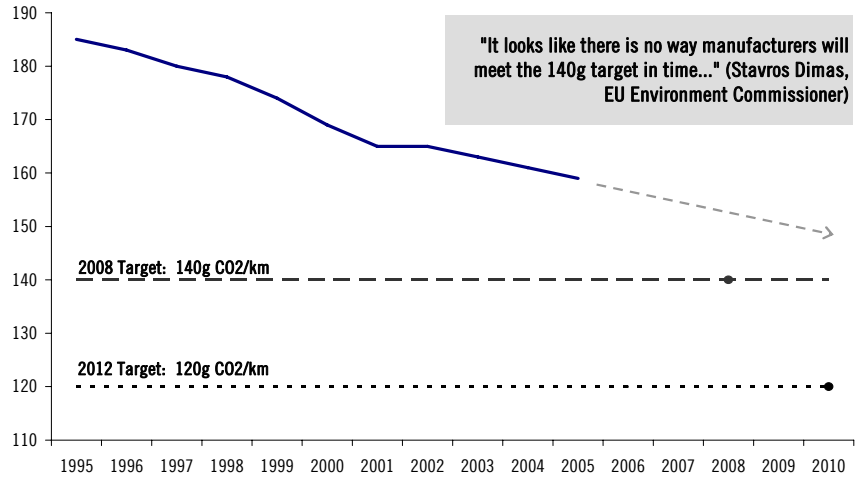
Figure 1. Progress of Europe's Voluntary Commitment to Reduce CO_2 Emissions, Fleet gCO_2/km



Source: Company Reports and CIR Estimates

See page 38 for Analyst Certification and important disclosures.

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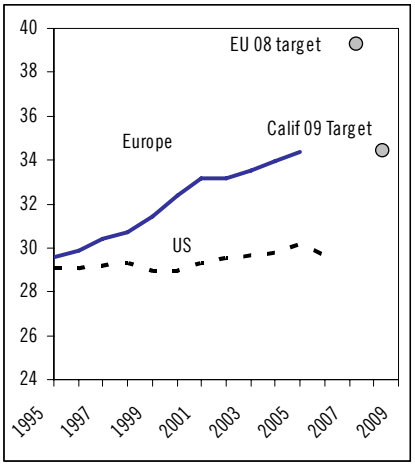
Figure 2. Not Quite Getting There... European and US Fleet Fuel Economy vs Targets, mpg



Source: Company Reports and CIR Estimates

Tightening CO_2 Regulations and Auto Assemblers

Climate Change in the News

So far, we doubt climate change has been an investor issue for the auto sector. But it's heating up, metaphorically speaking, as the international debate steps up. Europe's automakers look likely to have some fast adjustments to make.

- EC Environment Commissioner Stavros Dimas is threatening action as he wakes up to the likelihood that EU assemblers will miss targets (fleet-wide 140g/km by 2008E, and on to 120g/km by 2012) in their voluntary CO_2 reduction strategy. The EC Commission is due to present a revised Community strategy to reduce light vehicle CO_2 emissions 'in January 2007', delayed from late 2006.

- Recent other actions include a new CO_2 car tax base in Ireland, France (carte grise) and Spain (adjustments to the Prever scrapping scheme). The UK has become an uncharacteristic hotbed of climate debate, as the Stern Report raises awareness, while local actions (eg in London) — a wildcard in this whole area — are set to heavily penalise high-carbon light vehicles.

- International action: Japan appears poised to introduce new fuel efficiency rules that will be the strictest in the world (20% cut from 2005 levels by 2015). US CAFE rules are changing; California is sprinting ahead with measures to cut greenhouse gas (GHG) emissions by 25% by 2020 and suing six carmakers over GHG. Just as relevant, the recent surge in pump prices of fuel has caused a seismic shift in US vehicle demand as consumers newly value fuel economy.

All of which tells us it is time to sit up and take notice. The pace of change is quickening, and could take a sudden step-up if local action proliferates. Europe's auto industry has lost the initiative in change as CO_2 control migrates from voluntary to regulatory. Whatever form this regulation takes it has to squeeze down average CO_2 performance from the current 159g/km towards the 120g/km goal. Taxes and charges to push consumers and manufacturers to adopt lower-carbon vehicles are likely to substantially weaken mix, and favour smaller, less powerful cars.

Who is vulnerable?

Figure 3. Current Fleet Average Performance by Brand, 2005. g CO_2 /km

Maker	Fleet g/km
Fiat	139
PSA	148
Renault	149
GM of Eu	156
Ford of Eu	158
Average	**159**
VW	161
Japanese average	169
Korean average	170
DCX	185
BMW	192

Source: European T&E, 2006

Until the structure and timing of measures is clear, is judging their impact impossible? To some extent true — but we know the desired end-point for policy makers, and can thus comfortably rank manufacturers according to exposure. Any regulation is likely to be multi-part, including both fuel price and vehicle tax measures. Although there are ways in which the burden per manufacturer could be alleviated — through vehicle banding or by uniform percentage reduction structures for instance — we expect the adjustment pain to be rankable by the gap to the 120g/km ultimate target.

Our unsophisticated analysis tries to draw some simple 'order of magnitude impacts' on a three-year view, just to provide some idea of the scale of the issue, as we see it. The timescale is important: the actual adjustment period is clearly five to 10 years, and will begin to involve various new technologies, including hybrids and early fuel cell vehicles. The competitive implications of these could be immense as all manufacturers are returned, in some senses, to the starting grid. So we concentrate on the more tangible short term, making three points:

Figure 4. 'Order of Magnitude' Three-Year EBIT Impacts if CO_2 Regulation Forces Mild Mix Changes (€bn)

Maker	Indicative 3-year Vulnerability
BMW	neg €0.5
DCX	neg €0.5
Porsche	N/A
Volkswagen	balanced
Renault	pos €0.2
Fiat	pos €0.2
PSA	pos €0.3

Source: Citigroup Investment Research
Note: estimates of the cost of meeting 120g/km for the European fleet, by various EU consultants, and by motor industry sources, range up to €5,000/vehicle

1. We expect mix to be one of the main 'casualties' of change on a three-year view. Most external forecasts continue to see rapid growth in the content-rich upscale segments of the market, including luxury, sports and 4X4/crossover vehicles (5%-12% per annum, see Figure 17). This growth appears inconsistent with Europe's GHG commitments. Consumers want and can afford these cars at present; the European, national or local regulator may feel the need to dampen this appetite. There is a 23g/km difference between the average car sold in France and that in Germany, related to car size and to some extent fuel type. Mix is the line of least resistance to regulators — the 'low hanging fruit' to get Europe back on track on CO2. For this reason we base our 'order of magnitude' CO2 impact analysis solely on the possible impact of a 10% truncation of high-consuming segments relative to base forecasts, and 10% expansion of small car segments.

2. Diesel remains an effective part of the equation, but as Europe has slipped over 50% diesel car content has probably already made the bulk of its contribution. Rising relative costs and prices seem to be causing diesel share to plateau. As we move to Euro5 emission regulations (starting 2009E), a further €600/vehicle cost disadvantage will materialise.

3. Bio-fuels, with lower well-to-wheel carbon effects, offer enticing possibilities to car makers by passing responsibility for carbon emissions reduction elsewhere. However, even if the EU is successful in achieving a 5.75% share of biofuels at the pumps in 2010, this is unlikely to make a big dent in the sector's CO2 performance. (Current European biofuels offer limited CO2 savings and scope is limited by available land/cost/conversion efficiency.)

4. Hybrids may make a meaningful European appearance on a five-year view, but availability and cost make it unlikely they can impact fleet averages by much in the timescale required. A Toyota Prius rated at 104g/km costs €27,800 in France, whereas a Citroën C3 rated at 109g/km costs €15,700.

Our simple analysis of potential three-year impacts based on a 10% mix change is shown in Figure 4.

Figure 5. Conversion Rates

Emissions CO_2 g/km	Fuel economy MPG** Petrol	MPG** Diesel	Fuel usage L/100km Petrol	L/100km Diesel
100	45.5	53.5	4.3	3.9
110	41.4	48.6	4.7	4.3
120	**38.0**	**44.6**	**5.2**	**4.7**
130	35.0	41.1	5.6	5.0
140	**32.5**	**38.2**	**6.0**	**5.4**
150	30.4	35.7	6.5	5.8
161*	28.3	33.2	6.9	6.2
170	26.8	31.5	7.3	6.6
180	25.3	29.7	7.8	7.0
190	24.0	28.2	8.2	7.4
200	22.8	26.7	8.6	7.8

* Most recent (2004) Official EU data for average fleet new vehicle emissions for Member States

**Miles per gallon stated as UK metric gallons, where 1 gallon US = 0.83 gallons UK

Source: Citigroup Investment Research

Putting CO_2 into context

CO_2 is not an air 'pollutant' like exhaust emissions, which are subject to ever-tightening regulation (so-called Euro4, Euro5 standards). But it is a key Greenhouse Gas (GHG) which Europe is committed to controlling. CO_2 emissions from automobiles are directly linked to vehicle fuel consumption. In Figure 5 we show approximate conversion factors to MPG and l/100km. Burning a kilogram of fuel in a vehicle leads to approximately 3.15kg of CO_2 emissions in a gasoline engine and slightly higher for a diesel engine, with only minor regional variations for fuel quality and additives. Diesel has a slightly higher carbon density than gasoline which accounts for this difference.

Europe: Some Options for Regulation

CAFE Style Charges
US style direct charges to manufacturers. Possible, but Europe more likely to adopt an 'integrated' approach influencing consumer choice and fuel supply sector

Road Taxes
Vary annual standing charges (road tax) by CO_2 (already in train). Possible 'fee-bate' system – to add <120g vehicles, and truncate high carbon segment (say >200g/km). Effective for high incremental rates as 'annuity' effects depress/lift second-hand values Industry seeks linear relationship to CO_2 but vehicle 'banding' also possible

Fuel Duty
CO_2 depends on vehicle use as well as economy. Fuel taxes sometimes regarded as socially regressive, but highly likely they continue to rise

Differential Road Pricing/Charging
Likely to appear in some countries, but probably by local initiative. Database of vehicle emissions makes it possible to vary charges by CO_2

Carbon Trading
Seen by EC Industry DG as possible structure — but complex to set up between assemblers (trading fleet credits/debits); ruled out on consumer level

Biofuels
Use of lower well-to-wheel carbon fuels offers gains largely external to auto assemblers. Scope currently limited by cost/availability/conversion efficiency. Current European biofuels offer limited CO_2 savings, and scope is restricted by land available. Second-generation products more promising

Speed Limits/Eco Driving
Fuel economy deteriorates significantly with speed, so an attraction for local/national legislators, if unwelcome to German industry in particular

'Societal Pressure'
In some circles the Toyota Prius (hybrid) is 'cooler' than a big 4X4. Not to be underestimated....

Impact on European auto assemblers

The near-term threat is within Europe itself, as new regulation emerges, and perhaps local CO_2-based charges proliferate. Weak US regulation will have a limited impact on European companies, though we note Chrysler has the least fuel-efficient portfolio of major automakers present in the country. Meanwhile Japanese manufacturers will be spurred to even more competitive fuel-efficient offerings by domestic regulation, and will probably retain their strong lead in hybrid vehicles. Without second-guessing the mechanisms that will be employed by the European Commission, we think it is credible that:

5. Regulation will be introduced to ensure implementation of 2012 target of 120g/km. While this may set vehicle usage or annual taxes as a simple (and steep) function of carbon emissions, it could also devise target levels for vehicles of different size categories (as embodied in new CAFE regulations, and in Japanese plans).

6. Beyond that, the sector will be required to move towards the 1.5% per annum reductions required of society as a whole to mitigate climate change. (If it hits the target, the sector will have contributed 15% of the EU's Kyoto commitment — arguably not great for a sector that is responsible for 25% of the emissions).

7. Local initiatives will meanwhile proliferate, and will tend to use CO_2 as a principal base for modulation of charges by vehicle size.

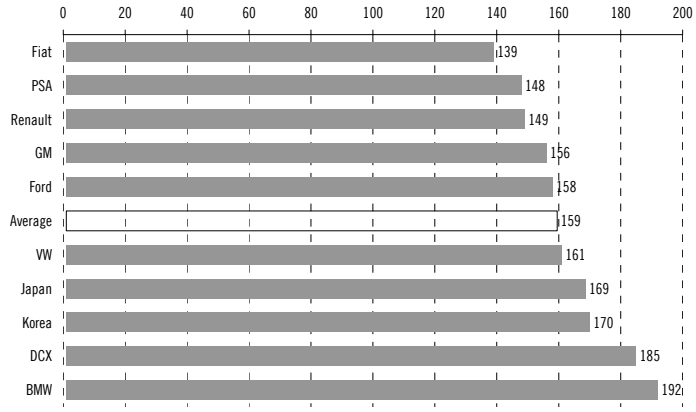
8. This compulsion could disrupt the industry's united lobbying front and make efficiency a point of competitive differentiation.

Current CO_2 performance

The current monitoring of the ACEA agreement (to reach 140g CO_2/km by 2008, and 120g by 2012) provides a very weak level of information to the external world. Not only is the last published report for Europe as a whole still based on 2004, but the agreement provides no review of manufacturer-level information. Fortunately there are two other valuable sources: one is a review completed by the European Federation for Transport & Environment (T&E) which calculated individual manufacturer positions in 2005; the other is the regular work done by ADEME in France which calculates this data for the large French light-vehicle market. France is a country with an above-average small car and diesel content market (achieving the lowest carbon emissions of 150g/km versus 161g/km European average). However, despite this deviation from the average, the rank-order of manufacturers in ADEME's measurement is quite similar to the T&E results. In fact, the main differences arise from the different vehicle mix sold in each country, with all manufacturer groups with the exception of the tiny Korean presence achieving substantially better carbon performance in the more fuel economy sensitive French market.

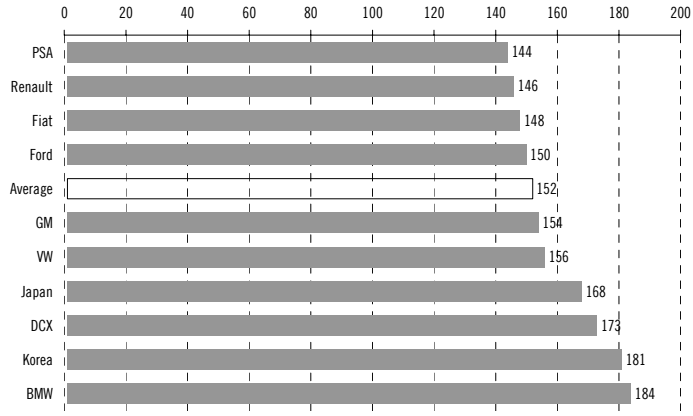
Three manufacturers, Fiat, Peugeot and Renault, are consistently fuel economy leaders, with an average carbon emission level near 145gCO_2/km. These are also the small-car biased assemblers with 58%, 46% and 47% of sales respectively in small and basic categories. Conversely the prestige Germans, BMW and DCX, along with gasoline-rich Koreans, are the three worst performers. BMW has just 14% of European sales in the small/basic category (Mini), while DCX has just 7% (with *smart fortwo* at a lifecycle low).

Figure 6. Comparative Fleet CO_2 Performance by Manufacturer, Europe 2005 (gCO_2/km)



Source: T&E, replicating EU Monitoring Agreement Methodology

Figure 7. Comparative Fleet CO_2 Performance by Manufacturer, France 2005 (gCO_2/km)

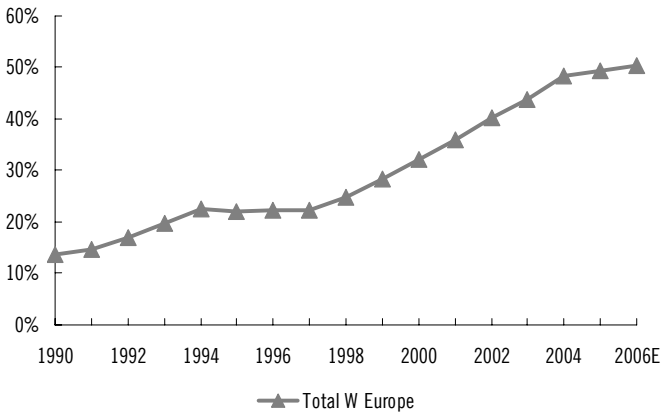


Source: ADEME (Environmental Agency), France

Recent progress owes much to diesel — unlikely to be big further change

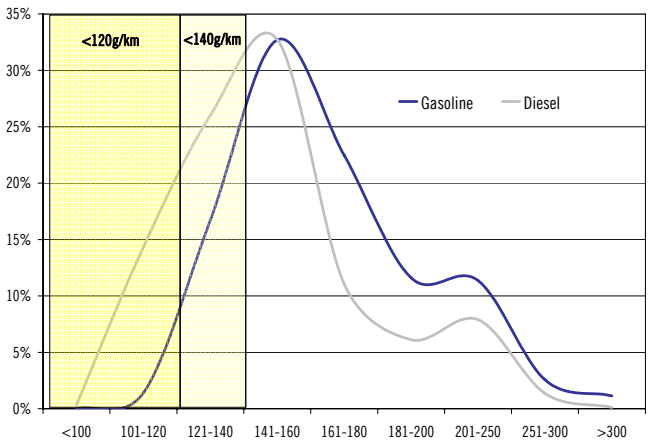
We examine the role of diesel more fully later in this report. Diesel has, however, played a very significant role in improving European fuel consumption. Despite the higher carbon density of the fuel the average diesel vehicle emits 153g/km according to the latest ACEA mix data in Europe, relative to 170g/km for a gasoline vehicle. Like-for-like carbon efficiency is even better than this 10% difference implies as diesel has a 30% share in small-car segments but an 80% share in large-car segments. However diesel has now moved from 25% of the European market in 1998 to 50% today. We believe it has limited scope to continue to rise in share, and that manufacturer differences in diesel preparedness have all but disappeared. Diesel's Achilles' Heel is its Air Quality performance. As we move to Euro5 (first applicable from September 2009) permitted PM (particles) emissions from new diesel cars will be cut by 80%, likely to force fleetwide application of diesel particle filters (DPFs), and an additional cost of up to €590 vehicle. Meanwhile a new generation of force-fed small-capacity gasoline engines is likely to offer improved economy.

Figure 8. European Diesel Penetration (% of Market), 1990-2005



Source: ACEA

Figure 9. Distribution of Diesel vs Gasoline Cars in EU, 2005 (g/km)



Source: ACEA and Citigroup Investment Research

Further adjustment levers…

Given the urgent need to improve fuel economy further (up to 5% per annum in a 'catch-up' period, for instance), and the likelihood of fiscal and regulatory action to promote this, what levers are manufacturers able to deploy? Various revised technologies appear in the medium-term roadmap, while evolutionary refinements of existing engines/vehicles will largely influence the short term. The long-term road map effectively indicates how overall vehicle technology may develop in order to meet increasing demands for fuel-efficient vehicles.

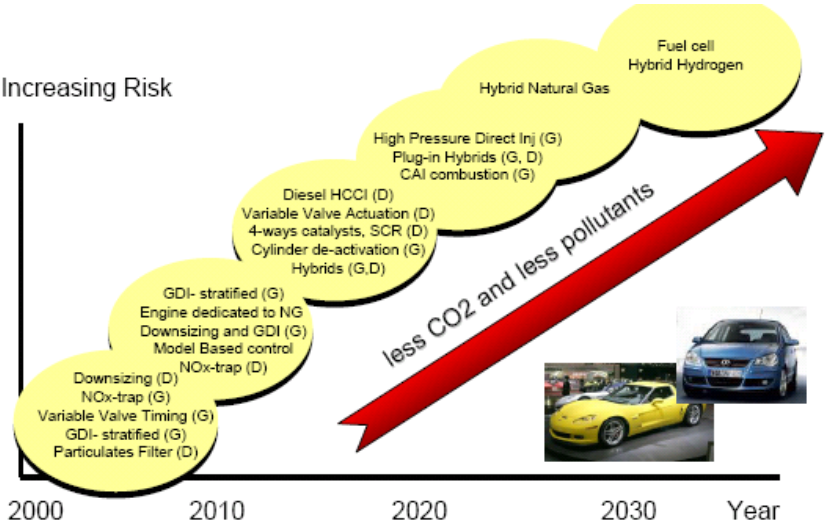
In the short term some of the technical developments that would probably feature in a CO_2 reduction strategy focused entirely on vehicles themselves are quite well summarised in Figure 11. This also shows the author's (Ricardo) assessment of the likely costs involved per vehicle.

Figure 11. Example CO_2-Saving Technologies and Their Cost

	CO_2 % from baseline vehicle	Costs (Euro)
Engine		
Autonomous evolution	-3.7	-182
Downsizing stage 1	-9.6	0
Downsizing stage 2	-17.3	159
Downsizing stage 3	-19.9	319
Gearbox		
6 speed manual	0.0	126
Dual clutch (i.c.w. 6speed)	-4.8	764
Hybrid		
Start stop	-3.6	427
Regenerative braking	-6.5	833
Mild hybrid/motor assist	-10.3	1860
Full hybrid	-18.8	4169
Other		
Euro V (DPF + Lean Nox)	1.5	639

Source: Ricardo, cited in EC Study B4-3040, June 2005.

Figure 10. Road Map for Future Light Vehicle Powertrain Options, 2000-2030



Source: Future Energy Sources for Transport, Forum for the Automobile & Society, June 2006

An IEEP/TNO/CAIR (three environmental consultancies) report (EU B4-3040, released June 2005) attempted to assess certain EU carbon policy instruments' impact per manufacturer, but gave no individual maker details

… and the bill

The cost of the whole package of meeting a fleet average of 120g/km has been the subject of various academic estimates. The EC's own research studies indicate that it would average €2,000/car if the EC sought a uniform target from all cars — with a range of effectively zero for small cars which already come close, to near €10,000/car for larger-size vehicles which would have to be heavily modified. Should the EC instead set all segments of the market a similar percentage reduction target, designed to move the aggregate fleet economy down to the 120g target, then overall cost should be a lower €1,200 approximately per car, with costs evenly spread between different segments of the market. Similar results apply when targets are grouped according to different vehicle segments/vehicle use categories, but with a slightly higher mean cost.

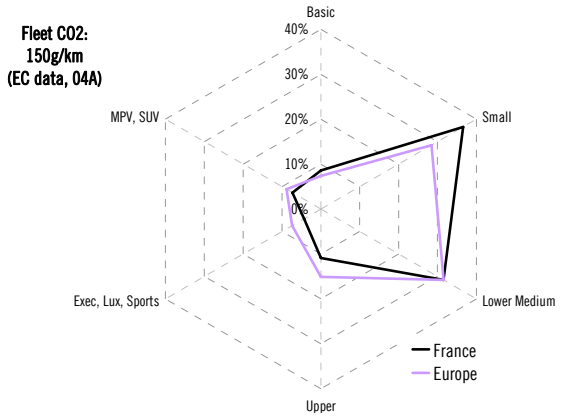
The IEEP/TNOP/CAIR study which examined costs falling to manufacturers under several scenarios concluded simply that "the winners under all systems are companies whose ranges already have a large proportion of compliant cars". Those with larger and high-performance cars are most at risk.

There is a 23g/km difference purely on mix of French and German markets — persuading consumers into smaller vehicles will have to be one of the main levers for regulation

Mix has a pivotal role

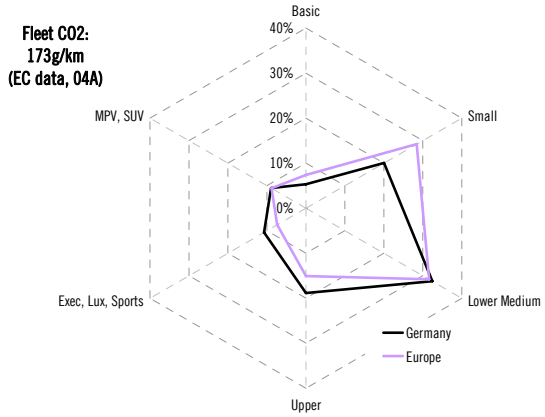
Above all, in our view, to come close to achieving the necessary European fleet average reductions a change in mix is indicated. Under certain regulatory scenarios, the impetus for this may even come from the manufacturer (and Toyota has already pruned its European offerings to exclude some of the highest-consuming vehicles). More likely, higher fuel duties and axes will be designed to lead consumers smartly in this direction. We compare below the segment footprint of the German market (average CO_2/km of 173g/km) and that of the French market (150g/km, as of the latest EC report date for 2004). The French market had a 69% diesel content in 2004, whereas the German market had a 44% content.

Figure 12. Market 'Footprint', France 2005, vs European Aggregate



Source: JDPower Forecasting and CIR Estimates

Figure 13. Market 'Footprint', Germany 2005, vs European Aggregate



Source: JDPower Forecasting and CIR Estimates

Figure 14. Example Premiums Charged for V8 Engines over Six-Cylinder, 2006

Manu'fr	Model	Premium for V8/6-cylinder
BMW	X5	€14,000
DCX	E-Class	€12,000
Audi	A6	€12,000

Source: Company Reports and CIR estimates

Figure 15. Sample Vehicles Where Entire Range is Above 225g/km, 2006

Manu'fr	Model	Range CO2
Audi	A8, Q7	231-326
BMW	X5	229-335
Jeep	All	246-366
LandRover	RR, Disco	249-376
MBenz	R, M-Class	246-392
Porsche	911, Cayenne	266-378
VW	Touareg	265-329

Source: SMMT, CIR

Costs of powertrain downgrades

Much less powerful is the potential to improve overall fleet economy by moving around within segments. The problem is that even small moves within segments can have large effects for manufacturers who rely on mix to enliven margins. Thus most of the upscale German car makers charge €10-15K more for the V8 (gasoline or diesel) version of their executive and luxury products than they do for the six-cylinder versions, at least for models in strong supply and in the early part of their lifecycle. These higher-powered versions have a relatively minor on-cost to the assembler. Yet this is precisely the kind of migration in product choice that consumers are likely to be prompted to make. In other respects the vehicle might be similarly equipped, but with a major powertrain downgrade. Similar arguments will apply at the 6-/4-cylinder frontier.

Costs of CO2 effective 'ceiling'

In the construction of some regulations and charges, an effective ceiling on CO_2 emissions/vehicle might be created. Manufacturers have wanted to avoid this above all, talking of a linear function between charges and CO_2 performance. We would expect European-wide regulation to seek largely to avoid distortions created by tax break-points. Others may not be so forgiving — the London congestion scheme looks likely to fix on the 225g/km level, echoing the highest UK road tax band. It is likely that the market for such vehicles in the London region (responsible for 25% of UK demand) falls significantly, not least as second-hand values will tumble, too, should the higher congestion charging scheme be implemented.

Mix developments: 'premium' segment growth may disappoint

Forecasts for Europe see growth of nearly 8% per annum in high-carbon car segments, SUV, Sports, Luxury

Most analysis of the European market has assumed that mix continues to enrich with an increasingly affluent and brand-aware consumer. For instance, we note (Figure 16) that respected forecaster JDPower Forecasting sees by far the fastest growth rates in the SUV, Sport, Executive and Luxury segments of the European market. These amount to growth of over 40% from 2006E to 2011E. We believe these forecasts are also in line with many internal expectations in the industry. Not surprisingly, a segment where growth is strong is typically one where margins are strong, so these growing 'premium' vehicles will be disproportionally present in margins. Renault's Carlos Ghosn has targeted some of these vehicle groups, for instance, precisely for this reason.

Figure 16. Example Forecasts of W European Car Market by Vehicle Segment, 2002A-2011E, Units

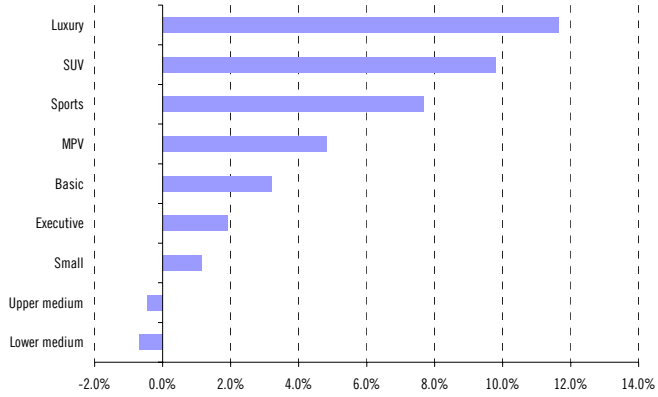
Segment	2002	2003	2004	2005	2006E	2007E	2008E	2009E	2010E	2011E
Basic	1,132	905	937	993	1,088	968	1,073	1,142	1,123	1,201
% of total	7.80%	6.30%	6.40%	6.80%	7.40%	6.60%	7.10%	7.40%	7.20%	7.50%
Small	3,901	4,257	4,214	4,011	4,188	4,227	4,073	4,328	4,485	4,295
% of total	26.70%	29.70%	28.80%	27.40%	28.40%	28.70%	27.00%	28.10%	28.60%	26.80%
Lower Medium	4,791	4,486	4,743	4,925	4,658	4,553	4,565	4,366	4,399	4,727
% of total	32.80%	31.30%	32.40%	33.60%	31.60%	31.00%	30.30%	28.30%	28.00%	29.50%
Upper Medium	2,648	2,422	2,268	2,225	2,227	2,159	2,270	2,263	2,112	2,166
% of total	18.10%	16.90%	15.50%	15.20%	15.10%	14.70%	15.10%	14.70%	13.50%	13.50%
Executive	664	639	627	592	565	538	551	595	701	663
% of total	4.60%	4.50%	4.30%	4.00%	3.80%	3.70%	3.70%	3.90%	4.50%	4.10%
Luxury	56	60	53	47	62	69	64	78	90	91
% of total	0.40%	0.40%	0.40%	0.30%	0.40%	0.50%	0.40%	0.50%	0.60%	0.60%
Sports	295	320	450	419	461	550	574	632	666	653
% of total	2.00%	2.20%	3.10%	2.90%	3.10%	3.70%	3.80%	4.10%	4.20%	4.10%
People Carrier	311	348	349	314	279	294	301	312	382	417
% of total	2.10%	2.40%	2.40%	2.10%	1.90%	2.00%	2.00%	2.00%	2.40%	2.60%
Offroad	645	743	855	957	1,022	1,182	1,433	1,557	1,602	1,677
% of total	4.40%	5.20%	5.80%	6.50%	6.90%	8.00%	9.50%	10.10%	10.20%	10.50%
Total	**14,598**	**14,342**	**14,654**	**14,664**	**14,736**	**14,704**	**15,063**	**15,422**	**15,700**	**16,025**

Source: JDPower Auto Forecasting

A simple analysis of the carbon economics of these vehicles shows why this development remains on a collision course with attempts to reduce Europe's fleet average CO_2 emissions. On average, the fast growing segments (currently 16%-17% of vehicles sold) have a CO_2 rating of 226g/km! Despite the ingenuity of carmakers and consumer freedom to shop within segments for the best performing vehicle, the further fast enrichment of the European mix is probably inconsistent with attempts to lower fuel consumption.

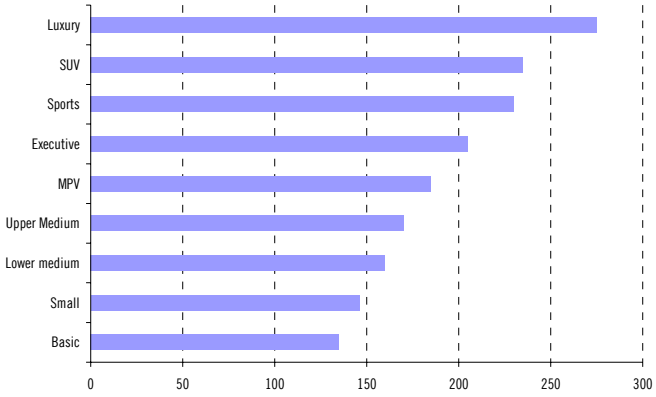
Cutting growth at the top end of the vehicle spectrum with a series of measures either local or European in nature is one effective way to control CO_2 emissions per vehicle. Matching the additional fiscal burden at the top end of the spectrum with additional generosity to the car buyer at the lower end has been a common policy response. In attempting to offer a simple way of thinking about the order of magnitude of manufacturer exposure to carbon based tax, we have used this kind of structure.

Figure 17. Potential Compound Annual Growth Rates per Segment, Western European Car Market, 2005-11E



Source: Based on Sample JDPower forecasts

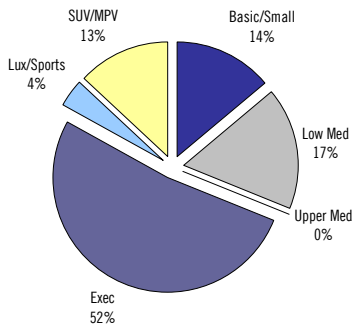
Figure 18. Current Average Emissions (g/km) per Segment, 2005



Source: SMMT

We adopt a pragmatic approach to quantifying uncertainty — nothing less than a 10% mix change will work… Hence we run a simple 'mix rebalancing' scenario based on 10% compression of top-end and 10% expansion of low-end volume. A blunt estimate of possible impact — but one which we expect gives a realistic sense of the order of magnitudes involved. Our suspicion is that ultimately considerably bigger adjustment pains may be involved.

Figure 19. BMW W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

Summary of Potential Impact by Manufacturer

Calculating the impact of a diverse range of CO_2 measures and influences, on an uncertain timetable, is imprecise at best. We have therefore adopted a simple expedient of presuming a 10%-15% mix change from current expectations at the top and bottom ends of the European car market. This is likely to come on top of powertrain and other technical change within the rest of the market. Taken together we estimate this will allow Europe to meet the 140g/km target, belatedly. To achieve 120g/km further adjustment would still be required.

Using segmental sales shares as calculated in our Model Behaviour Report[1] we apply our estimate of appropriate contribution margin/vehicle on the 'at risk' volume in order to calculate an 'order of magnitude' exposure even to this quite mild exposition of the cost of meeting carbon emission requirements as we see these evolving. In our view these estimates probably represent a minimum view of likely impact. Not surprisingly, this involves a rebalance between upscale and mainstream vehicle makers.

BMW

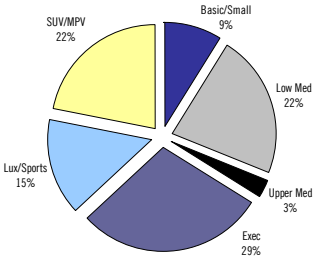
It is impossible to ignore the fact that BMW is a carbon outlier in Europe, comfortably the worst of the major groups, and one with the least progress in the last eight years. Despite its formidable technological prowess, and the outstanding specific fuel economy of some of its engines, in a nutshell it has prospered by selling powerful, sporting vehicles to Europe's affluent buyers. New Mini will improve the situation somewhat, as the new generation comes with almost 20% better economy than its predecessor. Overall, however, under some scenarios for Europe's regulation of carbon emission BMW has a challenging business model. Indeed, under most conditions we expect that a headwind to BMW from the re-focussing of the consumer on fuel economy is likely. The BMW share does not need another new headwind, as it struggles with renewed US$ negatives on a poorly-covered 2007E business year.

Based on European sales of some 800K units, highly concentrated in the larger and less fuel efficient segments, we assess an 'at risk' rebalancing volume of some 55-60K units. We note that this is relative to current forecasts which see substantial further top-line growth at this company (current company targets are to reach 1.6m units globally by 2010, relative to the 1.3m 2006A outturn). We further think it reasonable to assume an operating leverage impact of higher than the €6K/vehicle which we normally use for BMW, given the risk to higher-price engine segments. In total therefore, we place the order of magnitude of headwind which BMW might face from greater European carbon awareness as around €500m, or a fully taxed €0.5 per share, or some 15% of current profitability. This is the highest in the group. Although we are less certain of US transmission mechanisms we also observe that BMW is also a carbon outlier in the US, as it is in Japan. In practice, any negative repercussions from these regions may well be balanced by continued growth in other parts of Asia.

BMW as a brand had worse fuel consumption in 2005 in the US than in 1997 — 23.6mpg vs 27.1mpg — and was one of the most fuel inefficient in the market, although it improved slightly at the group level (including Mini) in the period. In Europe it has also been a weak performer — improving fuel economy by only 10% from 1997-2005, against a 17%improvement by Mercedes.

[1] *Model Behaviour: Product Cycle Revisited*, 13 September 2006.

Figure 20. DCX W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

DCX

Slightly better placed than BMW in Europe, and moving faster — a process liable to continue with the *smart* renewal. Mercedes was the worst of the major European makers from a fuel economy vantage, but its expansion of small and micro cars, and highest diesel content in the upscale group has enabled it to edge up rankings. Chrysler remains the least fuel efficient of the US-based assemblers, a function of the truck-heavy mix which has been the bugbear of market performance throughout 2006E. Group diesel expertise could prove valuable in mitigating this US position, which is also being addressed through a rapid migration of Chrysler product positioning. As always in the motor industry, re-positioning an entire product line-up is the work of many years.

Under previous managements, DCX has occasionally been vocal about the need to make significant strides in CO_2 performance. It referenced the move into smart and A-Class as owing something to a motivation to improve its average fleet economy. The same thinking was also behind its apparent interest in the purchase of Fiat in the 1990s and its acquisition of a controlling interest in Mitsubishi Motors (MMC). The failure to expand the smart brand as originally planned, the withdrawal from MMC and even the addition of a second heavier model on the A-Class platform have all blunted this earlier drive to engage improved fuel economy. Assisting recent efforts has been the dieselisation of the European fleet, and continued engine-line renewals.

Like many other automakers, and with similar priorities to those expressed at VW and to some extent BMW, DCX can see some structural shifts in vehicle technology which will help it meet the challenges better in the medium term. These include hybrid drives, where work in cooperation with GM and BMW concentrates on 'two-mode' hybrid systems. These may begin to appear from 2008E. On a longer view fuel cell drive systems will be utilised and DCX is also active in research and development in this area. As with hybrid systems, it has already gained considerable experience by having such fuel cell vehicles in operation in commercial vehicle chassis worldwide. Like other makers, too, DCX is highly interested in developing bio-fuels, initially as an additive. In the long run ("about 20 years") it places more emphasis on fuel cell cars and hydrogen.

Based on European volumes of around 920,000 we view the potential mix rebalancing we have explored at DCX approximating a €0.5bn headwind (30c/share or 8% of 2007E income). Not surprisingly, given volume and product range similarities, this is close to the sensitivity at BMW, but in the case of DCX this represents a substantially smaller relationship to profit.

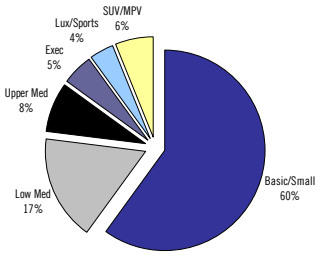
Fiat

Europe's current fuel economy champion, and already the 'right' side of 140g/km courtesy of its pronounced small-car bias. Recent progress has also been strong following further downsizing of mix and small capacity diesel engine success. Fiat may seem to have little to do in the newly carbon-sensitive world but is continuing to major on this strong suit, with downsized gasoline engines.

Other new powertrain developments include the Multiair technology (including electronic valve actuation) to the Fire gasoline engine range, and Europe's first revival of the two-cylinder engine with the 0.9l new Small Gasoline Engine (SGE) due in 2009.

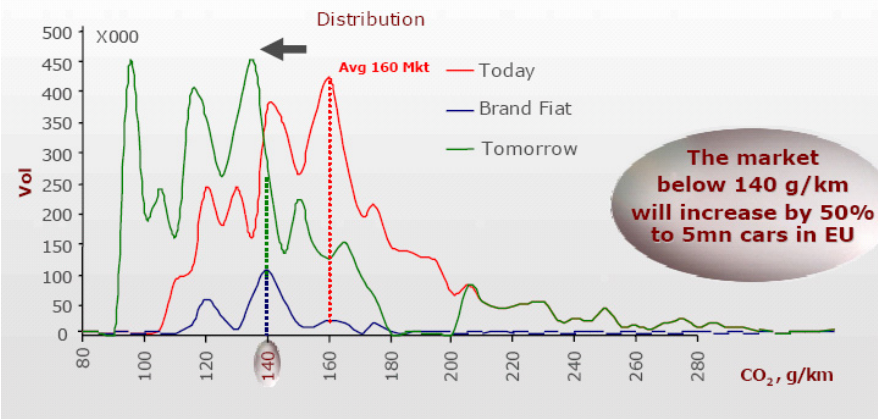
Fiat is developing diesel hybrids in particular for light commercial vehicles and buses, but regards their fuel economy advantages as mostly confined to urban missions, and at a very high 'on-cost'. We do not expect the company to feel the need to try to take a lead in such technology, nor to push ahead faster than consumers demand it in alternative fuels and hydrogen power. At present Fiat shows decisively how a small-car mix, and the willingness to make a light environmental footprint (part of the appeal of its Fiat brand), positions the company to benefit from growing consumer and legislator concerns surrounding carbon emissions.

Figure 21. Fiat W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

Figure 22. Fiat Brand Market Positioning by CO_2 Category

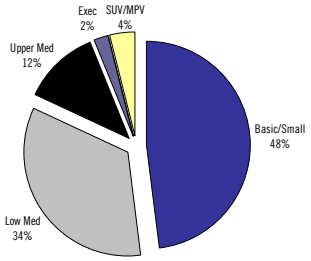


Source: Fiat Auto, Presentation by Luca de Meo, Lingotto, 9 November 2006.

Part of Fiat's reviving brand appeal is its light environmental footprint

In terms of potential financial impacts, we would not expect CO_2 to be a dominant separable feature of the apparent re-valuing of Fiat's brand image which has been underway for some time. However, using the methodology applied elsewhere based on the 1.2m vehicles sold in Europe in 2006A, the rebalancing opportunity could be at least 70K vehicles. We use a higher contribution margin than the long-term operating leverage impact of €2K/vehicle shown at Lingotto in November, and estimate the order of magnitude benefit at around €0.2bn, equivalent to 100bps of Fiat Auto margin or 10c/share.

Figure 23. Peugeot W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

Figure 24. Most Fuel Efficient Diesel/Gasoline Vehicles on sale in France, 2006

Fuel	Model	g CO2/km
Diesel	smart fortwo CDI	90
	Citroën C2 1.4 HDI	107
	Citroën C1 1.4 HDI	109
	Citroën C3 1.4 HDI	109
	Peugeot 107 1.4 HDI	109
Gasoline	Toyota Prius	104
	Citroën C1 1.0e SensoDrive	109
	Daihatsu Cuore	109
	Peugeot 107 1.0e	109
	Toyota Aygo 1.0 VVTi	109

Source: ADEME, France

PSA Peugeot Citroën

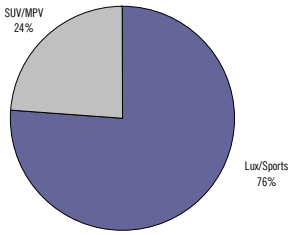
Well positioned from a mix and technology perspective. PSA offers consumers the widest ranges of small cars available in Europe, and will develop stop-start and diesel hybrid solutions to continue to progress its fleet CO_2 performance.

Diesel is no longer a particularly strong competitive advantage at PSA. Although it maintains one of the most efficient diesel line-ups of all European manufacturers, the catch-up process of the last few years has been pronounced. The strength of the small car franchise at PSA is however represented by a wide variety of bodyshells — Citroën C1/Peugeot 107, Peugeot 1007, Citroën C2, Citroën C3 and Peugeot 207 (and for the present the Peugeot 206). These six vehicles give unrivalled small car bandwidth. Matched with PSA's strong diesel line-up they also underpin Peugeot's status as the most fuel efficient manufacturer in France (where it narrowly pips Renault with a fleet average of 144g CO_2/km against 146g CO_2/km). Toyota, despite the Prius, is considerably above the 152g/km average calculated by ADEME, at 161g/km. Not surprisingly, seekers of the most fuel efficient cars in Europe have the biggest choice still at PSA (Figure 24).

PSA has promoted a number of technologies designed to further improve fuel efficiency. It launched its first Stop & Start system as early as 2004, working with Valeo for the reversible alternator/starter system, now in both C2 and C3. So far, payback on Stop & Start (with a 5%-8% CO_2 benefit) has been particularly poor, as customers have been unwilling to pay for the technology — the sort of consumer attitude that could change sharply on future tax-based measures. It has more recently declared its intention to develop a mid-range hybrid HDI family vehicle with a 90g CO_2/km target, at an affordable price, marketable by 2010. PSA believes this technology could be 25% more efficient than a gasoline-based hybrid, and works in partnership with Continental (CAS), Michelin, Valeo and battery/electronic partners in developing the technology. PSA will also launch flex-fuel vehicles (gasoline/E85) in 2007, and like Renault supports Diester30, which has powered its in-house diesel fleet since 2001.

Looked at from our familiar re-balancing scenario, Peugeot sells some 2m vehicles in W Europe, over 900K of them in the small/basic car category. It has limited position in the MPV segment among the higher reaches of the market, a very small large car footprint and until later in 2007E no 4X4 segment entry. Net positive to Peugeot from the rebalancing we have assumed is some €0.3bn. This equates to some 70bps of Auto Division margin, and 90c of EPS. Although this figure represents no more than a sense of the order of magnitude of the potential benefit of its carbon positioning, it does suggest a further way in which the product tide is turning rather more in PSA's favour after a prolonged difficult period.

Figure 25. Porsche W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

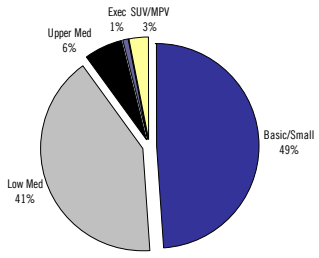
Porsche

We are unable to track Porsche CO_2 performance from either of the two datasources used for other makers, but on a simple sales-weighted average of its three model ranges it is unlikely to be much different from 290-300g/km. This has risen significantly in the last seven years as the Cayenne (range avge c360g/km) has joined the fleet. A belated conversion to GDI is currently moving figures back in the right direction, but Porsche clearly remains exposed to changing fiscal regimes and consumer attitudes regarding fuel economy. Mitigating the impact of these is the low mileages many Porsche vehicles cover and the extreme affluence of part of the customer base.

We consider it highly unlikely that Porsche's sales profile will be materially impacted by carbon considerations in its core sportscar franchise. The picture is more complicated, however, for its expanding range of more mainstream vehicles, particularly the Cayenne. This is already something of a European outlier, product-wise. Large SUVs throughout Europe have an 85%-90% diesel content; a fuel which CEO Wiedeking has vowed will never be used by Porsche. Not surprisingly, therefore, the focus of development efforts is on offering a hybrid drivetrain for the Cayenne. Toyota has successfully developed 'muscle hybrids' largely for its US-bound SUVs and luxury sedans under the Lexus brand. These typically achieve 25%-30% fuel economy savings versus the equivalent gasoline model (thus from 264g/km to 192g/km in the RX SUV, rather more in the LS sedan). The hybrid Cayenne is unlikely to be on commercial sale before 2008E.

We believe any estimate of the order of magnitude of carbon concern impacts on Porsche is extremely tentative, but do believe it is necessary to acknowledge the danger that large and powerful SUVs will become an increasingly difficult market sector, after years of growth. If this cut European sales by 10%, we would think in terms of some €20-25m impact on profitability. A bigger impact would be plausible only if sales were hit by a larger percentage, or if we attempted model changes in the North American market where Cayenne sales have been higher. Recent sales declines, even before the run-out phase of the pre-facelift model, were down by 20%-30% in both territories. Much of the recent strength of the Cayenne has been in Asia, where we would see limited carbon sensitivity.

Figure 26. Renault W European Sales Mix by Segment, 2006A



Source: Citigroup Investment Research

Renault

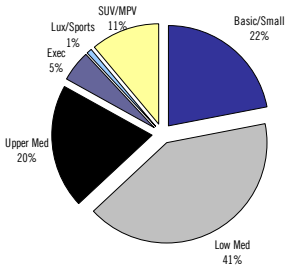
Carlos Ghosn's 2009 Commitment includes the goal of achieving Global 'Top 3' status for CO_2 emissions, a position it already enjoys in Europe. The attempt to enrich Renault's model mix will be a headwind, while Alliance partner Nissan likewise appears to be sacrificing CO_2 progress for its 'niche' strategy in Europe. RNO is one of the few to emphasise bio-fuels as a CO_2 reduction strategy in this time frame. RNO plans 50% flex-fuel capability for its gasoline cars by 2009E, as well as D30 capability for its diesels. RNO has a specific target for 1m cars <140g/km by 2008E, and 0.33m <120g/km in Europe.

As is the case with several metrics, RNO thus has more specific targets than any other maker out there. It also has a small car oriented mix, which puts it in a favourable position up-front with the 146g/km it achieves on French sales and 149g/km we believe it achieves at the European level. However, the mix upgrade aims of the 2009 Commitment Plan are to some extent hostile to the fuel economy aims of the same plan. RNO emphasises several key 'margin events' based on new and mostly upscale models as it tries to rebuild its brand values, improve average price level (five new vehicles in the 'over €27K' category between 2007-09E), and lift margins. The key models would be the new Laguna to be launched in 2H07E, which RNO hopes will get back up to the 250K volumes of old with its three versions, rather than the 100K annual volumes to which the current vehicle has sunk. A further vehicle will be the Koleos 4X4 from Korea, where RNO hopes to sell 50K units in Europe, and the final big event, a replacement Espace with two distinct vehicles for the Luxury and Practical segments of the large minivan market. Incrementally, this suggests 200K-plus vehicles at a much higher CO_2 point to be absorbed within targets. With a 15% weight in European sales and possible 30g/km penalty over current averages, this could be a 5g/km headwind to corporate carbon emissions in Europe.

Thus we believe RNO may have to work hard to achieve its carbon aims. In any event, however, it will be a probable beneficiary of mix change and should be able to capitalise on its existing small car franchise. With a net 600K small car sales in Europe the rebalancing benchmark we adopt could provide a €0.2bn benefit to margin. This equates to 50bps of auto margin and 50c of EPS — a relatively small percentage of group EPS (4%) because of the heavy influence of associate earnings at RNO.

Meanwhile, Alliance associate Nissan has one of the least fuel-efficient line-ups among volume car makers in Europe at 172g/km against the 160g/km average, and has made among the least progress since 1997 in improving its performance. In the US a similar picture emerges, with Nissan 25.9mpg fleet average the worst of the major Japanese auto groups (Honda and Toyota both near 29mpg), and worse than it was a decade ago in 1996 (at 27.9mpg).

Figure 27. VW W European Sales Mix by Segment, 2006A



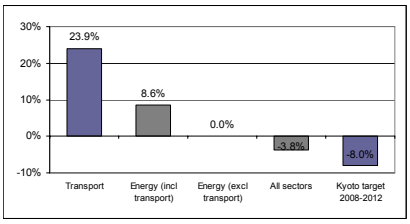
Source: Citigroup Investment Research

Volkswagen

Not as good as it was as the mix has enrichened significantly at this producer and the share of large vehicles increased. Hence VW has progressed significantly slower than competitors over the last seven years. The introduction of two successful full-size SUVs and the build-up of larger-car volume has been a significant drag to performance. It has however led the industry in GDI and its small 'twin-charger' gasoline engines bring class-leading economy/performance with the start of a new wave of downsized gasoline engines.

Based on our familiar metrics, we reckon VW could stand to lose about the same as it would gain from a significant increase in carbon awareness among consumers. While there are 600K small cars sold, there are also 300K large cars sold. The benefits and losses could just about balance, though Audi would be by far the biggest loser at the brand level, given its customers' interest in higher-powered cars. As befits Europe's largest and most market-neutrally balanced car maker, we do not believe any significant net gains or losses stand to be accounted.

Figure 28. Change in GHG Emissions for Annex 1 Parties (1990-2004)



Source: UNFCCC 2006

Background & International Framework

The EU is committed under the Kyoto Protocol of the United Nations Convention on Climate Change to reduce greenhouse gas emissions by 8% by 2008-12 compared to the 1990 level. The issue of greenhouse gas emission (GHG) targets is heavily on the political agenda after October's publication of the Stern Review, sponsored by the UK Treasury, which highlights the costs of mitigating the risks of climate change. Additionally, November saw the Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC), hosted by Nairobi, discussing the next round of emissions control. Since road transport accounts for c25% of CO_2 emissions in the EU and transport is the worst performing sector under 'Kyoto', the autos sector is on the front line of developments on climate change.

Data from the UNFCCC's annual report on GHG emissions for 1990-2004 shows that transport remains a sector where emission reductions are needed but seem difficult to obtain, with a rise of 23.9% during the period (up from an estimated growth of 20.7% 1990-2003), whereas emissions in the remainder of the energy sector (excluding transport) remained flat 1990-2004. Hence, the spotlight is focused firmly on the car industry and any steps taken to achieve the voluntary and mandatory emissions targets set by different countries and regions around the world.

Worldwide GHG emissions standards

Despite relatively static fuel economy standards in the US over the past few decades, the EU, Japan, China and California have all established tighter GHG or fuel economy standards. Automobile fuel economy standards can take many forms, including those based on fuel consumption (eg litres of gasoline per 100 km of travel); fuel economy (eg miles per gallon); and emissions (eg grams of CO_2 per km) and therefore require normalisation around metrics in order to aid comparison. While Europe is most advanced in its regulation in this area, other countries are also taking their own approaches to the same problem.

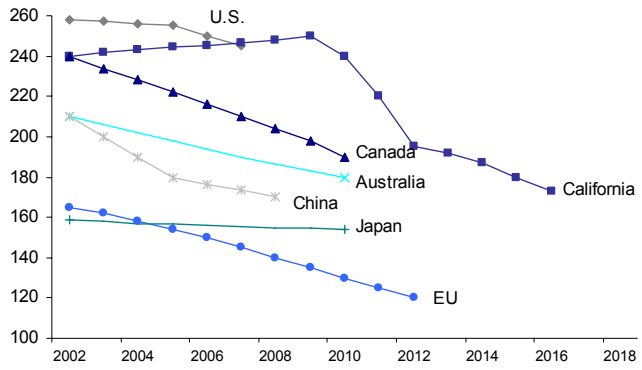
Figure 29. Worldwide Fuel Economy and GHG Standards

Country/Region	Type	Measure	Structure	Test Method*	Implementation
United States	Fuel	mpg	Cars & light trucks	U.S. CAFE	Mandatory
California	GHG	g/mile	Cars & light trucks	U.S. CAFE	Mandatory
Canada	Fuel	l/100 km	Cars & light trucks	U.S. CAFE	Voluntary
Australia	Fuel	l/100 km	Overall light-duty fleet	EU NEDC	Voluntary
China	Fuel	l/100 km	Weight-based	EU NEDC	Mandatory
European Union	CO_2	g/km	Overall light-duty fleet	EU NEDC	Voluntary
Japan	Fuel	km/l	Weight-based	Japan 10-15	Mandatory
Taiwan, S Korea	Fuel	km/l	Engine size	U.S. CAFE	Mandatory

* Test methods include U.S Corporate Average Fuel Economy (CAFE) and New European Drive Cycle (NEDC)

Source: World Resources Institute and PEW Center for Global Climate Change

Figure 30. Comparison of Worldwide CO_2 Emissions Standards



Y-axis: g CO2/km – Converted to CAFE Test Cycle

Source: PEW Center on Global Climate Change

Figure 31. Key Findings from Comparison of Worldwide CO_2 Emissions Standards

The European Union (EU) and Japan have the most stringent standards worldwide.

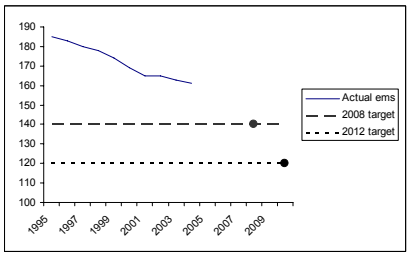
The GHG emission performance of US cars and light trucks – both historically and projected based on current policies – lags behind most other nations.

If the California emissions standards come into effect, they would narrow the gap between US and EU standards, but would still be less stringent than those in the EU

New Chinese standards are more stringent than those in Australia, Canada, California and the rest of the US but less stringent than those in the EU and Japan.

Source: Citigroup Investment Research

Figure 32. Progress Towards ACEA Targets (gCO_2/km)



Source: Citigroup Investment Research & ADEME

EU Background to ACEA Voluntary Agreement

In 1996 the EU member states and the European Parliament approved a 'Community Strategy to reduce CO_2 emissions from passenger cars'. The strategy was based on three policies:

1. A voluntary agreement from industry members to reduce emissions from new models;
2. A fiscal framework for Member States to address fuel consumption (eg fuel taxes); and
3. A fuel economy labelling programme to educate consumers.

In March 1998 the ACEA (the European Automobile Manufacturers' Association) entered into a voluntary agreement with the European Commission to reduce fleet average emissions of CO_2 from new cars in the (then) 15 EU Member States to 140 g/km by 2008 — as a step towards a 120g/km level by 2012. In addition, an intermediate target rate of 165-170g CO_2/km to be achieved by 2003 was established to monitor the industry's progress towards the 2008 target. The agreement covers all vehicles produced or imported into the EU by member companies (BMW, DCX, Fiat, Ford, GM, Porsche, PSA, Renault and VW).

In 1999 KAMA (representing Korean car manufacturers, including Daewoo, Hyundai, Kia and Ssangyong) and JAMA (the Japanese Automobile Association, representing companies including Daihatsu, Honda, Isuzu, Mazda, Mitsubishi, Nissan, Subaru, Suzuki and Toyota) made parallel commitments for their EU sales. However, they were allowed a one-year time-lag, giving them until 2009 to meet the 140g/km target. Additionally, KAMA was given until 2004 to reach the intermediate target and JAMA's intermediate target range was widened to 165-175g/km.

It was hoped that the 1998/99 deal would be achieved by a combination of technical measures, consumer information and fiscal measures. However, in 1995 the average new car emitted 187g/km of CO_2 and by 2004 figures released by the Commission for the 15 "old" EU member states were down only 12.4%. Although ACEA, JAMA and KAMA manufacturers achieved their 2003/04 interim targets, the historical average annual emissions reductions have been a far cry from the 25% reduction (equivalent to a fuel consumption of 6.0 litres per 100km for petrol cars and 5.3 litres for diesel cars) necessary by 2008/09 in order to achieve the 140gCO_2/kg target. Additionally, the voluntary commitment only applies to new passenger cars sold and data on vehicle emissions indicates that, although emissions per car per kilometre have fallen, overall the level of carbon dioxide emissions from road transport has risen 22% since 1990 as the number of cars on the roads has risen and the distance travelled has lengthened.

To quote the European Environment Commissioner Stavros Dimas, "it looks like there is no way manufacturers will meet the 140 target in time".

It is not clear whether there is any underlying structure to the ACEA agreement or indeed how each OEM has been able to determine the level of reductions it will commit to. In any event it is now highly likely that the industry self-regulation has failed and that the industry as a whole will not be capable of meeting the 2008 target. At present, too, the costs to be distributed between the members of ACEA remain hidden from investors, who might benefit if the rules of engagement were laid out in a more open manner, even if determined by regulation.

Figure 33. Progress Towards 140g/km Target

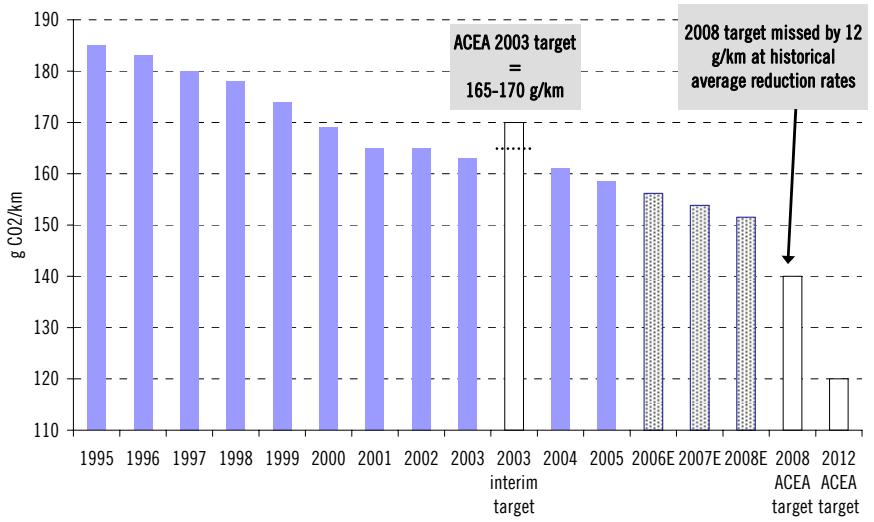
	ACEA	JAMA	KAMA
140 g/km voluntary target date	2008	2009	2009
Balance at intermediate target date *	163	172	168
2004	161	170	168
2005	159	167	165
% change 2004-2005	-1.2%	-1.7%	1.8%
Annual % change necessary from 2006 to meet 140g/km	**-4%**	**-5%**	**-5%**

* An interim target of 165-170 g/km was required by 2003 for ACEA and by 2004 for KAMA. JAMA was set a wider target range of 165-170 g/km

Source: ACEA & CIR Estimates

ACEA easily achieved their 2003 interim target but by projecting figures for 2006-08E based on historical average reduction rates (of 1.5% per annum), ACEA will miss the 2008 target by 12g CO_2/km

Figure 34. Average CO_2 Emissions of New Passenger Vehicles for ACEA vs EU Targets

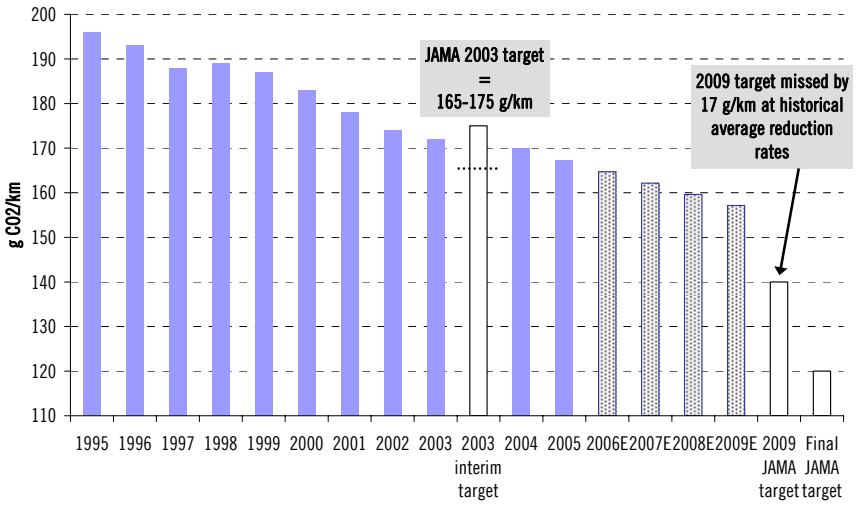


* 2006-2008E annual average CO_2 emissions estimated based on average annual reductions in the historical period (1995-2005)

Source: European Commission COM (2006) 463 and CIR Estimate

Although average fleet emissions for JAMA achieved their 2003 interim target with 172g/km, the 2009 target of 140g/km will be missed by 17g/km, if the manufacturers continue to reduce emissions at historical rates of only 1.6% per annum

Figure 35. Average CO_2 Emissions of New Passenger Vehicles for JAMA vs EU Targets

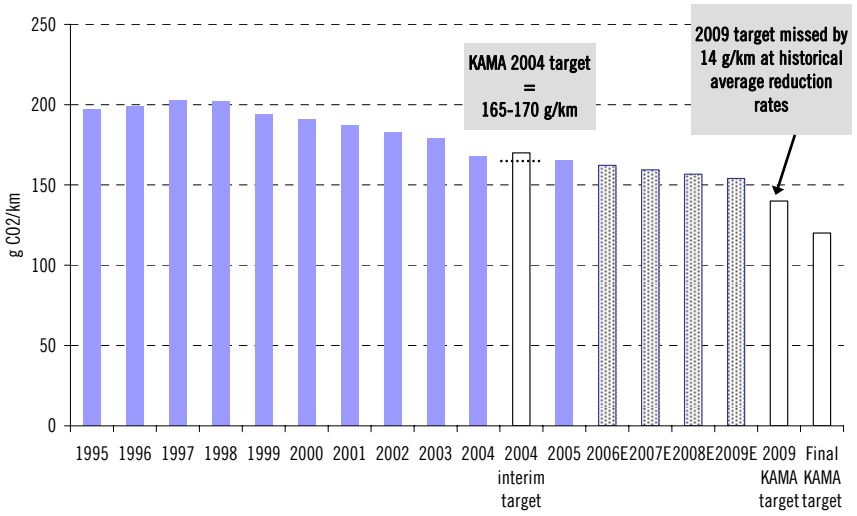


* 2006-2008E annual average CO_2 emissions estimated based on average annual reductions in the historical period (1995-2005)

Source: European Commission COM (2006) 463 and CIR Estimate

By 2004 KAMA was within its interim target range with average emissions of 168g/km but we project that it will fail by 14g/km to reach the 2009 target of 140 g/km, if annual reductions continue at average annual historical rates of only 1.7%

Figure 36. Average CO_2 Emissions of New Passenger Vehicles for KAMA vs EU Targets



* 2006-2008E annual average CO_2 emissions estimated based on average annual reductions in the historical period (1995-2005)

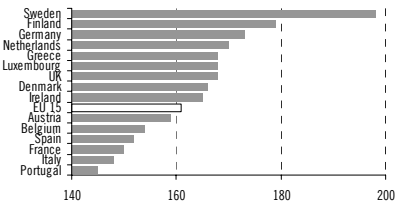
Source: European Commission COM (2006) 463 and CIR Estimate

Europe Threatens Regulation

The European Commission, or at least some parts of it, has started talking tough and threatening to impose legislation if the voluntary agreement is not met. In January 2005 the European Parliament passed a resolution calling on the Commission to put forward legally-binding limits for new vehicle emissions. The Commission is soon expected to publish proposals to make emissions reduction a mandatory requirement. Commissioner Dimas has been quoted as saying that the EC will "be bringing out legislation to cut CO_2 emissions from cars soon", in an attempt to force carmakers to reach the 120g/km target on time.

As may be expected, ACEA and European carmakers oppose the move from voluntary targets to binding rules. ACEA "does not think it is appropriate to talk about legislation", especially considering the voluntary agreement was intended to include an element of flexibility in order to take into account the regulatory environment, market developments and economic situation when assessing the outcome at the end of the 10-year period. ACEA is therefore demanding a more integrated approach, including CO_2 related taxation of cars, tax incentives to encourage consumers to buy more eco-friendly models, increased investments in alternative fuels, and the education of customers to enable them to drive in a more economical (ie fuel-efficient) manner.

Figure 37. 2004 Average CO_2 g/km Emissions for Newly Registered Cars in EU15 Countries



Source: Citigroup Investment Research

ACEA acknowledges need for CO_2-based Taxation

In 2005, the European Commission launched the CARS 21 (Competitive Automotive Regulatory System for the 21st Century) Group, which brought together key stakeholders in the automotive sector to analyse the competitiveness of the European automotive industry[2]. The Group adopted a 10-year roadmap for a competitive EU auto industry, from which the Commission will develop policy proposals. CARS 21 also recommended an "integrated approach", in order to fairly distribute the regulatory burden between the different stakeholders. The Group concluded that the responsibility for the reduction of carbon emissions in the road transport sector should be spread between vehicle manufacturers, oil/fuel suppliers, repairers, consumers and public authorities. All stakeholders should be held accountable for the implementation of measures to reduce emissions. Additionally, the Report states that CARS 21 stakeholders welcome the introduction of a CO_2-based element to taxes, in order to increase the "international harmonisation" of fiscal measures and avoid any market distortions between EU Member States.

While supporting CARS 21's proposals to link car taxation directly to CO_2 emissions in the EU, Ivan Hodac, secretary-general of ACEA, has confirmed the need for an integrated approach to the CO_2 issue. He believes that all shareholders should share the effort, whether they be car drivers, governments or oil companies. He reasserts the need for policy makers to harmonise CO_2 taxation by creating tax incentives to encourage consumers to buy less polluting cars and encourage action from oil companies. Mr Hodac believes that by linking taxation of cars and alternative fuels to CO_2 emissions, this would create the necessary demand for the CO_2-efficient solutions that are either already offered to the market or waiting to be introduced. ACEA's position is that consumer demand for safer, larger cars has had a counterproductive effect on reducing emissions. Hodac estimates that the growing popularity of SUVs and minivans may have added between 10g/km and 15g/km to average CO_2 emissions.

[2] European Commission, 2006. *CARS 21: A Competitive Automotive Regulatory System for the 21st century – Final Report,* Brussels.

Figure 38. European Emissions Taxes by Country

Member State	Changes to vehicle taxation in 2005/06 to minimise harmful emissions
Austria	Speed limits in Vienna to lower emissions Taxes on fuel increased for "traditional fuels" and rebates given for use of bio-fuels
Belgium	From Jan 2005, CO_2 based taxation for personal use of company cars CO_2 incentives for purchase of new cars: - tax reduction at 15% of sale price for cars <105 g CO_2/km (capped at €4530) - tax reduction at 3% of sale price for cars +105g-115 g CO_2/km
Denmark	As from 2006, tax allowance granted to diesel passenger cars & LCVs with particulate filters (including subsidy for retrofitting of particle filters)
Finland	Studies by Ministry of Finance into using CO_2 component in annual (circulation) taxation continue. Decisions expected in summer 2007.
France	Since July 2006, in addition to cost of existing registration certificate, the purchase of any passenger car aged <2 years incurs a €2 tax for each gram of CO_2 emitted beyond 200g/km and €4/gram beyond 250g/km. Credits on income tax granted for LPG, CNG, electrical or hybrid cars emitting <200g CO_2/km (to be lowered to 160g in 2007 and 140g in 2008)
Germany	The planned increase of VAT by 3% is expected to lead to an additional burden for private car owners of €1.1bn via fuel-prices. Discussions are ongoing re the possibility of a future compulsory quota of biofuels in the German market. Labelling of cars according to Euro particulate emissions compliance may be used by councils to ban old, highly-polluting cars from entering city centres
Greece	No new measure in 2005/06 (in Oct 2003 registration tax was reduced but not abolished and a CO_2 labelling directive is currently in effect)
Italy	In Dec 2006, the government approved the 2007 budget to include rebates for consumers who trade in older cars for new, lower-emission vehicles
Ireland	In Dec 2006 budget a system was proposed to calculate motor tax on individual vehicles' CO2 emissions, in addition to the normal engine cc value Manatory environmental labelling for vehicles to be introduced, in attempt to inform consumer choice Incentives were introduced in Dec 2005 budget for Flexible Fuels Vehicles, with a reduction of 50% in VRT, similar to the existing incentive for hybrid vehicles

Source: ACEA Economic Report November 2006

However, in order for such tax schemes to prove effective, ACEA believes the EU would need to agree some basic principles and avoid market-distorting effects. For instance, the taxation would need to be technology neutral and linearly related to emissions. Additionally, the transitions from current tax regimes to the new regimes should be budget neutral.

European Fiscal Fuel Efficiency Measures

Purchase Taxes

A variety of measures exist in European countries in an attempt to combat GHG emissions. In addition to VAT of between 15% and 25%, many EU countries have car purchase or registration tax which is often graded according to the power of the car. Scandinavian countries have historically had extremely high taxes on car acquisitions: for instance, in Finland car purchase tax (including VAT) is 53%, while in Denmark it is as high as 155%. Ireland, the Netherlands and Portugal also tax more than 50% of the total car purchase price. However, in these countries tax reductions for diesel cars and other allowance for cleaner cars reduce the tax charge significantly for smaller and more fuel-efficient cars.

ACEA produces an annual economic report detailing changes to each country's vehicle taxation for the year. The report highlights the huge variety of measures used by EU member states but also shows that recent tax changes have been biased towards emissions-related schemes. As noted, many countries have had historically high car purchase taxes, however, such price-based taxation is a poor proxy for CO_2 taxation, as there is a wide variety in the specific consumption of similarly priced cars. Indeed, the cost of new energy-efficient technologies can often add to the purchase price of a car and thus under such measures the consumer would be taxed for choosing the more environmentally friendly alternative. Therefore, some countries, notably the Netherlands, Portugal and Cyprus, have also integrated a CO_2-based component into their registration taxes. Likewise, in France in 2004 car registration tax was reformed into a 'feebate' scheme, whereby cars emitting over 200g CO_2/km face a surcharge of €380, while cars that emit under 140g CO_2/km receive a rebate. In the Netherlands, hybrid cars are given a €6,000 tax advantage, in order to encourage emissions reductions.

Annual Registration Taxes

In addition to purchase taxes, EU countries have annual registration (circulation) tax, which is often graded by engine size or power of car. In Denmark the tax varies with fuel consumption, whereas Germany links the tax directly to the Euro emissions standards. However, in Germany the tax rate is so low that its impact is negligible. In 2001, the UK adopted an emission-based system of banding for its registration tax, as per Figure 40 below and in addition in 2002 linked the tax charge on company cars to carbon dioxide emissions, with reductions for low emission cars and hybrid vehicles. Likewise, in late 2006 both Sweden and Ireland introduced a CO_2-based taxation system, in addition to the existing tax on engine size.

Taxation on Vehicle Usage

Tax on fuel is a widespread means of targeting vehicle usage. In Europe, tax on fuel is high by international standards and additionally some Scandinavian countries (Denmark, Finland and the Netherlands) have introduced CO_2 tax as well as excise duty on road fuels. Three Norwegian cities as well as London have also brought in congestion charging measures in order to further address environmental issues.

Figure 39. European Emissions Taxes by Country

Member State	Changes to vehicle taxation in 2005/06 to minimise harmful emissions
Netherlands	From July 2006, Dutch registration tax is differentiated according to the relative fuel-efficiency of the car in its class. The premium can be a bonus or a malus.
Portugal	From July 2006 new car tax came into effect, based on a combination of cc value and CO2 emissions From 2007 tax to be revised with 10% of tax based on ownership, rather than acquisition. Emissions tax will comprise 30% of whole (70% = cc value) From 2008, another 10% transferred to tax on ownership and emission-dependent part will become 60% of total tax on acquisition.
Spain	The Prevar Plan (incentives granted on new car purchases if old vehicles are simultaneously scrapped) was extended in Dec 2006 for another year, but incentives scrapped for people buying more-polluting cars From Jan 2005, reduced IGIC (equivalent of VAT) tax of 2% on purchase of hybrid vehicles emitting <120 g CO_2/km
Sweden	From October 2006 a new CO2-related annual road tax on passenger cars has been implemented, based on the formula of SKr 360 + SKr 15 for every g CO_2 above 100g (cars with ethanol or CNG pay only SKr 10/g). The new government announced a proposal to introduce a tax incentive of SKr 10,000 for people purchasing an "environmental car" (as yet, unspecified). After 2006 trial of congestion tax in Stockholm, referendum in Sept voted to maintain congestion tax
UK	No new measures in 2006, although in December's pre-budget report unleaded petrol duty was increased by 1.25p/litre for the first time since 2003. No punitive taxes, as yet, for the most polluting vehicles (the "Chelsea Tractors") but Gordon Brown did not rule out the use of such taxes in future budgets Some London councils are looking to base parking permit fees on vehicle CO_2 emissions Congestion charging zone to be extended in 2007

Source: ACEA Economic Report November 2006 & CIR estimates

Even within the EU there is currently a bewildering variety of different fiscal measures in place to target emissions but without the implementation of harmonised policies, it is difficult to rate counties against one another and measure the effectiveness of such policies. For instance, although in 2004, Sweden was the worst performing EU15 country averaging 198g CO_2/km emissions for new fleet registrations, the country is aware of the need to target emissions. Since 1996 Sweden has implemented low emission zones in four cities and more recently in October 2006 implemented a new CO_2-based annual road tax in a further attempt to reduce emissions but it is impossible to rate any resultant improvement in harmful emissions against countries that have historically had lower emissions figures but no CO_2 element to their vehicle taxation.

UK Taxation Initiatives and Proposals

Mirroring the ACEA demands for greater accountability for all stakeholders, the UK government announced plans in November 2006 to introduce a Climate Change Bill that will make the UK's 2050 target for a 60% reduction in CO_2 emissions legally binding. The bill makes no reference to annual carbon dioxide reduction targets but it does enable the introduction of a new Carbon Committee to set interim targets and impose penalties if these are not met. Additionally, a draft Road Transport bill aims to extend the powers of local authorities to introduce road charging and look at the scope of a national road toll.

Richmond Borough Council was one step ahead when it announced in October its plans to increase the price of its parking permits for the owners of "gas-guzzling" cars. Under the proposals, owners of cars in Richmond which are judged to have high emissions could find their bills increase threefold. By contrast, drivers of a Honda Insight Hybrid and other cars with carbon emissions below 100g/km would be able to park free of charge, and owners of cars which are already compliant with the EU's 120g/km target, such as Toyota Prius, would receive a 50% permit reduction. This is just one example of local legislation aimed at raising consumer awareness of CO_2 targets.

Similarly, London Mayor Ken Livingstone intends to proceed with proposals to link congestion charges to CO_2 emissions. The daily charge for "gas-guzzling" vehicles in the highest emitting band G (those which emit more than 225g/km) will rise over 300% to £25 from 2009. Additionally, the 90% residents' discount for people living in the congestion charging zone will be withdrawn for these cars. In 2008, the charge will be removed entirely for cars in bands A and B, which produce emissions below 120g/km (although it is noted that there are currently no band A cars on sale in Britain), while the majority of cars, those in bands C, D and E, will be unaffected. Although these measures are in accord with the ACEA's call for multi-stakeholder taxation linked to emissions, the band rating only relates to cars registered after 23 March 2006 and would not penalise emissions on older models.

Figure 40. UK Car Banding by CO_2 Emissions

Band	CO2 emission figures (g/km)	Examples include:
A	up to 100	Honda Insight hybrid, Smart diesel, Toyota Prius 1.5l hybrid
B	101-120	
C	121-150	
D	151-165	
E	166-185	
F	Over 185	
G*	**Over 225**	Range Rover 4.4 V8 petrol, Renault Espace 2litre petrol, Porsche 911 Carrera Coupe 3.6, BMW X5 4.8litre, Ford Modeo automatic, Citroen C8 2litre automatic

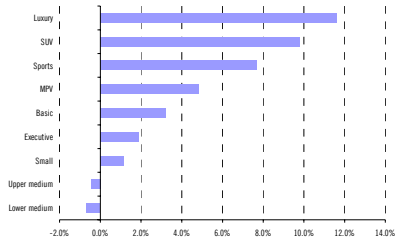
* Cars registered on or after 23 March 2006

Source: Citigroup Investment Research

Consumer Behaviour

It is likely that the European Commission will call for some kind of harmonisation of fuel tax across all member states, to ensure that car purchases and ownership depend, at least in part, on fuel consumption. However, eco-reforms to vehicle taxation have as yet achieved only limited success. More is required, so the ACEA believes, in order to encourage consumers to buy more fuel-efficient vehicles and thus assist car manufacturers in meeting the voluntary EU targets. Recent trends towards bigger, more powerful cars, with the fashion for four-wheel drive SUVs pushing up power and worsening fuel consumption, imply that despite existing emission-related taxation, consumer demand is not yet aligned to EU climate targets. Indeed, JDPower forecasts show that between 2005 and 2011E SUVs are expected to experience an almost 10% CAGR, beaten only by the luxury segment with a CAGR of 11.6%, whereas the small and basic car segments are predicted to grow by a CAGR of less than 3%.

Figure 41. Potential Growth Rates per Segment (W European Car Market 2005-11E)



Source: Based on sample JDPower forecasts

EU Safety Regulations Increase Fuel Inefficiency

In addition for the need for more integrated fiscal measures and full stakeholder accountability, ACEA is appealing to reduce the Commissions voluntary target because of the increased weight of equipment required to meet Brussels regulations on local exhaust pollution and vehicle safety. It claims that the use of air bags and strengthened bodies to reduce crash damage make cars heavier and therefore less fuel-efficient.

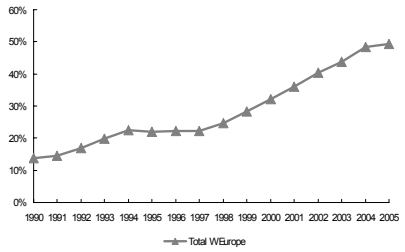
However, the European Transport Safety Council (ETSC) claims that the added weight due to the EU safety regulations is negligible, claiming that it is rather size, comfort and the top-speed capabilities of today's cars that are driving carbon emissions. The Chairman of ETSC responded to ACEA's demands by saying: "Blaming safety is unfair, incorrect and just hides the fact that there are other issues responsible for industry's failure to meet its contract with society. The performance of smaller and lighter cars at Euro NCAP clearly shows that improved safety does not need additional weight." Likewise, data from BMW suggests that such safety measures have only added 30kg out of a total 410kg weight increase over the last 30 years.

Costs of Cutting Carbon Reduce Competitiveness

A further argument put forward by ACEA in opposition to legally-binding emission limits is the implications for competitiveness. A report published by ACEA claims that in order to meet the carbon dioxide target of 120g/km by 2012, OEMs will have to add an extra €4,000 on average to the price of each new car. Ford believes that this figure will be closer to €5,000-€10,000 over the next five to 10 years, although the Commission has expressed reservations about these results, claiming that the underlying costs associated with lower carbon technologies are not as brutal as the ACEA predicts. In Europe, the automotive industry is already challenged by fierce competition and downward price pressure and thus is opposed to any regulation which could threaten competitiveness and profitability. Research by SAM Group and the World Resources Institute calculates that the industry as a whole faces new capital expenditures of €5.6 billion to meet the initial 140 g CO_2/km target, although it is unclear how this will be distributed throughout the industry. However, the 2003 review of progress towards the 2008 target by ACEA and the Commission claims that the 140g CO_2/km standard is likely to be met by a mixture of portfolio restructuring, efficiency improvements in the internal combustion engine and diesel technology, and thus will not require any major technology shift. Additionally, some low-carbon technologies such as diesel and hybrids might even command price premiums and hence allow for longer-term sales growth.

Impact of Diesel Penetration

Figure 42. Diesel Penetration in Western Europe (EU15 and EFTA), 2005

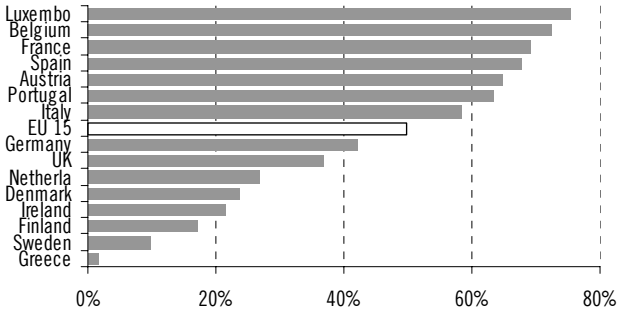


Source: ACEA

Since the 1998 voluntary agreement, there has been a sustained increase in the share of diesel vehicles in the European new passenger car market, as illustrated by the table opposite. In 1990 only 13.8% of the 13.6m total new car registrations in Western Europe (comprising EU15 and EFTA countries) were attributed to diesel cars but by 2005 this figure had increased to 49.3% (49.8% for EU15 countries) and is expected to break through the 50% barrier in FY06. The impact of fiscal incentives for diesel fuel in most EU Member States has likely contributed to this increased diesel vehicle penetration.

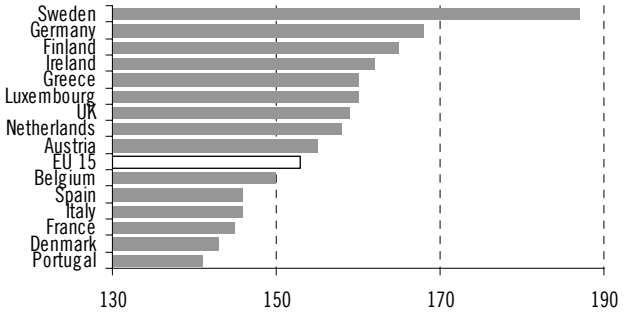
Despite the higher carbon density of the fuel, the average diesel in Europe emits 153g/km according to the latest ACEA mix data in Europe, relative to 170g/km for a gasoline vehicle. Therefore, the growth in diesel vehicles has made it easier for companies to meet their intermediate 2003 target and is likely to contribute towards attempts to reach the 2008 target. However, the figures vary greatly by country, with countries such as Luxembourg, Belgium, France, Spain Austria and Portugal showing over 60% of new registrations as diesel, whereas diesel penetration in Greece, Sweden and Finland was below 20% in 2005. Likewise, average diesel emissions for new passenger cars in the EU vary widely by country. Sweden fares worst, with the average vehicle emitting 187g CO_2/km, while Belgium, Spain, Italy, France, Denmark and Portugal's diesel emissions are below the EU15 average of 153g CO_2/km.

Figure 43. Diesel Penetration by EU15 Country (2005)



Source: ACEA

Figure 44. Av Diesel Emissions (CO_2 g/km) by EU15 Country (2004*)

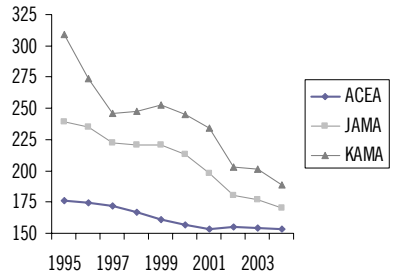


Source: European Commission

* Most recent data published by European Commission

Since 1995, fuel efficiency improvements in diesel passenger cars have been greater than in gasoline vehicles. The average emissions of ACEA's new car fleet registered in the EU15 was 161g CO_2/km, which was composed of 170g/km for petrol-fuelled cars; 153g/km for diesel cars; and 144g/km for alternative fuelled cars. Although the JAMA figures show that diesel and petrol emissions are almost neck and neck, at 170g and 171g/km respectively, and that for KAMA diesel emissions were actually higher by 29g/km than for petrol cars, it is the percentage decrease which is worth noting. There has been almost a 40% reduction in diesel emissions for KAMA, whereas petrol emissions have reduced by only 18% 1995-2004. Likewise, JAMA diesel car emissions have been reduced by 30% since 1995, as opposed to only a 10% reduction for petrol vehicles. When combined with the steady increase in diesel's market penetration, this improvement in diesel emissions has made an important contribution to the overall progress achieved towards the ACEA target.

Figure 45. Diesel Emissions by Car Association



Source: European Commission

ACEA argues that according to the independent panel the European Commission consulted for its car emission proposals, including research institutes like TNO, the price of diesel cars may increase by up to €900 as an effect of Euro 5 & 6. This increased price could significantly impact sales of small diesel cars and light duty vehicles in the future. Since the difference in fuel consumption between diesel and gasoline engines amounts to about 20%-25%, ACEA believes that this change in mix from diesel to gasoline, combined with the use of particulate filters and NOx after-treatment systems to meet the Euro 5 & 6 standards, could lead to an increase in CO_2 emissions.

Figure 46. Petrol and Diesel Emissions Comparisons in Europe, 1995-2004 (g CO_2/km)

ACEA				
	1995	**2000**	**2004**	**% change 1995-04**
Petrol	188	177	170	-9.6%
Diesel	176	157	153	-13.1%
All fuels	**185**	**169**	**161**	**-13.0%**
JAMA				
	1995	**2000**	**2004**	**% change 1995-04**
Petrol	191	177	171	-10.5%
Diesel	239	213	170	-28.9%
All fuels	**196**	**183**	**170**	**-13.3%**
KAMA				
	1995	**2000**	**2004**	**% change 1995-04**
Petrol	195	185	160	-17.9%
Diesel	309	245	189	-38.8%
All fuels	**197**	**191**	**168**	**-14.7%**

Source: COM(2006) 463 Final

The Global Dimension

United States

Although vehicles sold by companies under the ACEA agreement comprise 90% of total EU vehicle sales, the United States withdrew from the Kyoto agreement in 2001 and, to date, has taken no comparable action to regulate vehicle emissions. However, given that CO_2 emissions from the US transport sector are approximately double those of the EU, any meaningful action to reduce global transport-related carbon emissions would require US participation.

The fuel economy standard for cars in the US has remained virtually unchanged since the 1980s at 27.5 mpg (the equivalent of 200g CO_2/km) and the US Congress has repeatedly rejected bills proposing higher fuel economy standards. Corporate Average Fuel Economy (CAFE) standards are used in the US, which require each manufacturer to meet specified fleet average fuel economy levels for cars and light trucks. The CAFE standard for passenger cars has remained static at 27.5mpg, but the standard for light trucks was increased in 2004 from the existing standard of 20.7mpg to 21.0mpg for model year 2005, and increasing steadily up to 23.5mpg for model year 2010.
As can be seen from the tables below, when ranked by percentage of vehicles meeting CAFE standards, BMW, Ford, GM, Nissan and DCX were the worst performers in 2005 and Japanese manufacturers fared best. The importance of product mix is highlighted by the fact that manufacturers such as BMW, Nissan, Kia and Hyundai who saw a decline in the number of vehicles meeting CAFE targets between 1996 and 2005, also substantially increased their SUV/pickup populations during the period. However, mix is not the full story since despite having significant numbers of SUV/pickups in their fleet, Honda and Toyota are the best performers both by percentage of vehicles meeting CAFE in 2005 and by 2005 MPG average (although Honda did experience declines in its overall CAFE mpg rating during the period). Indeed, only three manufacturers managed to improve their CAFE ratings between 1996 and 2005 and the 3.2% improvement from DaimlerChrysler masks the fact that since 1996 the manufacturer has experienced the worst average CAFE rating at only 22.9mpg in 2005 (Honda averaged 29.3mpg in 2005 and the US total was 25.4mpg).

Figure 47. CAFE Passenger Car and Light Truck Standards

	Passenger cars	Light Trucks ("unreformed")	Light trucks ("reformed") *
2004	27.5	20.7	
2005	27.5	21.0	
2006	27.5	21.6	
2007	27.5	22.2	
2008	27.5	22.5	22.7
2009	27.5	23.1	23.4
2010	27.5	23.5	23.7
2011	27.5		**24.0**

Source: Citigroup Investment Research

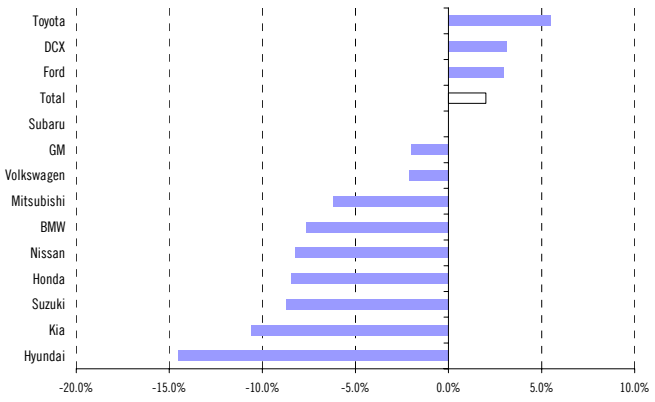
* Truck manufacturers have the option from 2008 to comply with the "unreformed" standards or those based on the vehicle "footprint". From 2011, all truck standards will be based on the "reformed" system.

Figure 48. Manufacturers Ranked by Percent of Vehicles Meeting CAFE Requirements in 2005

Manufacturer	Vehicles meeting CAFE 1996	Vehicles meeting CAFE 2005	% Change
Honda	86%	94%	8%
Toyota	61%	84%	23%
Mitsubishi	78%	83%	5%
Subaru	67%	82%	15%
Suzuki	100%	82%	-18%
Hyundai	98%	80%	-18%
Kia	100%	79%	-21%
Volkswagen	73%	75%	2%
DCX	46%	65%	19%
Nissan	68%	65%	-3%
GM	52%	56%	4%
Ford	45%	49%	4%
BMW	42%	40%	-2%

Source: Consumer Federation of America

Figure 49. % Change in Manufacturer MPG, 1996-2005



Source: Consumer Federation of America

Figure 50. CAFE Fines Collected ,2000-05

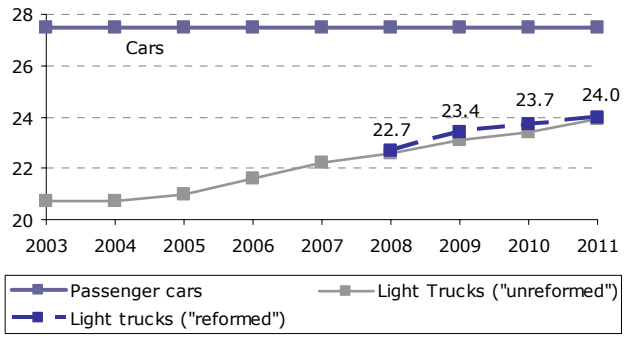
Model Years	Manufacturer	Amount Fined
1999-2003	BMW of North America	$ 94,616,159
1998-2000 & 2004	DCX Group	$ 35,806,438
1998-2004	Porsche Cars North America, Inc.	$ 29,509,540
1999-2001 & 2004	Volkswagen of America, Inc.	$ 4,148,639
1999-2002	Fiat Motors of North America	$ 3,914,581
2003-2004	Ferrari Maserati North America, Inc.	$ 2,650,835
1998-2002	Lotus Cars USA, Inc.	$ 203,043
1998	Other	$ 3,867,630
	Total fines 2000-2005	**$174,716,866**

Source: NHTSA

The 'Proposed Light Truck CAFE rule' of August 2005 and 'Final Light Truck CAFE rule' in April 2006 ("Reformed CAFE") further extended the regulations and set six size categories, or "footprints" (wheelbase multiplied by track width) for each vehicle with their own mpg target, rather than having a single standard for the whole class. The new rules enforce higher miles per gallon targets for all light trucks (including models that were previously exempt from any CAFE requirements, notably SUVs weighing between 8,500 and 10,000lbs) to be implemented by 2011 at the latest. This means that smaller SUVs are now required to meet efficiency standards more closely aligned with the standards for passenger cars (see Figure 51 below). Indeed some light trucks will even have to meet a fuel economy target of 28.4mpg, which is higher than the current standard for passenger cars.

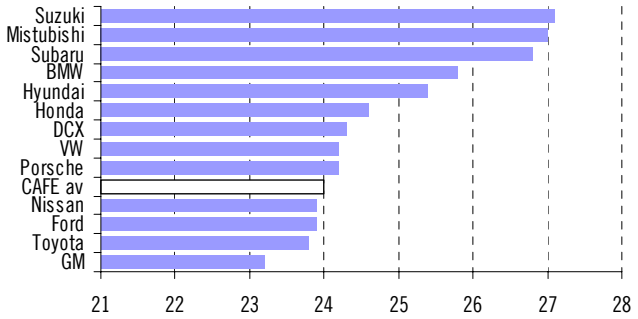
There are heavy fiscal as well as legal penalties for failure to comply with the CAFE standards. For each vehicle produced, a manufacturer whose fleet-average fuel consumption does not meet the CAFE standards is fined $5 per vehicle for every 0.1mpg by which it fails to meet the standard. Manufacturers can offset these fines against credits accrued for other model years. Despite the punitive nature of the fines, many manufacturers have missed the targets. Between 2000 and 2005, US manufacturers were fined a massive $175 million for failure to comply with CAFE, with BMW making up almost 55% of that total. As can be seen from Figure 52 below, based on production plans and anticipated fleet footprints provided by vehicle manufacturers, the US Department of Transport has projected the fuel economy levels which would be required by each manufacturer by 2011 under the Reformed CAFE system. Four companies (GM, Toyota, Ford and Nissan) would be able to produce average fleet fuel economy levels below the CAFE fleet average of 24 mpg, while Suzuki, Mistubishi, Suburu, BMW and Hyundai would all need to achieve an average of over 25 mpg.

Figure 51. CAFE Standards for Passenger Vehicles and Light Trucks (mpg)



Source: Citigroup Investment Research

Figure 52. Projected Required Fuel Economy Levels by Manufacturer (mpg) by 2011 under Reformed CAFE Standards Compared to CAFE Average



Source: U.S. Department of Transportation NHTSA – Average Fuel Economy Standards for Light Trucks Model Years 2008-2011 (49 CFR Parts 523, 533 & 537)

Data is based on product plans provided by manufacturers

Figure 53. U.S. "Gas Guzzler Tax"

Combined Fuel Economy level:	Tax Payable
22.5 mpg and above	No tax
21.5 - 22.5 mpg	$1,000
20.5 - 21.5 mpg	$1,300
19.5 - 20.5 mpg	$1,700
18.5 - 19.5 mpg	$2,100
17.5 - 18.5 mpg	$2,600
16.5 - 17.5 mpg	$3,000
15.5 - 16.5 mpg	$3,700
14.5 - 15.5 mpg	$4,500
13.5 - 14.5 mpg	$5,400
12.5 - 13.5 mpg	$6,400
Less than 12.5 mpg	$7,700

Source: EPA – EPA420-F-06-042 October 2006

In 2005 the majority of manufacturers managed to achieve the CAFE target of 27.5mpg for passenger vehicles and 21mpg for light trucks (Porsche and VW were the only two truck manufacturers to fail to meet the 2005 CAFE target and Porsche and BMW failed to meet the passenger car targets). The National Highway Traffic Safety Administration (NHTSA) has projected the average fuel economy levels that each manufacturer would be required to obtain by 2008, in order to achieve the new CAFE targets. These figures show that with the exception of Suzuki, the Japanese manufacturers have already achieved the necessary levels. By contrast, the majority of the US and European brands still have some way to go, most notably Porsche, VW, DCX and BMW.

In addition to the CAFE standards, manufacturers of new cars in the US that fail to meet a minimum fuel economy of 22.5mpg (5mpg below the CAFE requirement) are required to pay a "Gas Guzzler Tax". This tax was imposed in 1978 by the Energy Tax Act and is calculated based on the US Environment Protection Agency's (EPA) procedures. The tax is a sliding scale starting at $nil for vehicles with a fuel economy of 22.5mpg or above and increasing for each mile per gallon of poorer fuel economy, up to a limit of $7,700 for vehicles giving less than 12.5mpg. However, the "Gas Guzzler Tax" does not apply to minivans, SUVs or pick-up trucks.

The Federal fuel efficiency programme in the US also provides consumers with information regarding the relative efficiency of new cars. The 'Gas Mileage Guide' published by the EPA and Department of Energy lists the fuel economy results of each vehicle model, in an effort to educate new-car buyers and encourage them to make an environmentally-informed choice. Additionally, stickers are required on new cars indicating their fuel economy as determined by the EPA, an estimate of the annual fuel cost based on 15,000 miles of operation, and the range of fuel economy achieved by similar-size vehicles of other makes.

California

Figure 47. California Air Resources Board Approved Standards

	CO_2 g/km (*)		CAFE-equivalent (mpg)	
Model Year	Cars & light trucks <3,750 lbs	Trucks weighing 3,751 to 10,000 lbs	Cars & light trucks <3,750 lbs	Trucks weighing 3,751 to 10,000 lbs
2009	323	439	27.6	20.3
2010	301	420	29.6	21.2
2011	267	390	33.3	22.8
2012	233	361	38.2	24.7
2013	227	355	39.2	25.1
2014	222	350	40.1	25.4
2015	213	341	41.8	26.1
2016	205	332	43.4	26.8

Source: Pew Centre for Global Climate Change

*California Standards are based on CO2 emissions but these have been converted to MPG for comparison with CAFE standards

In 2004 the California Air Resources Board (CARB) approved draft legislation to reduce GHG emissions from passenger vehicles in California State to be phased in from 2009. The regulations include one set of fleet average emission standards for vehicles weighing below 3,750 lbs and another for heavier light-duty trucks (weighing between 3,751-8,500 lbs) and medium-duty passenger vehicles (weighing 8,500-10,000 lbs). Ten other US states as well as Canada, comprising approximately 30% of the North American vehicle market, have indicated that they will consider following suit and adopt the Californian regulations.

In retaliation, in December 2004, the automobile industry (namely the Alliance of Automobile Manufacturers, the Association of International Automobile Manufacturers and some Californian auto dealers) filed a lawsuit challenging the CARB regulations (or Pavley law), claiming that only the federal government has the power to regulate fuel economy. However, the Californian officials claim that under the Clean Air Act, the state is permitted to regulate polluting greenhouse gases. The case therefore hinges on the definition of CO_2 as a pollutant since vehicle CO_2 emissions and fuel economy ratings are directly related. The challenge to the Pavley law comes as the Californian state attorney has filed a suit against six of the world's largest carmakers — Chrysler, GM, Ford, Toyota NA, Honda NA and Nissan NA — to hold them liable for damages caused by their vehicles' emissions. Such cases therefore underline the importance of the emissions debate and show that climate issues relating to automobiles are firmly in the forefront of public opinion in America. However, the US still has a long way to go to narrow the gap on emission performance in comparison to other countries, lagging far behind Europe and Japan, as well as behind both China and Canada.

Canada

In Canada a voluntary agreement was announced in 2005 to reduce emissions from new passenger vehicles by 25% by 2010. Under the terms of the Canadian agreement, legislation was to be enacted, if the industry were not to meet the voluntary target. However, after rumours of tougher emissions standards to be introduced by the new government in 2006, Canadian officials told auto representatives in September that the new regulations would be negotiated over the next three years.

Japan

Under the Kyoto Protocol, Japan formulated its "Master Plan for Measures to Prevent Global Warming", which was revised in 2002 and again in 2005. This initiative stipulates specific CO2 reduction targets for the transport sector. In 1998 Japan's Energy Conservation Law implemented mandatory fuel economy standards for gasoline and diesel powered light-duty passenger and commercial vehicles, with the aim of reducing fuel consumption by 23% for gasoline passenger vehicles (14% for diesel vehicles) by 2010 from the 1995 fleet average of 14.6 km/l (equivalent to 159g CO2/km). The Japanese government contends that this will result in an average fleet fuel economy of 35.5mpg by 2010 for Japanese vehicles. The standards are based on weighted average values of vehicle fuel economy performance for the respective vehicle weight (kg) classes, assuming no change in vehicle mix from 1995 to 2010. The regulations include penalties if the targets are not met, but these penalties are extremely small. However, the auto industry has worked hard to comply, and the majority of manufacturers are meeting the necessary fuel economy improvements ahead of schedule. In 2004, domestically manufactured gasoline powered passenger cars achieved an average fuel economy performance of 15.4km/litre, exceeding the 2010 target value of 15.1km/l (equivalent to 154g CO2/km). Indeed, the importance given to climate factors affecting the automobile industry in Japan is clearly shown by the fact that the largest Japanese OEMs produce annual sustainability reports, detailing their environmental objectives and progress to-date towards various emissions-related targets.

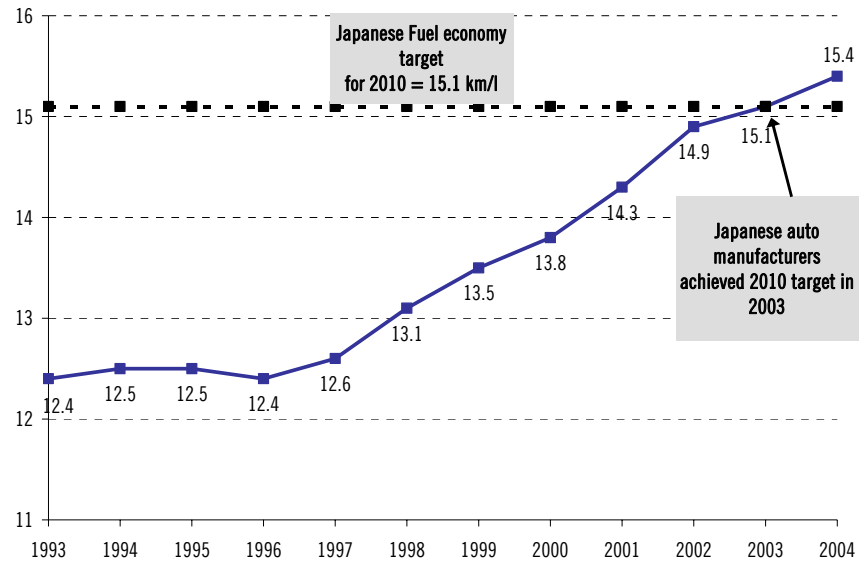
Figure 54. Japanese Weight Class Fuel Economy Standards for Gasoline Passenger Vehicles

Vehicle weight class (kg)	Equivalent weight in lbs	Fleet average fuel economy (km/l)	CAFE equivalent fuel economy (mpg)
<702	<1,548	21.2	49.8
703-827	1550-1824	18.8	44.2
828-1015	1826-2238	17.9	42.1
1016-1265	2240-2789	16.0	37.6
1266-1515	2791-3341	13.0	30.6
1516-1765	3343-3892	10.5	24.7
1766-2015	3894-4443	8.9	20.9
2016-2265	4445-4994	7.8	18.3
2266	>4997	6.4	15.0

Source: Pew Center on Global Climate Change

The Japanese target for 2010 of 15.1km/l equates to 154g CO2/km, or 29.6mpg (using gallons UK)

Figure 55. Average Fuel Economy Performance of Japanese Petrol Passenger Cars (km/l)

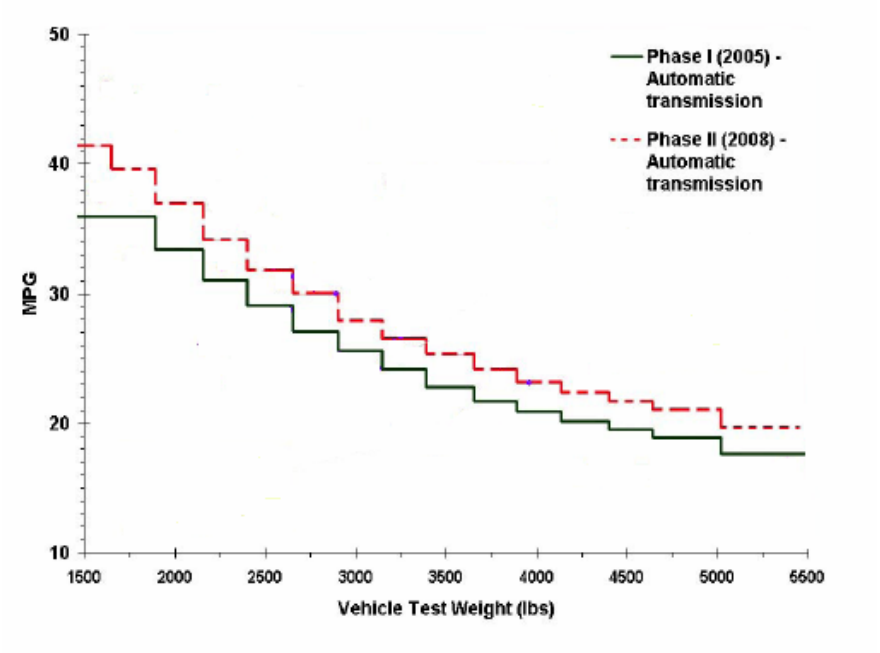


Source: JAMA

Chinese regulations

China is the second-largest emitter of energy-related carbon dioxide emissions after the United States, although per capita China's emissions are lower than the world average. The Chinese automobile industry has been one of the most rapidly growing in the world and the active population of cars and SUVs in China has been forecast to grow to 15 times its present size in 30 years. Correspondingly, CO_2 emissions from on-road transport are expected to grow three and a half times during the same period. In an attempt to harness the effects of such explosive growth, the first fuel efficiency standard in China, "Fuel Consumption Limits for Light Duty Passenger Vehicles", was published in October 2004, for implementation as of July 2005. The components of the mandatory fuel efficiency standard were i) the development of weight-class based maximum fuel consumption standards; ii) an overall per-distance fuel consumption reduction of 15%; and iii) a more stringent standard for heavier vehicle classes to prevent a shift to heavier vehicles and to encourage the use of economic compact cars. The standard set different targets for manual transmission cars and automatic transmission light duty vehicles. The first phase targeted a reduction of 5% in per-distance fuel consumption and a second phase was introduced, with a goal of a 10% reduction in fuel consumption for each weight category for 2008 model years.

Figure 56. Chinese Fuel Economy Standards



Source: WRI

Each vehicle sold in China will be required to meet the standard for its weight-class, of which there are 16, ranging from 38mpg in 2005 (43mpg in 2008) to 19mpg in 2005 (21mpg 2008) for vehicles weighing over 5,500 lbs[3]. The regulations are "bottom heavy", in that they require the heaviest, most inefficient vehicles to make the largest improvements. In 2003, 66% of cars sold in China met the Phase 1 standards (with 35% meeting the Phase II standards) while only 4% of SUVs and minivans met the Phase 1 standards (no light trucks met the Phase II standard). However, the various manufacturers are positioned differently in relation to these standards and, particularly regarding Phase II, it is not yet known how the standards will be enforced by the Chinese authorities. Commercial vehicles and pickup trucks are not regulated by the standards. These standards are more exacting than the USCAFE programme, as the limits are maximum values rather than fleet average values. However, a further reduction of 25% in vehicle fuel consumption would be required to catch up with European regulations of 140g/km by 2008.

In addition, in March 2006 the Chinese government announced plans to increase fiscal penalties for "gas guzzling vehicles": from the current rate of 8% to 20%, while the tax on vehicles with small engines will decrease. Further measures to target fuel efficiency include allowing petrol & diesel prices to increase by up to 12% in May 2006. Additionally, based on discussions with market participants, we believe that the Chinese government is planning to introduce favourable policies such as tax cuts to encourage diesel usage in passenger vehicles in 2007.

[3] MPG values converted to the US CAFE test cycle (source WRI)

European Autos Recommendation Summary

Figure 57. European Automakers and Suppliers Recommendation Summary, 2006E

RIC	Company	Currency	Current Price	Target Price	ETR	Code / Recommendation	Ordinary Shares (m)	Market Cap. (m)	EV 2006E (m)	WACC 2006E	Reported EPS 2005A	2006F	2007F
European Automakers													
BMWG.DE	BMW	EUR	44.1	46.0	6.0%	2M Hold/ Medium Risk	649.9	28,628	27,615	8.00%	3.34	4.26	4.20
DCXGn.DE	DaimlerChrysler	EUR	47.5	45.0	-2.1%	2M Hold/ Medium Risk	1,012.7	48,103	60,250	8.50%	2.81	2.90	3.50
FIA.MI	Fiat	EUR	14.5	14.4	-0.9%	2H Hold/ High Risk	1,279.0	18,581	25,961	9.00%	1.26	0.72	1.00
PEUP.PA	Peugeot	EUR	52.3	61.0	19.3%	1H Buy/ High Risk	229.1	11,970	13,902	8.50%	4.47	2.20	3.25
PSHG_p.DE	Porsche	EUR	983.5	840.0	-14.0%	3H Sell/ High Risk	17.5	17,211	16,094	8.00%	44.74	78.21	72.13
RENA.PA	Renault	EUR	92.6	82.0	-8.1%	3H Sell/ High Risk	276.1	25,563	16,686	8.00%	13.19	11.04	11.69
VOWG.DE	Volkswagen (Ord.)	EUR	85.5	80.0	-5.0%	2M Hold/ Medium Risk	278.6	23,815	34,812	7.00%	2.90	3.80	6.70
VOWG_p.DE	Volkswagen (Pref.)	EUR	56.3	56.0	2.5%	2M Hold/ Medium Risk	105.2	5,923	16,920	7.00%	2.90	3.80	6.70

Source: Powered by dataCentral. Prices as at 2 January 2007. Note: dataCentral is Citigroup Investment Research's proprietary database which includes Citigroup estimates, data from company reports, and feeds from Reuters and Datastream.

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% of companies in each rating category that are investment banking clients	100%	86%	50%

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