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Monitoring of ACEA's Commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Monitoring of JAMA's commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Monitoring of KAMA's Commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Final Reports
13 July 2001

[COM(2001)643 final]

Monitoring of ACEA's Commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Final Report
13 July 2001

Joint Report of the European Automobile Manufacturers Association and the Commission Services

Monitoring of ACEA Commitment[1] on CO_2 Emission Reduction from Passenger Cars

JOINT REPORT OF ACEA AND THE COMMISSION SERVICES[2]: YEAR 2000 REPORT

ES SUMMARY OF PROGRESS IN DELIVERING THE COMMITMENT

E1 Trends in specific emissions of CO_2 (g/km)

On an EU-wide basis, ACEA reduced the average CO_2 emissions of its new car fleet to 169 g/km[3] in 2000, from 174 g/km in 1999, and from 185 g/km in 1995. Since 1998, when the ACEA CO_2 Commitment was established, European manufacturers have on average reduced CO_2 emissions by 2.5% a year [4] (2.9% reduction in 2000). Over the 1995-2000 period, ACEA has cut its new car average CO_2 emissions by 8.6%, with an increasing downward trend. (see Figure 1).

The average CO_2 emissions of new gasoline-fuelled cars fell to 177 g/km in 2000 (from 180 g/km in 1999); for diesel-fuelled cars there was a reduction to 157 g/km (from 161 g/km in 1999). Between 1995 and 2000, the CO2 emissions of gasoline cars were down by 5.9%, and those from diesel cars by 10.8%.

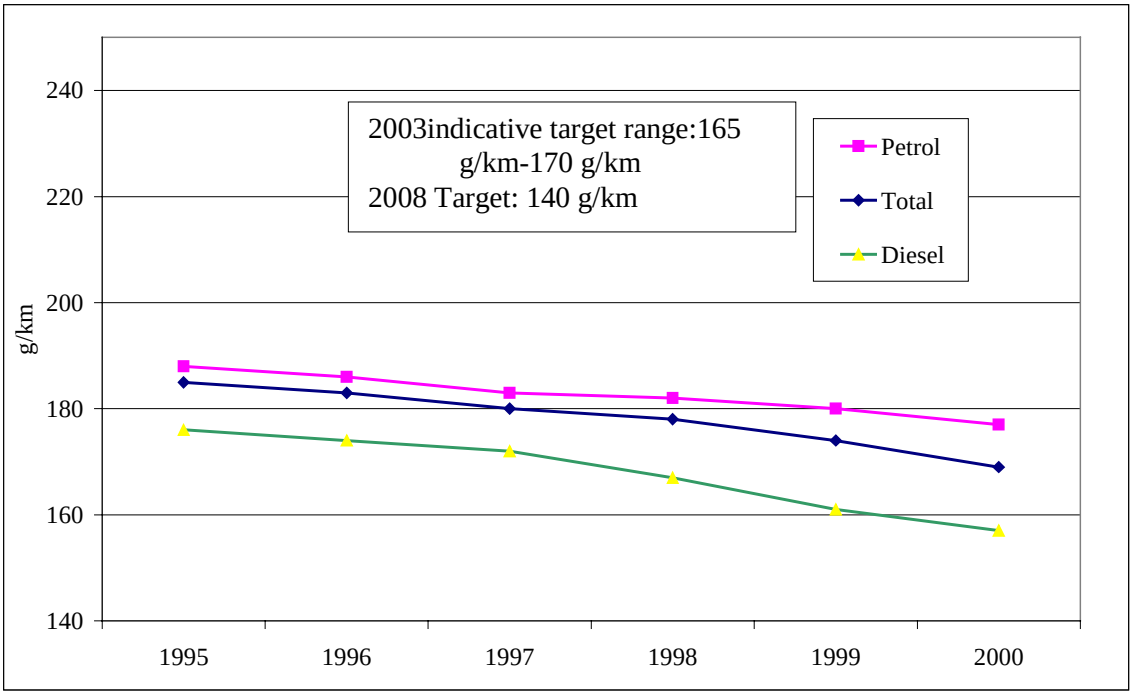


Figure 1: EU Trends of ACEA's Fleet in Specific Average Emissions of CO_2

[1] As recognized by the European Commission in the Recommendation of 5 February 1999 on the reduction of CO2 emissions from passenger cars (1999/125/EC); Hereafter referred to as "The Commitment"

[2] Hereafter often referred to as "The Commission"

[3] ACEA's 2000 CO2 performance does not include the effects of the mandatory drive cycle change, progressively introduced from January 2000 (see Section 2.10). This would lower ACEA's specific CO2 emissions for newly registered cars.

[4] This value is a simple arithmetic average, and throughout the text simple arithmetic averages are used.

E2 Trends in specific fuel consumption by fuel type (litres/100km)

Average fuel consumption in 2000 was 6.8l/100km for new petrol and diesel registered cars combined, down from 7.0l/100km in 1999. For petrol driven cars the corresponding values were 7.4l/100km in 2000, down from 7.5l/100km in 1999. For diesel cars, average fuel consumption of new registrations was 5.9l/100km in 2000, down from 6.0l/100km in 1999.

Over the period 1995 and 2000, new gasoline-fuelled cars and diesel cars reduced their average fuel consumption from 7.9 l/100km to 7.4 l/100km and 6.6 l/100km to 5.9 l/100km, respectively (see Figure 2). The average fuel consumption for petrol and diesel fuelled cars combined fell from 7.6l/100km to 6.8l/100km.

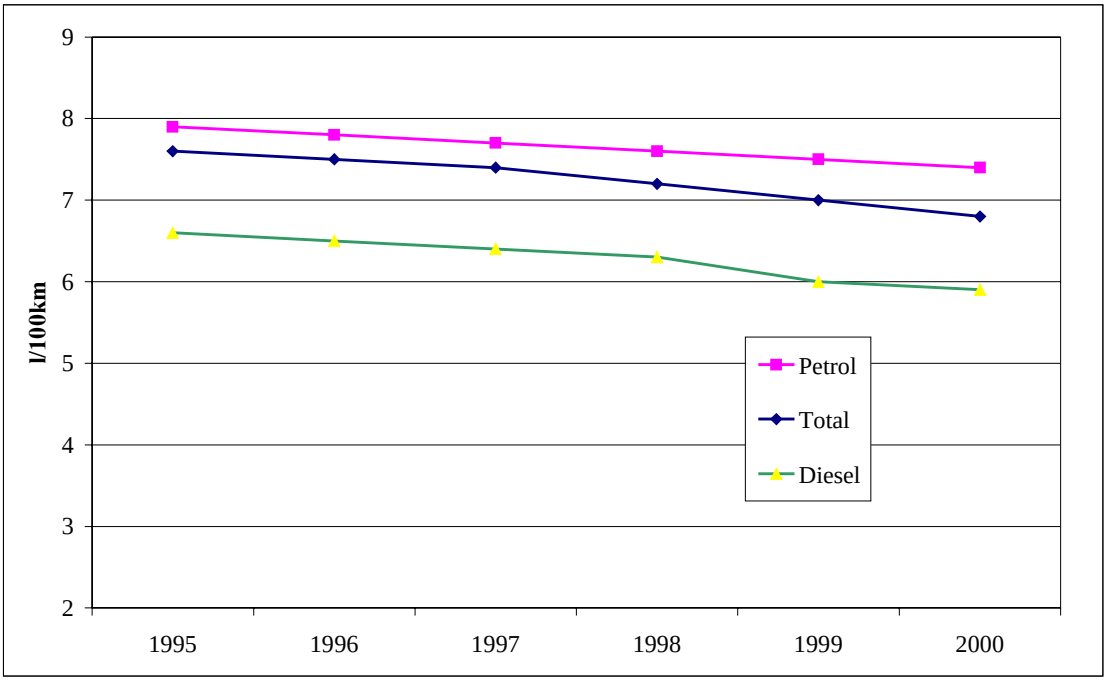


Figure 2: Trends in ACEA's Fleet in Specific Average Fuel Consumption, by Fuel Type

E3 Trends in physical fleet characteristics

Average car mass reduced marginally between 1999 and 2000, whereas other physical characteristics of cars increased slightly. Between 1995 and 2000, average engine capacity increased slightly (+3.8%), and average car mass and engine power increased by 7.9% and 14.3% respectively. Vehicle weight is a main driver of other characteristics, and mass increases resulted from a range of factors such as: car safety improvements; other automotive regulations; an increased diesel car share; and customer-driven vehicle utility enhancement. Even with these trends in physical characteristics, sustained improvements in new car CO2 performance were delivered by ACEA.

E4 Technical developments introduced to reduce CO_2 emissions

Building on the successful introduction of direct injection diesel engine technologies over recent years, 2000 saw a "new generation" of technically-advanced diesels come to market, notably incorporating highly efficient pump-nozzle and common rail technology. In the 1998-2000 period, the market share of diesel cars has expanded,

reflecting the consumer benefits of these highly competitive and fuel-efficient products. A number of European manufacturers have launched gasoline direct injection models. However, research has increasingly highlighted the sensitivity of this technology to sulphur because the performance of after-treatment systems depends on the sulphur content of the fuel. The car industry now considers zero-sulphur fuel as essential if gasoline direct injection is to contribute significantly to car CO2 emission reduction. The Commission has submitted to the Council and European Parliament a proposal for a Directive on the quality of petrol and diesel fuels, and the Commission expects, that this would guarantee fuel qualities on the market in sufficient quantities[5] and within the foreseeable future.

Technical advances by ACEA manufacturers resulted in a continued strong upward trend in fuel-efficient car sales. In 2000, over 2 million ACEA cars were sold with CO2 levels of 140g or less a growth of over 62% on the previous year ; such cars accounted for over 17% of sales. Furthermore, the end of 2000 was the deadline for ACEA's adherence to the first of its CO2 commitments: "some members of ACEA will introduce in the EU market models emitting 120g CO2/km or less". ACEA manufacturers have brought to market more than 20 car models that meet the target of emitting 120g/km or less. In 2000, ACEA's sales of 120g or less cars increased by over 80% on 1999 levels (to almost 160,000 units) , even though there was a 2.4% decline in the overall market. Certain ACEA manufacturers introduced electric or innovative vehicles, and generally the on-going development and offering of alternative-fuelled vehicles continued.

E5 Brief overall assessment on progress in relation to the target

In 2000, ACEA reduced the average CO2 emissions of its new car fleet to 169 g/km; this represents a 2.9% cut from 1999, and a decrease of 8.6% since 1995, corresponding to about 1.7 % per year [6]. Furthermore, 2000 saw ACEA members meet the first of their CO2 commitments with the launch of many models emitting 120 g/km or less; there was also a strong volume growth in the sales of such vehicles (+80% in 2000 on 1999, to almost 160,000 units).

Latest figures show that ACEA's CO_2 performance is consistent with the achievement of the 2003 indicative target range, 165 g/km-170 g/km. And there is further strong evidence of ACEA's determination to meet its other CO2 targets, for example:

- Since 1998, when the ACEA CO_2 Commitment was established, European manufacturers have reduced CO_2 emissions at a rate of 2.5% a year, culminating in a 2.9% reduction in 2000; and
- In 2000, ACEA sales of 140g/km or less cars expanded to over 2 million units; a growth of over 62% on the previous year, and of over 666% since 1995.

In order to meet the target of 140 g/km in 2008 an annual average reduction rate of about 2.1% has to be achieved[7] by ACEA. The Commission Services and ACEA currently have no reason to believe that ACEA would not live up to its Commitment.

[5] COM(2001) 241 final : Proposal for a Directive of the European Parliament and Council on the quality of petrol and diesel fuels and amending Directive 98/70/EC

[6] *Op cit* footnote 4.

[7] *Op cit* footnote 4.

1. MONITORING OF TECHNOLOGICAL DEVELOPMENTS AFFECTING THE COMMITMENT[1]

1.1. Commitment Initiatives

1.1.1 Brief Description of current R&D programmes

1.1.2 Other

The ACEA Commitment continues to ensure that right across the European automotive industry, CO_2 reduction remains a high priority in R&D expenditures, as well as in product and process planning and development. Achievement of technological breakthroughs is seen as key to CO_2 abatement. The vast majority of this R&D effort is being undertaken independently, by each of the ACEA manufacturers freely pursuing their own policies and initiatives in this highly competitive area.

In addition, as explained in the 1999 report, the European automotive industry, through ACEA and EUCAR, has set up a collaborative, pre-competitive research programme on medium to long-term technologies for reduction of CO_2 emissions from vehicles. This programme, which is called *CO2perate*, was launched in 1998 and will continue until 2004 and has an expected overall total budget of around 300 M Euro. Its objectives are to identify, develop and demonstrate new technologies and system concepts enabling reduction of CO_2 emissions from vehicles. Main areas of the programme are Powertrain, Materials and Manufacturing, Electronics and Control, Mobility, System Assessment and Demonstrators.

The CO2perate programme has sought to make use of European Commission's Fifth Framework Programme (FP5) for creating collaborative projects between the automotive manufacturers, suppliers, institutes and universities. In December 2000 a total of 33 projects have been accepted for funding, of which about half are already initiated. Three areas of R&D dominate: Conventional Powertrain (based on conventional fuels), Alternative Powertrain (hybrid ICE/electric and fuel cells respectively) and Material (mainly high strength, low weight material for body and powertrain). During 2000, the technology R&D has been complemented with demonstration projects involving three Powertrain Technology Platforms.

A Life Cycle Assessment project was also launched during 2000, aimed at investigating the relations and implications of the End-of-Life Vehicle directive and the CO_2 reduction targets.

1.2. Technological developments

1.2.1. Description of fuel efficiency characteristics of new technologies, alternative concepts

1.2.2. Availability of New Technologies in the EU

1.2.3. Availability of alternative concepts passenger cars in the EU

1.2.4. Availability of low emission passenger cars (e.g. emitting 120 g/km or less) in the EU

European car manufacturers are continuing to gear research and product and process development towards attaining the 140g CO_2/km target by 2008, with direct injection ultra lean burn engines being seen as a key area of fuel-efficient technology. ACEA's main technological achievement has been the introduction of such engines onto the EU market since 1998.

In 2000 ACEA has built on the successful introduction of direct injection diesel engines with the launch of a "new generation" of technically-advanced diesels, notably incorporating common rail technology. The new diesels are highly competitive products with strong consumer benefits having the drive-quality and performance

[1] As recognized by the European Commission in the Recommendation of 5 February 1999 on the reduction of CO2 emissions from passenger cars (1999/125/EC); Hereafter referred to as "The Commitment"

characteristics of their conventional gasoline alternatives, but with superior fuel consumption. These very fuel-efficient products have been well accepted on the market and as a result, the diesel market share has expanded.

A number of European manufacturers have launched gasoline direct injection models, that meet 2000 emission standards. These were mainly low volume products, and compared to ACEA's expectations at the time ACEA made its commitment, greater uncertainty now surrounds the practical CO_2 benefits of gasoline direct injection technology, especially when simultaneously meeting forthcoming emission requirements. (See also Section 2.5). It turned out that sulphur tolerant technology has not been developed as once expected.

Technical advances by ACEA manufacturers resulted in a continued strong upward trend in fuel-efficient car sales. In 2000, over 2 million ACEA cars were sold with CO_2 levels of 140g or less - a growth of over 62% on the previous year; such cars accounted for over 17% of sales. Furthermore, the end of 2000 was the deadline for ACEA's adherence to the first of their CO_2 commitments: "some members of ACEA will introduce in the EU market … models emitting 120g CO_2/km or less". ACEA manufacturers have brought to market more than 20 models that achieve 120g or less; although mainly diesels, a number of gasoline products were available (see Section 2.7). In 2000 ACEA's sales of 120g or less cars increased by over 80% on 1999 levels (to almost 160,000 units), even though there was a 2.4% decline in total market sales.

Certain ACEA manufacturers introduced electric or innovative concept vehicles onto the EU market, and generally the on-going development of alternative-fuelled vehicles (AFVs) continued. Manufacturer offerings included: LPG Bi-fuel, CNG/Biogas Bi-fuel, and alcohol flex-fuel vehicles, as well as dedicated LPG and CNG/Biogas vehicles. In 2000, AFV sales by ACEA members grew to over 17,000 units.

1.3. Description of market trends in physical fleet characteristics

In the year 2000, the average car mass was marginally lower than in 1999, whereas other engine capacity and engine power increased. Between 1995 and 2000, average engine capacity remained relatively constant (+3.8%), while average car mass and engine power increased by 7.9% and 14.3% respectively. Vehicle weight is a main driver of other physical characteristics of cars, and mass increases have resulted from a range of factors such as: car safety improvements; automotive regulations; an increased diesel car share; and customer-driven vehicle utility enhancement. Safety improvements, for instance, affected the whole car structure, and have arisen from: legislative requirements (such as front and side-impact requirements); motorists' association tests (like Euro NCAP); and consumer preferences and expectations, along with competitive considerations.

Even with these trends in physical characteristics, ACEA's technical improvements more than compensated and delivered sustained improvements in new car CO_2 performance (with a cut of some 9% over the 1995-2000 period).

2. STATISTICAL MONITORING (1995-2000)

2.1. Trends in specific emissions of CO_2 (g/km)

As shown in Figure 1 (recall chapter E1), on an EU-wide basis, ACEA reduced the average CO_2 emissions of its new car fleet to 169 g/km in 2000, from 174 g/km in 1999, and from 185 g/km in 1995. ACEA's 2000 CO_2 performance does not include the adverse effects of the mandatory drive cycle change on the measured CO2 emissions. The new drive cycle has been progressively introduced from January 2000 (see Section 2.9); if included ACEA CO_2 emissions values would be slightly lower.

Since 1998, when the ACEA CO_2 Commitment was established, European manufacturers have reduced CO_2 emissions at an average rate of 2.5% a year (a 2.9% reduction in 2000). Over the period 1995 to 2000, ACEA has cut its new car average CO_2 emissions by 8.6% (corresponding to about 1.7 % per year [8]); an unbroken downward trend has been maintained. In order to meet the target of 140 g/km in the year 2008 an annual average reduction rate of about 2.1% has to be achieved[9].

The average CO_2 emissions of gasoline-fuelled cars reduced average CO_2 emissions to 177 g/km in 2000 (from 180 g/km in 1999); for diesels there was a reduction to 157 g/km (from 161 g/km in 1999). Between 1995 and 2000, the CO_2 emissions of gasoline cars were down by 5.9%, and those of diesels by 10.8%.

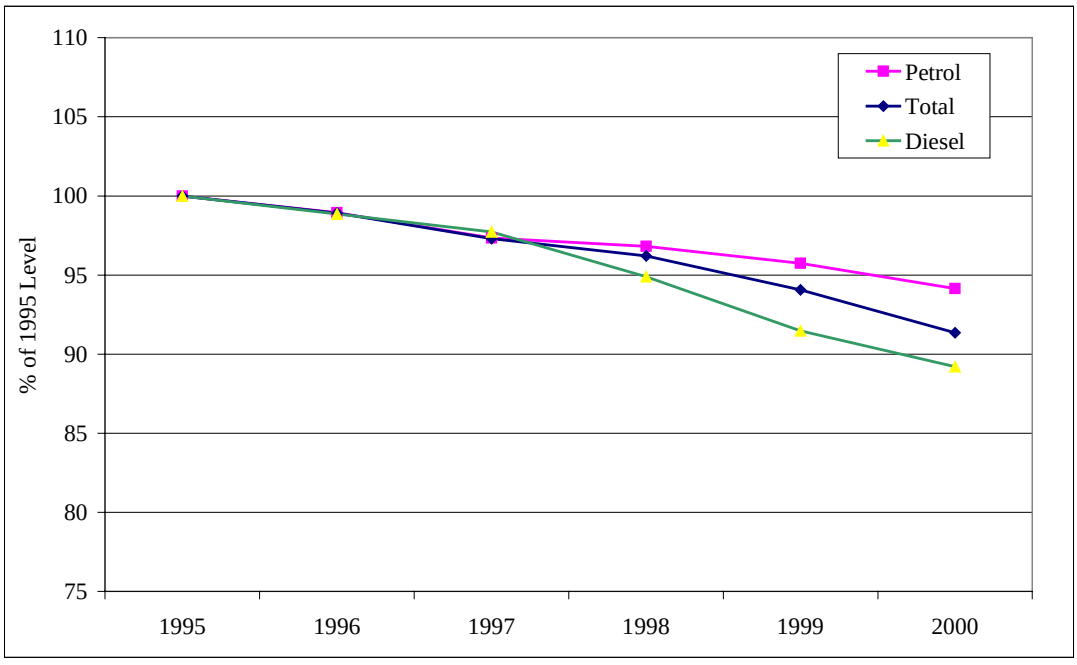


Figure 3: ACEA's CO_2 Reduction Index (1995= 100)

As set-out in Section 1.2, in 2000 ACEA has built on the successful introduction of direct injection diesel engines with the launch of a "new generation" of technically-advanced diesels, notably incorporating common rail and highly efficient pump-nozzle technology. The new diesels are highly competitive and fuel-efficient

[8] This value is a simple arithmetic average. For a year-on-year compound reduction, the value would not be 1.7%, but 1.8%.

[9] The text gives the arithmetic average; for a constant year on year reduction, the value would be 2.3% per year

products, with strong consumer benefits. As a result, in 2000, the diesel market share increased to 35.8% (up from 31% in 1999), continuing the expansion seen since 1998 and the launch of direct injection diesel models.

2.2. Number of newly registered passenger cars

In 2000, ACEA new car sales in the EU amounted to 12217744 units, down 2.4% on previous year. ACEA's market share of total EU passenger cars was 85.4%. Over the period 1995-2000 new registrations increased by 19%.

Gasoline car sales totalled 7443683 units in 2000, a 9.7% decrease on the previous year. In 2000, such vehicles represented 60.9% of total car sales by ACEA members. The number of diesel cars sold increased to 4,378,391 in 2000, which represented 35.8% of total car sales by ACEA members. (see Figure 4).

The number of cars equipped with other fuel types has increased.. However, in relation to total sales, these vehicles remained relatively small in 2000 (17,283 units).

New registrations in Member States are shown in the Annex.

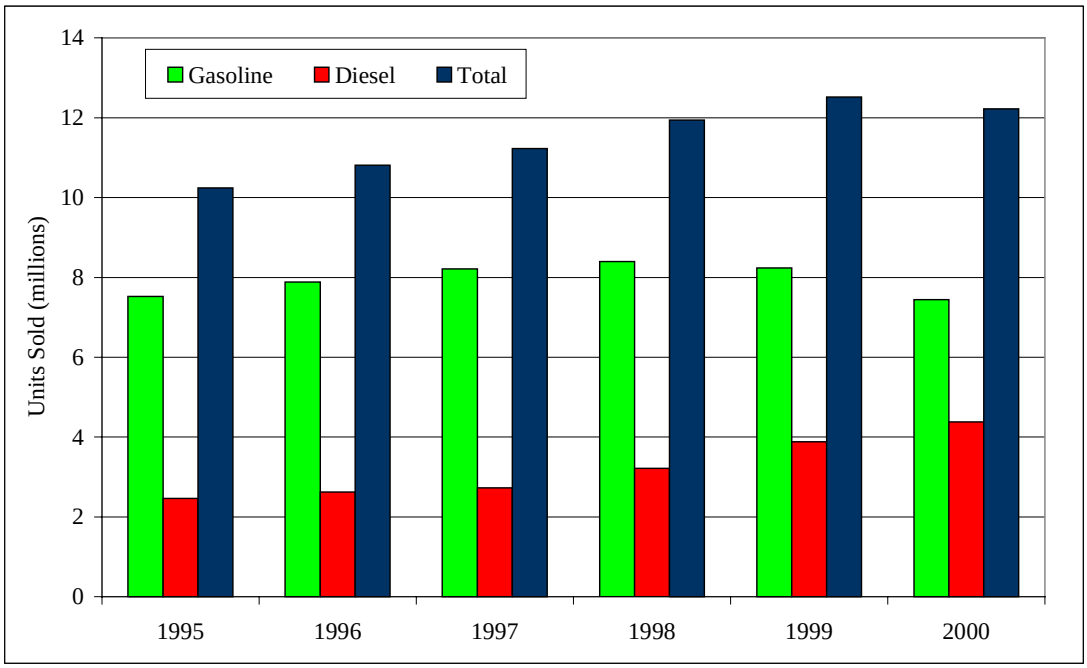


Figure 4: Number of Newly Registered Passenger Cars by ACEA [10]

[10] The difference between the "total" registrations and the "diesel" + "petrol" registrations is due primarily to the unknown vehicles and to a minor extent due to AFVs.

2.3. Fleet Composition

The graph below shows ACEA's fleet composition for the year 2000 and the reference year 1995.

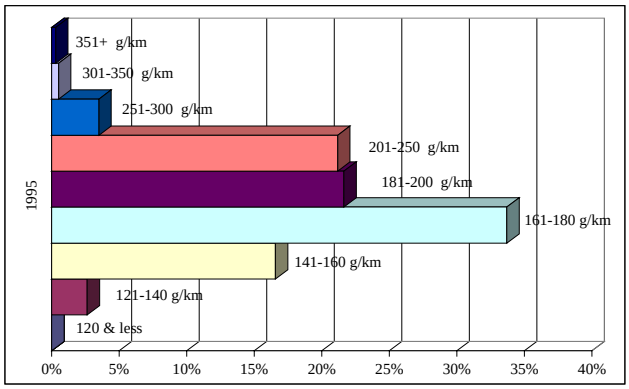


Figure 5a: ACEA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 1995

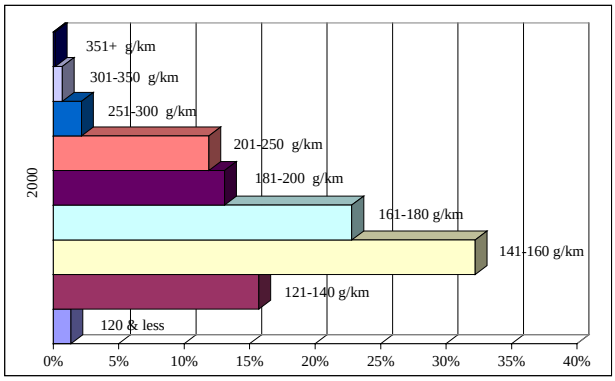


Figure 5b: ACEA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 2000

In 2000, ACEA's CO_2-related fleet composition continued to show a strong move towards more fuel-efficient cars, with 140g or below car sales rising by 62% on 1999 (despite a falling overall market). ACEA members sold over 2 million cars of 140g or below in 2000 (up by over 666% on 1995). These cars accounted for 17% of sales in 2000, up from 10.2% in 1999, and 2.6% in 1995. ACEA sales of cars of more than 160g fell by 25.6% in 2000 compared to 1995; as a proportion of total ACEA sales such cars decreased from 80.8% in 1995, 58.1% in 1999 to reach 50.7% in 2000.

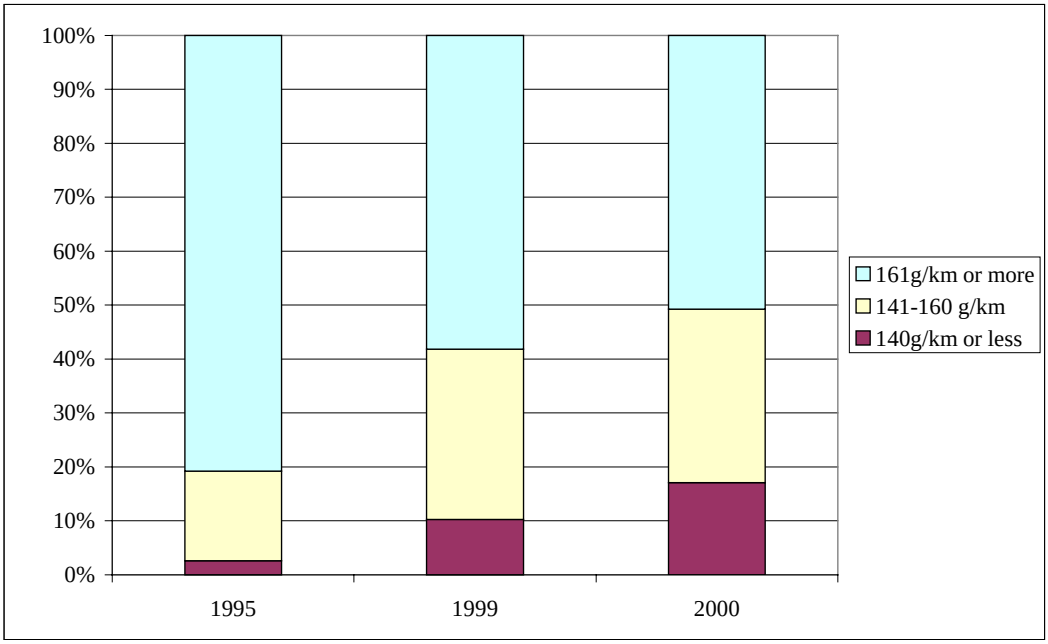


Figure 5c Change in ACEA's Fleet Composition between 1995, 1999 and 2000 by "aggregated CO_2 Categories":

2.4. EU trends in physical fleet characteristics

In the year 2000, the average car mass was marginally lower than in 1999, whereas engine capacity and engine power increased over the period. (See Figure 6).

Average total automobile mass decreased from 1190 kg in 1999 to 1188 kg in 2000. Over the period 1995 to 2000 the mass increased by 7.9% (1,101 kg in 1995). Gasoline automobiles' average mass decreased by 1.3% from 1999 to 2000. Over the period 1995 to 2000, gasoline vehicles' average mass increased by 4.7% - from 1068 kg in 1995 to 1118 kg in 2000. Diesel automobiles' average mass decreased from 1310 kg to 1308 kg in 2000. Over the 1995 to 2000 period diesel mass increased by 8.6% (1,204 kg in 1995). No data is available on the average mass of vehicles in the 'Other Fuels' category.

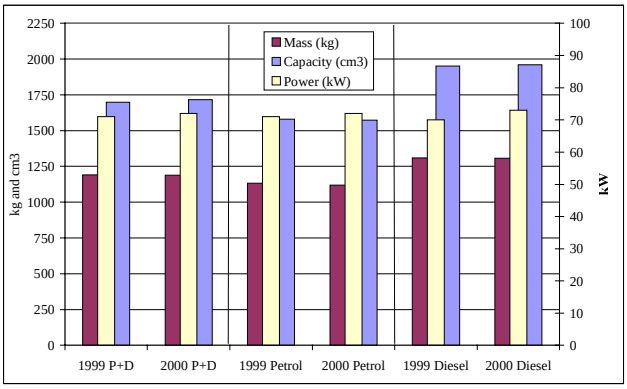
Total engine capacity increased by 1.1% between 1999 and 2000. Over the period 1995 to 2000, engine capacity increased by 3.8%, from 1654 cm^3 in 1995 to 1717 cm^3 in 2000. Gasoline engine capacity decreased by 0.4% in 2000, and increased by 0.6% over the 1995-2000 period, from 1564 cm^3 in 1995 to 1573 cm3 in 2000. Diesel engine capacity increased by 0.5% in 2000, and by 1.7% over the 1995-2000 period, from 1928 cm^3 in 1995 to 1961 cm3 in 2000.

Total engine power increased by 1.4% in 2000. Over the period 1995 to 2000, power increased by 14.3%, from 63 kW in 1995 to 72kW in 2000.

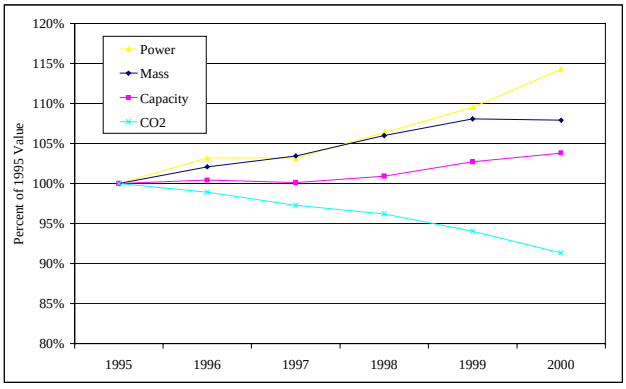
Gasoline engine power increased by 1.4% in 2000. Over the 1995 to 2000 period gasoline power increased by 10.8%, from 65 kW in 1995 to 72 kW in 2000.

Diesel engine power increased by 4.3% in 2000. Over the 1995 to 2000 period diesel power increased by 21.7%, from 60 kW in 1995 to 73 kW in 2000.

Even with these trends in physical characteristics (see Figure 6B), ACEA's technical improvements more than compensated and delivered sustained improvements in new car CO_2 performance (with a cut of some 9% over the 1995-2000 period).



Figures 6a: Physical ACEA fleet characteristics for 1999 & 2000



Figures 6b: Physical ACEA fleet characteristics 1995 to 2000 (percent of 1995 values)

2.5. Trends in new technologies in the EU

As noted in Sections 1.2 and 2.1, a "new generation" of technically-advanced diesels came to market in 2000, notably incorporating common rail technology, and built on the successful introduction of direct injection diesel engine technologies. A number of European manufacturers have launched gasoline direct injection models that meet 2000 emission standards. These were mainly low volume products, and compared to the expectations of the car industry at the time ACEA made its Commitment, greater uncertainty now surrounds the real CO_2 benefits of gasoline direct injection technology, especially when simultaneously meeting forthcoming emission requirements.

In the 1999 report it was explained by ACEA that these new fuel-efficient lean-burn engine technologies need to use after-treatment systems to meet both CO_2 and tailpipe emissions, and that zero sulphur fuel (less than 10 ppm sulphur) will be required as sulphur contaminates after-treatment systems and significantly reduces their efficiency. Without zero sulphur fuel, additional fuel is consumed to purge after-treatment systems of sulphur contamination, and consequently CO_2 benefits are dramatically reduced.

ACEA explains that, specifically with regard to gasoline direct injection, a number of developments are likely to affect the prospects for this technology since the CO_2 commitment:

- New research has highlighted the sensitivity of gasoline direct injection technology to sulphur;
- Despite technical advances and substantial R&D spend by manufacturers, the development of robust sulphur-tolerant after-treatment systems, suitable to European conditions, has not yet been successful;
- Stringent 2005 emission standards have been formulated, and uncertainties exist over full availability of zero-sulphur fuel; and
- There are cost and market acceptability uncertainties associated with gasoline direct injection technology, particularly in the light of the diesel advances noted previously.

In the light of the above, and with product plans now focussed on 2005 emission standards (that are being drawn ahead by national incentives), ACEA explains that manufacturers are less confident about the ability of gasoline direct injection technology to meet these standards and achieve worthwhile CO_2 reductions, without zero-sulphur fuel. Such fuel is now seen as essential by the car industry if gasoline direct injection is to contribute significantly to car CO_2 emission reduction[11].

Available statistics do not allow trends in specific new technologies to be quantified**.** However, over the 1995-2000 period, technical advances by ACEA manufacturers facilitated a strong move towards more fuel-efficient cars, and their 2008 Commitment of a 140g CO_2/km new car fleet average.

In the year 2000 over 2 million ACEA cars with CO_2 levels of 140g or less were sold - a growth of over 62% on the previous year. In terms of share of sales, such cars accounted for over 17%, and continued to exhibit an extremely powerful upward trend (recall Figure 5c). This compared to a share of 10.2% in 1999 and a share of only 2.6% in 1995.

In 2000, ACEA manufacturers continued their on-going development of alternative-fuelled vehicles (AFVs). Manufacturer offerings included: LPG Bi-fuel, CNG/Biogas Bi-fuel, and alcohol flex-fuel vehicles, as well as dedicated LPG and CNG/Biogas vehicles. In 2000, AFV sales by ACEA members grew to over 17,000 units

[11] This will be covered by COM(2001)241final, - the Proposal for a Directive of the European Parliament and the Council on the Quality of Petrol and Diesel Fuels and amending Dir 98/70/EC. The current proposal, if adopted, would introduce fuels which are essentially sulphur free. Therein, the Commission explains that "the impact of these fuels in relation to the attainment of the 140 g/km target will be taken into account in the joint monitoring mechanism".

(compared to 13,000 in 1999); even so, the market share of these cars amounted to only 0.14%. (However, as stated in the previous report, these statistics understate AFV activity in two respects: firstly, to date most AFVs have been after-market fitments, and therefore not recorded under "Other Fuel"; and secondly AFVs that are dual-fuelled generally get recorded under gasoline or diesel.) ACEA continues to note that technical progress on AFVs is hampered by widely diverging national policies, discouraging manufacturers from advancing more strongly into this area, as well as by an inadequate fuelling infrastructure (availability of fuel at service stations). It should be noted that the CO_2 monitoring data contained in this report does not include the CO_2 benefits of AFVs.

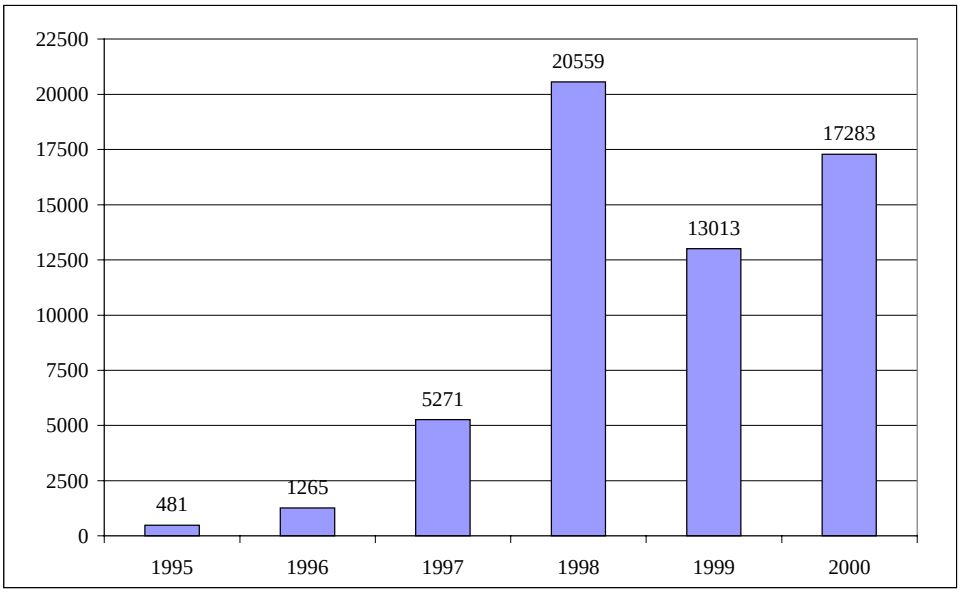


Figure 7: ACEA AFV sales (units per year)

2.6. Trends in alternative concepts passenger cars in the EU

Certain ACEA manufacturers introduced electric vehicles onto the EU market (see Section 2.7). Furthermore, one manufacturer launched a new type of vehicle on the European Market, which is not classified as an M1 product. For monitoring purposes, car manufacturers and the Commission Services will investigate the definition of innovative concepts with the objective of clarifying what can be regarded as innovative concepts in light of the text in the ACEA Commitment and Commission Recommendation, *inter alia*, in order to clarify whether this new type should be taken into account in future.

2.7. Trends in low emission passenger cars in the EU

The end of 2000 was the deadline for ACEA's adherence to the first of their CO_2 commitments: "some members of ACEA will introduce in the EU market … models emitting 120g CO_2/km or less". ACEA manufacturers have brought to market more than 20 models that achieve 120g or less; although mainly diesels, a number of gasoline products were available.

In 2000, ACEA's sales of 120g or less cars totalled almost 160,000 units - an increase of over 80% on 1999 levels, even though there was a 2.4% decline in total market sales. These 120g or less cars accounted for 1.3% of total ACEA (gasoline+diesel) sales in 2000.

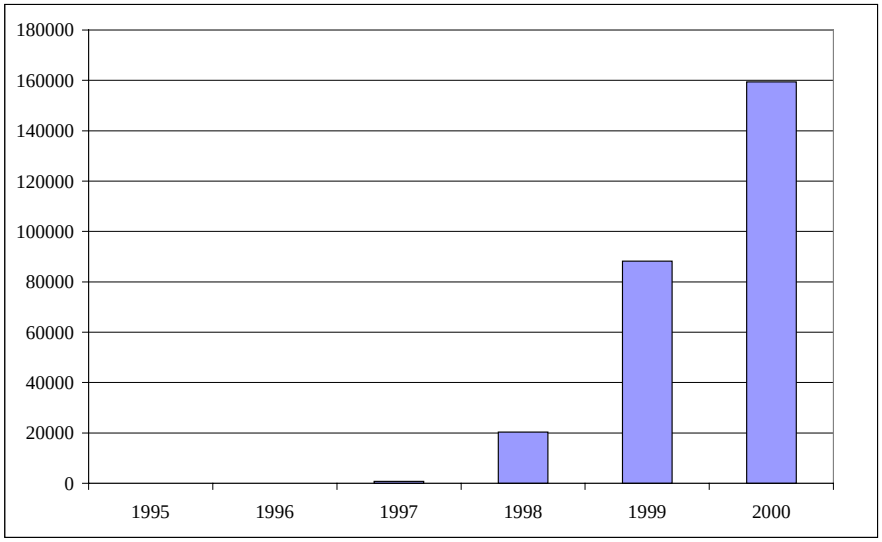


Figure 8: ACEA Sale of Vehicles with Specific Emissions of 120g/km or Less (unit sales)

2.8 Brief Description of the degree of occurrence of Grey Areas between M1 and N1 vehicles

As shown in the 1999 report the number of M1 vehicles potentially registered as N1 remains below 0.4% of total new registrations.

2.9 Data methods (Monitoring Decision annexes II & III), data sources, and data confidence levels

ACEA has used the same high-quality data provider, the French-based association AAA (Association Auxiliaire de L'Automobile), as in the 1999 report. As agreed with the Commission, ACEA continues to provide CO_2 data into the monitoring process as long as the official EU scheme (1753/2000/EC) has not reached the stage where Member State provided data can become the basis for monitoring progress. ACEA facilitates the undertaking of the monitoring exercise by the provision of this data in which it has high confidence

Of the 12,217,714 new car registrations for ACEA in 2000, all but 378 387 were known to be registered as petrol, diesel or other fuel driven cars. The 378 387 cars, representing 3.1% of the total, arise mainly due to the fact that new passenger cars registrations in Greece and Finland are given without disaggregating petrol and diesel cars (see Annex) .

2.10 Description of measurement issues for CO_2 Emission Factors

The ACEA Commitment specified that new car CO_2 emissions will be measured according to Directive 93/116/EC. Since the establishment of the ACEA Commitment, the mandatory type approval method of measuring CO_2 emissions has been revised by Directive 99/100/EC. One of the principle changes (being introduced over the period 2000 to 2002 for M1 vehicles) relates to the drive cycle - the deletion of the initial 40 seconds of unmeasured engine idling prior to the commencement of the test. Such a change of test procedure increases the measured value of CO_2 emissions for any given vehicle design.

From January 2000, new homologations (new model introductions) of M1 vehicles up to 2500 kilos have had their CO_2 emissions measured according to the "new" directive/cycle (99/100/EC). A correction factor needs to be applied to the measured CO_2 emissions of such vehicles to broadly bring them into line with the 93/116/EC

procedure, which is the basis on which ACEA's future targets were established and the basis of historical monitoring data in this report. However, ACEA's data provider (AAA) has not been able to formulate a procedure for determining which newly registered cars in 2000 had their CO_2 emissions measured according to which (new or old) cycle. As a consequence, no correction factor has been applied, and therefore the CO_2 data for 2000 in this report overstates ACEA emission data (i.e. ACEA emissions data should be lower). Estimates for the effect of the cycle change vary between 0.7 (Commission Estimate[12]) and 1.2% (ACEA[13]) for 2000. As for future years, CO_2 emissions of ACEA's newly registered cars should be reduced by an agreed and appropriate correction factor.

ACEA explained that data on 2001 registrations would be provisionally corrected by an average of 1% by ACEA´s data provider to correct to the test cycle EU 93/116/EC specified in the Commitment. ACEA considers that the impact of this measurement cycle change needs to be further assessed in the future. ACEA states, that due to the spread of today's data difficulties exist in making a reasonable estimate of the impact for the future car fleet.

2.11 Other Issues

Nothing to report.

[12] The estimate corresponds to the results of a study carried out by TNO

[13] Based on manufacturers' assessment

3. KEY ASSUMPTIONS TO THE COMMITMENT

3.1. Availability of Enabling Fuels

Statement on implication for the Commitment and justification

Nothing to report.

3.2. Distortion of Competition

Statement on implication for the Commitment and justification

As stated in the 1999 report, ACEA was the first Association to finalise a car CO_2 Commitment, and based its Commitment on a "Distortion of Competition" assumption, in order to ensure a level playing field. ACEA continues to stress that the competitive environment is very sensitive to CO_2, with technical and economic factors being significantly affected by even small variations in fuel average performances.

3.3. Promotion of CO_2 efficient technologies

Statement on implication for the Commitment and justification

As indicated previously, ACEA members have high expectations for certain technologies, in particular those associated with direct injection engines. ACEA's commitment was therefore based on the assumption of an unhampered diffusion of car CO_2 efficient technologies into the market. Consequently it is fundamental that any measures, which might hamper the diffusion process of CO_2 efficient technologies are taken into consideration in the monitoring procedure.

In the context of this assumption, ACEA signalled its concern in the 1999 report about tax measures in a number of countries (e.g. Netherlands, Sweden, UK) that penalised diesel cars. ACEA expressed particular concern over the UK government's policy of high taxation of diesel, with successive Budget measures penalising diesel cars through fuel duty increases. In 1999 and 2000 diesel penetration was only around 14%, compared to over 20% in 1995. Additional forms of anti-diesel taxation have also been announced in the UK. ACEA will be closely assessing all such national measures from the perspective of compromising the "unhampered diffusion" assumption. If necessary, ACEA will ask that they be taken into account when monitoring ACEA's progress towards achieving its Commitment. (see also Section 4.3)

3.4. Acceptance of innovation

Statement on implication for the Commitment and justification

Nothing further to report. (see Sections 2.6 & 3.3)

4. OTHER ISSUES

4.1. New Measures affecting CO_2

Comment on impact of the issue and on implication for the Commitment

Nothing further to report. (see in Section 3.3 & 4.3).

4.2. New regulatory measures

Comment on impact of the issue and on implication for the Commitment

ACEA continues to anticipate that the End-of-Life Vehicle (ELV) Directive[14] which entered into force in 2000, will have adverse implications for the fuel efficiency of cars in the future, as it may in ACEA's view limit the use of certain light materials and technologies, while burdening significantly the companies. There is substantial research underway on this issue (see Section 4.5). The Commission does not expect repercussions of the ELV Directive on the CO_2 commitment.

4.3. Fiscal Measures

Comment on impact of the issue and on implication for the Commitment

ACEA's views on fiscal measures hampering the diffusion of CO_2 efficient technologies into the market are outlined in Section 3.3. According to ACEA such measures can simply delay product programmes due to late disruption of the market. Section 2.5 also refers to the discouraging effects of divergent national Alternative-Fuelled Vehicles (AFV) policies observed by ACEA (which include fiscal incentive measures).

4.4. Breakthrough technologies

Comment on impact of the issue and on implication for the Commitment

Nothing further to report. (see Section 1.1, 3.3 & 4.5).

4.5. Research Programmes: Description and Future Potential

Comment on impact of the issue and implications for the Commitment

The ACEA Commitment continues to ensure that right across the European automotive industry, CO_2 reduction remains a high priority in R&D expenditures, as well as in product and process planning and development. Achievement of technological breakthroughs is seen as key to CO_2 abatement.

The vast majority of this R&D effort is being undertaken independently, by each of the ACEA manufacturers freely pursuing their own policies and initiatives in this highly competitive area. It is inappropriate to review individual manufacturer R&D programmes as part of the monitoring report. However, the Commitment has presented the opportunity for longer-term "breakthrough" solutions at a pre-competitive stage to be investigated. Furthermore, as set-out in the 1999 monitoring report, ACEA and its sister body EUCAR have seized this opportunity by formulating and implementing a collaborative, pre-competitive automotive R&D programme for

[14] Directive 2000/53/EC

CO_2 reduction, called CO2perate. This programmes reflects the research interests of the participating companies, and serves to illustrate key areas of R&D activity.

The CO2perate R&D programme has involved collaborative project proposals between the automotive manufacturers, suppliers, institutes and universities being submitted mainly to the GROWTH and ENERGY programmes of the FP5. Proposal making during 1999 – 2000 resulted in 33 projects being accepted for funding; these have a total budget of about 108 M Euro with 54% funding from the FP5. Three major areas of R&D can be identified, namely Conventional Powertrain (based on conventional fuels), Alternative Powertrain (hybrid ICE/electric and fuel cells respectively) and Material (mainly high strength, low weight material for body and powertrain), (see the diagram below).

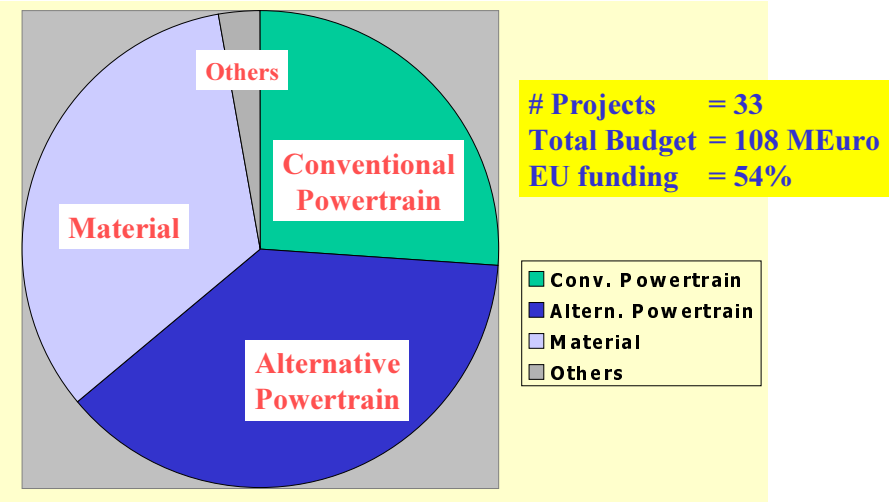


Figure 9: Status of CO2perate December 2000

The start-up of CO2perate in 1999 was mainly through submission of technology oriented projects (focusing at a specific issue using a predefined technology approach). In 2000, proposals aimed at demonstrating working Powertrain systems were also submitted and accepted. The development of these demonstration projects are done in the form of three Technology Platforms:

- GET dealing with downsized, supercharged gasoline engines
- EUDIESEL aiming at low emission diesel engine technologies
- SUVA addressing the competitiveness of hybrid (ICE/electric) vehicles.

In the later development stage these platforms will, as far as possible, be evaluated by an independent university using the TREMOVE model.

Most of the CO2perate powertrain projects are also members of PREMTECH, a thematic network started in 1997 and funded by the European Commission under the GROWTH programme. In total around 40 EU funded research projects on power trains, including heavy duty vehicles projects and the technology platforms GET, EUDIESEL and SUVA are part of PREMTECH. The network provides an important forum for European automotive specialists to exchange and confront ideas on potential strategies to reach 120g/km including the use of hybrid/electrical vehicles. The objectives of the network include in particular the simultaneous reduction of CO_2 and exhaust gas emissions as well as improvement of manufacturing and maintenance of components and sub-systems.

The final PREMTECH workshop was held on 12 and 13 February 2001 in Paris. It addressed future technologies for providing tomorrow's vehicles with clean and economic engines. This occasion, succeeded to

bring together hundred participants, including vehicle manufacturers, equipment suppliers and R&D organisations of the European automotive industry. For the first time this forum was widen to European and Associated Member State representatives.

Following the completion of PREMTECH, the partners involved have proposed an extension which was accepted under the GROWTH programme. The PREMTECH II Thematic Network which covers the period 2001-2005 will also provide an assessment of the technologies advances on CO_2 and emissions reduction using the simulation model TREMOVE.

Also Life Cycle Assessment is part of CO2perate. In 2000 the project LIECAR was launched as an activity in this domain. The scope of this project is to investigate the implications of the End-of-Life Vehicle directive and the CO_2 reduction targets on the vehicle design and material choice.

During 2001, CO2perate will make use of the "final calls of the FP5". This will mainly be done by proposing to the GROWTH programme projects that complement the three Technology Platforms. Also a fourth Technology Platform may be proposed in the domain of material and powertrain. For the Energy programme proposals dealing with improved and designed conventional fuels will be formulated. Technology projects complementing the FUERO Cluster of Fuel Cell projects are also expected.

ACEA continues to stress the important role that R&D has to play in car CO_2 reduction, as indeed did the CEC in its car CO_2 reduction strategy communication (COM(95)689). R&D is a key area where the Commission's concept of a "joint endeavour" to achieve such reductions must occur. Industry is already making a sizeable contribution, and is receiving funding from FP5.

However vigilance is always needed to ensure that EU R&D programmes fully acknowledge automotive CO_2 research needs, and allocate appropriate resources for their realisation. From the perspective of the Commitment, ACEA has two pressing concerns:

1. Low cost designs and efficient productions are necessary for widespread market penetration of the forthcoming new "CO_2 lean products". Within CO2perate a number of proposals have been made aiming at production and processes for affordable solutions. Unfortunately these have not been well acknowledged by the appropriate key actions within FP5.

2. The CO2perate programme will run until 2004, but it is virtually certain that further R&D efforts will be needed beyond this date. It is therefore extremely important that the next EU Framework programme (FP6) can provide the necessary resources for the required research. ACEA consider that the CEC's proposal on FP6, which was made public in February 2001, does not properly address the R&D necessary for development of important automotive CO_2 reduction technologies. As a matter of fact, ACEA fears that the FP6 proposal does not address adequately the R&D technology needs necessary for the success of the ACEA CO_2 reduction commitment. This mismatch clearly has to be corrected before the final form of the FP6 is decided. Preferably this should be done by adopting the topics and forms of research as outlined in the EUCAR Position Paper on FP6, as already communicated to the CEC in December 2000.

4.6. Other measures - telematics, infrastructure, education

Comment on impact of the issue and on implication for the Commitment

In the 1999 monitoring report, ACEA highlighted its involvement in the promotion of non-product CO_2 reduction measures (such as: driver education and training schemes; encouragement for correct vehicle maintenance; incentives for park renewal; telematics and infrastructure optimisation; and better integrated land use and transport planning). Measures of this type have a significant potential to deliver CO_2 reductions, and deliver them quickly and often cheaply. During 2000 ACEA has been deeply involved in the various Commission Working Groups established under the ECCP initiative. ACEA has played a leading role in

identifying CO_2 reduction opportunities in areas such as awareness/eco-driving and ITS/infrastructure improvements.

ACEA considers it important to built-up an ethos of support for CO_2 savings across a wide area of European society, so that its citizens become truly engaged in a "joint endeavour", and "multiplier" CO_2 reductions are achieved. ACEA believes that such initiatives fit well with, and can reinforce, its Commitment; this is why the Commitment specifically identifies "the development and the promotion of other measures" as a key item to be monitored. By way of example, eco-driving training on the new car technological features being introduced to meet the Commitment will be essential to optimise driving styles to obtain best fuel economy results. Certain ACEA manufacturers have actively implemented eco-driving programmes, and there is also undoubtedly a need for public authorities and other involved parties to contribute with positive initiatives in the field of CO_2 abatement via "other measures".

4.7. Economic situation of the car industry

Comment on impact of the issue and on implication for the Commitment

ACEA reiterates its points made in the 1999 report. The economic situation of the European car industry, as reflected in its financial performance, competitiveness and employment situation, needs to be strong and healthy to provide the opportunity to focus resources on its CO_2 reduction Commitment as this goes far beyond any "business as usual" scenario. ACEA car manufacturers operate in a complex environment, and have to manage resources to meet a range of competing societal and customer demands, not just CO_2 abatement.

ACEA believes that new "external" developments can also adversely affect the industry's economic situation, and consequently the ability of European manufacturers to meet their CO_2 Commitment. According to ACEA the End-of-Life Vehicle Directive (2000/53/EC) is a case in point (see also Section 4.2).

5. CONCLUSIONS

5.1. Progress Statement on Delivering the Commitment

In 2000, ACEA reduced the average CO_2 emissions of its new car fleet to 169 g/km; this represents a 2.9% cut from 1999, and a decrease of 8.6% since 1995. Furthermore, in the year 2000, ACEA members met the first of their CO_2 commitments with the launch of many models emitting 120 g/km or less; there was also a strong volume growth in the sales of such vehicles (+80% in 2000 on 1999, to almost 160,000 units).

Latest figures show that ACEA's CO_2 performance is consistent with the achievement of the 2003 indicative target range, 165 g/km-170 g/km. And there is further strong evidence of ACEA's determination to meet its other CO_2 targets, for example:

- Since 1998, when the ACEA CO_2 Commitment was established, European manufacturers have reduced CO_2 emissions at a rate of 2.5% a year, culminating in almost a 3% reduction in 2000; and
- In 2000, ACEA sales of 140g or less cars expanded to over 2 million units; a growth of over 62% on the prior year, and of over 666% since 1995.

As in earlier the period, ACEA's car CO_2 performance in 2000 was fully in line with their commitment. In order to meet the target of 140 g/km in 2008 an annual average reduction rate of about 2.1% has to be achieved[15] by ACEA.

5.2. Statement on Expected Future Progress of the Commitment

There is evidence to support ACEA's claim that its manufacturers will continue to focus significant research, product and process development towards attaining the 140g CO_2/km target by 2008, and that this commitment will be achieved.

According to ACEA, main threats to its CO_2 reduction efforts include:

1. The non-full market availability of fuels with a sufficient quality to enable the application of technologies needed for the industry to achieve its CO_2 Commitment.
2. New legislative measures that either impose "mutually exclusive" demands to CO_2 reduction, or undermine the European industry's financial viability.
3. The introduction of measures which might hamper the diffusion of the CO_2 efficient technologies.

The Commission Services and ACEA currently have no reason to believe that ACEA would not live up to its Commitment.

[15] *Op cit* footnote 4.

ACEA
Data Annexes
2000

ACEA Data Annexes (2000)

A1 : SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO_2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

A2 : THE DISTRIBUTION OF CO_2 EMISSIONS IN THE NEW PASSENGER CAR FLEET FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)[16]

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

[16] Curb weight of vehicles.

A1 : SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO_2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

ACEA MEMBERS: 2000

	Total	Identified version										unknown version
		Petrol			Diesel			Petrol + Diesel			Other	
Member State	Number	Number	average Fuel	average CO2	Number	Average Fuel	average CO2	Number	average Fuel	average CO2	Number	Number
EU-15	**12,217,744**	**7,443,683**	**7.4**	**177**	**4,378,391**	**5.9**	**157**	**11,822,074**	**6.8**	**169**	**17,283**	**378,387**
A	248,481	81,366	7.4	178	166,437	5.8	155	247,803	6.3	162	13	665
B	439,197	167,438	7.2	174	271,067	5.9	157	438,505	6.4	163	332	360
DK	81,169	66,895	7.7	184	13,900	5.7	152	80,795	7.3	178	6	368
F	1,991,452	989,485	7.0	168	997,331	5.8	155	1,986,816	6.4	162	4,629	7
FIN	99,470											99,470
GER	2,949,330	1,909,039	7.8	186	944,644	6.0	162	2,853,683	7.2	178	221	95,426
GR	178,374											178,374
IRE	148,320	129,790	6.9	165	18,272	5.9	158	148,062	6.8	165		258
IT	2,088,115	1,325,502	6.7	161	751,187	5.8	156	2,076,689	6.4	159	10,460	966
LUX	36,700	17,021	8.0	191	19,656	5.9	158	36,677	6.9	173		23
NL	460,178	333,853	7.5	181	125,275	5.8	157	459,128	7.1	174	164	886
P	220,714	160,618	6.6	158	60,062	5.5	148	220,680	6.3	156	26	8
SP	1,223,333	522,677	7.3	176	700,132	5.7	152	1,222,809	6.4	162		524
SW	235,192	217,724	8.5	202	17,119	6.3	170	234,843	8.3	200	9	340
UK	1,817,719	1,522,275	7.6	183	293,309	6.0	162	1,815,584	7.4	179	1,423	712

A2 : THE DISTRIBUTION OF CO_2 EMISSIONS IN THE NEW PASSENGER CAR FLEET FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

ACEA MEMBERS: 2000

CO2 (category)	Identified version					
	Petrol		Diesel		Petrol + Diesel	
	Number	average CO2	Number	average CO2	Number	average CO2
81 – 100	0	0	24,787	88	24,787	88
101 - 120	68,230	117	66,367	119	134,597	118
121 - 140	617,028	136	1,238,881	135	1,855,909	135
141 - 160	2,190,694	151	1,618,979	150	3,809,673	150
161 - 180	1,871,678	169	822,618	170	2,694,296	170
181 – 200	1,259,944	190	285,560	188	1,545,504	189
201 – 250	1,135,264	220	269,310	219	1,404,574	220
251 – 300	211,715	271	41,974	268	253,689	270
301 - 350	71,405	324	9,915	308	81,320	322
351 - 450	16,586	387	0	0	16,586	387
>450	1,139	478	0	0	1,139	478

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)[1]

ACEA MEMBERS: 2000

Member State	Identified version					
	Petrol		Diesel		Petrol + Diesel	
	average mass	average CO2	Average Mass	average CO2	average mass	average CO2
EU-15	**1,118**	**177**	**1,308**	**157**	**1,188**	**169**
A	1,154	178	1,371	155	1,300	162
B	1,093	174	1,323	157	1,235	163
DK	1,168	184	1,280	152	1,187	178
F	1,039	168	1,249	155	1,144	162
GER	1,222	186	1,423	162	1,287	178
IRE	1,063	165	1,326	158	1,096	165
IT	981	161	1,291	156	1,093	159
LUX	1,197	191	1,360	158	1,284	173
NL	1,139	181	1,316	157	1,188	174
P	1,006	158	1,253	148	1,073	156
SP	1,102	176	1,228	152	1,174	162
SW	1,306	202	1,448	170	1,316	200
UK	1,144	183	1,343	162	1,176	179

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

ACEA MEMBERS: 2000

Member State	Identified version					
	Petrol		Diesel		Petrol + Diesel	
	average Power	average CO2	average Power	average CO2	average Power	average CO2
EU-15	**72**	**177**	**73**	**157**	**72**	**169**
A	72	178	75	155	74	162
B	68	174	68	157	68	163
DK	76	184	72	152	75	178
F	64	168	69	155	67	162
GER	82	186	83	162	82	178
IRE	62	165	72	158	63	165
IT	57	161	74	156	63	159
LUX	90	191	80	158	84	173
NL	73	181	72	157	73	174
P	56	158	74	148	61	156
SP	68	176	65	152	66	162
SW	99	202	86	170	98	200
UK	76	183	74	162	76	179

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

ACEA MEMBERS: 2000

Member State	Identified version					
	Petrol		Diesel		Petrol + Diesel	
	average Cm3	average CO2	average Cm3	Average CO2	average Cm3	average CO2
EU-15	**1,573**	**177**	**1,961**	**157**	**1,717**	**169**
A	1,608	178	1,973	155	1,853	162
B	1,525	174	1,928	157	1,774	163
DK	1,684	184	1,952	152	1,730	178
F	1,463	168	1,939	155	1,702	162
GER	1,729	186	2,044	162	1,834	178
IRE	1,401	165	1,973	158	1,471	165
IT	1,317	161	1,943	156	1,543	159
LUX	1,831	191	2,012	158	1,928	173
NL	1,622	181	1,959	157	1,714	174
P	1,290	158	1,872	148	1,449	156
SP	1,560	176	1,908	152	1,759	162
SW	1,945	202	2,086	170	1,955	200
UK	1,653	183	1,978	162	1,706	179

Monitoring of JAMA's commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Final Report
13 July 2001

Joint Report
of the
Japan Automobile Manufacturers Association
and
the Commission Services

Monitoring of JAMA Commitment[17] on CO_2 Emission Reduction from Passenger Cars

JOINT REPORT OF JAMA AND THE COMMISSION SERVICES[18]: YEAR 2000 REPORT

ES SUMMARY OF PROGRESS IN DELIVERING THE COMMITMENT

E1 Trends in specific emissions of CO_2 (g/km)

In the EU, averaged specific CO_2 emissions of passenger cars sold by JAMA Members decreased from 1999 to 2000 – from 187g/km in 1999 to 183g/km in 2000. This is a 2.4% drop[19], which has been the largest one year reduction within the reporting period.

For petrol-fuelled cars, specific emissions dropped from 181g/km in 1999 to 177g/km in 2000 – a 2.2% reduction. For diesel-fuelled cars, the corresponding values were 221g/km in 1999 and 213g/km in 2000 – a 3.6% reduction.

Over the full reporting period 1995 to 2000, specific emissions showed a decreasing trend. Specific CO_2 emission (g/km) levels of Japanese cars have tended to decrease by an average of 1.3%[20] each year and fell from 196g/km in 1995 to 183g/km in 2000, achieving a 6.6% reduction compared to 1995 (see Figure 1).

The average CO_2 emission levels of gasoline-fuelled cars recorded a decrease from 191g/km in 1995 to 177g/km in 2000 - a 7.3% reduction as compared with 1995. The average CO_2 emission levels of diesel cars recorded a decrease from 239g/ km in 1995 to 213g/km - a 10.9% reduction as compared with 1995.

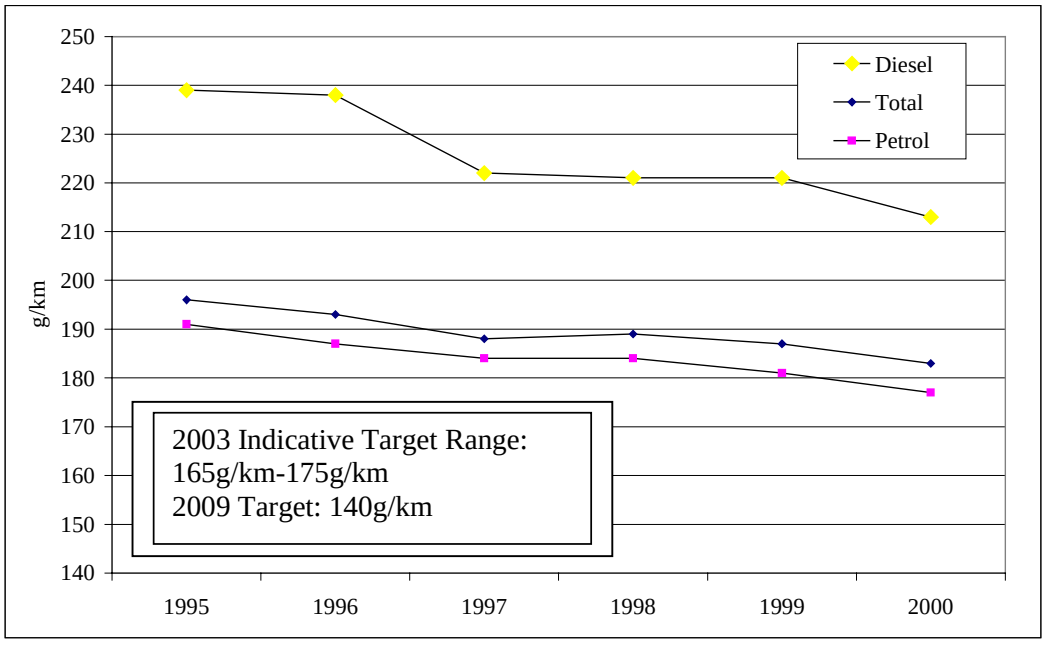


Figure 1. EU Trends of JAMA's fleet in average specific emissions of CO_2

[17] As recognized by the European Commission in the Recommendation of 13 April 2000 on the reduction of CO2 emissions from passenger cars (2000/304/EC). Hereafter referred to as "The Commitment"
[18] Hereafter often referred to as "The Commission"
[19] The drop from 187 to 183g/km gives a reduction of 2.4%; differences due to rounding in the specific emissions figures
[20] This value is a simple arithmetic average, and throughout the text simple arithmetic averages are used.

E2 Trends in specific fuel consumption by fuel type (l/ 100 km)

Fuel efficiency in 2000 was better than in 1999 for both petrol and diesel cars. Values in 1999 were 7.5 l/100km for petrol, 8.2 l/100km for diesel and 7.6l/100km for all JAMA sales, while values in 2000 were 7.3l/100km, 7.9l/100km and 7.4l/100km for petrol-fuelled cars diesel-fuelled cars and all cars, respectively.

Gasoline passenger cars, which occupied most of JAMA's sales volumes over the full 1995 to 2000 reporting period, consumed about 8.0 l/100 km in 1995. Over the reporting period, their average fuel consumption has decreased to 7.3 l/100 km in 2000. Diesel cars consumed an average of 9.0 l/100 km in 1995, and achieved an average fuel consumption of 7.9 l/100 km in 2000.

Total fuel consumption did not differ much from that of gasoline passenger cars due to the small sales volume of diesel cars and other fuels (see Figure 2).

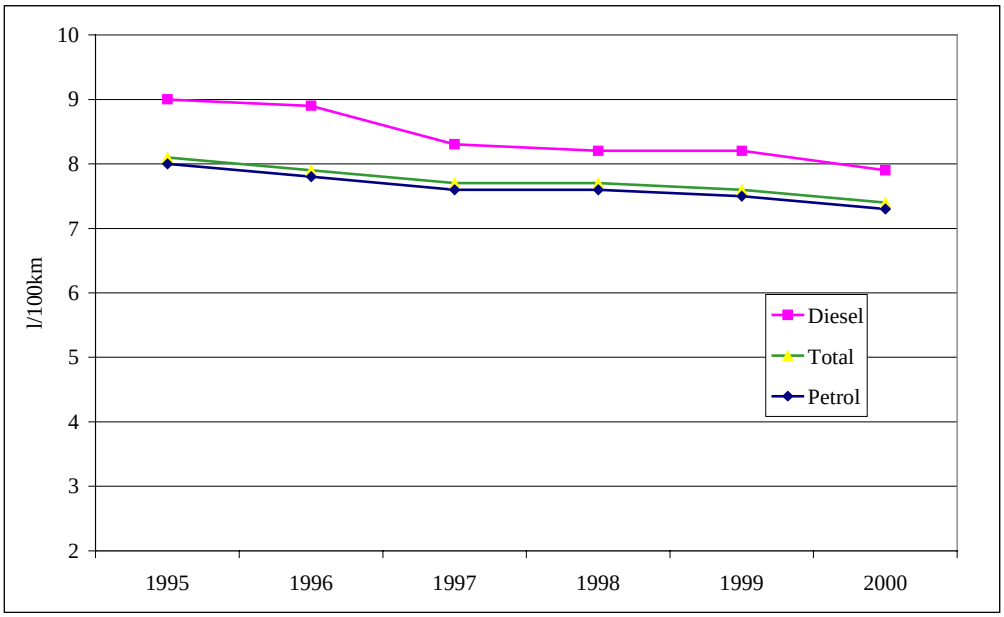


Figure 2. Trends of JAMA's fleet in average specific fuel consumption by fuel (L/100km)

E3 Trends in physical fleet characteristics

The average mass of new registrations increased between 1999 to 2000 – rising from 1123kg in 1999 to 1133 in 2000; for diesel the corresponding values were 1507 kg and 1557 kg respectively. When all sales are combined the average mass was 1173kg in 1999 and 1205 kg in 2000. Average engine power of new registrations increased slightly, from 71kW in 1999 to 73kW in 2000. Average engine capacity also increased, from 1634 cm^3 in 1999 to 1650 cm^3 in 2000.

The general trends in physical characteristics over the whole reporting period 1995 to 2000 show an increase, notably in mass (+ 10.0%). This is mainly due to increasing gasoline car weight (+ 7.3%) and increased diesel car sales (+ 133%) over the reporting period. Average engine capacity increased by 1.8% over the period 1995 to 2000, and the engine power increased by 4.3%.

E4 Technical developments introduced to reduce CO_2 emissions

The main new technologies introduced since 1995 include the gasoline and diesel direct injection engines. The Lean-Burn Engine and Continuous Variable Transmission Technology (CVT) have already been introduced and are continuing to be used on cars sold on the market. JAMA has also included the hybrid cars and idle stop mechanism during 2000.

E5 Brief overall assessment on progress in relation to the target

In the EU, averaged specific CO_2 emissions of passenger cars sold by JAMA Members decreased from 1999 to 2000 – from 187g/km in 1999 to 183g/km in 2000. This is a 2.4% drop[21], which has been the largest one year reduction within the reporting period.

Over the whole reporting period, 1995 to 2000, JAMA fleet's average specific CO_2 emissions fell from 196g/km in 1995 to 183g/km in 2000. Japanese automobile manufacturers have produced passenger cars achieving lower specific CO_2 emission levels since 1995, achieving a 6.6% decrease in average CO_2 specific emissions

The share of diesel cars in JAMA's fleet has increased over the reporting period. While gasoline cars accounted for 89.6% of the fleet and diesel cars for 10.4% in 1995, diesel cars share increased to 16.9% in 2000, and gasoline cars share decreased accordingly to 83.1%.

An important achievement before the 2003 review is the launch on the EU market of gasoline cars emitting 120g/km in 1999. Although sales remain small (8,767 vehicles in 2000), this shows a positive effort made by JAMA.

Further CO2 emissions reductions are required to meet the indicative interim target (165 to 175g/km in 2003) and the final target (140g/km in 2009)g/km. Assuming that the achieved 2.4% reduction rate for 1999 to 2000 would be continuing hereafter, JAMA would meet the higher 2003 intermediate target (175g/km). However, emissions reductions will have to fall faster for the 2009 target (140g/km) to be met.

To achieve the CO_2 emission targets agreed upon in the commitment by 2009, Japan automobile manufacturers will further explore various technologies namely Direct Injection (DI), hybrid vehicles and Continuous Variable Transmission Technology (CVT).

The Commission Services sees no reason to believe that targets will not be reached if efforts continue. JAMA emphasizes the difficulty of planning and managing of CO2 reduction due to unknown factors such as changes of consumer demands.

[21] *op cit* Footnote 3

1. MONITORING OF TECHNOLOGICAL DEVELOPMENTS AFFECTING THE COMMITMENT[1]

1.1. Commitment Initiatives

1.1.1. Brief Description of current R & D programs

Sections 1.2 and 2.5 cover JAMA technological developments and research activities.

1.2. Technological developments

1.2.1. Description of fuel efficiency characteristics of new technologies, alternative concepts

1.2.2. Availability of New Technologies in the EU and Member States

1.2.3. Availability of alternative concepts passenger cars in the EU

1.2.4. Availability of low emission passenger cars (e.g. emitting less than 120g/km) in the EU

Description

JAMA has committed itself to achieving a 140g/km emission target by 2009 and JAMA's members are continuing CO_2 emission reduction R&D toward this goal. Ongoing efforts are made to make technological improvements successively available to the market. Technological developments achieved by JAMA's members within the reporting period include lean burn engines, Direct Gasoline and Diesel Injection engines and Continuous Variable Transmission Technology (CVT). JAMA has also launched hybrid cars and the Idle stop mechanism on the EU market during 2000.

Availability of these new technologies

The CO_2 emission reduction technologies made available by JAMA to the market are shown in Figure 6 in Section 2.5. A direct injection gasoline model has been on the market since 1997 and it steadily achieved greater market penetration by 2000 (3% of JAMA's sales on the EU market in 2000). Similarly, a direct injection diesel car debuted on the market in 1998 and has seen a very quick uptake by the markets in 2000 (7% of JAMA's sales in 2000). Efforts are also made to diffuse the Continuous Variable Transmission Technology (CVT) available on the market prior to 1995. A Lean-Burn engine car has shown receding trend since 1997.

Several low-emission passenger cars have been put on the EU market within the reporting period, achieving 120g/km. In 2000, a 80g/km gasoline-hybrid car and another 119g/km car with Idle stop mechanism have been put on the market by JAMA member companies. Another 120g/km gasoline-hybrid model was launched in the Autumn of 2000.

1.3 Description of market trends in physical fleet characteristics

For Japanese cars as a whole, mass increased by approximately 10.0% in 2000 as compared with 1995. The main factor is the increase in the weight of gasoline-fuelled cars (mass increased by around 7.3%). Engine capacity of Japanese cars showed a shift towards an increase by approximately 1.8% and their engine power presented an increase by approximately 4.3% in 2000 as compared with 1995. CO_2 emission levels, however, showed a decrease of approximately 6.6% for Japanese cars as a whole in 2000 as compared with 1995, a sign that the cars available on the market have benefited from CO_2 reduction technologies (see Section 2.4 for further details and linkage to CO_2). Trends in Member States are presented in the Annex.

[1] As recognized by the European Commission in the Recommendation of 5 February 1999 on the reduction of CO2 emissions from passenger cars (1999/125/EC); Hereafter referred to as "The Commitment"

2. STATISTICAL MONITORING (1995-2000)

2.1. Trends in specific emissions of CO_2 (g/km)

From 1999 to 2000 the average specific emissions from JAMA new car registration in the EU dropped by 2.4%[22] (from 187 to 183g/km). For gasoline-fuelled cars the corresponding reduction was 2.2%, and for diesel fuelled cars, average specific emissions were 3.6% lower in 2000 than in 1999.

The average specific CO_2 emission levels of Japanese cars over the full 1995-2000 reporting period showed a decreasing trend (See Figure 3). Their average specific CO_2 emission levels tended to decrease by an average of roughly 1.3% each year and fell from 196g/km in 1995 to 183g/km in 2000 (marking a 6.6% reduction as compared with 1995).

The averaged specific CO_2 emission levels of gasoline-fuelled cars recorded a decrease from 191g/km in 1995 to 177g/km in 2000 -a 7.3% reduction as compared with 1995. This gives an average annual reduction of around 1.5%.

The averaged specific CO_2 emission levels of diesel cars recorded a decrease from 239g/km in 1995 to 213g/km in 2000 - a 10.9% reduction as compared with 1995. This amounts to a 2.2%[23] average reduction over the period.

Total average fuel consumption decreased within the reporting period 1995 to 2000: the diesel fuel consumption decreased from about 9.0 l/100 km to 7.9 l/100km, and the gasoline fuel consumption from 8.0 l/100 km to 7.3 l/100km. For all vehicles, the average fuel consumption was 7.4l/100km. Corresponding figures for 1999 were 7.5l/100km for petrol, 8.2l/100km for diesel and 7.6l/100km for the average of all JAMA registrations in that year.

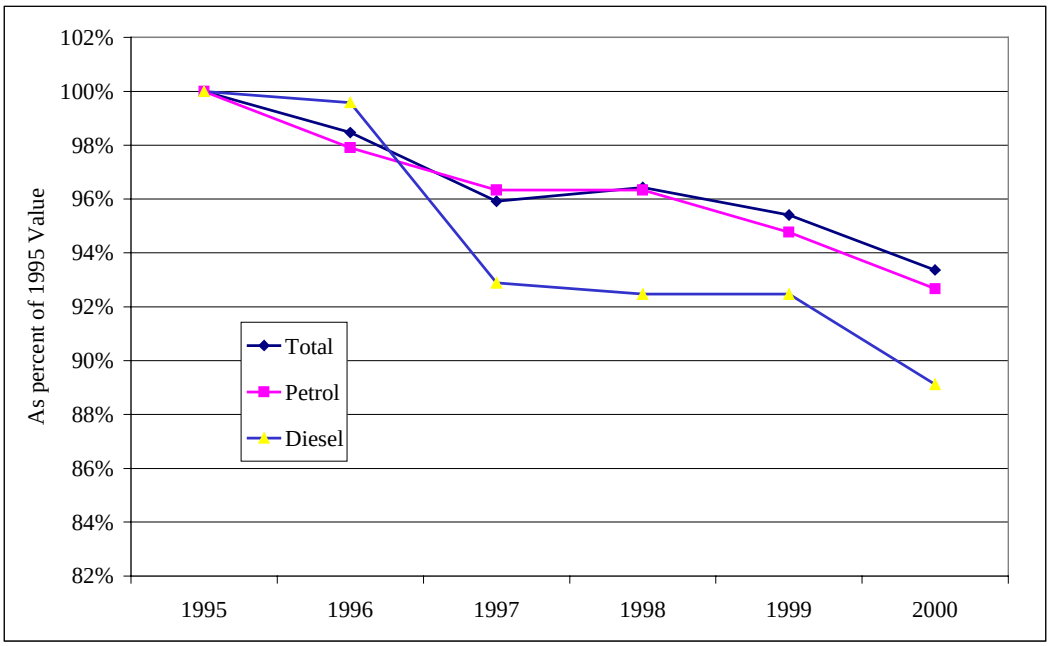


Figure 3: JAMA's CO2 Reduction Index (1995=100)

[22] ibid footnote 3

[23] This 2.2% is the simple average (total specific emissions reduction divided by number of years). The corresponding compound average emissions reduction is 2.3%.

2.2. Number of newly registered passenger cars

The number of gasoline passenger cars sold in the EU steadily increased from 1,013,138 vehicles in 1995 to 1,347,485 vehicles in 2000 (+33%) and represents about 83.1% of total sales by JAMA members. The number of diesel passenger cars sold increased from 117,577 in 1995 to 274,414 in 2000 (+133%), - although remaining small as compared to gasoline cars (see Figure 4). Corresponding values for 1999 were: 1379723 petrol cars, 255165 diesel cars, and 1716048[24] for all car registrations in 1999.

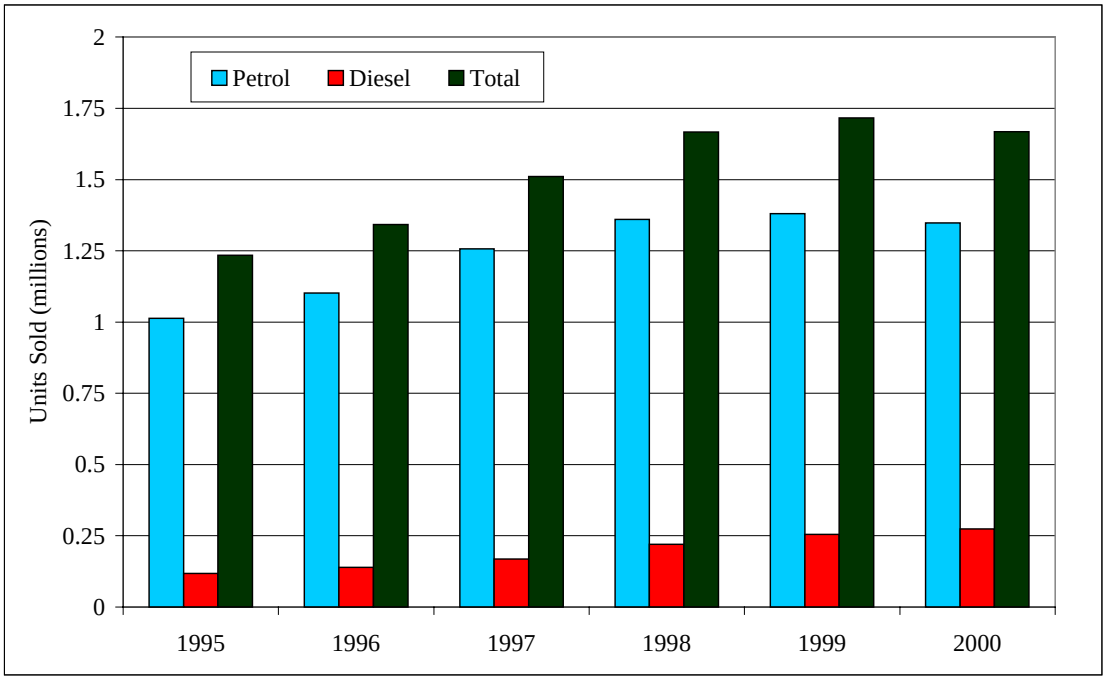


Figure 4. Number of newly registered passenger cars by JAMA's members (unit registrations)

2.3. Fleet Composition

The share of cars emitting categories 120g or less, 121-140g/km, 141-160g/km and 161-180g/km has increased from 40.6% in 1995 to 56.7% in 2000, while the share of the car emitting more than 181g/km decreased from 59.4% to 43.3%.

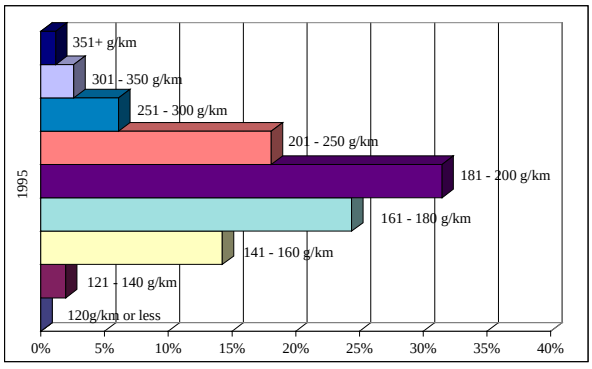


Figure 5a: JAMA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 1995

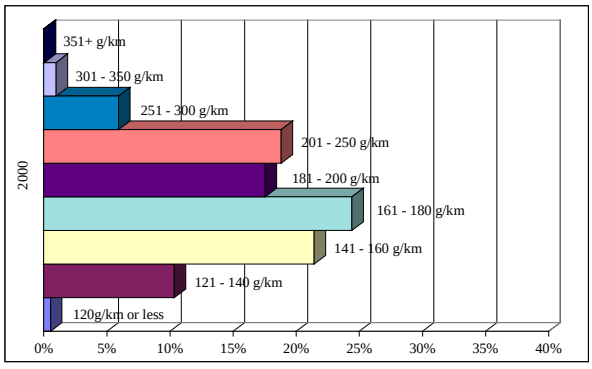


Figure 5b: JAMA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 2000

[24] Petrol and diesel cars together amount to 1635986 cars. "Unknown vehicles" make up the difference with the total vehicles (1716048)

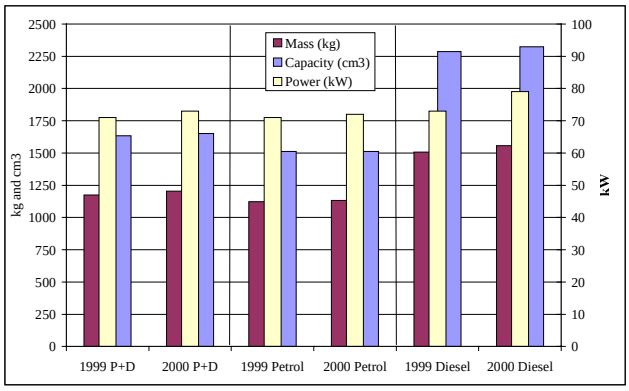
Importantly, registrations of vehicles in the "120g/km or less" range increased to 8767 cars in 2000 from 5544 cars in 1999 (a 58% increase); in earlier years there had been no sales of vehicles in this emissions category. Furthermore, as Figure 5 shows, an important shift in registrations for emissions categories over the period 1995 to 2000 was in the category of "121 to 140g/km"; there were 167852 new registrations for this category in 2000, up from 22055 in 1995.

2.4. EU trends in physical fleet characteristics

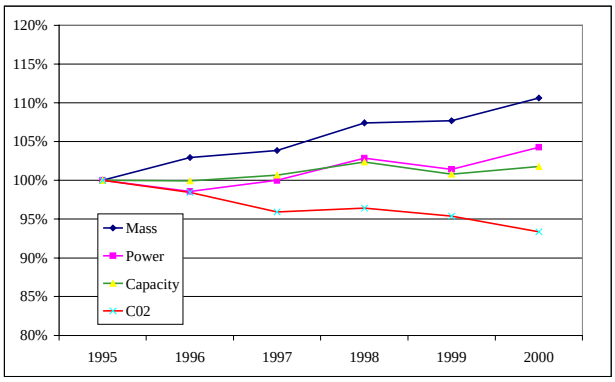
Changes in physical characteristics - mass, engine capacity and engine power - from 1999 to 2000 showed an upward trend, continuing the overall trend present over the full reporting period 1995 to 2000. (see Figure 6a and 6b). The average mass of new registrations rose from 1173kg in 1999 to 1205kg in 2000; engine capacity increased from 1634cm^3 to 1650 cm^3; and power rose from 71kW to 73kW in 2000. Average diesel-fuelled car mass was over a third higher than that for petrol, and the capacity was over 50% higher for diesel-fuelled cars than for petrol cars.

Average total automobile mass was 1,095 kg in 1995 and increased by 10.0% over the reporting period (1,205 kg in 2000). Gasoline automobiles' average mass has increased by 7.3% within the reporting period, from 1,056 kg in 1995 to 1,133 kg in 2000. Diesel automobiles' average mass reached the minimum of 1,447 kg in 1997 (against 1,461 kg in 1995) but increased up to 1,557 kg in 2000; i.e. a 6.6% increase over the reporting period 1995 to 2000.

Total engine capacity has increased by 1.8% within the reporting period, from 1,621 cm^3 in 1995 to 1,650 cm^3 in 2000 (with a maximum in 1998, 1,659 cm^3). Gasoline engine capacity reached the maximum 1,558 cm^3 capacity in 1998 (against 1,543 cm^3 in 1995) and decreased to 1,513 cm^3 in 2000 (-1.9% as compared with 1995). Diesel engine capacity reached a minimum 2,285 cm^3 capacity in 1997 (against 2,298 cm^3 in 1995) but remained constant over the reporting period (2,322 cm^3 in 2000). The overall trend shows only a marginal growth in average engine capacity over the reporting period.



Figures 6a: Physical JAMA fleet characteristics for 1999 & 2000



Figures 6b: Physical JAMA fleet characteristics 1995 to 2000 (percent of 1995 values)

While total engine power was 70 kW in 1995, it has only risen to 73kW by 2000, a 4.3% increase in EU average over this five year period. Gasoline engine power has increased marginally from 70 kW in 1995 to 72kW in 2000. Diesel engine power has steadily increased by 19.7%within the reporting period, i.e. from 66 kW in 1995 to 79kW in 2000.

While the physical characteristics increased over the period, average specific CO_2 emissions dropped by 6.6% over the reporting period (see Figure 6b).

2.5. Trends in new technologies

JAMA's Members have introduced several new technologies on the EU market over the monitoring period (see description in 1.2). Trends in sales vary across technologies, but overall, shares of JAMA total new sales remain small. The shares of cars equipped with gasoline & diesel direct injection engines have increased from 0% to 3.2% and 6.6% (respectively) since their respective launch in 1997 and 1998. Shares of cars with lean burn engines have decreased since 1997 (launched in 1992) from 4.5% to 0.4% and sales of cars equipped with Continuous Variable Transmission Technology (CVT) have not shown any particular trends. It's also included the hybrid cars and Idle stop mechanism since 2000.

The trends for each technology, as well as the share of new passenger cars equipped with these technologies in total new passenger car sales by JAMA, are shown in Figure 7 below:

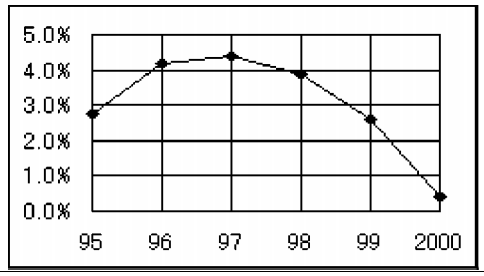
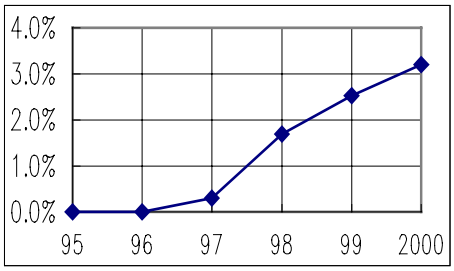
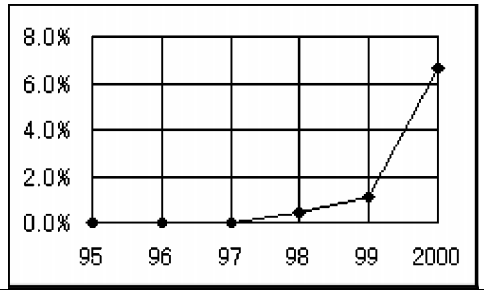
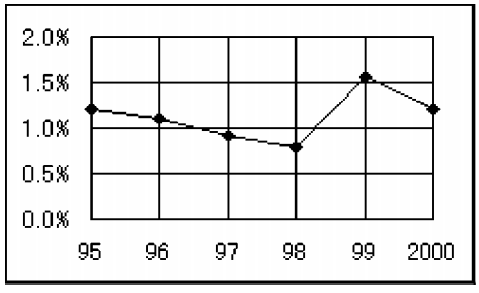
	Qualitative Description	Quantitative
Lean burn	Marketed in 1992. Has shown a receding trend since 1997. (shift to DI gasoline)	
Direct Injection Gasoline	Since it was first marketed in 1997 it has shown definite growth.	
Direct Injection Diesel	Has been marketed in 1998. Showed rapid growth in 2000.	
CVT	Marketed in 1988. No particular trend between 1995 and 2000.	

Figure 7: Trends in New Technologies launched by JAMA on the EU market

2.6. Trends in alternative concepts passenger cars

Nothing to report.

2.7. Trends in low emission passenger cars

JAMA released its first "120g/km or less" car on the EU market in 1999. In 2000, JAMA has launched a 119g/km car and a 80g/km gasoline-hybrid car. Furthermore, JAMA released a 120g/km gasoline-hybrid model in the autumn of 2000 (see Section 1.2.4).

In 2000, 8767 JAMA cars with emissions of 120g/km or less were registered in the EU, up from 5544 cars in 1999 (a 58% increase); in earlier years there had been no sales of vehicles in this emissions category.

2.8 Brief Description of the degree of occurrence of Grey Areas between M1 and N1 vehicles

JAMA estimates the number of M1 vehicles potentially registered as N1 in the EU amount to a total of 75001 vehicles or 4.5% of total registrations in 2000.

2.9 Data methods (Monitoring Decision annexes II & III), data sources, and data confidence levels

As in the previous report JAMA has used CO_2 statistics supplied by Marketing Systems Corporation. As agreed with the Commission, JAMA continues to provide CO2 data into the monitoring process as long as the official EU scheme (1753/2000/EC) has not reached the stage where Member State provided data can become the basis for monitoring progress[25].

Of the 1667987 new car registrations for JAMA in 2000, only 46074 units did not have specific CO2 emissions values, and hence excluded from the average specific CO2 emissions. The 46074 vehicles, represents just under 2.8% of total new registrations. There is insufficient data available to estimate what effect this would have on the total specific emissions for JAMA.

2.10 Description of measurement issues for CO_2 Emission Factors

JAMA's CO_2 emissions figures have been established according to Directive 93/116/EC, which replaced the old Directive 80/1268/EC. The new test cycle has been fully implemented as from 1.1.1997, and will be applicable for the coming years. Among other changes, the new cycle includes for the first time a cold start period, and consequently values for fuel consumption and CO_2 emissions are higher under the new system. The implementation of this new measuring procedure has led to an artificial average increase of 9% of the CO_2 emission figures, compared to the previously used Directive, whereas the CO_2 emissions from cars in the real world have not changed.

[25] According to Decision 1753/2000/EC Member States' data have to be used for the year 2003 at the latest.

One of the principle changes (being introduced during years 2000 to 2002 for M1 vehicles) relates to the drive cycle - the deletion of the initial 40 seconds of unmeasured engine idling prior to the commencement of the test. Such a change of test procedure increases the measured value of CO2 emissions for any given vehicle design.

From January 2000, new homologations (new model releases) of M1 vehicles up to 2500 kilos have had their CO2 emissions measured according to the "new" directive/cycle (99/100/EC). A correction factor needs to be applied to the measured CO2 emissions of such vehicles to broadly bring them into line with the 93/116/EC procedure, which is the basis on which JAMA's future targets were established and the basis of historical monitoring data in this report. However JAMA's data provider (Marketing Systems) has not been able to formulate a procedure for determining which newly registered cars in 2000 had their CO2 emissions measured according to which (new or old) cycle. As a consequence, no correction factor has been applied, and therefore the CO_2 data for 2000 in this report overstates JAMA emission data. Estimates for the effect of the cycle change vary between 0.7 (Commission Estimate[26]) and 1.2% ([27]) for 2000. As for future years, CO_2 emissions of JAMA's newly registered cars should be reduced by an agreed and appropriate correction factor.

JAMA agreed with ACEA's suggestion that data on 2001 registrations will be provisionally corrected by an average of 1% by JAMA´s data provider to correct to the test cycle EU 93/116/EC specified in the Commitment. JAMA considers that the impact of this measurement cycle change needs to be further assessed in the future.

2.11 Other Issues

Nothing to report.

[26] Based on independent study by TNO
[27] Based on manufacturers' assessment, initiated by ACEA

3. KEY ASSUMPTIONS TO THE COMMITMENT

3.1. Availability of Enabling Fuels

Statement on implication for the Commitment and justification

JAMA indicates that the premise on which the achievement of the CO_2 emission targets rests is not only the development of technology necessary for improving fuel efficiency but also for upgrading the quality of the fuel products that make this possible. The full availability of fuels with a sufficient quality to enable the application of technologies is imperative for the industry to achieve its CO2 commitment. JAMA states that the lean-burn gasoline engine will not become an effective technology without exhaust gas treatment technologies such as NOx catalyst. According to JAMA the same can be said for the diesel engine and it will not be effective until Diesel Particulate Filter (DPF) and NOx catalyst are fitted.

In this respect, the Commission studied the costs and benefits of introducing zero sulphur fuels in detail and concluded that "…the overall benefits …are derived from the sum of the reduced fuel costs for the consumer, reduced emissions of conventional air pollutants and the additional refinery costs associated with producing the required amounts of zero sulphur fuels….". Based on the study, the Commission has submitted to Council and European Parliament a proposal for a Directive on the quality of petrol and diesel fuels[28] which would guarantee that appropriate fuel qualities are on the market in sufficient quantities. The Commission's proposal aims to ensure that sufficient quantities of zero sulphur petrol and diesel fuels are available from 1 January 2005 on a balanced geographical basis and a complete penetration of zero sulphur fuels should be have been achieved by the 1 January 2011.

The impact of these fuels in relation to the attainment of the 140 g CO_2 /km target will be taken into account in the joint monitoring mechanism.

3.2. Distortion of Competition

Statement on implication for the Commitment and justification

Nothing to report.

Promotion of CO_2 efficient technologies

Statement on implication for the Commitment and justification

Nothing to report.

3.3. Acceptance of innovation

Statement on implication for the Commitment and justification

Nothing to report.

[28] COM(2001)241final, - the Proposal for a Directive of the European Parliament on the Quality of Petrol and Diesel Fuels and amending Dir 98/70/EC.

4. OTHER ISSUES

4.1. New Measures affecting CO_2

Comment on impact of the issue and on implication for the Commitment

Nothing to report.

4.2. New regulatory measures

Comment on impact of the issue and on implication for the Commitment

JAMA anticipates that the End of Life Vehicle (ELV) Directives will have adverse implications for the fuel efficiency of cars, as it may limit in its opinion the use of certain light materials and technologies, while burdening significantly the companies. The Commission does not expect repercussions of the ELV Directive on the commitment.

4.3. Fiscal Measures

Comment on impact of the issue and on implication for the Commitment

Nothing to report.

4.4. Breakthrough technologies

Comment on impact of the issue and on implication for the Commitment

Nothing to report.

4.5. Research Programmes: Description and Future Potential

Comment on impact of the issue and on implication for the Commitment

Nothing to report.

4.6. Other measures - telematics, infrastructure, education

4.6.1. Comment on impact of the issue and on implication for the Commitment

JAMA believes that measures such as the promotion of trade in purchase of new cars, presentations of correct and proper car maintenance methods, driver training, optimization of infrastructure, effective and efficient land use, and efforts to achieve a smoother traffic road will have a beneficial effect on CO2 reduction. JAMA thinks that such measures should therefore be embraced in a positive manner under government lead and with the co-operation of the industrial sectors involved.

JAMA, for its part, continues to engage in driver education activities for more environmentally and friendly driving in 2000.

4.7. Economic situation of the car industry

Comment on impact of the issue and on implication for the Commitment

Nothing to report.

5. CONCLUSIONS

5.1. Progress Statement on Delivering the Commitment

Japanese automobile manufacturing companies will concentrate on CO_2 emission reductions by developing low-emission cars. Although Japanese companies have begun to put more CO_2 efficient gasoline cars (emitting 119g/km) on the EU market in 1999 and have launched a 80g/km gasoline-hybrid car on the market in 2000, there was no sign of significant CO_2 emissions reductions due to these factors during the period 1995 to 2000 due to low sales volumes.

5.2. Statement on Expected Future Progress of the Commitment

The estimated target range of 165-175g/km in 2003 and the final target value of 140g/km in 2009 require further serious effort by the Japanese automobile manufacturers. If JAMA succeeds in reducing average specific emissions at the same rates for 1999 to 2000 (a 2.4% reduction, from 187 to 183g/km[29]), JAMA would meet the higher 2003 target (175g/km). However, emissions reductions will have to fall faster for the lower 2003 target (165k/km) and the 2009 target (140g/km) to be met. For the 2009 target, annual emissions reductions will have to increase to an average of 2.9% per year over the period until 2009.

Importantly, and as agreed upon, this target will mainly be achieved by technological developments affecting different car characteristics and market changes linked to these developments. Regarding technological developments, JAMA reiterated that its members would aim at a high share of new cars equipped with CO_2 efficient technologies. Japanese automobile manufacturers have agreed to make every endeavour to contribute to the achievement of JAMA's goals.

In order to achieve the targets JAMA believes that the following would be desirable:

1. The full market availability of fuels with a sufficient quality to enable the application of technologies needed for the industry to achieve its CO2 commitment.
2. Sound development of automobile industry and manufacturers' stable profitability.
3. Adopting measures to diffuse CO_2 emission reduction technologies in consideration of a balanced approach with regard to other regulatory requirements.

The Commission Services and JAMA see no reason to believe that the targets will not be reached if efforts continue.

[29] The drop from 187 to 183g/km gives a reduction of 2.4%; differences due to rounding in the specific emissions figures

JAMA
Data Annexes
2000

JAMA Data Annexes (2000)

A1 : SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO_2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

A2 : THE DISTRIBUTION OF CO_2 EMISSIONS IN THE NEW PASSENGER CAR FLEET FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)[30]

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

[30] Curb weight of vehicles.

A1 : SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO_2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

2000 - JAMA MEMBERS

2000	Petrol			Diesel			Other			All			CO2	Total
	Number	Fuel Efficiency	CO2	Number	Fuel Efficiency	CO2	Number	Fuel Efficiency	CO2	Number	Fuel Efficiency	CO2	Unknown	Number
EU-15	1,347,485	7.3	177	274,414	7.9	213	14	7.7	194	1,621,913	7.4	183	46074	1667987
A	31,305	7.2	174	22,060	7.0	193	0	0.0	0	53,365	7.2	182	813	54178
B	40,553	7.1	169	17,431	6.9	188	6	7.7	190	57,990	7.0	175	5512	63502
DK	21,807	7.3	176	4,454	7.7	210	0	0.0	0	26,261	7.4	181	6391	32652
F	73,679	7.2	173	41,046	8.0	215	8	7.8	196	114,733	7.5	188	1894	116627
FIN	29,815	7.3	176	2,610	7.1	190	0	0.0	0	32,425	7.3	177	192	32617
GER	329,947	7.6	184	33,552	7.7	207	0	0.0	0	363,499	7.7	186	1431	364930
GR	57,680	7.0	170	534	6.7	178	0	0.0	0	58,214	7.0	170	5895	64109
IRE	61,114	6.8	166	9,089	8.7	234	0	0.0	0	70,203	7.1	175	3574	73777
IT	160,333	6.8	163	41,617	8.1	218	0	0.0	0	201,950	7.0	174	575	202525
LUX	2,706	7.7	184	1,246	7.6	206	0	0.0	0	3,952	7.7	191	107	4059
NL	94,237	7.2	173	9,856	7.0	191	0	0.0	0	104,093	7.2	175	1363	105456
P	28,127	7.1	170	16,219	8.9	238	0	0.0	0	44,346	7.7	195	3163	47509
SP	64,295	7.5	180	57,550	7.9	213	0	0.0	0	121,845	7.7	195	13433	135278
SW	44,268	7.7	185	1,130	9.4	251	0	0.0	0	45,398	7.8	187	1300	46698
UK	307,619	7.5	181	16,020	9.0	242	0	0.0	0	323,639	7.6	184	431	324070

A2 : THE DISTRIBUTION OF CO_2 EMISSIONS IN THE NEW PASSENGER CAR FLEET FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

2000 – JAMA MEMBERS

CO2			<60	60-80	81-100	101-120	121-140	141-160	161-180	181-200	201-250	251-300	301-350	351-450	450<	Total
2000	Petrol	Number	0	212	0	8555	167547	285556	330165	271738	260456	17540	5122	594	0	1347485
		CO2	0	80	0	120	136	151	170	190	281	270	315	398	0	177
	Diesel	Number	0	0	0	0	305	61783	65537	12628	44622	78582	10957	0	0	274414
		CO2	0	0	0	0	136	155	172	185	225	276	382	0	0	213
	Other	Number	0	0	0	0	0	0	0	11	3	0	0	0	0	14
		CO2	0	0	0	0	0	0	0	188	215	0	0	0	0	194
	All	Number	0	212	0	8555	167852	347339	395702	284377	305081	96122	16079	594	0	1621913
		CO2	0	80	0	120	136	152	170	189	219	275	317	398	0	183

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)[1]

2000 – JAMA MEMBERS

2000	Petrol		Diesel		Other		All		inc. Mass unknown	
	Mass	CO2	Mass	CO2	Mass	CO2	Mass	CO2	Mass u.k.	All
EU-15	1,133	177	1,557	213	1,234	194	1,205	183	189	183
A	1,113	174	1,489	193	0	0	1,268	182	0	182
B	1,118	169	1,374	188	1,227	190	1,195	175	0	175
DK	1,142	175	1,517	210	0	0	1,206	181	186	181
F	1,054	173	1,534	215	1,240	196	1,226	188	0	188
FIN	1,185	176	1,508	190	0	0	1,211	177	225	177
GER	1,195	184	1,652	207	0	0	1,237	186	0	186
GR	1,092	170	1,380	178	0	0	1,095	170	176	170
IRE	1,088	166	1,657	234	0	0	1,161	175	267	175
IT	1,046	163	1,602	218	0	0	1,160	174	0	174
LUX	1,188	184	1,577	206	0	0	1,311	191	0	191
NL	1,117	173	1,490	191	0	0	1,153	175	0	175
P	1,122	170	1,627	238	0	0	1,307	195	0	195
SP	1,147	180	1,497	213	0	0	1,312	195	0	195
SW	1,227	185	1,698	251	0	0	1,239	187	170	187
UK	1,137	182	1,743	242	0	0	1,167	185	0	185

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

2000 – JAMA MEMBERS

2000	Petrol		Diesel		Other		All	
	Power	CO2	Power	CO2	Power	CO2	Power	CO2
EU-15	72	177	79	213	72	194	73	183
A	69	174	75	193	0	0	72	182
B	69	169	65	188	67	190	67	175
DK	73	176	70	210	0	0	72	181
F	70	173	80	215	76	196	74	188
FIN	75	176	78	190	0	0	76	177
GER	75	184	88	207	0	0	76	186
GR	66	170	68	178	0	0	66	170
IRE	64	166	84	234	0	0	66	175
IT	63	163	80	218	0	0	66	174
LUX	84	184	81	206	0	0	83	191
NL	70	173	75	191	0	0	70	175
P	68	170	76	238	0	0	71	195
SP	76	180	77	213	0	0	77	195
SW	83	185	79	251	0	0	83	187
UK	77	181	88	242	0	0	77	184

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

2000 – JAMA MEMBERS

2000	Petrol		Diesel		Other		All	
	Capacity	CO2	Capacity	CO2	Capacity	CO2	Capacity	CO2
EU	1513	177	2322	213	1793	194	1650	183
A	1487	174	2207	193	0	0	1785	182
B	1456	169	2037	188	1800	190	1631	175
DK	1573	176	2175	210	0	0	1675	181
F	1449	173	2341	215	1788	196	1768	188
FIN	1579	176	2169	190	0	0	1626	177
GER	1606	184	2420	207	0	0	1681	186
GR	1393	170	2014	178	0	0	1399	170
IRE	1360	166	2467	234	0	0	1504	175
IT	1301	163	2342	218	0	0	1516	174
LUX	1646	184	2335	206	0	0	1863	191
NL	1505	173	2174	191	0	0	1568	175
P	1388	170	2355	238	0	0	1742	195
SP	1569	180	2307	213	0	0	1917	195
SW	1739	185	2431	251	0	0	1756	187
UK	1558	182	2582	242	0	0	1609	185

Monitoring of KAMA's Commitment on CO_2 Emission Reduction from Passenger Cars (2000)

Final Report
13 July 2001

Joint Report of the Korea Automobile Manufacturers Association and the Commission Services

Monitoring of the KAMA Commitment[31] on CO_2 Emission Reduction from Passenger Cars

JOINT REPORT OF KAMA AND THE COMMISSION SERVICES[32]: YEAR 2000 REPORT

ES SUMMARY OF PROGRESS IN DELIVERING THE COMMITMENT

E1 Trends in specific emissions of CO_2 (g/km)

Average specific CO2 emissions from newly registered KAMA cars on the EU market dropped over the period 1999 to 2000. Specific emissions for KAMA member registered petrol and diesel-fuelled cars combined fell from 194g/km in 1999 to 191g/km in 2000 – a 1.5% reduction. Average specific emissions from petrol-fuelled cars fell from 189g/km in 1999 to 185g/km in 2000 - a 2.1% reduction. Specific emissions from diesel-fuelled cars fell from 253g/km in 1999 to 245g/km in 2000 – a 3.2% reduction (see Figure 1).

Over the whole reporting period, 1995 and 2000, average specific CO_2 emissions of passenger cars sold by KAMA members in the EU market have decreased slightly from 197 g/km to 191 g/km. This represents a drop of 3.0%[33] over the reporting period, equivalent to a 0.6% reduction per year[34]. The average specific emissions from petrol-fuelled cars fell from 195g/km in 1995 to 185g/km in 2000 – a 5.1% drop, equivalent to 1% per year[35]. And the average specific emissions from diesel-fuelled cars fell from 309g/km in 1995 to 245g/km in 2000 – a 20.7% drop, equivalent to 4.1% per year[36].

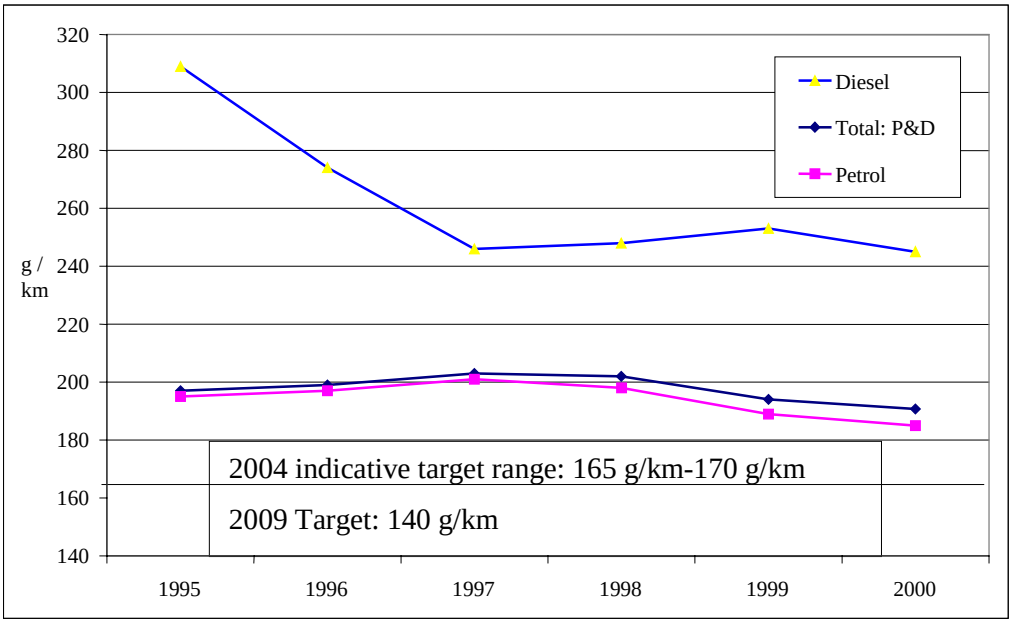


Figure 1. EU Trends of KAMA's fleet in average specific emissions of CO_2

[31] As recognized by the European Commission in the Recommendation of 13 April 2000 on the reduction of CO2 emissions from passenger cars (2000/303/EC). Hereafter referred to as "The Commitment"
[32] Hereafter often referred to as "The Commission"
[33] The drop from 197 g/km to 191 g/km gives a 3.2% reduction; the difference reflects rounding.
[34] This value is a simple arithmetic average, and throughout the text simple arithmetic averages are used.
[35] *Op cit* Footnote 4
[36] *Op cit* Footnote 4

The average specific emissions reflect mainly the emissions from gasoline cars as these represent the majority of new registrations. There are fewer sales of diesel cars (though with increasing share of new registrations over the period[37]) and these tend to be larger emitters of CO2.

E2 Trends in specific fuel consumption by fuel type (l/100km)

Specific fuel consumption (litres/100 km) of gasoline engine and diesel engine is proportional to their CO_2 emissions - the lower the fuel consumption, the lower the emissions.

Gasoline passenger cars, which occupied most of KAMA's sales volumes over the reporting period, consumed about 8.1 l/100 km in 1995, which decreased afterwards to 7.6 l/100km in 1999, and to 7.4 l/100 km in 2000. Diesel cars consumed an average of 11.6 l/100 km in 1995, decreasing to 9.5 l/100km in 1999 and 9.2 l/100 km in 2000.

Total fuel consumption did not differ much from that of gasoline passenger cars due to the small sales volume of diesel cars, which decreased from 8.2 l/100 km in 1995 to 7.8 l/100 km in 1999 to 7.6 l/100 km in 2000. (see Figure 2).

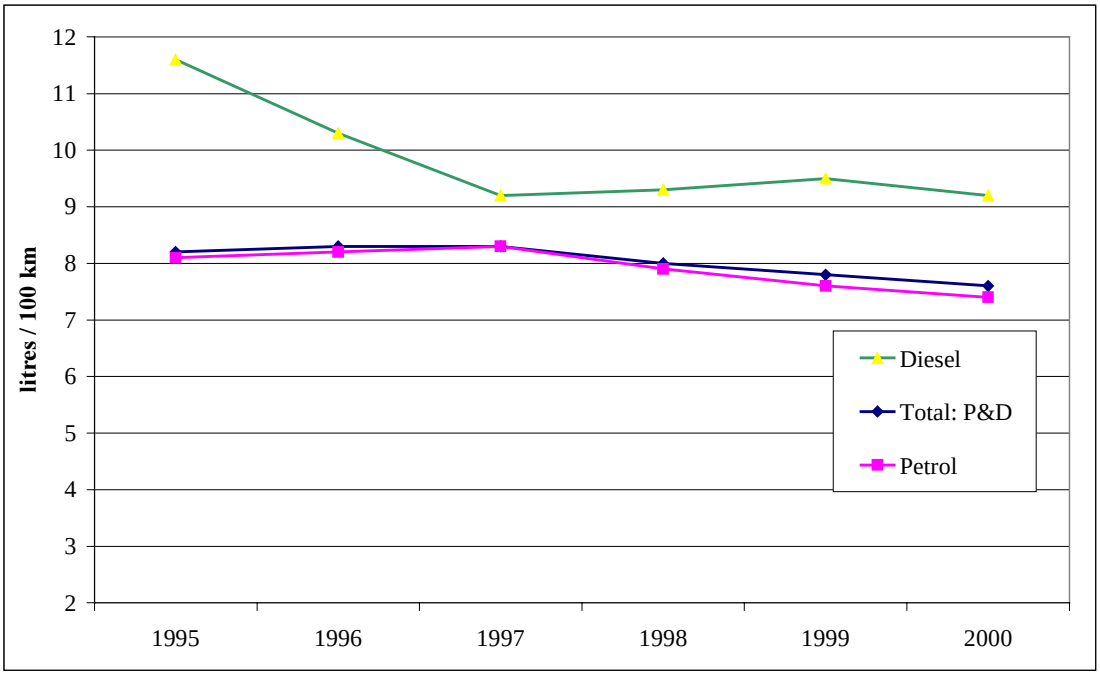


Figure 2. Trends of KAMA's fleet in specific average fuel consumption by fuel type

E3 Trends in physical fleet characteristics

The average power and engine size for newly registered cars have remained the same in 2000 as for 1999. However, the average mass decreased – from 1,096 kg in 1999 to 1,075 kg in 2000 (a 1.9% drop). The reduction in the mass of petrol-fuelled cars, which represent the main share of new KAMA registrations, was the reason for the reduction in the overall mass of new gasoline and diesel car registrations. Indeed while the mass of gasoline cars dropped from 1,039 kg to 1,006 kg (1999 to 2000), the mass of diesel cars rose slightly for the same period – from 1,731 kg to 1,740 kg.

[37] Diesel-fuelled cars amounted to under 2% of the combined registrations of petrol and diesel-fuelled cars in 1995, 8% in 1999, and 9% in 2000.

The general trends in physical characteristics over the 1995 to 2000 reporting period show slight variations, influenced by a recently increasing mini gasoline car (<1000cm^3) sales volume, and in part the growth in the share of diesel-fuelled car registrations. The overall increase in the car average mass over the period 1995 to 2000 was +1.7% , with the increasing sale of heavier diesel-fuelled cars overriding the reduction in weights of the petrol-fuelled cars, whose average mass reduced by 3.5% over the period. There was a decrease in average engine capacity of for all registrations combined of 10.8 % (a 16.6% reduction for petrol-fuelled cars), and an overall decrease in average engine power by -9.0 % (a 10.4% reduction for petrol-fuelled cars).

E4 Technical developments introduced to reduce CO_2 emissions

There was no special new technology to reduce CO_2 introduced in the market by KAMA members within the reporting period. Most developments have been carried out to reduce other emissions than CO_2 for meeting the low emission vehicle regulations such as EURO-III and EURO-IV.

KAMA members tried to reduce CO_2 emissions with applying the torque based actuator control, knock control, and weight reduction within the reporting period.

E5 Brief overall assessment on progress in relation to the target

Although KAMA members tried to make environment friendly automobiles, their main objective within the reporting period was to meet EURO-III and EURO-IV standards for regulated emissions (hydrocarbon, carbon monoxide, and nitrogen oxides). In this respect it should be noted that the full reporting period 1995 to 2000 covers several years before the Commitment on CO_2 reduction from passenger cars was in place[38]. The year 2000 was the first period after the Commitment was made.

Due mainly to the increased sales of mini gasoline cars on the EU, a small decrease in average specific CO_2 emissions was accomplished between 1995 and 2000, from 197 g/km to 191 g/km[39]. To achieve the CO_2 emission targets agreed upon in the commitment by 2004 and 2009, KAMA members have begun to concentrate on fuel efficient car technologies such as HSDI (High Speed Direct Injection), Gasoline Direct Injection, CVT (Continuously Variable Transmission), weight reduction, and reduction of drag force.

The Commission Services are concerned about the progress made so far. The Commission Services and KAMA, agree that only with significant and additional efforts will the targets be met.

[38] The European Commission Recommendation (2000/303/EC) date was: 13 April 2000, though the Exchange of Letters had been completed in 1999.

[39] An assessment to what extent the mini-car development can be considered as technological development needs to be carried out in the study assessing the achievement of the interim target. As stated in the Recommendation, Article 1, KAMA should "*mainly by technological developments and market changes linked to these developments, collective achieve a CO2 emission target of 140g/km*". *Furthermore, KAMA "should cooperate with the Commission in identifying the effect of market changes which are not linked to technological developments*"

1. MONITORING OF TECHNOLOGICAL DEVELOPMENTS AFFECTING THE COMMITMENT[1]

1.1. Commitment Initiatives

1.1.1 Brief Description of current R&D programmes

KAMA members consider investments into R&D as a key element for meeting the CO_2 targets of 2004 and 2009. They have already started new R&D projects aiming at reducing passenger car's CO_2 emissions as well as other emissions (see description in section 1.2.1). Section 1.2 also covers KAMA technological developments and research programme activities.

1.2. Technological developments

1.2.1. Description of fuel efficiency characteristics of new technologies, alternative concepts

Description

KAMA members have committed themselves to achieve a target (140 g/km of CO_2 emissions in 2009) and are running several R&D programmes to investigate methods to reduce automobile CO_2 emissions, in place for several years now. The activities can be divided into 4 major categories: The Engine Programme, the Transmission Programme, the After-Treatment Improvement Programme, and the Car Weight Reduction Programme.

Engine Programme

KAMA members are trying to develop higher performance and lower CO_2 emission engines. There are two different engine concepts being under development in addition to applying the torque based actuator control and the knock control within the reporting period. One is the High Speed Direct Injection (HSDI) diesel engine with common rail system which has been considered one of the most promising alternatives and already launched to the market by several automobile manufacturers in the world. HSDI diesel engines will allow a 10% to 20% gain in fuel efficiency as compared to conventional gasoline engines.

Another is the gasoline direct injection engine technology, which will allow 10% higher fuel efficiency than conventional gasoline engines. One of KAMA members already completed the development of a gasoline direct injection engine and is now trying to develop gasoline direct injection engine further aiming at smaller displacements. KAMA expects those passenger cars with small size of HSDI engines and gasoline direct injection engines to be launched onto the EU market by 2002 and 2003, respectively.

Transmission Programme

Transmission is one of the major factors affecting CO_2 emissions. Its efficiency and speed are the main factors to be improved so as to reduce emissions. KAMA members have already reviewed the CVT concept and are considering its application to passenger cars in the EU market. CVT has already been applied to a mini car (<1000cm^3) in Korea and showed its potential to reduce CO_2 emissions compared to conventional automatic transmission cars (by 3% to 5%). KAMA members are focusing to develop the CVT for matching with other car segment for EU market. KAMA expects those passenger cars will be launched onto the EU market by 2003.

[1] As recognized by the European Commission in the Recommendation of 13 April 2000 on the reduction of CO2 emissions from passenger cars (2000/303/EC). Hereafter referred to as "The Commitment"

After Treatment Improvement Programme

KAMA members are investigating several after-treatment systems for fuel-efficient diesel engines to be used in the near future, e.g. 4-way catalyst and photo catalyst systems. These will be applied to different car classes such as small and/or medium size cars and KAMA expects these cars will be launched onto the EU market from 2002 at the earliest.

Car Weight Reduction Programme

This programme is one of the major measures to contribute to CO_2 emissions reduction. KAMA members are developing aluminum bodies and chassis for lightweight vehicles. This activity will consist of extrusion, three-dimensional bending, casting as well as tube hydro-forming. In the case of chassis, the suspension system is a promising area where new technology can be applied.

KAMA is convinced that these programmes will contribute to further reducing specific CO_2 emissions.

1.2.2. Availability of New Technologies in the EU

There have not been any innovative new CO_2 efficient technologies applied to decrease CO_2 emissions put on the EU market within the reporting period.

Mini gasoline cars (engine capacities are less than 1,000 cm^3) sold in the EU market mainly contributed to reducing CO_2 emissions[40]. In addition to the reduction of car weight, KAMA members are trying to develop new technologies such as CVVT (Continuously Variable Valve Timing), Reduction of engine friction, Reduction of resistances (Running and Rolling) for reducing CO_2 emissions (by 5 to 15%) which will be launched into EU market by 2003.

No passenger car was offered by KAMA members onto the EU market within the reporting period met the criteria of emitting less than 120 g CO_2/km. In order to meet this requirement KAMA members are currently developing a diesel passenger car with common rail, hybrid electric vehicles (HEV) and fuel cell cars.

One of KAMA members developed HSDI diesel car and launched onto EU market at the end of 2000, which was not counted in statistics of this report.

1.2.3. Availability of alternative concepts passenger cars in the EU

1.2.4. Availability of low emission passenger cars (e.g. emitting 120 g/km or less) in the EU

There have not been alternative concept passenger cars to decrease CO_2 emission within the reporting period. KAMA members began to concentrate on fuel efficient car technologies, e.g. alternative fuel engine, electric vehicle including hybrid electric vehicle, and fuel cell vehicle which will probably be launched to the EU market in near future.

[40] An assessment to what extent the mini-car development can be considered as technological development needs to be carried out in the study assessing the achievement of the interim target. As stated in the Recommendation, Article 1, KAMA should "*mainly by technological developments and market changes linked to these developments, collective achieve a CO2 emission target of 140g/km*". *Furthermore, KAMA "should cooperate with the Commission in identifying the effect of market changes which are not linked to technological developments*"

There has not been a low emission passenger car to meet the CO_2 emitting less than 120 g/km within the reporting period. KAMA members are trying to develop as soon as possible diesel passenger car of small displacement with common rail, three-liter car, and HEV (hybrid electric vehicle) to meet the target.

1.3. Description of market trends in physical fleet characteristics

The average power and engine size for newly registered cars have remained the same in 2000 as for 1999. However, the average mass has dropped – from 1,096 kg in 1999 to 1,075 kg in 2000 (a 1.9% drop). The drop in the mass of petrol-fuelled cars, which represent the main share of new KAMA registrations, was the reason for the drop in the overall mass of new gasoline and diesel car registrations. Indeed while the mass of gasoline cars dropped from 1,039 kg to 1,006 kg (1999 to 2000), the mass of diesel cars rose slightly for the same period – from 1,731 kg to 1,740 kg.

The general trends in physical characteristics over the 1995 to 2000 reporting period show slight variations, influenced by a recently increasing mini gasoline car (<1000cm^3) sales volume. The overall increase in the car average mass over the period 1995 to 2000 was +1.7% (and 3.5% decrease for petrol-fuelled cars), decrease in average engine capacity (-10.8 %; 16.6% reduction for petrol-fuelled cars), and engine power (-9.0 %; 10.4% reduction for petrol-fuelled cars). For variations over the period 1995 to 2000:

- Average automobile mass reached the maximum 1,109 kg in 1998 and decreased slightly.
- Average engine capacity decreased after 1996 steadily to 1,417 cm^3 in 2000.
- Average engine power reached the maximum 71 kW in 1997 and decreased to 61 kW in 2000. The main contributor to CO_2 decrease after 1997 is increase of gasoline mini car sales.

2. STATISTICAL MONITORING (1995-2000)

2.1. Trends in specific emissions of CO_2 (g/km)

Average specific CO2 emissions from newly registered KAMA cars on the EU market dropped over the period 1999 to 2000 (see Figure 3 and recall Figure 1). Specific emissions for KAMA member registered petrol and diesel-fuelled cars combined fell from 194g/km in 1999 to 191g/km in 2000 – a 1.5% reduction. Average specific emissions from petrol-fuelled cars fell from 189g/km in 1999 to 185g/km in 2000 - a 2.1% reduction. Specific emissions from diesel-fuelled cars fell from 253g/km in 1999 to 245g/km in 2000 – a 3.2% reduction (see Figure 1)

As shown in Figure 1, the average specific CO_2 emissions of passengers sold by KAMA members on the EU market increased from 197 g/km in 1995 to 203 g/km in 1997. After 1997 it decreased, dropping to 191g/km in 2000. Over the period as a whole, there was a slight reduction in average specific CO_2 emission - of about 3.0%[41], equivalent to a 0.6% reduction per year[42] .

Specific CO_2 emissions from gasoline cars, which made up the majority of KAMA sales, reached a maximum in 1997 (201g/km) and decreased afterwards due to the increase of mini car (<1000cm^3) sales, to 189g/km in 2000 – a 5.1% drop over the period, equivalent to a 1% drop per year.

Diesel cars, with higher CO_2 emissions due to its greater weight, also showed a decrease in CO_2 emissions over the reporting period – from 309g/km in 1995 to 253g/km in 2000, a 20.7% drop, equivalent to a 4.1% average annual reduction[43] (see Figure 3).

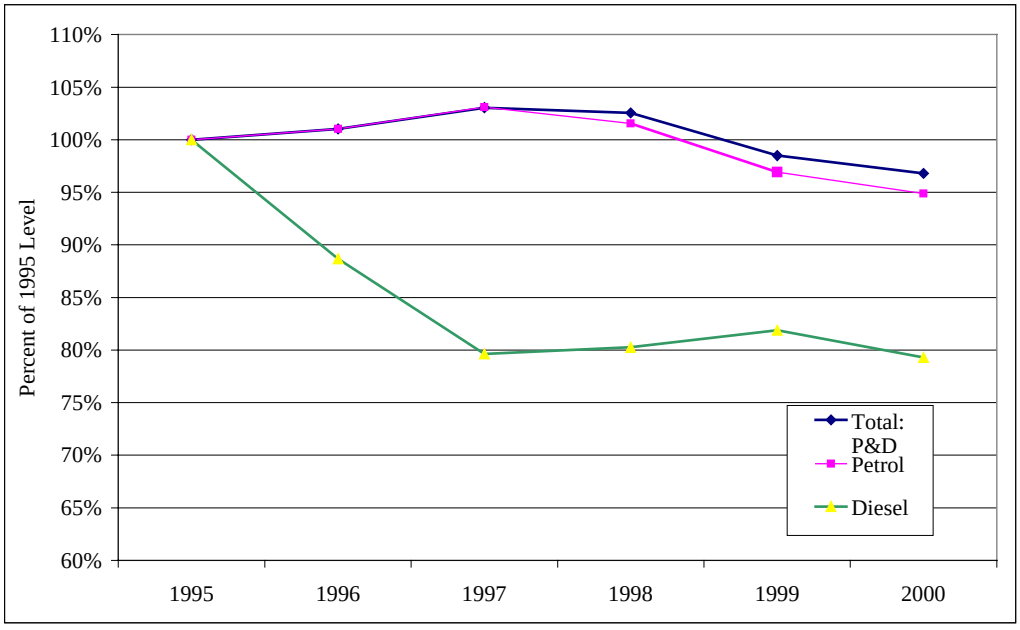


Figure 3 KAMA's CO2 Reduction Index (1995= 100%)

[41] The drop from 197 g/km to 191 g/km gives a 3.2% reduction; the difference reflects rounding.
[42] This value is a simple arithmetic average. The compound (or year-on-year) average is nearer 0.7%.
[43] This value is a simple average; the compound average is near 4.5%

2.2. Number of newly registered passenger cars

Total new car registration by KAMA were 491,244 in 2000, up by 5.9% from 1999 registrations (463,724). Gasoline cars represented the largest share of new registrations – 80.9% in 2000 (compared to 81.9% in 1999). Within the group of petrol-fuelled cars, the sales volume share of mini cars increased since 1998 and reached to 98,715 in 2000, representing 22.5% of total car sales and contributing to lower CO_2 emissions.

The number of diesel passenger cars sold increased from 34,286 in 1999 to 40,769 in 2000 (+18.9%) - although remaining small portion (8.3%) of total car registrations - which slightly affected the increase of CO_2 emissions (see Figure 4).

There were few "other cars" - 4995 in 1999 and 2947 in 2000 that represent those cars for which the fuel type is identified but the specific CO_2 value cannot be confirmed. There was, however, a significant number of "unknown cars" (rising from 44,777 in 1999 to 50,143 in 2000, representing around 10% of new registrations) which is mainly due to lack of data disaggregating between petrol-fuelled and diesel-fuelled cars for Greece (total number 46,592).

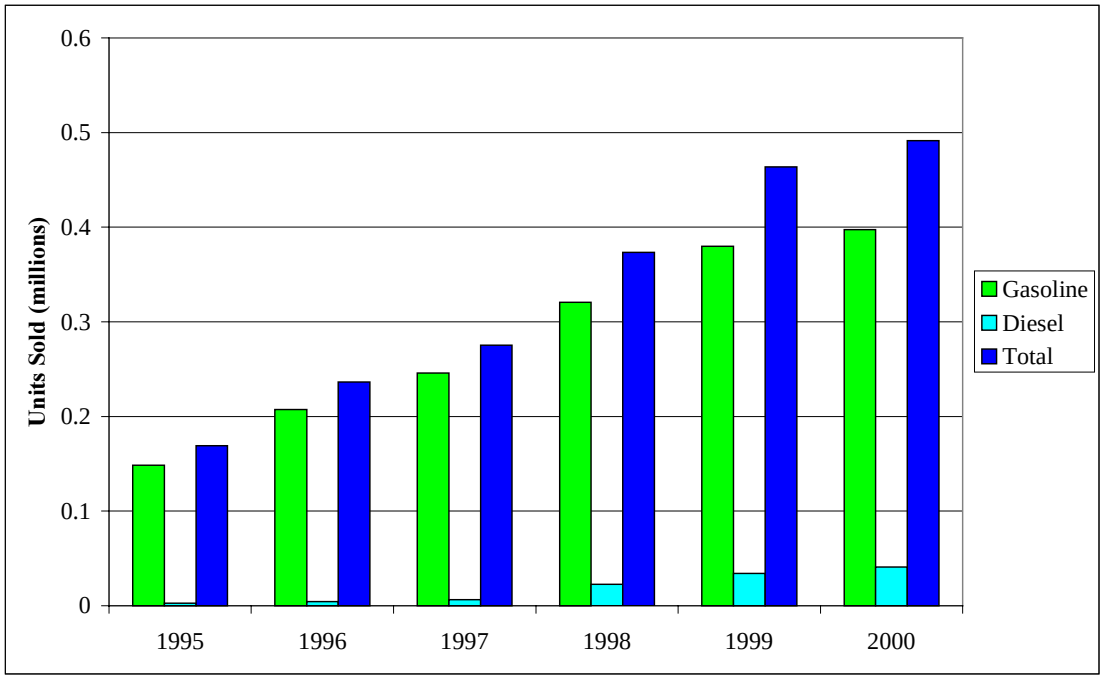


Figure 4. Number of newly registered passenger cars by KAMA's members

2.3. Fleet Composition

KAMA's fleet composition changed slightly from 1999 to 2000. The main change was the increase in the share of vehicles in the emissions range of 141g/km to 160g/km (a 5.9% increase in share). Shares in the ranges of 161g/km to 180g/km, 181g/km to 200g/km, and 201g/km to 250g/km each dropped – by 2%, 2.2% and 1% respectively.

The changes in 1999 to 2000 follow the changes in KAMA's fleet composition noted over the whole reporting period 1995 to 2000. The share of cars in the lowest category 141-160 g/km has increased significantly, by 13.3% (see Figure 5). And the share of cars emitting between 161 g/km and 180 g/km has increased by 4.4% Furthermore, the share of cars emitting more than 181 g/km decreased for all

the upper categories (with the exception of the 251-300 g/km category which increased by +3.4%). Notably, the share of cars in the 181-200 g/km category was 18.7% lower in 2000 than in 1995.

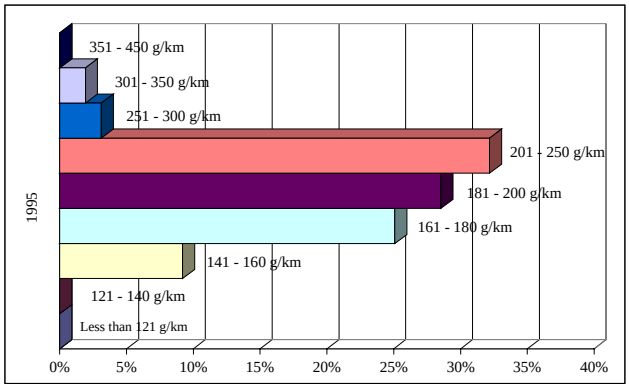


Figure 5a: KAMA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 1995

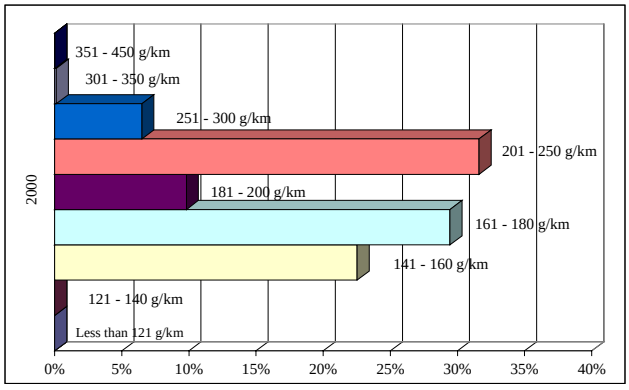


Figure 5b: KAMA's Fleet Composition per CO_2 Category in Shares of Total (gasoline+diesel) in 2000

2.4. EU trends in physical fleet characteristics

The average power and engine size for newly registered cars have remained the same in 2000 as for 1999. However, the average mass has dropped – from 1,096 kg in 1999 to 1,075 kg in 2000 (a 1.9% drop). The drop in the mass of petrol-fuelled cars, which represent the main share of new KAMA registrations, was the reason for the drop in the overall mass of new gasoline and diesel car registrations. Indeed while the mass of gasoline cars dropped from 1,039 kg in 1999 to 1,006 kg in 2000 (a 3.2% drop), the mass of diesel cars rose slightly for the same period – from 1,731 kg in 1999 to 1,740 kg in 2000 (a 0.5% increase).

On average the weight, engine capacity and engine power of KAMA registered diesel-fuelled cars is significantly higher than for petrol-fuelled cars (see Figure 6a). This, together with the different shares of registrations of petrol and diesel-fuelled cars, are a key influence behind the changes to total fleet average car characteristics over the period 1995 to 2000 as described below.

Average total automobile mass was 1,057 kg in 1995 and increased by 1.7% within the reporting period. The average mass reached a maximum of 1,109 kg in 1998 and afterwards decreased to 1,075 kg in 2000 (see Figure 6).

Gasoline automobiles reached the maximum average mass of 1,074 kg in 1997 (against 1,043 kg in 1995) and decreased to 1,006 kg in 2000, i.e. decreased by 3.5% within the reporting period.

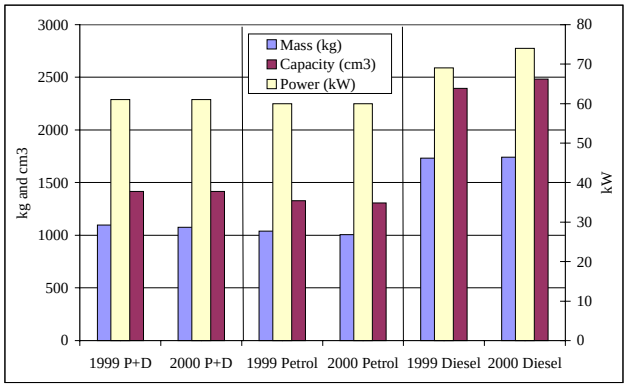
Diesel automobiles average mass reached the minimum of 1,630 kg in 1997 (against 1,789 kg in 1995) but increased to 1,740 kg in 2000; i.e. decreased by 2.7% within the reporting period. The overall trend in average mass shows very low variations in mass over the 1995-2000 period.

Total engine capacity has steadily decreased from 1,589 cm^3 in 1995 to 1,417 cm^3 in 2000 (with a slight increase in 1996). Gasoline engine capacity reached the maximum 1,583 cm^3 in 1996 (against 1,568 cm^3 in 1995) and decreased to 1,307 cm^3 in 2000. Diesel engine capacity reached the minimum

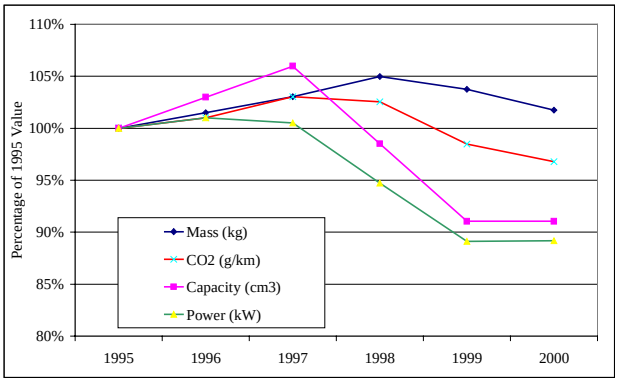
2,316 cm^3 in 1998 (against 2,735 cm^3 in 1995) and increased to 2,483 cm^3 in 2000. The overall trend shows some variations in engine capacity over the reporting period, mainly due to a more significant drop (-16.6%) in gasoline engine capacity since 1995 and a 9.2% lower diesel engine capacity.

Total engine power reached the maximum 71 kW in 1997 (against 67 kW in 1995) and decreased to 61 kW in 2000 i.e. decreased by 9% over the reporting period. Average gasoline engine power reached the maximum 71 kW in 1997 (against 67 kW in 1995) and decreased to 60 kW in 2000, i.e. decreased by 10.4% over the reporting period. Diesel engine power has slightly increased by 12.1% within the reporting period, i.e. from 66 kW in 1995 to 74 kW in 2000(see Figure 6).

While the average mass increased over the period, CO_2 emissions fell. Capacity and power characteristics, however, fell faster than CO_2 emissions.



Figures 6a: Physical KAMA fleet characteristics



Figures 6b: Trends and Physical Characteristics and Specific CO2 Emissions: 1995 to 2000

2.5. Trends in new technologies in the EU supported by data on sales or new fleet when possible

KAMA members tried to apply several techniques to reduce CO2 emissions such as torque based actuator control, knock control, and weight reduction within the reporting period.

Trends in sales vary across the applied technologies. The share of cars applied with torque based actuator control which could increase engine performance has increased from 6.7% in 1999 to 8.4% in 2000.

The share of cars applied with knock control which also could increase engine performance has increased from 7.4% in 1996 to 13.4% in 2000.

Share of mini cars has increased since 1998 from 14% to 20.1% in 2000.

2.6. Trends in alternative concepts passenger cars in the EU supported by data when possible

KAMA members are considering the development of alternate concepts passenger cars.

2.7 Trends in low emission passenger cars in the EU

KAMA expects KAMA members will launch the fuel-efficient cars of 120g/km or less onto EU market in 2003 at the earliest.

2.8 Brief Description of the degree of occurrence of Grey Areas between M1 and N1 vehicles

Around 31,120 vehicles sold by KAMA in the EU are understood to be “grey area vehicles” – in other words were registered as M1 in some countries but as N1 in other countries. This is equivalent to around 6.3% of new KAMA member registrations on the EU market. This relates primarily to the Spanish (14,046 vehicles) and Portuguese (8,236 vehicles) markets, and to a lesser extent Italian (3,383 vehicles) markets. Three models account for the majority of the grey area vehicles.

2.9 Data methods (Monitoring Decision annexes II & III), data sources, and data confidence levels.

KAMA has used the same high-quality data provider, the French-based association AAA (Association Auxiliaire de L'Automobile), as in the 1999 report. As agreed with the Commission, KAMA continues to provide CO_2 data into the monitoring process as long as the official EU scheme (1753/2000/EC) has not reached the stage where Member State provided data can become the basis for monitoring progress. KAMA facilitates the undertaking of the monitoring exercise by the provision of this data in which it has high confidence

AAA's CO_2 database covers, in a consistent manner, over 90% of the EU – for which both petrol-fuelled and diesel-fuelled cars are noted separately. For Finland and Greece, the fuel related disaggregation is not available and only total figures are presented..

2.10 Description of measurement issues for CO_2 Emission Factors

The KAMA Commitment specified that new car CO_2 emissions will be measured according to Directive 93/116/EC. Since the establishment of the KAMA Commitment, the mandatory type approval method of measuring CO_2 emissions has been revised by Directive 99/100/EC. One of the principle changes (being introduced over the period 2000 to 2002 for M1 vehicles) relates to the drive cycle - the deletion of the initial 40 seconds of unmeasured engine idling prior to the commencement of the test. Such a change of test procedure increases the measured value of CO_2 emissions for any given vehicle design.

From January 2000, new homologations (new model introductions) of M1 vehicles up to 2500 kilos have had their CO_2 emissions measured according to the "new" directive/cycle (99/100/EC). A

correction factor needs to be applied to the measured CO_2 emissions of such vehicles to broadly bring them into line with the 93/116/EC procedure, which is the basis on which KAMA's future targets were established and the basis of historical monitoring data in this report. However, KAMA's data provider (AAA) has not been able to formulate a procedure for determining which newly registered cars in 2000 had their CO_2 emissions measured according to which (new or old) cycle. As a consequence, no correction factor has been applied, and therefore the CO_2 data for 2000 in this report overstates KAMA emission data (i.e. KAMA emissions data should be lower). Estimates for the effect of the cycle change vary between 0.7 (Commission Estimate[44]) and 1.2% ([45]) for 2000. As for future years, CO_2 emissions of KAMA's newly registered cars should be reduced by an agreed and appropriate correction factor.

KAMA agreed with ACEA's suggestion that data on 2001 registrations will be provisionally corrected by an average of 1% by KAMA´s data provider to correct to the test cycle EU 93/116/EC specified in the Commitment. KAMA considers that the impact of this measurement cycle change needs to be further assessed in the future.

2.11 Other Issues

Nothing to report

[44] Based on independent study by TNO
[45] Based on manufacturers' assessment, initiated by ACEA

3. KEY ASSUMPTIONS TO THE COMMITMENT

3.1. Availability of Enabling Fuels

KAMA intends to make an assessment as to whether the assumption in KAMA's Commitment is being met; namely the full market availability of fuels with a sufficient quality to enable the application of technologies needed for the industry in order to achieve its CO_2Commmitment. The Commitment is based on fuel qualities as laid down in Directive 98/70/EC of 28 December 1998.

KAMA is expecting that fuels of the following better quality might be available in the market due to technical reasons, commercial competition as well as possible national policies: Some gasoline (e.g. Super-Plus, 98 octane as agreed in Germany) and some diesel plus with a maximum Sulphur content of 30 ppm are provided in 2000 on the whole EU market in a sufficient volume and geographical cover.

In addition, new fuel-efficient lean-burn engine technologies need to use after-treatment systems (NOx traps, particulate filters and conventional catalysts) to meet CO_2 and tailpipe emissions at the same time. Therefore "Zero Sulphur Fuel" (less than 10 ppm sulphur) will be required as sulphur contaminates after-treatment systems and significantly reduces their efficiency.

In this respect, the Commission studied the costs and benefits of introducing zero sulphur fuels in detail and concluded that "…the overall benefits …are derived from the sum of the reduced fuel costs for the consumer, reduced emissions of conventional air pollutants and the additional refinery costs associated with producing the required amounts of zero sulphur fuels….". Based on the study, the Commission has submitted to Council and European Parliament a proposal for a Directive on the quality of petrol and diesel fuels[46], which would guarantee that appropriate fuel qualities are on the market in sufficient quantities. The Commission's proposal aims to ensure that sufficient quantities of zero sulphur petrol and diesel fuels are available from 1 January 2005 on a balanced geographical basis and a complete penetration of zero sulphur fuels should be have been achieved by the 1 January 2011.

In the Commission Proposal for a Directive on the Quality of Petrol and Diesel Fuels, it is explained that "the impact of these fuels in relation to the attainment of the 140 g/km target will be taken into account in the joint monitoring mechanism".

3.2. Distortion of Competition - link to 4.7.1

Nothing to report

3.3. Promotion of CO_2 efficient technologies

Cars with low CO_2 emission technology like lean burn engines could not be launched to the EU market although they were introduced in 1998 to the Korean market, due to the stringent emission regulations of EU. KAMA expects fuel-efficient lean burn cars (with de-NOx catalyst) to contribute to reducing CO_2 emission in the near future. One of KAMA members developed and launched HSDI (High Speed Direct Injection) diesel car into EU at the end of 2000, which was not counted in statistics of this report. The HSDI diesel car CO_2 emission could be reduced by 10% compared to gasoline car.

3.4. Acceptance of innovation

Nothing to report

[46] COM(2001)241final, - the Proposal for a Directive of the European Parliament on the Quality of Petrol and Diesel Fuels and amending Dir 98/70/EC.

4. OTHER ISSUES

4.1. New Measures affecting CO_2

Nothing to report

4.2. New regulatory measures

More stringent regulations of emissions, safety, and recycling can affect the effort to reduce CO_2 emissions. For example, such regulations may contain legal, technical or procedural requirements that in practice could create technical or other impediments to the objective of reducing CO_2 emissions. Compliance with such regulations may also increase costs for manufacturers, thereby affecting their financial situation and having an impact on the resources available for developing CO_2 efficient technologies.

KAMA anticipates that the End-of-Life Vehicle (ELV) Directive[47] and possible implementation of regulations on Pedestrian Friendly Vehicle will have adverse implications for the fuel efficiency of cars, as it may limit the use of certain light materials and technologies, while burdening significantly the companies. The Commission does not expect repercussions of the ELV Directive on the CO_2 commitment.

4.3. Fiscal Measures

Nothing to report

4.4. Breakthrough technologies

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According to KAMA the development costs for breakthrough technologies will be higher for KAMA members than other associations which have a higher sales volume in the EU market. In addition, there have been no diesel passenger cars (except for jeep-type 4WDs) in Korea. KAMA argues that the development cost per diesel car will be much higher compared to other automobile manufacturers that sell diesel cars in large volume in the EU market.

4.5. Research Programmes: Description and Future Potential

KAMA members have committed themselves to achieve a target (140 g/km of CO_2 emissions in 2009) and are running several R&D programmes to investigate methods to reduce automobile CO_2 emissions, in place for several years now. The activities can be divided into several categories: The Engine Programme, the Transmission Programme, the After-Treatment Improvement Programme, and the Car Weight Reduction Programme. (see 1.2.1)

In addition to the reduction of car weight, KAMA members are trying to develop new technologies such as CVVT (Continuously Variable Valve Timing), Reduction of engine friction, Reduction of resistances (Running and Rolling) for reducing CO_2 emissions (by 5 to 15%) which will be launched into EU market by 2003 at the earliest.

[47] Directive 2000/53/EC

4.6. Other measures - telematics, infrastructure, education

KAMA believes that measures such as the promotion of trade-in purchase of new cars, presentation of correct and proper car maintenance methods, driver training, optimisation of infrastructure, effective and efficient land use, and efforts to achieve a smoother traffic flow by using ITS will have a beneficial effect on CO_2 reduction. KAMA thinks that such measures should therefore be embraced in a positive manner under government lead and with the co-operation of the industrial sectors involved.

KAMA also will consider the driver education activities for more environmentally friendly driving in the EU.

4.7. Economic situation of the car industry

Since the economic downturn at the end of 1997 in the wake of financial crisis, KAMA members have been suffering from industry-wide restructuring and reforms and are still in a vulnerable state. Over the past three years the Korean auto industry has been characterized by a large number of mergers and acquisitions, strategic alliances and considerable restructuring involving both auto makers and auto parts suppliers. The impact of the realignment was extensive and severe. During the process the Korean auto industry has underwent severe budget cuts and mass lay-off of employees including engineering staff, which depleted resources for investments and eroded capabilities of KAMA members, in particular, in research and development of CO_2 efficient technologies. However, the economic prospects of Korean car industry is rather promising as the Korean economy is recovering rapidly and the restructuring of the industry is progressing into a desirable direction to enhancing its competitiveness.

5. CONCLUSIONS

5.1. Progress Statement on Delivering the Commitment

KAMA members are encouraged to concentrate on CO_2 emission reductions by developing fuel-efficient cars.

KAMA's main objective within the full reporting period 1995 to 2000 was to meet standards for regulated emissions (hydrocarbon, carbon monoxide, and nitrogen oxides). In this respect it should be mentioned that the full reporting period 1995 to 2000 covers several years before the Commitment on CO_2 reduction from passenger cars was finalised; the Commitment was recognized by the European Commission in the Recommendation of 13 April 2000 on the reduction of CO2 emissions from passenger cars (2000/303/EC). The agreed draft Commitment and "exchange of letters" between the Commission and KAMA had been completed in 1999. The year 2000 was the first period after the Commitment was made.

KAMA members could achieve the CO_2 reduction by 1.5% during one year (1999 and 2000), which is same amount of CO_2 reduction during 1995 and 1999. Although KAMA members have started to develop fuel-efficient car technologies during the period 1995 to 2000, these CO_2 efficient technologies have not been launched on the EU market yet. KAMA member's current status in fuel-efficient car technologies lags several years behind those of European automobile manufacturers.

5.2. Statement on Expected Future Progress of the Commitment

The estimated intermediate target range of 165-170 g/km in 2004 and the final target value of 140 g/km in 2009 require further serious efforts by KAMA members. Importantly, and as agreed upon, this target will mainly be achieved by technological developments affecting different car characteristics and market changes linked to these developments. Regarding technological developments, KAMA will aim at achieving a high share of new cars equipped with CO_2 efficient technologies. One of KAMA members developed HSDI diesel car and launched at the end of 2000, which will contribute to the reduction of CO_2 emission as a start of new technology. KAMA members have agreed to make every endeavor to contribute to the achievement of KAMA's goals.

In order to achieve the targets KAMA believes that the following would be desirable:

1. Ensuring the full market availability of fuels with a sufficient quality to enable the application of technologies needed for the industry to achieve its CO_2 Commitment
2. Adopting measures to diffuse CO_2 emission reduction technologies in consideration of a balanced approach with regard to other regulatory requirements.

The Commission Services are concerned about the progress made so far.

The Commission Services and KAMA agree that only with significant and additional efforts will the targets be met.

KAMA
Data Annexes
2000

KAMA Data Annexes (2000)

A1 : SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO_2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

A2 : THE DISTRIBUTION OF CO_2 EMISSIONS IN THE NEW PASSENGER CAR FLEET FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

A3 : THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)[48]

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

[48] Curb weight of vehicles.

A1: SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

2000 - KAMA MEMBERS

	Total	identified version										unknown version
		Petrol			Diesel			Petrol + Diesel			Other	
Member State	Number	Number	average Fuel	average CO2	Number	average Fuel	average CO2	Number	average Fuel	average CO2	Number	Number
EU-15	**491,244**	**397,385**	**7.4**	**185**	**40,769**	**9.2**	**245**	**438,154**	**7.6**	**191**	**2,947**	**50,143**
A	6,632	4,104	7.3	180	2,523	9.0	242	6,627	8.0	204		5
B	14,089	12,644	7.5	188	1,004	8.8	237	13,648	7.6	192	439	2
DK	5,758	5,683	7.5	183	75	8.9	236	5,758	7.5	184		
F	25,400	16,625	7.4	186	7,838	9.4	249	24,463	8.0	206	937	
FIN	3											3
GER	58,129	47,113	7.9	194	7,754	9.7	260	54,867	8.2	203		3,262
GR	46,592											46,592
IRE	14,221	14,198	7.2	183	23	9.4	251	14,221	7.3	183		
IT	121,476	107,022	6.9	174	12,866	9.3	249	119,888	7.2	182	1,571	17
LUX	1,132	935	7.3	177	197	9.2	244	1,132	7.6	189		
NL	33,712	33,241	7.4	183	311	9.1	244	33,552	7.4	184		160
P	10,458	10,256	6.9	170	202	6.4	171	10,458	6.8	170		
SP	72,491	67,341	7.9	197	5,049	8.3	220	72,390	7.9	199		101
SW	8,680	8,573	7.6	183	107	9.8	265	8,680	7.6	184		
UK	72,471	69,650	7.6	189	2,820	8.9	237	72,470	7.7	191		1

A2: THE DISTRIBUTION OF CO2 EMISSIONS
IN THE NEW PASSENGER CAR FLEET
FOR EACH DIFFERENT FUEL TYPE, FOR THE EU

2000 - KAMA MEMBERS

	identified version					
	Petrol		Diesel		Petrol + Diesel	
CO2 (category)	Number	average CO2	Number	average CO2	Number	average CO2
141 - 160	98,715	153			98,715	153
161 - 180	124,367	163	4,668	178	129,035	164
181 - 200	42,979	191			42,979	191
201 - 250	119,058	223	19,463	232	138,521	224
251 - 300	11,838	271	16,578	280	28,416	276
301 - 350	422	311	60	307	482	311
351 - 450	6	376			6	376

A3: THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3a. The Distribution of New Passenger Cars: by Average Mass (kg)

2000 - KAMA MEMBERS

Member State	identified version					
	Petrol		Diesel		Petrol + Diesel	
	average Mass	average CO2	average Mass	average CO2	average Mass	average CO2
EU-15	**1,006**	**185**	**1,740**	**245**	**1,075**	**191**
A	1,086	180	1,752	242	1,340	204
B	1,031	188	1,557	237	1,070	192
DK	1,031	183	1,834	236	1,041	184
F	970	186	1,656	249	1,190	206
GER	1,152	194	1,786	260	1,241	203
IRE	1,024	183	1,880	251	1,025	183
IT	916	174	1,799	249	1,011	182
LUX	1,086	177	1,581	244	1,172	189
NL	986	183	1,747	244	993	184
P	963	170	1,178	171	967	170
SP	1,045	197	1,630	220	1,085	199
SW	1,055	183	1,582	265	1,062	184
UK	1,012	189	1,887	237	1,046	191

A3: THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3b. The Distribution of New Passenger Cars: by Average Engine Power (kW)

2000 - KAMA MEMBERS

Member State	identified version					
	Petrol		Diesel		Petrol + Diesel	
	average Power	average CO2	average Power	average CO2	average Power	average CO2
EU-15	**60**	**185**	**74**	**245**	**61**	**191**
A	59	180	78	242	67	204
B	60	188	64	237	60	192
DK	65	183	84	236	66	184
F	58	186	70	249	62	206
GER	70	194	77	260	71	203
IRE	61	183	88	251	61	183
IT	50	174	76	249	53	182
LUX	64	177	64	244	64	189
NL	58	183	74	244	58	184
P	55	170	50	171	55	170
SP	66	197	65	220	66	199
SW	67	183	66	265	67	184
UK	62	189	92	237	63	191

A1: SPECIFIC FUEL CONSUMPTION AND EMISSIONS OF CO2 AVERAGED OVER ALL NEWLY REGISTERED PASSENGER CARS FOR EACH DIFFERENT FUEL-TYPE, FOR THE EU AND EACH MEMBER STATE

2000 - KAMA MEMBERS

Member State	Total	identified version									unknown version
		Petrol			Diesel			Petrol + Diesel			Other	
	Number	Number	average Fuel	average CO2	Number	average Fuel	average CO2	Number	average Fuel	average CO2	Number	Number
EU-15	**491,244**	**397,385**	**7.4**	**185**	**40,769**	**9.2**	**245**	**438,154**	**7.6**	**191**	**2,947**	**50,143**
A	6,632	4,104	7.3	180	2,523	9.0	242	6,627	8.0	204		5
B	14,089	12,644	7.5	188	1,004	8.8	237	13,648	7.6	192	439	2
DK	5,758	5,683	7.5	183	75	8.9	236	5,758	7.5	184		
F	25,400	16,625	7.4	186	7,838	9.4	249	24,463	8.0	206	937	
FIN	3											3
GER	58,129	47,113	7.9	194	7,754	9.7	260	54,867	8.2	203		3,262
GR	46,592											46,592
IRE	14,221	14,198	7.2	183	23	9.4	251	14,221	7.3	183		
IT	121,476	107,022	6.9	174	12,866	9.3	249	119,888	7.2	182	1,571	17
LUX	1,132	935	7.3	177	197	9.2	244	1,132	7.6	189		
NL	33,712	33,241	7.4	183	311	9.1	244	33,552	7.4	184		160
P	10,458	10,256	6.9	170	202	6.4	171	10,458	6.8	170		
SP	72,491	67,341	7.9	197	5,049	8.3	220	72,390	7.9	199		101
SW	8,680	8,573	7.6	183	107	9.8	265	8,680	7.6	184		
UK	72,471	69,650	7.6	189	2,820	8.9	237	72,470	7.7	191		1

A3: THE DISTRIBUTION OF AVERAGED MASS, POWER AND ENGINE CAPACITY OF NEW PASSENGER CARS FOR EACH FUEL TYPE FOR THE EU-15 AND EACH MEMBER STATE

A3c. The Distribution of New Passenger Cars: by Average Engine Capacity (cm3)

2000 - KAMA

Member State	identified version					
	Petrol		Diesel		Petrol + Diesel	
	average Cm3	average CO2	average Cm3	average CO2	average Cm3	average CO2
EU-15	**1,307**	**185**	**2,483**	**245**	**1,417**	**191**
A	1,364	180	2,567	242	1,822	204
B	1,346	188	2,182	237	1,407	192
DK	1,444	183	2,699	236	1,460	184
F	1,266	186	2,406	249	1,631	206
GER	1,551	194	2,520	260	1,688	203
IRE	1,329	183	2,874	251	1,331	183
IT	1,088	174	2,473	249	1,237	182
LUX	1,390	177	2,288	244	1,546	189
NL	1,284	183	2,547	244	1,296	184
P	1,199	170	1,905	171	1,213	170
SP	1,439	197	2,384	220	1,505	199
SW	1,475	183	2,198	265	1,484	184
UK	1,340	189	2,896	237	1,401	191