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FINAL REPORT

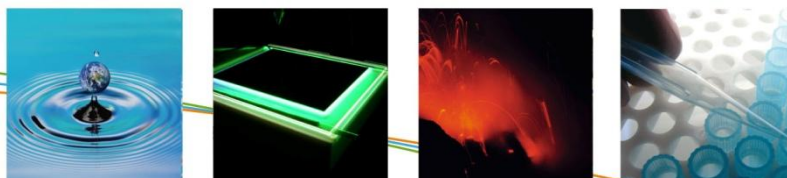
# Analysis of the Belgian car fleet 2009

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Study accomplished under the authority of the Flemish, the Walloon and the Brussels Capital Region

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## SUMMARY

The Belgian car fleet has grown with 4,2% comparing 2009 to 2006. The growth takes place in all regions, with a faster growth than average in the Brussels Capital Region and a slower growth in Flanders. Compared to 2008, the biggest growth in 2009 was in the Walloon Region, and the smallest growth was once again in Flanders.

In general, the same evolutions can be seen over the 3 regions, with slight differences in speed and amount of change. Overall (see Table 1) it can be said that compared to 2006 the overall fleet of 2009 has become slightly younger (-0,3 years), is slightly lighter (+6 kg), has around the same cylinder size but a slightly higher engine power (+4kW). The average CO<sub>2</sub>-emission has gone down with 4,2 g/km, and the average ecoscore has increased with 4,4 points, which equals an increase of 8,5%.

The share of diesel cars in the Belgian car fleet is still increasing (+7,6% in 2009 compared to 2006).

	2006 All cars	2009 All cars	Difference 2009 vs. 2006	% 2009 vs. 2006
<b>Number of cars</b>	4.798.996	5.000.617	+201.621	+4,2%
<b>Avg. Age</b>	6,3 years	6,1 years	-0,2 years	-3,2%
<b>Avg. Ecoscore</b>	51,5	55,9	+4,4	+8,5%
<b>Avg. Weight</b>	1.401 kg	1.395 kg	-6 kg	-0,4%
<b>Avg. Engine Size</b>	1709 cc	1707 cc	-2 cc	-0,1%
<b>Avg. Engine Power</b>	71 kW	75 kW	+4 kW	+5,6%
<b>Avg. CO<sub>2</sub>-emission</b>	156,1 g/km	151,9 g/km	-4,2 g/km	-2,7%
<b>Share of diesel cars</b>	53,6%	61,2%	+7,6%	

Table 1 Comparison data whole fleet 2006-2009

## Summary

Since 2008, we are able to split the data into company cars and private cars. In the overview below average vehicle characteristics of these two types of vehicles are compared based on the 2009 data. We can see (Table 2) that private cars, compared to company cars, in 2009 are generally older (+3,7 years), lighter (-229kg), have smaller engines (-331 cc), generate less engine power (-25 kW), and are less frequently diesel cars (-28%). Private cars have a significantly lower average CO<sub>2</sub>-emission, but also a lower average ecoscore (-2,2). This is probably due to the fact that they are older cars, and thus have higher levels of pollutant emissions.

	2009 Company Cars	2009 Private Cars	Difference private vs. company	% private vs. company
<b>Total Number</b>	744.633	4.216.677		
<b>Avg. Age</b>	3,0 years	6,7 years	+3,7 years	+55,2%
<b>Avg. Ecoscore</b>	57,8	55,6	-2,2	-4,0%
<b>Avg. Weight</b>	1590 kg	1361 kg	-229 kg	-16,8%
<b>Avg. Engine Size</b>	1989 cc	1658 cc	-331 cc	-20,0%
<b>Avg. Engine Power</b>	96 kW	71 kW	-25 kW	-35,2%
<b>Avg. CO<sub>2</sub>-emission</b>	163,5 g/km	149,8 g/km	-13,7 g/km	-9,1%
<b>Share of diesel cars</b>	85%	57%	-28%	

Table 2 Comparison data company cars and private cars (2009)

We can also split the data of company cars into "company owned cars" and "company leased cars". We can see (Table 3) that company leased cars, compared to company owned cars, in 2009 are generally younger (-1,8 years), slightly lighter (-54kg), have smaller engines (-198 cc), generate less engine power (-9 kW), and are more frequently diesel cars (+17%). Company leased cars have significantly lower average CO<sub>2</sub>-emissions (-20 g/km), and have a significantly higher ecoscore (+5,7).

	2009 Company Owned Cars	2009 Company Leased Cars	Difference leased vs. owned	% leased vs. owned
<b>Total Number</b>	466.004	281.129		
<b>Avg. Age</b>	3,7 years	1,9 years	-1,8 years	-48,6%
<b>Avg. Ecoscore</b>	55,7	61,4	+5,7	+10,2%
<b>Avg. Weight</b>	1610 kg	1556 kg	-54 kg	-3,4%
<b>Avg. Engine Size</b>	2064 cc	1866 cc	-198 cc	-9,6%
<b>Avg. Engine Power</b>	99 kW	90 kW	-9 kW	-9,1%
<b>Avg. CO<sub>2</sub>-emission</b>	171 g/km	151 g/km	-20 g/km	-11,7%
<b>Share of diesel cars</b>	79%	96%	+17%	

Table 3 Comparison data company owned cars and company leased cars (2009)

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## **LIST OF ABBREVIATIONS**

BEL	Belgium
BXL	Brussels Capital Region. In text also referred to as Brussels.
c.c.	Company car
cm <sup>3</sup>	Cubic centimeters
CNG	Compressed Natural Gas
CO <sub>2</sub>	Carbondioxyde
DIV	Dienst Inschrijvingen Voertuigen (=Belgian Vehicle Registration Administration)
FEBIAC	The Belgian Federation of Car and Motorbike Manufacturers
Kg	Kilogramme
kW	Kilowatt
LPG	Liquefied Petroleum Gas
PM	Particulate Matter
VL	Flemish Region
WAL	Walloon Region

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## CHAPTER 1 INTRODUCTION AND METHODOLOGY

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### 1.1 Objectives

This report analyses the whole Belgian passenger car fleet of the year 2009. The purpose is to follow up on the status of the car fleet, in particular concerning environmental performances of the fleet. Various car parameters are evaluated. These parameters will be compared with the parameters from the previous years (2006-2007-2008) to identify evolutions.

The data of the cars registered in the different Belgian Regions (Flanders, Walloon and Brussels Capital Region) are also compared to provide more detailed input for the different regions.

### 1.2 Used data

The initial data was collected from DIV (Vehicle Registration Service Belgium). The datasets used reflect the composition of the Belgian car fleet for the related years (2006 – 2007 – 2008 – 2009). Each record of a car contains information about the exact type, the technical specifications, the emissions, the fuel type and the registration data (incl. region).

The 2 latest datasets (2008-2009) contain additional information related to whether the car owner is a natural person or a legal body, and in the latter whether the legal body is a member of RENTA or not. RENTA is the Belgian federation of car rental companies and its members consist of lease companies and short term vehicle rental agencies. The majority of the vehicles of the RENTA-members are offered as so called lease cars (>300.000 vehicles compared to <16.000 short term rental vehicles). Therefore, in this analyses, we consider all vehicles that are owned by a member of RENTA as so called lease cars. The data for these years has been filtered based on this data. A low percentage of the vehicles in the database belongs to another category. These records have not been included in the analysis but are part of the recordset for 2006 and 2007.

Another dataset used was the Ecoscore-database. Ecoscore is a comprehensive well-to-wheel emission tool developed by VITO, VUB and ULB on behalf of the Flemish government. It takes both direct and indirect emissions of passenger cars into account and this for greenhouse gasses, pollutants and noise. The output of Ecoscore is a number between 0 and 100 for each car. The higher the Ecoscore, the lower the impact of the vehicle. The Ecoscore is based on actual and historic FEBIAC data on cars.

The database was also filtered based on the CarKindCode. This field indicates the kind of vehicle (AA, AB, AC, AD, AE, AF, VP, SW). In Table 4 an overview is given of the CarKindCodes. Fields in green relate to passenger cars.

As a second filter, all cars older then 25 years were left out of the analysis. Due to these two filters the total number of cars per year differ from the 2008 report.

CarKindCodes	
AA	Sedan
AB	Hatchback
AC	Stationwagon
AD	Coupé
AE	Cabriolet
AF	MPV
AZ	Ambulance
BP	Light Armor
CL	Geleed dubbeldeks
LV	Slow person carrier
OM	Trailor
SA	Camper
SB	Armored vehicle
SC	Ambulance
SD	Hearse
SW	Vehicle double use
VC	???
VP	Person carrier

*Table 4: Selection of CarKindCodes*

### 1.3 Methodology

The initial DIV-database was matched with the Ecoscore-database. This way for each car an Ecoscore was added. If an exact match was not possible, the car was compared with equivalent cars and the mean Ecoscore of those cars was used.

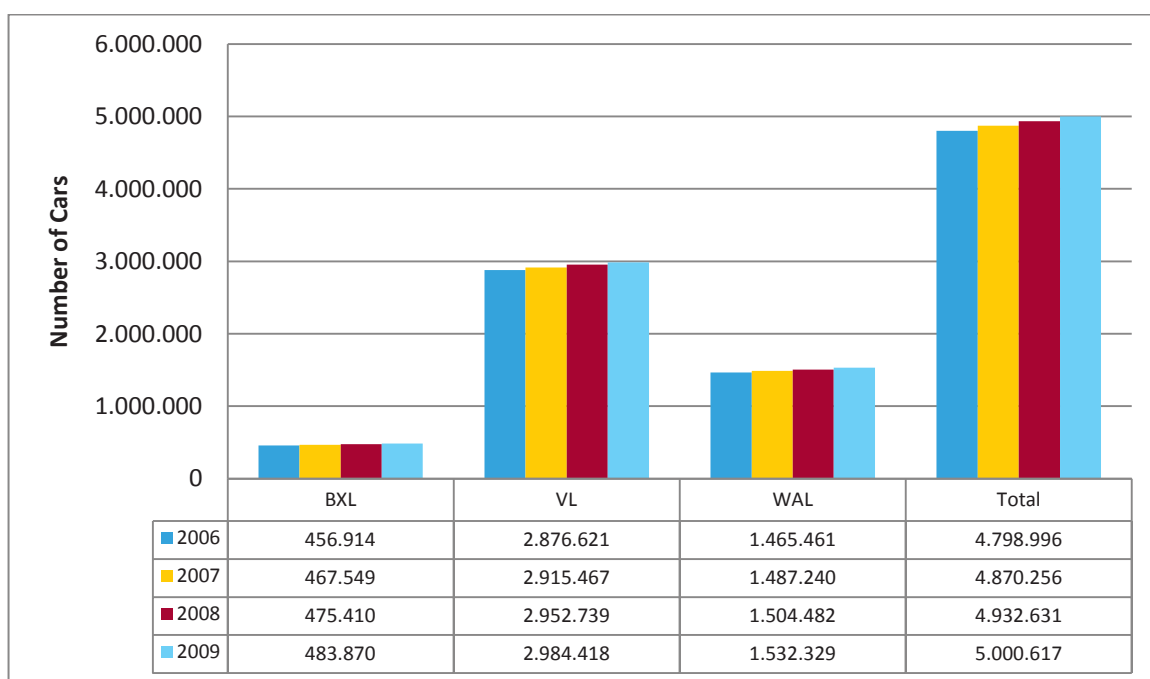
For some analyses the data has been aggregated into categories of the assessed indicator.

## CHAPTER 2 COMPOSITION OF THE COMPLETE BELGIAN CAR FLEET

### 2.1 Total Numbers

#### 2.1.1 Size of the passenger car fleet, per region

Figure 1: Size of the passenger car fleet per region



YEAR	2006	2007	2008	2009
Total Number	4.798.996	4.870.256	4.932.631	5.000.617
Growth Belgium	-	1,48%	1,28%	1,38%
BXL	-	2,33%	1,68%	1,78%
VL	-	1,35%	1,28%	1,07%
WAL	-	1,49%	1,16%	1,85%

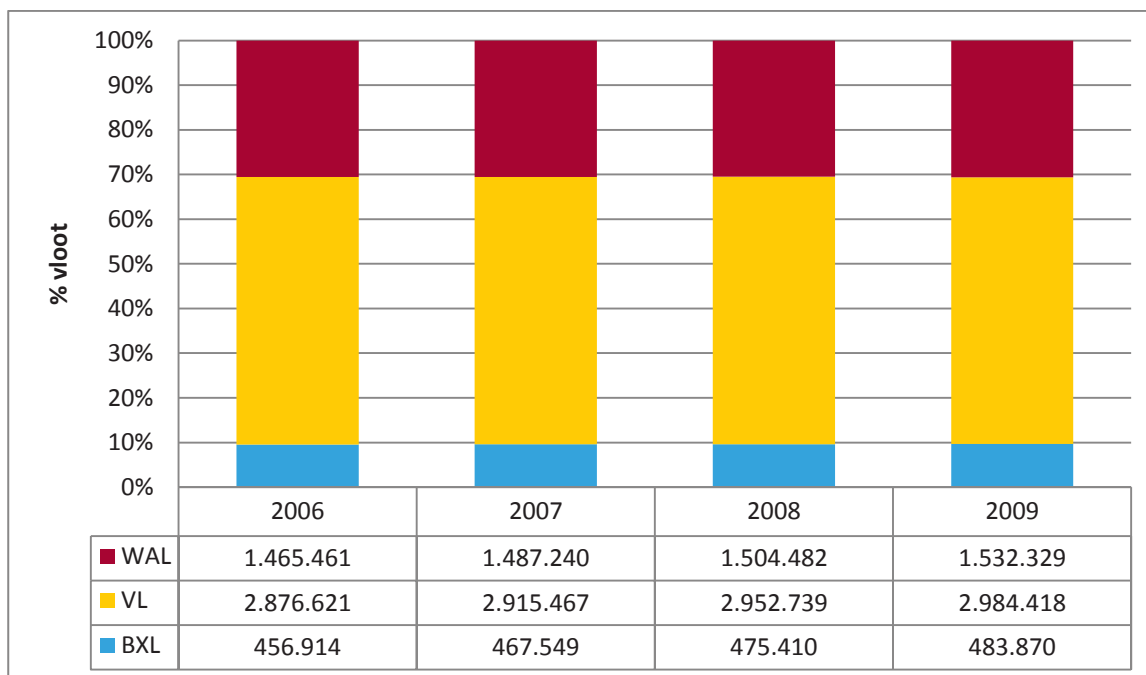
Table 5: Growth of the fleet per year and per region

The Belgian car fleet is characterized by a continuous growth between 1,3 and 1,5% per year. The total vehicle fleet counts 5.000.617 passenger cars (31-12-2009) younger than 25 years. This is a growth of 1,38% compared to 2008 and a growth of 4,2% compared to 2006. The lower growth in 2008 can be explained by the economic crisis.

The growth of 2009 compared to 2008 was the lowest in Flanders (1,07%). The smallest growth of the passenger car fleet in 2009 can be seen in the Walloon Region (1,85%).

### 2.1.2 Distribution of passenger cars per region

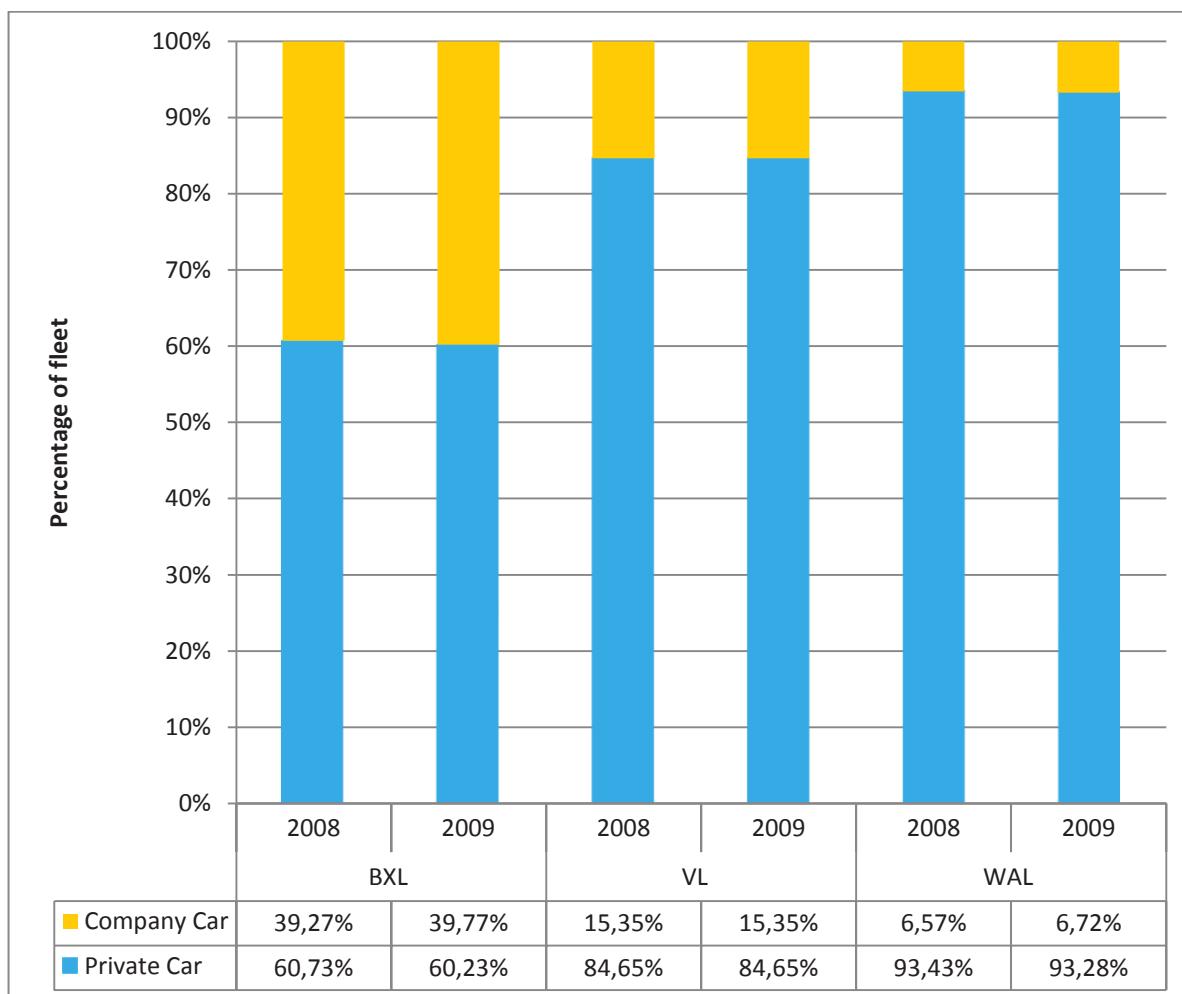
Figure 2: Distribution of passenger cars per region



The biggest share of passenger cars is in Flanders (59,9%) followed by Wallonia. The Brussels Capital Region accounts for 9,4% of the Belgian passenger car fleet.

### 2.1.3 Distribution of company cars and private cars per region

Figure 3: Distribution of company cars and private cars per region



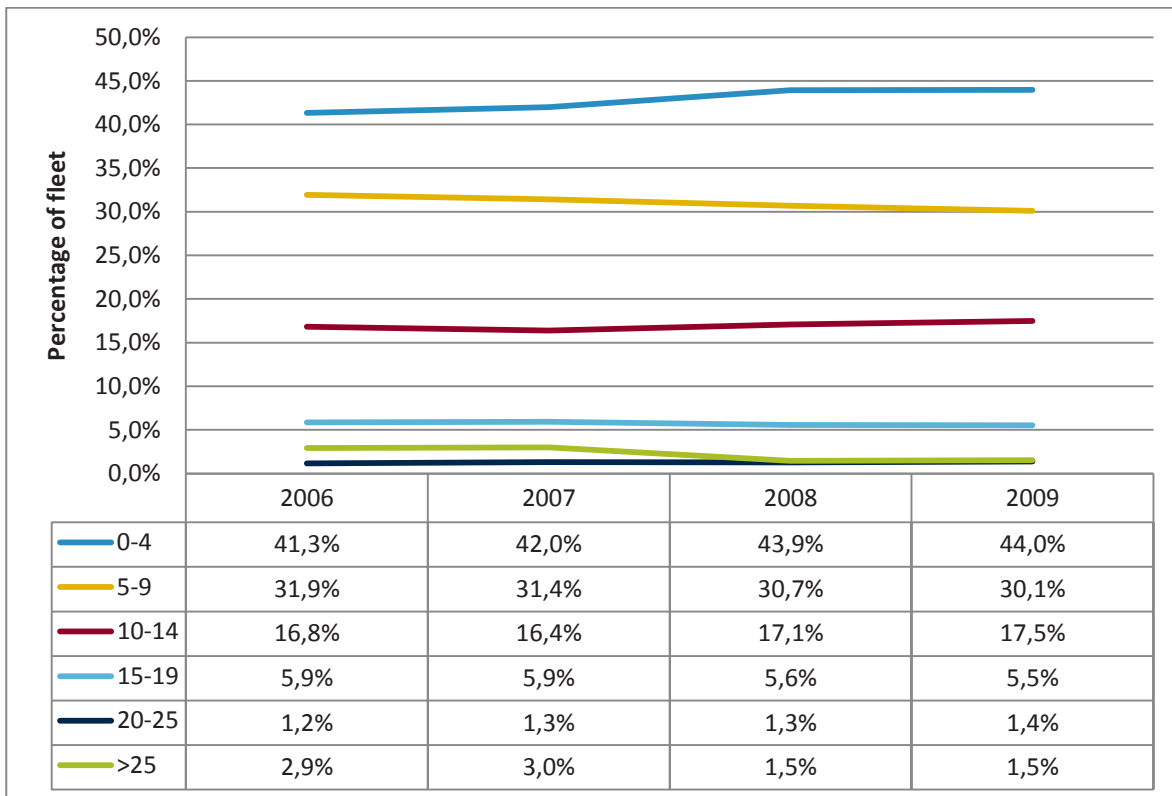
Since 2008 it is possible to divide the data of the fleet into cars owned by a natural person (1) and cars owned by a legal body (2). In the Brussels Capital Region, the highest share of company cars can be seen (39,39% of the fleet). All regions remain quite stable in the share of company cars vs. private cars.

## 2.2 Age Distribution

The age of a vehicle is defined by the year of the database (2006, 2007, 2008 or 2009) minus the year of the first registration. So a vehicle that is in the database of 2006 registered in 2005 will have an age of 1 year. The same vehicle –if still registered- will have an age of 4 years in the database of 2009.

## 2.2.1 Age distribution evolution

Figure 4: Age distribution of passenger cars



Based on the registration year, the cars of the Belgian fleet have been grouped in 6 categories as shown in Figure 4. The biggest part of the fleet is composed of vehicles younger than 10 years (74,1% in 2009). The percentage of young vehicles (0-4years) is growing together with the vehicles between 10-14years while the percentage of vehicles between 5 and 9 years is slightly shrinking.



## 2.2.2 Age distribution of company cars versus private cars

Figure 5: Age distribution of company cars versus private cars for fleet 2009

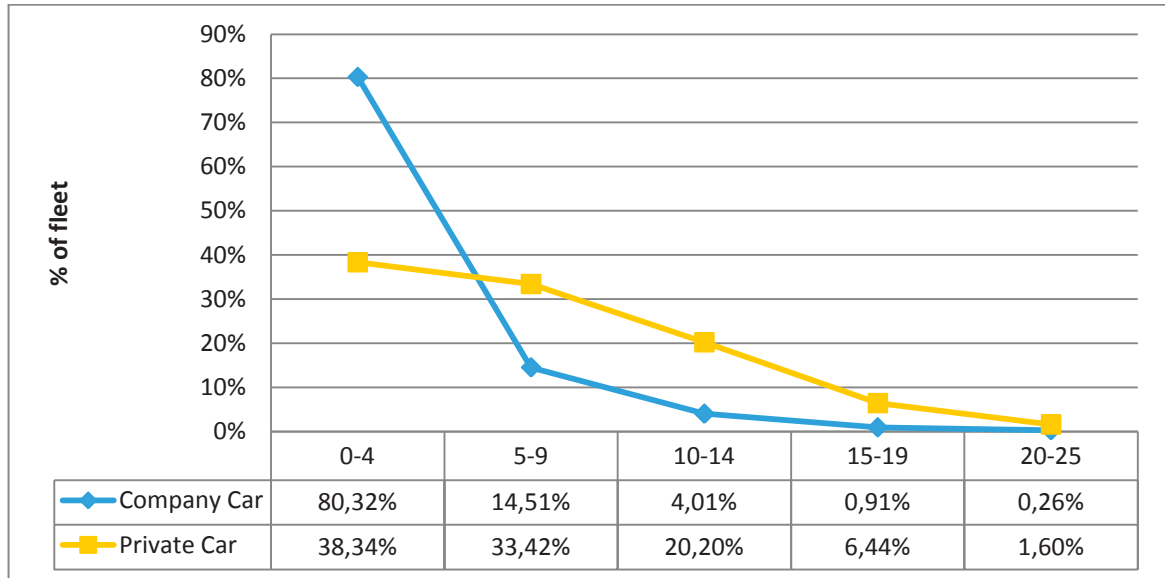
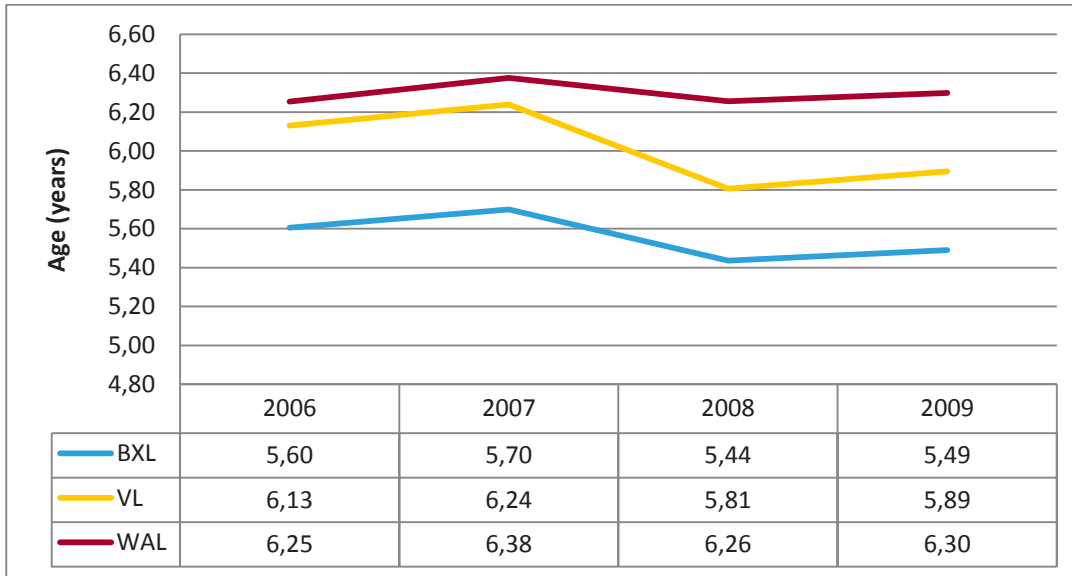


Figure 5 shows that most company cars have an age between 0 and 4 years (80,32%). Only a small percentage of company cars is older than 10 years. For privately owned cars, only 38,34% is younger than 5 years.. This indicates that the renewal rate for company cars is much higher than that of private owned cars. Overall, average age of a company car is 4,24 years while that of a privately owned car is 6,70 years based on the complete fleet of 2009.

### 2.2.3 Average age of vehicles per region and year

Figure 6: Average age of vehicles per region and year.



In all 3 regions a renewal of the fleet can be seen between 2007 and 2008. The Brussels Capital Region has the youngest fleet while Wallonia has the oldest average fleet. The fleet in Flanders became much younger between 2007 and 2008.

### 2.3 Fuel distribution

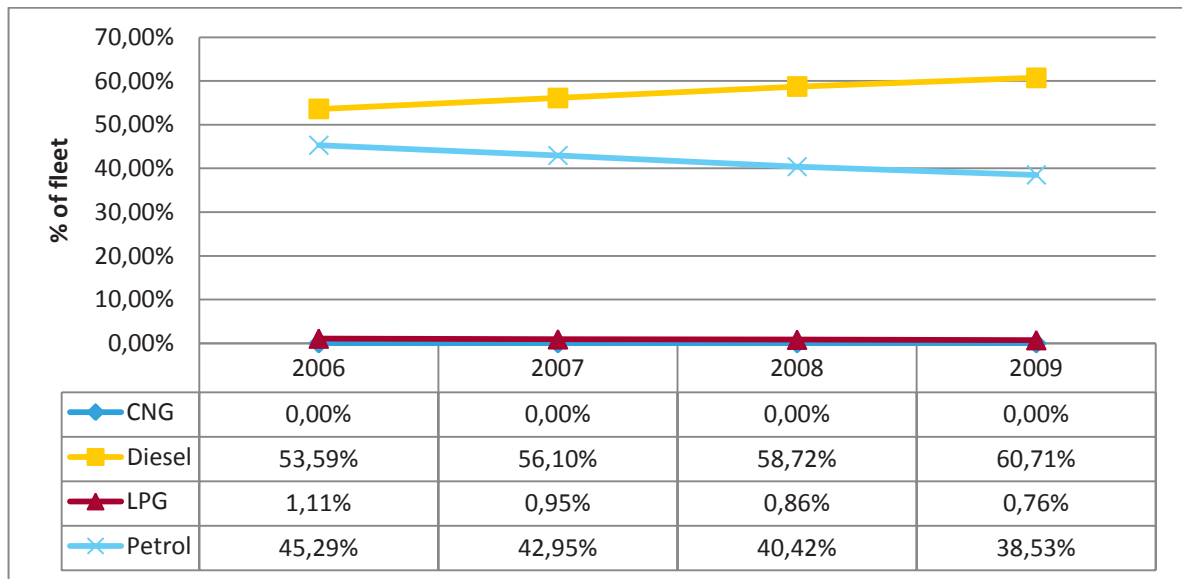
In the tables below an overview is given of the number and percentage of fueltypes per database year. A small number of vehicles has no fuel type assigned to them. These vehicles are not taken into account in further analysis.

Row Labels	2006	2007	2008	2009
CNG	1	7	37	61
Diesel	2.572.012	2.732.142	2.888.592	3.028.707
LPG	53.477	46.491	42.616	38.077
Petrol	2.173.496	2.091.606	2.001.361	1.932.983
(blank)	10	10	25	789
<b>Grand Total</b>	<b>4.798.996</b>	<b>4.870.256</b>	<b>4.932.631</b>	<b>5.000.617</b>

Table 6: Overview of number of vehicles per fueltype per database year

### 2.3.1 Evolution of the share of CNG, diesel, LPG and petrol cars in Belgium

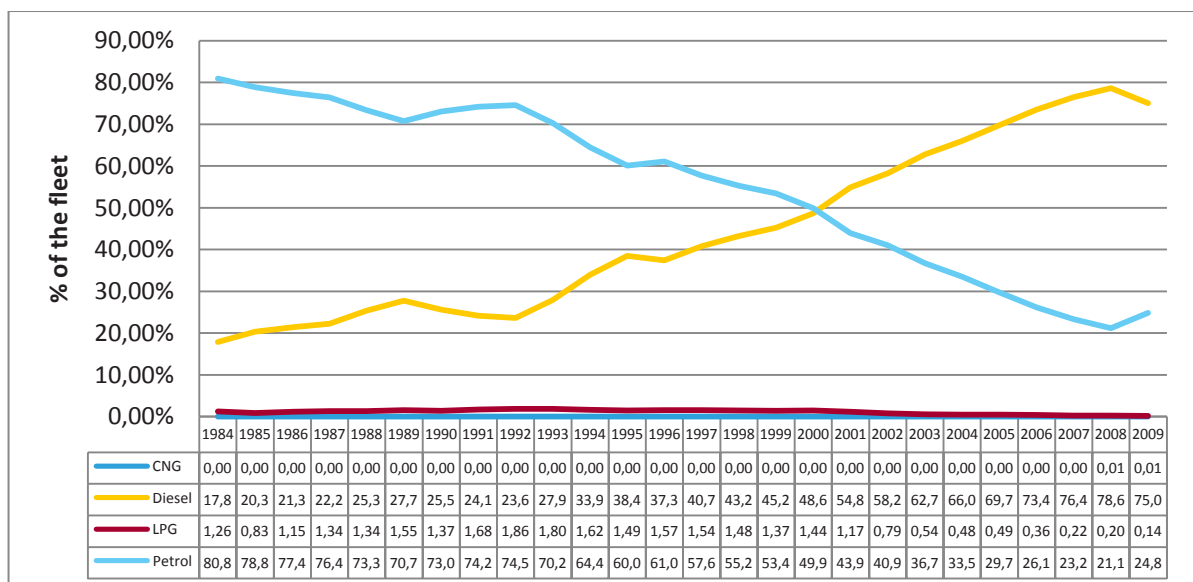
Figure 7: Evolution of the share of CNG, diesel, LPG and petrol cars in Belgium



The share of diesel cars in the Belgian fleet seems to keep on going. In 2009 about 60% of the Belgian car fleet was a diesel car. This is almost 2% more than the year before and 7,5% compared to 2006. At the same time the percentage of petrol cars has dropped by about the same percentages (-7,17% compared to 2006 and -1,82% compared to 2008). The share of diesel cars in the Belgian fleet has also resulted in a lower share of LPG-vehicles (-0.34% compared to 2006).

### 2.3.2 Fuel composition per registration year

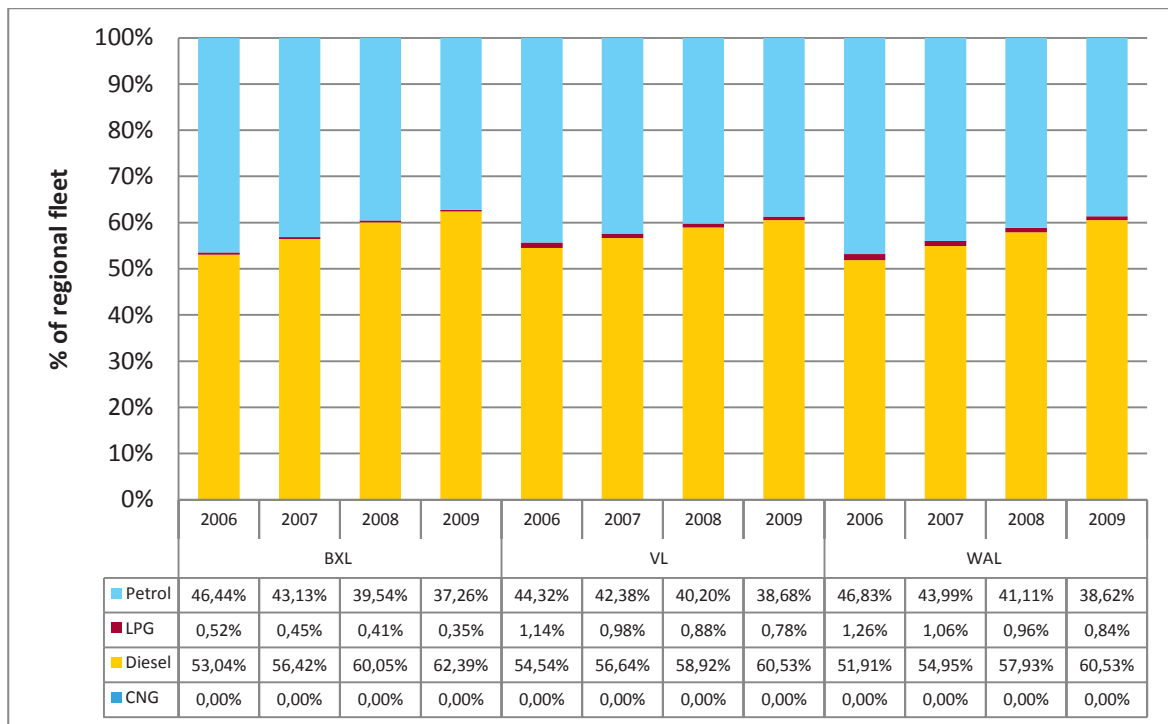
Figure 8: Fuel composition of the Belgian car fleet per registration year



The total numbers give the impression that the share of diesel cars in the Belgian fleet is still going strong. However, it needs to be noted that when looking at the share of diesel and petrol powered cars per registration year, the share of diesel vehicles is less in 2009 than it was for 2008 (ref. Figure 8). Currently it is unclear if this will be a long term trend or a temporarily change in purchasing behaviour.

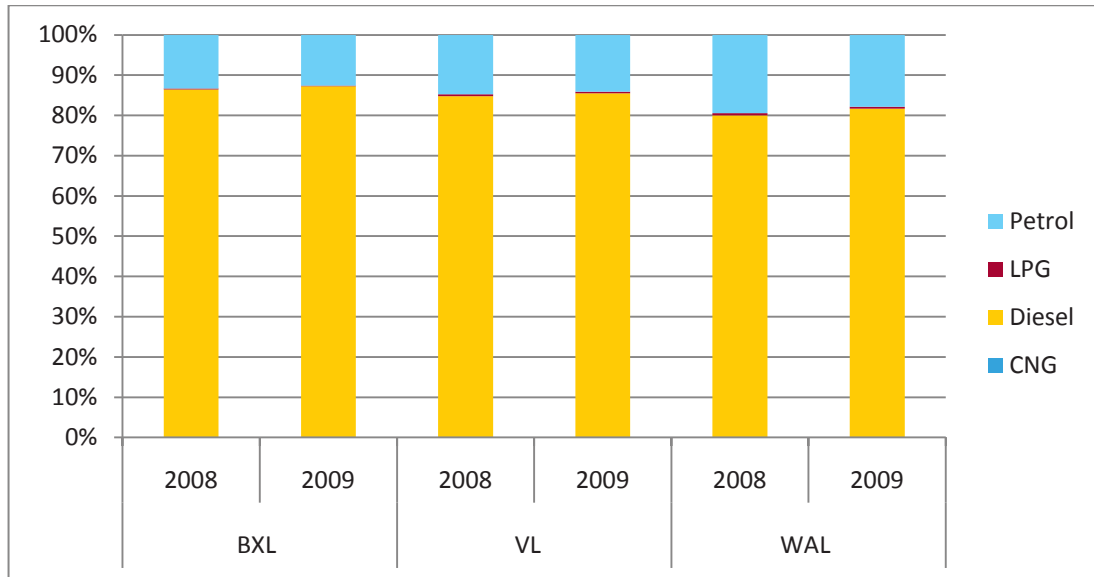
### 2.3.3 Distribution of the fuel types per region

Figure 9: Distribution of the fuel types per region over the past 4 years



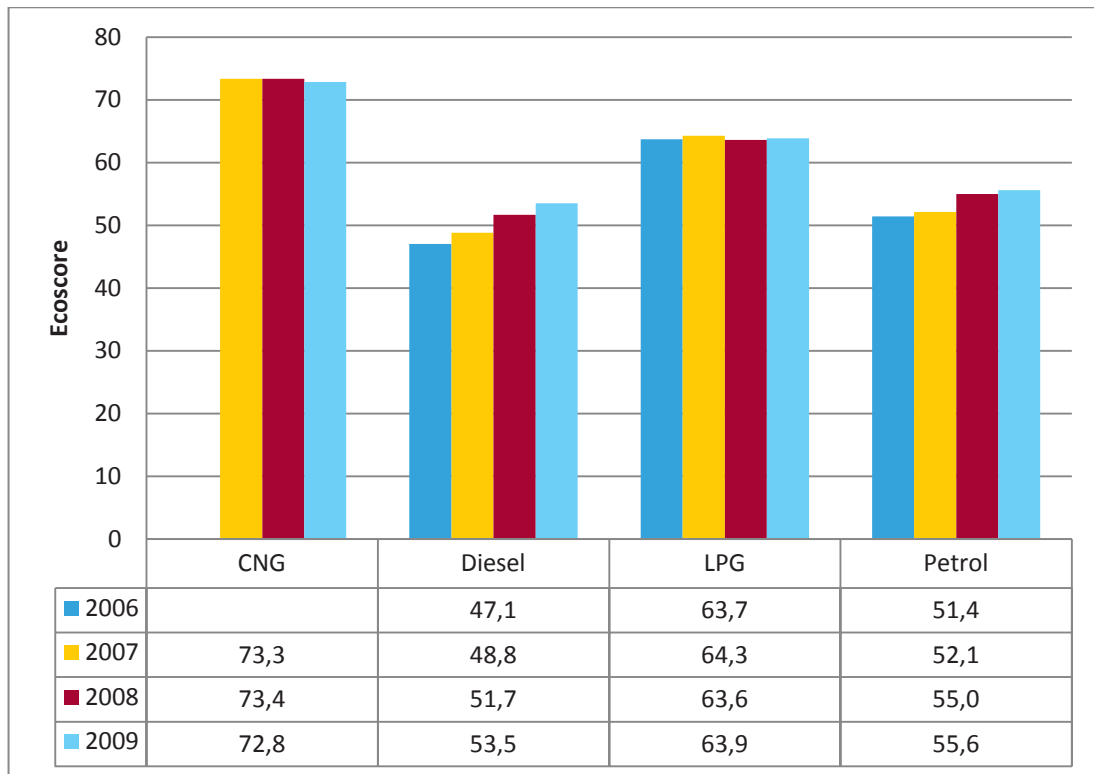
The distribution of the fuel types over the different years shows that the increasing share of diesel cars in the fleet can be seen in all regions. The Brussels Capital Region has the highest number of diesel vehicles in its fleet. This is amongst others because of the high percentage of diesel company cars registered in the Brussels Capital Region (Figure 10. ).

Figure 10: Distribution of company cars and private cars per fuel type



### 2.3.4 Average Ecoscore per fuel type

Figure 11: Average Ecoscore evolution per fuel type

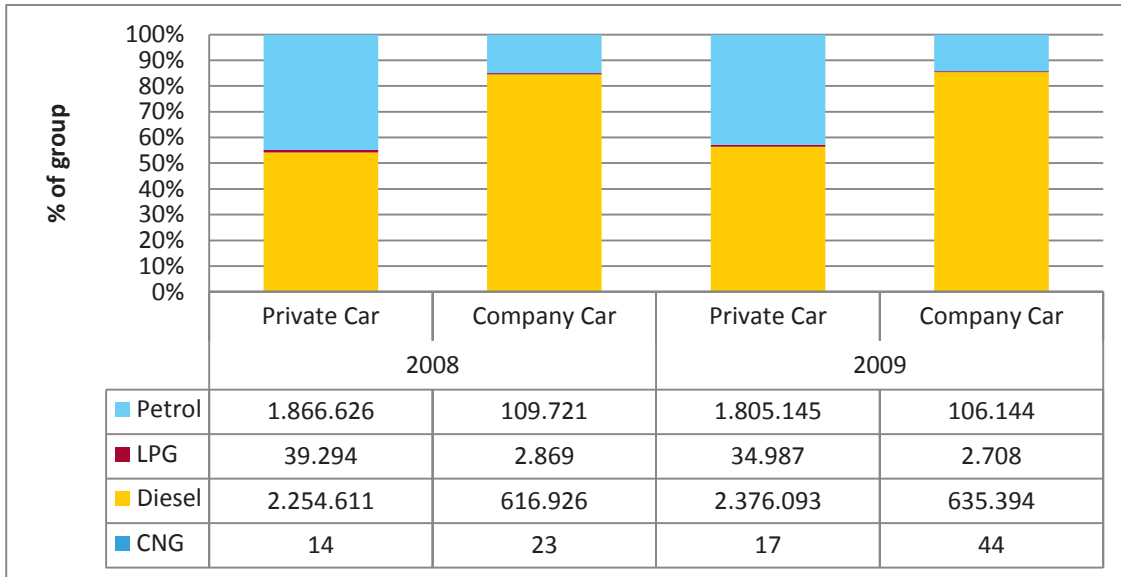


The average Ecoscore per fuel type is given in Figure 11. On average both diesel and petrol cars have a higher Ecoscore compared to the previous years. Diesel cars have

increased the most in the past few years although their average Ecoscore is still lower than the petrol cars, and well below the average Ecoscore of LPG and CNG-vehicles.

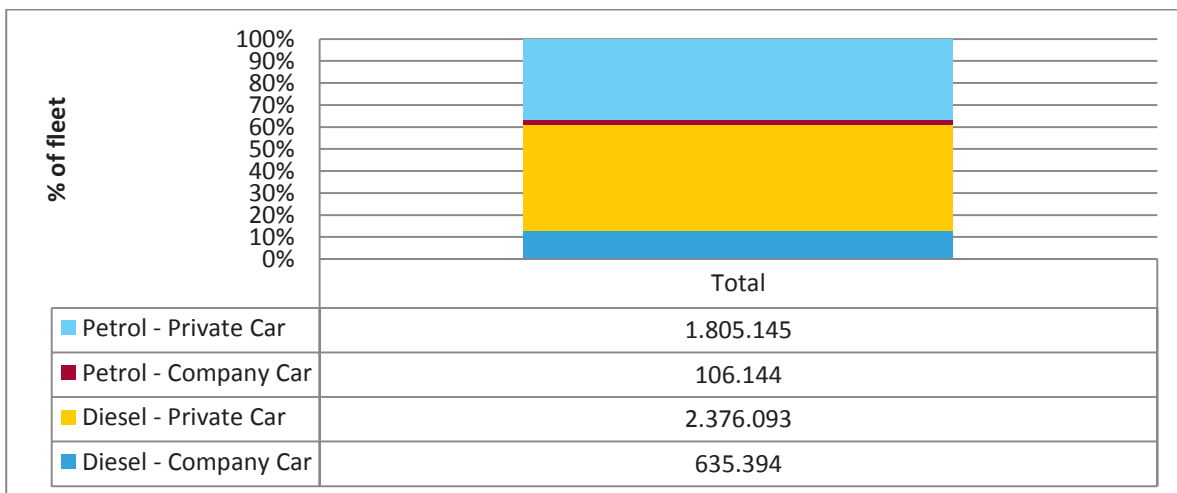
### 2.3.5 Distribution fuel types versus ownership type

Figure 12: Distribution of fuel type per ownership type (1) private car, (2) company car



Grouping the data based on fuel type and ownership type shows that about 85% of the company cars are diesel vehicles compared to about 55% for the private cars. For both ownership types the percentage of diesel vehicles has increased (company cars +0,79%; private cars +2,12%). Diesel cars represent 61% of the total fleet in 2009.

Figure 13: Distribution fuel types vs. ownership type for 2009 (1) private cars (2) company cars



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## 2.4 Euro Standards

Not for all records a valid Euro standard was filled in. In Table 7 an overview is given of the total number and the percentage of the fleet that has a certain Euro standard. The category "n/A" was not taken into account in the further analysis.

*Table 7: Overview number of cars in analysis Euro standard (Not for all records a valid Euro standard was filled in.)*

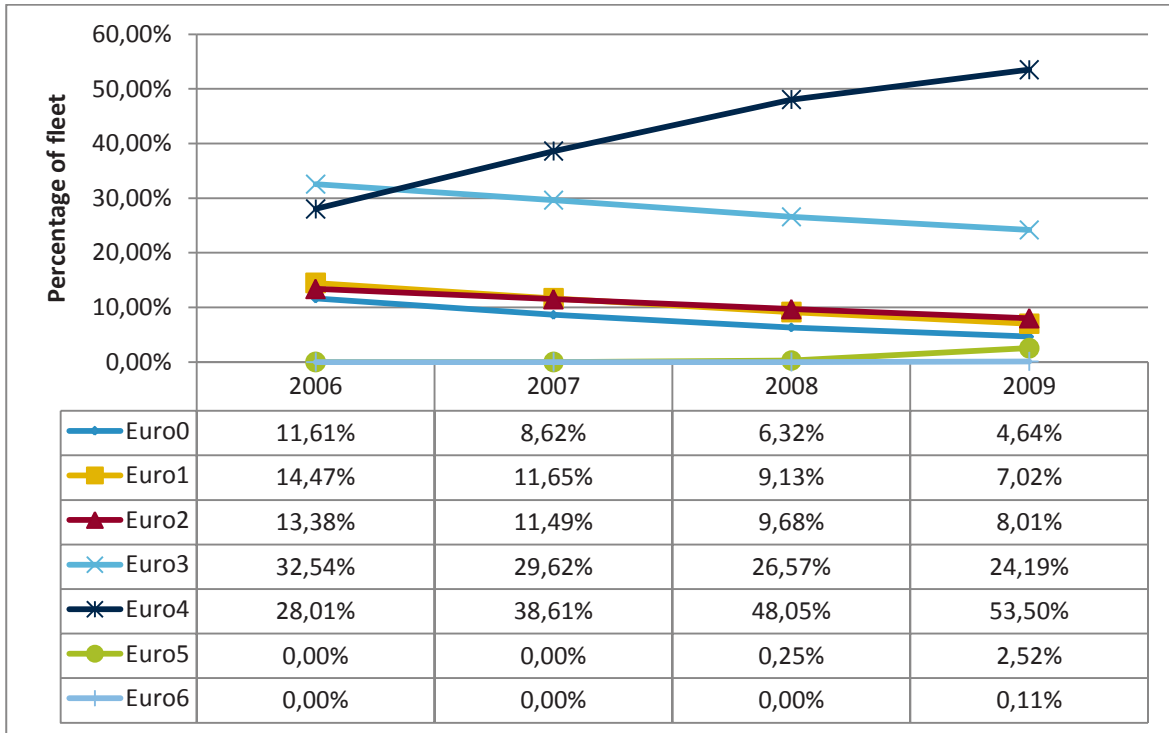
	2006	2007	2008	2009
n/A	1.144.322	1.089.850	1.022.837	964.934
Euro0	568.323	475.818	402.814	348.948
Euro1	528.669	440.578	357.091	283.379
Euro2	488.891	434.498	378.372	323.436
Euro3	1.189.301	1.119.808	1.038.818	976.188
Euro4	1.023.664	1.459.541	1.878.536	2.159.267
Euro5		16	9.697	101.789
Euro6				4.425

*Table 8: Overview of percentage of cars per Euro standard*

	2006	2007	2008	2009
n/A	23,15%	21,71%	20,10%	18,69%
Euro0	11,50%	9,48%	7,92%	6,76%
Euro1	10,69%	8,78%	7,02%	5,49%
Euro2	9,89%	8,66%	7,44%	6,27%
Euro3	24,06%	22,31%	20,42%	18,91%
Euro4	20,71%	29,07%	36,92%	41,83%
Euro5		0,00%	0,19%	1,97%
Euro6				0,09%

### 2.4.1 Evolution of Euro standards

Figure 14: Evolution of Euro standards of the complete fleet

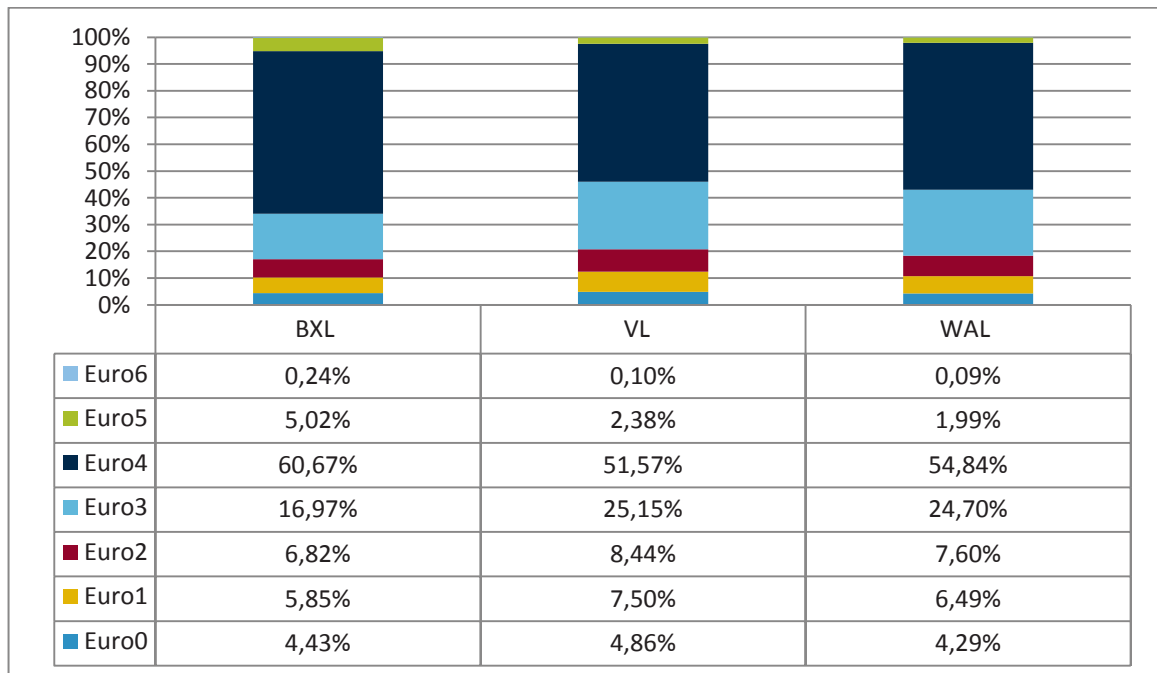


Most vehicles in Belgium are Euro4 vehicles (53,50% in 2009). A growth of Euro5 vehicles is seen as well, although this is still only 2,52%. Compared to 2006, the percentage of Euro4 vehicles has increased with 25,49%.



## 2.4.2 Distribution of Euro standards per region

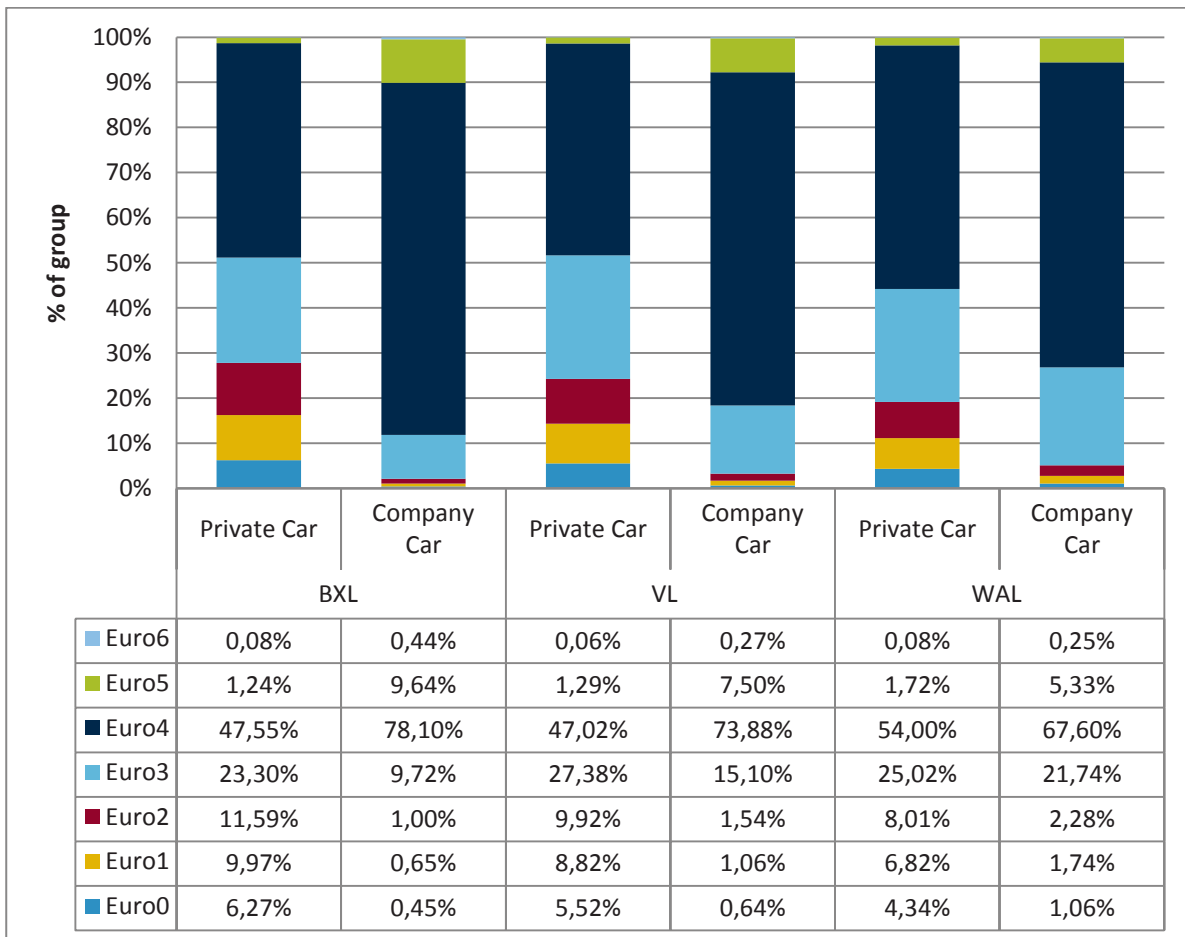
Figure 15: Distribution of Euro standards per region for the fleet of 2009



The Brussels Capital Region has the highest percentage of Euro4 (60,67%), Euro5 (5,02%) and Euro6 (0,24%) vehicles. This is probably due to the high share of company cars in the Brussels fleet (see figure 15).

### 2.4.3 Euro standard distribution private cars versus company cars

Figure 16: Euro standard distribution: private car (1) vs. company car (2) for fleet 2009



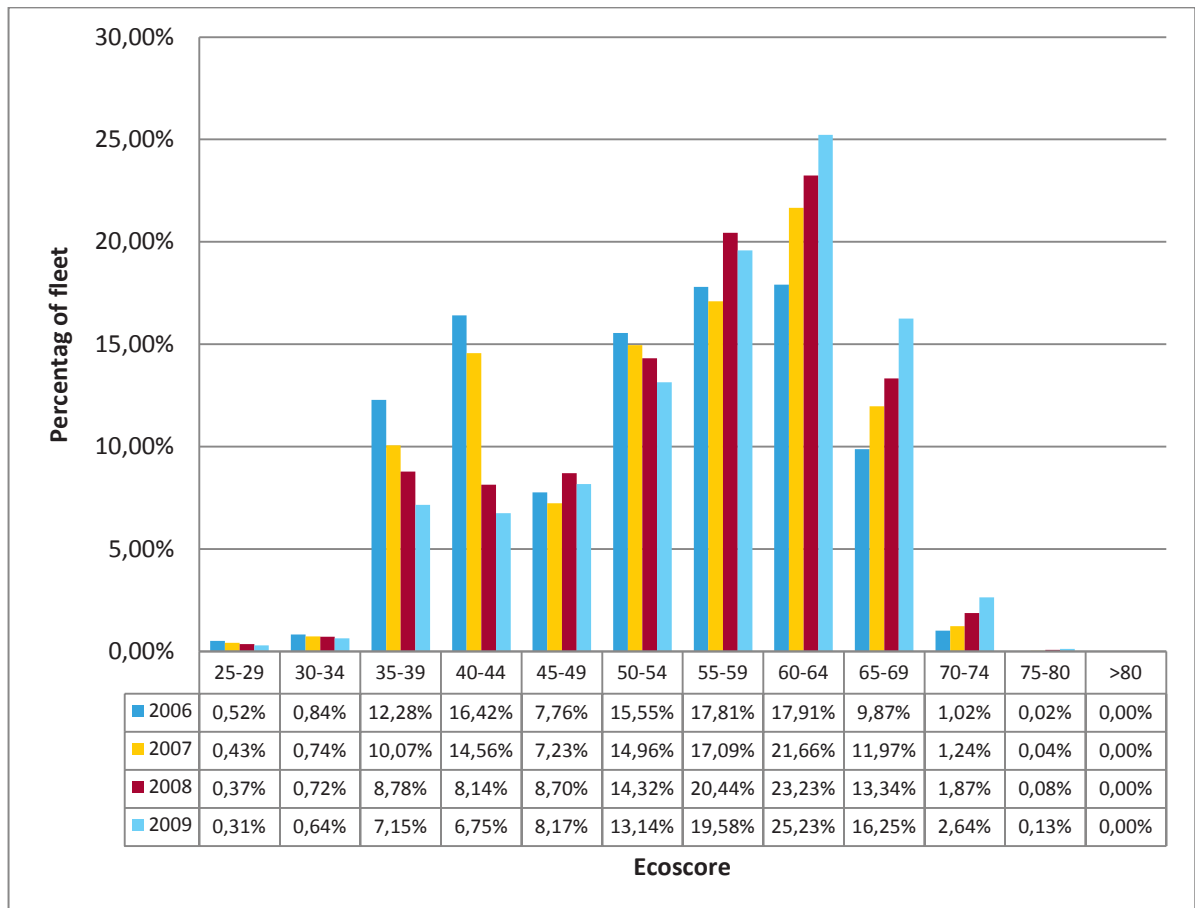
When splitting up the data per region and per car ownership type (private/company car), company cars have a higher Euro standard than private cars. This is due to a higher renewal rate of company cars vs. private cars. Wallonia has the highest percentage of privately owned Euro4 cars (54,00%). In the Brussels Capital Region there's a higher percentage of privately owned Euro0, Euro1 and Euro2 vehicles. Flanders has the highest percentage of privately owned Euro3 vehicles of the three regions.

Of all regions, the Brussels Capital Region has the highest percentage of Euro4, Euro5 and Euro6 company cars. Wallonia has the highest percentage of Euro3 company cars compared to the other regions.

## 2.5 Ecoscore

### 2.5.1 Distribution of Ecoscores

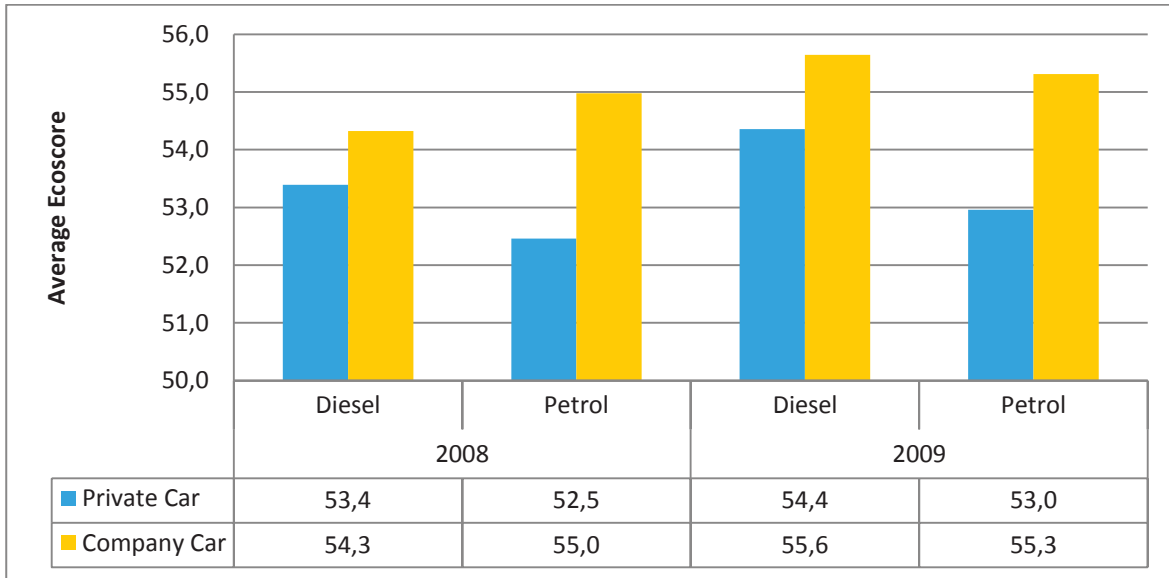
Figure 17: Distribution of Ecoscores over the whole Belgian fleet



VITO attributed an Ecoscore to each car in the DIV-database. The distribution over 5-points wide Ecoscore-classes for the Belgian car fleet in the respective years 2006 to 2009 is shown in Figure 17. This figure shows that the number of vehicles in the category 50-54 and below has declined while vehicles in the 60-64 group and above have increased. The category of vehicles in the 70-74 group has more than doubled since 2006 but is still only 2,64% of the fleet.

## 2.5.2 Average Ecoscore per ownership type

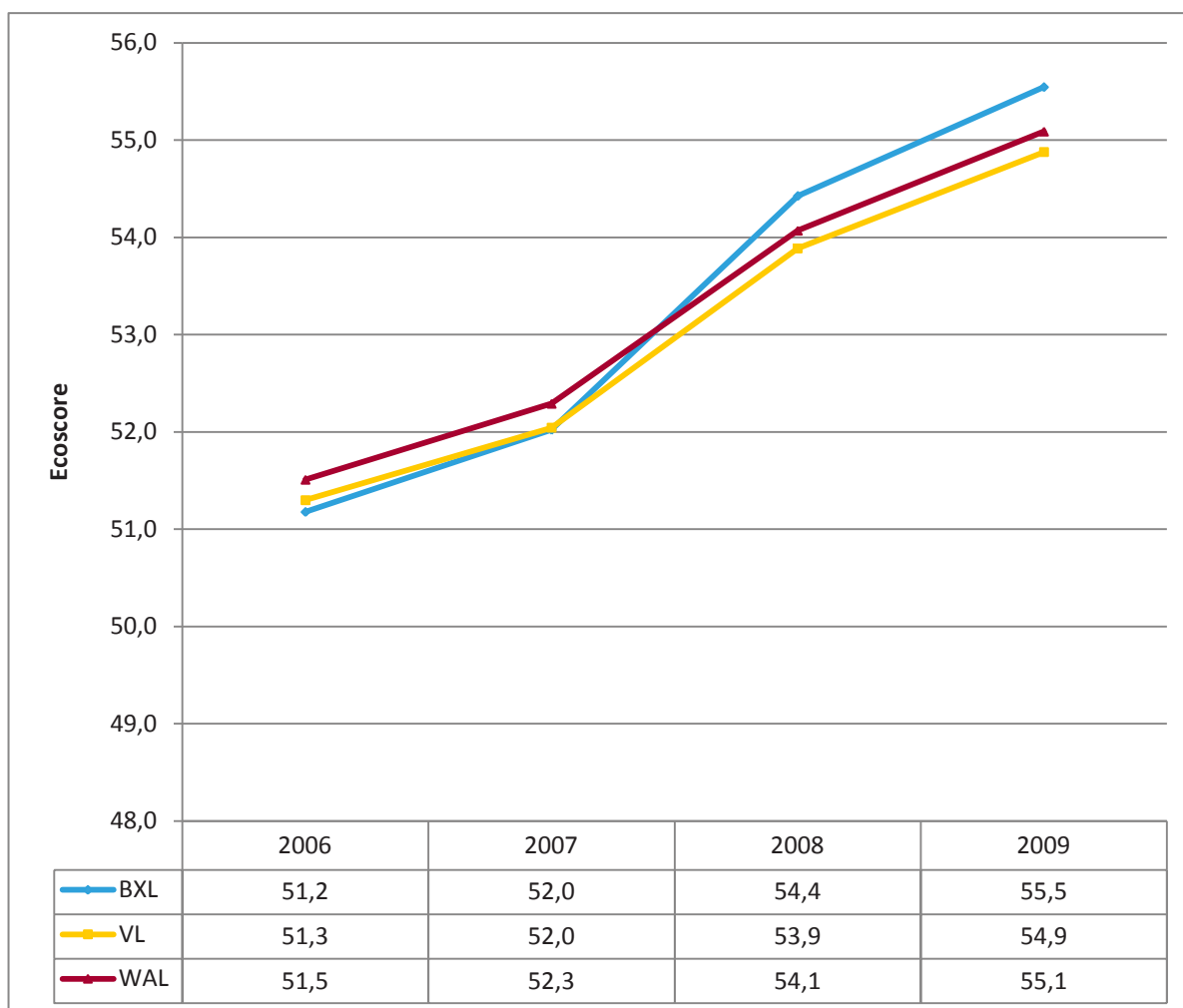
Figure 18: Average Ecoscore per ownership type (1) private car (2) company car



Overall, company cars have a higher Ecoscore than private cars. There is for both types of ownership an improvement in average Ecoscore although the growth for the private cars is smaller than that of the company cars.

### 2.5.3 Average Ecoscore evolution

Figure 19: Average Ecoscores evolution for cars <25years old



In Figure 19 the evolution of average Ecoscores per region is shown. Compared to 2006, the Brussels Capital Region has increased the most (+4,1 pts) and since 2008 this region has the highest average Ecoscore of the three. Flanders and Wallonia have both increased with +/-3,4pts compared to 2006.

## 2.6 Cylinder

There's only a small number of vehicles (+/-40/database year) that does not have a cylinder size assigned to them. These vehicles are not taken into account in the analysis of the cylinder sizes.

Table 9: Grouping of vehicles per cylinder size

	2006	2007	2008	2009
--	------	------	------	------

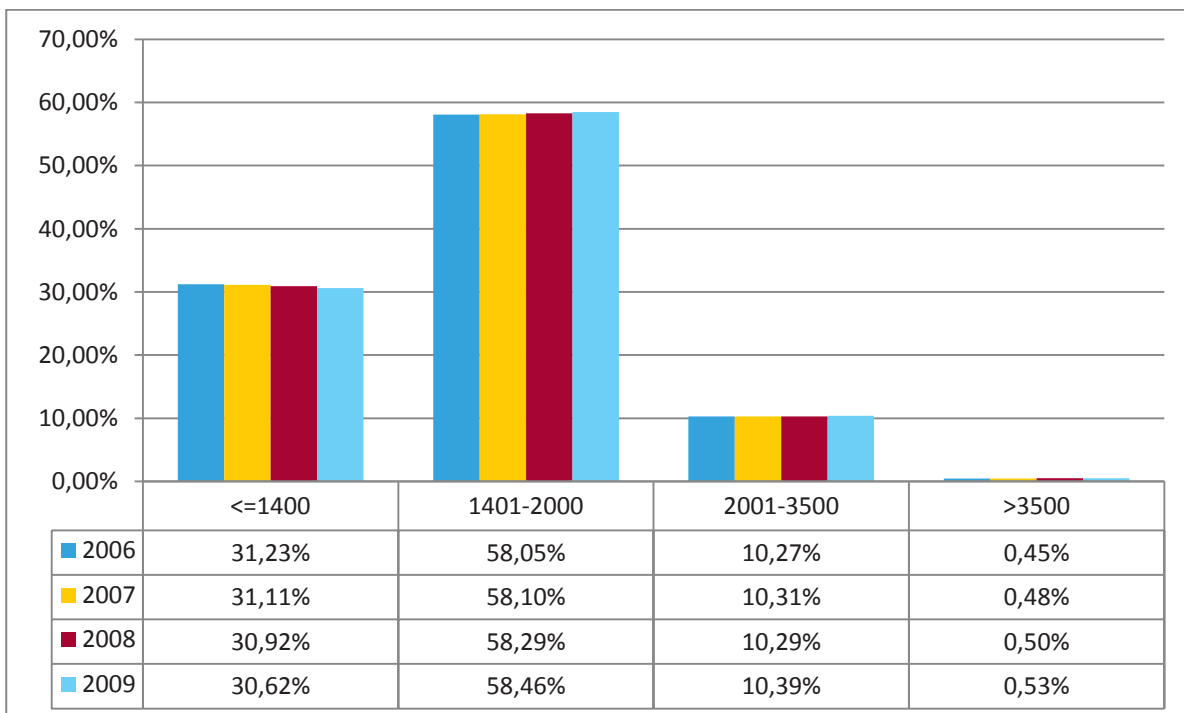
<=1400	1.498.642	1.514.996	1.522.656	1.528.585
1401-2000	2.785.760	2.829.496	2.873.570	2.921.943
2001-3500	492.987	502.328	511.147	523.204
>3500	21.562	23.396	25.216	26.845
0	45	40	42	40

Table 10: Percentage of fleet per cylinder size group

	2006	2007	2008	2009
<=1400	31,23%	31,11%	30,87%	30,57%
1401-2000	58,05%	58,10%	58,26%	58,43%
2001-3500	10,27%	10,31%	10,36%	10,46%
>3500	0,45%	0,48%	0,51%	0,54%
0	0,00%	0,00%	0,00%	0,00%

### 2.6.1 Cylinder Size distribution

Figure 20: Evolution of distribution of cylinder sizes



The most popular engine size over the past 4 years is 1400-2000cc followed by the smaller engine sizes. The higher engine sizes represent about 11% of the complete fleet. This group of vehicles has remained stable compared to 2006 while the vehicles with engines smaller than 1400cc have declined slightly.

## 2.6.2 Distribution cylinder size versus ownership type for 2009

Figure 21: Distribution cylinder size versus ownership type for 2009

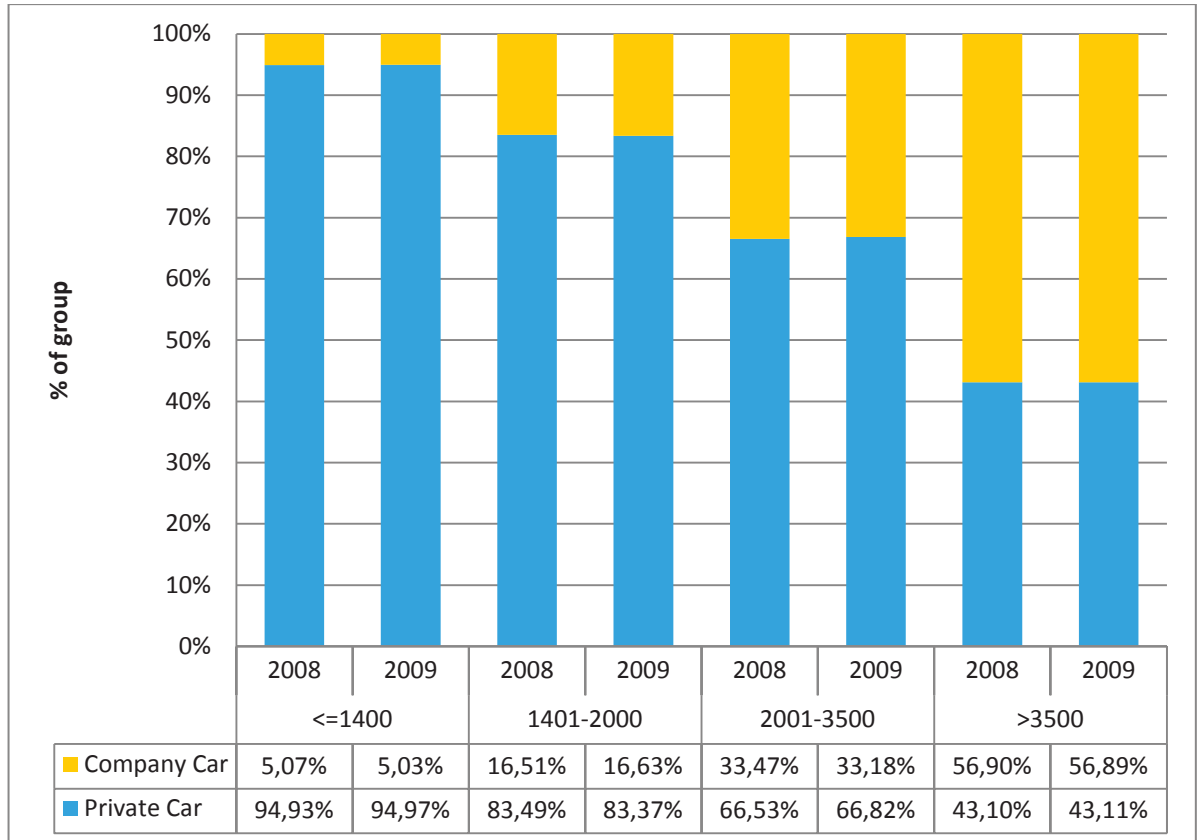
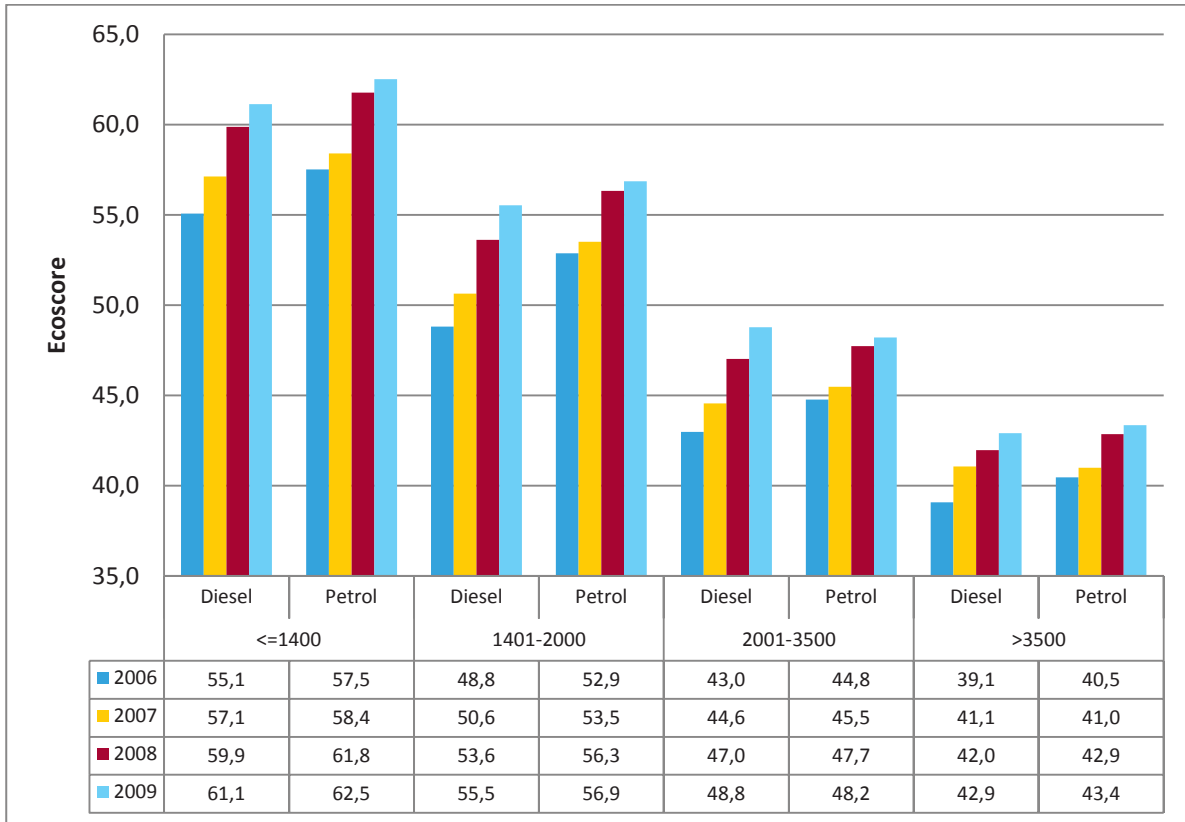


Figure 21 shows that company cars(2) represent a higher share of big engine cars than private cars (1). If we look at the absolute figures, only 10,26% of the company cars has an engine size smaller than 1400cc while this is 34,22% for private cars. On the other hand, 24,96% of company cars has an engine size bigger then 2000cc while this is only 8,44% of the private cars.

### 2.6.3 Cylinder Capacity vs. Ecoscore

Figure 22: Evolution of Ecoscore per fuel type and engine capacity



For both diesel and petrol cars the same statement is valid: the smaller the cylinder capacity, the higher the Ecoscore. We can see that for all categories of cylinder capacity and fuel types the average Ecoscore has increased. Petrol cars have higher Ecoscores in all categories.

Compared to 2006, all cylinder size categories have an improved Ecoscore. The biggest progression is made in the group of diesel cars with an engine size between 2001 and 3500cc (+6,7 ptn); the lowest progression is made in the group of petrol cars with an engine size of more than 3500cc (+2,9 ptn). This last category is mainly the cars with a focus on performance and less on environment or tax related issues.



## 2.6.4 Evolution of engine size per fuel type

Figure 23: Evolution of engine size per fuel type

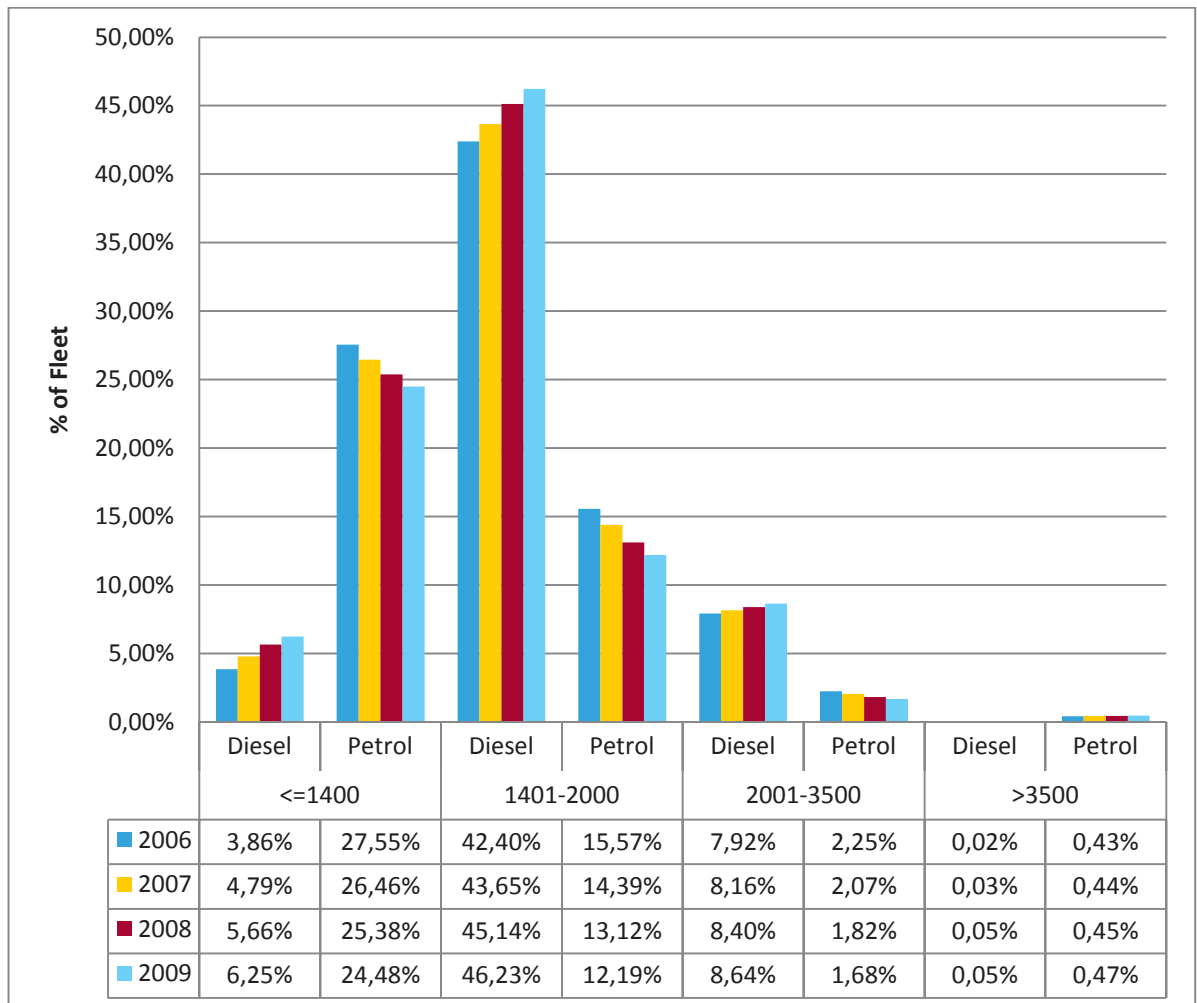


Figure 23 shows the evolution of engine sizes per fuel type. This shows that over the whole fleet, the number of diesel vehicles in all categories is rising and petrol cars are in decline. The biggest category of vehicles is still the 1401-2000cc diesel group followed by the petrol cars with an engine smaller than 1400cc.

## 2.6.5 Distribution of engine size per registration year

Figure 24: Distribution of engine size per registration year

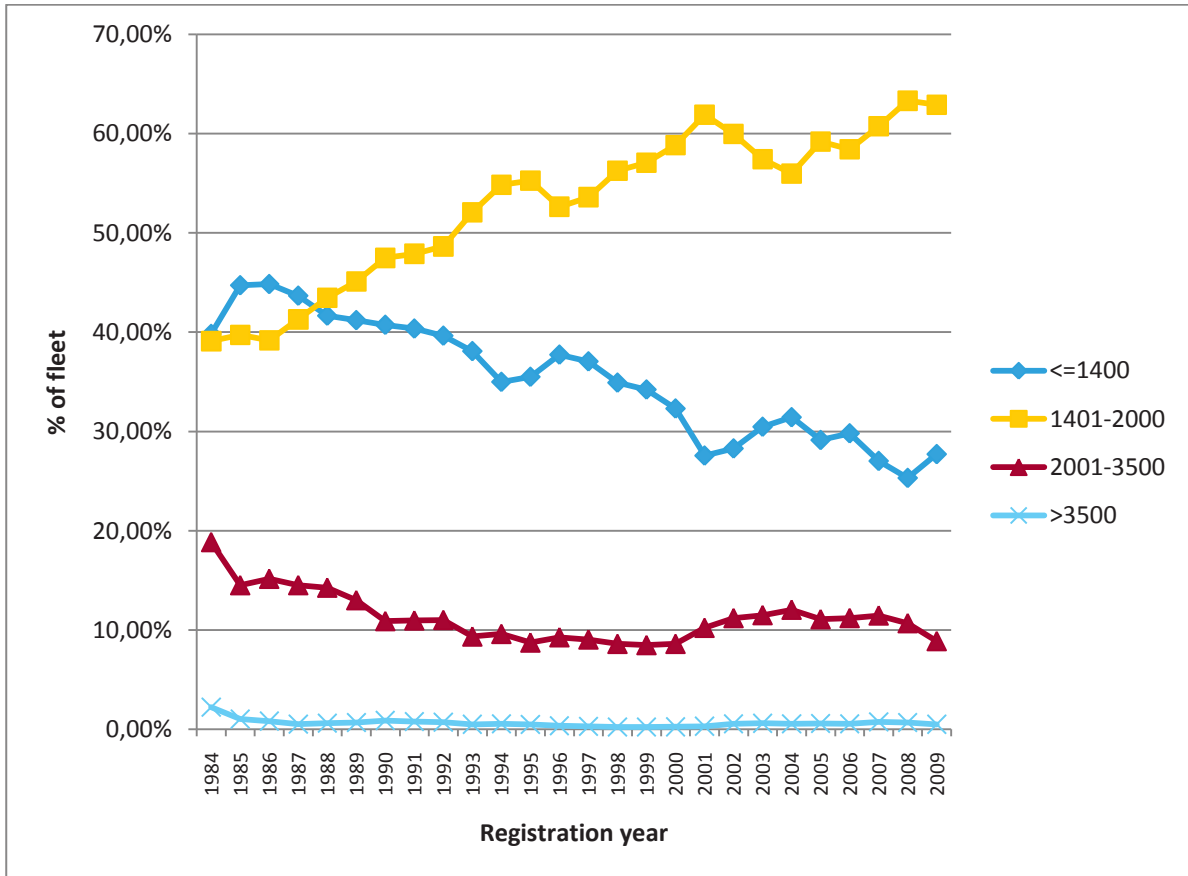


Figure 24 shows the distribution of engine sizes grouped per category and registration year. Splitting up the fleet of 2009 based on registration year shows that compared to previous years there is again a growing interest in small engine ( $\leq 1400$ cc) cars although most cars registered are still 1401-2000cc (Figure 24).

## 2.6.6 Engine size distribution of petrol and diesel cars for the fleet of 2009

Figure 25: Engine size distribution over age of petrol vehicle based on vehicle fleet 2009

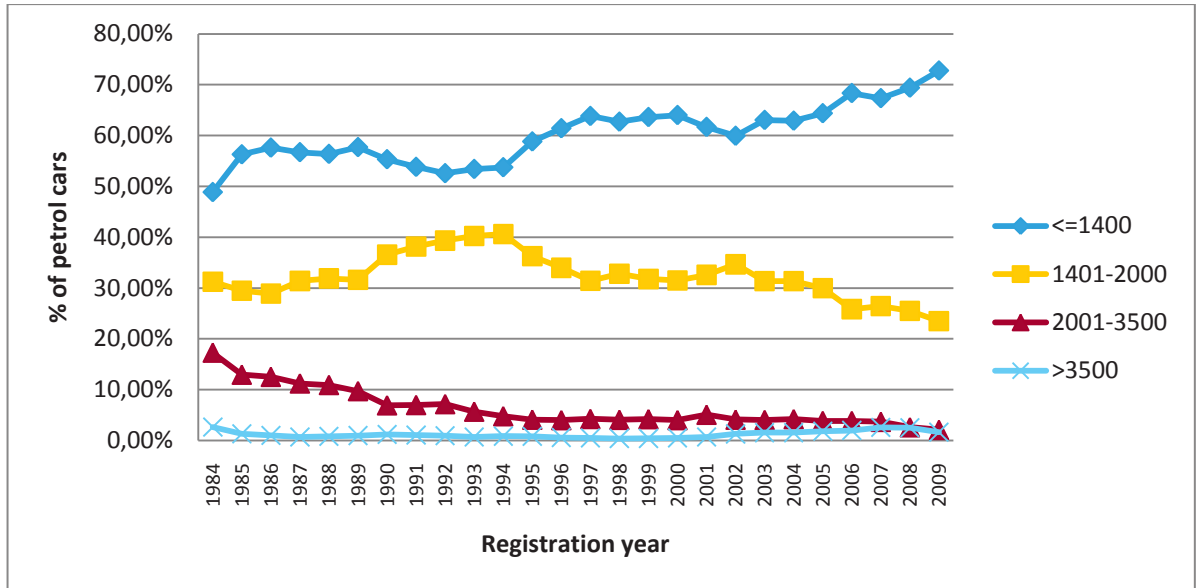


Figure 26: Engine size distribution over age of diesel vehicle based on vehicle fleet 2009

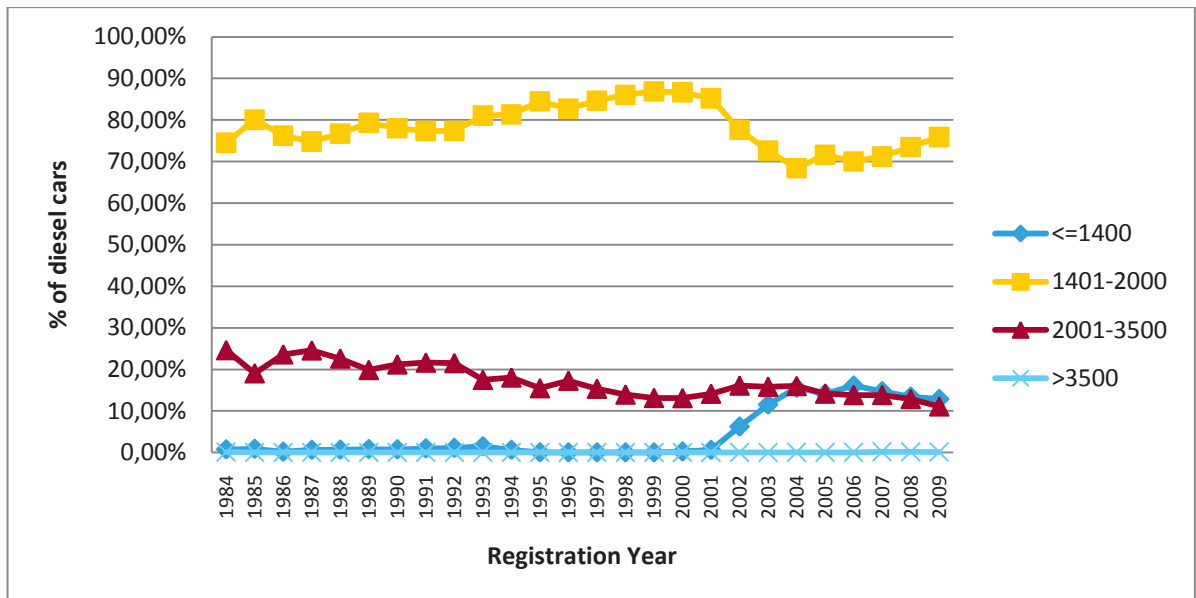


Figure 25 and Figure 26 show the evolution of engine sizes related to registration year of petrol and diesel cars. These show that for petrol cars the majority of the vehicles registered have an engine size smaller than 1400cc and an increasing trend can be spotted. The number of petrol vehicles with an engine size of 1401cc and above is in a steady decline.

For diesel vehicles most vehicles are in the category 1401-2000cc. From 2001 on we see more small diesel vehicles registered but they seem to stay stable around 14-15%.

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The number of diesel vehicles with engine sizes of 2001cc and above is in a slow decline.

## 2.7 Mass

The analysis based on the mass of the vehicle could only be conducted on a small section of the available databases since this parameter is not available for all vehicles. In the tables below an overview is given of the vehicles which have a mass above and below 500kg. The vehicles with a mass below 500kg or without a mass assigned have not been taken into account. (64% for 2006; 44% for 2009).

	2006	2007	2008	2009
<500	3.167.481	2.862.323	2.560.394	2.299.231
500-5000	1.775.689	2.157.786	2.527.771	2.863.135

*Table 11: Overview of vehicles with valid mass data*

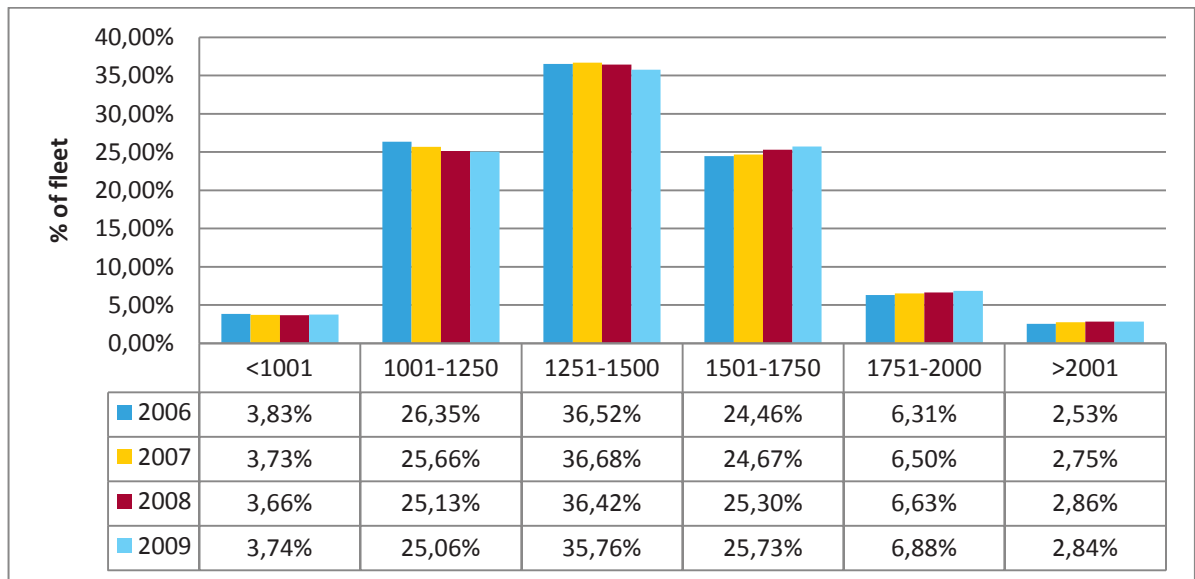
	2006	2007	2008	2009
<500	64,08%	57,02%	50,32%	44,54%
500-5000	35,92%	42,98%	49,68%	55,46%

*Table 12: Percentage of vehicles with valid mass data*

As shown in the tables above, the following analysis is based on 36% (2006) to 55% (2009) of the fleet.

## 2.7.1 Vehicle weight distribution

Figure 27 Vehicle weight distribution



Most vehicles in the complete fleet weigh between 1251 and 1500kg (+/-36%). Between 2006 and 2009 the group of vehicles above 1500kg has grown slightly while the group of vehicles below 1250kg has decreased slightly.

## 2.7.2 Evolution vehicle weight versus Ecoscore

Figure 28: Evolution vehicle weight versus Ecoscore

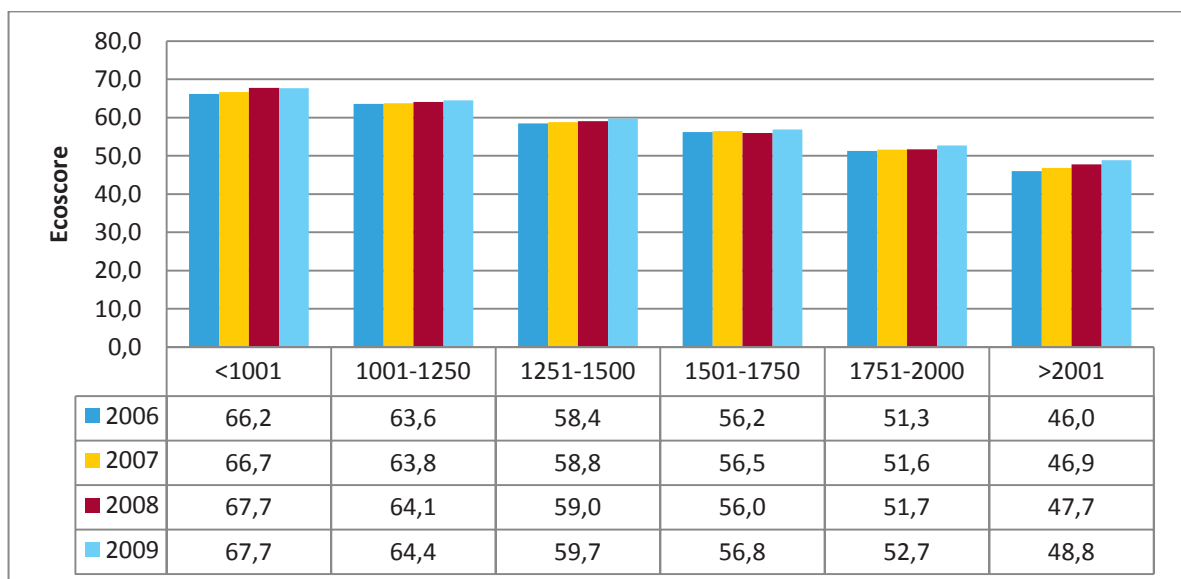
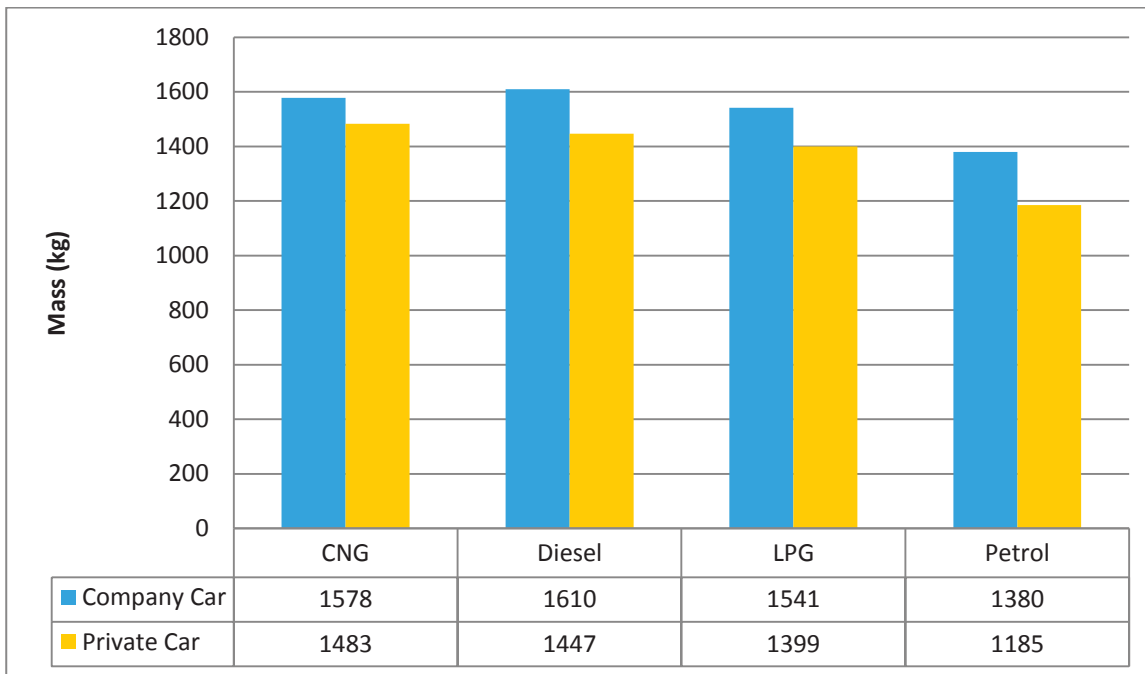


Figure 27 shows that for all weight classes, the Ecoscore has increased slightly between 2006 and 2009 with the highest increase for the group of vehicles weighting more than

2000kg. The lighter the vehicle, the higher the Ecoscore. The lowest increase in Ecoscore can be seen in the group of vehicles weighting between 1001-1250kg.

### 2.7.3 Average vehicle weight per ownership type and fuel type

Figure 29: Average vehicle weight per ownership type and fuel type fleet 2009



For all fuel types, company cars (2) are –on average- heavier than private cars. This can be explained by their overall higher engine displacement (2169cc vs. 1967cc).

## 2.8 Engine Power

Not for all vehicles the engine power is known. The limits for a valid engine power were taken based on the lowest available kW-car (the Nice Mega City – 3 kW) and the highest kW-car (Bugatti Veyron – 736kW). The vehicles that have an engine power outside these limits were not taken into account for further analysis.

Engine Power	2006	2007	2008	2009
<3	585.881	456.256	349.442	264.826
3-740	4.213.112	4.413.997	4.583.187	4.735.790
>740	3	3	2	1

Table 13: Number of vehicles with valid engine power

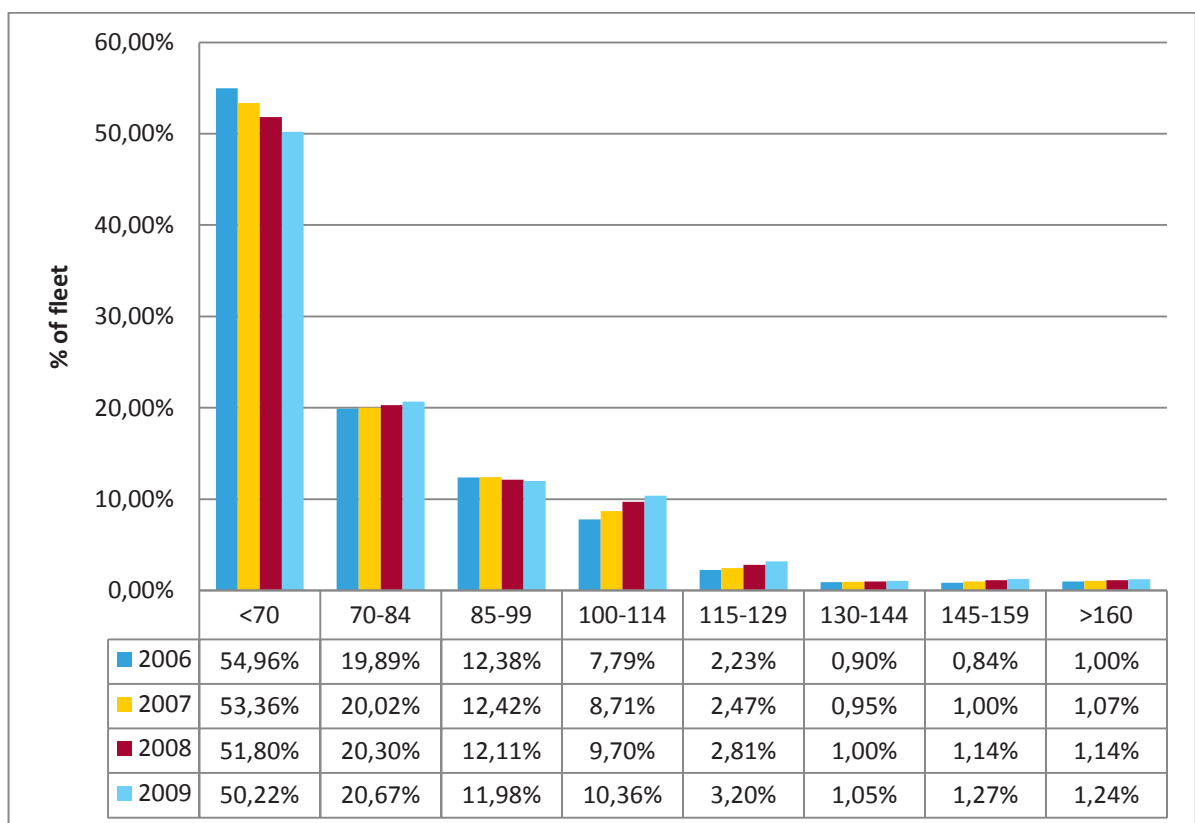
Engine Power	2006	2007	2008	2009
<3	12,21%	9,37%	7,08%	5,30%
3-740	87,79%	90,63%	92,92%	94,70%

>740	0,00%	0,00%	0,00%	0,00%
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Table 14: Percentage of fleet with valid engine power

### 2.8.1 Engine Power distribution

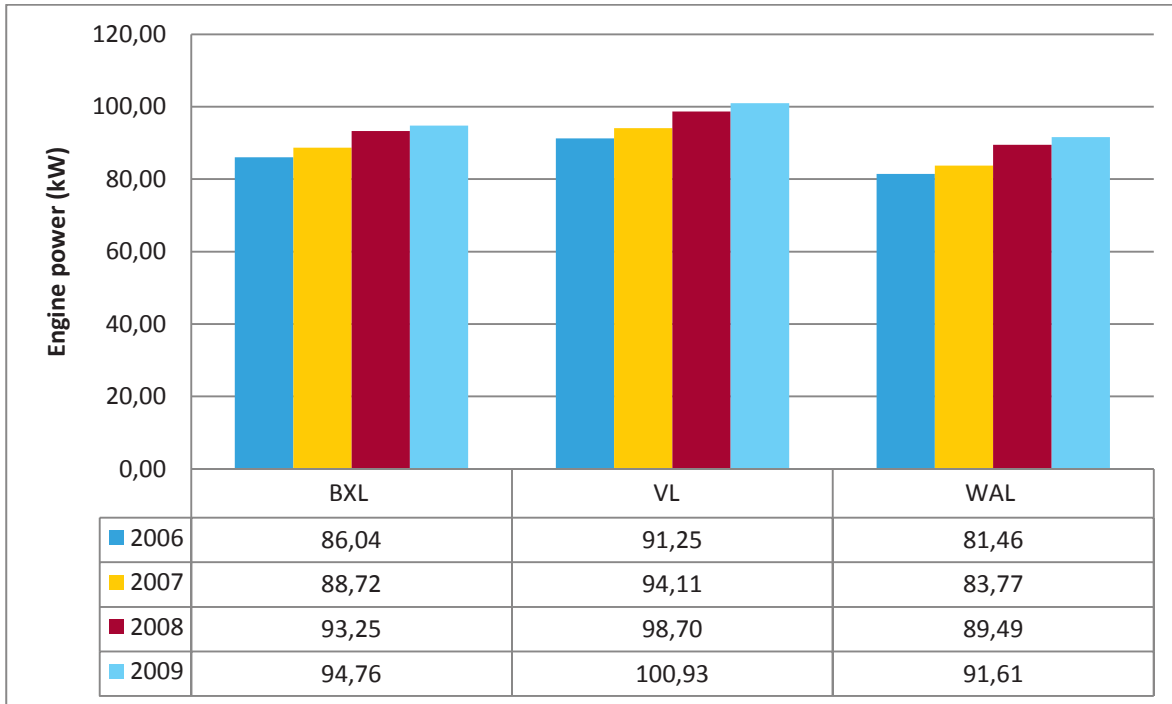
Figure 30: Engine power distribution



The majority of the fleet still has an engine power of less than 70kW (52,80% in 2009). However, the percentage of this group is reducing in favour of the higher engine power groups. The category of 70-84 kW grows with 2,11%; the category of 85-99kW grows with 0,49%. The biggest relative growth is in the 100-114kW group (+3,00%). In general, the overall fleet has a growing average power output (86,71kW in 2006 versus 94,10kW in 2009).

## 2.8.2 Average Engine power per region

Figure 31: Evolution average engine power per region

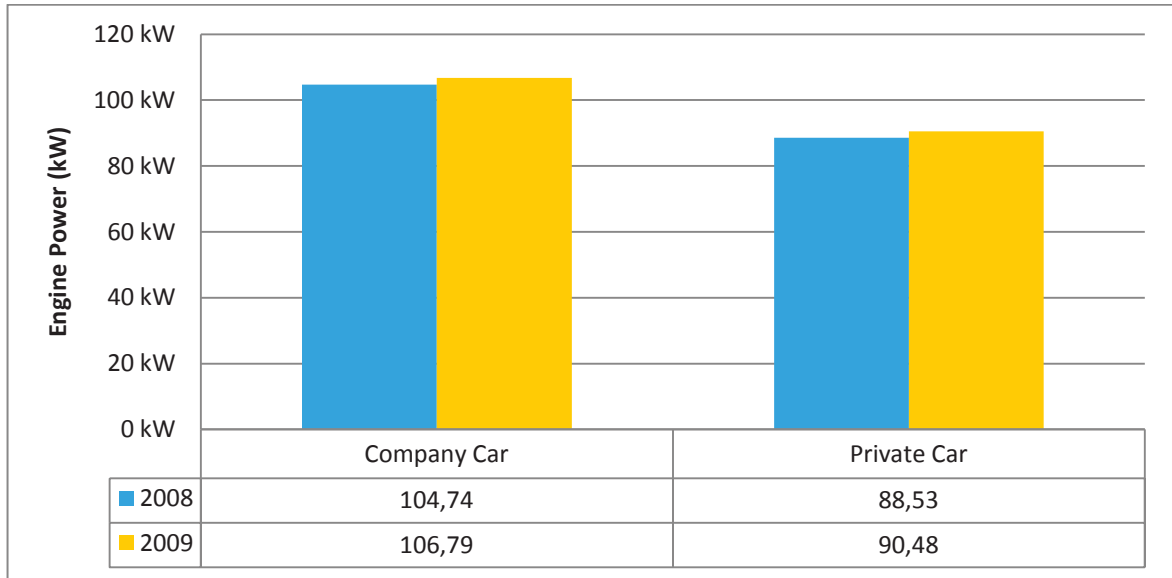


We can see a growth in average engine power in all regions. In Wallonia, the average engine power is the lowest (88,23kW) and in Flanders it is the highest (99,34kW). In Flanders the engine power has increased the most compared to 2006 (+8,09kW). In Brussels the increase has been the lowest (+5,99kW).



### 2.8.3 Average engine power evolution per ownership type

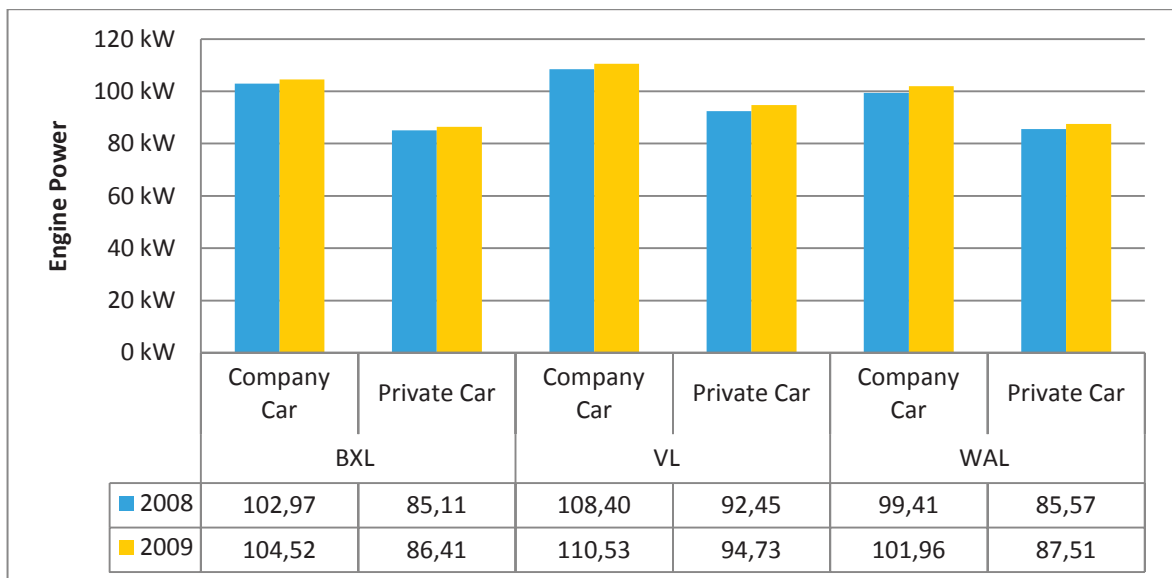
Figure 32: Average engine power per ownership type



The average engine power of private cars (90,48kW) is lower than that of company cars (106,79kW). The engine power of company cars has also increased slightly more than that of private cars (company cars: +2,05kW | private cars: +1,95kW).

### 2.8.4 Average engine power per region and ownership type

Figure 33: Average engine power per region and ownership type (private cars (1) and company cars (2))

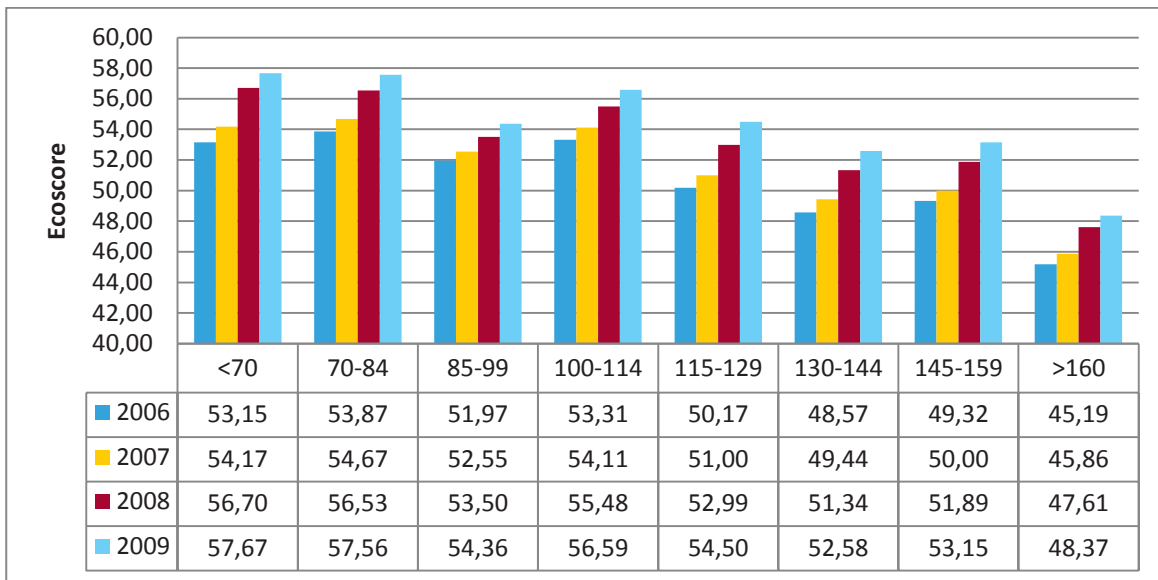


Private cars in the Brussels Capital Region have the lowest engine power (86,41kW) of the three regions. Flanders has the highest average engine power for private cars (94,73kW) which is still lower than the lowest average engine power of company cars.

Company cars in Flanders have the highest engine power (110,53 kW) while company cars in Wallonia have the lowest average engine power (101,96 kW).

### 2.8.5 Engine Power versus Ecoscore evolution

Figure 34: Engine power versus Ecoscore for complete fleet of 2009



In general a higher engine power results in a lower Ecoscore. The average Ecoscore per engine power category has increased between 2006 and 2009. The category of 100-114kW deviates from the general trend with a higher average Ecoscore than that of the category 85-99kW and that of 115-129kW.

## 2.9 CO<sub>2</sub>-emissions

It needs to be noted that not all vehicles in the database have a valid CO<sub>2</sub>-emission assigned to them. The vehicles with an unrealistic CO<sub>2</sub>-emission have been filtered out. This resulted in the following "loss of data":

Table 15: Number of records with invalid CO<sub>2</sub>-emission

Row Labels	2006	2007	2008	2009
<85 g/km	3.019.377	2.706.676	2.363.357	2.100.408

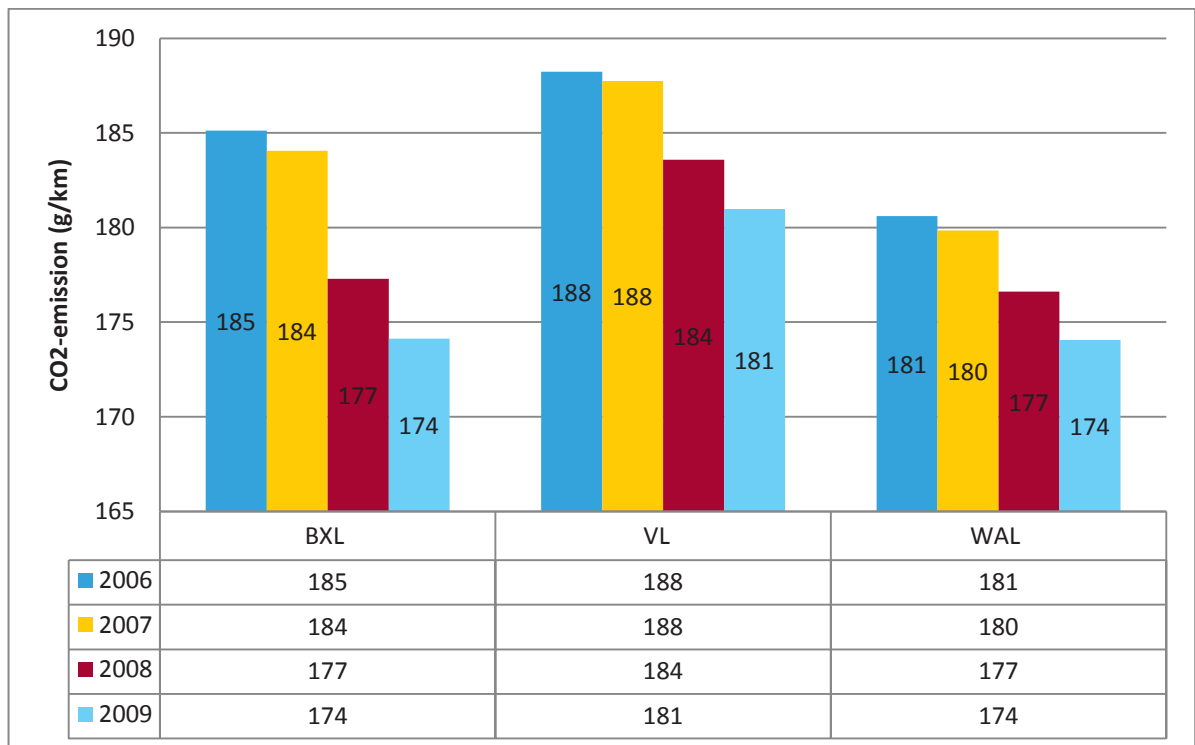
These numbers are roughly the same as the number of vehicles registered before 2002. Vehicles after that date almost all have a valid CO<sub>2</sub>-emission. So for the analysis of the data only a percentage of the fleet has been taken into account. The percentages over the past years are represented in the table below:

Table 16: Number of vehicles with valid CO<sub>2</sub>-emission

Grand Total	2006	2007	2008	2009
Records with valid CO <sub>2</sub> -emission.	37,08%	44,42%	51,67%	57,66%

### 2.9.1 Evolution CO<sub>2</sub>-emissions

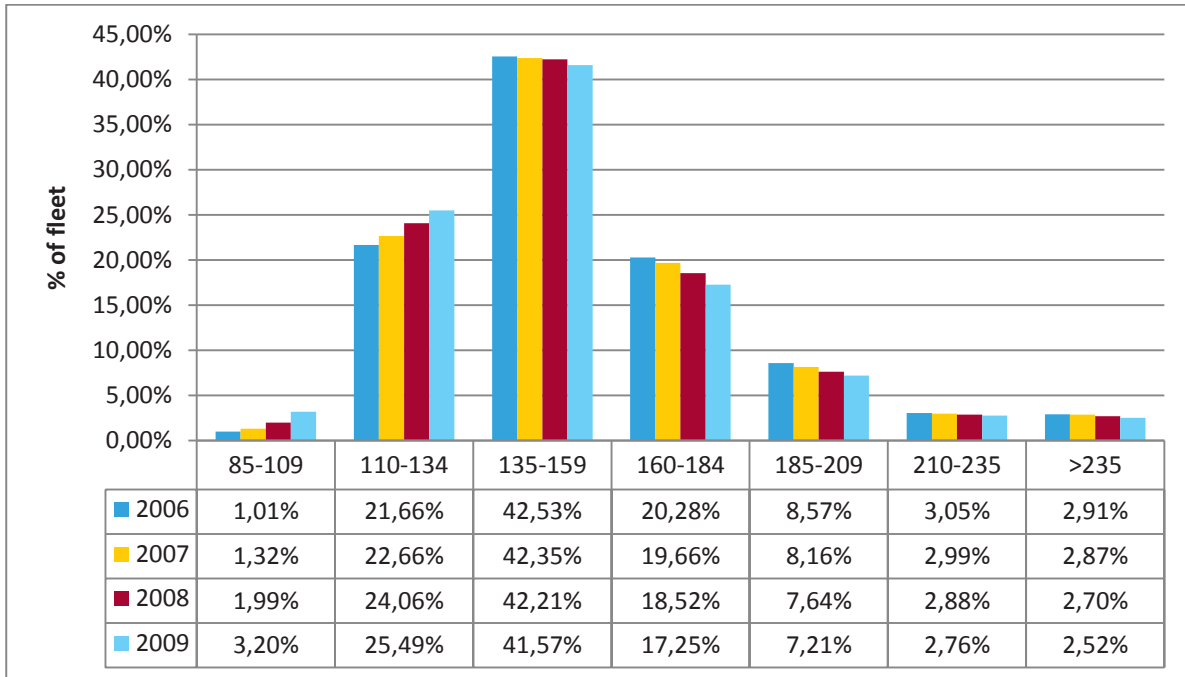
Figure 35: Evolution CO<sub>2</sub>-emissions per region



Over the past 4 years, the Brussels Capital Region has reduced its average CO<sub>2</sub>-emissions the most (-17g/km) and now has the lowest average CO<sub>2</sub>-emission together with Wallonia. Flanders is still lagging behind with an average of 181g/km (7g/km more than Brussels and Wallonia).

## 2.9.2 Distribution CO<sub>2</sub>-emissions

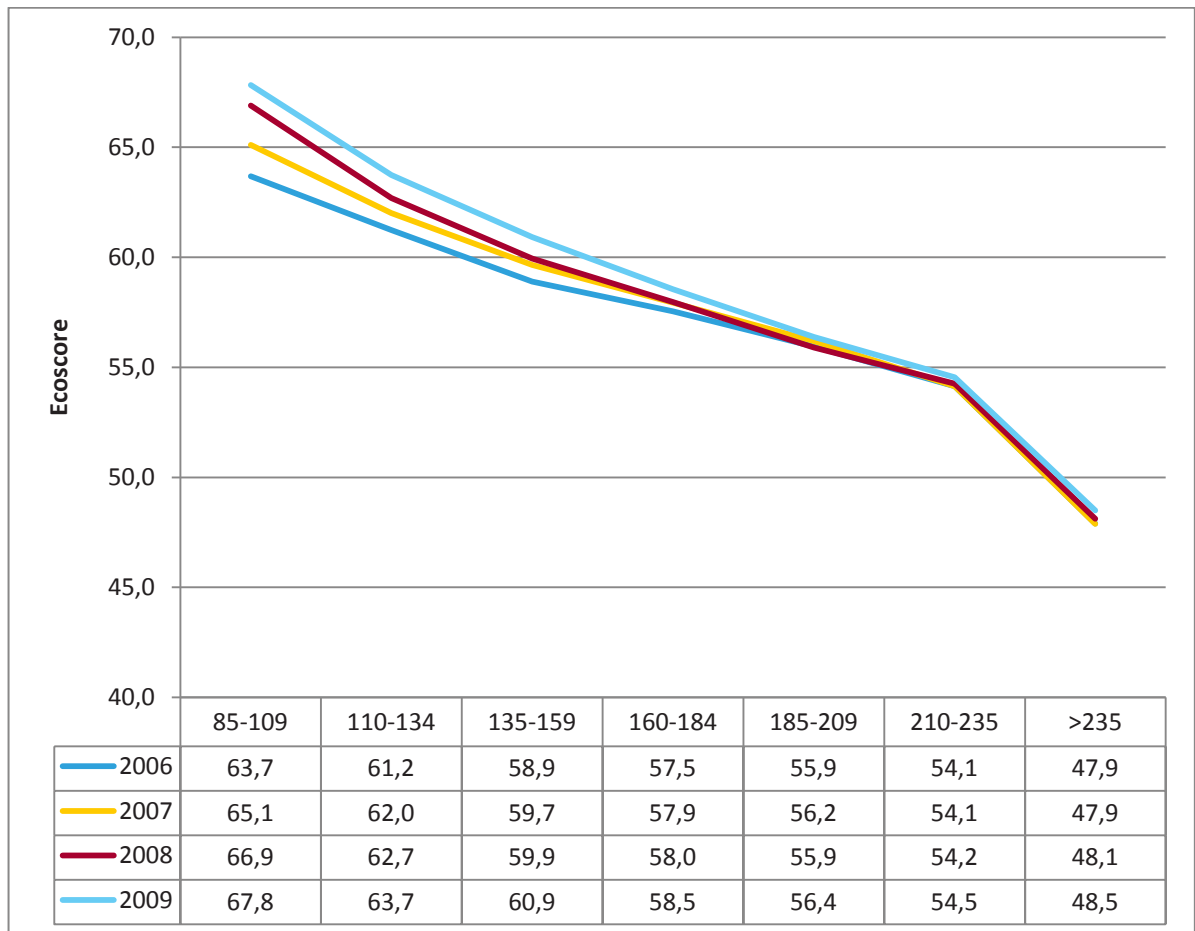
Figure 36: CO<sub>2</sub> distribution evolution



Most vehicles (41,53%) of vehicles in Belgium have a CO<sub>2</sub>-emission between 135-159g/km. However, this group is shrinking in favour of the lower-emission groups (85-109g/km and 110-134g/km). The higher emissions groups are also shrinking. The two highest categories (>210g/km) also shrink but less than the categories 160-184g/km and 185-209g/km.

### 2.9.3 CO<sub>2</sub>-emissions vs. Ecoscore

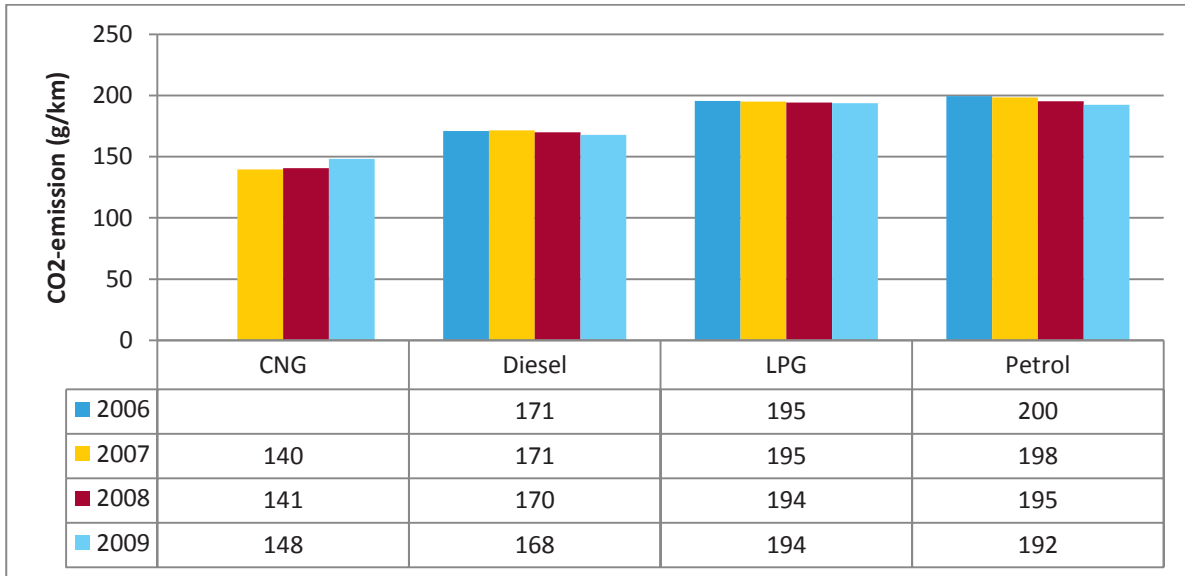
Figure 37: CO<sub>2</sub>-emissions vs. Ecoscore



For most categories of CO<sub>2</sub>-emission, the Ecoscore has hardly changed over the years. Only in the lower emission categories we can see a better average Ecoscore. For the category of vehicles with a CO<sub>2</sub>-emission between 85-109g/km the Ecoscore has improved with 4,1 points. For the category between 110-134g/km and 135-159g/km the improvement has been +2 points.

## 2.9.4 CO<sub>2</sub>-emissions vs. fuel type

Figure 38: Evolution CO<sub>2</sub>-emissions per fuel type



CNG vehicles have the lowest CO<sub>2</sub>-emission (148g/km). This has increased between 2007 and 2009. This can be explained by the low number of vehicles in the group and the addition of some CNG-vehicles with higher emissions. The average diesel vehicle scores better than the average petrol car when it comes to CO<sub>2</sub> (168 g/km vs. 192 g/km in 2009).

## 2.9.5 CO<sub>2</sub>-emissions in function of registration year

Figure 39: CO<sub>2</sub>-emissions distribution per registration year

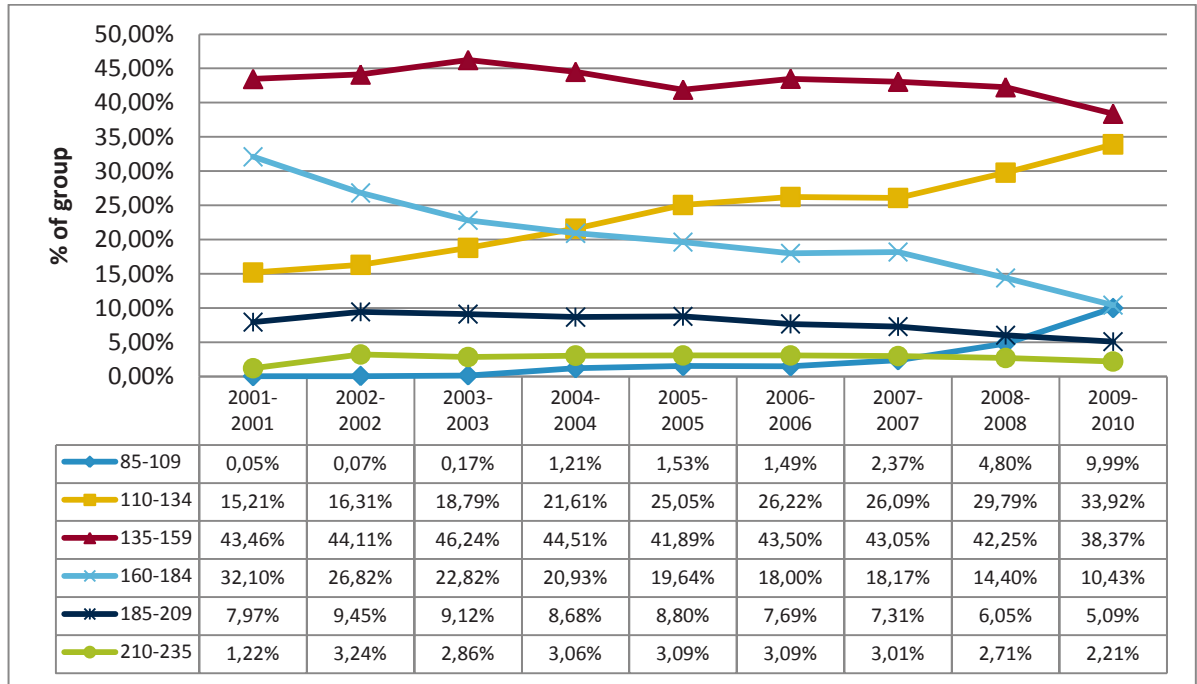
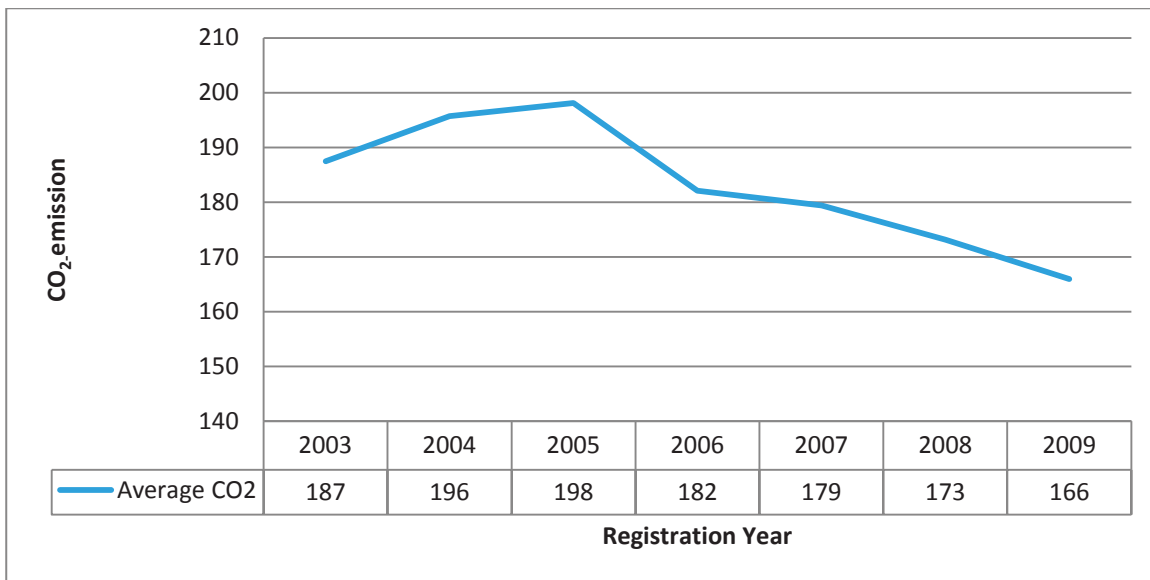


Figure 39 shows that since 2007 more vehicles with a CO<sub>2</sub>-emission below 134g/km have been registered compared to the previous years. The group of vehicles with CO<sub>2</sub>-emissions above 135 g/km is in decline in favour of the vehicles with lower CO<sub>2</sub>-emissions although most vehicles registered in 2009 still have a CO<sub>2</sub>-emission between 135-159g/km. If the trend continues, most cars registered in 2010 will have a CO<sub>2</sub>-emission between 110-134g/km.

Based on the fleet data of 2009 grouped per registration year an evolution towards lower CO<sub>2</sub>-emissions can be identified (Figure 40)

Figure 40: Average CO<sub>2</sub>-emission evolution per registration year based on fleet 2009



## 2.10 Particulate Matter

Since the emissions of particulate matter are only regulated for petrol cars as from September 2009, and moreover only for direct injection petrol cars (with the Euro 5 emission standard), the analysis has only been done for diesel cars. The presence of a PM-filter was derived according to the following parameters:

- Euro3: PM < 11mg and >1mg → PM-filter present
- Euro4: PM < 11mg → PM-filter present
- Euro5 and Euro6 → PM-filter present
- Euro2 and below → No PM-filter present

It also needs to be noted that not for all vehicles in the complete fleet a PM-emission has been assigned since for older vehicles this was not a requirement.



## 2.10.1 Evolution distribution of Particulate Matter

Figure 41: Evolution distribution of PM

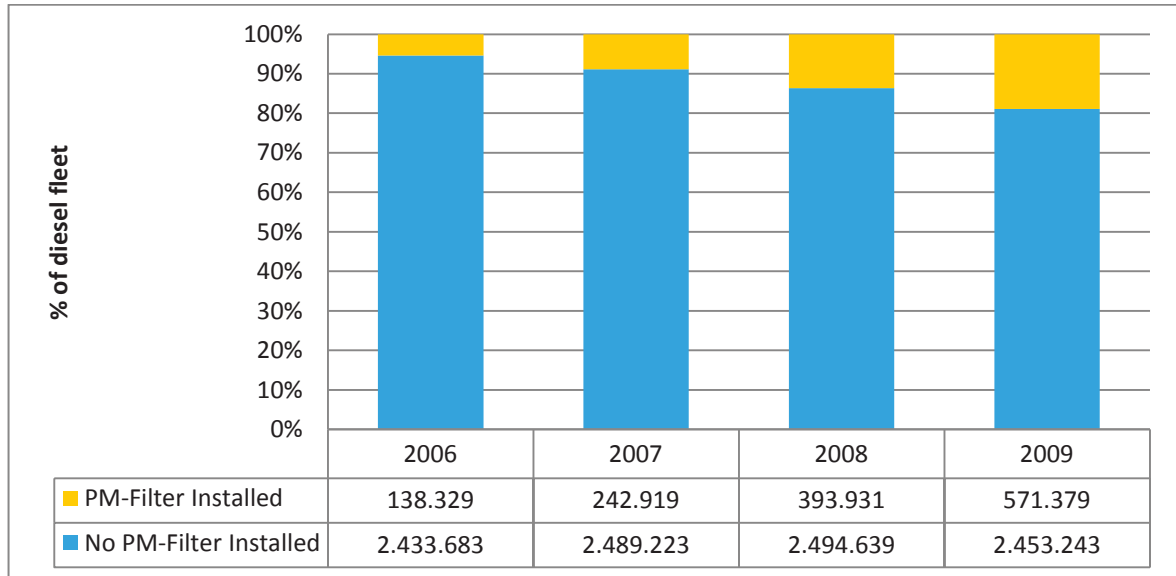


Figure 41 shows that the percentage of diesel vehicles with a PM-filter is steady growing. At the end of 2009 19% of the diesel fleet has a PM-filter installed. In 2006 this was only 5%.

## 2.11 Distribution of PM over the different regions

Figure 42: Distribution of PM over the different regions

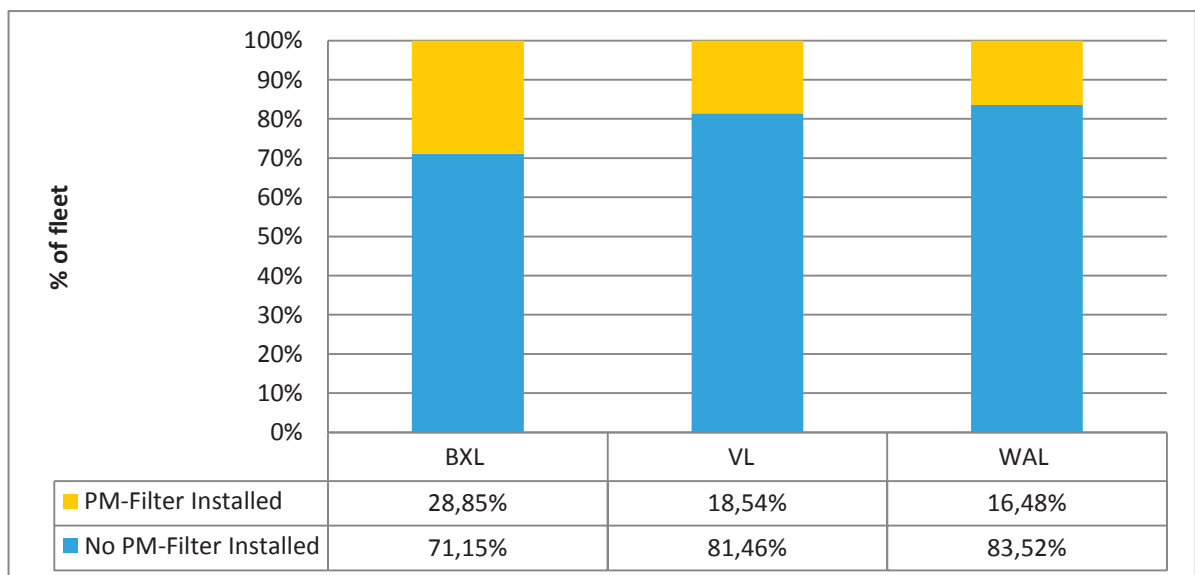
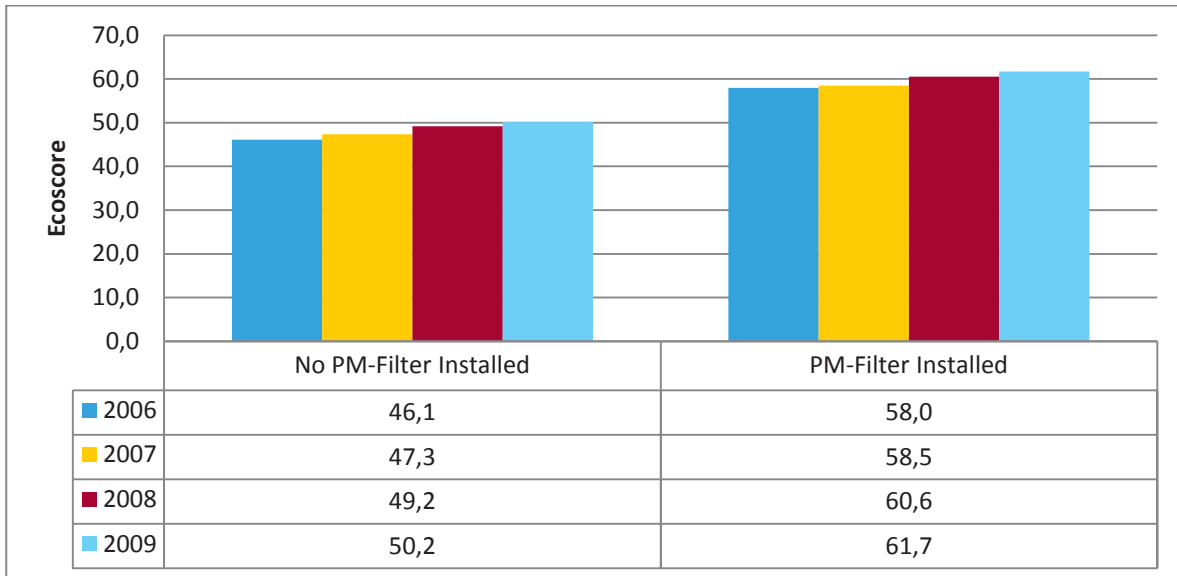


Figure 42 shows that a bigger share of the Brussels fleet is equipped with a PM-filter. In Wallonia the lowest share of vehicles with PM-filters is driving around.

### 2.11.1 Particulate Matter versus Ecoscore

Figure 43: Average Ecoscore per PM-category



Based on Figure 43 it is clear that vehicles with a PM-filter have a much higher Ecoscore than the vehicles without a PM-filter installed. This is because PM-emissions have a high impact on the air quality score. Generally can be stated that diesel cars with PM-filters are younger than the ones without. The average age of a diesel vehicle with PM-filter is 1,2 years; that of a diesel vehicle without PM-filter is 5,2 years.

The increase in Ecoscore for the vehicles without PM-filter is probably because older vehicles have been replaced with cleaner vehicles (with or without PM-filter).

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## CHAPTER 3 COMPANY OWNED CARS VS. LEASE CARS

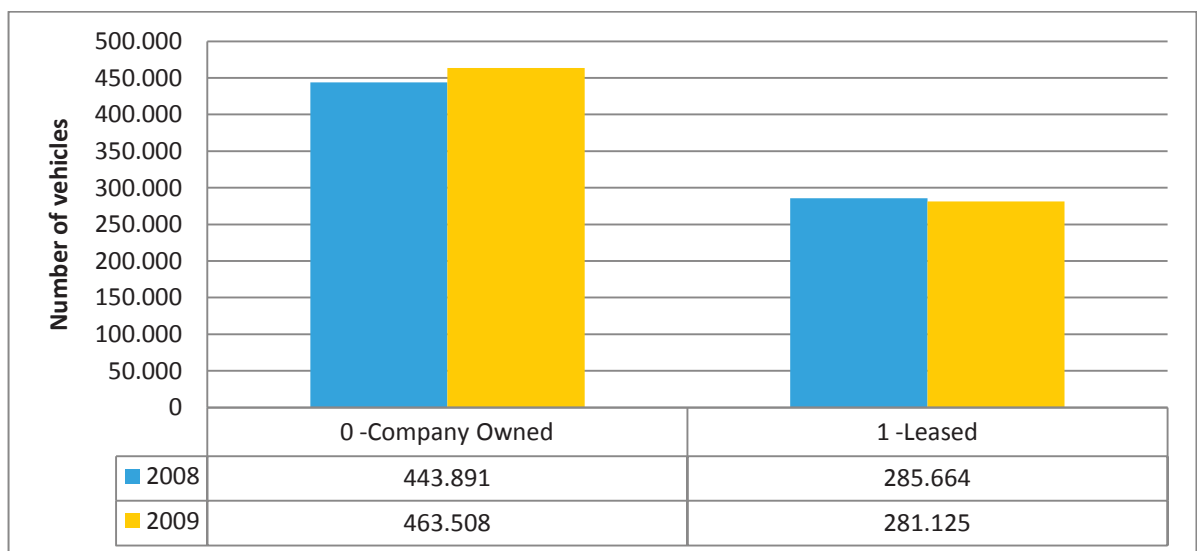
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Since 2008 two extra fields have been added to the DIV-database. The first field indicates whether the registered car is a company car or a private car. In the case of a company car, the second field indicates whether the company is a member of RENTA, which is the Federation of Belgian vehicles rental companies (short and long term rental). The majority of the vehicles of the RENTA-members are offered as so called lease cars (>300.000 vehicles compared to <16.000 short term rental vehicles). Therefore, in this analyses, we consider all vehicles that are owned by a member of RENTA as so called lease cars.

In the analysis below the differences between company owned cars and company leased cars is investigated.

### 3.1 Total Numbers

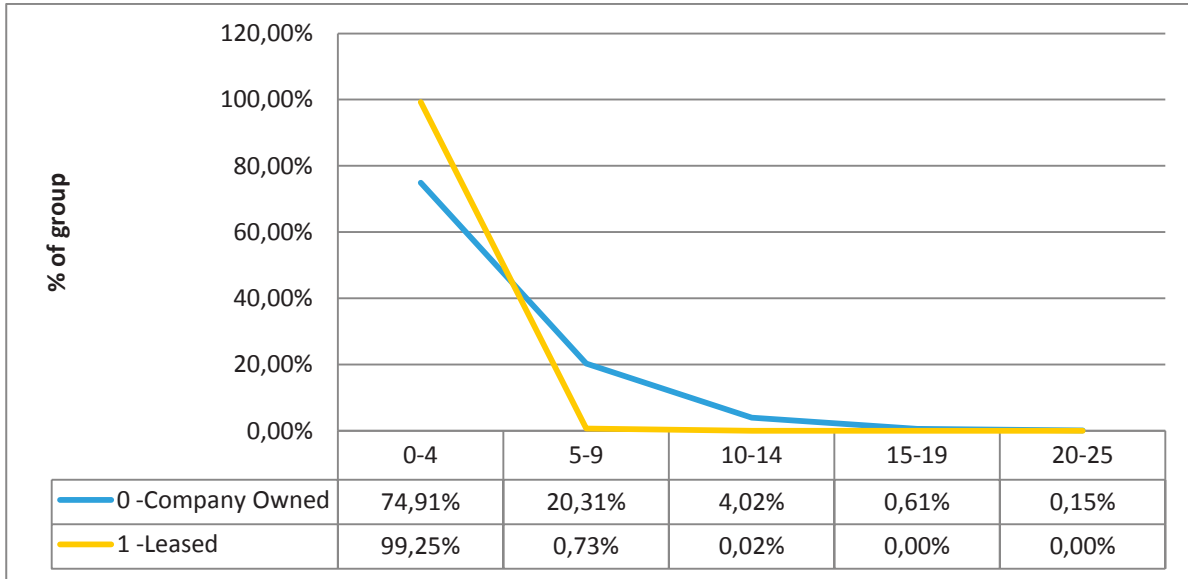
Figure 44: Company owned car vs. company leased car



Most company cars are owned directly by companies. About 38% of the company cars in 2009 is leased. The percentage of leased company cars is slightly lower in 2009 (-1%).

### 3.2 Age Distribution

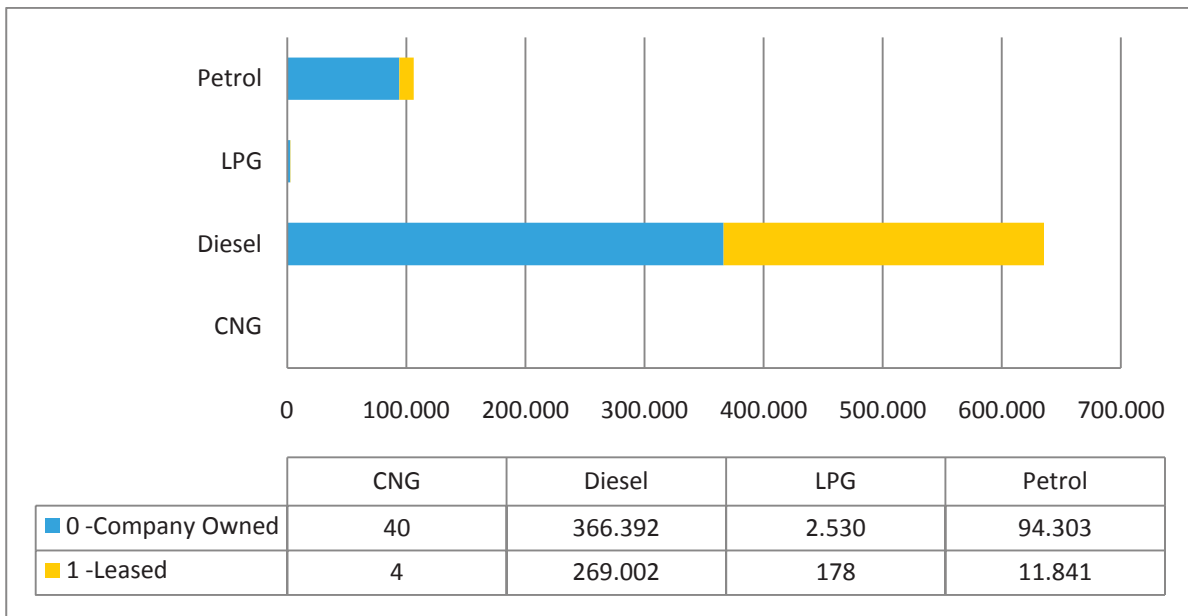
Figure 45: Age distribution of company owned cars and leased company cars



Most leased company cars have an age of 4 years or younger (99%). For company owned cars this is 75%. Remarkable is the fact that still 4% of the company owned cars is between 10 and 14 years old.

### 3.3 Fuel Distribution

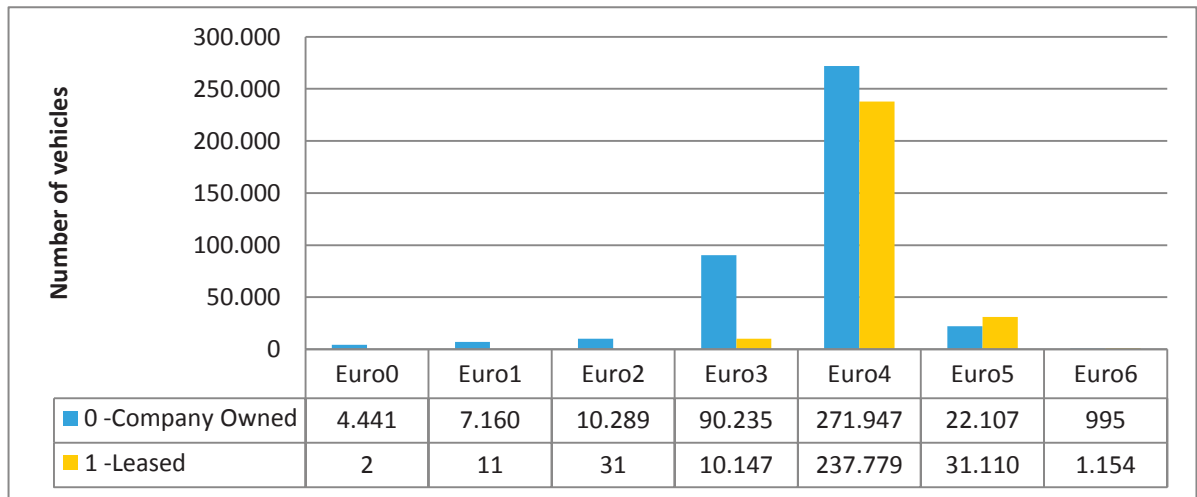
Figure 46: Fuel distribution of company owned cars and leased company cars



As seen in the overall composition of company cars in chapter 2, most company cars are diesel vehicles. Almost all leased company cars are diesel. Company owned cars contribute the most to the overall share of petrol company cars.

### 3.4 Euro Standard Distribution

Figure 47: Euro standard of company owned vehicles versus company leased vehicles



Most company cars are Euro4 vehicles. There are more Euro5 leased vehicles than Euro5 company owned vehicles. For Euro3 vehicles the share of company owned vehicles is significantly higher than that of the company leased vehicles.

### 3.5 Ecoscore Distribution

Figure 48: Ecoscore distribution of company owned cars vs. company leased cars (2009)

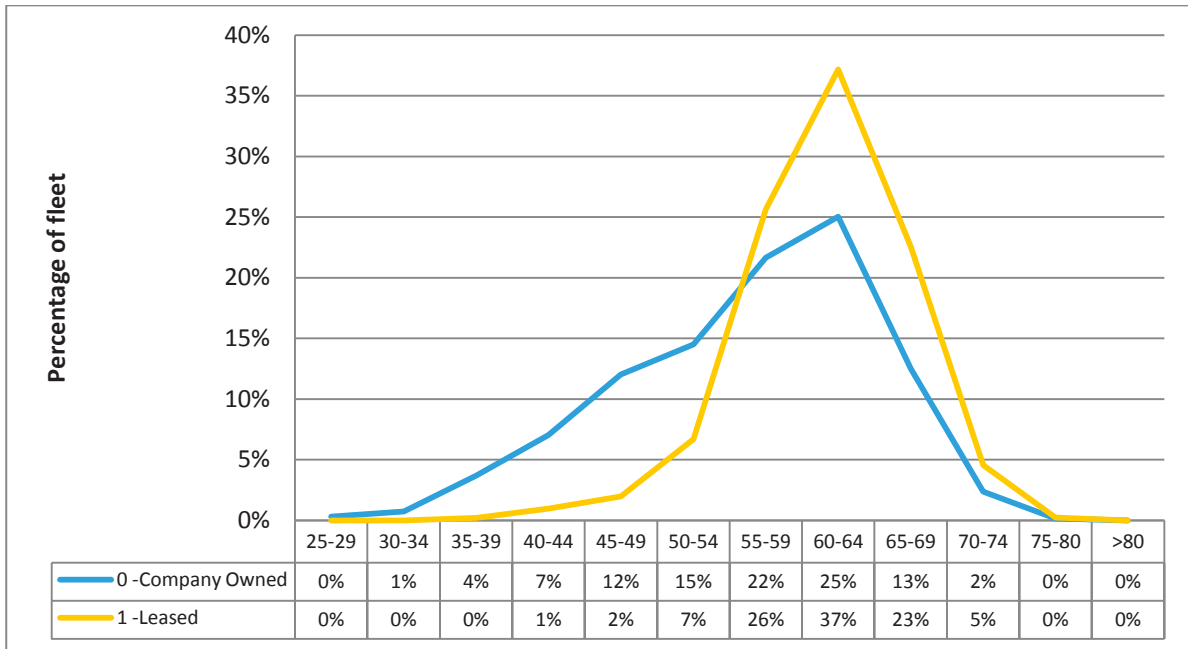
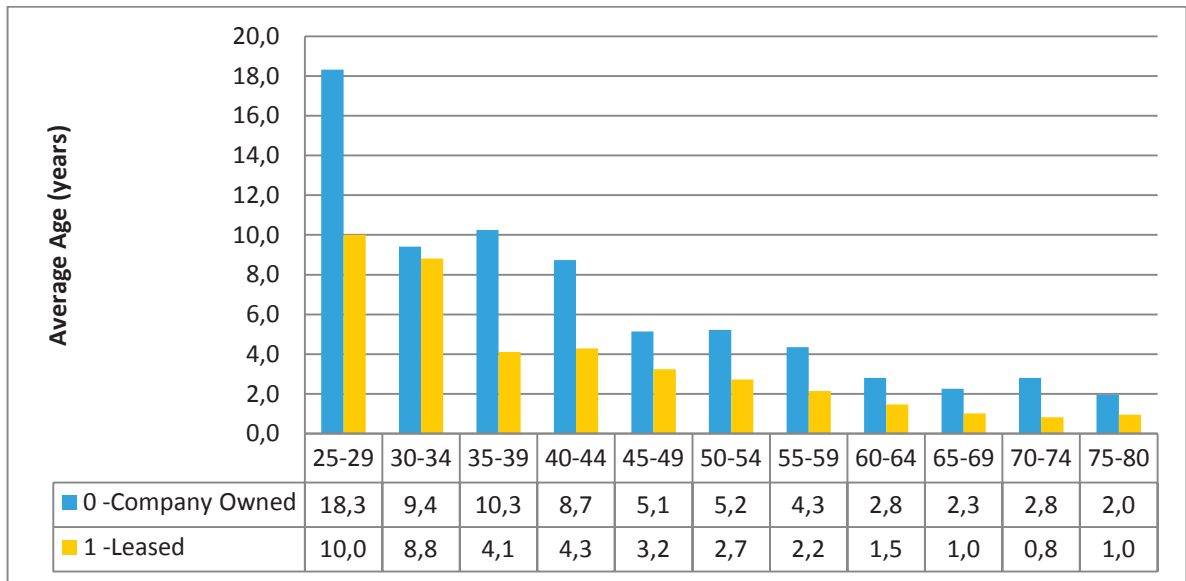


Figure 48 shows that a bigger share of company leased vehicles has an Ecoscore between 60-65 (37%). Although most of the company owned vehicles also belong to this category, their share is much smaller (25%). Company leased vehicles are also more grouped around this peak category where the Ecoscores of company owned vehicles are more spread over various (lower) categories.

The figures below (Figure 49 to Figure 55) show that in all groupings the company leased cars have a higher average Ecoscore than the company owned cars. This can be partially related to the average age of the company leased cars (younger) versus the company owned cars (older).

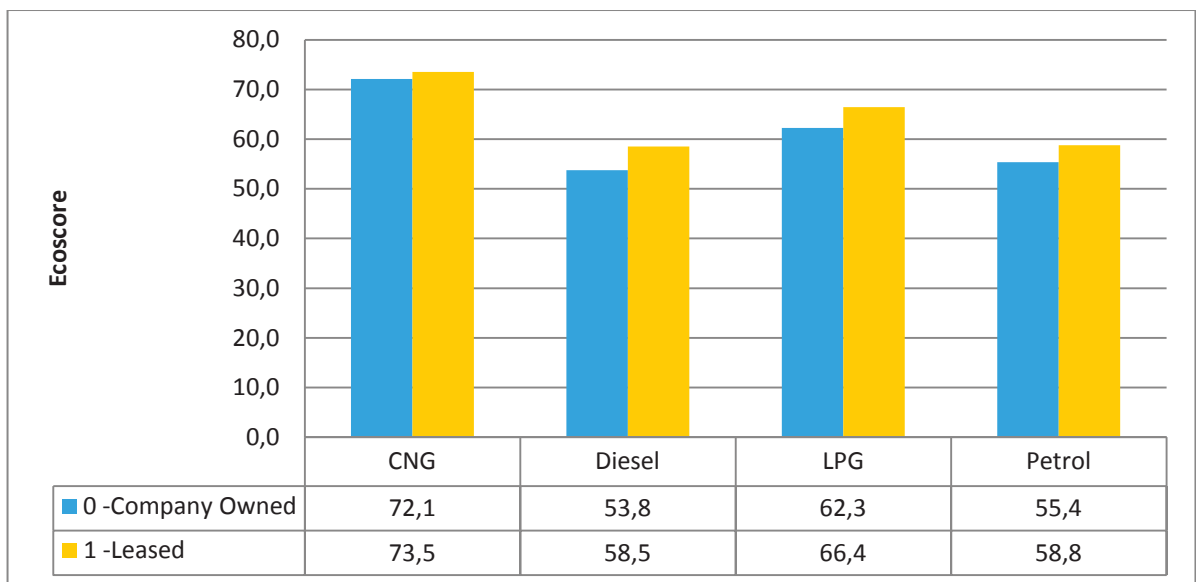
Figure 49: Average Age per Ecoscore group of company owned cars versus company leased cars (2009)



Older vehicles generally have lower Ecoscores than new vehicles. In all Ecoscore categories, the company owned vehicles have an average age which is older than the leased company cars.

Figure 50 to Figure 55 shows that company leased vehicles have a higher average Ecoscore in all types of grouping (fuel-type, cylinder size, mass, engine power, CO<sub>2</sub>, PM-filter).

Figure 50: Average Ecoscore per fuel type for company owned cars and company leased cars (2009)



In all fuel classes the average Ecoscore is higher for leased company cars than for company owned cars. This is related probably because of the average age of the leased company cars is lower than that of the company owned vehicles.

Figure 51: Average Ecoscore per cylinder size (cc) group for company owned and company leased cars (2009)

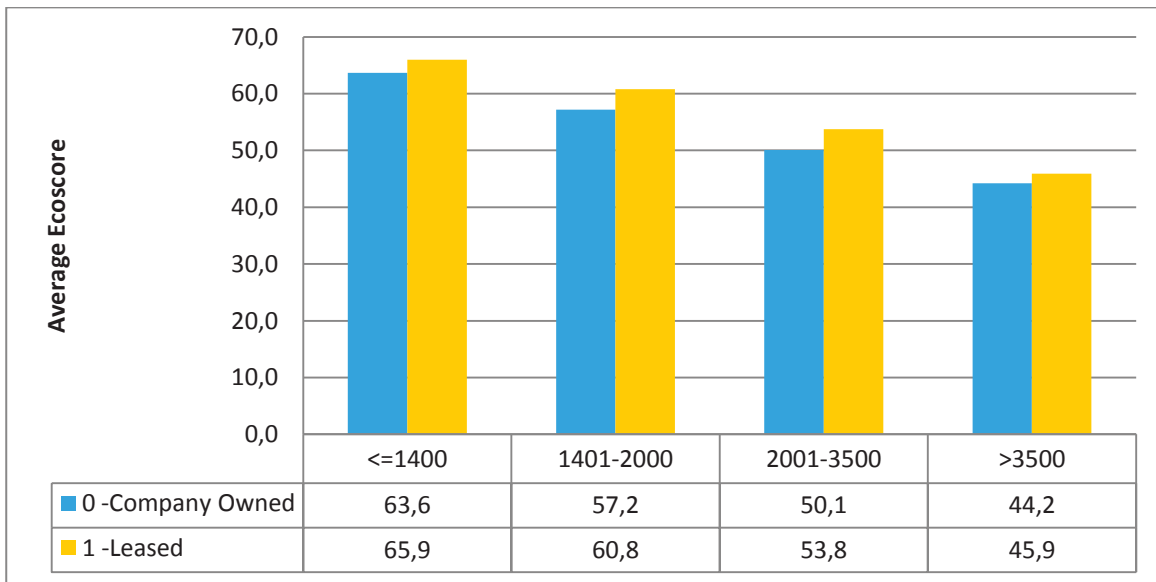


Figure 52: Average Ecoscore per mass group (kg) for company owned and company leased cars (2009)

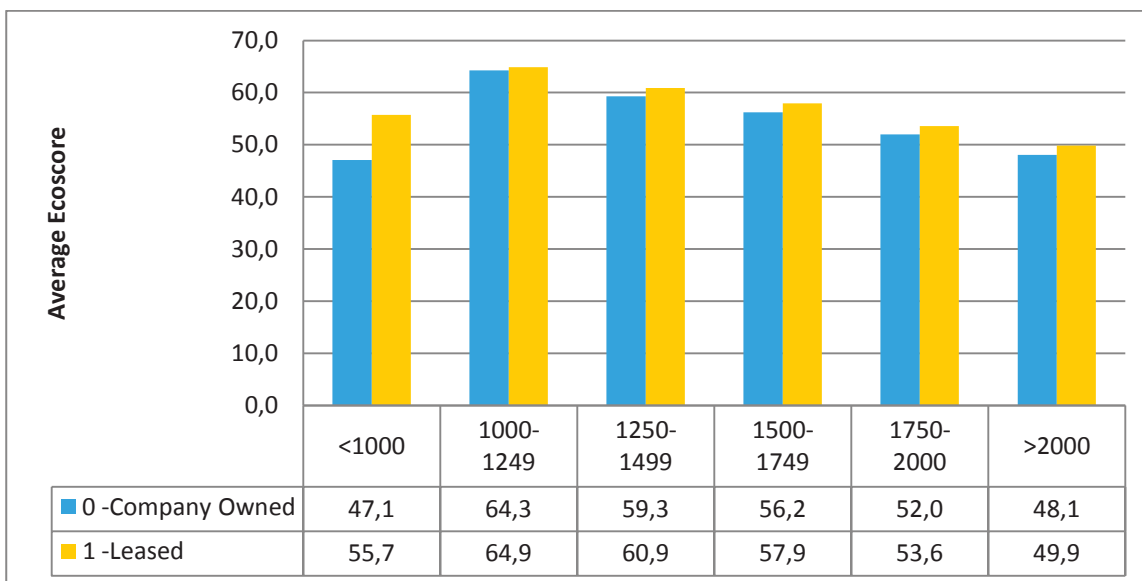




Figure 53: Average Ecoscore per engine power (kW) category for company owned and company lease cars (2009)

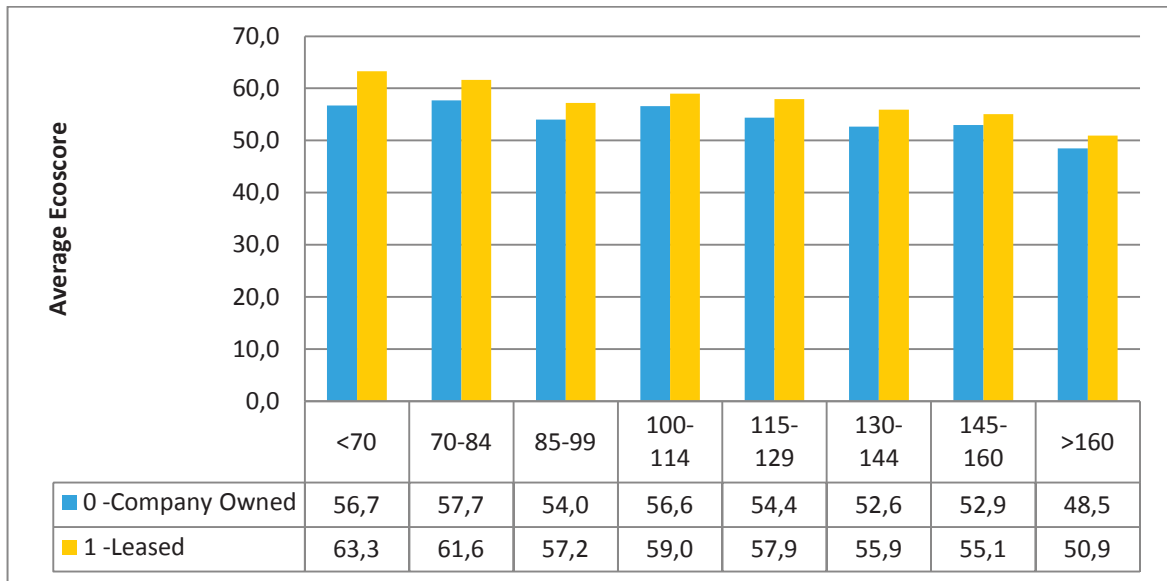


Figure 54: Average Ecoscore per CO<sub>2</sub>-emission group (g/km) for company owned and company leased cars (2009)

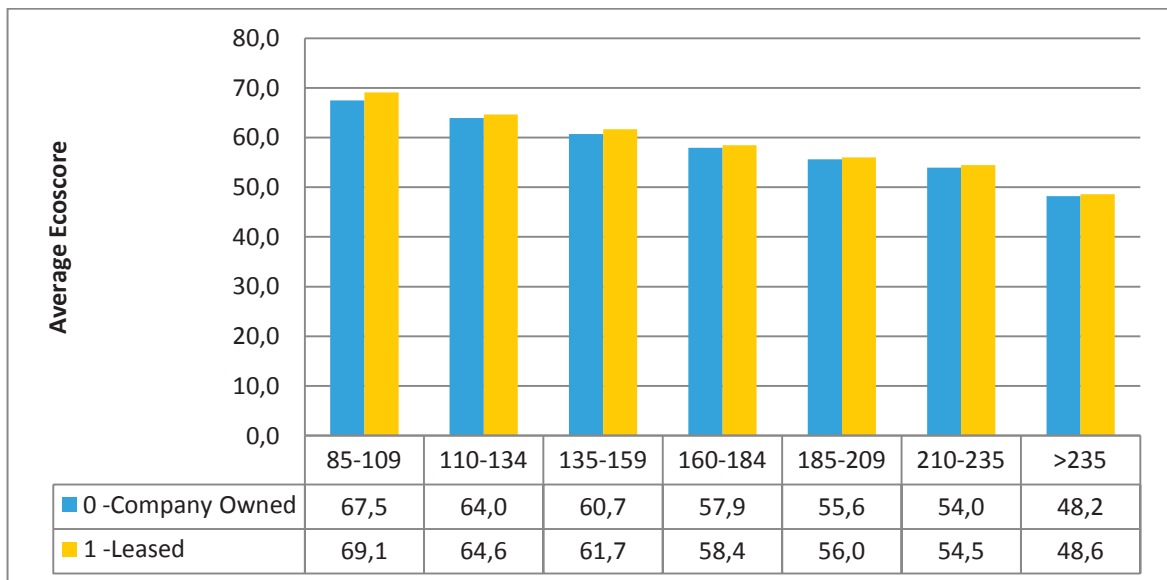
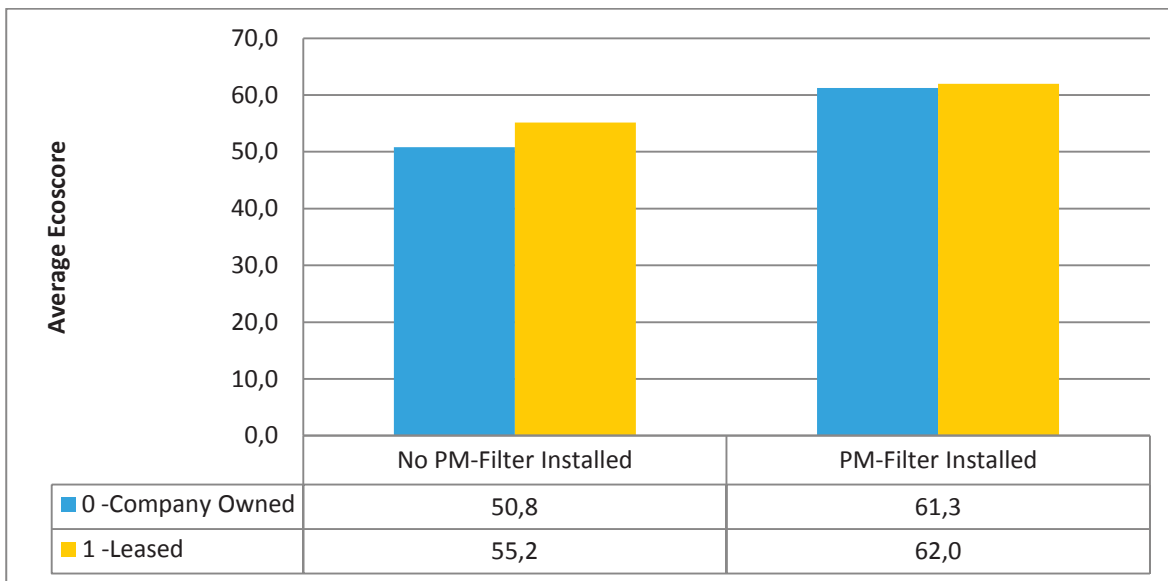
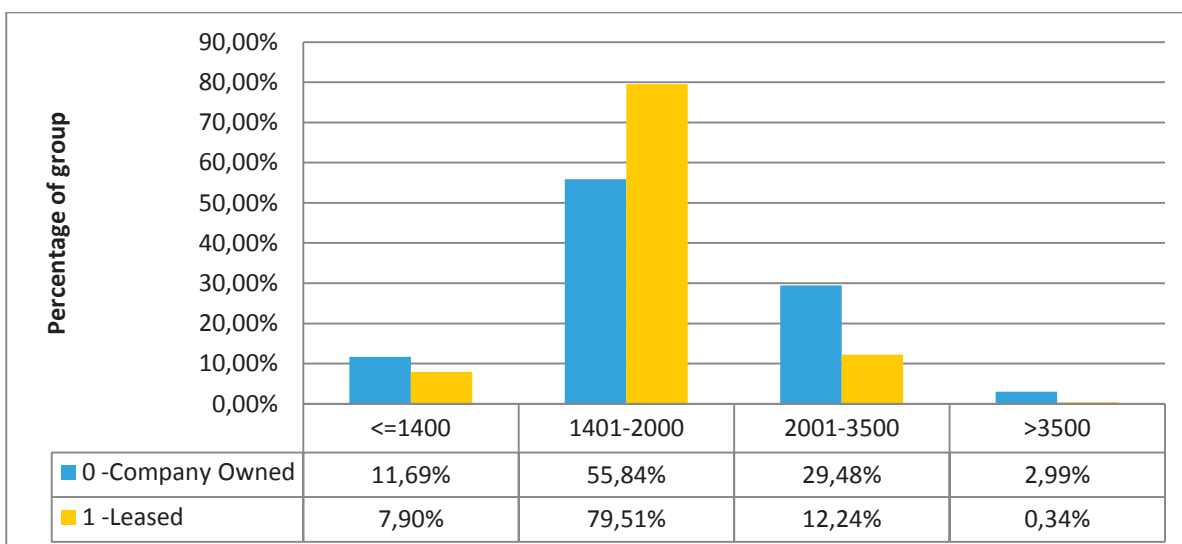


Figure 55: Average Ecoscore versus PM-filter installed for company owned and company leased diesel cars (2009)



### 3.6 Cylinder Size Distribution

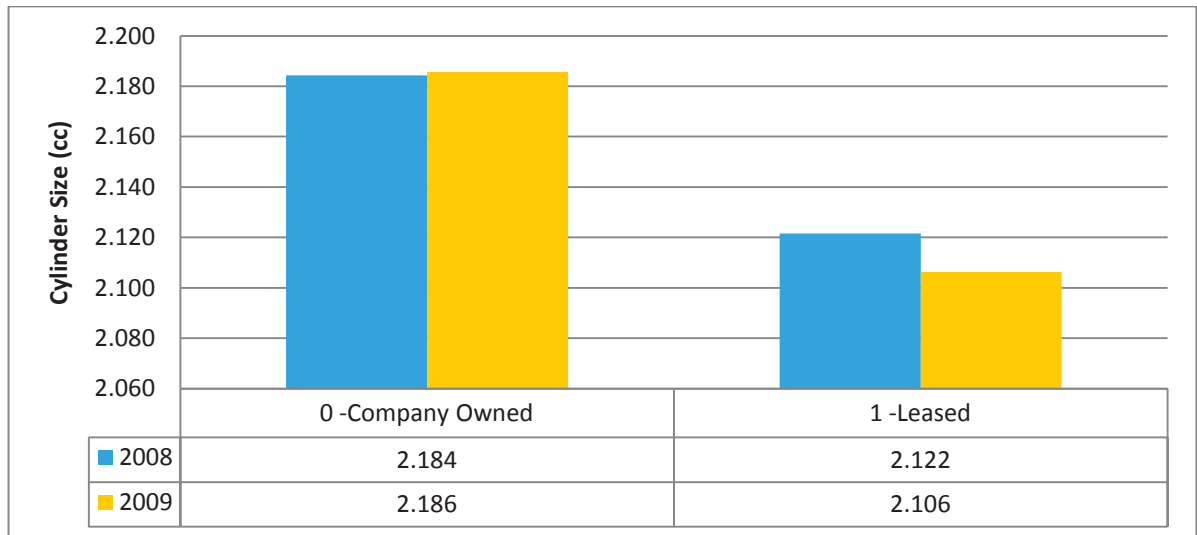
Figure 56: Cylinder size distribution (cc) for company owned cars and company leased cars (2009)



Most company leased cars have an engine size between 1401 and 2000cc (80%). This is also the biggest category for the company owned vehicles (56%) but their share in this group is smaller. The second most represented category for the company owned vehicles is the category of engine sizes between 2001 and 3500cc (29%) followed by the <=1400cc category (12%). Compared to the company leased vehicles the category of >3500cc vehicles is much bigger (2,99% vs. 0,34%), but also in the smallest category the company owned cars are better represented (11,69% vs. 7,90%).

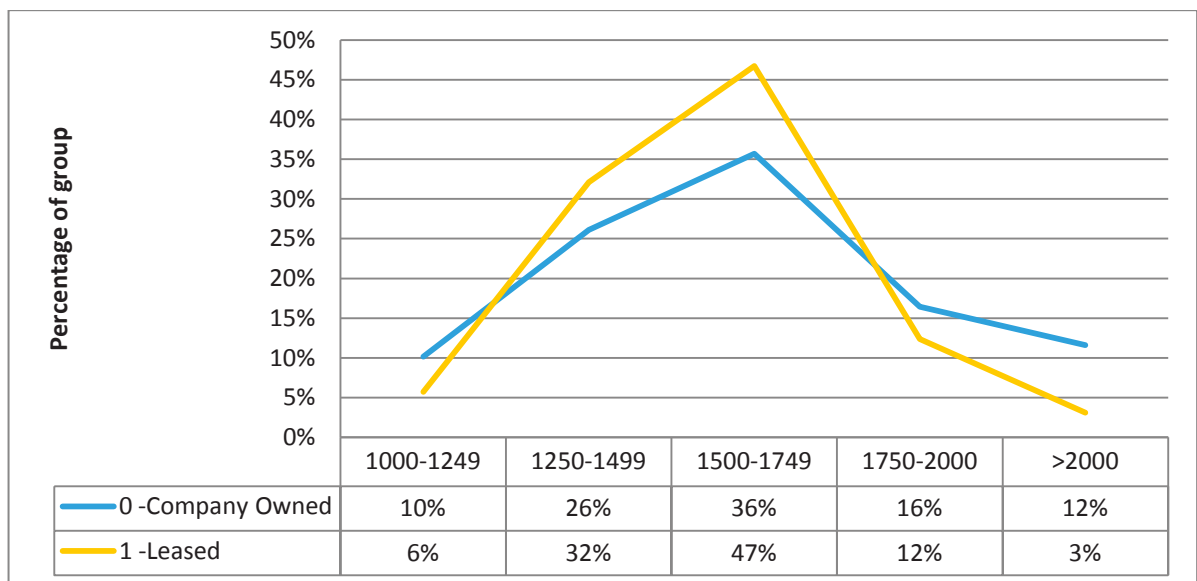
Due to the differences in distribution the average engine size of company owned cars is slightly higher (2.186cc vs. 2.106cc in 2009) than that of company leased cars.

Figure 57: Average cylinder size (cc) of company owned cars vs. company leased cars (2009)



### 3.7 Mass Distribution

Figure 58: Mass distribution (kg) of company owned cars vs. company leased cars



The distribution of the weight of company owned cars and company leased cars is about the same. The share of light company leased cars (6%) is lower than that of the company owned cars (10%) but in the following two categories (1250cc-1499cc and

1500cc-1749cc) their share is higher. Relatively there are more heavy company owned vehicles (+1750kg: 28% vs. 15%) than there are heavy company leased vehicles.

### 3.8 Engine Power Distribution

In the higher (>115 kW) and lowest (<70 kW) engine power categories, the company owned cars are better represented. The large majority of lease cars belong to the categories between 70 and 114 kW, where they are better represented than the company owned cars. The average engine power is highest for lease cars and increases from 2008 to 2009, but due to a larger increase the company owned cars are catching up.

Figure 59: Engine power (kW) distribution for company owned cars vs. company leased cars

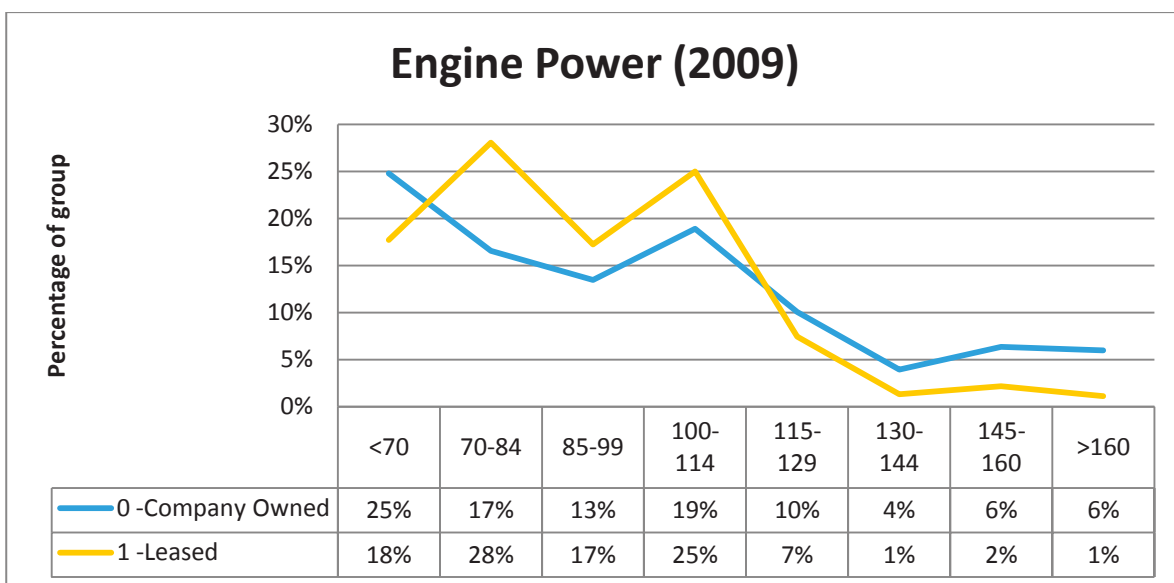
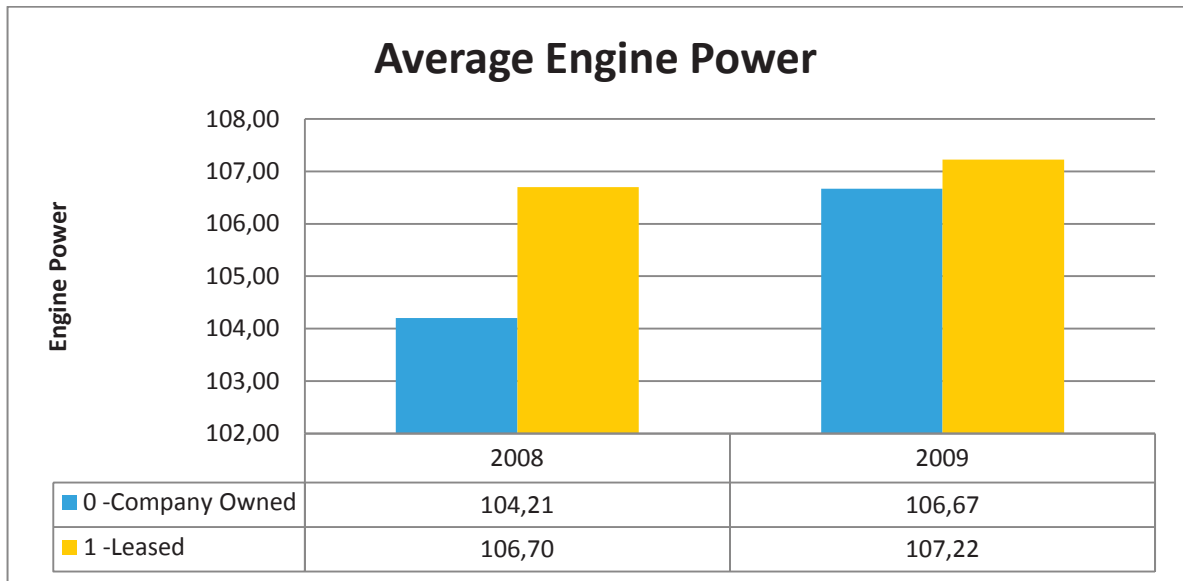
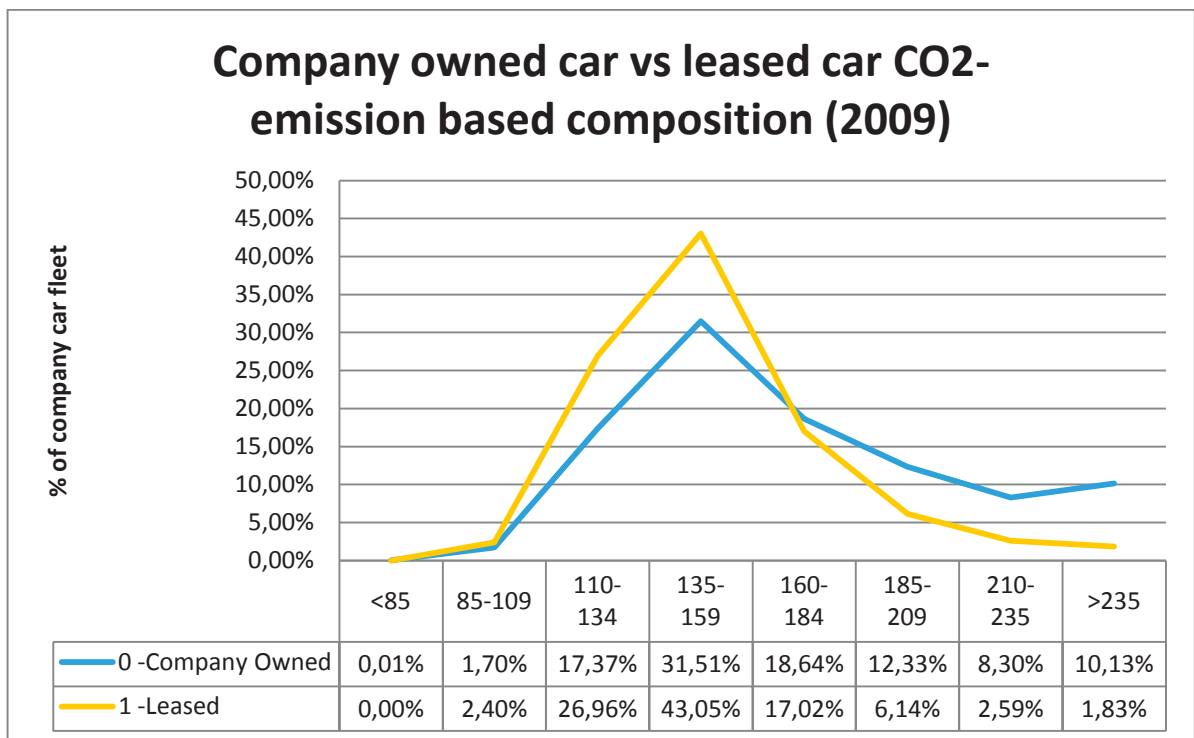


Figure 60: Average engine power (kW) of company owned cars vs. company leased cars



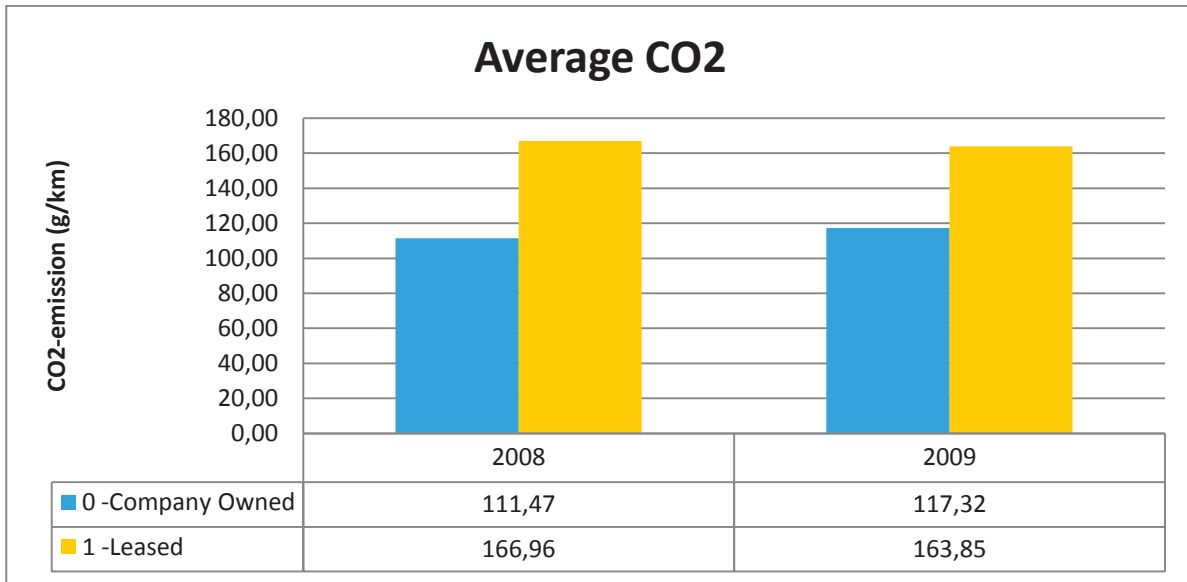
### 3.9 CO<sub>2</sub>-emission Distribution

Figure 61: Distribution of CO<sub>2</sub>-emissions (g/km) of company owned cars vs. company leased cars



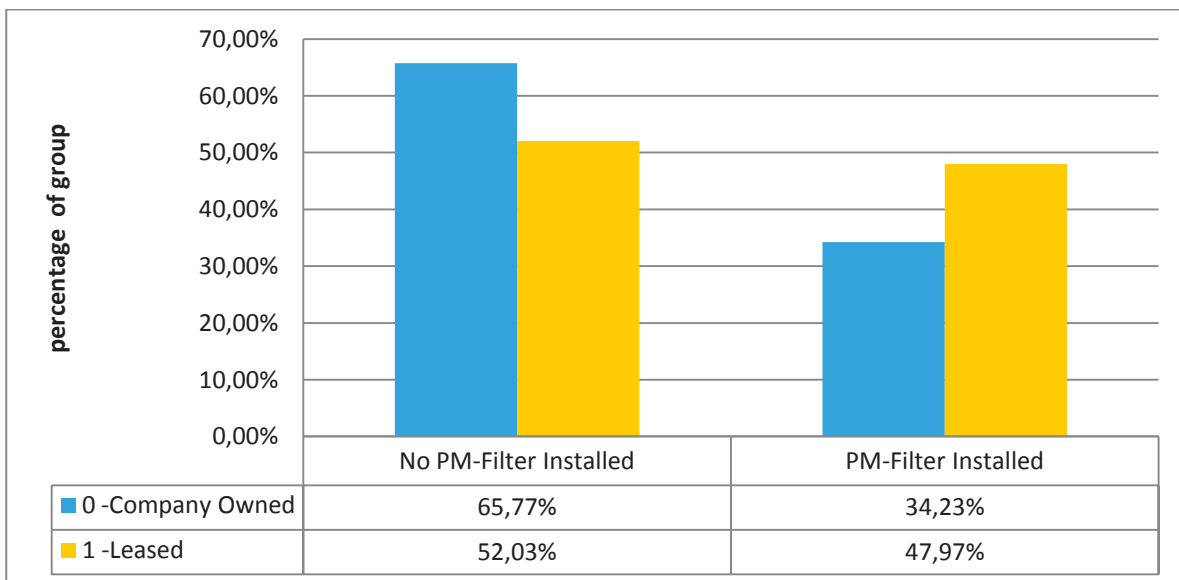
Most company cars have a CO<sub>2</sub>-emission between 135g/km and 159g/km. The share of company owned cars in this category is lower than the share of company leased cars. The company owned cars are also better represented in the higher emission categories (>160 g/km).

Figure 62: Average CO<sub>2</sub>-emission (g/km) evolution of company owned cars and company leased cars



### 3.10 Particulate Matter Distribution

Figure 63: PM-filters installed company owned versus company leased diesel cars



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More leased company diesel cars have a particulate matter filter installed than company owned vehicles. Still the majority of company cars do not have a PM-filter installed.

## CHAPTER 4 CONCLUSIONS

The Belgian car fleet has grown with 4,2% comparing 2009 to 2006. The growth takes place in all regions, with a faster growth than average in the Brussels Capital Region and a slower growth in Flanders. Compared to 2008, the biggest growth in 2009 was in the Walloon Region, and the smallest growth was once again in Flanders.

In general, the same evolutions can be seen over the 3 regions, with slight differences in speed and amount of change. Overall (see Table 17) it can be said that compared to 2006 the overall fleet of 2009 has become slightly younger (-0,3 years), is slightly lighter (+6 kg), has around the same cylinder size but a slightly higher engine power (+4kW). The average CO<sub>2</sub>-emission has gone down with 4,2 g/km, and the average ecoscore has increased with 4,4 points, which equals an increase of 8,5%.

The share of diesel cars in the Belgian car fleet is still increasing (+7,6% in 2009 compared to 2006).

	2006 All cars	2009 All cars	Difference 2009 vs. 2006	% 2009 vs. 2006
<b>Number of cars</b>	4.798.996	5.000.617	+201.621	+4,2%
<b>Avg. Age</b>	6,3 years	6,1 years	-0,2 years	-3,2%
<b>Avg. Ecoscore</b>	51,5	55,9	+4,4	+8,5%
<b>Avg. Weight</b>	1.401 kg	1.395 kg	-6 kg	-0,4%
<b>Avg. Engine Size</b>	1709 cc	1707 cc	-2 cc	-0,1%
<b>Avg. Engine Power</b>	71 kW	75 kW	+4 kW	+5,6%
<b>Avg. CO<sub>2</sub>-emission</b>	156,1 g/km	151,9 g/km	-4,2 g/km	-2,7%
<b>Share of diesel cars</b>	53,6%	61,2%	+7,6%	

Table 17 Comparison data whole fleet 2006-2009



Since 2008, we are able to split the data into company cars and private cars. In the overview below average vehicle characteristics of these two types of vehicles are compared based on the 2009 data. We can see (Table 18) that private cars, compared to company cars, in 2009 are generally older (+3,7 years), lighter (-229kg), have smaller engines (-331 cc), generate less engine power (-25 kW), and are less frequently diesel cars (-28%). Private cars have a significantly lower average CO<sub>2</sub>-emission, but also a lower average ecoscore (-2,2). This is probably due to the fact that they are older cars, and thus have higher levels of pollutant emissions.

	2009 Company Cars	2009 Private Cars	Difference private vs. company	% private vs. company
<b>Total Number</b>	744.633	4.216.677		
<b>Avg. Age</b>	3,0 years	6,7 years	+3,7 years	+55,2%
<b>Avg. Ecoscore</b>	57,8	55,6	-2,2	-4,0%
<b>Avg. Weight</b>	1590 kg	1361 kg	-229 kg	-16,8%
<b>Avg. Engine Size</b>	1989 cc	1658 cc	-331 cc	-20,0%
<b>Avg. Engine Power</b>	96 kW	71 kW	-25 kW	-35,2%
<b>Avg. CO<sub>2</sub>-emission</b>	163,5 g/km	149,8 g/km	-13,7 g/km	-9,1%
<b>Share of diesel cars</b>	85%	57%	-28%	

Table 18 Comparison data company cars and private cars (2009)

We can also split the data of company cars into "company owned cars" and "company leased cars". We can see (Table 19) that company leased cars, compared to company owned cars, in 2009 are generally younger (-1,8 years), slightly lighter (-54kg), have smaller engines (-198 cc), generate less engine power (-9 kW), and are more frequently diesel cars (+17%). Company leased cars have significantly lower average CO<sub>2</sub>-emissions (-20 g/km), and have a significantly higher ecoscore (+5,7).

	2009 Company Owned Cars	2009 Company Leased Cars	Difference leased vs. owned	% leased vs. owned
<b>Total Number</b>	466.004	281.129		
<b>Avg. Age</b>	3,7 years	1,9 years	-1,8 years	-48,6%
<b>Avg. Ecoscore</b>	55,7	61,4	+5,7	+10,2%
<b>Avg. Weight</b>	1610 kg	1556 kg	-54 kg	-3,4%
<b>Avg. Engine Size</b>	2064 cc	1866 cc	-198 cc	-9,6%
<b>Avg. Engine Power</b>	99 kW	90 kW	-9 kW	-9,1%
<b>Avg. CO<sub>2</sub>-emission</b>	171 g/km	151 g/km	-20 g/km	-11,7%
<b>Share of diesel cars</b>	79%	96%	+17%	

Table 19 Comparison data company owned cars and company leased cars (2009)