

# The European Emission Standards of the Car Fleet Registered across Scotland's Main Cities

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## Key Findings

- The configuration of Scotland's car fleet is quite distinct from the rest of the United Kingdom in terms of European Emission Standards
  - Generally, Scotland has higher proportions of Euro 5 and Euro 6 cars as compared to over Government Office Regions
- The car fleets registered across Scotland's four main cities are also distinct
  - Aberdeen has higher proportions of Euro 5 and higher cars
  - Edinburgh has higher proportions of Euro 3 and lower cars
- The direct economic cost of restricting the use of pre Euro 4 petrol and pre Euro 6 diesel cars is likely to be contingent on:
  - The number of vehicles effected by the restrictions
  - The change in asset value associated with these restrictions
  - The introduction and uptake of policy designed to partially offset the changes in asset value

## Scotland Overview

The quantity of cars complying with certain European Emission Standards (Euro bands) is constantly varying across time and space as new cars are bought, used cars are sold and old cars are scrapped. Underpinning these dynamics of the car stock are a series of spatial trends which are temporally persistent and indicative of underlining issues. For instance, the average age of the car fleet in Scotland is the lowest of any Government Office Region (GORs) and has been for the past five years (mean age of private cars being 6.8 years on Scotland, 8.2 years in Wales and 8.5 years in England), suggesting that car owners in Scotland have a heightened preference for newer cars.

Such spatial trends can also be observed in the Euro bands, with different areas having registered fleets with higher proportions of their cars in certain bands. Table 1 compares Scotland's private car fleet to other GORs in relation to the proportion of the fleet which is assigned to different Euro bands by fuel type as of August 2016. Here, it is clear that Scotland has the highest proportion of Euro 5 and above diesel and petrol cars, due to the relative newness of the fleet in Scotland. Figure 1 illustrates the structure of Scotland's car fleet in reference to Euro bands, with the Euro 4 and 5 bands containing the most cars for both petrol and diesel.

There are 797,292 private diesel cars registered in Scotland that are not compliant to the Euro 6 emission standard as well as 385,598 private petrol cars that are not compliant to the Euro 4 emission standard. Cumulatively, this equates to 53.34% of privately owned cars in Scotland being not compliant to these standards.

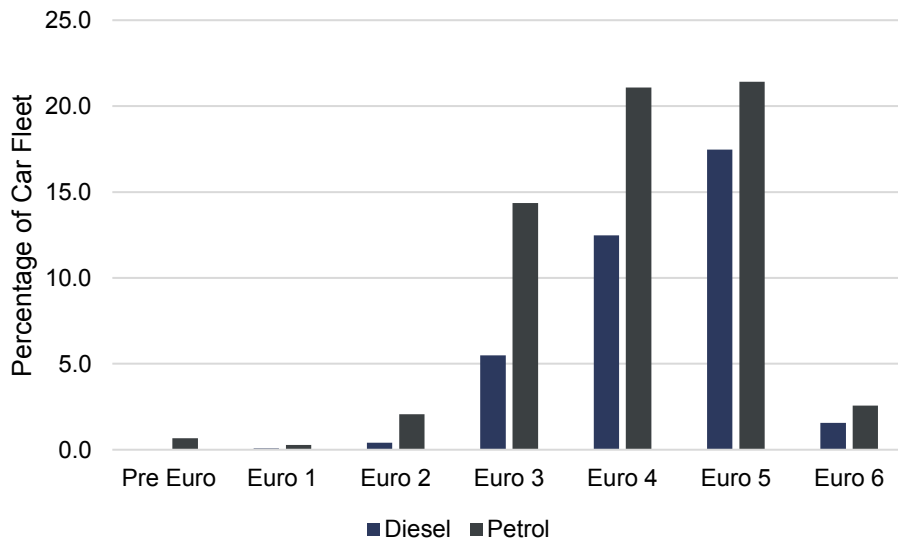


Figure 1: Private car registrations by European Emission Standard in Scotland as of August 2016

The European Emission Standards of the Car Fleet Registered across Scotland's Main Cities

Table 1: Proportion of the private car fleet registered in August 2016 across the different Euro emission bands by fuel type disaggregated at the Government Office Region level

Government Office Region	Total Cars	Diesel									Petrol						
		Diesel	Petrol	Pre Euro	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6	Pre Euro	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6
Scotland	2,217,342	37.5%	62.5%	0.0%	0.1%	0.4%	5.5%	12.5%	17.5%	1.6%	0.7%	0.3%	2.1%	14.4%	21.1%	21.4%	2.6%
Wales	1,415,140	39.8%	60.2%	0.0%	0.2%	1.0%	9.2%	15.3%	12.9%	1.1%	1.0%	0.6%	4.1%	18.5%	19.6%	14.5%	2.0%
Northern Ireland	828,773	52.8%	47.2%	0.0%	0.2%	1.5%	13.7%	20.6%	15.9%	0.9%	0.6%	0.3%	2.6%	13.6%	16.4%	12.3%	1.3%
England	23,270,600	35.0%	65.0%	0.0%	0.2%	0.7%	7.5%	13.4%	12.0%	1.1%	1.3%	0.8%	4.9%	20.9%	20.1%	15.0%	2.1%
East Midlands	2,138,599	37.5%	62.5%	0.0%	0.2%	0.8%	8.2%	14.4%	12.9%	1.1%	1.3%	0.6%	4.4%	20.6%	19.5%	14.3%	1.8%
East of England	2,974,348	34.1%	65.9%	0.0%	0.2%	0.7%	7.4%	13.0%	11.7%	1.1%	1.5%	0.9%	5.3%	21.4%	19.7%	14.9%	2.1%
London	2,438,759	29.1%	70.9%	0.0%	0.1%	0.5%	6.1%	11.6%	10.0%	0.8%	1.4%	1.3%	6.7%	24.7%	21.9%	13.2%	1.7%
North East	1,028,674	38.1%	61.9%	0.0%	0.1%	0.5%	7.1%	14.5%	14.6%	1.4%	0.7%	0.3%	2.3%	17.0%	20.7%	18.4%	2.5%
North West	2,913,910	35.0%	65.0%	0.0%	0.1%	0.6%	7.0%	13.1%	13.0%	1.2%	0.9%	0.5%	3.7%	19.0%	21.1%	17.5%	2.4%
South East	4,388,573	33.2%	66.8%	0.0%	0.2%	0.7%	7.0%	12.8%	11.4%	1.1%	1.7%	1.0%	5.8%	21.6%	20.2%	14.6%	2.0%
South West	2,693,817	36.7%	63.3%	0.1%	0.3%	1.2%	9.5%	14.0%	10.7%	1.0%	1.7%	1.0%	6.2%	21.8%	18.2%	12.6%	1.8%

The European Emission Standards of the Car Fleet Registered across Scotland's Main Cities

West Midlands	2,517,172	36.4%	63.6%	0.0%	0.2%	0.8%	8.3%	13.7%	12.1%	1.3%	1.3%	0.7%	4.4%	20.0%	19.5%	15.3%	2.4%
Yorkshire	2,176,748	38.5%	61.5%	0.0%	0.1%	0.6%	7.8%	14.9%	13.7%	1.4%	0.9%	0.4%	3.2%	18.7%	20.4%	15.7%	2.0%
United Kingdom	27,731,855	36.0%	64.0%	0.0%	0.2%	0.7%	7.7%	13.6%	12.6%	1.2%	1.2%	0.7%	4.6%	20.0%	20.0%	15.4%	2.1%

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## City Overview

The structures of the car fleet registered within Scotland's four major cities (i.e. Aberdeen, Dundee, Edinburgh and Glasgow) are also different from one another. Figure 2 displays the stratification of the car fleet across these cities in reference to Euro bands for diesel (upper chart) and petrol (lower chart). In terms of observations which stand out, Aberdeen has a notably higher level of Euro 5 Diesel and Petrol car registrations compared to the other four cities whilst having relatively lower levels of Euro 3 Petrol and Diesel car registrations.

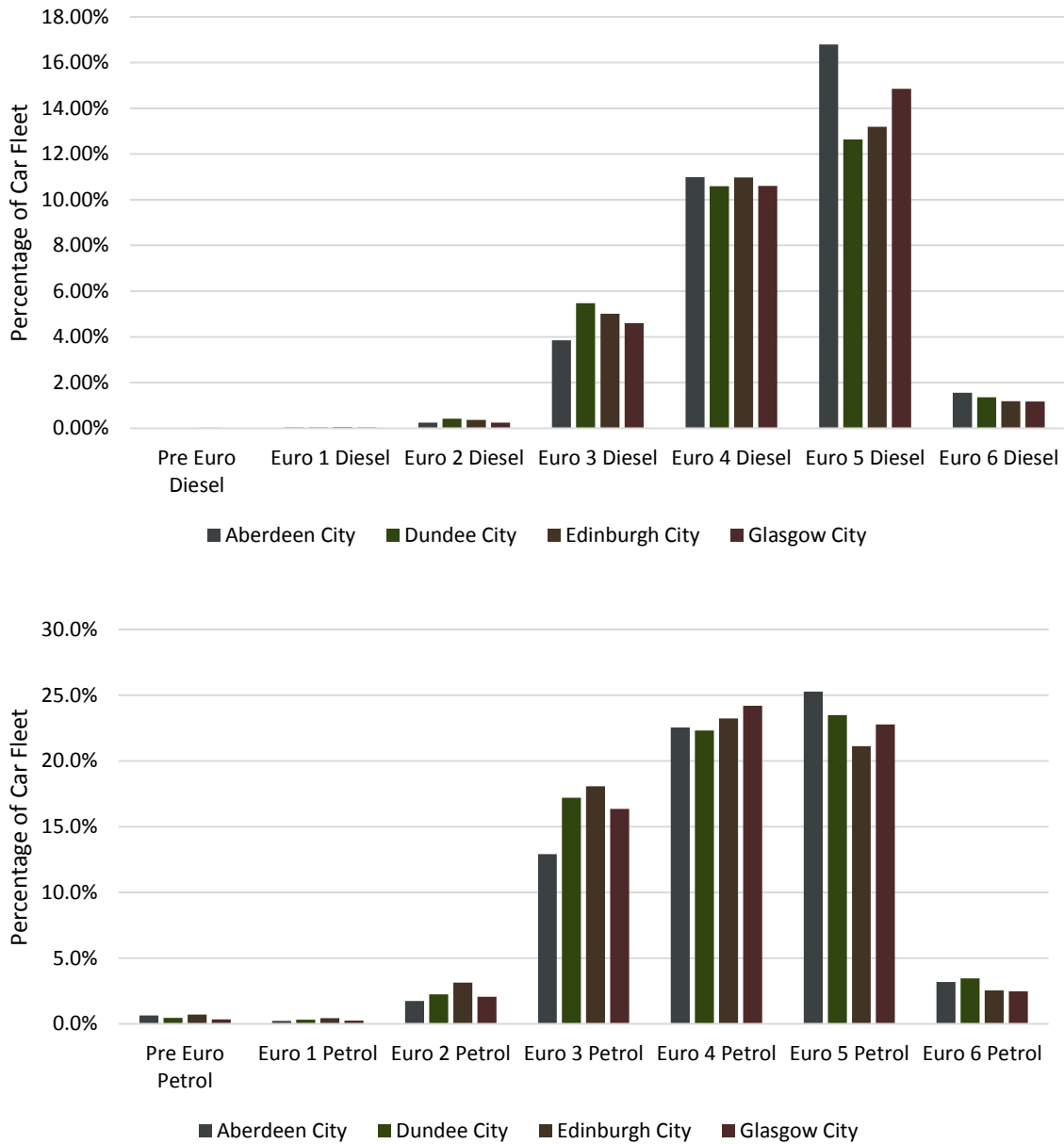


Figure 2: Private car registrations by European Emission Standards across Scotland's four major cities by [upper chart] diesel and [lower chart] petrol

Table 2 summarises the proportion of the private car fleets registered across the four cities which would not be compliant with Euro 6 diesel and Euro 4 petrol European Emission standards. Over all of the cities, 234,346 private cars would not be compliant to the proposed standards.

Table 2: The number of private cars not compliant to Euro 6 diesel and Euro 4 petrol European Emission Standards by Scottish city

City	Diesel Cars	Petrol Cars	Combined Percent
Aberdeen City	28,481	13,842	47.4%
Dundee City	14,681	10,175	49.4%
Edinburgh City	47,852	36,083	51.9%
Glasgow City	51,177	32,055	49.4%

To further investigate the degree of variation in compliance to the Euro 6 diesel and Euro 4 petrol emission standards within the four main cities, Figure 3 presents a series of boxplots which display compliance rates at Datazone level. From this visualisation, it is clear to see that all four of the cities display similar standard deviations, though Glasgow City exhibits a relatively large number of outliers in the right tail of its distribution (i.e. a large number of Datazones with relatively high rates of non-compliance).

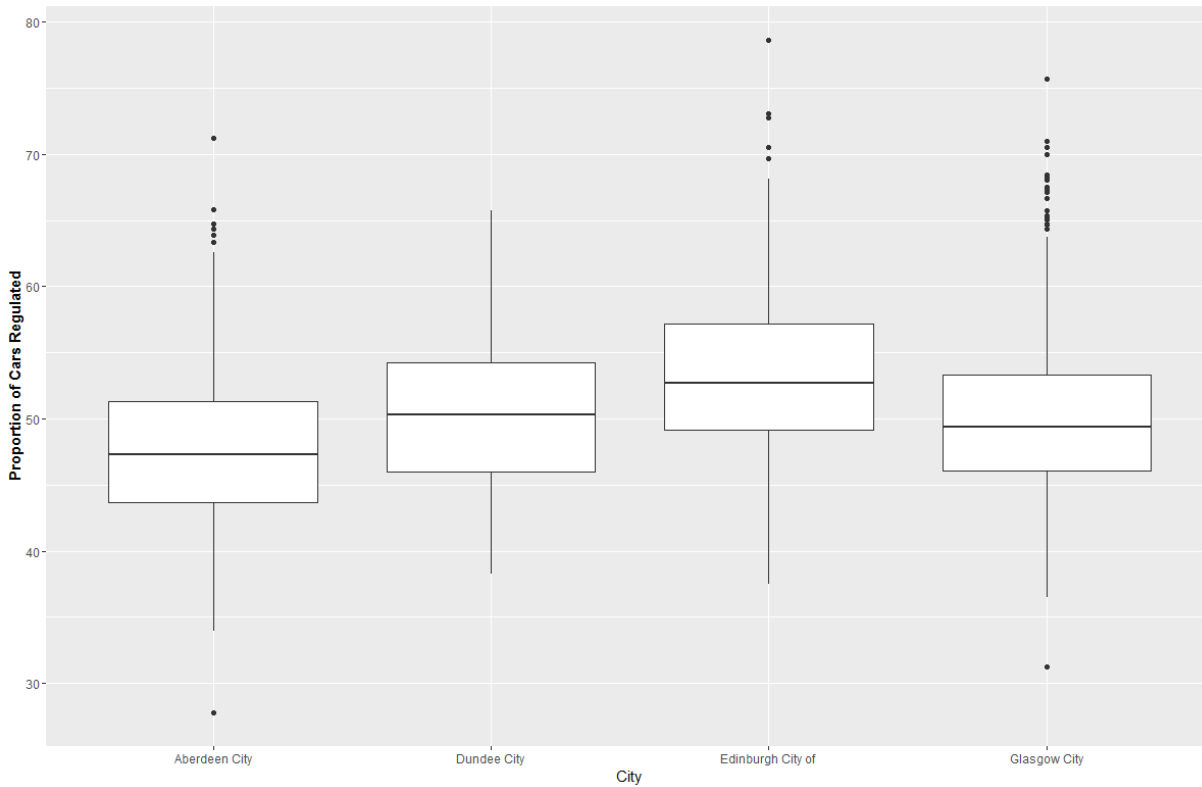


Figure 3: Boxplots displaying the distribution of compliance rates to Euro 6 diesel and Euro 4 petrol emission standards over the Datazones of Scotland's four main cities

## Cost Overview

In order to use the private car registration data presented in the preceding sections to estimate associated costs of introducing a Clean Air Zone policy, a number of assumptions will need to be made. These are partially listed and described here.

### Level of Compliance at Policy Implementation

The registration data presented here relates to the structure of the private car fleet as of August 2016. Due to fleet turnover, it is likely that fewer non-complaint cars will be in circulation when the CAZ is introduced. Fleet forecasting methods can be applied in order to estimate the structure of the fleet at different points in the future.

### Asset Value

When the scheme is announced and introduced, it will likely cause cars that are not compliant to the adopted Euro band standards to decrease in value. In order to consider this effect, two issues are of particular relevance. The first is the quantity of decrease in value likely to be generated per vehicle (i.e. the percentage decrease). The second is the number of vehicles likely to be effected by the decrease in value (i.e. if the impact is restricted to the local car market or extends outwards). Similarly, cars that are complaint to the adopted Euro band standards will likely increase in value, with the same quantification method outlined above capable of estimating the magnitude of this increase in value.

## Policy Options

The implementation of a CAZ could coincide with the introduction of a number of ancillary policies which are likely to be associated with additional costs. For instance, a scrappage scheme could be opened to allow owners of cars not compliant to the Euro band standards to trade-in their cars for a set outcome. The outcome could come in different forms such as a cash payment, money off the purchase of a compliant car or free access to public transportation (e.g. a gratis annual bus pass). The specific outcome selected will likely influence the number of applications to such an ancillary policy which in turn would affect the level of associated expenditure.

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