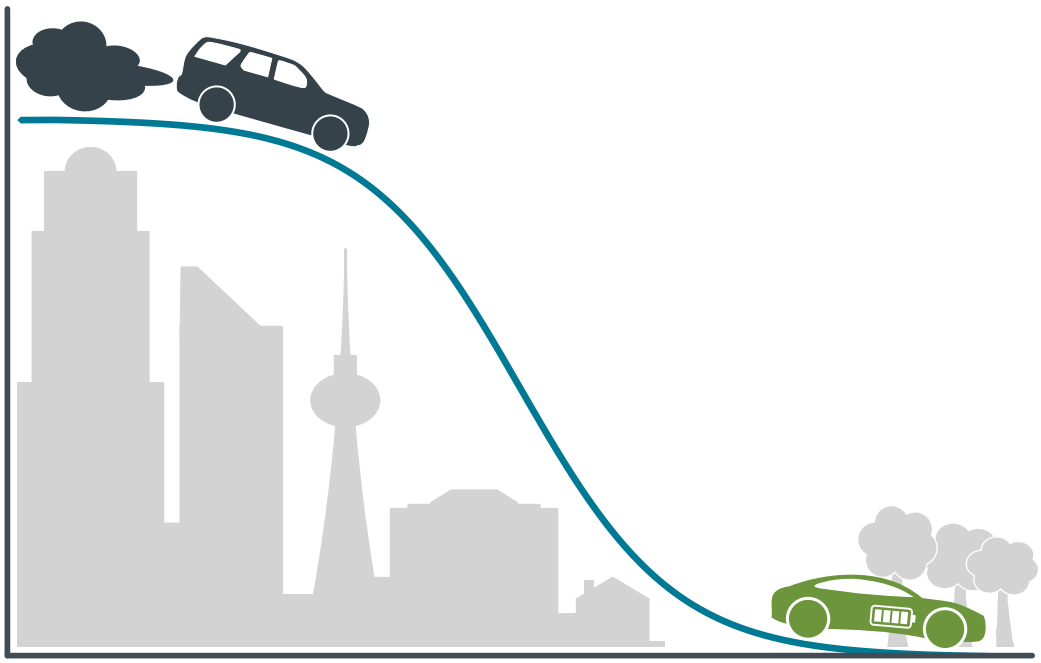
SUMMARY REPORT

APRIL 2017

CLEANER CAR CONTRACTS BENCHMARK 2017

OVERVIEW OF VEHICLE FLEETS AND EFFICIENCY BENCHMARK



Cleaner Car CONTRACTS

icct THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

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About the Cleaner Car Contracts initiative

Cleaner Car Contracts is a collaboration of European fleet owning and leasing companies aiming to introduce more fuel-efficient cars into the European vehicle fleet. Cleaner Car Contracts and participating companies improve employee mobility and reduce corporate emissions. The initiative was established in 2010 by Natuur & Milieu. It now brings together many companies in the Netherlands and Belgium working on a more fuel-efficient car fleet and calling upon the EU to set ambitious real-world carbon dioxide targets for vehicles.

The International Council on Clean Transportation (ICCT) is an independent nonprofit organization founded to provide first-rate, unbiased research and technical and scientific analysis to environmental regulators. The ICCT analyzes fuel consumption data from the Cleaner Car Contracts initiative since 2015. Summary results are published in the From Laboratory to Road study, which investigates the gap between on-road and official carbon dioxide emissions of European passenger cars.

1 Introduction

This report summarizes results from the 2017 Cleaner Car Contracts (CCC) vehicle fleet benchmark. The benchmark compares company fleets in terms of vehicle technologies and carbon dioxide (CO_2) emissions. Sixteen companies provided data for approximately 39,000 vehicles, with the majority of vehicle model years ranging from 2009 to 2017. The benchmark uses both official and on-road CO_2 figures because the official and on-road performance of vehicles can differ dramatically. Valid CO_2 values were collected for roughly 28,000 passenger cars and vans. This report sums up the development of the participating companies' fleets over time and presents average and best in class CO_2 values for different vehicle categories.

2 Overview of the vehicle fleet

Figure 1 plots the share of different vehicle segments in the Cleaner Car Contracts fleets over model years. Vehicle segments were grouped as follows: small cars (A- and B-segments), medium cars (C- and D-segments), large cars (E-, F-, J- and M-segments), small vans (e.g., Renault Kangoo), and large vans (e.g., VW Transporter). In total, the majority (63%) of vehicles were medium-sized passenger cars, followed by small cars (16%), large vans (10%), large cars (6%), and small vans (5%). The share of medium-sized cars is particularly high for more recent model years. Large variances were observed in segment shares across different company fleets. For instance, some fleets primarily consisted of vans while others included no or few vans.

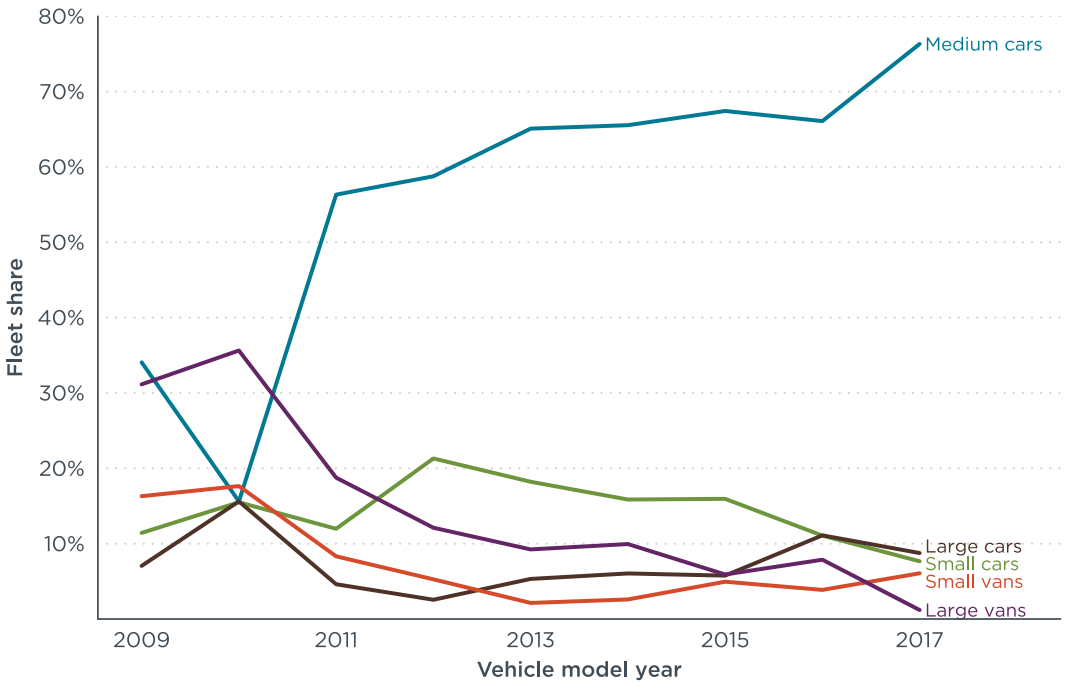

Figure 1: Development of vehicle segment shares

Figure 2 plots the development of power train shares in the Cleaner Car Contracts fleets. In total, roughly 65% of vehicles were diesel powered, while roughly 23% were gasoline powered. The share of plug-in hybrid electric vehicles (PHEVs) significantly increased over time, reaching approximately 15% in 2017. In total, hybrid electric vehicles (HEVs) and PHEVs accounted for 4% and 5% of the fleet, respectively. Other power trains, including battery electric vehicles (BEVs) and gas powered vehicles (using compressed natural gas or liquefied petroleum gas), made up less than 2% of the fleet.

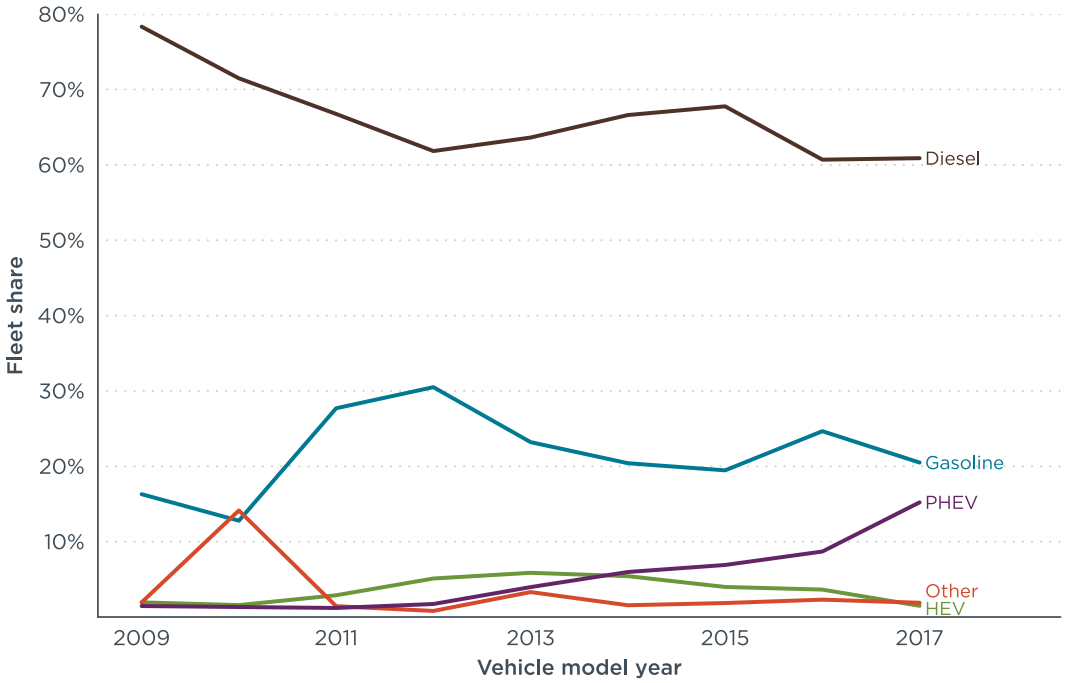

Figure 2: Development of power train shares

3 CO_2 emissions benchmark

The Cleaner Car Contracts vehicle efficiency benchmark focuses on official and on-road CO_2 values. Since virtually all of the carbon in fuel is converted to CO_2 during combustion, these values also reflect fuel consumption. The following factors were used to convert from fuel consumption to CO_2 emission values: 23.4 g/km per l/100 km of gasoline and 26.8 g/km per l/100 km of diesel.

Figure 3 graphs the development of average official and on-road CO_2 emissions over vehicle model years. On paper, newer vehicles in the Cleaner Car Contracts benchmark are more fuel-efficient than older ones: While average official CO_2 emissions of the entire fleet are 112 g/km, new vehicles (model year 2017) have considerably lower official CO_2 values, on average 97 g/km. This downward trend in official values does not necessarily translate into on-road fuel savings due to the increasing gap between official and on-road performance.

Figure 3 shows that average official CO_2 values increased in model year 2016. This is the first increase since 2010. Official values of all vehicles (cars and vans) increased from 100 g/km in 2015 to 105 g/km in 2016, a 5% increase, while official values of cars increased from 93 g/km in 2015 to 96 g/km in 2016, a 3% increase. This trend is confirmed by the Vereniging van Nederlandse Autoleasemaatschappijen, the association of Dutch vehicle leasing companies, which reports a 10% increase in official CO_2 values of all new cars purchased by leasing companies in 2016 (from 92 g/km in 2015 to 101 g/km in 2016). Model year 2017 saw the return of decreasing official CO_2 values in the Cleaner Car Contracts data, but on-road values continued to increase.

Figure 4 displays the development of average official and on-road CO_2 emission values by power train. On-road CO_2 emissions were significantly higher than official values for all power trains, and the gap between official and on-road values has been widening. The gap is particularly high for PHEVs. The figure also differentiates between two vehicle categories: all vehicles and cars only. The difference between these two groups is only noticeable for diesel powered vehicles where all vehicles combined have considerably higher CO_2 emissions than cars. This difference is due to vans, which generally are diesel powered and have comparatively high CO_2 emissions, but decreases in recent model years due to declining van shares (see Figure 1).

Figure 5 plots the development of average official and on-road CO_2 emissions by vehicle segment. Official CO_2 values in all vehicle segments decreased over time, but on-road CO_2 emissions did not decline to the same extent. Excluding PHEVs from the segment averages has a noticeable effect on official CO_2 values in the medium and large car segments, predominatly due to the popularity of the Volvo V60 Plug-In Hybrid in the medium car segment and the Mitsubishi Outlander PHEV in the large car segment. Excluding PHEVs does not have a noticeable effect on the average on-road performance, indicating that PHEVs currently fail to provide significant on-road fuel savings.

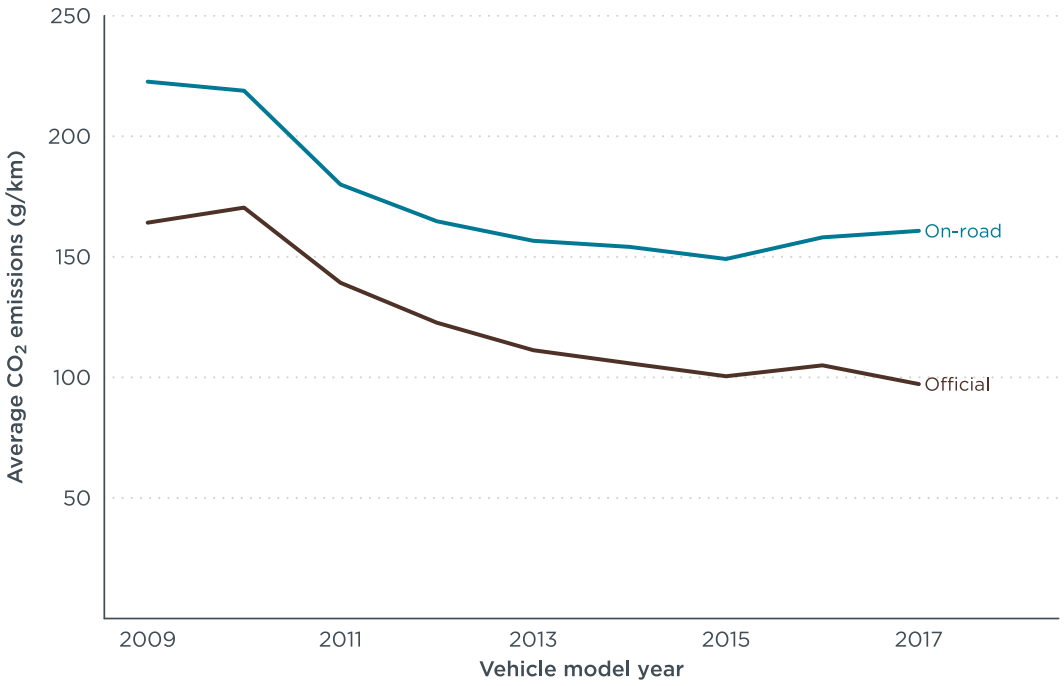

Figure 3: Development of official and on-road CO_2 emissions

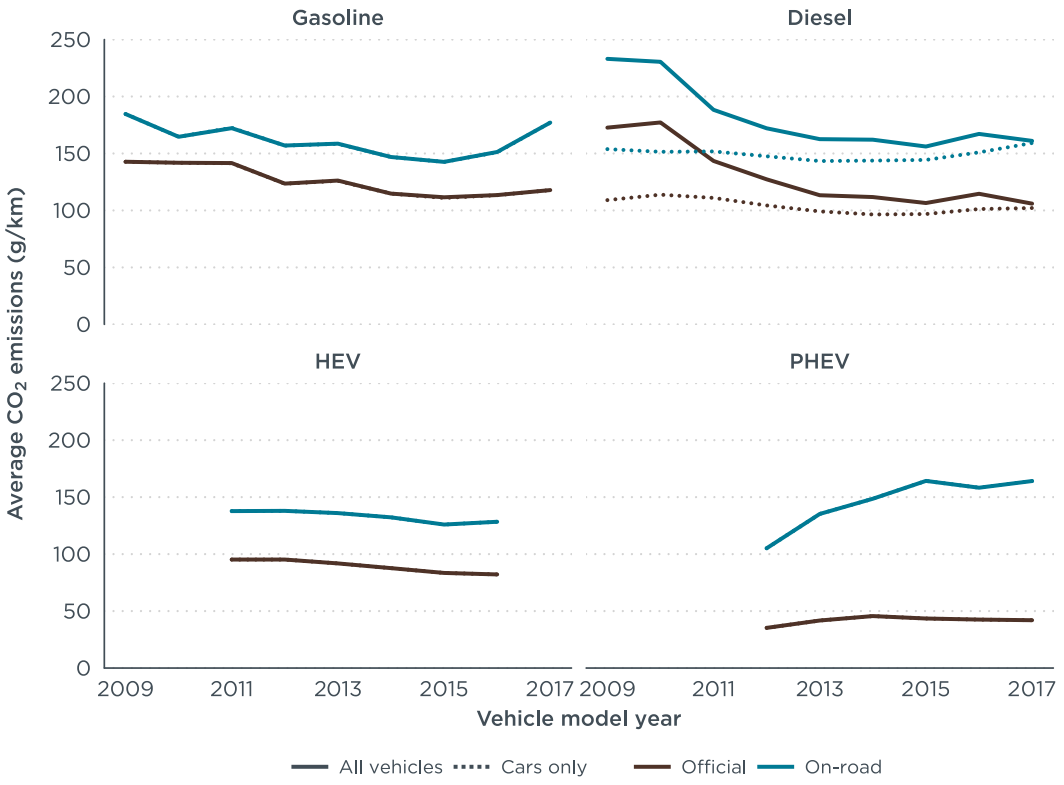

Figure 4: Development of official and on-road CO_2 emissions by power train

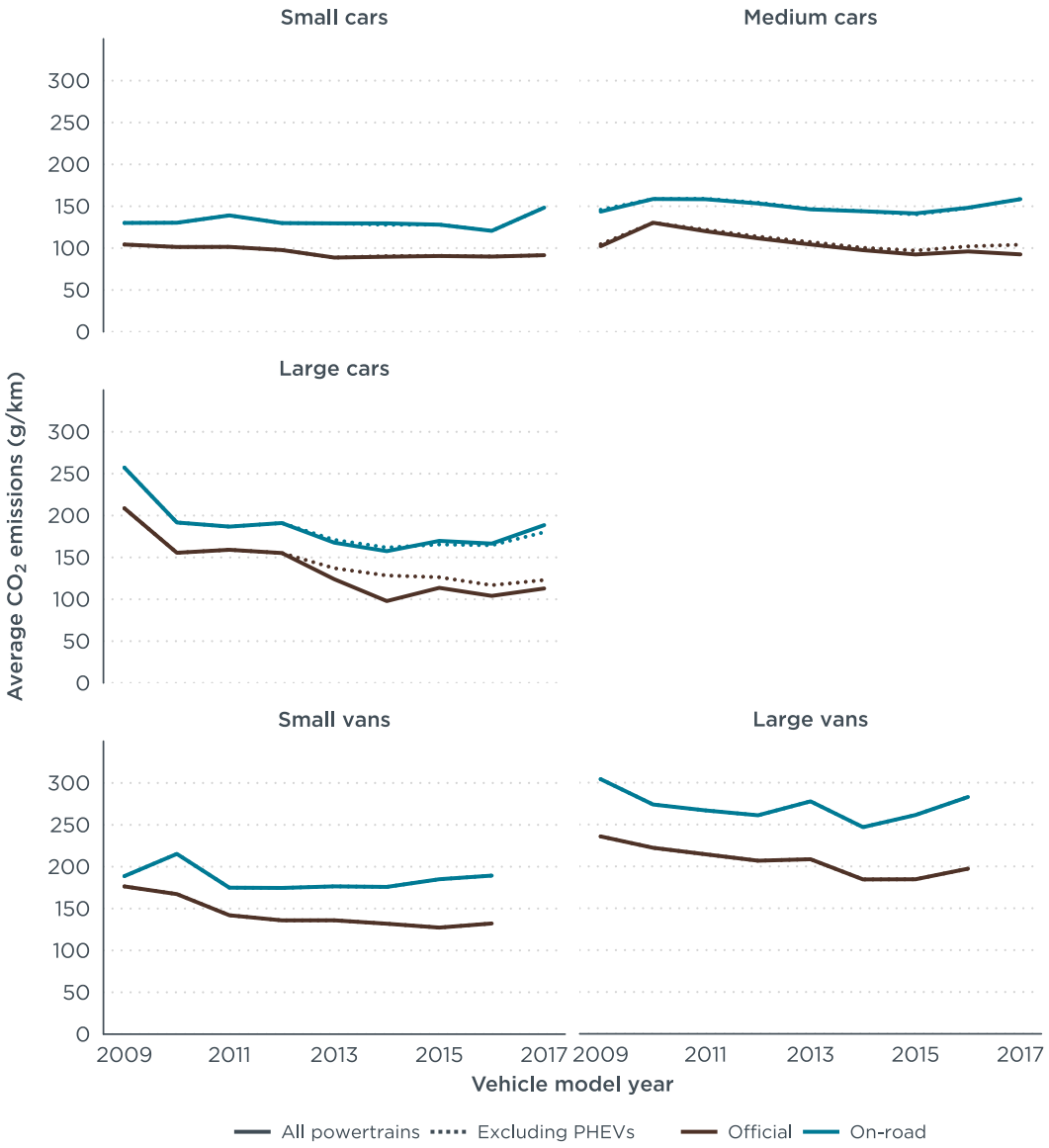

Figure 5: Development of official and on-road CO_2 emissions by vehicle segment, including and excluding PHEVs

Figure 6 plots average official and on-road CO_2 emission values by vehicle category for all companies and model years combined. The figure includes the Cleaner Car Contracts best in class metric, which was defined as the most efficient company fleet in each vehicle category. The figure shows that CO_2 emissions increase with vehicle size and that on-road CO_2 emissions are, on average, 50% higher than official figures.

Electric vehicles play an important role in reducing CO_2 emissions of cars. In the small car category, BEVs were the key driver of the low official and on-road best in class values. In contrast, in the medium and large car categories, official best in class values were set by fleets with a majority of PHEVs, but on-road best in class values were set by fleets with comparatively low shares (<5%) of PHEVs. This inconsistency is due to the high gap observed for PHEVs: On-road emissions of PHEVs were, on average, 270% higher than official values. PHEV owners can close this gap by regularly charging their vehicles.

In van segments, the size of the vehicle largely determines the level of CO_2 emissions. Small vans have considerably lower official (141 g/km) and on-road (186 g/km) CO_2 values than large vans (204 g/km and 266 g/km, respectively). Both small and large vans have a gap of approximately 30%.

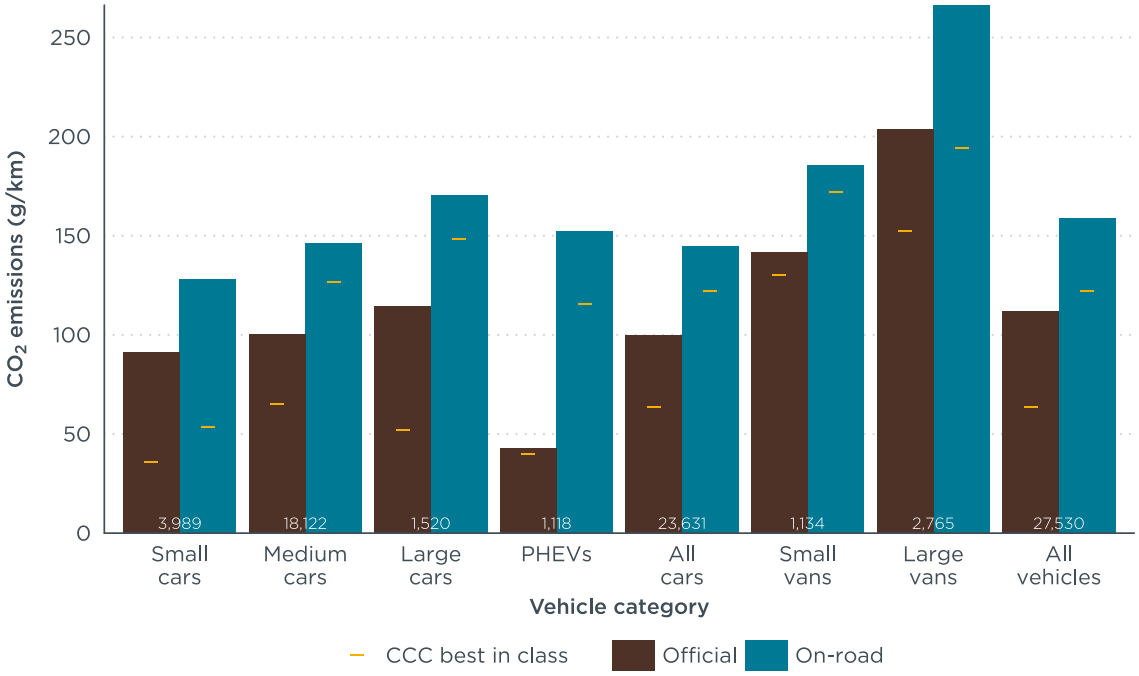

Figure 6: Average and best in class official and on-road CO_2 emissions by vehicle categories

On the whole, this benchmark shows that companies participating in Cleaner Car Contracts are investing in fuel-efficient vehicles, as indicated by decreasing official CO_2 values and the considerable share of HEVs and PHEVs. Nevertheless, these efficiency improvements on paper do not necessarily yield on-road fuel savings, in part due to the increasing gap between official and on-road values. The gap between on-road and official CO_2 values currently costs companies participating in the Cleaner Car Contracts benchmark approxi-

mately *19 million euros per year* (at a fuel price of 1.30 euros per liter) and creates roughly *38 thousand tons of excess CO_2 emissions per year*. For an average medium-sized car, the gap costs approximately 750 euros and creates roughly 1.5 tons of excess CO_2 emissions per year. Unrealistic official CO_2 values are the leading cause of the gap, but companies can reduce fuel expenses and CO_2 emissions by:

- encouraging PHEV drivers to regularly charge their vehicles;
- using smaller, lighter vehicles, hybrid vehicles, or battery electric vehicles;
- selecting vehicle models and manufacturers that have a comparatively low gap (see the From Laboratory to Road study);
- training drivers in eco-driving techniques;
- optimizing routes for fuel savings;
- and supporting policies for more realistic CO_2 emission values and better efficiency labels.