



Environment
Canada

Environnement
Canada



FLEET AVERAGE NO_x EMISSION PERFORMANCE OF 2009 MODEL YEAR LIGHT-DUTY VEHICLES, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY PASSENGER VEHICLES

In relation to the
On-Road Vehicle and Engine Emission Regulations
under the *Canadian Environmental Protection Act, 1999*

Transportation Division
Environment Canada
January 2012

Canada 

Disclaimer

This document provides a summary of data collected pursuant to the *On-Road Vehicle and Engine Emission Regulations*. It does not in any way supersede or modify the requirements of the *Canadian Environmental Protection Act, 1999* or the Regulations made under that Act. In the event of an inconsistency between this document and the Act and/or the Regulations, the Act and the Regulations prevail.

Cat. No.: En81-10/2009E-PDF
ISSN: 1927-2456

Information contained in this publication or product may be reproduced, in part or in whole, and by any means, for personal or public non-commercial purposes, without charge or further permission, unless otherwise specified.

You are asked to:

- Exercise due diligence in ensuring the accuracy of the materials reproduced;
- Indicate both the complete title of the materials reproduced, as well as the author organization; and
- Indicate that the reproduction is a copy of an official work that is published by the Government of Canada and that the reproduction has not been produced in affiliation with or with the endorsement of the Government of Canada.

Commercial reproduction and distribution is prohibited except with written permission from the Government of Canada's copyright administrator, Public Works and Government Services of Canada (PWGSC). For more information, please contact PWGSC at 613-996-6886 or at droitdauteur.copyright@tpsgc-pwgsc.gc.ca.

© Her Majesty the Queen in Right of Canada, represented by the Minister of the Environment, 2012

Aussi disponible en français

Table of Contents

1	Executive Summary	1
2	Purpose.....	2
3	Introduction.....	2
4	Company Fleet Average NO _x Emission Performance for the 2009 Model Year.....	5
4.1	Scope of Company Reports	5
4.2	Distribution of Light-Duty Vehicles, Light Light-Duty Trucks, Heavy Light-Duty Trucks and Medium-Duty Passenger Vehicles.....	5
4.3	Company Fleet Average NO _x Values	6
4.4	NO _x Emission Credits/Deficits for the 2009 Model Year and End of Model Year Balance	7
4.5	Distribution of Bins and NO _x Fleet Average Value for the Canadian Fleet	8
4.6	Fleet Average NO _x Values Trend	10
5	Conclusions.....	11

List of Tables

Table 1: Light-Duty Vehicle, Light Light-Duty Truck, Heavy Light-Duty Truck and Medium-Duty Passenger Vehicle Full Useful Life Exhaust Emission Standards.....	3
Table 2: Fleet Average NO _x Standards.....	3
Table 3: Scope of Company Reports.....	5
Table 4: Summary of Company Average NO _x Values for the Combined Fleet of Light-Duty Vehicles, Light Light-Duty Trucks, Heavy Light-Duty Trucks and Medium-Duty Passenger Vehicles.....	6
Table 5: NO _x Emission Credits/Deficits for the 2009 Model Year and End of Model Year Balance	7
Table 6: Distribution of Vehicles by the NO _x Standard of Each Bin	8

List of Figures

Figure 1: Distribution of the Canadian Fleet by Number of Vehicles in Each Bin.....	9
Figure 2: Distribution of the Canadian Fleet by the Percentage of Vehicles Relative to the Fleet in Each Bin.....	9
Figure 3: Fleet Average NO _x Values and Standards	10

1 EXECUTIVE SUMMARY

Under the *On-Road Vehicle and Engine Emission Regulations* (hereafter referred to as the “Regulations”), each new light-duty vehicle, light-duty truck and medium-duty passenger vehicle is required to be certified by its manufacturer to one of the bins corresponding to those of the United States Environmental Protection Agency for which there are specific emission standards for oxides of nitrogen (NO_x) and other pollutants. In addition, manufacturers and importers of these vehicles are required to report on their fleet average NO_x emission performance for each model year.

This report is the sixth annual performance report and it summarizes the fleet average NO_x emission performance of the Canadian 2009 model-year fleet of vehicles. It includes the fleet average NO_x value for each company as well as their emission credits/deficits. It also provides a comparison of the distribution of vehicles certified to the various emissions bins and the overall NO_x performance with that of previous model years (i.e., 2004 to 2008 model years).

For the 2009 model year, 23 companies submitted end of model year reports comprising a total of 1 351 327 vehicles manufactured in Canada or imported into Canada for the purpose of first retail sale. Each individual company had a fleet average NO_x value that was at or below the standard of 0.07 grams/mile, and all companies complied with the fleet averaging provisions of the Regulations based on their reports.

The average NO_x value for the Canadian 2009 model year combined fleets of light-duty vehicles and light light-duty trucks and of heavy light-duty trucks and medium-duty passenger vehicles is 0.06743109 grams/mile compared to a single combined fleet average NO_x standard of 0.07 grams/mile, and is continuing to decline. This trend is consistent with the objectives of the Regulations.

2 PURPOSE

The purpose of this report is to summarize the fleet average NO_x emission performance of individual companies and the overall Canadian fleet for the 2009 model year (MY) based on data submitted by companies in their end of model year reports; furthermore, it is also to report on the effectiveness of the Canadian fleet average NO_x emission program in achieving the environmental performance objectives.

3 INTRODUCTION

On January 1, 2004, the *On-Road Vehicle and Engine Emission Regulations* (hereafter referred to as the “Regulations”) came into effect under the *Canadian Environmental Protection Act, 1999* (CEPA 1999). These Regulations introduced more stringent national emission standards for on-road vehicles and engines. The Regulations align Canada’s emission standards for light-duty vehicles, light-duty trucks, medium-duty passenger vehicles, heavy-duty vehicles, heavy-duty engines and on-road motorcycles with those of the U.S. Environmental Protection Agency (EPA) through incorporation by reference to the Code of Federal Regulations (CFR).

The Regulations also establish fleet average NO_x standards for light-duty vehicles⁽ⁱ⁾ (LDV), light light-duty trucks⁽ⁱⁱ⁾ (LLDT), heavy light-duty trucks⁽ⁱⁱⁱ⁾ (HLDT) and medium-duty passenger vehicles^(iv) (MDPV). Each new LDV, LLDT, HLDT and MDPV is required to be certified to one of the bins presented in Table 1, for which there are specific emission standards for NO_x and other pollutants. A company’s choice of bin to which individual vehicle models are certified in a given model year is limited by the obligation to comply with the fleet average NO_x standards associated with that model year. Table 2 presents the applicable fleet average NO_x standards for a company’s fleet of LDV, LLDT, HLDT and MDPV.

⁽ⁱ⁾ Light-duty vehicles generally consist of passenger cars.

⁽ⁱⁱ⁾ Light light-duty trucks generally consist of vans, sport utility vehicles and pick-up trucks having GVWR of 2 722 kg (6 000 pounds) or less.

⁽ⁱⁱⁱ⁾ Heavy light-duty trucks generally comprise vans, sport utility vehicles and pick-up trucks having a GVWR of more than 2 722 kg (6 000 pounds) and up to 3 856 kg (8 500 pounds).

^(iv) Medium-duty passenger vehicles generally consist of heavier passenger-type vehicles, such as vans and sport utility vehicles having a gross vehicle weight rating (GVWR) greater than 3 856 kg (8 500 pounds) and less than 4 536 kg (10 000 pounds).

Table 1: Light-Duty Vehicle, Light Light-Duty Truck, Heavy Light-Duty Truck and Medium-Duty Passenger Vehicle Full Useful Life Exhaust Emission Standards (gram/mile)

Bin Number	NO _x	NMOG	CO	Formaldehyde	PM
11	0.9	0.28	7.3	0.032	0.12
10	0.6	0.156/0.230	4.2/6.4	0.018/0.027	0.08
9	0.3	0.090/0.180	4.2	0.018	0.06
8	0.20	0.125/0.156	4.2	0.018	0.02
7	0.15	0.09	4.2	0.018	0.02
6	0.10	0.09	4.2	0.018	0.01
5	0.07	0.09	4.2	0.018	0.01
4	0.04	0.07	2.1	0.011	0.01
3	0.03	0.055	2.1	0.011	0.01
2	0.02	0.01	2.1	0.004	0.01
1	0.00	0.00	0.0	0.000	0.00

Notes: 1) The equivalent limits in units of grams/km are obtained by multiplying the grams/mile value by 0.621.

2) Bins 8 through 10 contain additional temporary, less stringent standards for certain pollutants and for certain vehicles.

3) Bin 11 was only available for MDPV for the 2004 to 2008 model years.

4) Bins 9 and 10 were only available for LDV and LLDT for the 2004 to 2006 model years and for HLDT and MDPV for the 2004 to 2008 model years.

5) Beginning in the 2009 model year, applicable standards are limited to bins 1 to 8 for all categories.

Table 2: Fleet Average NO_x Standards (grams/mile)

Model Year	LDV/LLDT	HLDT/MDPV
2004	0.25	0.53
2005	0.19	0.43
2006	0.13	0.33
2007	0.07	0.20
2008	0.07	0.14
2009 and subsequent model years	0.07	

A company's fleet average NO_x value is the weighted average based on the number of vehicles certified to each bin. The emission bins, fleet average NO_x standards, and methods of calculating fleet average NO_x values are aligned with those of the EPA; however, there are differences in the structure of the NO_x averaging program in Canada, which is designed to recognize vehicles that are sold concurrently in Canada and the U.S. The regulatory requirements are structured to deliver fleet average emissions comparable to those of the U.S. while minimizing the regulatory burden on companies and enabling the marketing of vehicles in Canada independently from the U.S.

The Regulations require that all companies submit a report to the Minister of the Environment no later than May 1 after the end of each model year. The end of model year report must contain detailed information concerning the company's fleet(s) and/or groups of vehicles, including information related to the following:

- statements of allowable elections made by the company in complying with the fleet average NO_x requirements of the Regulations, if any;
- the applicable fleet average NO_x standard;

- the fleet average NO_x value achieved by the company;
- the values used in calculating the company fleet average NO_x value;
- calculation of NO_x emission credits and/or deficits, if any;
- balance of credits or deficits; and
- credit transfers to or from the company, if any.

For more information regarding the calculation of fleet average NO_x values and NO_x emission credits or deficits please refer to the Regulations which can be found on the Environment Canada CEPA Registry at www.ec.gc.ca/CEPARegistry/regulations. Reports for the 2004 to the 2008 model years can also be found on the CEPA Registry.

4 COMPANY FLEET AVERAGE NO_x EMISSION PERFORMANCE FOR THE 2009 MODEL YEAR

4.1 Scope of Company Reports

Table 3 presents a list of the companies that submitted an end of model year report for the 2009 model year in accordance with the requirements of the Regulations, including the vehicle makes as well as the number of test groups covered by their reports.

Table 3: Scope of Company Reports

Company	Makes	Number of Test Groups ¹
Aston Martin Lagonda Limited	Aston Martin	2
BMW Group Canada	BMW, Mini, Rolls-Royce	20
Chrysler Canada Inc.	Chrysler, Dodge, Jeep	27
Ferrari North America, Inc.	Ferrari	3
Ford Motor Company of Canada, Limited	Ford, Lincoln, Mercury	25
General Motors of Canada Limited	Buick, Cadillac, Chevrolet, Hummer, GMC, Pontiac, Saab, Saturn	51
Honda Canada Inc.	Acura, Honda	17
Hyundai Auto Canada Corp.	Hyundai	14
Jaguar (Jaguar Land Rover Canada ULC)	Jaguar	2
Kia Canada Inc.	Kia	14
Land Rover (Jaguar Land Rover Canada ULC)	Land Rover	4
Lotus Cars Limited	Lotus	1
Maserati North America, Inc.	Maserati	1
Mazda Canada Inc.	Mazda	13
Mercedes-Benz Canada Inc.	Maybach, Mercedes, Smart	16
Mitsubishi Motor Sales of Canada, Inc.	Mitsubishi	9
Nissan Canada Inc.	Infiniti, Nissan	23
Porsche Cars Canada, Ltd.	Porsche	7
Subaru Canada, Inc.	Subaru	4
Suzuki Canada Inc.	Suzuki	6
Toyota Canada Inc.	Lexus, Toyota	25
Volkswagen Group	Audi, Bentley, Lamborghini, Volkswagen	26
Volvo Cars of Canada Corp.	Volvo	6

¹A test group is the basic classification unit that comprises LDV, LLDT, HLDT or MDPV having similar exhaust emission performances and that share all of the features described in section 1827, subchapter C, part 86 of the CFR.

A total of 23 companies submitted reports for the 2009 model year covering a total of 310 distinct test groups. It should be noted that certain test groups were common between companies that shared vehicle platforms or powertrains.

4.2 Distribution of Light-Duty Vehicles, Light Light-Duty Trucks, Heavy Light-Duty Trucks and Medium-Duty Passenger Vehicles

Starting with the 2009 model year, companies are required to meet a single fleet average NO_x standard of 0.07 grams/mile for a combined fleet of LDV, LLDT, HLDT and MDPV. Therefore,

companies were not required to distinguish their LDV and LLDT fleet from their HLDT and MDPV fleet in their 2009 model year reports.

4.3 Company Fleet Average NO_x Values

Table 4 summarizes the total number of vehicles and average NO_x values for each company's combined fleet of LDV, LLDT, HLDT and MDPV.

Table 4: Summary of Company Average NO_x Values for the Combined Fleet of Light-Duty Vehicles, Light Light-Duty Trucks, Heavy Light-Duty Trucks and Medium-Duty Passenger Vehicles

Fleet Average NO_x Standard = 0.07 grams/mile
Maximum NO_x = 0.2 grams/mile (Bin 8)

Company	Total Number of Vehicles	Average NO _x Value (grams/mile)
Aston Martin Lagonda Limited	135	0.0700
BMW Group Canada	26 571	0.070000
Chrysler Canada Inc.	147 722	0.0639232
Ferrari North America, Inc.	75	0.070
Ford Motor Company of Canada, Limited	159 736	0.0572435
General Motors of Canada Limited	255 177	0.0699082
Honda Canada Inc.	147 352	0.0695283
Hyundai Auto Canada Corp.	109 813	0.0700000
Jaguar (Jaguar Land Rover Canada ULC)	1 038	0.07000
Kia Canada Inc.	35 691	0.070000
Land Rover (Jaguar Land Rover Canada ULC)	1 400	0.07000
Lotus Cars Limited	44	0.070
Maserati North America, Inc.	143	0.0700
Mazda Canada Inc.	47 160	0.068504
Mercedes-Benz Canada Inc.	22 351	0.069524
Mitsubishi Motor Sales of Canada, Inc.	25 420	0.070000
Nissan Canada Inc.	86 875	0.070000
Porsche Cars Canada, Ltd.	1 616	0.07000
Subaru Canada, Inc.	20 768	0.070000
Suzuki Canada Inc.	10 648	0.068921
Toyota Canada Inc.	195 950	0.0682114
Volkswagen Group	50 282	0.070000
Volvo Cars of Canada Corp.	5 360	0.07000

Note: Fleet average NO_x values are rounded to the same number of significant figures that are contained in the total number of vehicles in a company's fleet.

The company average NO_x values ranged from 0.0572435 grams/mile to 0.0700000 grams/mile for the fleet of LDV, LLDT, HLDT and MDPV, and no companies reported a fleet average NO_x value that was above the standard of 0.07 grams/mile. Fifteen out of twenty-three companies reported a fleet average NO_x value that was equal to the fleet average NO_x standard.

4.4 NO_x Emission Credits/Deficits for the 2009 Model Year and End of Model Year Balance

Table 5 summarizes the NO_x emission credits/deficits obtained by each company for the 2009 model year. It also lists the balance of credits at the end of the 2009 model year for each company. Companies that elected to exclude their group of vehicles from compliance with the fleet average NO_x standard, did not report credits or had a fleet average NO_x value that was equal to the standard were assigned “0” for the “Total 2009 MY Credits”.

Table 5: NO_x Emission Credits/Deficits for the 2009 Model Year and End of Model Year Balance (vehicle-grams/mile)

Company	Initial Balance ¹	Total 2009 MY Credits ¹	New Balance ¹
Aston Martin Lagonda Limited	0	0 ⁴	0
BMW Group Canada	913	0 ⁴	913
Chrysler Canada Inc.	41 020	898	41 918
Ferrari North America, Inc.	0	0 ²	0
Ford Motor Company of Canada, Limited	37 732	2 038	39 770
General Motors of Canada Limited	75 874	23	75 897
Honda Canada Inc.	19 975	70	20 045
Hyundai Auto Canada Corp.	3 163	0 ⁴	3 163
Jaguar (Jaguar Land Rover Canada ULC)	126	0 ⁴	126
Kia Canada Inc.	4 721	0 ⁴	4 721
Land Rover (Jaguar Land Rover Canada ULC)	953	0 ⁴	953
Lotus Cars Limited	0	0 ²	0
Maserati North America, Inc.	0	0 ²	0
Mazda Canada Inc.	14 878	71	14 949
Mercedes-Benz Canada Inc.	0	11	11
Mitsubishi Motor Sales of Canada, Inc.	76	0 ³	76
Nissan Canada Inc.	18 854	0 ³	18 854
Porsche Cars Canada, Ltd.	456	0 ⁴	456
Subaru Canada, Inc.	2 606	0 ⁴	2 606
Suzuki Canada Inc.	1 255	11	1 266
Toyota Canada Inc.	26 005	350	26 355
Volkswagen Group	0	0 ⁴	0
Volvo Cars of Canada Corp.	3 538	0 ⁴	3 538
Total	252 145	3 472	255 617

¹NO_x emission credits/deficits are rounded to the nearest whole number. A negative sign (-) indicates a deficit.

²The company elected to exclude their entire fleet, which is sold concurrently in Canada and the U.S., from compliance with the fleet average NO_x standard pursuant to subsection 31(1) of the Regulations.

³The company elected to exclude only parts of their fleet that satisfied the election from compliance with the fleet average NO_x standard pursuant to subsection 31(1) of the Regulations. However, the average NO_x value for their group of vehicles not subject to the election was equal to the fleet average NO_x standard. Therefore, the company did not incur a deficit.

⁴The company reported a fleet average NO_x value that is equal to the fleet average NO_x standard.

A total of 3472 credits were generated by companies for the 2009 model year. No company incurred a deficit with respect to their 2009 model year fleet and no company reported a negative balance of credits at the end of the 2009 model year. Also, there were no transfers of credits to or from companies for the 2009 model year.

4.5 Distribution of Bins and NO_x Fleet Average Value for the Canadian Fleet

Table 6 summarizes the distribution of vehicles by the NO_x standard of each bin. It also provides the calculated fleet average NO_x value of the entire Canadian fleet for the 2009 model year.

Table 6: Distribution of Vehicles by the NO_x Standard of Each Bin

Bin Number	NO _x Standard (grams/mile)	Total Number of Vehicles in "Bin"	Percentage of Vehicles in "Bin"
11	0.9	N/A	N/A
10	0.6	N/A	N/A
9	0.3	N/A	N/A
8	0.20	4 040	0.30
7	0.15	0	0.00
6	0.10	0	0.00
5	0.07	1 246 221	92.22
4	0.04	89 404	6.62
3	0.03	10 272	0.76
2	0.02	1 390	0.10
1	0.00	0	0.00
Total Number of Vehicles in 2009 MY Fleet			1 351 327
NO_x Fleet Average Value for the Canadian Fleet (grams/mile)			0.06743109
Fleet Average NO_x Standard (grams/mile)			0.07

For the 2009 model year, almost all vehicles (99.7% of the fleet) were certified to a bin at or below the fleet average NO_x standard of 0.07 grams/mile. The NO_x fleet average value for the Canadian fleet was 0.06743109 grams/mile, which is 3.7% below the standard.

Figure 1 depicts the changing distribution of the combined Canadian fleet by the NO_x standard of each bin across the 2004 to 2009 model years. In addition, Figure 2 presents this information on a percentage basis to facilitate year to year comparison.

Figure 1: Distribution of the Canadian Fleet by Number of Vehicles in Each Bin

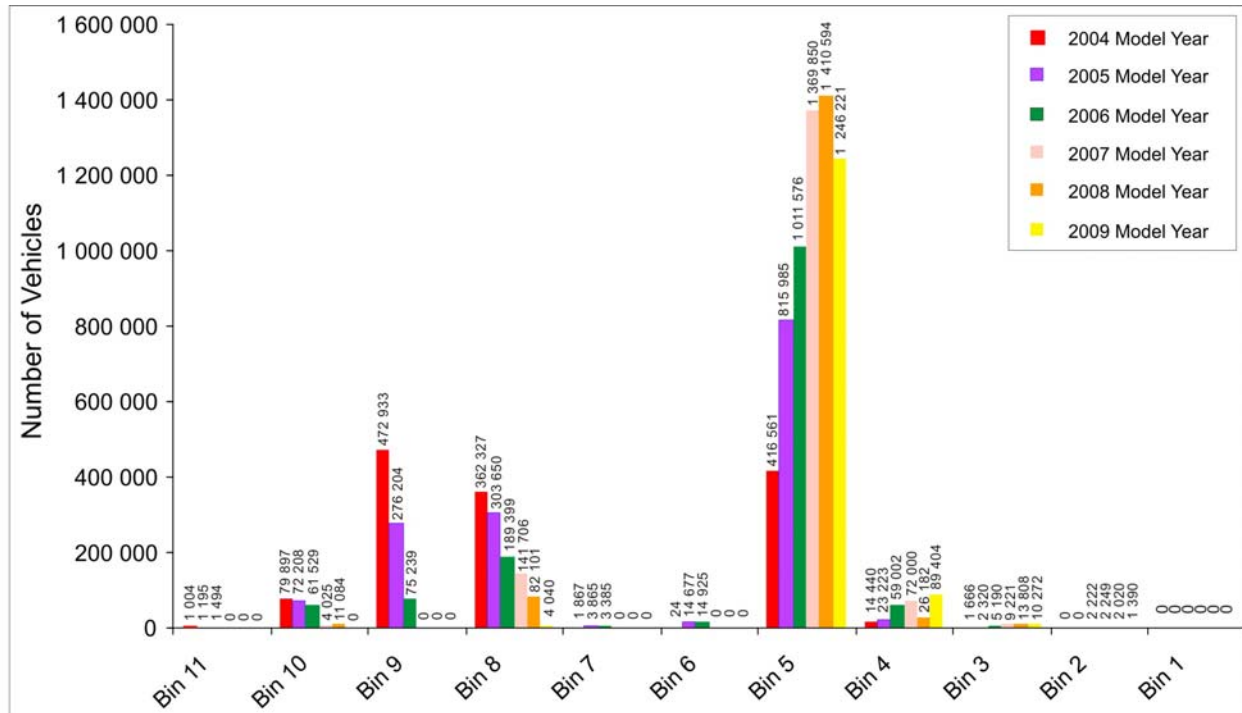
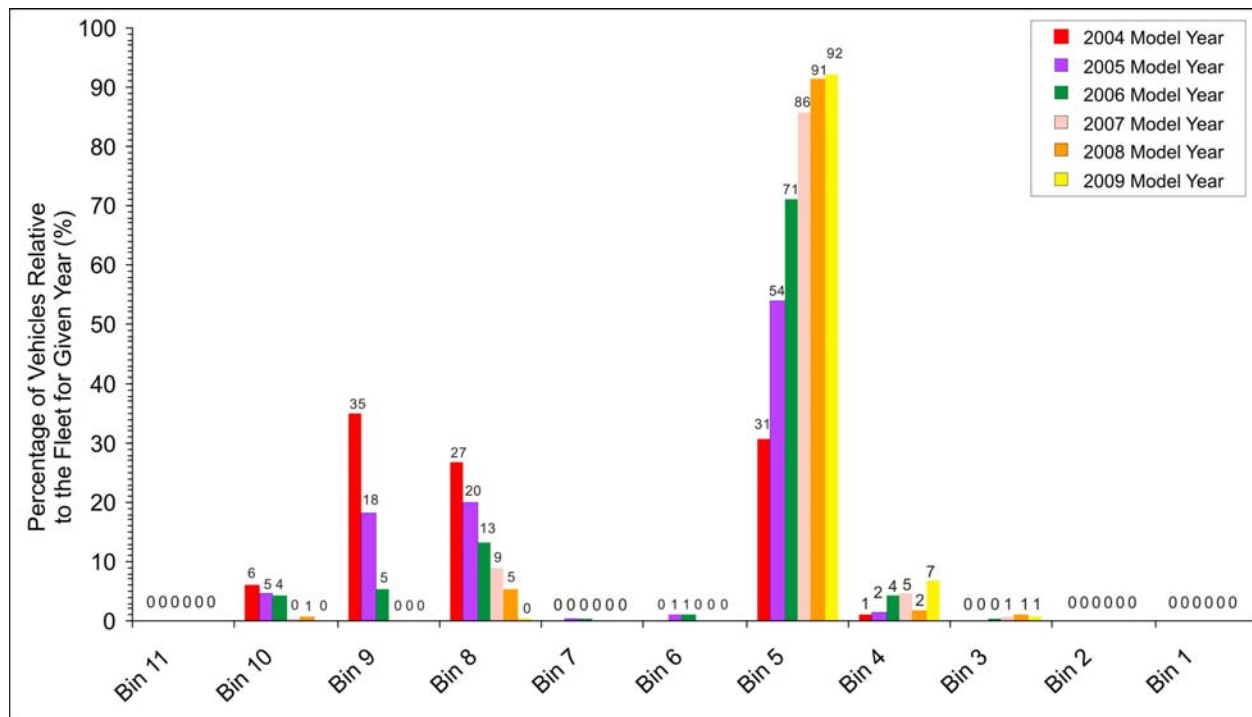


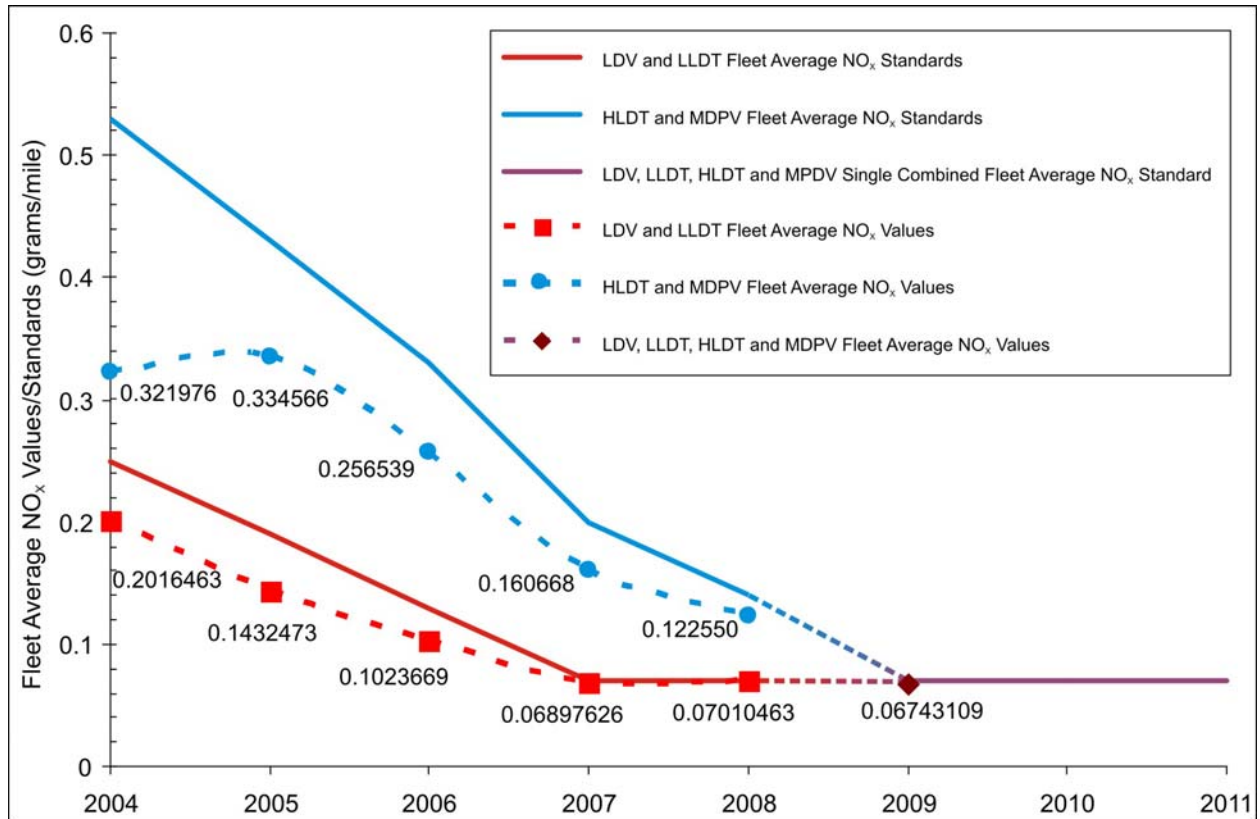
Figure 2: Distribution of the Canadian Fleet by the Percentage of Vehicles Relative to the Fleet in Each Bin



4.6 Fleet Average NO_x Values Trend

Figure 3 presents the average NO_x values trend relative to the applicable standards since 2004 for both the LDV/LLDT and HLDT/MDPV fleets. The fleet average NO_x value for the 2009 model year is shown as a single point as the fleet of LDV, LLDT, HLDT and MDPV is now subject to a single combined fleet average standard of 0.07 grams/mile instead of two different standards.

Figure 3: Fleet Average NO_x Values and Standards



Overall, the fleet average NO_x value for the combined fleets of LDV/LLDT and HLDT/MDPV decreased from 2004 to 2008. The fleet average NO_x value for the 2009 model year continues to decrease and is 3.7% below the single combined fleet average NO_x standard of 0.07 grams/mile.

5 CONCLUSIONS

This is the sixth year that companies were subject to the fleet average NO_x requirements under the Regulations. A total of 23 companies submitted reports for a total of 310 distinct test groups comprising 1 351 327 vehicles that were either manufactured in Canada or imported into Canada for the purpose of first retail sale.

The fleet average NO_x value for the 2009 model year was 0.06743109 grams/mile compared to a single combined fleet average NO_x standard of 0.07 grams/mile. Each individual company had a fleet average NO_x value that was at or below the standard, and all companies complied with the fleet averaging provisions of the Regulations based on their reports.

The fleet average NO_x value for the combined fleets of LDV/LLDT and HLDT/MDPV continues to decrease which is consistent with the environmental performance objectives of the Regulations.

www.ec.gc.ca

Additional information can be obtained at:

Environment Canada

Inquiry Centre

10 Wellington Street, 23rd Floor

Gatineau QC K1A 0H3

Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800

Fax: 819-994-1412

TTY: 819-994-0736

Email: enviroinfo@ec.gc.ca