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Measurement report: Insight into greenhouse gas emission characteristics of light-duty vehicles in China in the context of technological innovation

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Contents

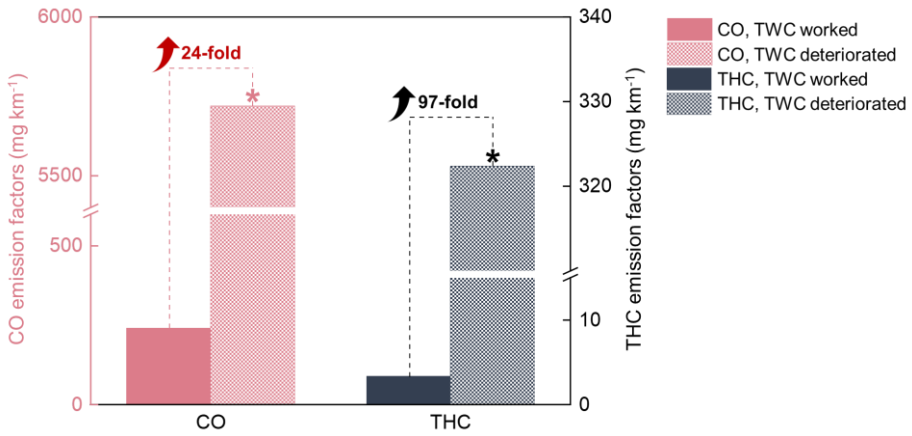

Figure S1. CO and THC emission factors from the taxi with conventional gasoline under the "TWC worked" and "TWC deteriorated" conditions under the WLTC protocol. The symbol * represents that the pollutant concentrations exceeded the upper limit of the measurement instrument.

Table S1. Comparison of CO_2, CH_4, and N_2O emission factors in different studies.

GHG	Tested vehicles	Fuel types	Methods	Emission factors	References
CO_2	China 6	Gasoline	PEMS[1]	313.7 g/km (urban area, expressway) 304.4 g/km (suburban area, expressway)	(Zhu et al., 2022)
	China 6	Gasoline	PEMS	275.7 g/km (urban area, expressway) 273.9 g/km (suburban area, expressway)	(Zhu et al., 2022)
	China 6	Gasoline	Chassis dynamometer	≈ 300 g/km (-10 ℃, cold start, TWC[2]) ≈ 289 g/km (0 ℃, cold start, TWC) ≈ 230 g/km (23 ℃, cold start, TWC) ≈ 259 g/km (40 ℃, cold start, TWC)	(Wang et al., 2022b)
				≈ 257 g/km (-10 ℃, cold start, TWC + GPF[3]) ≈ 259 g/km (0 ℃, cold start, TWC + GPF) ≈ 210 g/km (23 ℃, cold start, TWC + GPF) ≈ 238 g/km (40 ℃, cold start, TWC + GPF)	
	UK fleet using 2015 new car sales car	Gasoline	PEMS	175.2 g/km (urban conditions, extra small displacement) 199.2 g/km (urban conditions, small displacement) 231.5 g/km (urban conditions, medium displacement) 340.9 g/km (urban conditions, large displacement)	(O'Driscoll et al., 2018)
				140.6 g/km (motorway conditions, extra small displacement) 154.3 g/km (motorway conditions, small displacement) 174.4 g/km (motorway conditions, medium displacement) 213.0 g/km (motorway conditions, large displacement)	
	China 0 ~ China 2	Diesel	IVE[4]	409.9 g/km	(Yao et al., 2011)
	China 2	Diesel	COPERT[5]	245.8 g/km	(Cai and Xie, 2010)

	China 3	Diesel	COPERT	238.2 g/km	(Cai and Xie, 2010)
	China 3	Diesel	PEMS	304 g/km	(Wu et al., 2017)
	China 4	Diesel	PEMS	310 g/km	
	China 4	Diesel	COPERT	238.2 g/km	(Cai and Xie, 2010)
	China 4	Diesel	Chassis dynamometer	214.1 g/km (NEDC[6])	(Wang et al., 2022a)
				209.7 g/km (WLTC[7])	
	China 4	Diesel	PEMS	415.06 g/km	(Li et al., 2024)
	China 5	Diesel	PEMS	447.48 g/km	
	China 6	Diesel	PEMS	335.26 g/km	
	Euro 6	Diesel	Chassis dynamometer	239.0 g/km	(Vojtíšek-Lom et al., 2018)
				133 g/km	
				134 g/km	
	UK fleet using 2015 new car sales car	Diesel	PEMS	141.9 g/km (urban conditions, small displacement) 163.4 g/km (urban conditions, medium displacement) 205.1 g/km (urban conditions, large displacement)	(O'Driscoll et al., 2018)
				137.1 g/km (motorway conditions, small displacement) 149.0 g/km (motorway conditions, medium displacement) 170.0 g/km (motorway conditions, large displacement)	
	Heavy-duty vehicles in Korea	Diesel	Chassis dynamometer	320 g/km (case 1) 411 g/km (case 2) 634 g/km (case 3) 727 g/km (case 4) 877 g/km (case 5) 537 g/km (case 6)	(Seo et al., 2018)
CH_4	Euro 5	Gasoline		4.8 mg/km	(Clairotte et al., 2020)

	Euro 6b/c	Gasoline	Chassis dynamometer	3.2 mg/km	
	Euro 6d-TEMP	Gasoline		1.7 mg/km	
	Euro 5	Gasoline hybrid		0.8 mg/km	
	Euro 6b	Gasoline hybrid		4.5 mg/km	
	Euro 6b	Dual-LPG/Gasoline		2.3 mg/km	
	Euro 5	Diesel		3.6 mg/km	
	Euro 6b/c	Diesel		10.3 mg/km	
	Euro 6d-TEMP	Diesel		3.6 mg/km	
	China 0	Diesel	COPERT	18 mg/km	(Wang et al., 2022a)
	China 1	Diesel	COPERT	11 mg/km	
	China 2	Diesel	COPERT	5 mg/km	
	China 0 ~ China 2	Diesel	IVE	90 mg/km	(Yao et al., 2011)
	China 2	Diesel	COPERT	7 mg/km	(Cai and Xie, 2010)
	China 3	Diesel	COPERT	2 mg/km	(Wang et al., 2022a)
	China 3	Diesel	COPERT	0 mg/km	(Cai and Xie, 2010)
	China 4	Diesel	COPERT	1 mg/km	(Wang et al., 2022a)
	China 4	Diesel	COPERT	0 mg/km	(Cai and Xie, 2010)
	China 4	Diesel	PEMS	5 mg/km	(Li et al., 2024)
	China 5	Diesel	COPERT	1 mg/km	(Wang et al., 2022a)
	China 5	Diesel	PEMS	3 mg/km	(Li et al., 2024)
	China 6	Diesel	PEMS	3 mg/km	(Li et al., 2024)

	Euro 6	Diesel	Chassis dynamometer	3 mg/km	(Vojtíšek-Lom et al., 2018)
				5 mg/km	
				7 mg/km	
N_2O	Euro 5	Gasoline	Chassis dynamometer	3.1 mg/km	(Clairotte et al., 2020)
	Euro 6b/c	Gasoline		0.9 mg/km	
	Euro 6d-TEMP	Gasoline		0.3 mg/km	
	Euro 5	Gasoline hybrid		0.3 mg/km	
	Euro 6b	Gasoline hybrid		3.2 mg/km	
	Euro 6b	Dual-LPG/Gasoline		0.9 mg/km	
	Euro 5	Diesel		6.2 mg/km	
	Euro 6b/c	Diesel		13.5 mg/km	
	Euro 6d-TEMP	Diesel		15.2 mg/km	
	China 0 ~ China 2	Diesel	IVE	197 mg/km	(Yao et al., 2011)
	China 0	Diesel	COPERT	0 mg/km	(Wang et al., 2022a)
	China 1	Diesel	COPERT	2 mg/km	
	China 2	Diesel	COPERT	5 mg/km	
	China 2	Diesel	COPERT	167 mg/km	(Cai and Xie, 2010)
	China 3	Diesel	COPERT	8 mg/km	(Wang et al., 2022a)
	China 3	Diesel	COPERT	200 mg/km	(Cai and Xie, 2010)
	China 4	Diesel	COPERT	8 mg/km	(Wang et al., 2022a)
	China 4	Diesel	COPERT	200 mg/km	(Cai and Xie, 2010)

	China 4	Diesel	PEMS	2 mg/km	(Li et al., 2024)
	China 4	Diesel	COPERT	8 mg/km	(Wang et al., 2022a)
	China 5	Diesel	PEMS	4 mg/km	(Li et al., 2024)
	China 6	Diesel	PEMS	3 mg/km	(Li et al., 2024)
	Euro 6	Diesel	Chassis dynamometer	13 mg/km	(Vojtíšek-Lom et al., 2018)
				5 mg/km	
				7 mg/km	

Notes:

[1] Portable Emission Measurement System

[2] Three-Way Catalyst

[3] Gasoline Particulate Filter

[4] International Vehicle Emissions model

[5] Computer Programme to Calculate Emissions from Road Transport

[6] New European Driving Cycle

[7] Worldwide Harmonized Light Vehicles Test Cycle

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