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Proposal of a methodology enabling application of the COPERT IV method to calculate air emissions from light and heavy duty vehicles, buses, motorcycles and mopeds in Poland

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Abstract: The paper presents a method of preparation of statistical data in such a manner as to enable application of the COPERT IV method to calculate emissions resulting from the operation of light and heavy commercial vehicles, buses as well as motorcycles and mopeds. The paper also presents the results of calculations of emissions from these vehicles in Poland in 2014, made by means of the COPERT IV method with application of the proposed methodology. The results have been compared with data from emission inventories, and conclusions have been drawn concerning the reasonableness and possibility of applying the proposed methodology.

Keywords: COPERT IV method, pollutants emission, road transport
JEL:

1. Introduction

The paper is a continuation of an earlier presentation of this approach, which enables reporting in the scope of emissions from road transport using the COPERT IV method, which is applied by the majority, i.e. 22 member states of the European Union. In the first paper that tackled this issue (Trela 2016: 226-236), a method was presented that enables assessment of the number of the particular types of vehicles in Poland in compliance with the classification provided for by the

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COPERT IV method; thereafter, calculations of pollution emissions were performed and the results were compared with the official statistical data. The data concerning cars, even though most numerously represented, are not sufficient for the purpose of compiling an inventory of pollution emissions from road transport in Poland. In order for this to be possible, it is necessary to supplement these data with emissions from light and heavy commercial vehicles, buses, motorcycles and mopeds (Preisner, Trela 2013: 61-72). The objective of this paper is to present a method for assessing the number of the remaining types of vehicles (apart from cars) compliant with the classification of the COPERT IV method and for calculating pollution emissions from these vehicles using this method. This paper, in conjunction with the paper concerning assessment of emissions from cars can provide a basis for carrying out an inventory of emissions from road transport in Poland (excluding agricultural tractors).

2. Methods of data processing

The analysis uses statistical data from 2014 and includes categories that can be taken into account in the COPERT IV method with regard to the actual occurrence of the vehicles of the type concerned in operation in Poland. The following assumptions were made:

1) Light commercial vehicles (delivery vehicles) and heavy commercial vehicles only come in diesel-powered versions;
2) Heavy commercial vehicles come in versions up to a maximum GVW of 32 tonnes, and in the case of road trains (e.g. road tractor with semi-trailer, lorry with trailer) up to a maximum GVW of 40 tonnes;
3) It was assumed that tourist coaches in Poland do not come in the articulated version.

This was the basis for identifying the types of vehicles that were taken into account in the calculations (Table 5, col. a and b).

Furthermore, with regard to the data presented in the statistics and concerning the number of vehicles registered in Poland, the following assumptions were made:

1) Lorries with a payload up to 999 kg are passenger vehicles with regard to their construction, with converted passenger space in a manner that enables carrying loads. As a consequence,

calculations of emissions for these vehicles should be performed in like manner as for cars. Thus, these vehicles have not been taken into consideration in the calculations in this paper.

2) Lorries with payloads between 1,000 and 1,499 kg are light commercial vehicles (i.e. delivery vehicles), and so calculations of pollution emissions should be performed for them in accordance with the methods for light commercial vehicles.

The structure of light commercial vehicles with reference to the compliance of the EURO standard was determined taking advantage of statistical data concerning the age of the vehicle and taking dates of application of the particular EURO standards according to Table 1. For the EURO 1 and EURO 2 standards, 25% of the number vehicles were taken into account for the relevant year of production as the standard was in force for 3 out of 12 months of the years 1995 and 1998, respectively. Calculations in the paper were made for 2014, and therefore the EURO 6 standard is not taken into account for light commercial vehicles as it came into force for this category of vehicles in 2016. The structure of two-wheelers with reference to compliance with the relevant EURO standard was determined on the basis of statistical data concerning the ages of the vehicles and assuming that two-wheelers comply with the EURO standard concerned from the date concerned – according to Table 2.

The EURO 4 standard for two-wheelers came into force as late as 2016, and this date only concerns the new types of vehicles (new type approvals). As the calculations included in the paper were made for 2014, this standard was not taken into account.

Table 1. Dates for compliance with the particular EURO exhaust emission standards for light commercial vehicles adopted for the calculations.

EURO norm	Date
EURO 1	01.10.1995
EURO 2	01.10.1998
EURO 3	01.01.2002
EURO 4	01.01.2007
EURO 5	01.01.2012

Source: author's own elaboration based on Directive 93/59/EEC, Directive 96/69/EC, Directive 98/69/EC, Directive 2002/80/EC, Regulation 715/2007

It was assumed that the percentage share of the individual categories of two-wheelers, with regard to the engine cylinder capacity and the number of engine strokes complying with the relevant exhaust emission standard corresponds to the share of this category of vehicles in the current market offer in Poland, based on the largest Polish online automotive advertisement portal – otomoto.pl (Table 3).

Table 2. Dates for compliance with the particular EURO exhaust emission standards for two-wheelers adopted for the calculations

EURO norm	Date
EURO 1	01.07.2000
EURO 2	01.07.2005
EURO 3	01.07.2007

Source: author's own elaboration based on Directive 97/24/EC and Directive 2002/51/EC

Table 3. Percentage share of two-wheelers depending on the engine cylinder capacity and the number of engine strokes [%]

mopeds		motorcycles			
2-stroke	4-stroke	2-stroke	4-stroke (50-250> cm^3	4-stroke (250-750> cm^3	4-stroke > 750 cm^3
46.7	53.3	5.7	30.7	31.1	32.5

Source: author's own elaboration based on advertisement portal – otomoto.pl

In order to determine the structure of heavy commercial vehicles and buses depending on the EURO standard complied with, advantage can be taken, as in the case of cars, of statistical data presenting the numbers of the particular vehicles depending on their age. In the case of these vehicles, however, unlike cars, identical vehicle models were commonly manufactured and marketed at the same time with engines complying with two different exhaust emission standards. For instance, vehicles complying with the EURO IV and EURO V standards were offered concurrently during the period when the EURO IV standard was in force. For this reason, the date of production cannot be the indicator of fulfilling the requirements of the relevant exhaust emission standard by the vehicle (Pindór, Trela 2014: 117-129). Therefore, it was decided to use the data that seem definitely more reliable – the data showing the percentage shares of vehicles fulfilling the requirements of each EURO standard which are registered in the electronic toll collection system in operation in Poland (viaTOLL). It was thus assumed that the structure of vehicles belonging to the groups of lorries and buses complying with the relevant EURO standards is identical with the structure of vehicles registered in the viaTOLL system (Table 4). This system includes vehicles having a maximum gross vehicle mass (GVM) exceeding 3.5 tonnes, which in the market reality translates into vehicles with payloads of 1,500 kg and more.

Table 4. Percentage structure of lorries and buses registered in the viaTOLL system depending on the EURO standard complied with – as of December 2014 [%]

Before EURO 1	EURO 1	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6
9,2	2,1	11,1	24,2	14,6	35,6	3,2

Source: viaTOLL – podsumowanie 2014 roku

In order to assess the number of heavy commercial vehicles belonging to the relevant category based on the available statistical data, it is proposed to assume that:

- vehicles with payloads up to 4,999 kg do not exceed a GVM of 7.5 t;
- vehicles with payloads between 5,000 kg and 6,999 kg do not exceed a GVM of 12 t;
- vehicles with payloads between 7,000 kg and 9,999 kg are 50% vehicles with a GVM not exceeding 14 t and 50% with a GVM not exceeding 20 t;
- vehicles with payloads between 10,000 kg and 14,999 kg are 50% vehicles with a GVM not exceeding 26 t and 50% with a GVM not exceeding 28 t;
- vehicles with payloads of 15,000kg and more are vehicles with a GVM of 32 t;
- the number of road tractors corresponds to the number of road trains of a GVM of 34-40 t;
- 5% of mileages of lorries with payloads of 1,500 kg or more (excluding road tractors) are covered with trailers, which causes that they are qualified as mileages covered by road trains, i.e.:
    - 5% of mileages of vehicles with a GVM between 7.5 t and 14 t will be classified as mileages of road trains with a GVM between 14 t and 20 t.
    - 5% of mileages of vehicles with a GVM between 14 t and 20 t will be classified as mileages of road trains with a GVM between 20 t and 28 t.
    - 5% of mileages of vehicles with a GVM between 20 t and 28 t will be classified as mileages of road trains with a GVM between 28 t and 34 t.

For buses, it is proposed to assume that:

- 10% of city buses are articulated buses;
- the percentage share of city buses with a GVM not exceeding 15 t amounts to 4%.

In accordance with the COPERT IV methodology, it is necessary to determine not only the number of vehicles in each category but also their performance parameters, of which the key ones are: average annual mileage within a defined type of infrastructure as well as the average service speed allocated to a given type of infrastructure. All the essential parameters allowing the application of the COPERT IV methodology for calculating exhaust emissions have been presented in Table 5 (columns c-j).

Table 5. Performance parameters and numbers of light and heavy duty vehicles, buses, mopeds and motorcycles in Poland in 2014

		quantity	mileage [km]	driving share [%]			speed [km/h]		
				urban	rural	highway	urban	rural	highway
a	b	c	d	e	f	g	h	i	j
light duty									
Diesel	Before Euro 1	271453	16000	50	30	20	30	70	100
Diesel	Euro 1 (LD Euro 1)	73012	22000	50	30	20	30	70	100
Diesel	Euro 2 (LD Euro 2)	93911	26000	50	30	20	30	70	100
Diesel	Euro 3 (LD Euro 3)	143984	31000	50	30	20	30	70	100
Diesel	Euro 4 (LD Euro 4)	121309	36000	50	30	20	30	70	100
Diesel	Euro 5 (LD Euro 5)	52152	46000	50	30	20	30	70	100
heavy duty									
Rigid <=7,5 t	Before Euro 1	26588	16000	30	50	20	25	70	80
Rigid <=7,5 t	Euro I (HD Euro I)	6069	22000	30	50	20	25	70	80
Rigid <=7,5 t	Euro II (HD Euro II)	32079	28000	30	50	20	25	70	80
Rigid <=7,5 t	Euro III (HD Euro III)	69938	32000	30	50	20	25	70	80
Rigid <=7,5 t	Euro IV (HD Euro IV)	42194	39000	30	50	20	25	70	80
Rigid <=7,5 t	Euro V (HD Euro V)	102885	42000	30	50	20	25	70	80
Rigid <=7,5 t	Euro VI (HD Euro VI)	9248	44000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Before Euro 1	13093	16000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro I (HD Euro I)	2989	22000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro II (HD Euro II)	15797	28000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro III (HD Euro III)	34440	32000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro IV (HD Euro IV)	20778	39000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro V (HD Euro V)	50664	42000	30	50	20	25	70	80
Rigid 7,5 - 12 t	Euro VI (HD Euro VI)	4554	44000	30	50	20	25	70	80
Rigid 12 - 14 t	Before Euro 1	3737	16000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro I (HD Euro I)	853	22000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro II (HD Euro II)	4509	28000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro III (HD Euro III)	9830	32000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro IV (HD Euro IV)	5931	39000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro V (HD Euro V)	14461	42000	30	50	20	25	70	80
Rigid 12 - 14 t	Euro VI (HD Euro VI)	1300	44000	30	50	20	25	70	80
Rigid 14 - 20 t	Before Euro 1	3737	18000	20	50	30	25	70	80

Rigid 14 - 20 t	Euro I (HD Euro I)	853	20000	20	50	30	25	70	80
Rigid 14 - 20 t	Euro II (HD Euro II)	4509	24000	20	50	30	25	70	80
Rigid 14 - 20 t	Euro III (HD Euro III)	9830	32000	20	50	30	25	70	80
Rigid 14 - 20 t	Euro IV (HD Euro IV)	5931	40000	20	50	30	25	70	80
Rigid 14 - 20 t	Euro V (HD Euro V)	14461	45000	20	50	30	25	70	80
Rigid 14 - 20 t	Euro VI (HD Euro VI)	1300	48000	20	50	30	25	70	80
Rigid 20 - 26 t	Before Euro 1	3411	21000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro I (HD Euro I)	779	24000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro II (HD Euro II)	4115	31000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro III (HD Euro III)	8972	36000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro IV (HD Euro IV)	5413	45000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro V (HD Euro V)	13198	51000	10	50	40	25	70	80
Rigid 20 - 26 t	Euro VI (HD Euro VI)	1186	55000	10	50	40	25	70	80
Rigid 26 - 28 t	Before Euro 1	3411	21000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro I (HD Euro I)	779	24000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro II (HD Euro II)	4115	31000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro III (HD Euro III)	8972	36000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro IV (HD Euro IV)	5413	45000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro V (HD Euro V)	13198	51000	10	50	40	25	70	80
Rigid 26 - 28 t	Euro VI (HD Euro VI)	1186	55000	10	50	40	25	70	80
Rigid 28 - 32 t	Before Euro 1	3287	21000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro I (HD Euro I)	750	24000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro II (HD Euro II)	3966	31000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro III (HD Euro III)	8647	36000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro IV (HD Euro IV)	5217	45000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro V (HD Euro V)	12720	51000	10	50	40	25	70	80
Rigid 28 - 32 t	Euro VI (HD Euro VI)	1143	55000	10	50	40	25	70	80
Articulated 14 - 20 t	Before Euro 1	886	42000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro I (HD Euro I)	202	52000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro II (HD Euro II)	1069	62000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro III (HD Euro III)	2330	74000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro IV (HD Euro IV)	1406	88000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro V (HD Euro V)	3428	90000	5	35	60	25	70	80
Articulated 14 - 20 t	Euro VI (HD Euro VI)	308	94000	5	35	60	25	70	80
Articulated 20 - 28 t	Before Euro 1	197	42000	5	35	60	25	70	80
Articulated 20 - 28 t	Euro I (HD Euro I)	45	52000	5	35	60	25	70	80
Articulated 20 - 28 t	Euro II (HD Euro II)	237	62000	5	35	60	25	70	80
Articulated 20 - 28 t	Euro III (HD Euro III)	517	74000	5	35	60	25	70	80
Articulated 20 - 28 t	Euro IV (HD Euro IV)	312	88000	5	35	60	25	70	80

Articulated 20 - 28 t	Euro V (HD Euro V)	761	90000	5	35	60	25	70	80
Articulated 20 - 28 t	Euro VI (HD Euro VI)	68	94000	5	35	60	25	70	80
Articulated 28 - 34 t	Before Euro 1	359	51000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro I (HD Euro I)	82	68000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro II (HD Euro II)	433	81000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro III (HD Euro III)	944	92000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro IV (HD Euro IV)	570	102000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro V (HD Euro V)	1389	108000	5	25	70	25	70	80
Articulated 28 - 34 t	Euro VI (HD Euro VI)	125	110000	5	25	70	25	70	80
Articulated 34 - 40 t	Before Euro 1	27893	55000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro I (HD Euro I)	6367	71000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro II (HD Euro II)	33654	85000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro III (HD Euro III)	73372	98000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro IV (HD Euro IV)	44266	115000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro V (HD Euro V)	107935	119000	5	15	80	25	70	80
Articulated 34 - 40 t	Euro VI (HD Euro VI)	9702	122000	5	15	80	25	70	80
buses									
Urban buses <=15 t	Before Euro 1	42	30000	100	0	0	20		
Urban buses <=15 t	Euro I (HD Euro I)	10	36000	100	0	0	20		
Urban buses <=15 t	Euro II (HD Euro II)	51	41000	100	0	0	20		
Urban buses <=15 t	Euro III (HD Euro III)	111	47000	100	0	0	20		
Urban buses <=15 t	Euro IV (HD Euro IV)	67	51000	100	0	0	20		
Urban buses <=15 t	Euro V (HD Euro V)	164	53000	100	0	0	20		
Urban buses <=15 t	Euro VI (HD Euro VI)	15	55000	100	0	0	20		
Urban buses 15 - 18 t	Before Euro 1	915	56000	100	0	0	20		
Urban buses 15 - 18 t	Euro I (HD Euro I)	209	60000	100	0	0	20		
Urban buses 15 - 18 t	Euro II (HD Euro II)	1104	63000	100	0	0	20		
Urban buses 15 - 18 t	Euro III (HD Euro III)	2407	65000	100	0	0	20		
Urban buses 15 - 18 t	Euro IV (HD Euro IV)	1452	69000	100	0	0	20		
Urban buses 15 - 18 t	Euro V (HD Euro V)	3542	71000	100	0	0	20		
Urban buses 15 - 18 t	Euro VI (HD Euro VI)	318	73000	100	0	0	20		
Urban buses >18 t	Before Euro 1	102	56000	100	0	0	20		
Urban buses >18 t	Euro I (HD Euro I)	23	60000	100	0	0	20		
Urban buses >18 t	Euro II (HD Euro II)	123	63000	100	0	0	20		
Urban buses >18 t	Euro III (HD Euro III)	267	65000	100	0	0	20		
Urban buses >18 t	Euro IV (HD Euro IV)	161	69000	100	0	0	20		
Urban buses >18 t	Euro V (HD Euro V)	394	71000	100	0	0	20		
Urban buses >18 t	Euro VI (HD Euro VI)	35	73000	100	0	0	20		
Coaches <=18 t	Before Euro 1	8698	26000	15	35	50	30	80	100
Coaches <=18 t	Euro I (HD Euro I)	1985	45000	15	35	50	30	80	100

Coaches <=18 t	Euro II (HD Euro II)	10494	61000	15	35	50	30	80	100
Coaches <=18 t	Euro III (HD Euro III)	22879	72000	15	35	50	30	80	100
Coaches <=18 t	Euro IV (HD Euro IV)	13803	82000	15	35	50	30	80	100
Coaches <=18 t	Euro V (HD Euro V)	33657	88000	15	35	50	30	80	100
Coaches <=18 t	Euro VI (HD Euro VI)	3025	94000	15	35	50	30	80	100
mopeds									
2-stroke <50 cm³	Before Euro 1	184113	500	99	1	0	40	45	
2-stroke <50 cm³	Euro I (Mop - Euro I)	38301	900	99	1	0	40	45	
2-stroke <50 cm³	Euro II (Mop - Euro II)	39509	1300	99	1	0	40	45	
2-stroke <50 cm³	Euro III (Mop - Euro III)	306547	1900	99	1	0	40	45	
4-stroke <50 cm³	Before Euro 1	209906	600	99	1	0	40	45	
4-stroke <50 cm³	Euro I (Mop - Euro I)	43666	1200	99	1	0	40	45	
4-stroke <50 cm³	Euro II (Mop - Euro II)	45044	1900	99	1	0	40	45	
4-stroke <50 cm³	Euro III (Mop - Euro III)	349493	2200	99	1	0	40	45	
motorcycles									
2-stroke >50 cm³	Before Euro 1	50252	700	90	9	1	40	70	90
2-stroke >50 cm³	Euro I (Mot - Euro I)	6854	1700	90	9	1	40	70	90
2-stroke >50 cm³	Euro II (Mot - Euro II)	2866	2200	90	9	1	40	70	90
2-stroke >50 cm³	Euro III (Mot - Euro III)	7469	3100	90	9	1	40	70	90
4-stroke <250 cm³	Before Euro 1	272126	1000	45	50	5	40	90	120
4-stroke <250 cm³	Euro I (Mot - Euro I)	37114	2100	45	50	5	40	90	120
4-stroke <250 cm³	Euro II (Mot - Euro II)	15521	2900	45	50	5	40	90	120
4-stroke <250 cm³	Euro III (Mot - Euro III)	40447	3500	45	50	5	40	90	120
4-stroke 250 - 750 cm³	Before Euro 1	275808	1300	40	50	10	40	90	120
4-stroke 250 - 750 cm³	Euro I (Mot - Euro I)	37617	2100	40	50	10	40	90	120
4-stroke 250 - 750 cm³	Euro II (Mot - Euro II)	15731	3000	40	50	10	40	90	120
4-stroke 250 - 750 cm³	Euro III (Mot - Euro III)	40994	4000	40	50	10	40	90	120
4-stroke >750 cm³	Before Euro 1	288160	1500	30	50	20	40	90	120
4-stroke >750 cm³	Euro I (Mot - Euro I)	39301	2500	30	50	20	40	90	120
4-stroke >750 cm³	Euro II (Mot - Euro II)	16436	3500	30	50	20	40	90	120
4-stroke >750 cm³	Euro III (Mot - Euro III)	42830	4500	30	50	20	40	90	120

Source: author’s own elaboration

3. Calculation of emissions by means of the COPERT IV method and comparison of results with the GUS (Central Statistical Office) data

Based on the above data, calculations were made of emissions of nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs) and particulate matter (PM) resulting from the operation of light commercial vehicles, heavy commercial vehicles, buses, mopeds and motorcycles in Poland in 2014 in accordance with the COPERT IV methodology, which has been presented in Table 6. At the same time, the table presents statistical data concerning emissions of corresponding compounds from selected means of road transport.

Table 6. Emissions of NO_x, NMVOC and PM resulting from the operation of light commercial vehicles, heavy commercial vehicles, buses, mopeds and motorcycles in Poland in 2014, and statistical data concerning emissions of these compounds resulting from the operation of heavy commercial vehicles, buses, agricultural tractors, motorcycles and mopeds in 2013

	NMVOC	NO_x	PM
	[t]		
COPERT IV	14849	276094	7350
Statistical data GUS (ITS method)	37120	123540	7170

Source: Author's own elaboration based on Ochrona Środowiska 2015, GUS

The data presented in Table 6 cannot be directly compared with each other as firstly, they refer to two different periods (2013 and 2014) and secondly, the categories of vehicles included in current statistics do not correspond exactly to the categories of vehicles in the COPERT IV methodology.

These data are nevertheless presented here for the purpose of relative verification of the correctness of the methodology proposed in the paper concerning preparation of the data that were used as the basis to make the calculations. Although the methods of calculating the volumes of emissions of the particular pollutants are completely different, they return comparable results. It can be thus concluded that there are no grounds to reject the proposed methodology on account of the lack of realism of the adopted assumptions.

4. Conclusion

The methodology of data preparation as proposed in this paper, along with the method that enables preparation of corresponding data with regard to cars, make it possible to compile an inventory of emissions from road transport using the COPERT IV method. This method has a definitely more complex part concerning detailed categorisation of vehicles, also with regard to the EURO standards of exhaust emissions, which increases its accuracy in comparison with the method of compiling inventories of emissions from road transport currently used in Poland. However, the lack of appropriate statistical data, above all concerning the numbers of vehicles in the particular categories complying with the particular EURO standards, necessitates that these values can only be roughly assessed, which causes deviations from the actual values of emissions. The best way of solving this problem would be by intensifying efforts aimed at improving the existing and being constantly developed system of the Central Register of Vehicles and Drivers (CEPiK) in Poland, so that it should gather data relating to the exhaust emission standard complied with by each vehicle. As long as the system is not sufficiently extended however, the only option of using the best of the recognised inventory methods, which is the COPERT IV/COPERT V method, will be by assessing the numbers of vehicles in each category.

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Propozycja metodologii umożliwiającej zastosowanie metody COPERT IV do obliczenia emisji zanieczyszczeń do powietrza z lekkich i ciężkich pojazdów użytkowych, autobusów, motocykli i motorowerów w Polsce

Streszczenie

Artykuł przedstawia metodologię przygotowania dostępnych danych statystycznych, tak aby możliwe było zastosowanie metody COPERT IV do obliczeń emisji zanieczyszczeń wynikających z eksploatacji lekkich i ciężkich pojazdów użytkowych, autobusów oraz motocykli i motorowerów. W artykule zaprezentowano także wyniki obliczeń emisji zanieczyszczeń z tych pojazdów w Polsce w 2014 roku, wykonanych metodą COPERT IV, przy wykorzystaniu zaproponowanej metodologii. Wyniki zestawiono z danymi pochodzącymi z inwentaryzacji emisji zanieczyszczeń oraz wyciągnięto wnioski dotyczące zasadności i możliwości stosowania zaproponowanej metodologii.

Słowa kluczowe: metoda COPERT IV, emisja zanieczyszczeń, transport drogowy

JEL: