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Research Report

**Analysis of emissions' territorial
distribution for individual
subcategories and greenhouse
gases. Deliverable 1.2**

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Geoinformation technologies, spatio-temporal approaches, and full carbon account for improving accuracy of GHG inventories

Deliverable 1.2. Analysis of emissions' territorial distribution for individual subcategories and greenhouse gases

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Work package 1. Spatially resolved greenhouse gas inventory for Poland

Deliverable 1.2. Analysis of emissions' territorial distribution for individual subcategories and greenhouse gases

Content

- 1. Analysis of emissions' territorial distribution for Energy sector: stationary sources**
- 2. Analysis of emissions' territorial distribution for road transport sector**
- 3. Analysis of emissions' territorial distribution for individual subcategories and greenhouse gases from Industry and Agriculture**

List of figures

Figure 1.1. GHG emissions from electricity/heat production, 10^3 tones of CO₂ eq.

Figure 1.2. GHG emissions from electricity/heat production by fossil fuel burned (coal, natural gas, brown coal), 10^3 tons of CO₂ eq.

Figure 1.3. GHG emissions from electricity/heat production by fossil fuel burned (coal, natural gas, brown coal) in Śląskie voivodeship, 10^3 tones of CO₂ eq.

Figure 1.4. Structure of GHG emissions in CO₂eq. by type of fossil fuel burned in residential sector for voivodeships (tons, Poland)

Figure 1.5. Specific CO₂ emissions in residential sector (ton/sq.km., Poland)

Figure 1.6. Specific CH₄ emissions in residential sector (ton/sq.km., Poland)

Figure 1.7. Specific N₂O emissions in residential sector (kg/sq.km., Poland)

Figure 1.8. Contribution of each voivodeship to the total emissions in residential sector (% of total emissions in residential sector, Poland)

Figure 1.9. GHG emissions from burning fossil fuels for manufacturing industries and construction needs in Podlaskie voivodeship of Poland (tones of CO₂eq.)

Figure 2.1. Specific CO₂ emissions from gasoline combustion by passenger cars in Poland (2 km x 2 km; t/km²)

Figure 2.2. Specific CO₂ emissions from diesel combustion by buses in Poland (2 km x 2 km; t/km²)

Figure 2.3. Specific CO₂ emissions from diesel combustion by passenger cars in Poland (2 km x 2 km; t/km²)

Figure 2.4. Specific CO₂ emissions from gasoline combustion by buses in Poland (2 km x 2 km; t/km²)

Figure 2.5. Specific CO₂ emissions from LPG combustion by buses, passenger cars, lorries, and special vehicles in Poland (2 km x 2 km; t/km²)

Figure 2.6. Specific CH₄ emissions from LPG, gasoline, and diesel combustion by buses, lorries, and special vehicles in Poland (2 km x 2 km; t/km²)

Figure 2.7. Specific CH₄ emissions from gasoline combustion by passenger cars in Poland (municipalities; t/km²)

Figure 2.8. Prism-map of specific CH₄ emissions from gasoline combustion by passenger cars in Poland (municipalities; t/km²)

Figure 2.9. Specific CH₄ emissions from diesel and LPG combustion by passenger cars in Poland (2 km x 2 km; t/km²)

Figure 2.10. Specific N₂O emissions from gasoline, diesel, and LPG combustion by passenger cars in Poland (2 km x 2 km; t/km²)

Figure 2.11. Specific N₂O emissions from gasoline, diesel, and LPG combustion by buses, lorries, and special vehicles in Poland (2 km x 2 km; t/km²)

Figure 3.1. CO₂ emissions from Cement Production of voivodeships (sorted by the amount of emissions: from the largest to the smallest one)

Figure 3.2. CO₂ emissions from Glass Production in voivodeships

Figure 3.3. Structure of methane emissions from enteric fermentation of livestock animals bred for individual farms (Mazowieckie voivodeship)

Figure 3.4. Structure of methane emissions from manure management of livestock animals bred at individual farms (Wielkopolskie voivodeship)

Figure 3.5. Structure of methane emissions from manure management of dairy and non-dairy cattle, swine, and poultry bred at individual farms (Zachodniopomorskie voivodeship)

Figure 3.6. Structure of methane emissions from manure management of horses, sheep, and goats bred at individual farms (Zachodniopomorskie voivodeship)

Figure 3.7. Structure of methane emissions from enteric fermentation of livestock animals bred at individual farms (Opolskie voivodeship)

Figure 3.8. Structure of methane emissions from enteric fermentation of horses, sheep, and goats bred at individual farms (Opolskie voivodeship)

Figure 3.9. Structure of methane emissions from enteric fermentation of non-dairy cattle and from manure management of swine bred at individual farms (Podkarpackie voivodeship)

Figure 3.10. Fragment of geodatabase: methane emissions from enteric fermentation of livestock owned by individual farms (kg)

Figure 3.11. Fragment of geodatabase: methane emissions from manure management of livestock owned by individual farms (kg)

List of tables

Table 1.1. GHG emissions (CO₂eq.) from electricity and heat production in Polish voivodeships

Table 1.2. GHG emissions of heat/power plants that use coal as the main fuel

Table 1.3. GHG emissions of heat/power plants that use natural gas as the main fuel

Table 1.4. GHG emissions of heat/power plants that use brown coal as the main fuel

Table 1.5. Carbon dioxide (CO₂) emissions from burning fossil fuels for manufacturing industries and construction needs in Podlaskie voivodeship of Poland (kg)

Table 1.6. Methane (CH₄) emissions from burning fossil fuels for manufacturing industries and construction needs in Podlaskie voivodeship of Poland (kg)

Table 1.7. Emissions of nitrous oxide (N₂O) from burning fossil fuels for manufacturing industries and construction needs in Podlaskie voivodeship of Poland (kg)

Table 1.8. Methane emissions from burning fossil fuels for manufacturing industries and construction needs in Lubelskie voivodeship of Poland (kg)

Table 2.1. GHG emissions from fuel burning by passenger cars and buses in Poland
(t, districts)

Table 2.2. GHG emissions from fuel burning by lorries and special vehicles in Poland
(t, districts)

Table 3.1. CO₂ emissions from cement production

Table 3.2. CO₂ emissions of the main glass factories

3. Analysis of emissions' territorial distribution for individual subcategories and greenhouse gases from Industry and Agriculture

Cement Production

Territorial distribution of GHG emissions of cement production is quite disproportional because of uneven allocation of cement plants. In most cases cement plants are located not far from coal mines, which provide plants by raw materials.

Table 1 shows contributions of each plant in total GHG emissions of cement production. Heidelberg Cement group is the biggest emitter of carbon dioxide (CO₂) – 26%. The contribution of Lafarge group in total emissions is 23%; CRH – 15%; Cemex – 13%; Dyckerhoff – 8%; Polen Cement – 7%; Miebach – 4,5%; Polska Energetyka Holding SA – 1% and Mapei – 0,5%.

Table 3.1. CO₂ emissions from cement production

Group	Plants	Cement production 2010 (Gg)	Clinkier production 2010 (Gg)	K_clinkier (kg CO ₂ / kg of clinkier)	K _C P	CO ₂ emissions (Gg)
Cemex	Cementownia Chelm	1123.42	836.08	0.529	1.02	451.13
Cemex	Cementownia Rudniki	936.18	696.73	0.529	1.02	375.94
CRH	Cementownia Ozarów	1217.04	905.75	0.529	1.02	488.73
CRH	Cementownia Rejowiec	1217.04	905.75	0.529	1.02	488.73
Dyckerhoff	Dyckerhoff Polska Sp. z o.o.	1310.65	975.42	0.529	1.02	526.32
Heidelberg Cement	Cementownia Góraźdże	2808.54	3065.62	0.529	1.02	1654.15
Heidelberg Cement	EKOCEM Sp. z o.o.	1310.65	0.00	0.529	1.02	0.00
Lafarge	Cementownia Małogoszcz	1872.36	1393.46	0.529	1.02	751.89
Lafarge	Cementownia Kujawy	1872.36	1393.46	0.529	1.02	751.89
Mapei	Górka Cement Sp. z o.o.	93.62	69.67	0.529	1.02	37.59
Miebach	Cementownia Odra S.A.	702.14	522.55	0.529	1.02	281.96
Polen Cement	Cementownia Warta S.A.	1160.86	863.95	0.529	1.02	466.17
Polska Energetyka Holding SA	Cementownia Kraków - Nowa Huta Sp. z o.o.	187.24	139.35	0.529	1.02	75.19

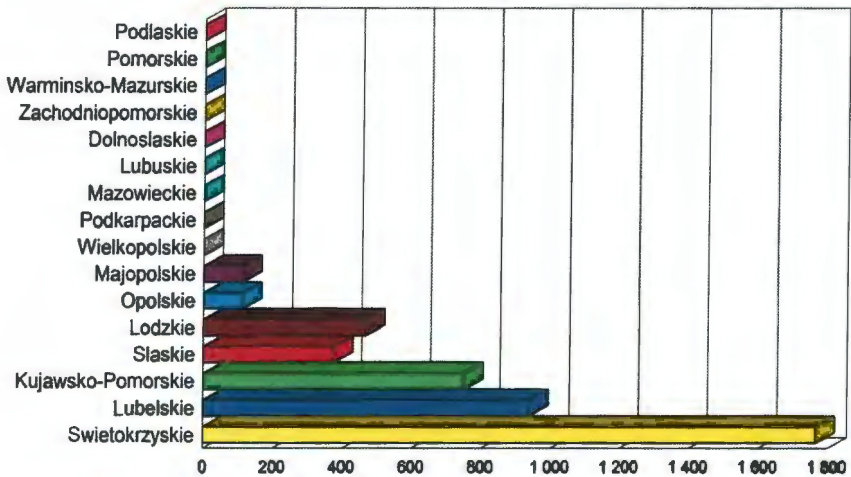


Figure 3.1. CO₂ emissions from cement production of voivodeships (sorted by the amount of emissions: from the largest to the smallest one)

Glass Production

As for the cement production, territorial distribution of GHG emissions from glass production depends on location of plants which produce limestone. Figure 1 presents the information on CO₂ emissions for Polish voivodeships.

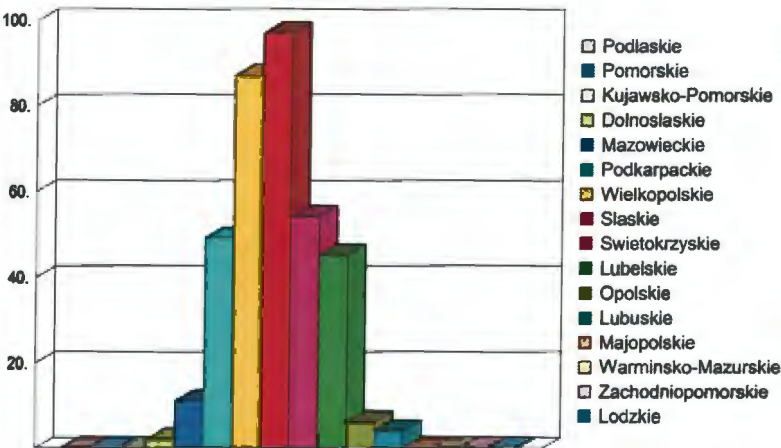


Figure 3.2. CO₂ emissions from Glass Production in voivodeships

Table 3.2. CO₂ emissions of the main glass factories

Plants	Glass production (Gg)	K_e emission (kg of CO₂/kg of glass)	Part of cullet (%)	CO₂ emissions (Gg)
Ardagh Glass Gostyń S.A.	183.59	0.21	0.45	21.20
Ardagh Glass Ujście S.A.	124.78	0.21	0.45	14.41
Ardagh Glass Wyszów S.A.	53.07	0.21	0.45	6.13
Euroglas Polska Sp. z o.o.	272.1	0.21	0.2	45.71
Guardian Industries Poland Sp. z o.o.	272.1	0.21	0.25	42.86
HUTA SZKŁA "CZECHY" S.A.	37.29	0.21	0.45	4.31
HUTA SZKŁA "GLOSS"	15	0.1	0.4	0.90
Huta Szkła „Jedlice” S.A.	53.07	0.21	0.45	6.13
Huta Szkła Gospodarczego Irena S.A.	15	0.1	0.4	0.90
Huta Szkła Kryształowego „Beata”	15	0.1	0.4	0.90
Huta Szkła Kryształowego „Julia”	15	0.1	0.4	0.90
Huta Szkła Kryształowego Violetta S.A.	15	0.1	0.4	0.90
Huta Szkła SŁAWA S.P.	53.07	0.21	0.45	6.13
Huta Szkła Warta S.A.	91.8	0.21	0.45	10.60
Huta Szkła WYMIARKI S.A.	38.73	0.21	0.45	4.47
Huta Szkła Zawiercie Sp. z o.o.	15	0.1	0.4	0.90
Huta Szkła Arystycznego i Gospodarczego "Fistek Glass"	15	0.1	0.4	0.90
KROSGLOSS S.A.	79.58	0.19	0.075	13.99
MAKORA Krośnieńska Huta Szkła S.A.	15	0.1	0.4	0.90
Owens-Illinois Polska S.A.	288.29	0.21	0.45	33.30
Owens-Illinois Polska S.A.	288.29	0.21	0.45	33.30
Part-Glass Krosno Sp. z o.o.	15	0.1	0.4	0.90
Philips Lighting Poland S.A.	5.81	0.2	0.55	0.52
Pilkington Polska Sp. z o.o.	272.1	0.21	0.15	48.57
Saint-Gobain Glass Polska Sp. Z o.o.	272.1	0.21	0.25	42.86
SCHOTT Poland Sp. z o. o.	5.81	0.1	0.4	0.35
Stolzle Częstochowa S.A.	91.8	0.21	0.45	10.60
Sudety Crystal Works Sp. z o.o.	15	0.1	0.4	0.90
Thomson Multimedia Polska Sp. z o.o.	5.81	0.13	0.45	0.42
Vitrosilicon S.A.	53.07	0.21	0.45	6.13
Total				360.98

Agriculture

The assessment of greenhouse gas emissions in the sector of "Agriculture" is conducted for the following sources: domestic livestock (enteric fermentation and manure management), rice cultivation (flooded rice fields), savanna burning, field burning of agricultural residues and agricultural soil management. The categories of "Rice cultivation" and "Savanna burning" are not investigated for Poland due to the absence of these agricultural activities in the country.

Major agricultural enterprises and farms in Poland are considered to be point-type sources of GHG emissions. In this case, the data on the livestock referees to spatially located point-objects (enterprises). In order to construct the geo-distributed cadastres digital maps of administrative divisions and populated areas were used.

Livestock owned by smaller agricultural enterprises referees to the territories classified as farmlands – area type sources.

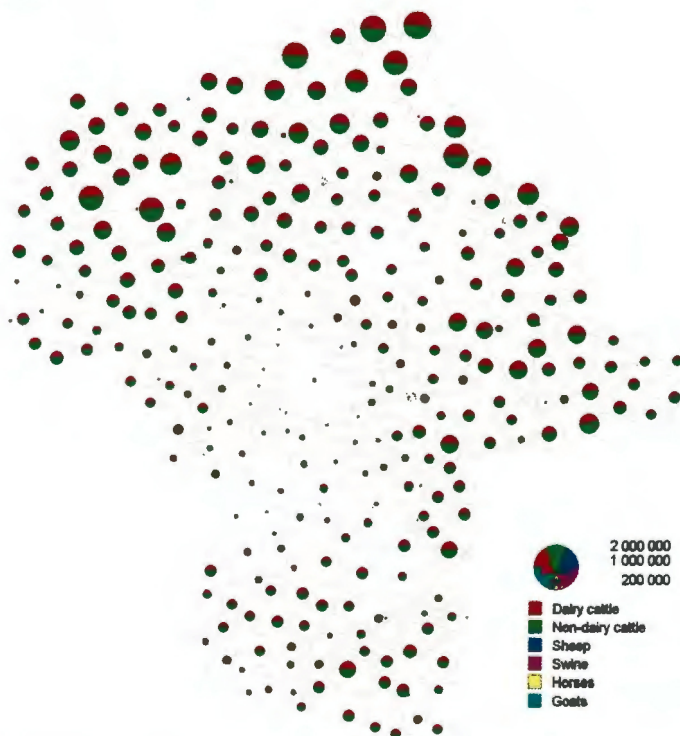


Figure 3.3. Structure of methane emissions from enteric fermentation of livestock animals bred for individual farms (Mazowieckie voivodeship, 2010)

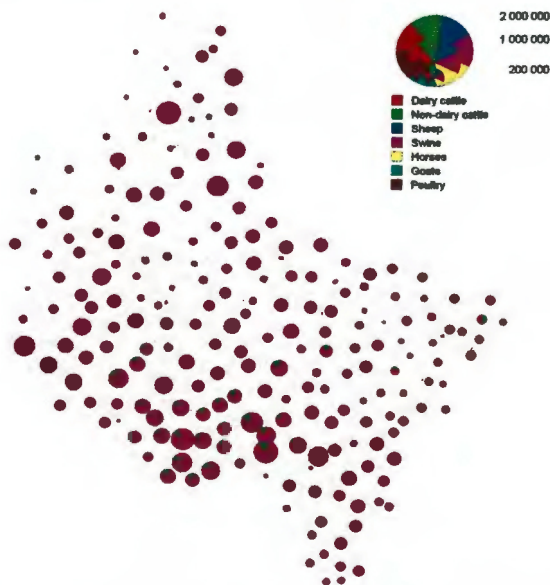


Figure 3.4. Structure of methane emissions from manure management of livestock animals bred at individual farms (Wielkopolskie voivodeship, 2010)

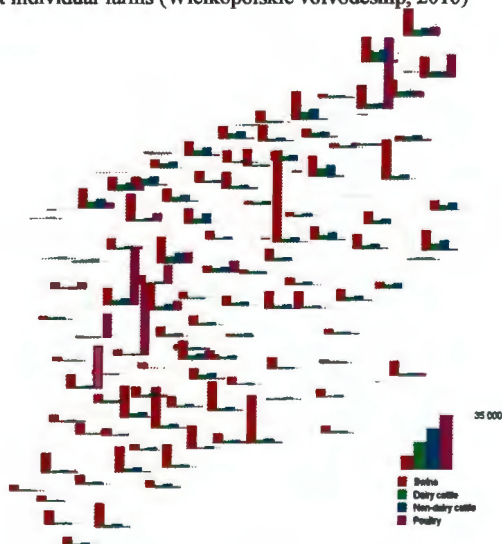


Figure 3.5. Structure of methane emissions from manure management of dairy and non-dairy cattle, swine, and poultry bred at individual farms (Zachodniopomorskie voivodeship, 2010)

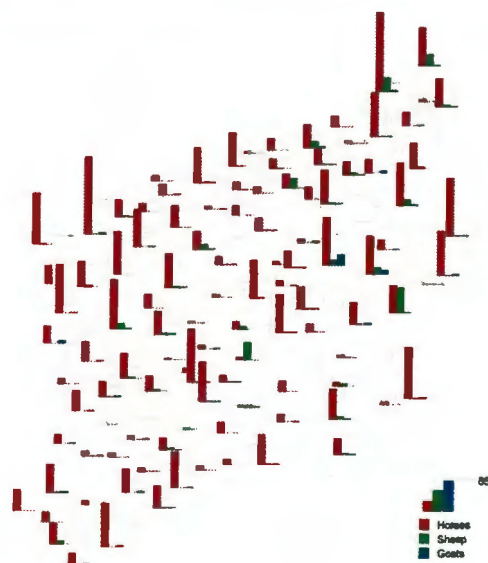


Figure 3.6. Structure of methane emissions from manure management of horses, sheep, and goats bred at individual farms (Zachodniopomorskie voivodeship, 2010)

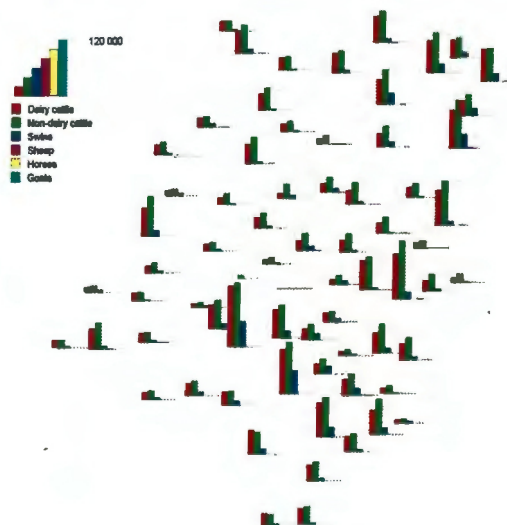


Figure 3.7. Structure of methane emissions from enteric fermentation of livestock animals bred at individual farms (Opolskie voivodeship, 2010)

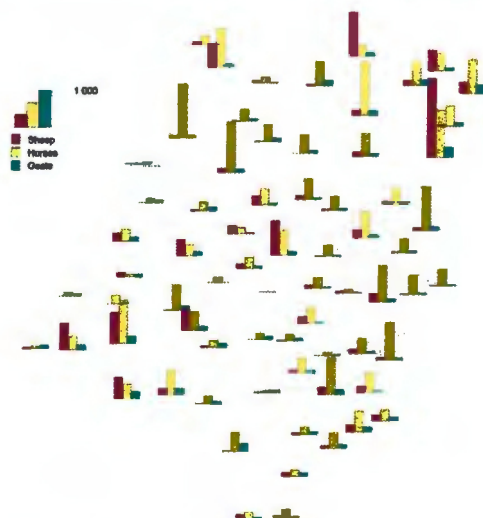


Figure 3.8. Structure of methane emissions from enteric fermentation of horses, sheep, and goats bred at individual farms (Opolskie voivodeship, 2010)

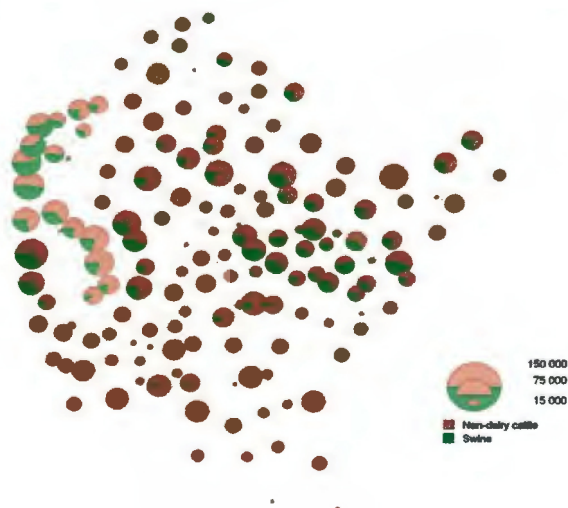


Figure 3.9 Structure of methane emissions from enteric fermentation of non-dairy cattle and from manure management of swine bred at individual farms (Podkarpackie voivodeship, 2010)

Gmina	Województwo	Powiat	Identyf.	Dairy_cattle_indiv_2010	Non dairy_cattle_indiv_2010	Sheep_indiv_2010	Swine_indiv_2010	Horses_indiv_2010	Goats_indiv_2010	Poultry_indiv_2010
Bolna_owiec	Dolnośląskie	bolna_owiec	0201011	0	10	8	66	8	9	319
Bolna_owiec	Dolnośląskie	bolna_owiec	0201022	223	565	21	1 640	81	72	105 685
Gromadka	Dolnośląskie	bolna_owiec	0201032	75	202	18	2 259	39	28	25 711
Nowogrodzko	Dolnośląskie	bolna_owiec	0201043	268	795	9	2 220	53	110	21 108
Oleśnica	Dolnośląskie	bolna_owiec	0201052	24	57	45	234	24	19	10 438
Wielka Bolna_owiec	Dolnośląskie	bolna_owiec	0201062	108	297	10	1 118	14	34	25 933
Biława	Dolnośląskie	dzier_znowski	0202011	63	128	0	63	21	12	464
Dzier_znowski	Dolnośląskie	dzier_znowski	0202021	18	38	18	267	7	21	5 388
Pleszów	Dolnośląskie	dzier_znowski	0202031	91	180	62	958	94	48	1 032
Przysie G. rze	Dolnośląskie	dzier_znowski	0202041	98	151	3	148	10	10	1 043
Dzier_znowski	Dolnośląskie	dzier_znowski	0202052	313	819	61	1 805	68	79	50 436
ogólna	Dolnośląskie	dzier_znowski	0202062	242	613	20	1 883	14	30	4 941
Nienica	Dolnośląskie	dzier_znowski	0202073	54	132	0	331	32	62	1 483
G. og. w	Dolnośląskie	g. ogowski	0203011	12	36	0	363	15	5	218
G. og. w	Dolnośląskie	g. ogowski	0203022	98	273	0	1 635	52	34	5 502
Jerzmanów	Dolnośląskie	g. ogowski	0203032	43	108	8	829	15	6	11 659
Kalis	Dolnośląskie	g. ogowski	0203042	40	129	0	2 470	68	27	2 627
P. c. ow	Dolnośląskie	g. ogowski	0203052	80	180	5	1 103	10	14	884
Łubowice	Dolnośląskie	g. ogowski	0203062	34	107	0	2 572	36	22	4 342
G. ra	Dolnośląskie	g. rowski	0204013	442	1 145	24	7 100	64	137	5 295
Jamiełno	Dolnośląskie	g. rowski	0204022	195	421	2	3 215	63	32	3 277
Niechl_w	Dolnośląskie	g. rowski	0204032	285	651	9	2 458	27	22	4 877
W. szez	Dolnośląskie	g. rowski	0204043	588	1 570	5	4 909	91	80	134 711
Jawor	Dolnośląskie	jaworski	0205011	0	17	0	115	0	0	171
Seł_w	Dolnośląskie	jaworski	0205023	380	964	764	957	180	92	5 377
M. chłwa	Dolnośląskie	jaworski	0205032	195	443	186	1 952	42	83	5 385
M. chłwa_w	Dolnośląskie	jaworski	0205042	108	307	4	1 336	22	22	2 986
Poznań	Dolnośląskie	jaworski	0205052	153	389	29	1 082	84	37	1 818
W. dno_c. Wielkie	Dolnośląskie	jaworski	0205062	175	484	0	1 781	7	19	2 474
Karpacz	Dolnośląskie	jeleniog_rski	0206011	8	10	3	29	6	7	36
Kowary	Dolnośląskie	jeleniog_rski	0206021	22	66	5	6	38	0	8 570
Piechowice	Dolnośląskie	jeleniog_rski	0206031	32	57	0	20	42	25	180
Szklarska P. dno	Dolnośląskie	jeleniog_rski	0206041	3	13	0	28	39	24	141
Jelenia Woda	Dolnośląskie	jeleniog_rski	0206052	94	228	14	208	95	19	708
Ja_w. Sułkowski	Dolnośląskie	jeleniog_rski	0206062	218	618	38	600	189	47	2 973
Myś. pleszewski	Dolnośląskie	jeleniog_rski	0206072	231	578	23	114	104	21	1 398
Podg. gryn	Dolnośląskie	jeleniog_rski	0206082	194	421	859	81	167	38	3 181
Stare Kamienice	Dolnośląskie	jeleniog_rski	0206092	149	372	33	171	87	62	3 216
Kamienice G. ra	Dolnośląskie	kamieniec_rski	0207011	17	37	14	16	11	5	270
Kamienice G. ra	Dolnośląskie	kamieniec_rski	0207022	820	1 249	72	635	254	84	2 680
Łubawka	Dolnośląskie	kamieniec_rski	0207033	330	685	189	398	188	77	1 949
Mielno_w	Dolnośląskie	kamieniec_rski	0207042	369	603	144	94	132	80	1 413

Figure 3.10. Fragment of geodatabase: methane emissions from enteric fermentation of livestock owned by individual farms (kg, 2010)

Gmina	Województwo	Powiat	M_id_gosk	M_Balzy_cattle_indiv_2010	M_Handziny_cattle_indiv_2010	M_Chepc_indiv_2010	M_Swine_indiv_2010	M_Horses_indiv_2010	M_Goats_indiv_2010	M_Poultry_indiv_2010
Bolca_owice	Dolno_śląskie	bolca_owice	0201011	0,000	49,309	0,899	389,709	11,129	1,889	25,829
Bolca_owice	Dolno_śląskie	bolca_owice	0201022	2 346,190	2 785,499	3,579	10 671,609	112,999	9,849	8 463,289
Olomedia	Dolno_śląskie	bolca_owice	0201032	789,799	989,889	2,729	14 773,899	94,219	3,129	2 066,889
Nowogrodzkie	Dolno_śląskie	bolca_owice	0201049	2 822,049	3 771,499	1,839	14 518,609	73,679	13,209	1 889,469
Oniscarica	Dolno_śląskie	bolca_owice	0201052	282,729	291,919	7,689	1 539,399	33,369	2,299	634,669
Warta Bolca_owice	Dolno_śląskie	bolca_owice	0201082	1 147,779	1 454,219	1,709	7 311,729	18,469	4,989	2 074,649
Blizawa	Dolno_śląskie	dzier_zonowicki	0202011	559,099	621,189	0,009	412,999	28,199	1,449	37,129
Dzier_zonowicki	Dolno_śląskie	dzier_zonowicki	0202021	189,549	187,349	2,729	1 879,989	9,739	2,529	430,869
Peszycy	Dolno_śląskie	dzier_zonowicki	0202031	642,339	887,409	10,949	3 639,249	130,889	5,499	82,569
Pl_pwa G_ma	Dolno_śląskie	dzier_zonowicki	0202041	621,279	744,439	0,519	948,309	13,809	1,209	83,449
Dzier_zonowicki	Dolno_śląskie	dzier_zonowicki	0202062	3 295,889	4 037,079	13,779	13 034,229	91,749	9,469	4 034,889
ogowicki	Dolno_śląskie	dzier_zonowicki	0202082	2 548,289	3 022,089	3,409	12 184,929	19,469	3,609	366,289
Hłomża	Dolno_śląskie	dzier_zonowicki	0202073	868,629	659,789	0,009	2 164,749	44,489	7,449	117,049
G_og_w	Dolno_śląskie	g_ogowicki	0203011	126,389	177,489	0,009	2 374,029	20,689	0,609	17,449
G_og_w	Dolno_śląskie	g_ogowicki	0203022	1 031,949	1 345,899	0,009	10 682,909	72,289	4,089	440,169
Jerzmanowa	Dolno_śląskie	g_ogowicki	0203032	452,799	537,379	0,859	5 421,899	20,669	0,729	932,729
Katla	Dolno_śląskie	g_ogowicki	0203042	421,209	635,979	0,009	16 163,809	122,329	3,249	202,169
P_s_w	Dolno_śląskie	g_ogowicki	0203052	631,809	768,809	0,899	7 213,629	13,809	1,689	69,129
ukowice	Dolno_śląskie	g_ogowicki	0203062	358,029	527,519	0,009	16 820,889	39,949	2,649	347,389
G_ra	Dolno_śląskie	g_rowicki	0204013	4 654,289	5 644,699	4,089	46 434,009	88,999	16,449	423,609
Jemielno	Dolno_śląskie	g_rowicki	0204022	1 737,459	2 075,539	0,349	21 028,109	118,379	3,849	282,169
Hłuchów	Dolno_śląskie	g_rowicki	0204032	2 695,159	3 208,439	0,009	16 140,729	37,639	2,649	368,189
W_ozisz	Dolno_śląskie	g_rowicki	0204043	9 285,359	7 779,649	0,889	32 104,889	128,489	9,609	10 778,889
Jawor	Dolno_śląskie	jaworicki	0205011	63,189	83,619	0,009	782,109	0,009	0,009	13,689
Bol_w	Dolno_śląskie	jaworicki	0205023	3 685,909	4 703,229	129,889	8 259,789	208,909	11,049	430,189
M_cirka	Dolno_śląskie	jaworicki	0205032	1 747,989	2 163,899	33,329	12 631,489	58,369	7,589	430,809
M_cirka_w	Dolno_śląskie	jaworicki	0205042	1 116,189	1 513,519	0,689	8 737,449	38,829	2,649	238,809
Paszewice	Dolno_śląskie	jaworicki	0205062	1 611,099	1 619,179	4,939	7 141,889	116,789	4,449	146,529
W_etrze Wielkie	Dolno_śląskie	jaworicki	0205082	1 842,759	2 388,129	0,009	11 647,749	9,739	2,289	197,929
Karpacz	Dolno_śląskie	jeleniog_rski	0206011	0,009	49,309	0,519	189,889	11,129	0,849	2,489
Kowary	Dolno_śląskie	jeleniog_rski	0206021	231,889	325,369	0,899	52,329	82,829	0,009	695,609
Piechocice	Dolno_śląskie	jeleniog_rski	0206031	231,889	281,019	0,009	130,889	58,389	2,789	15,209
Szlarzka Par_ba	Dolno_śląskie	jeleniog_rski	0206041	31,599	64,089	0,009	189,889	39,829	2,889	11,289
Jaworzno Wielkie	Dolno_śląskie	jeleniog_rski	0206062	989,829	1 114,189	2,389	1 380,329	76,489	2,289	56,409
Ja_w Sudetach	Dolno_śląskie	jeleniog_rski	0206082	2 296,549	3 036,889	6,129	3 270,009	151,519	5,649	185,849
Mys_owice	Dolno_śląskie	jeleniog_rski	0206072	2 432,439	2 854,479	3,919	745,389	144,889	2,529	108,609
Pedz_rzyn	Dolno_śląskie	jeleniog_rski	0206082	1 726,929	2 075,539	94,529	399,849	232,139	4,599	254,499
Skora Kamienica	Dolno_śląskie	jeleniog_rski	0206092	1 568,979	1 833,889	5,619	1 118,349	134,639	7,449	267,289
Kamienica G_ra	Dolno_śląskie	kamienieg_rski	0207011	179,019	182,419	2,389	104,649	19,289	0,809	21,609
Kamienica G_ra	Dolno_śląskie	kamienieg_rski	0207022	5 478,809	6 157,579	12,249	4 153,809	393,889	10,089	214,409
Lubuska	Dolno_śląskie	kamienieg_rski	0207033	3 596,149	4 367,989	26,889	2 852,829	258,549	6,249	147,929

Figure 3.11. Fragment of geodatabase: methane emissions from manure management of livestock owned by individual farms (kg, 2010)

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has become an important employer of people with mental health problems.

There is a growing awareness of the need to improve the mental health of people in the public sector. The Department of Health (1996) has published a strategy for mental health care, which includes a commitment to improve the mental health of people in the public sector. The strategy states that 'the mental health of people in the public sector is a priority for the Department of Health'.

The strategy also states that 'the Department of Health will work with other government departments to ensure that the mental health of people in the public sector is given the same priority as the mental health of people in the private sector'. The strategy also states that 'the Department of Health will work with other government departments to ensure that the mental health of people in the public sector is given the same priority as the mental health of people in the private sector'.

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