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FEATURES OF THE RESOURCES OF THE HARD COAL COVERING IN THIN COAL-SEAMS IN POLAND

The results of analyses of features of geological resources of the hard coal, in majority of mine located in Poland, were presented, according to adopted arbitrarily criteria. All active mines of the hard in the Silesia voivodship were provided with analysis.

ОСОБЛИВОСТІ ЗАЛЯГАННЯ РЕСУРСІВ КАМ'ЯНОГО ВУГІЛЛЯ В ТОНКИХ ПЛАСТАХ У ПОЛЬЩІ

Результати аналізів особливостей геологічних ресурсів кам'яного вугілля, в більшості шахт Польщі, були представлені згідно довільно прийнятим критеріям. Були проаналізовані всі діючі кам'яновугільні шахти воєводства Сілесія.

ОСОБЕННОСТИ ЗАЛЕГАНИЯ РЕСУРСОВ КАМЕННОГО УГЛЯ В ТОНКИХ ПЛАСТАХ В ПОЛЬШЕ

Результаты анализов особенностей геологических ресурсов каменного угля, в большинстве шахт Польши, были представлены согласно произвольно принятым критериям. Были проанализированы все действующие каменноугольные шахты воеводства Силесия.

INTRODUCTION

Described analysis concerns resources of the hard coal covering in active mines in Poland, located in the Silesian Voivodeship.

It is embracing almost 100% of all mines of the hard coal in Poland, apart from one mine "Bogdanka" in the Lublin Voivodeship. The Silesian voivodship is on the South of country. Coal seams are defined as the medium thickness from 0,6 up to 1,6 m.

Over 10 billion ton of the hard coal covering in thin coal-seams are in resources of analysed mines. In Poland, over 30 years ago, it was resigned from their exploitation, having thicker seams at their disposal. It comes back to idea of exploitation of thin coal-seams at present, because thick seams in some mines undergo exhaustion, which threatens these mines the clo-

sure with reason of exhaustion of resources.

It is a next argument for the return to the exploitation of thin coal-seams, that many of them, incurring little investments relatively, it is possible to exploit from mine horizon's already made available. Building new mine-shafts and new levels of the output in mines is an alternative what requires very big investments.

This analysis concerns geological resources. On this stage of the works, associated with the identification of thin coal-seams, it isn't possible to settle which of them are already now available for the economically justified exploitation. It requires further research works and design. Nevertheless, accepting theoretically, that at least 10% of these resources are available, right away to efficient economical exploitation, we have over 1 billion the tone of coal at our disposal. It is An
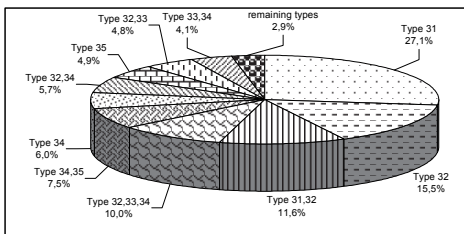
equivalent of 10 of year's production of the hard coal in Poland.

The analysis was carried out an analysis under the following criteria: type of coal, division into ranges of the average depth of covering of coal-seams, the division into ranges of the average inclination of seams, associative criteria of the average depth of covering and the medium thickness of seams and associative criteria for average depth of covering, the average of the calorific value and the average of contents of sulphur. Chosen criteria of diameters of analysis were chosen arbitrarily. The last diameter of analysis is being taken back to quality parameters of coal, taking into account its calorific value and the content of sulphur.

METHOD OF ANALYSIS

For aims of analysis a system of Cartesians coordinates was created in the n- dimension's space, which one kind of variables describing features of a given coal seam corresponds to every of axes in. It is possible to describe every of lines of the set of primary data in the form of the vector in the n-dimensions space, for which coordinates of the top appoint values of individual variables for. For the entire set of primary data we will receive, so, very bulk of vectors located in this space, fastened in the beginning of the system of coordinates.

A method of concentrations and automatic

neural networks were used to the further data handling [1, 4]. The application of the method of concentrations allows for assigning subsets being characterized by resemblance of variables with reason of oneself [3]. For individual sections of analysis, from the entire set of primary data, subsets described only by analysed variables were created.
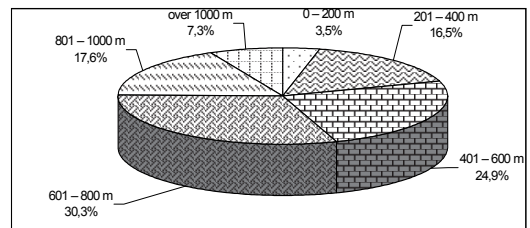
Automatic neural networks are computer programs imitating learning processes appearing in the human mind in their action. In this particular case a peculiar type of the net was exploited – Kohonena networks, and a STATISTICA program was a tool of the realization 9.0 version [2].

Primary data obtained from mines were a base of to do analyse [5].

STRUCTURE OF RESOURCES ACCORDING TO THE CRITERION OF THE TYPE OF COAL

The criterion of types of coal was applied in this diameter of analysis. It was assumed that giving a few types of coal in characteristics of resources meant that they are in these resources quoin of different types in this analysis.

According to classification in accordance with Polish Norms the following types of coal were distinguished: Type 31 – flame coal; Type 32 – fiery – flame coal; Type 33 – fiery coal; Type 34 – fiery – cooking coal; Type 35 – orto – cooking coal; Type 36 – meta – cooking coal; Type 37 – semi – cooking coal.

Source: own study.

Fig. 1. Structure of resources according to the criterion of types of coal

Source: own study.

Fig. 2. Structure of resources according to the criterion of the average depth of covering of coal seams

Id.	Types of coals	Size of resources [thousands of ton]	% of participation in resources with the whole
1	Type 31	2 946 517	27.6
2	Type 32	1 683 001	15.46
3	Type 33	70 201	0.64
4	Type 34	648 717	5.96
5	Type 35	537 166	4.93
6	Type 36	4 202	0.04
7	Type 37	37 633	0.35
8	Type 31,32	1 267 695	11.64
9	Type 32,33	445 191	4.09
10	Type 32,34	624 489	5.74
11	Type 32,35	18 820	0.17
12	Type 33,34	256 514	2.16
13	Type 33,35	13 375	0.12
14	Type 34,35	811 447	7.45
15	Type 35,36	23 729	0.22
16	Type 35,37	69 252	0.64
17	Type 36,37	5 478	0.05
18	Type 31,32,33	30 960	0.28
19	Type 31,32,34	57 766	0.53
20	Type 32,33,34	1 042 487	9.57
21	Type 32,34,35	35 494	0.33
22	Type 33,34,35	84 125	0.77
23	Type 34,35,37	5 475	0.05
24	Type 35,36,37	1 913	0.02
25	Type 31,32,33,34	70 959	0.65
27	Type 32,33,34,35	95 713	0.88
	TOTAL	10 888 319	

Source: own study.

In the Table 1 a structure of resources was given according to the criterion of types of coal. In figure 6 a structure of reserves according to the criterion of the type of coal for the whole tested resources was described.

In resources with the whole coals of the following types have large stakes: Type 31 – 2 946 517 th. tone i.e. 27,06% whole of stores; Type 32 – 1 683 001 th. tone i.e. 15,46% whole of stores; Type 31, 32 – 1 267 695 th. tone i.e. the 11.64% whole of stores and the Type 32, 33, 34 – 1 042 487 th. tone i.e. 9.57% whole of stores.

STRUCTURE OF RESOURCES ACCORDING TO THE CRITERION OF IDENTITY FOR RANGES OF THE AVERAGE DEPTH OF COVERING OF COAL SEAMS

In this diameter of analysis a criterion of identity was applied for ranges of the average depth of covering of restores. In analysis the following ranges of the average depth of covering were accepted: 0 – 200 m, 201 – 400 m, 401 – 600 m, 601 – 800 m, 801 – 1000 m, over 1000 m.

In the Table 2 a structure of resources was given according to the criterion of identity for ranges to the depth of covering of coal seams, and in picture 2 graphically this structure of resources was described.

In resources with the whole the largest re-

serves of coal are appearing in ranges of the average depth of covering: in the range from 601 up to 800 m – 3 299 842 thousands tone i.e. the 30.31% whole of stores and in the range from 401 up to 600 m – 2 708 947 thousands tone i.e. 24.88%.

Table 2

Id.	Ranges of the depth of covering	Size of resources [thousands of ton]	% of participation in resources with the whole
1	0-200 m	381 258	3.50
2	201-400 m	1 791 386	16.45
3	401-600 m	2 708 947	24.88
4	601-800 m	3 299 842	30.31
5	801-1000 m	1 910 948	17.55
6	over 1000 m	795 938	7.31
	TOTAL	10 888 319	

Source: own study.

STRUCTURE OF RESOURCES ACCORDING TO THE CRITERION OF THE MEDIUM THICKNESS OF COAL SEAMS

In this diameter of analysis a criterion of ranges of the medium thickness of coal seams was applied. The following ranges of the medium thickness of seams were accepted: 0.6 up to 0.8 m; 0.81 to 1.0 m; 1.01 up to 1.2 m; 1.21 up to 1.4 m; 1.41 to 1.6 m and above 1.6 m. In the range resources above of the average thicknesses 1.6 m are finding underground oneself resources about the variable of thicknesses, in which the lower limit of the thickness is located in a range 0.6 up to 1.6 m.

In Table 3 a structure of sources was given according to the criterion of ranges to the medium thickness of decks, and in Figure 3 a graphical illustration of this structure was described.

Table 3

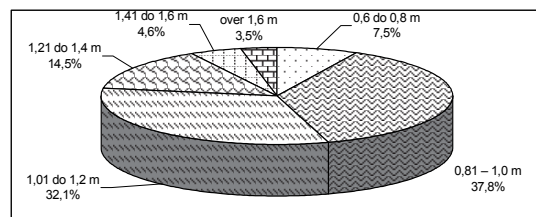| Id.	Ranges of the medium thickness of coal seams	Size of resources [thousands of ton]	% of participation in resources with the whole
1	0.6 to 0.8 m	821 037	7.54
2	0.81 to 1.0 m	4 120 405	37.84
3	1.01 to 1.2 m	3 492 662	32.08
4	1.21 to 1.4 m	1 577 880	14.49
5	1.41 to 1.6 m	500 760	4.60
6	over 1.6 m	375 575	3.45
	TOTAL	10 888 319	

Source: own study

The largest resources of coal are located in ranges of the medium thickness of seams: in the range 0,81 to 1,0 m – 4 120 405 thousand of ton that presents 37,84% of whole of resources and in the range 1,01 up to 1,2 m – 3 492 662 thousand of ton that presents 32,08% of whole of resources.

THE STRUCTURE OF RESOURCES ACCORDING TO CRITERION OF THE AVERAGE INCLINATION OF COAL SEAMS

It was applied a criterion of ranges of average inclination of coal seams as well as the resources selection into the capital groups and then its division into the particular coal mines that are within those groups in this diameter of analysis .

The following ranges of average inclination of seams were accepted: $0°$ to $5°$; $6°$ to $10°$; $11°$ to $15°$; $16°$ to $20°$; $21°$ to $25°$; above $25°$.

In Table 4 a structure of resources was given according to the criterion of ranges of average inclination of coal seams, and in Figure 4 a graphical illustration of this structure was described.

The largest coal resources are located in range of average inclination of seams: in range $0°$ to $5°$ − 4 559 024 thousand tone i.e. the 41.87% whole of stores and in range $6°$ to $10°$ − 3 829 225 thousand tone i.e. the 35.17% whole of stores.
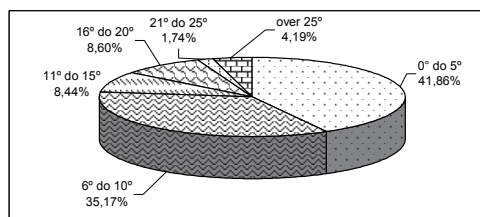

Source: own study.

Fig. 3. Structure of resources according to the criterion of ranges of the medium thickness of coal seams.

Source: own study.

Fig. 4. The structure of resources according to criterion of ranges the average inclination of coal seams.

STRUCTURE OF RESOURCES ACCORDING TO THE CRITERION OF RANGES OF   Table 4
AVERAGE INCLINATION COAL-SEAMS

Id.	Ranges of average inclination of coal seams	Size of resources [thousands of ton]	% of participation in resources as total
1	0° to 5°	4 559 024	41.86
2	6° to 10°	3 829 225	35.17
3	11° to 15°	918 671	8.44
4	16° to 20°	936 025	8.60
5	21° to 25°	189 195	1.74
6	above 25°	456 179	4.19
	SUM	10 888 319	

Source: own study.

STRUCTURE OF RESOURCES ACCORDING TO ASSOCIATIVE CRITERIA OF THE AVERAGE DEPTH OF COVERING AND THE MEDIUM THICKNESS OF COAL SEAMS

It was applied the associative criteria of the average depth of covering of coal seams and the average of thickness of these seams as well as the resources selection into the capital groups and then its division into the particular coal mines that are within those groups in this diameter of analysis. The following ranges of the average depth of covering of seams were accepted: 0 up to 200 m; 201 up to 400 m; 401 up to 600 m; 601 up to 800 m; 801 up to 1000 m; over 1000 m.
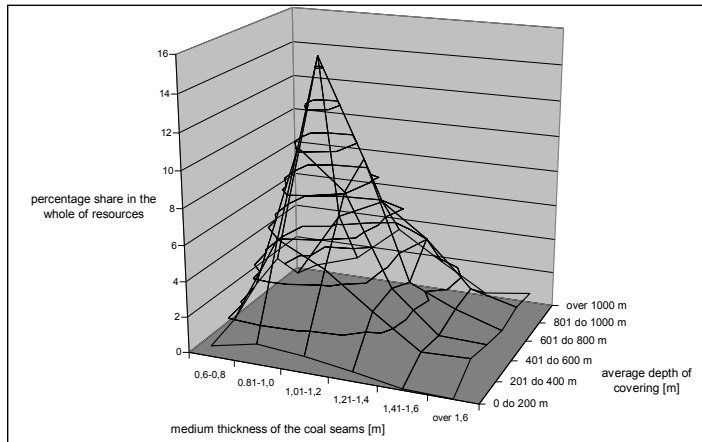
The following ranges of the medium thickness of coal seams were accepted: 0,6 up to 0,8 m; 0,81 up to 1.0 m; 1,01 up to 1,2 m; 1,21 up to 1.4 m; 1,41 to 1,6 m and the over 1,6 m. The seam of the thickness over 1,6 m were ranked among thin coal seams about the diversified thickness, which the lower limit of the thickness is located in a range from 0,6 up to 1,6 m.

Source: own study.

Fig. 5. Structure of resources according to associative criteria of ranges of the average depth of covering and ranges of the average of thickness of seams appointed according to real values

The structure of resources according to the associative criterion of ranges to the medium thickness and the average depths of covering of stores was given in Table 5. The illustration of structure of resources appointed according to real values was showed on Figure 5 and on Figure 6 appointed according to ranges of value.

Source: own study.

Fig. 6. Structure of resources according to associative criteria of ranges of the average depth of covering and ranges of the average of thickness of coal seams appointed according to ranges of value

THE STRUCTURE OF RESOURCES ACCORDING TO ASSOCIATIVE CRITERIA OF RANGES   *Table 5*
OF AVERAGE DEPTH COVERING AS WELL AS THE RANGES OF AVERAGE OF THICKNESS SEAMS

Ranges of the average depth of covering of seams	Ranges of medium thicknesses of coal seams [m]						SUM
	0.6-0.8	0.81-1.0	1.01-1.2	1.21-1.4	1.41-1.6	over 1.6	
Absolute values [thousands of ton]							
0 to 200 m	66 599	126 630	100 305	58 386	9 992	4 619	1 791 386
201 to 400 m	114 000	650 579	509 224	301 317	102 503	113 763	2 712 548
401 to 600 m	227 235	1 113 775	879 427	332 538	83 671	75 902	3 314 569
601 to 800 m	228 071	1 590 812	997 034	260 852	134 432	43 368	375 575
801 to 1000 m	87 468	509 240	641 519	439 086	153 989	79 646	1 910 948
over 1000 m	37 664	129 368	365 153	185 701	16 173	58 278	792 337
SUM	821 037	4 120 404	3 492 662	1 577 880	500 760	375 576	10 888 319
Percentage share in the whole of resources							
0 to 200 m	0.61	1.16	0.92	0.54	0.09	0.04	3.36
201 to 400 m	1.05	5.98	4.68	2.77	0.94	1.04	16.46
401 to 600 m	2.09	10.22	8.08	3.05	0.77	0,70	24.91
601 to 800 m	2.65	14.61	9.16	2.40	1.23	0.40	30.45
801 to 1000 m	0.80	4.68	5.88	4.03	1.41	0.73	17.53
over 1000 m	0.35	1.19	3.35	1.71	0.15	0.54	7.29
SUM	7.55	37.84	32.07	14.50	4.19	3.45	100

Source: own study.

The largest resources of coal are located in the ranges of the medium thickness of coal seams and the average depths of covering: in the range of the thickness 0.81 up to 1.0 m and the range of the depth of covering 601 to 800 m – 1 590 812 thousand ton i.e. the 14.61% whole of stores.
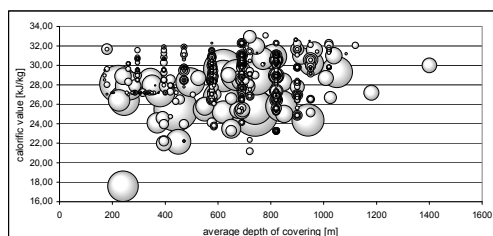
STRUCTURE OF RESOURCES ACCORDING TO ASSOCIATIVE CRITERIA OF THE AVERAGE DEPTH OF COVERING, OF THE MEDIUM CALORIFIC VALUE AND THE AVERAGE CONTENT OF SULPHUR

It was applied the associative criteria of the average depth of covering of coal seams, of the medium calorific value and the average content of sulphur in as well as the resources selection into the capital groups and then its division into the particular coal mines that are within those groups in this diameter of analysis.

The following ranges of the average depth of covering of coal seams were accepted: 0 up to 200 m; 201 up to 400 m; 401 up to 600 m; 601 up to 800 m; 801 up to 1000 m; over 1000 m. The following ranges of the medium calorific value were accepted: to 18,0 kJ/kg; 18,01 to 22,0 kJ/kg; 22,01 to 26,0 kJ/kg; 26,01 to 30,0 kJ/kg and above 30,0 kJ/kg.

The following ranges of the average content of sulphur were accepted: to 0,4%; 0,41 to 1,0%; 1,01 to 1,6%; 1,61 to 2,2% and above 2,20%.

The structure of resources for the whole of stores according to the associative criterion of ranges to the average depth of lying of decks, for the medium calorific value and the average content of sulphur was given in Table 6.

Source: own study.

Fig. 7. Structure of resources according to associative criteria of the average depth of covering and the medium calorific value appointed according to real values – for the content of sulphur in coal to 0.4%

Source: own study.

Fig. 8. Structure of resources according to associative criteria of the average depth of covering and the medium calorific value appointed according to real values – for the content of sulphur in coal from 0.41 to 1.0%
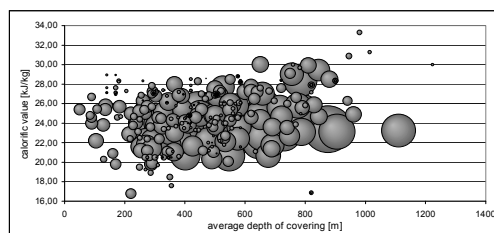

Source: own study.

Fig. 9. Structure of resources according to associative criteria of the average depth of covering and the medium calorific value appointed according to real values – for the content of sulphur in coal from 1.01 to 1.6%

Source: own study.

Fig. 10. Structure of resources according to associative criteria of the average depth of covering and the medium calorific value appointed according to real values – for the content of sulphur in coal from 1.61 to 2.2%
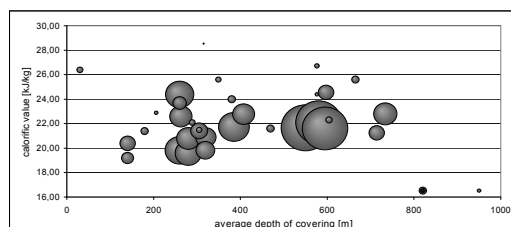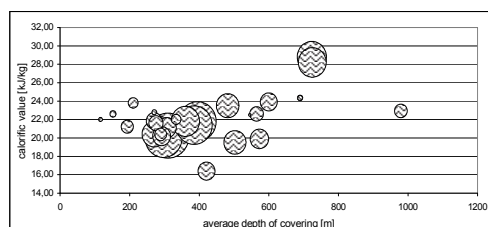

Source: own study.

Fig. 11. Structure of resources according to associative criteria of the average depth of covering and the medium calorific value appointed according to real values – for the content of sulphur in coal above 2.2%

Structure of resources was set according to real values, based on adopted criteria, for stores with the whole, for different ranges contents of sulphur were described appropriately: on Figure 7 – for the range to 0,4%; on Figure 8 – for the range from 0,41 to 1.0%; on Figure 9 – for the range from 1,01 to 1,6%; on Figure 10 – for the range 1,61 to 2,2% and on Figure 11 for the content above 2,21%.

The complete resources of coals with the content of sulphur meeting the appropriate ranges, representing the following participations : to 0,40% – 3,801% i.e. 414 031 thousands of ton; from 0,41 to 1,0% – 71,266% i.e. 7 759 061 thousands of ton; from 1,01 to 1,6% – 9.263% i.e. 2 094 835 thousands of ton; from 1,61 to 2,2% – 3,787% i.e. 411 411 thousands of ton; above 2,2% – 1,882 % i.e. 208 981 thousands of ton.

The complete resources of the coals with the calorific value meeting the appropriate ranges representing the following participations: to 18 kJ/kg – 0.439% i.e. 47 043 thousands of ton; from 18,01 to 22,0 kJ/kg – 7,373% i.e. 802 182 thousands of ton; from 22,01 to 26,0 kJ/kg – 44,306% i.e. 4 826 010 thousands of ton; from 26,01 to 30,0 kJ/kg – 42,257% i.e. 4 600 054 thousands of ton; above 30,0 kJ/kg – 5,624% i.e. 613 030 thousands of ton.

The maximum participation in the whole of resources carrying out 13,19% i.e. 1 436 642 thousand tons possess the resources fulfilling the following criteria: the content of sulphur the range from 0,41 to 1,0%; calorific value in range from 26,01 to 30,0 kJ/kg as well as depth of covered in range since 601 to 800 m.

STRUCTURE OF RESOURCES ACCORDING TO ASSOCIATIVE CRITERIA OF RANGES OF THE AVERAGE DEPTH OF COVERING OF COAL SEAMS, RANGES OF THE MEDIUM CALORIFIC VALUE AND RANGES OF THE AVERAGE CONTENT OF SULPHUR – REAL VALUE

Table 6 (a)

Ranges of the average depth of coal seams	Ranges of medium calorific values [kJ / kg]					SUM
	to 18.0	18.01-22.0	22.01-26.0	26.01-30.0	over 30.0	
Absolute values [thousands of ton]						
Content of sulphur to 0.4%						
0 to 200 m	0	0	0	795	1 029	1 824
201 to 400 m	7 205	0	7 958	51 961	3 501	70 625
401 to 600 m	0	0	29 068	40 385	6 215	75 668
601 to 800 m	359	0	40 796	86 381	22 231	149 767
801 to 1000 m	0	0	27 412	35 155	34 294	96 861
over 1000 m	0	0	0	14 765	4 521	19 286
SUM	**7 564**	**0**	**105 234**	**229 442**	**71 791**	**414 031**
Content of sulphur from 0.41 to 1.0%						
0 to 200 m	21 390	0	150 094	109 751	3 003	284 238
201 to 400 m	1 746	66 949	633 341	225 984	3 335	931 355
401 to 600 m	3 729	30 901	811 865	772 411	50 173	1 669 079
601 to 800 m	0	61 804	807 316	1 436 642	219 145	2 524 907
801 to 1000 m	0	5 141	343 304	1 040 425	225 986	1 614 856
over 1000 m	0	0	252 743	453 791	28 092	734 626
SUM	**26 865**	**164 795**	**2 998 663**	**4 039 004**	**529 734**	**7 759 061**
Content of sulphur from 1,01 to 1.6%						
0 to 200 m	0	8 839	49 573	5 249	0	63 661
201 to 400 m	4 303	114 902	308 134	59 163	0	486 502
401 to 600 m	0	131 210	510 559	83 504	0	725 273
601 to 800 m	0	82 262	383 555	112 732	9 000	587 549
801 to 1000 m	640	0	148 367	42 358	2 059	193 424
over 1000 m	0	0	37 752	228	446	38 426
SUM	**4 943**	**337 213**	**1 437 940**	**303 23**	**11 505**	**2 094 835**
Content of sulphur from 1.61 to 2.2%						
0 to 200 m	0	12 425	0	1 087	0	13 512
201 to 400 m	0	0	161 694	42	0	161 736
401 to 600 m	0	127 259	80 385	586	0	208 230
601 to 800 m	0	6 823	18 064	0	0	24 887
801 to 1000 m	3 046	0	0	0	0	3 046
SUM	**3 046**	**146 507**	**260 143**	**1 715**	**0**	**411 411**
Content of sulphur above 2.2%						
0 to 200 m	0	2 688	608	0	0	3 296
201 to 400 m	0	137 611	3 557	0	0	141 168
401 to 600 m	4 625	13 386	16 304	0	0	34 297
601 to 800 m	0	0	800	26 659	0	27 459
801 to 1000 m	0	0	2761	0	0	2 761
SUM	**4 625**	**153 667**	**24 030**	**26 659**	**0**	**208 981**
TOTAL	**47 043**	**802 182**	**4 826 010**	**4 600 054**	**613 030**	**10 888 319**

Source: own study.

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STRUCTURE OF RESOURCES ACCORDING TO ASSOCIATIVE CRITERIA OF RANGES OF THE AVERAGE DEPTH OF COVERING OF COAL SEAMS, RANGES OF THE MEDIUM CALORIFIC VALUE AND RANGES OF THE AVERAGE CONTENT OF SULPHUR – PERCENTAGE SHARES   *Table 6 (b)*

Ranges of the average depth of coal seams	Ranges of medium calorific values [kJ / kg]					SUM
	to 18.0	18.01-22.0	22.01-26.0	26.01-30.0	over 30.0	
Percentage shares in the whole of resources						
Content of sulphur to 0.4%						
0 to 200 m	0	0	0	0.0073	0.0095	0.017
201 to 400 m	0.07	0	0.073	0.48	0.0322	0.655
401 to 600 m	0	0	0.27	0.37	0.0571	0.698
601 to 800 m	0.003	0	0.375	0.793	0.20	1.371
801 to 1000 m	0	0	0.25	0.32	0.31	0.880
over 1000 m	0	0	0	0.14	0.04	0.180
SUM	**0.073**	**0.000**	**0.968**	**2.111**	**0.649**	**3.801**
Content of sulphur from 0.41 to 1.0%						
0 to 200 m	0.20	0	1.38	1.01	0.028	2.618
201 to 400 m	0.016	0.61	5.82	2.08	0.031	8.557
401 to 600 m	0.034	0.28	7.46	7.09	0.46	15.324
601 to 800 m	0	0.57	7.41	13.19	2.01	23.180
801 to 1000 m	0	0.047	3.15	9.56	2.08	14.837
over 1000 m	0	0	2.32	4.17	0.26	6.750
SUM	**0.250**	**1.507**	**27.54**	**37.1**	**4.869**	**71.266**
Content of sulphur from 1.01 to 1.6%						
0 to 200 m	0	0.081	0.46	0.048	0	0.589
201 to 400 m	0.04	1.06	2.83	0.54	0	4.470
401 to 600 m	0	1.21	4.69	0.77	0	6.670
601 to 800 m	0	0.76	3.52	1.04	0.083	5.403
801 to 1000 m	0.006	0	1.36	0.39	0.019	1.775
over 1000 m	0	0	0.35	0.0021	0.0041	0.356
SUM	**0.046**	**3.111**	**13.210**	**2.790**	**0.106**	**19.263**
Content of sulphur from 1,61 to 2,2%						
0 to 200 m	0	0.114	0	0.010	0	0.124
201 to 400 m	0	0	1.49	0.00039	0	1.490
401 to 600 m	0	1.17	0.74	0.0054	0	1.915
601 to 800 m	0	0.063	0.166	0	0	0.229
801 to 1000 m	0.028	0	0	0	0	0.028
SUM	**0.028**	**1.347**	**2.396**	**0.016**	**0.000**	**3.787**
Content of sulphur above 2.2 %						
0 to 200 m	0	0.025	0.0056	0	0	0.031
201 to 400 m	0	1,26	0.0033	0	0	1.263
401 to 600 m	0.042	0.123	0.151	0	0	0.316
601 to 800 m	0	0	0.0073	0.24	0	0.247
801 to 1000 m	0	0	0.025	0	0	0.025
SUM	**0.042**	**1.408**	**0.192**	**0.240**	**0.000**	**1.882**
TOTAL	**0.439**	**7.373**	**44.306**	**42.257**	**5.624**	**100.00**

Source: own study.

CONCLUSIONS

The analysis of characteristic feature of coal seams, covering in Poland in thin seams, show that they are then the resources, in majority, very attractive to future exploitation. It is possible even to propose a thesis, that they are more attractive than, many thin coal seams exploited for decades in the Ukraine. The mining of Ukraine, with success, exploits such coal seams, then it is logic that it should also be back to their mining utilization in Poland.

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