Mineral and Energy
Economy Research
Institute
Polish Academy of Sciences

Report 2018

Hard Coal Mining in Poland

Krakow 2019

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Report prepared under Jerzy Kicki, Ph.D. Eng., direction by a team of the Division of Mineral Resources Acquisition and of the Division of Fossil Fuels and Energy Market Research.

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The presented report *Hard Coal Mining in Poland 2018* is the effect of statistical data aggregation as well as of own research carried out at the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences.

The authors plan to publish it in the next years with the intention of expansion. The report focuses on the data from a few recent years (from 2014 it was prepared at the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences in a slightly shorter version, but it also uses historical data, e.g. for 1991, when the Agencja Rozwoju Przemysłu (Industrial Development Agency), was established.

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The report contains data illustrating: the legal situation comprising issues related to obtaining a licence to carry out mining activity, resource base of hard coal mines acc. to Polish classification and acc. to accepted worldwide JORC Code, the situation of deposit extraction technology and engineering as well as geological and mining conditions of its performance, the situation of occupational safety, and also expenditures, costs, and economic results of hard coal mining and its role in the economy of Poland. A part of presented data is referred to the mining activity in the world. As a supplement to the last year report, this report contains also data related to Polish mining companies listed on the GPW (Warsaw Stock Exchange) against a background of global companies.

A calendar of events in the hard coal mining in 2018 accompanies the report.

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Reservation

The report uses publicly available GUS and CIRE statistical data as well as data purchased from the Industrial Development Agency and analysed especially for the needs of this report.

Contents

Report Goals

- presentation of the sector, which plays a key role in Polish economy, to a significant extent decides about its image and has strategic importance for Polish power industry picture and prospects,
- report as a method to provide the society with information on the mining sector activity, integrating with the term of open access to knowledge, which is to be the main attribute of the 21st century society,
- report as a source of information about long-term hard coal mining problems,
- report as a source of reliable information established in its readers conscience and as a set of facts deciding about results of its activity.

Reports and studies on the hard coal mining in Poland in the years 2012-2018

- **Report of the Adam Smith Centre**

Surdej A. et al., *Przyszłość polskiego węgla. Bankructwo czy międzynarodowa konkurencyjność?*, (Future of Polish Coal. Bankruptcy or International Competitiveness?) Warsaw 2012.

- **Deloitte Report**

T. Konik, A. Walter, A. Obońska, *Czy nadchodzi kres polskiego modelu górnictwa?* (Is the End of Polish Mining Model Coming?), 2012.

- **WiseEuropa Institute**

Bukowski M., Maśnicki J., Śniegocki A., Trzeciakowski R., *Polski węgiel Quo Vadis? Perspektywy rozwoju górnictwa węgla kamiennego w Polsce*, (Quo Vadis Polish Coal? Prospects for Hard Coal Mining Development in Poland) Warsaw 2014.

- **WiseEuropa Institute**

Bukowski M., Śniegocki A., *Ukryty rachunek za węgiel. Analiza wsparcia gospodarczego dla energetyki węglowej oraz górnictwa w Polsce*, (Hidden Bill for Coal. Analysis of Economic Support for Coal-Based Power Industry and Mining in Poland) Warsaw 2014.

- **Civil Development Forum FOR**

Guzera H., *Problemy Kompani Węglowej przykładem społecznych kosztów odkładania reform., Nr. 14/2014*, (Problems of Kompania Węglowa - an Example of Social Costs of Putting Reforms Off) Warsaw 2014.

Reports and studies on the hard coal mining in Poland in the years 2012-2018

- **Wydawnictwo Krytyki Politycznej (Political Critique Publishers)**

Bendyk E., Papajak U., Popkiewicz M., Sutowski M., *Polski węgiel (Polish Coal)*, Warsaw 2015.

- **WiseEuropa**

Bukowski M., Siedlecka U., Śniegocki A.: *Zapaść, czy fuzja z energetyką uratuje polskie górnictwo?,* (Collapse, Will Merger with Power Industry Save Polish Mining?) Warsaw 2016.

- **Supreme Audit Office**

Funkcjonowanie górnictwa węgla kamiennego w latach 2007–2015 na tle założeń programu rządowego, (Hard Coal Mining Operation in the years 2007-2015 Against a Background of Government Programme Assumptions) Warsaw 2017.

- **WiseEuropa**

Siedlecka U., Śniegocki A., Wetmańska Z., *Ukryty rachunek za węgiel 2017, Wsparcie górnictwa i energetyki węglowej w Polsce - wczoraj, dziś i jutro*, (Hidden Bill for Coal 2017. Support for Coal Mining and Power Industry in Poland - Yesterday, Today, and Tomorrow) Warsaw 2017.

- **Institute for Structural Research**

Antosiewicz M., Baran J., Lewandowski P., Szpor A., Witajewski-Baltvilks J. Transformacja Górnictwa w ambitnym scenariuszu dekarbonizacji w Polsce – skutki dla rynku pracy, (Mining Sector Transformation in an Ambitious Decarbonisation Scenario in Poland - Effects for the Labour Market) Warsaw 2018.

Formal and Legal Conditions of Carrying out Mining and Geological Activities - Certain Aspects

The goal of State policy on hard coal mining sector consists in rational and effective management of coal deposits situated in the territory of the Republic of Poland, so that the resources would serve the next generations of Poles.

Principles and conditions of rational management of mineral deposit resources, and hence carrying out geological work, extracting minerals from deposits, and protecting deposits of minerals, ground waters and other components of the environment in relation to performance of geological work and extracting minerals, have been included in Art. 1 of the Act of 9 June 2011 - Geological and Mining Law.

The performance of business in a mining enterprise is affected by many diverse conditions of legal, political, social, and economic nature.

This chapter presents a set of documents functioning in the planning process in a mining enterprise, also documents related to obtaining licences (both for a mineral deposit prospecting or exploring, and also for its mining).

Also the evolution of legislation, which has resulted in the current formal and legal situation of hard coal mining operations in Poland, has been presented.
The chapter contains also changes in the legislation, which were introduced to the Geological and Mining Law in August 2018 and are important to carry out geological and mining activity

Legal grounds to grant prospecting, exploring, and mining licences

1. Geological and Mining Law of 9 June 2011 (Dz.U. No 2017, item 2126 with amendments)
2. Act of 15 June 2018 on Amendment to the Geological and Mining Law and to Certain Other Laws
3. Regulation of the Minister of Environment of 16 October 2014 on the register of mine fields and closed underground carbon dioxide storage facilities
4. Regulation of the Minister of Environment of 25 February 2015 on specimens of information forms applicable to charges resulting from provisions of the Geological and Mining Law
5. Regulation of the Minister of Environment of 24 April 2012 on detailed requirements related to deposit management designs

Legal grounds to grant prospecting, exploring, and mining licences

6. Regulation of the Minister of Environment of 9 November 2010 on projects that can have a significant environmental impact
7. Act of 6 March 2018 on Provisions Implementing the Entrepreneurs Law and Other Acts on Business Activities.
8. Act of 3 October 2008 on Making the Environmental Information Available and on Environmental Protection, on Society Participation in the Environmental Protection and on Environmental Impact Assessments
9. Announcement of the Minister of Environment of 16 July 2018 on rates of charges resulting from provisions of the Geological and Mining Law valid for 2019
10. Act of 14 June 1960 on Administrative Proceedings Code
11. Act of 30 August 2002 on Administrative Courts Proceedings Law

Geological and Mining Law - a historical perspective

Decree of 6 May 1953
MINING LAW
Effective date: 1 December 1953
Date of repealing: 1 September 1994

Act of 4 February 1994
GEOLOGICAL AND MINING LAW
Effective date: 1 September 1994
Date of repealing: 1 January 2012

Act of 9 June 2011
GEOLOGICAL AND MINING LAW
Effective date: 1 January 2012
IN FORCE

RIGHT OF PRE-EMPTION

Art. 15. 1. The person, who as a result of geological work performance:

1) has explored a complex of underground carbon dioxide storage facility and has documented it to a degree enabling preparation of underground carbon dioxide storage facility management plan as well as has obtained a decision approving the geological documentation of the complex,
2) has documented a mineral deposit, being the subject of mining ownership, excluding a hydrocarbons reservoir, to a degree enabling preparing the deposit management design and has obtained a decision approving the geological documentation of this deposit based on a licence to:
   a) prospect for mineral deposits within a scope comprising the whole newly documented deposit,
   b) prospect and explore for mineral deposits, within the scope of:
      - the entire documented deposit as a result of prospecting,
      - a part of documented deposit as a result of exploration, in which it has improved its category of exploration to a degree enabling preparation of the deposit management plan,
   c) explore for mineral deposits, only in this part of documented deposit, in which it has improved its category of exploration to a degree enabling preparation of the deposit management plan,
      - is authorised to apply for establishment in his favour of mining use with the right of pre-emption before others.

2. The right, referred to in para. 1 shall expire after 3 years from the date of delivering the decision approving the geological documentation applicable to the underground carbon dioxide storage facility or the geological documentation of a mineral deposit.
3. In the case of submitting an application, referred to in para 1, the licensing authority concludes a contract on establishment of mining use until the deadline, referred to in para 2.
4. The non-signing of the contract on establishment of mining use for reasons being on the side of the entity entitled to conclude it, by the deadline referred to in para 2, results in losing the entitlement to conclude this contract.

LICENCE WITHDRAWAL

Art. 37:

7. The licensing authority can withdraw, without compensation, the licence in the case of losing the mining use, irrespective of the reason.

GIVING OPINIONS ON MINING LICENCES VALIDITY EXTENSION

Art. 205:

5. A change of the licence to mine hard coal or lignite from the deposit, if it is related only to the extension of its validity and is justified by a rational deposit management requires an opinion of the head of the municipality (mayor, president of the city) competent due to the place of intended activity performance. Provision of Art. 23 para 2a subpara 1 shall not be applied.

The following amendments are introduced to the Act of 3 October 2017 on Making the Environmental Information Available and on Environmental Protection, on Society Participation in the Environmental Protection and on Environmental Impact Assessments (Dz. U. of 2017, item 1405, with later amendments):

ENVIRONMENTAL DECISIONS

Art. 72. 2. The requirement of obtaining a decision on environmental conditions is not applied in the case of changing:

...

2) licence or decision, referred to in para 1 subpara 4 and 5, consisting also in:

...

j) single validity extension of the licence to mine hard coal from the deposit, only in the case, when the licence extension is justified by rational deposit management and without expansion of the licence scope,

k) single validity extension of the licence to mine lignite from the deposit, only in the case, when the licence extension is justified by rational deposit management and without expansion of the licence scope,

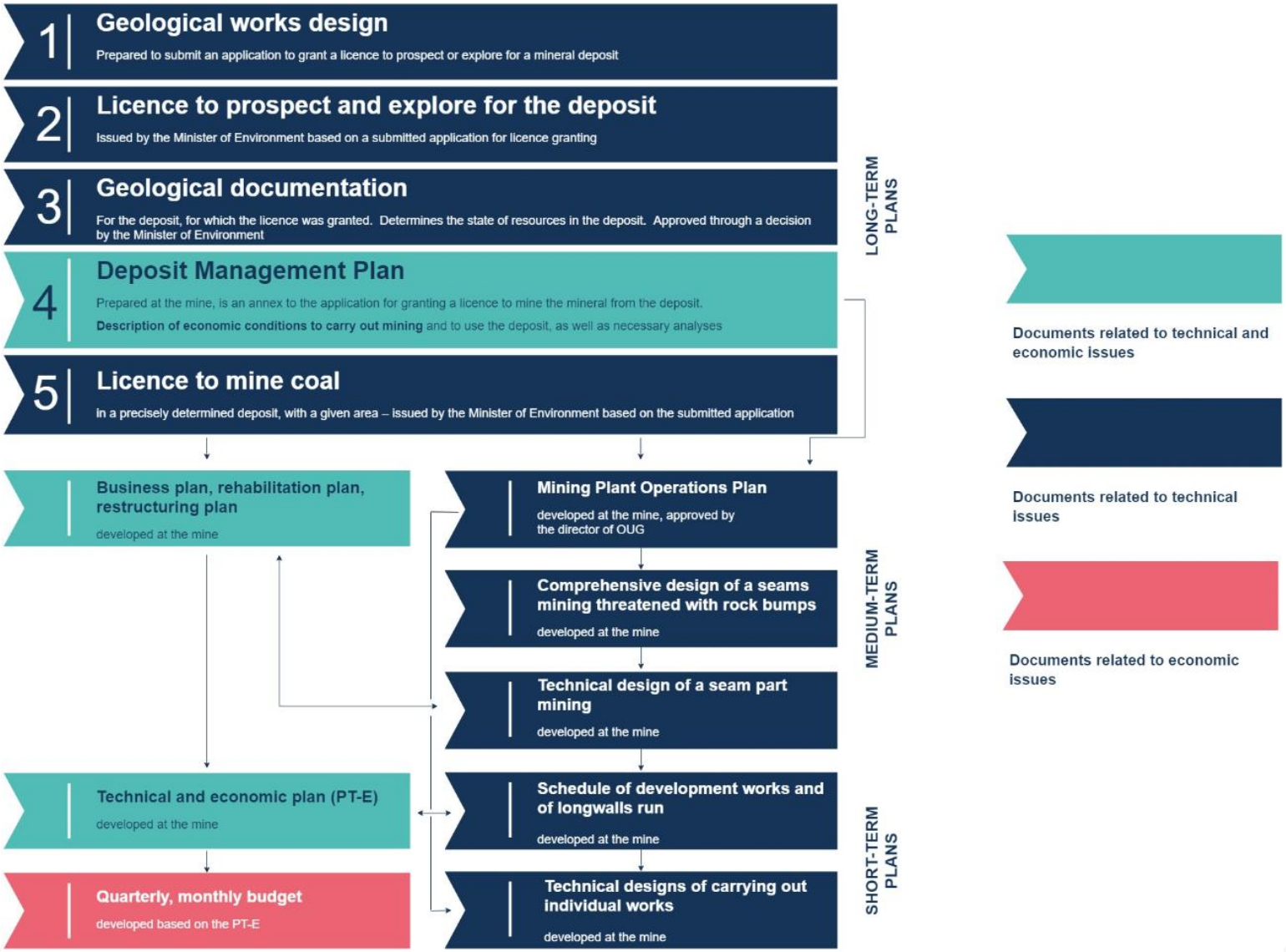
l) single validity extension of the licence to mine brimstone from the deposit by means of boreholes, only in the case, when the licence extension is justified by rational deposit management and without expansion of the licence scope.

LOCAL DEVELOPMENT PLANS

Art. 80:

3. In the case of activity defined by the Act of 9 June 2011 - *Geological and Mining Law*, different from projects that require licence to prospect and explore for mineral deposits, the criterion of project location assessment consists in not disturbing, by the planned activity, the purpose of real property, determined in the local development plan, if the plan has been resolved, and in separate provisions.

Documents in the process of underground mining planning and carrying out



‘Licences 2020’

- After taking effect by the Act on Amendment to the Geological and Mining Law and to Certain Other Laws 5 mining licences valid till 31 January 2019 (Rydułtowy, Marcel, Jankowice, Budryk, Jas-Mos) have been extended acc. to the simplified procedure;
- 2 mining licences: Anna 1 and Marcel (part of former Rymer deposit) are valid till 31 December 2019;
- 19 currently valid licences expire in 2020;
- Simplified procedures for mining licences extension will allow to extend quickly licences valid till 2020, which will enable continuing the current mining.

Validity dates of licences to mine for hard coal mines' deposits

PG Silesia

Licence number	Licence name	Date of granting	Validity date
162/94	Silesia	26-08-1994	21-08-2020

Tauron Wydobycie

Licence number	Licence name	Date of granting	Validity date
1/2004	Dziećkowice	12-01-2004	31-12-2022
4/2012	Wisła I Wisła II	03-08-2012	03-08-2031
12/2004	Brzeszcze	23-09-2004	23-09-2040
2/2013	Byczyna	13-03-2013	31-12-2040
4/2016	Janina	31-05-2016	31-12-2040
6/2016	Jaworzno	09-12-2016	31-12-2040
1/2017	Brzezinka 1	04-01-2017	31-12-2040

Licences valid till 2019

Licences valid till 2020

Licences valid longer than till 2020

Validity dates of licences to mine for hard coal mines' deposits

Polska Grupa Górnicza

Licence number	Licence name	Date of granting	Validity date
211/93	Marcel (part of former Rymer deposit)	08-11-1993	31-12-2019
5/2013	Anna-1	16-07-2013	31-12-2019
59/94	Sośnica	21-04-1994	15-04-2020
116/94	Bolesław Śmiały/Łaziska	27-07-1994	31-07-2020
136/94	Staszic	26-08-1994	13-08-2020
122/94	Pokój	12-08-1994	15-08-2020
125/94	Halemba	18-08-1994	31-08-2020
131/94	Wieczorek	22-08-1994	31-08-2020
128/94	Wujek	22-08-1994	31-08-2020
164/94	Czeczott	26-08-1994	31-08-2020
135/94	Murcki	26-08-1994	31-08-2020
137/94	Mysłowice	26-08-1994	31-08-2020
138/94	Śląsk	26-08-1994	31-08-2020
134/94	Wesoła	26-08-1994	31-08-2020
161/94	Zabrze-Bielszowice	26-08-1994	31-08-2020
163/94	Ziemowit	26-08-1994	31-08-2020
28/98	Halemba II	09-10-1998	09-10-2021
15/2010	Śląsk-Pole Panewnickie	20-12-2010	31-12-2025
4/2010	Piast	13-05-2010	31-12-2030
7/2012	Imielin-Południe	14-12-2012	31-12-2030
13/95	Wujek-Stara Ligota	29-05-1995	29-05-2035
5/2016	Chwałowice	13-09-2016	31-12-2040
2/2018	Marcel	01-01-2018	31-01-2042
3/2018	Rydułtowy	01-01-2018	31-01-2043
4/2018	Jankowice	01-01-2018	31-01-2045

Validity dates of licences to mine for hard coal mines' deposits

LW Bogdanka

Licence number	Licence name	Date of granting	Validity date
5/2009	Bogdanka	06-04-2009	31-12-2031
3/2014	LZW-K-3	17-06-2014	01-07-2046
6/2017	Ostrów	17-11-2017	31-12-2065

Jastrzębska Spółka Węglowa

Licence number	Licence name	Date of granting	Validity date
29/94	Szczygłowice	08-04-1994	31-03-2020
60/94	Knurów	21-04-1994	15-04-2020
3/2005	Chudów-Paniowy 1	18-04-2005	18-04-2020
158/94	Pniówek	26-08-1994	13-08-2020
7/2009	Borynia	27-10-2009	31-12-2025
6/2018	Jas-Mos	01-01-2018	20-03-2026
15/2008	Bzie-Dębina 2 Zachód	01-12-2008	31-12-2042
5/2010	Zofiówka	14-05-2010	31-12-2042
7/2018	Budryk	01-01-2018	31-01-2043
3/2012	Pawłowice	21-06-2012	31-12-2051

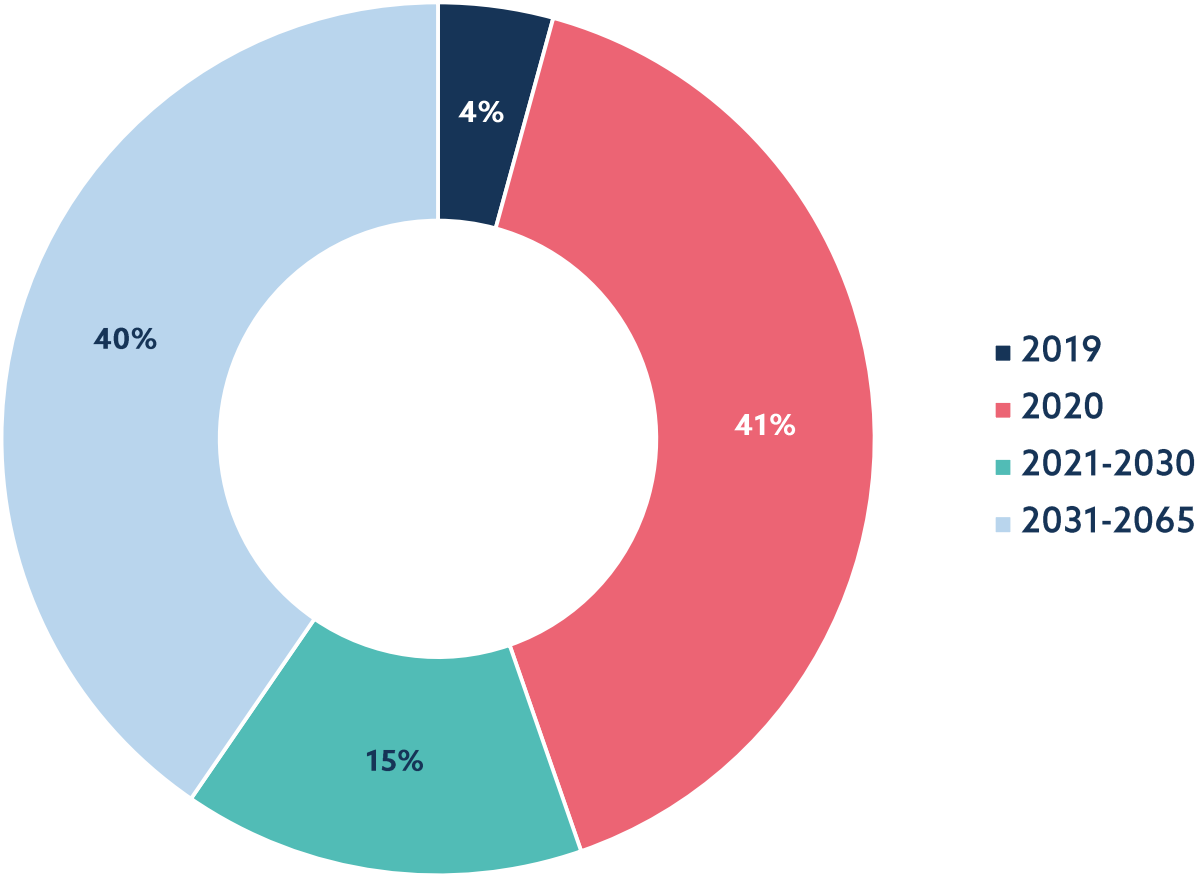
Licences valid till 2019

Licences valid till 2020

Licences valid longer than till 2020

MEERI PAS study based on the Public Information Bulletin of the Ministry of Environment.MEERI PAS

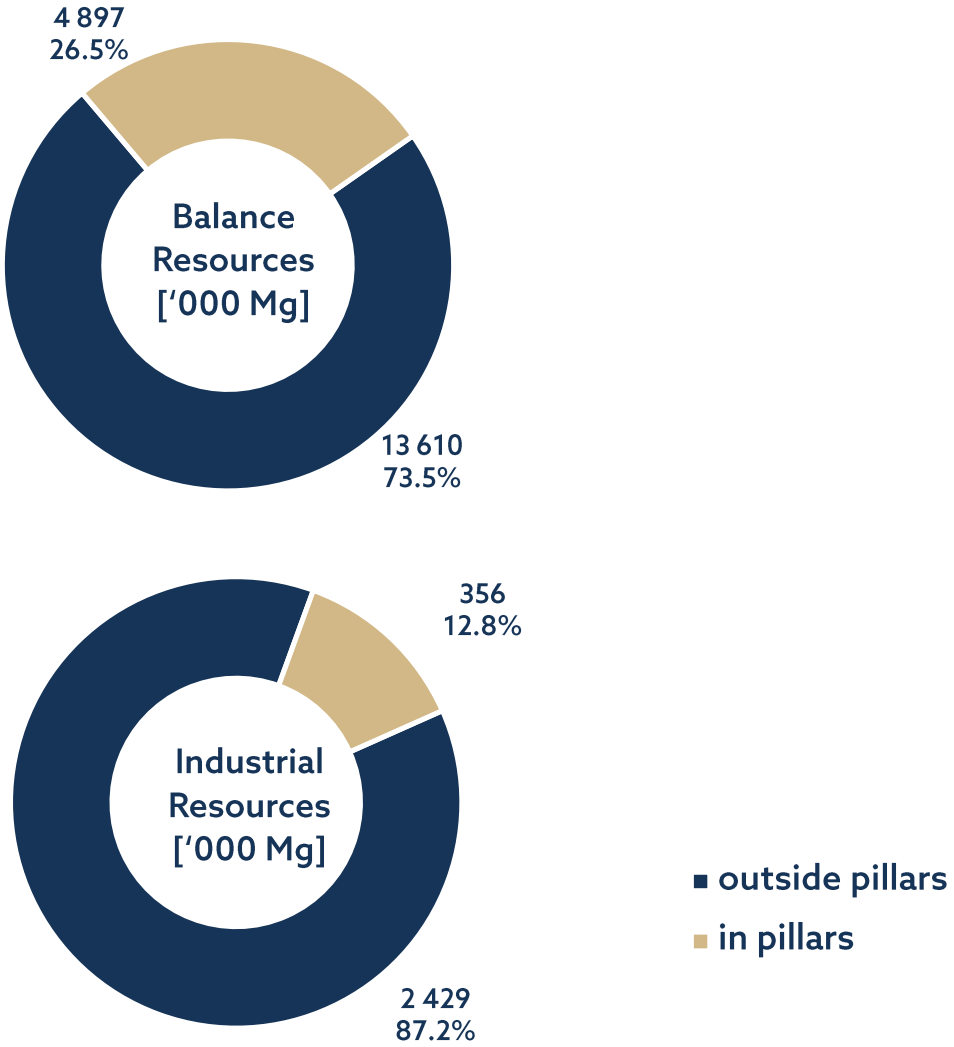
Validity dates of licences to mine for hard coal mines' deposits



MEERI PAS study based on the Public Information Bulletin of the Ministry of Environment.

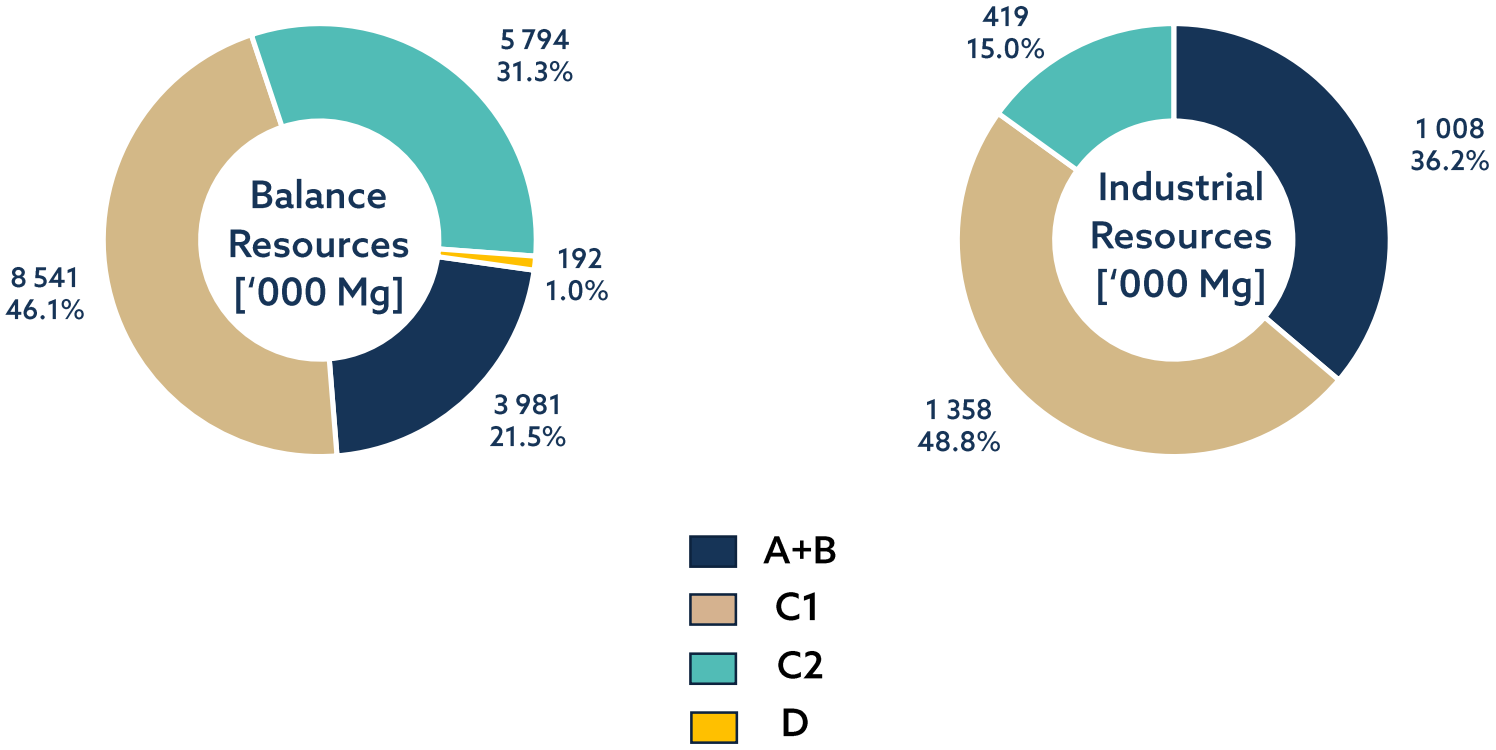
Hard Coal Resources in Poland

Hard coal resources structure in managed deposits (for the entire deposit)



The MEERI PAS study based on the Ministry of Energy data (as of 31/12/2017).

Structure of balance and industrial resources by exploration category [‘000 Mg, %] (for the entire deposit)



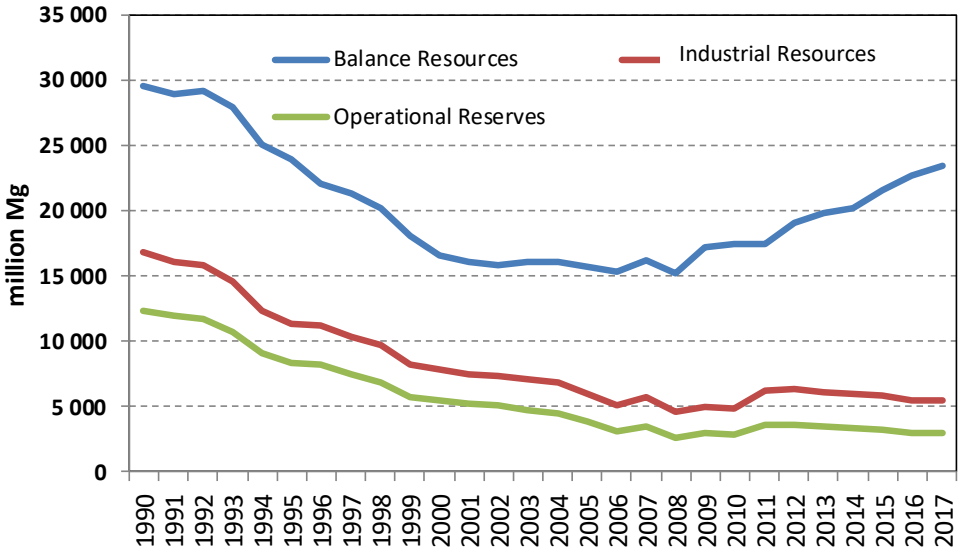
The MEERI PAS study based on the Ministry of Energy data (as of 31/12/2017).

State of hard coal resources in Poland

Documented resources of hard coal in Poland (as of 31/12/2017)

Coal basin	Balance Resources [million Mg]	Industrial Resources [million Mg]
Upper Silesian		
total	48 399	2 660
of which unmanaged deposits	21 613	2 542
Dolnośląskie		
total	424	-
of which unmanaged deposits	-	-
Lubelskie		
total	11 673	541
of which unmanaged deposits	884	290
Razem		
total	60 496	3 201
of which unmanaged deposits	22 497	2 832

Changes of hard coal resources in deposits of operating mines



MEERI PAS report based on data from the Balance of Mineral Resources and Ground Waters in Poland

The current size of hard coal resources base in Poland results from changes in the assessment of operating mines deposit resources, which are caused by implementation of market economy rules as well as consecutive restructuring actions.

A very important element of the restructuring process consisted in verification of the resource base in operating mines, aimed at adapting it to economic, formal, and legal requirements of the market economy. This resource verification, albeit determined by improvement in the coal production effectiveness, has not substantially affected mines profitability, but reduced the resources intended to extract, shortening thereby the life of levels, mining panels, and whole mines.

Essentially, these changes forced:

- another approach to economic resources assessment, both in operating mines and in unmanaged deposits,
- closure of mines considered permanently unprofitable,
- pursuing profitability of remaining mines, primarily via increase in the mining concentration.

State of hard coal resources in Poland

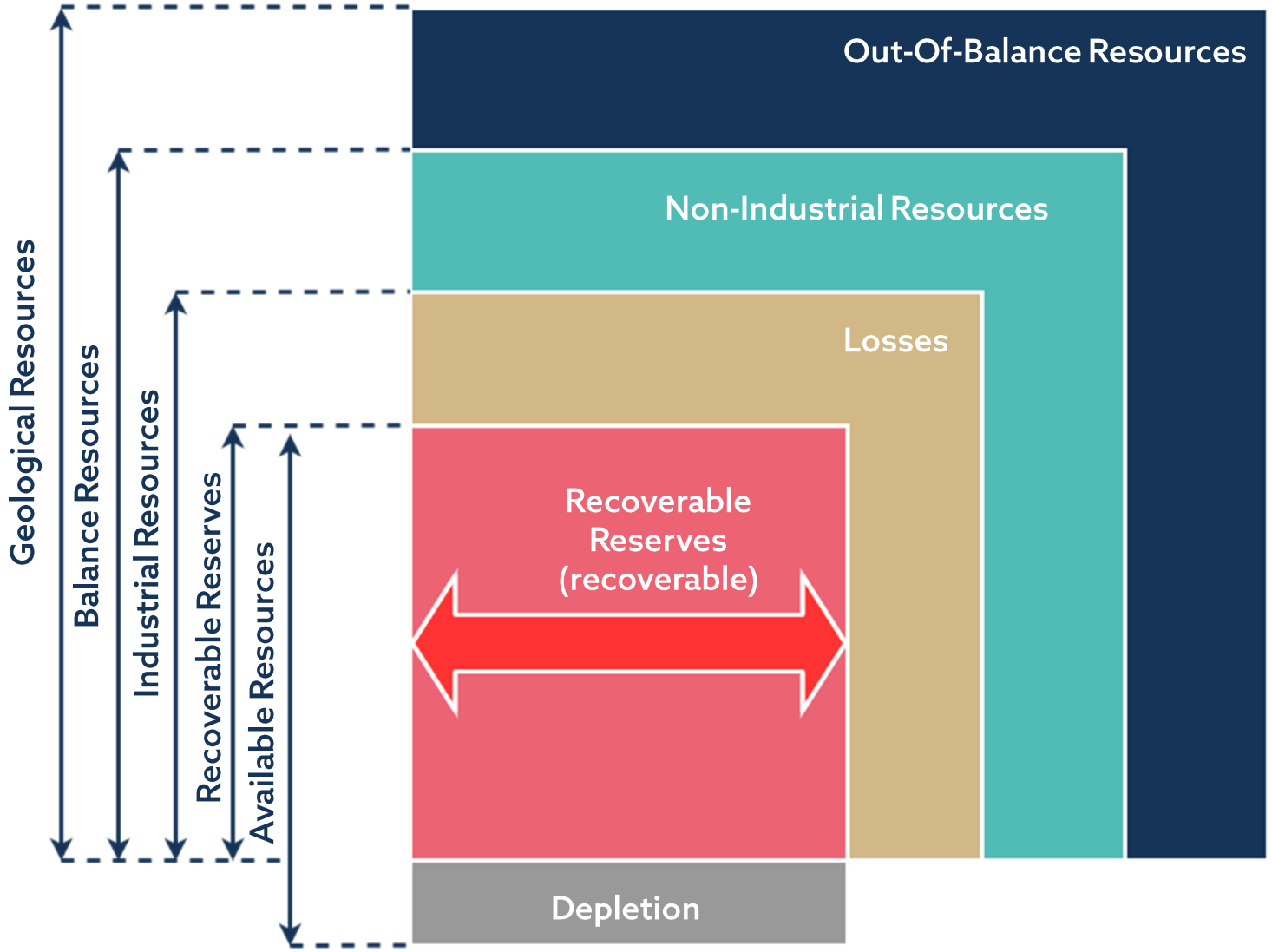
In the period between 1990 and 2018 the state of balance resources went down by 6.1 billion Mg, of which the commercial reserves decreased by as much as 11.4 billion Mg. These changes only to a small extent were caused by mining. During that period altogether 2,560 million Mg of coal were extracted. That means that the commercial reserves went down by 78% as against the initial situation, for reasons other than mining, and mainly as a result of actions forced by the implementation of market economy rules and aimed at adapting the hard coal mining to new economic conditions.

An increase in balance reserves after 2001 is mainly caused by:

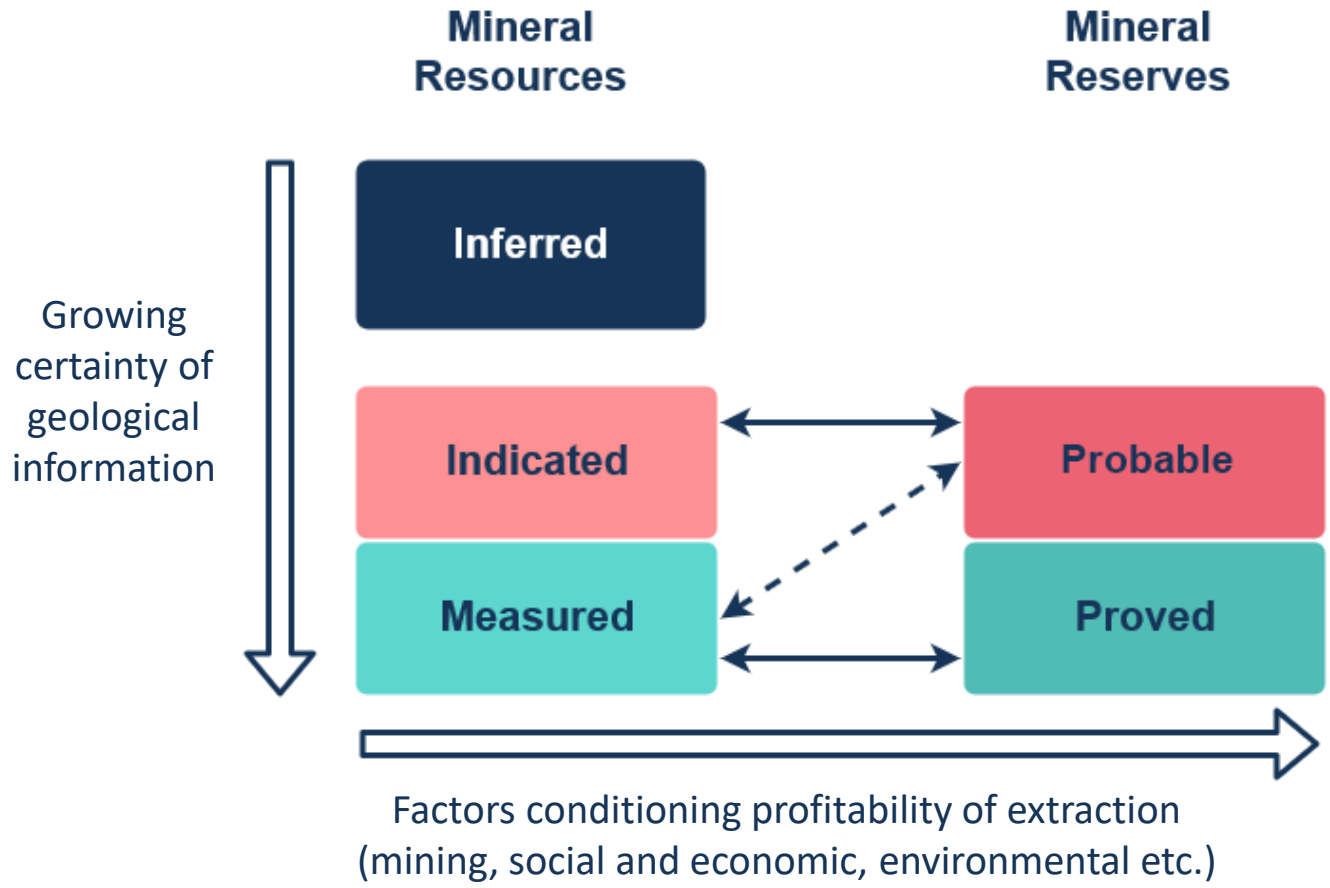
1. giving up distinguishing out-of-balance resources of group "b", which resultet in classifying them as balance reserves in new Geological Documentation (GD) or additions to the GD, and as non-industrial resources in Deposit Management Plans (DMP);
2. change of criteria for commercial nature:

- maximum proved depth of 1250 m,
- minimum thickness of 0.6 m - so far coal resources, classified as non-industrial resources, in new GD or in additions to the GD are classified as balance ones.

Polish classification of resources



Resource classification system acc. to the JORC Code standard



Source: The 2004 Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves (The JORC Code).

Harmonisation of classification used in Poland with JORC Code standard classification

The *Resources* category, pursuant to the JORC definition, includes total resources in the deposit, for which there are valid prospects for economically justified mining. An average thickness of coal in seams, not less than 1.2 m, was taken as the basic criterion. This is the limit value of a seam parameter, at which mining is technically possible and economically justified.

The recoverable reserves distinguished in the Polish system correspond to the definition of *Reserves* term in the JORC code standard, provided that these are resources in the area of deposits covered by licences currently valid and they fit within the period of licence validity.

Also the recorded (geological) resources have been shown, which were not included in the classification of commercial nature. They correspond to non-industrial resources category distinguished in the Polish system, while in the JORC Code standard they can be shown only as *Inventory Coal* in accordance with guidelines for JORC code application to coal deposits – *Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves 2012*.

Harmonisation of classification used in Poland with the JORC Code standard classification

Harmonisation of classification used in Poland with the JORC Code standard

Types of resources	
Polish classification	JORC Code
Recorded Resources (geological) Resources in deposits not classified as industrial	*Exploration Results*
Non-industrial Resources	*Inventory Coal*
Industrial Resources (Inferred)	*Resources*
Recoverable Reserves	*Reserves*

Classification of resource exploration degree

Polish classification	JORC Code	
Exploration category	*Resources*	*Reserves*
D, C2	*Inferred*	
C1 (or C2)	*Indicated*	*Probable*
A, B	*Measured*	*Proved*

Estimate values of Resources and Reserves in deposits of operating mines acc. to the JORC Code system

Inventory Coal (million Mg)				Resources and Reserves (million Mg)						
(Non JORC Categories)				Resources			Reserves			
Measured	Indicated	Inferred	Total	Measured	Indicated	Total	Licence period	Proved	Probable	Total
2 693,0	7 413,0	6 066,0	16 113,0	1 384,0	3 683,0	5 065,0	during licence validity period	494,0	909,0	1 402,0

Resource base of hard coal deposits acc. to the JORC Code standard

The presented principles of Polish resources classification comparison with the JORC Code system were used to verify the amounts of resources in operating hard coal mines in Poland.

The analysis includes mines of Polska Grupa Górnicza SA, Jastrzębska Spółka Węglowa SA, Tauron Wydobycie SA, and of LW Bogdanka SA.

Coal resources in operating mines take into account seams intended for mining during the period of current licences validity (*Reserves*) and planned to extract in the period of future licences validity (*Resources*).

The application of international standardisation of mineral resources classification and the unification of geological work reporting results from requirements set by international financial institutions (banks, stock exchanges, funds) in the field of geological work reporting and of mining projects feasibility and economic assessment for the needs of their financing.

Resource base of hard coal deposits acc. to the JORC Code standard

This standardisation is aimed at enabling comparison of an economic value of a mineral deposit resources acc. to uniform rules and treating the mineral resources as a component of mining company assets.

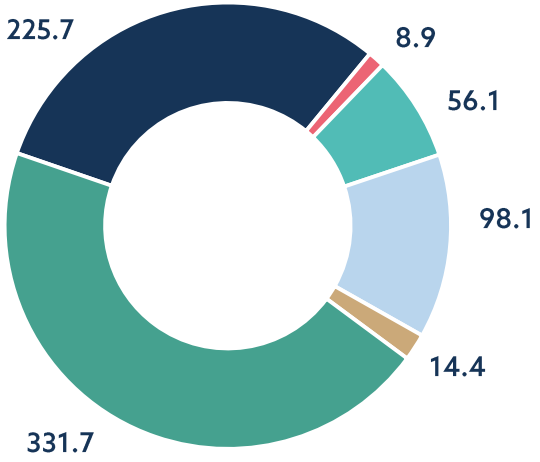
The amount of recoverable resources is crucial for international institutions financing mining projects, because such institutions include in mining company assets only recoverable resources.

Therefore, in accordance with the JORC Code requirements, a realistic and up-to-date part of resources, which are technically extractable based on mining plans and schedules, and economically profitable adopting justified financial assumptions.

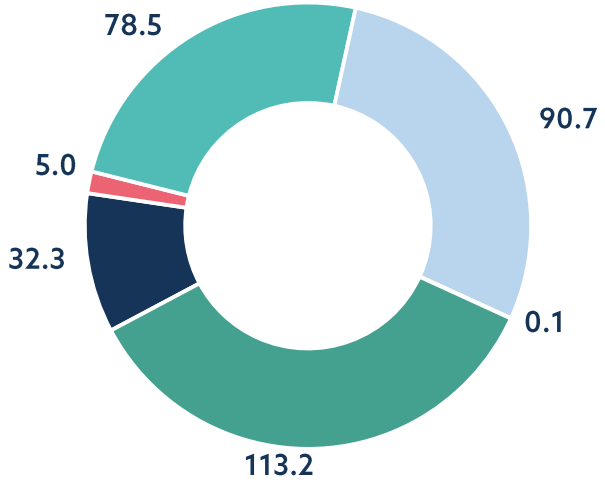
Such an approach to the hard coal resource base shows an actual access to resources, and hence a real production possibility of Polish mines.

Global resources (*Proved Reserves*) of extractable coal at the end of 2018

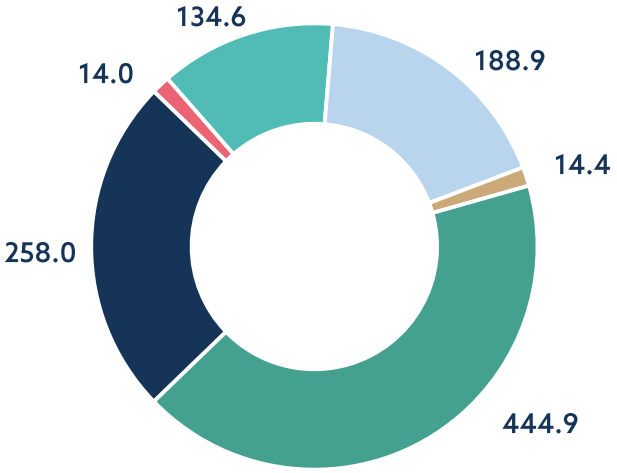
Hard coal and anthracite*
[billion Mg]



Brown coal and lignite**
[billion Mg]



Total
[billion Mg]



! - Mexico, USA, and Canada are included within the North America

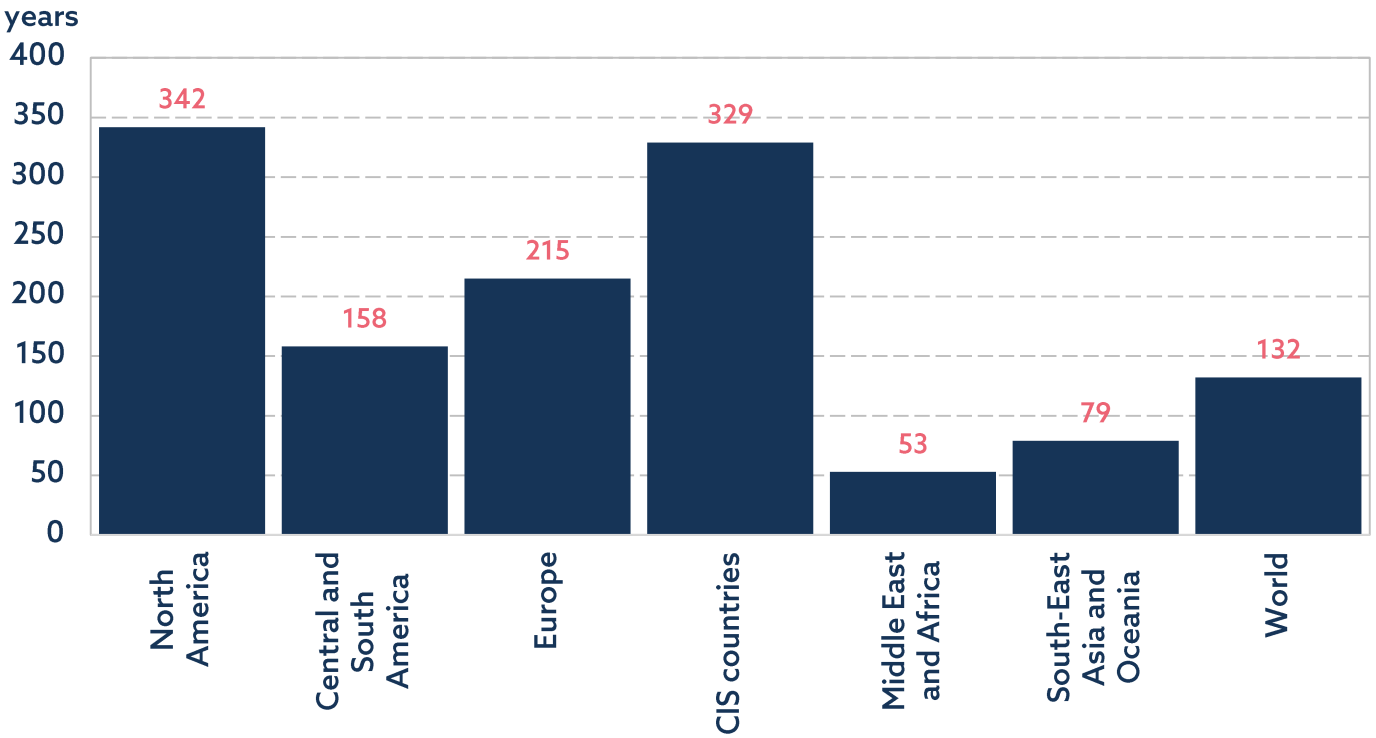
* - Bituminous coal and anthracite

** - Sub-bituminous coal and lignite

- North America
- Central and South America
- Europe
- CIS countries
- Middle East and Africa
- South-East Asia and Oceania

MEERI PAS study based on BP Statistical Review of World Energy 2019.

Sufficiency of coal resources worldwide

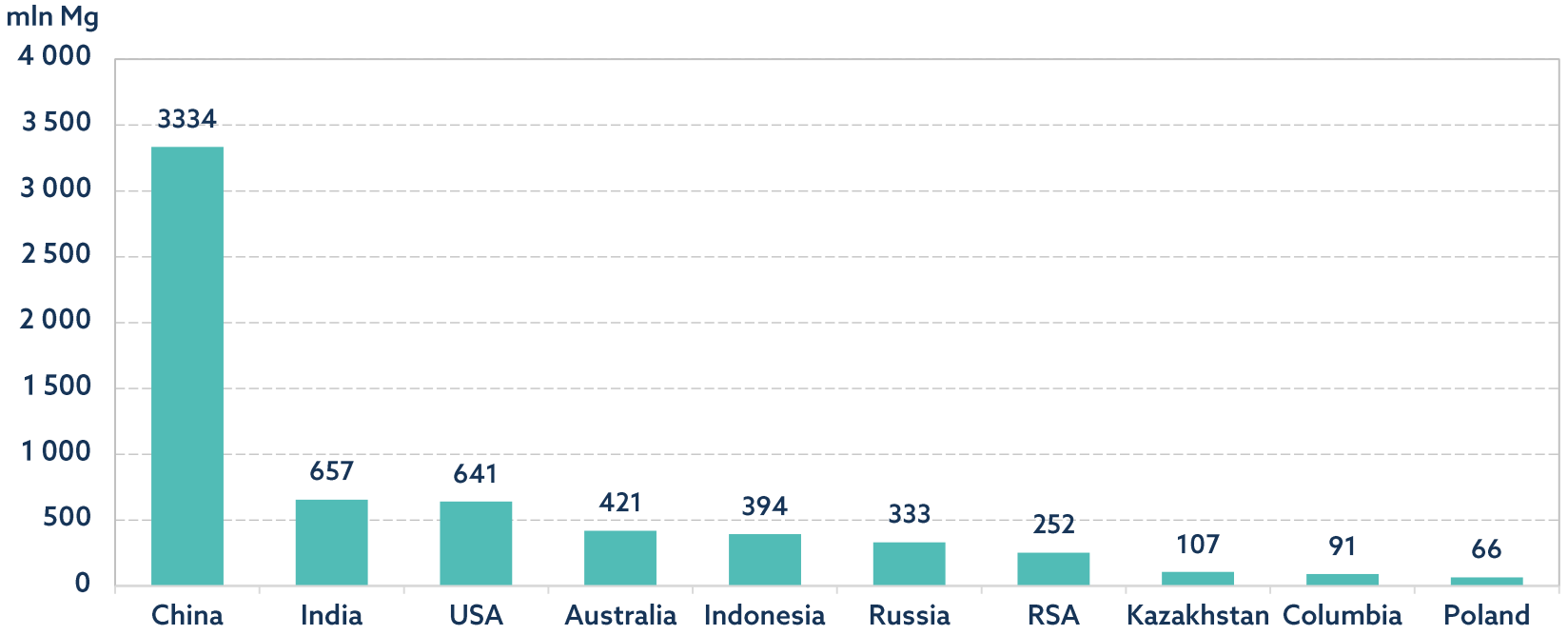


The sufficiency coefficient of resources is a quotient of proved reserves to the amount of output in a specific year. At the level of 2018 production and the size of proved reserves the coefficient for the entire world is 132 years. In a regional approach the highest sufficiency of coal resources is forecast in the Northern America countries (USA, Canada, and Mexico) (342 years), and the lowest – the Middle East and Africa region (53 years).

MEERI PAS study based on BP Statistical Review of World Energy 2019.

Technology and Engineering of Hard Coal Deposits Mining

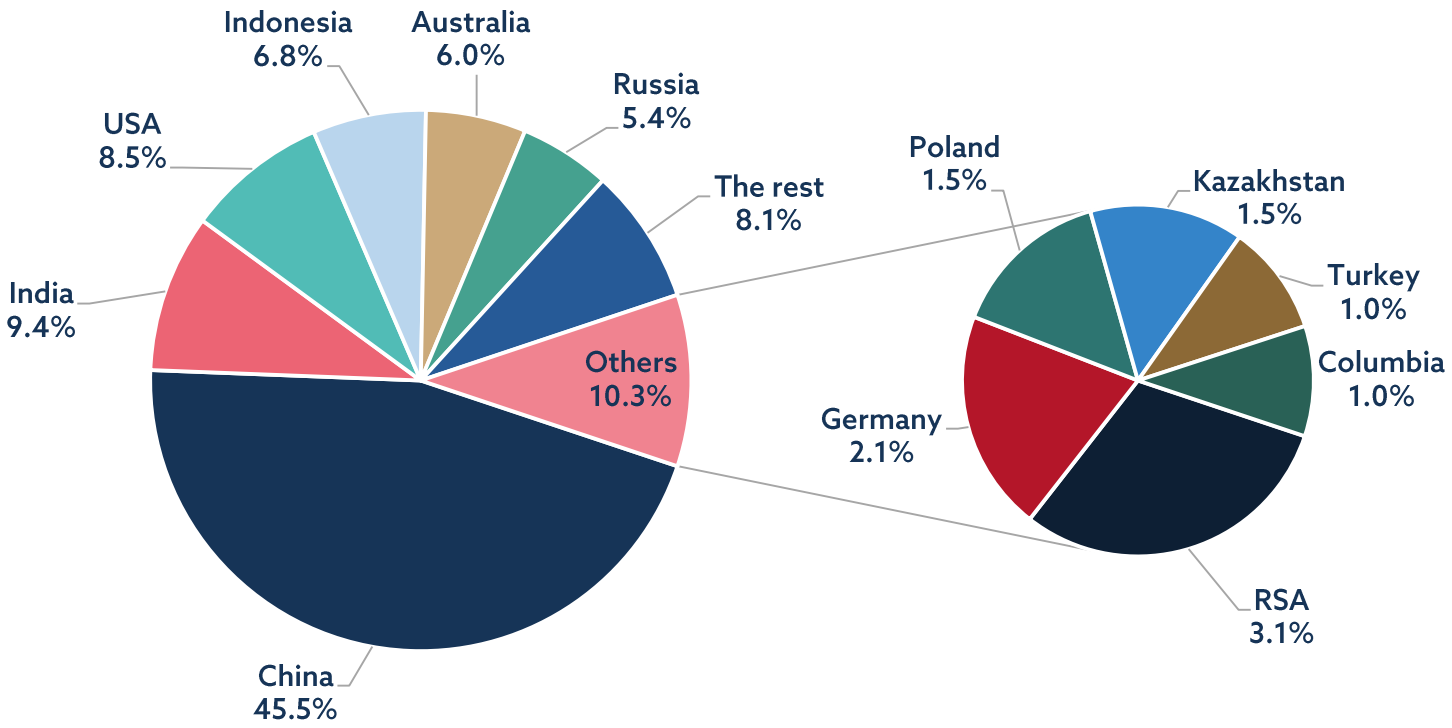
Biggest hard coal producers worldwide in 2017



For more than 20 years China is the leader among the hard coal producers. In 2017 the China's share in the global hard coal production (6,770 million Mg) was 49.2 % (3,334 million Mg).

MEERI PAS study based on BP Statistical Review of World Energy 2019 and on Knoema data

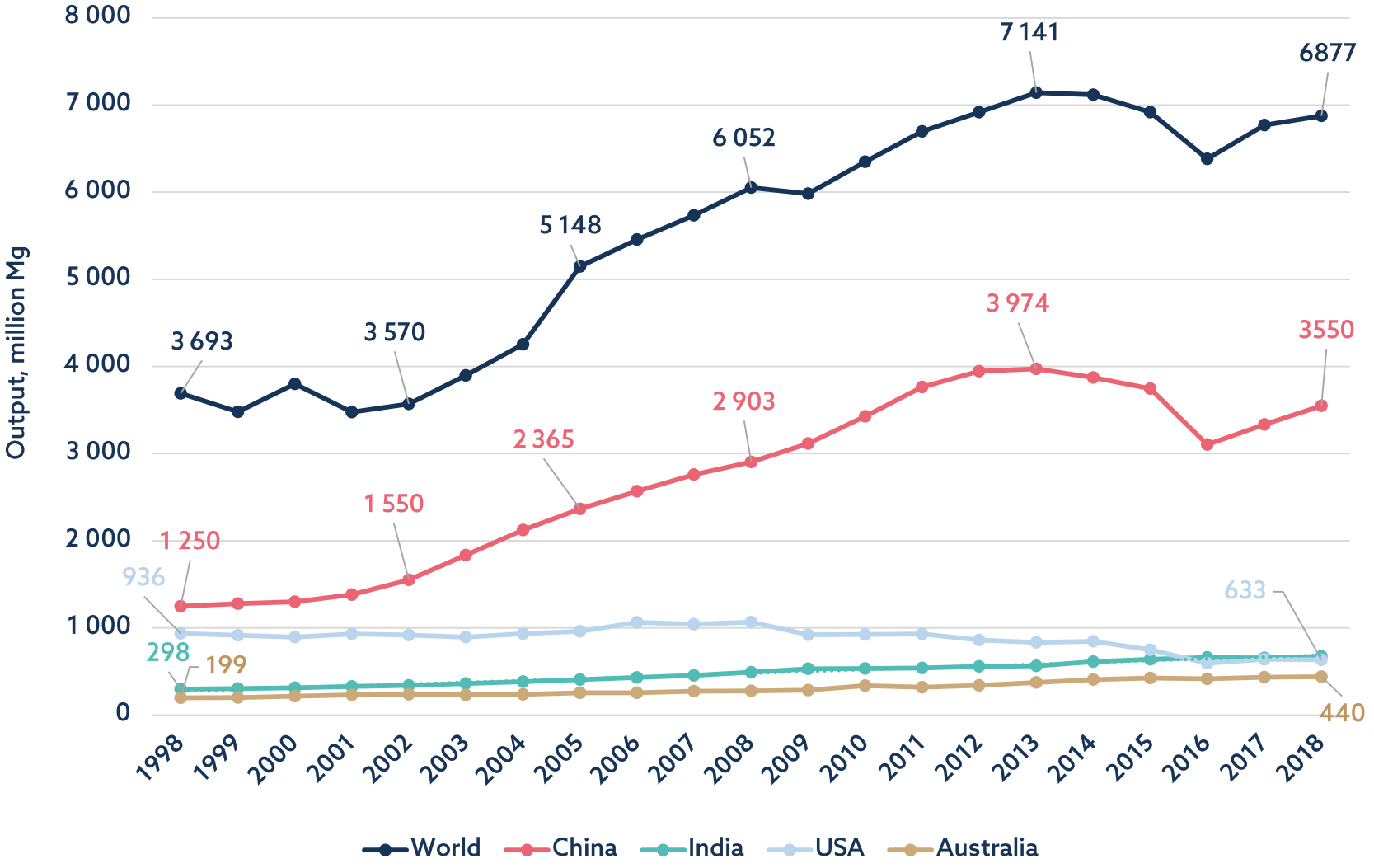
Biggest coal producers worldwide in 2018



- In 2018 China remained the leader of total coal production, with the output of approx. 3.68 million Mg (46% of global output).
- Further places coincide with the specification of hard coal producers. Germany is the only exception, which in 2018 was the second brown coal producer with a share in the global production of approx. 20.2% (171 million Mg).

MEERI PAS study based on BP Statistical Review of World Energy 2019

Hard coal output worldwide in the years 1996-2018



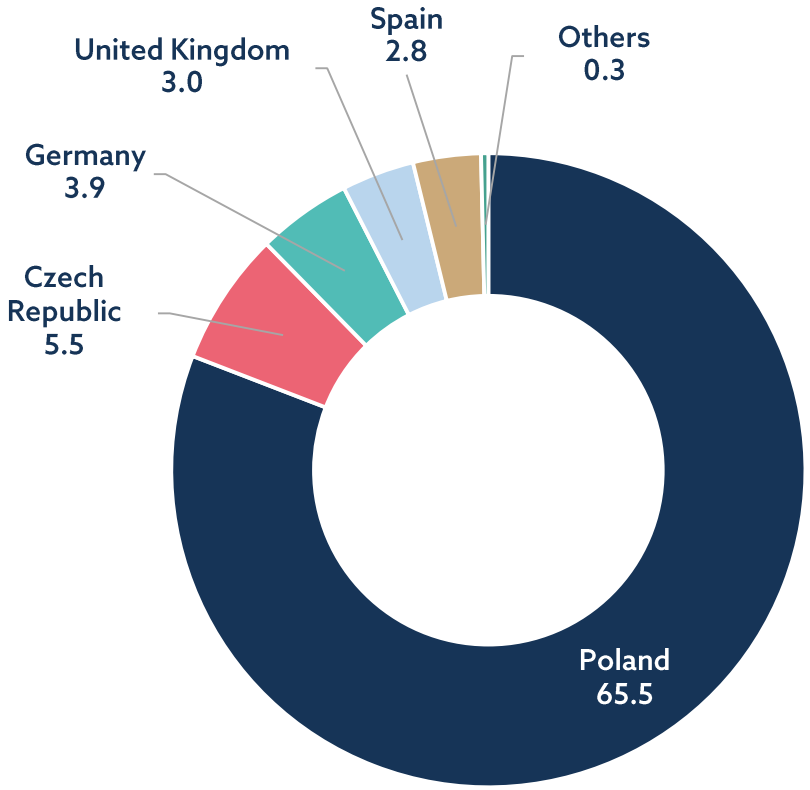
MEERI PAS study based on BRG Energiestudie 2017, Indian Minerals Yearbook 2018 and the data of United Nations Statistics Division, BP Statistical Review of Energy 2019, Knoema, reuters.com, spglobal.com, eia.gov

Hard coal output worldwide in the years 1996-2018

- After a period of coal output decline in the years 2013 - 2016, recent years witness a noticeable trend change and an increase in the output. In 2018 there was recorded a growth in the global coal production of approx. 4.3% y/y, parallel to the increase in consumption by 1.4%. The pace of changes was the fastest in five years. The trend concentration occurred in Asia, and India and China are together responsible for a decisive increase both in the consumption and in the production.
- The recovery of coal consumption was related primarily to the increase in the global demand for energy. The increase in electricity supply from renewable sources, despite a quick growth, did not manage to cover the demand due to which coal was absorbed by the power sector as the balancing fuel.
- According to various sources the energy consumption is forecast to increase by approx. 50% till 2040, where the Asian countries will have a half of the share in the increase - mainly India, where the predicted increase in the electricity demand is estimated at 5% yearly.
- It is anticipated that despite a fall of coal share in the global energy mix its consumption will grow by 0.4-0.5% per year.

MEERI PAS study based on IEA: World Energy Outlook 2015; BP: BP Energy Outlook 2017

Biggest hard coal producers in the European Union in 2018



- In 2018 83.4% of hard coal production in the European Union (76 million Mg) was coal from Poland (63.4 million Mg).
- Czechia, Germany, United Kingdom, and Spain were next in the leaderboard.
- However, it is necessary to mention that the United Kingdom closed the last deep coal mine in 2015 (output in 2017 originated from surface mines), and Germany did that in December 2018 (Prosper-Haniel mine).
- In Europe (outside the European Union) hard coal is mined in Ukraine (33.3 million Mg) and in the Russian Federation (330 million Mg, however to a significant extent in its Asian part).

MEERI PAS study based on Euracoal, Coal in Europe 2018

Structure of hard coal mining worldwide acc. to mining systems

Estimate share of mining methods and systems of leading hard coal producers			
Surface mining	Underground mining		
	Room-and-pillar system	Longwall system	Other
1. CHINA			
5,0%	95,0%		
	b.d.	90,0%	5,0%
2. INDIA			
93,7%	6,3%		
	5,4%	0,3%	0,6%
3. USA			
64,7%	35,3%		
	12,9%	21,9%	0,4%
4. AUSTRALIA			
82,3%	17,7%		
	1,8%	15,9%	b.d.
10. POLAND			
0%	100%		
	0%	90,2%	9,8%

MEERI PAS study based on: Indian Minerals Yearbook 2018; Concurrent mining and reclamation for underground coal mining subsidence impacts in China, 2018; Implementation of Paste Backfill Mining Technology in Chinese Coal Mines, 2014; EIA, Annual Coal Report 2017; ARP SA data; Australian Government Department of Industry Innovation and Science data

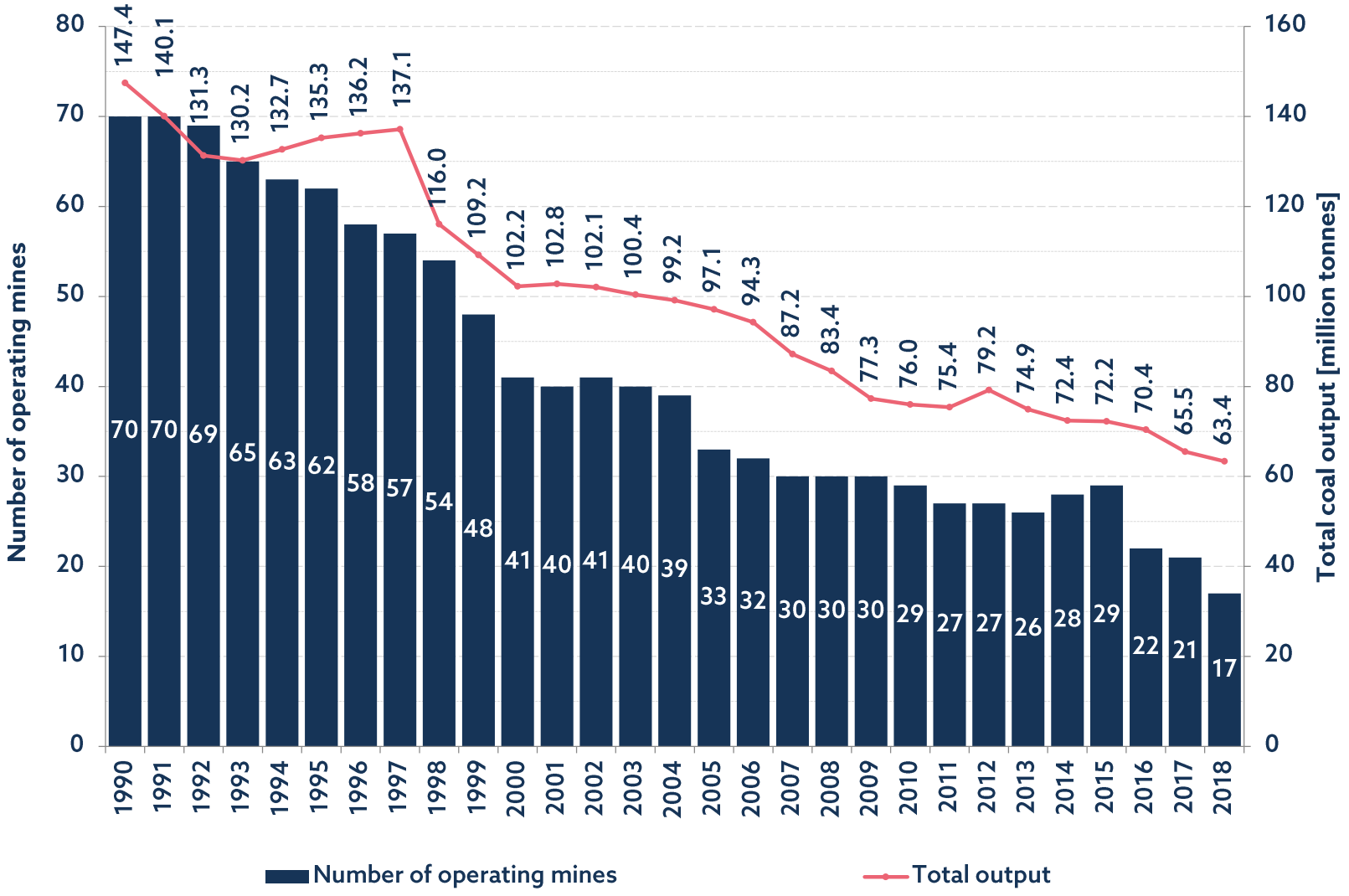
Hard coal mining restructuring in Poland

- The technical and technological restructuring of hard coal mines in Poland carried out from the beginning of the 1990s resulted in a number of changes. Many of them had a favourable impact on basic technical indices of mining at the beginning of the 21st century. The restructuring comprised:
    - liquidation of unprofitable mining areas, panels, and levels;
    - simplification of mines spatial structure, which allowed to reduce the costs of workings maintenance;
    - increase in the mining concentration through a decline in the number of working longwalls and an increase in the daily output from one longwall due to introduction of modern machines and equipment;
    - increase in the productivity at stagnation of those indices in recent years.
- Adaptation of coal production to the market demand required liquidation of inefficient capacities.

Hard coal mining restructuring in Poland

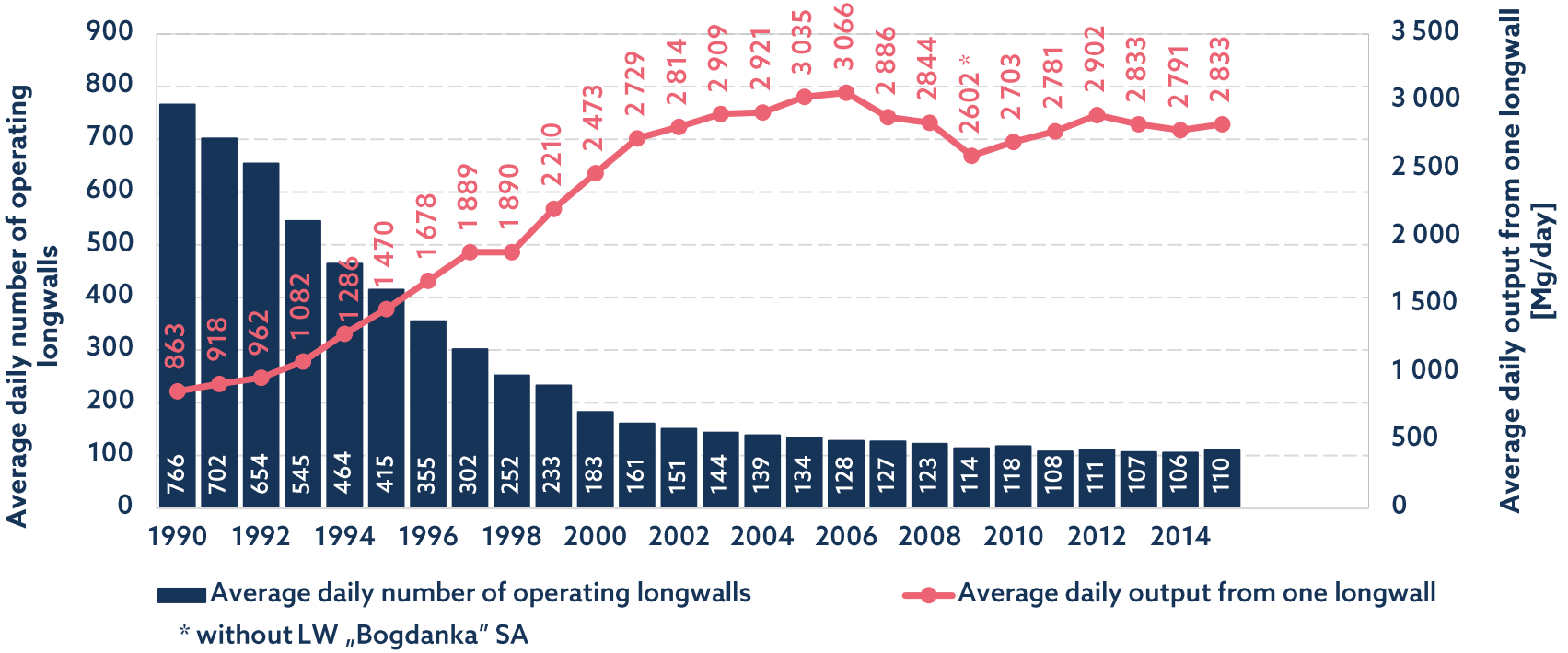
- The number of operating mines went down more than three times in the years 1991 - 2017.
- Breakthrough years in the 21st century from the organisational restructuring point of view:
  - 2003 - establishment of Kompania Węglowa SA based on the coal companies: Gliwicka, Rudzka, Nadwiślańska, Rybnicka, and Bytomska;
  - 2016 - establishment of Polska Grupa Górnicza Sp. z o.o. (Ltd.) from mines and plants of Kompania Węglowa SA. Three combined mines were established within the PGG:
    - KWK ROW (from merged KWK Marcel, KWK Rydułtowy, KWK Chwałowice, and KWK Jankowice),
    - KWK Ruda (from merged KWK Halemba-Wirek, KWK Pokój, and KWK Bielszowice),
    - KWK Piast – Ziemowit (from merged KWK Piast and KWK Ziemowit);
  - 2017 - integration of Katowicki Holding Węglowy mines into Polska Grupa Górnicza. Transformation of the PGG Sp. z o.o. into a joint stock company as of 29.12.2017.
  - 2018 - handing over KWK Wieczorek and Śląsk Colliery to SRK SA
- The recent years witnessed a decline of hard coal output in Poland, at stagnation of concentration indicators and productivity per employee.

Number of operating mines against a background of net output



MEERI PAS study based on ARP SA data.

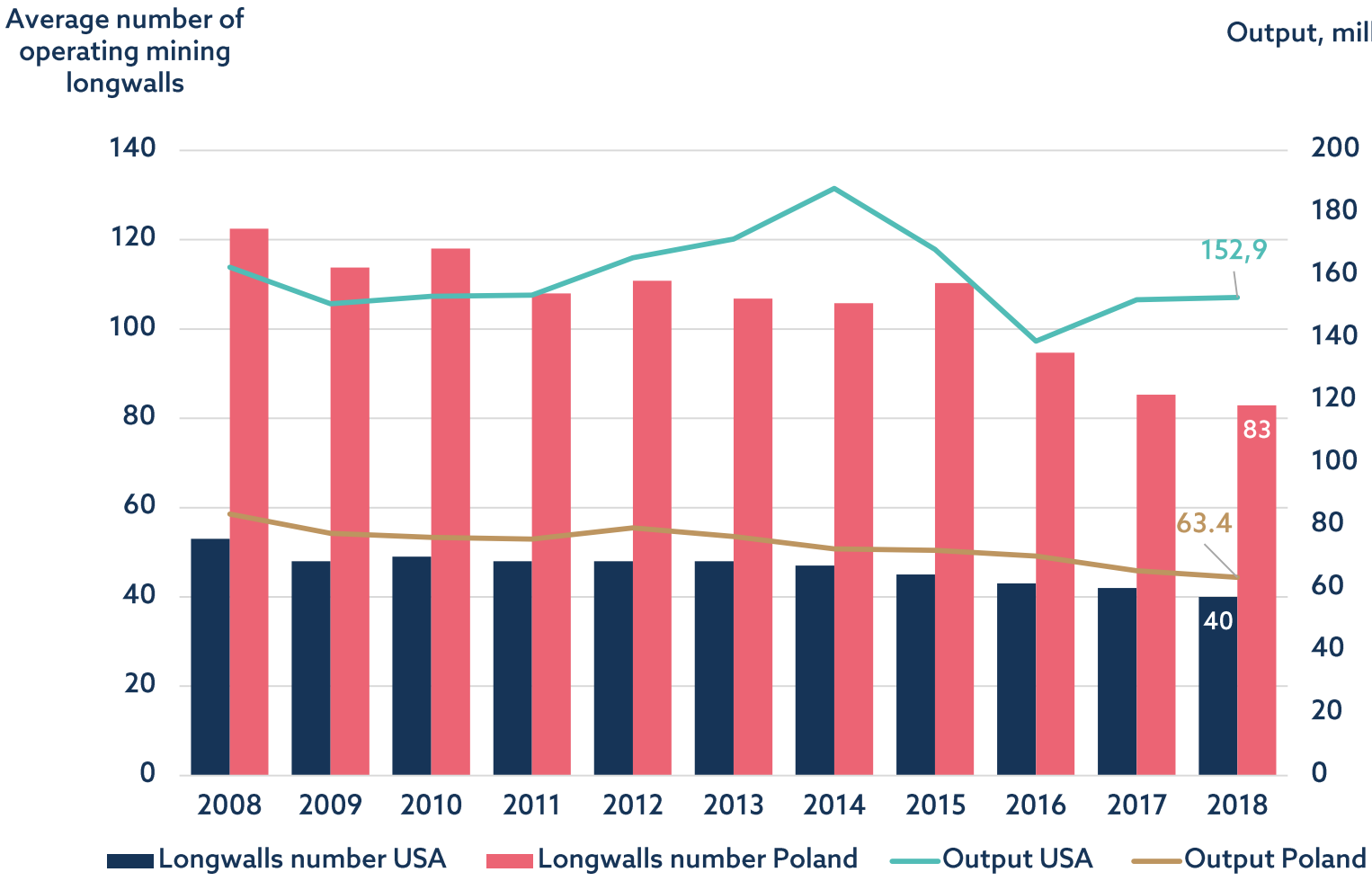
Average number of longwalls and a daily output from one longwall



- In the years 1991-2006 a more than three times increase in the daily output from one longwall was recorded, exceeding the limit of 3000 Mg/day, parallel to four-time decrease of daily number of operating longwalls.
- In the years 2007-2015 an average daily output from a longwall went down to approx. 2800 Mg/day.
- The years 2016-2018 witnessed a small increase in the daily output from a longwall, exceeding again the value of 3000 Mg/day. The index stabilisation creates hope for improvement in a longer perspective, however these values can hardly be considered satisfactory, because the historical maximum of 2006 has not been reached yet.

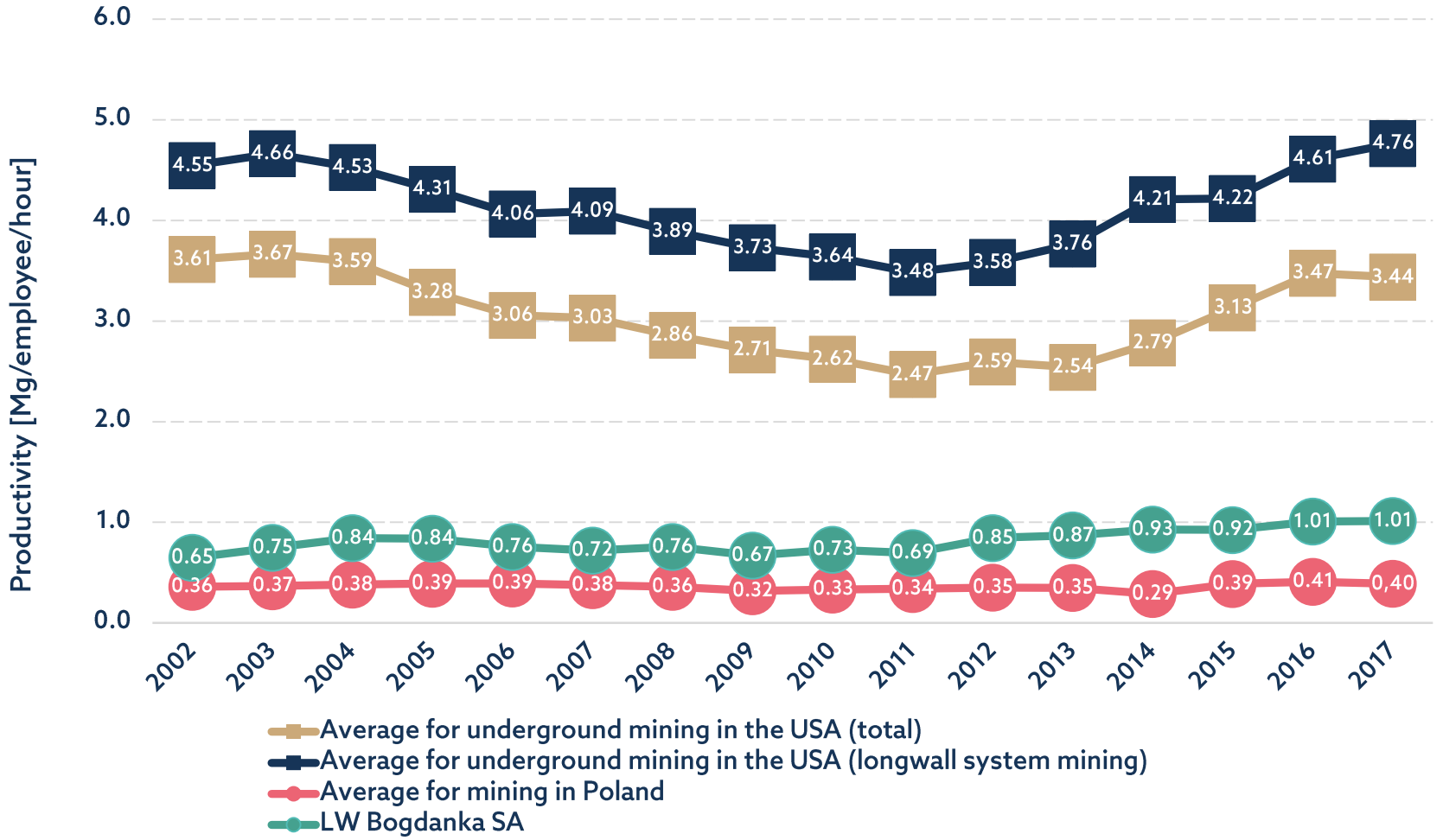
MEERI PAS study based on ARP SA data.

Number of mining longwalls in Poland in the years 2008-2018



MEERI PAS study based on ARP SA data; Coal Age 2009-2019; EIA: Annual Coal Report 2008-2016.

Productivity in underground hard coal mining in Poland and in the USA

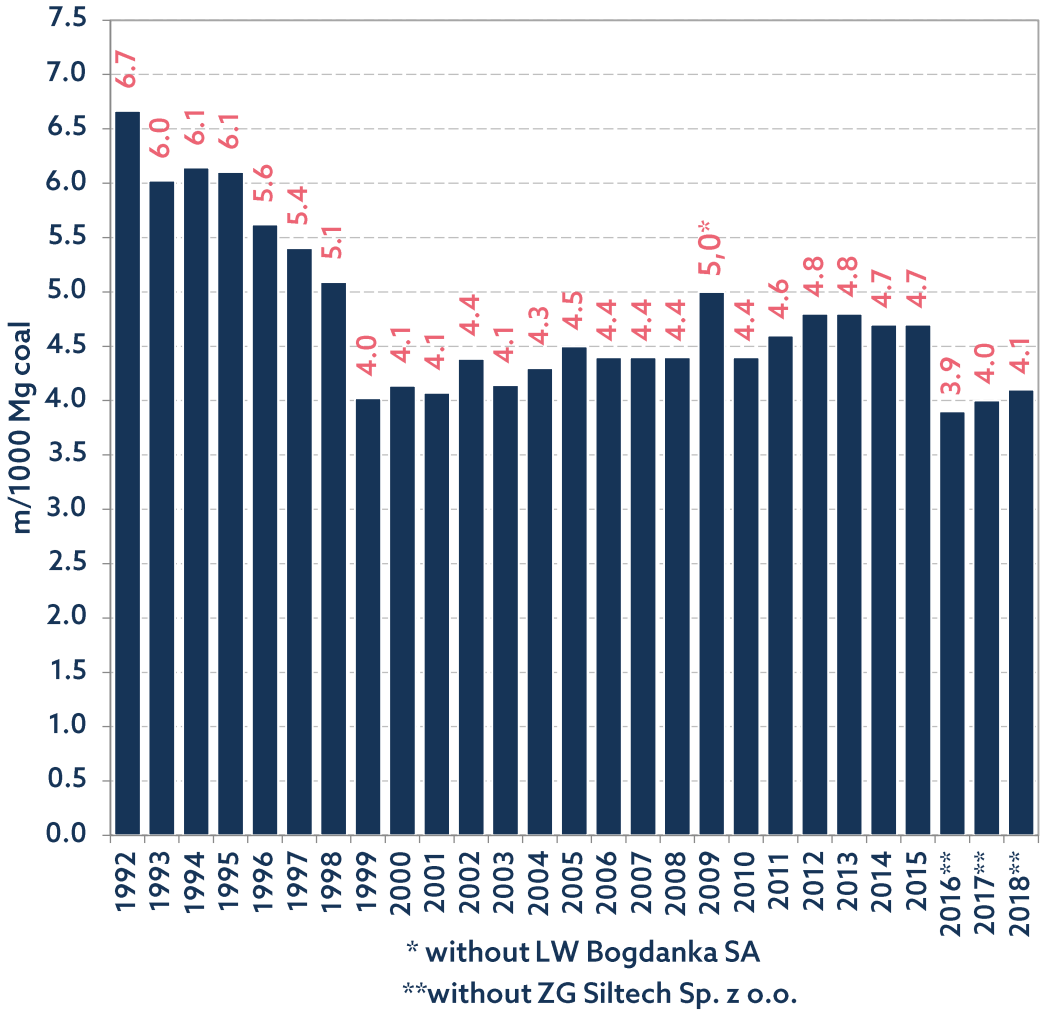


MEERI PAS study based on: EIA: Annual Coal Report 2002–2017; LW Bogdanka SA: Management Board Report on the activities of Lubelski Węgiel 'Bogdanka' SA for the years 2004 - 2017; ARP SA data.

Productivity in underground hard coal mining in Poland

- An upward productivity trend was recorded in the years 2002-2006 in Polish hard coal mining as a result of many stages of sector restructuring carried out from the times of systemic transformation.
- The upward trend broken in 2007 started a period of productivity decline continuing until 2014, when the 1999 productivity level was achieved.
- In 2016, as a result of thorough restructuring and optimising changes, the maximum productivity for the analysed period was obtained.
- Recent years are not a harbinger of productivity improvement, as it still remains on a level many times lower (disregarding more difficult mining conditions in the case of Polish deposit) than the leading hard coal producers, who apply the prevailing in Polish mining longwall system based on coal face systems.

Development works intensity



- The increased average power of equipment installed on the face allowed to lengthen longwalls, and thereby to reduce the development works intensity index.
- The development works intensity index went down from 6.7 m/1000 Mg of coal in 1991 to 4.1 m/1000 Mg in 2018.
- However, in recent years a small increase in the development works intensity index can be noticed.
- The pace differential in works performance between plants is significant: from approx. 100 m/month (PGG SA) to approx. 500 m/month (LW Bogdanka SA).

MEERI PAS study based on ARP SA data.

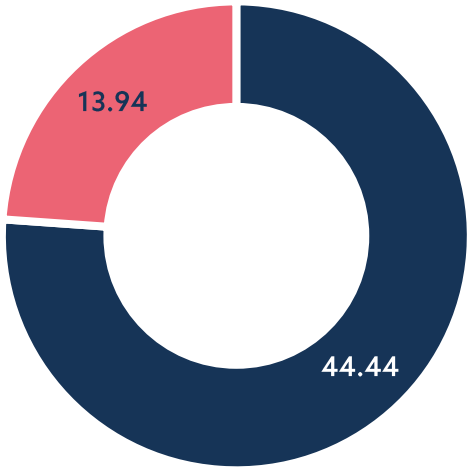
The growing depth of mining (now more than 700 m) results in the natural hazards intensification. Combined hazards (fire, rock bumps, temperature, and methane) occur in seams situated at greater depths. Among natural hazards the methane and fire hazard are most important from the ventilation safety point of view.

The methane hazard increases with growing depth of carried out mining works. The concentration of mining is a factor, which substantially affects the amount of emitted methane (Szlązak N., Kubaczka Cz., 2012).

The fire hazard was the hazard occurring most often in Polish hard coal mines in the years 2007-2016 (74 such events occurred, with 13 fatalities). However, in the analysed decade the accidents caused by methane ignition and explosion had the most tragic effects - in total 28 fatalities (Patyńska R. et al., 2017).

Methane hazard

Total coal output in 2018 [million tonnes]



The methane hazard in the hard coal mining is high due to:

- growing depth of mining;
- higher methane content of seams situated deeper;
- existence of trapped methane pockets under pressure in tectonic disturbance zones;
- high concentration of mining.

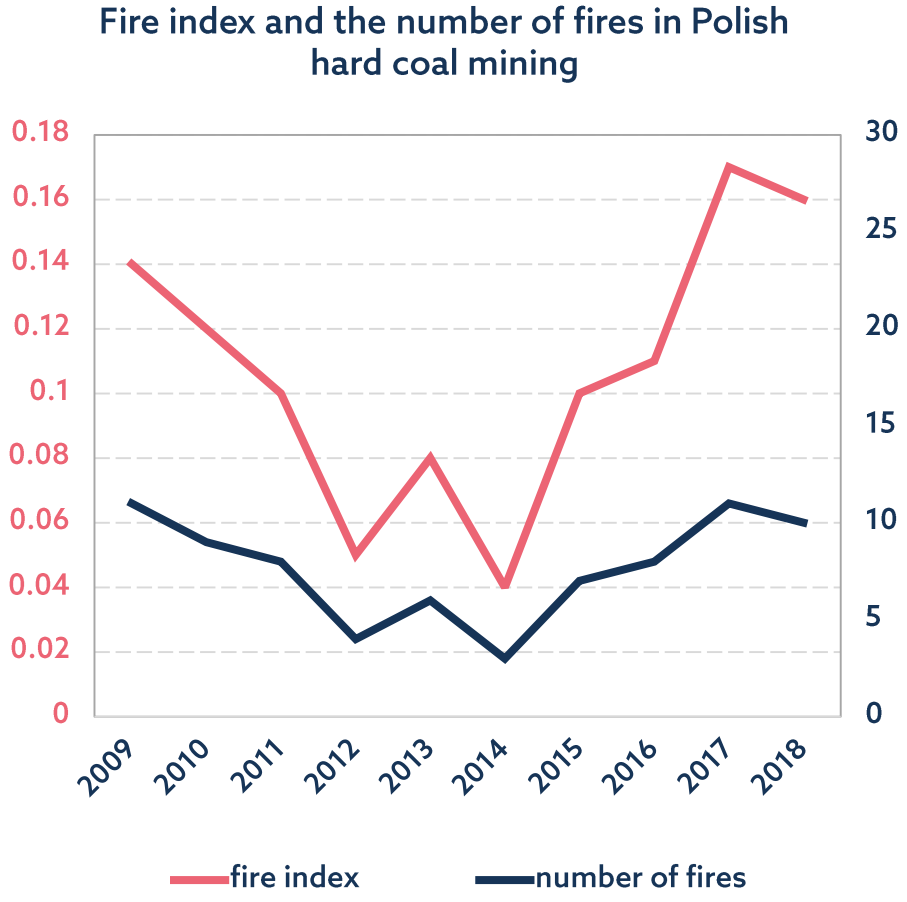
In the year 2018 916.05 million m^3 of CH_4 were emitted from the rock mass comprised by the mining influence, that is 32.4 million m^3 of CH_4 less than in the previous year.

Mines with the highest methane content in 2018:

- KWK „Budryk" – 155.23 million m^3 CH_4 in a year – 13 million m^3 more than in 2017;
- KWK „Pniówek" – 111.43 million m^3 CH_4 in a year – a decrease of 3.4 million m^3 as against 2017;

MEERI PAS study based on Kabiesz J. et al., 2019

Fire hazard



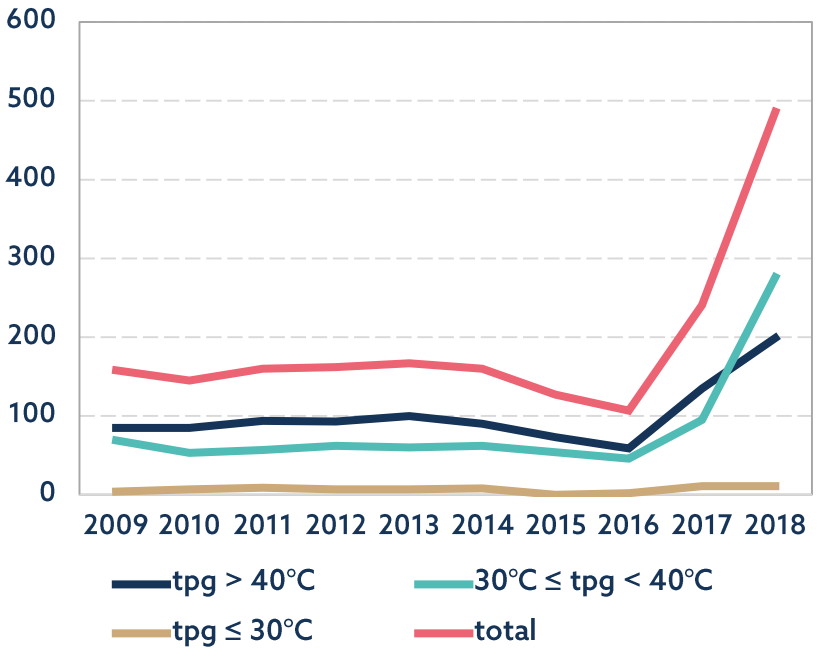
- In 2018 in Polish hard coal mines 8 spontaneous and 2 open fires broke out.
- In the years 2009-2018 there were 63 spontaneous fires, which constituted 82% of all fires in Polish hard coal mining.

During recent 30 years no clear increase in the fire hazard was observed. However, certain increase was recorded in the years 2014-2017. The number of fires went up from 3 to 11, while the fire index (the number of fires per 1 million Mg of output) increased from 0.04 to 0.17.

MEERI PAS study based on Kabiesz J. et al., 2019

Climate hazard

Number of workings with elevated air temperatures in Polish hard coal mines in the years 2009-2018



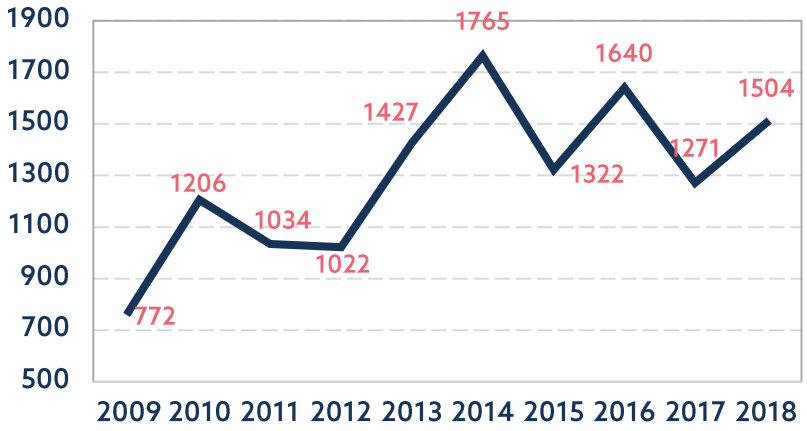
tpg – primary temperature of rock mass
tpg > 40°C means that in the mine on the lowest mining level the primary temperature of rocks exceeds 40°C.

- In the years 2008 - 2014 the number of workings with elevated temperature oscillated around 160, the next years (2015 - 2016) witnessed a decline resulting from the restructuring.
- The trend was reversed in 2017 due to the increased involvement of cooling potential.
- In 2018 the number of workings with elevated temperature was 486, of which 276 are workings classified as category B ($30^0C \leq tpg < 40^0C$).
- Mines of Jastrzębska Spółka Węglowa SA feature the highest average level of climate hazard.

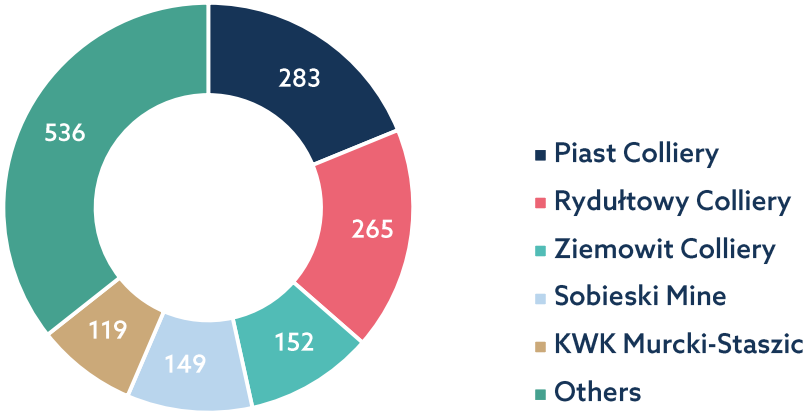
MEERI PAS study based on Kabiesz J. et al., 2019

Seismic hazard

Cumulative number of shocks in the GZW in the years 2009-2018



Number of shocks in GZW mines in 2018

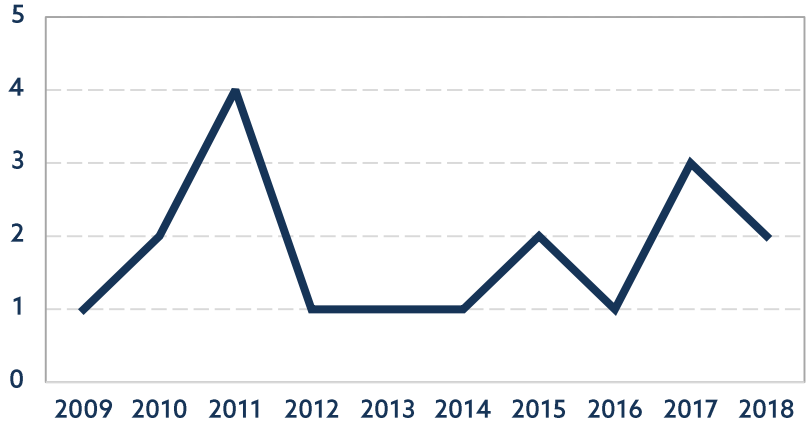


- In the period of 2008 - 2014 an upward trend could be observed in the number of seismic shocks in mines situated in the GZW.
- The highest number of shocks occurred in 2014 (1765), the lowest - in 2009 (772).
- In the analysed decade there were 12,963 shocks of energy $E \geq 10^5\,J$. There were 288 shocks of energy $E \geq 10^7 J$, 33 shocks of energy $E \geq 10^8\,J$, and 5 strongest shocks of energy $E \geq 10^9 J$
- In 2018 the biggest number of shocks occurred in Piast Colliery - 283 phenomena. Rydułtowy Colliery (KWK ROW) ranked the next - 265 phenomena. In the Ziemowit Colliery (KWK Piast-Ziemowit), Sobieski Mine and in the KWK Murcki Staszic there were respectively 152, 149 and 119 shocks. The other mines feature lower seismic activity.

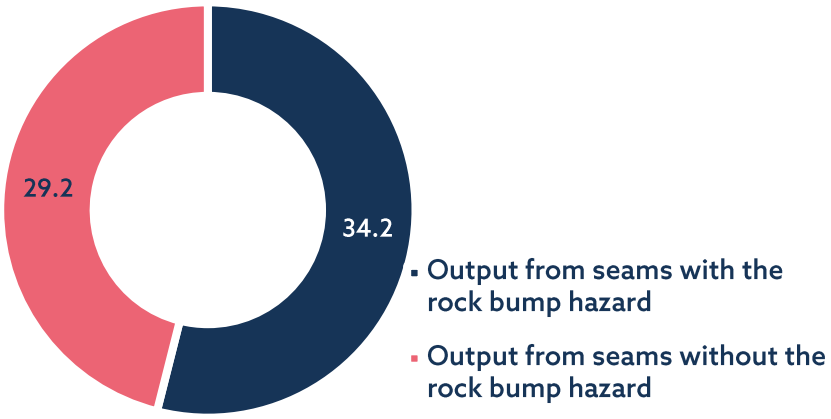
MEERI PAS study based on Kabiesz J. et al., 2019

Rock bumps hazard

Cumulative number of rock bumps in the GZW in the years 2009-2018



2018 output [million tonnes]



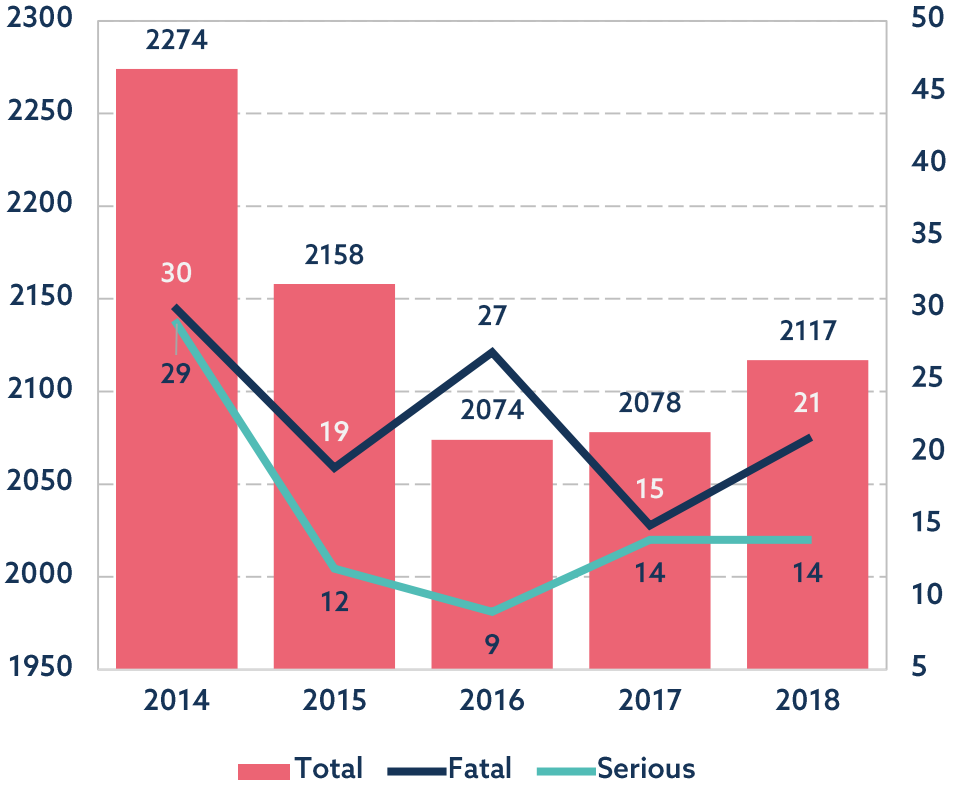
- The development of mining technologies and hence also of rock bumps preventive measures allowed to reduce in the last decade the number of rock bumps to 1-5 cases per year.
- According to the WUG data (as of 31/12/2018), among 21 hard coal mines operating in the GZW as many as 17 mines were extracting seams classified under at least one of three degrees of the rock bumps hazard.
- In 2018 53.9% (34.2 million Mg) of hard coal output in Poland originated from seams threatened with rock bumps, of which 9.7 million Mg was from seams classified as a II degree of rock bumps hazard.

MEERI PAS study based on Kabiesz J. et al., 2018

Occupational Safety in the Hard Coal Mining in Poland*

*Prepared based on the Report on the Safety State in Polish Mining Sector in 2018, presented during the XXVIII School of Underground Mining, Krakow, February 2019

Number of accidents in mining

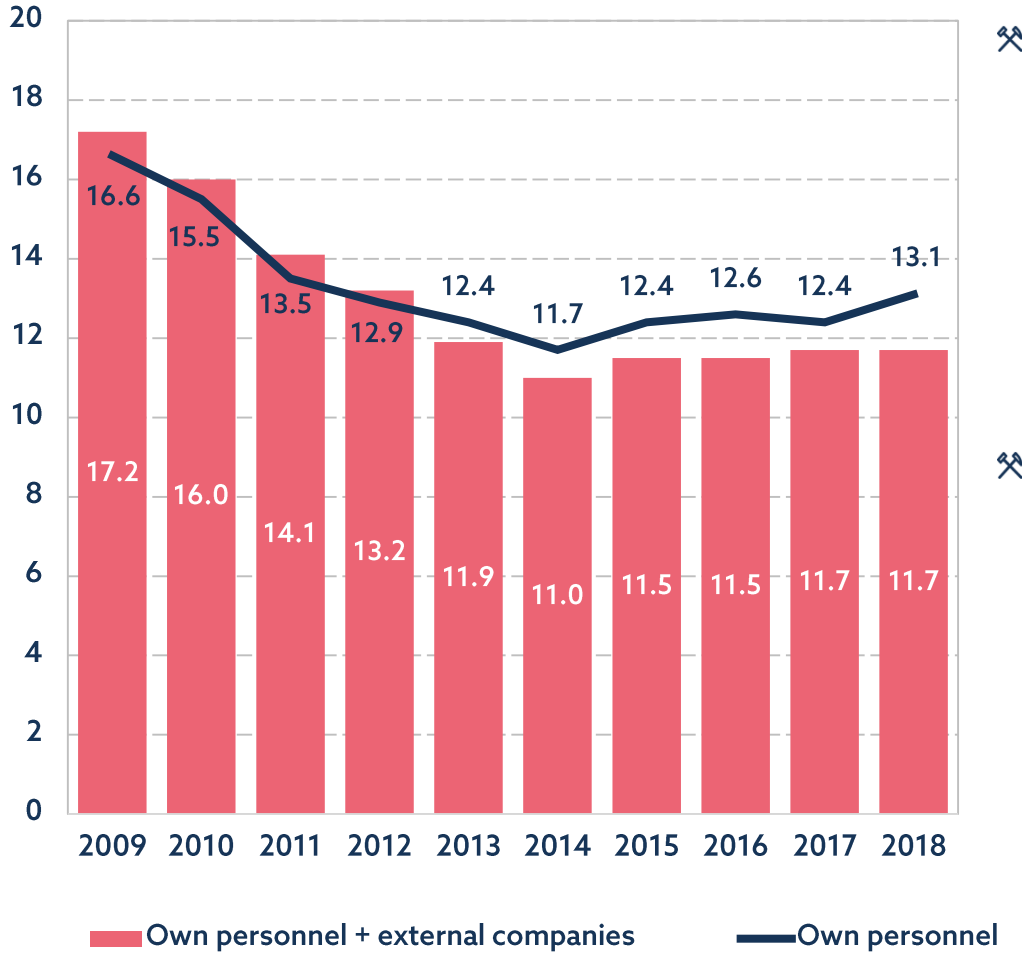


- As compared with the general downward trend in the total number of accidents in the years 2014-2016, in recent two years their number has been growing.
- In 2018, as against the previous year, only in the surface mining the total number of accidents went down.
- The number of fatal and serious accidents to a large extent is random and irregular (mining disasters), albeit last year in this category an increased number of events has been recorded.

	2014	2015	2016	2017	2018	2018/17
Underground mining	2165	2066	2003	2002	2028	+1,3%
Surface mining	69	58	47	56	49	-12,5%
Borehole mining + geological works	40	34	24	20	40	+100%

Source: Karkula P., 2019.

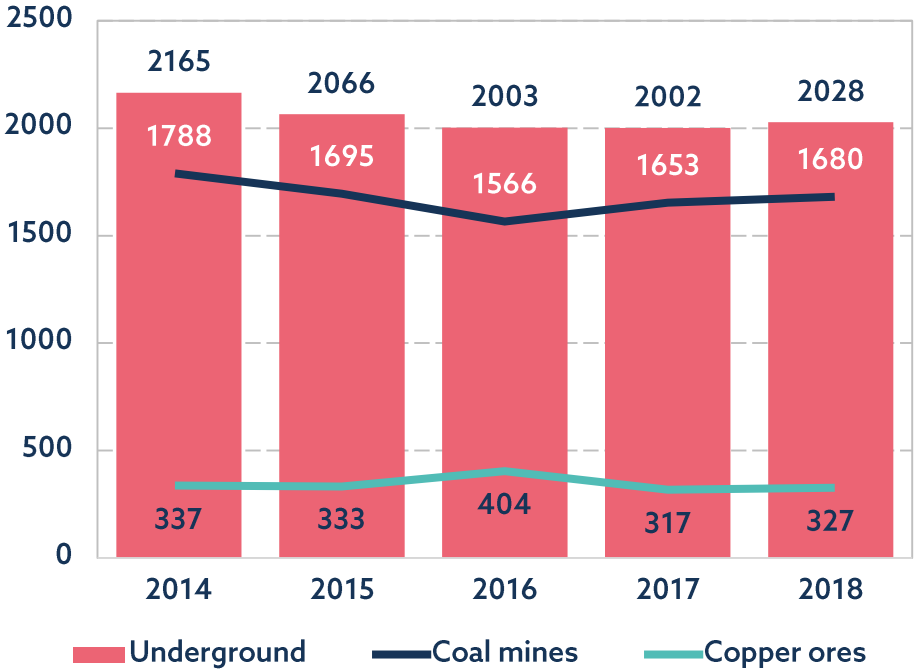
Total accident rate per 1000 employed in the mining industry



- The decrease of accidents number is related to a reduced number of persons employed in the mining. Converted to 1000 employees the number of accidents in the mining sector has been slightly increasing since 2014.
- In the years 2009-2018 a clear downward trend was recorded for accidents of personnel employed in companies providing services for the mining. From 2014 employees of outsourced companies are subject to a smaller number of accidents than mine workers.

Source: Karkula P., 2019.

Accident rate in underground mining

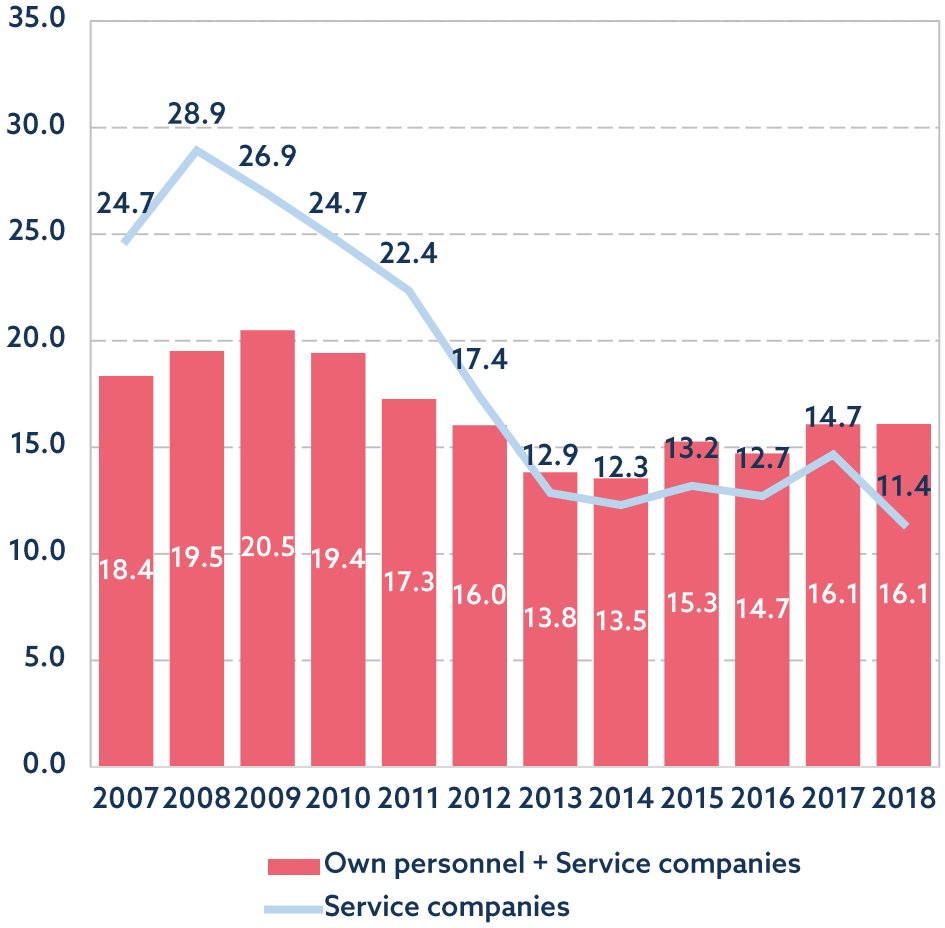


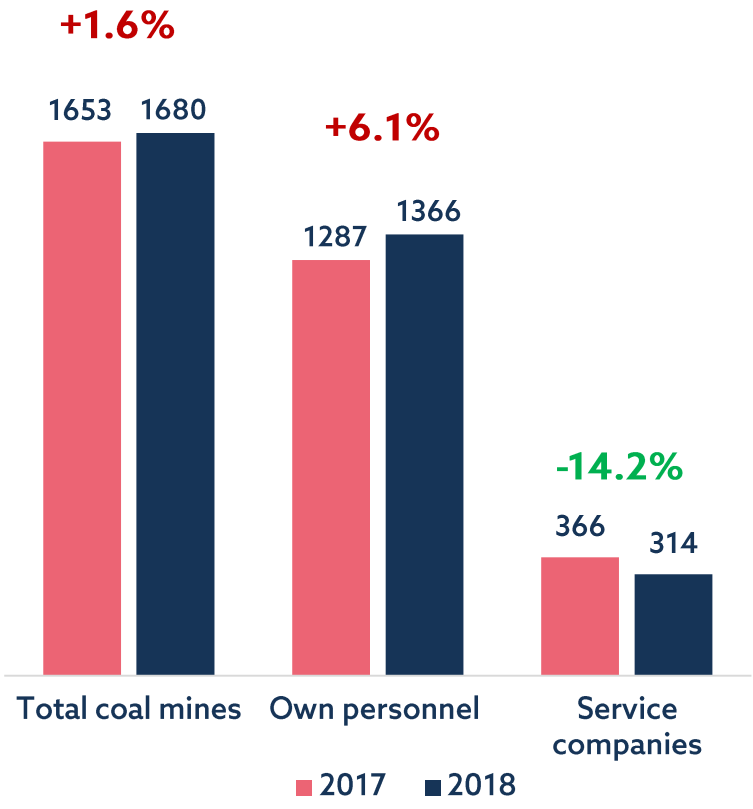
- In 2018 an increased accident rate was registered in underground mining both of hard coal and of copper ores.
- As against the previous year in 2018 a decline in the total accident rate per 1000 employed in the copper ores mining was recorded, which has translated into a decline in the entire underground mining sector.

	Total accident rate per 1000 employed				
	2014	2015	2016	2017	2018
Underground	13,9	15,2	15,3	15,9	15,6
Coal mines	13,5	15,3	14,7	16,1	16,1
Copper ores	18,2	16,4	20,6	17,0	15,6

Source: Karkula P., 2019.

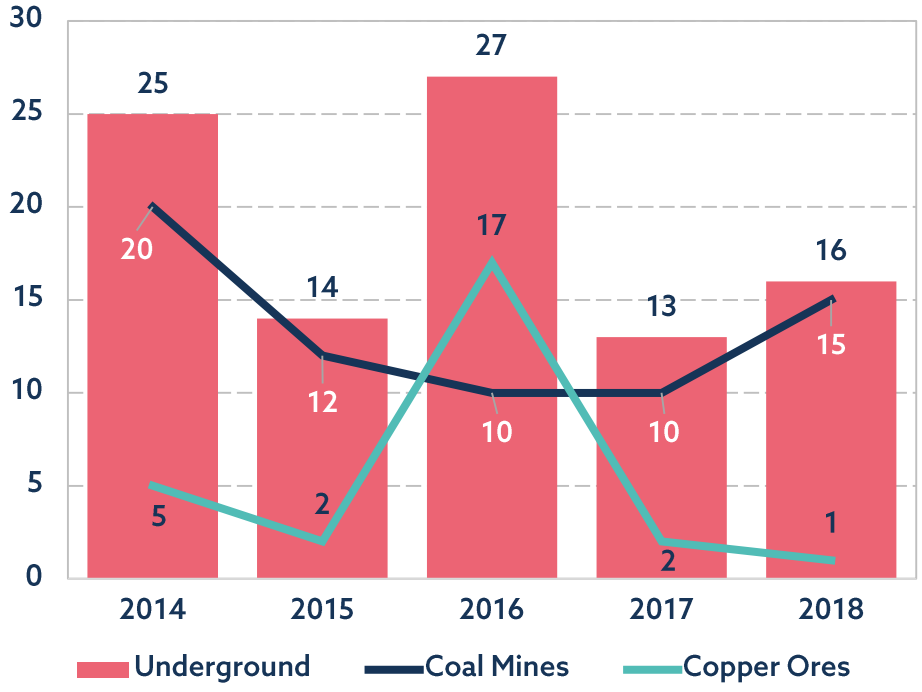
Total accident rate per 1000 employed in hard coal mining





Source: Karkula P., 2019.

Fatal accidents in underground mining plants

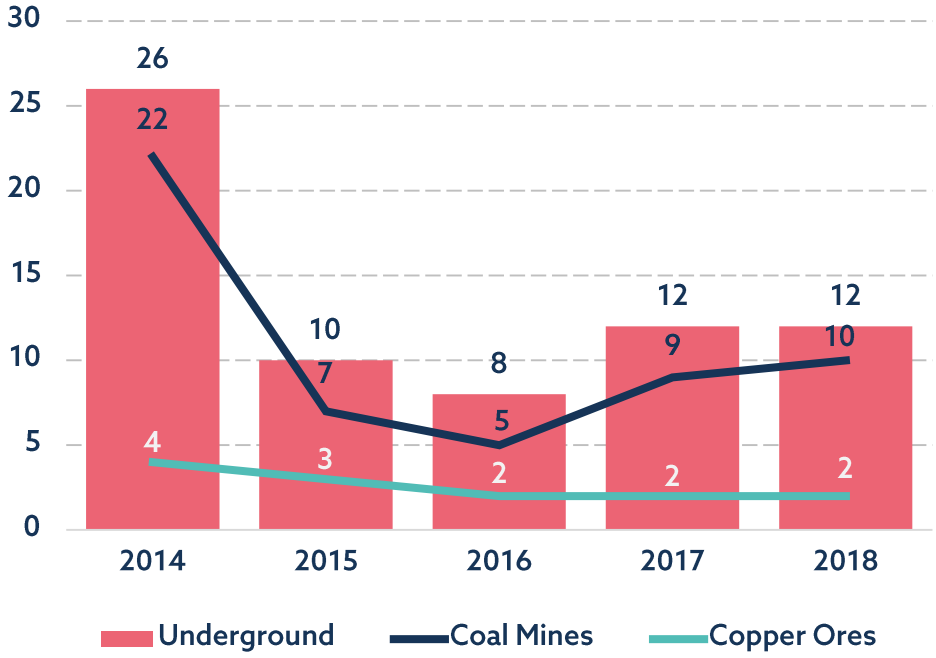


- The number of fatal accidents features a high variability. This is affected by group accidents which unfortunately occur every few years, and are related to natural hazards occuring in mines, e.g. methane explosions or rock bumps.
- For example, a high accident rate in ore mining in 2016 resulted from a disaster in Rudna mine, while in coal mining in 2018 a disastrous accident occurred in Zofiówka Colliery.

Fatal accidents rate per 1000 employed					
	2014	2015	2016	2017	2018
Coal mines	0,15	0,11	0,09	0,10	0,14
Copper ores	0,27	0,10	0,88	0,11	0,05

Source: Karkula P., 2019.

Serious accidents in underground mining plants



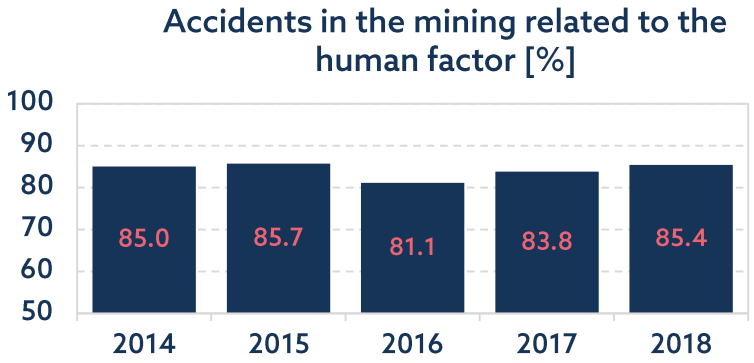
- In 2018 more serious accidents were recorded in coal mining as compared with the years 2015 - 2017, while in the copper mining for the third consecutive year the number of serious accidents remained on the same level.

	Serious accidents rate per 1000 employed				
	2014	2015	2016	2017	2018
Coal Mines	0,17	0,06	0,05	0,09	0,10
Copper Ores	0,22	0,15	0,10	0,11	0,10

Source: Karkula P., 2019.

Dangerous events in underground mining in the years 2014-2018

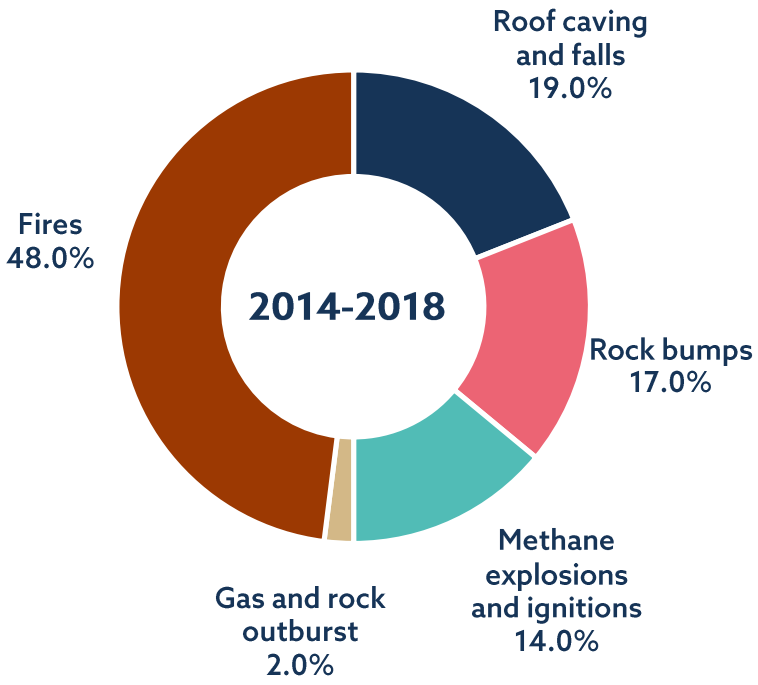
Events		Roof caving and falls	Rock bumps	Methane explosions and ignitions	Gas and rock outburst	Fires
Number of events	2014 - 2018	22	5	17	2	57
	2018	5	4	2	1	16
Fatalities	2014 - 2018	21	19	6	-	-
	2018	3	6	-	-	-



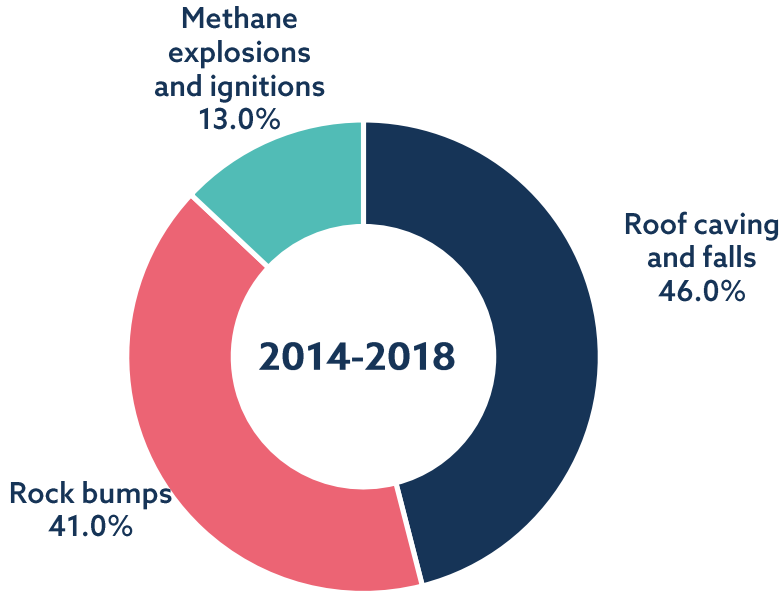
- Fires have the largest share among dangerous events in mining in recent years (2014 - 2018), which however, same as gas and rock bursts, did not result in fatalities during recent five years.
- In recent years nine fatalities were caused by roof caving and falls as well as by rock bumps (in previous years also methane explosions and ignitions were the reason of miners' deaths).
- In recent years the share of accidents caused by the human factor has remained relatively unchanged.

Source: Karkula P., 2019.

Dangerous events in underground mining in the years 2014-2018



Number of dangerous events in underground mining in the years 2014 - 2018



Structure of fatalities broken down into dangerous events in underground mining in the years 2014 - 2018

Source: Karkula P., 2019.

Fatalities as a result of natural hazards occurrence in the years 2000-2016

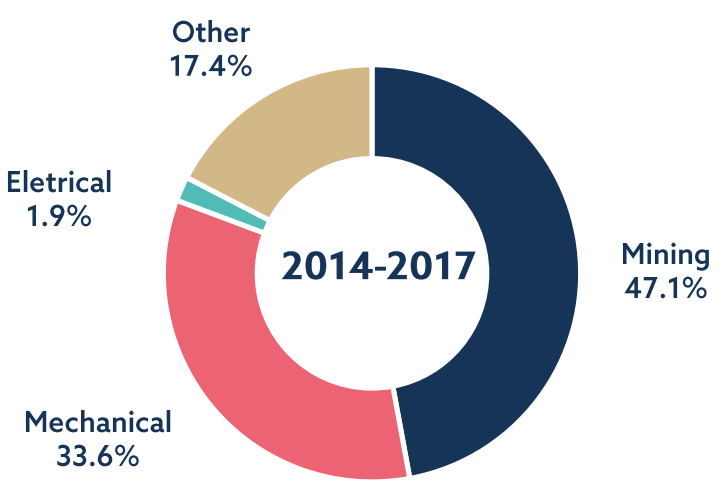
Year	Methane explosions and ignitions	Coal powder explosions	Spontaneous fires	Roof falls	Rock bumps and decompression	Gas and rock outburst	Water inrush	Total
2000	0	0	0	3	0	0	0	3
2001	0	0	1	0	2	0	0	3
2002	1+3*	10+3*	0	1	3	0	0	18
2003	1+3**	0	3**	0	2	0	0	6
2004	0	0	0	0	0	0	0	0
2005	0	0	0	1	1	3	0	5
2006	23*	23*	0	1	4	0	0	28
2007	0	0	0	2	0	0	0	2
2008	6+2*	2**	2**	1	0	0	0	9
2009	20*	20*	0	1	0	0	0	21
2010	0	0	0	0	2	0	0	2
2011	3	0	0	0	1	0	0	4
2012	0	0	0	1	1	0	0	2
2013	0	0	0	0	0	0	1	1
2014	5**	0	5**	0	0	0	0	5
2015	0	0	0	0	2	0	0	2
2016	1	0	0	1	1	0	0	3
Razem	12+46*+10** (20)	10+46*+2** (58)	1+10** (1)	12	19	3	1	114

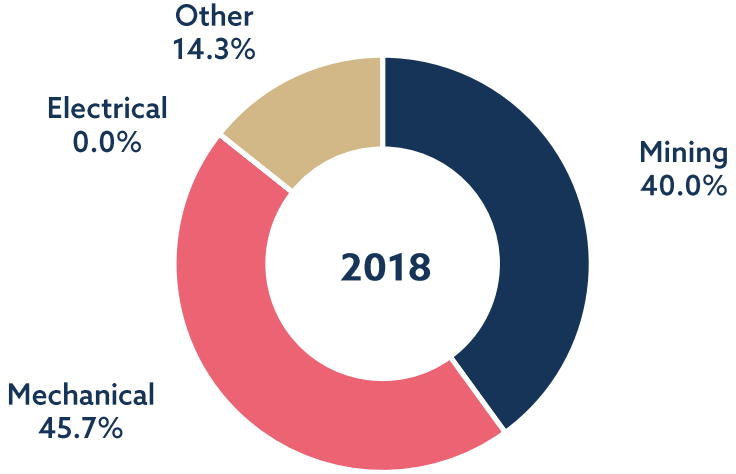
* Methane ignitions/explosions and coal powder explosions

** Fires and methane ignitions/explosions and/or coal powder explosions

Source: Burtan Z., Stasica J., Rak Z., 2017.

Main reasons for fatal and serious accidents in mining in the years 2014-2018





- In the years preceding 2018 the frequency of serious and fatal accidents with mining reasons exceeded that of accidents with mechanical reasons.
- In 2018 the mechanical reason was the cause of nearly 46% of all fatal and serious accidents. On the contrary, no fatal and serious accidents with electrical reasons were recorded.

Source: Karkula P., 2019.

Expenditures and Costs in Hard Coal Mining

Expenditures and costs in the hard coal mining

- This part of the Report presents selected information on capital expenditure, costs, and economic results in the hard coal sector.
- These are specifications prepared using data gathered for years at the MEERI PAS and statistics provided by the ARP Katowice. Missing figures (chosen years, single secondary items) were supplemented acc. to the best knowledge in this field, hence certain values can differ from the actual ones.
- The data gathered (in particular) before 2012 do not comprise statistics originating from the LW 'Bogdanka' SA or smaller business entities (ZG Siltech, PG Silesia).

Expenditures and costs in the hard coal mining

- General picture of the mining - it is a subject to major transformations. Difficult financial standing of the sector during the crisis in years 2015-2017 resulted in far-reaching reduction of cash expenses. A clear increase in investments may be currently observed , in particular in the field of machinery enrichment, which suggests a periodical revival of the sector.

- To certain extent also the investments related to development of new mining panels increase, which is a good signal, although they still do not reach values that could ensure stability of mining, especially in relation to growing unit costs of workings driving.

Expenditures and costs in the hard coal mining

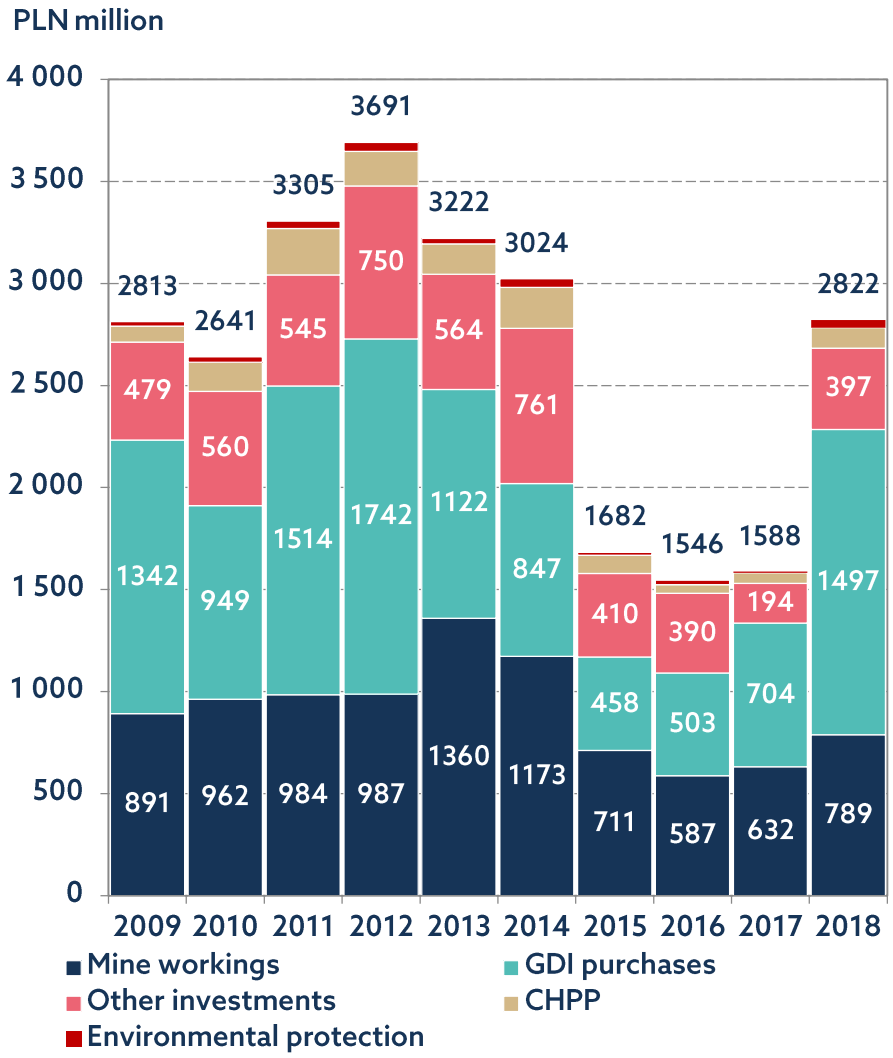
- In the years 2013-2016 the sector generated negative financial results, which was caused by a decline of prices (both of thermal and coking coal).
- The price of coking coal suddenly increased in 2017 and contrary to forecasts it remains on a relatively stable level. This is one of reasons, why the sector generated profits in 2017 and 2018.
- The coal price in Poland is substantially affected by the economic situation worldwide and the European Union energy policy. The coking coal prices are determined in a benchmark formula, based on coal quality parameters, in particular the CRI and CSR indices. In the case of thermal coal the contents of such elements as chlorine, mercury, phosphorus are important, because have a negative impact on further processes of coal processing.

Expenditures and costs in the hard coal mining

- The increase in the CO_2 emission allowance price puts a cost pressure on power stations based on thermal coal, which influences the mining sector. Mines make efforts to cut the production costs, but effects occur with a delay.

- A high, nearly 90% share of fixed costs continues to be the problem of mining companies, because according to our assessment the possibility to reduce them is limited. Because of that mining companies are sensitive to coal price falls.

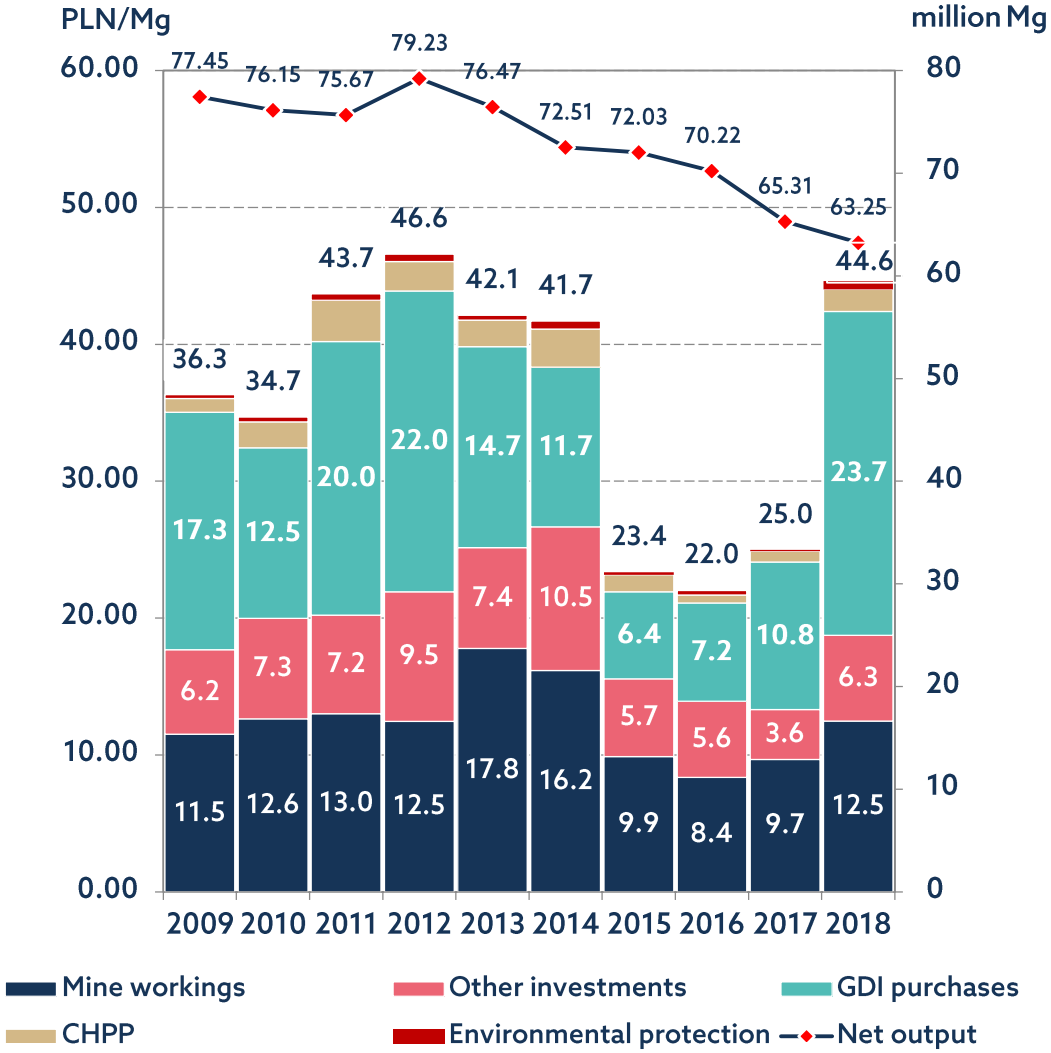
Capital expenditures in the hard coal mining



- In the studied period the highest capital expenditures were recorded in the years 2011-2014, of PLN 3.0-3.7 billion. In the next years they were reduced nearly by half. It is worth emphasising that the capital expenditure is 10-15% of total mines expenditures and costs.
- In 2018 there was a significant overall increase in the capital expenditure as against 2017, reaching a figure close to ones recorded in the years 2009-2014.
- The highest investments growth was related to purchases of fixed assets, resulting from enrichment of Polish companies machinery and from increasing mining machines prices.

MEERI PAS study based on ARP SA data.

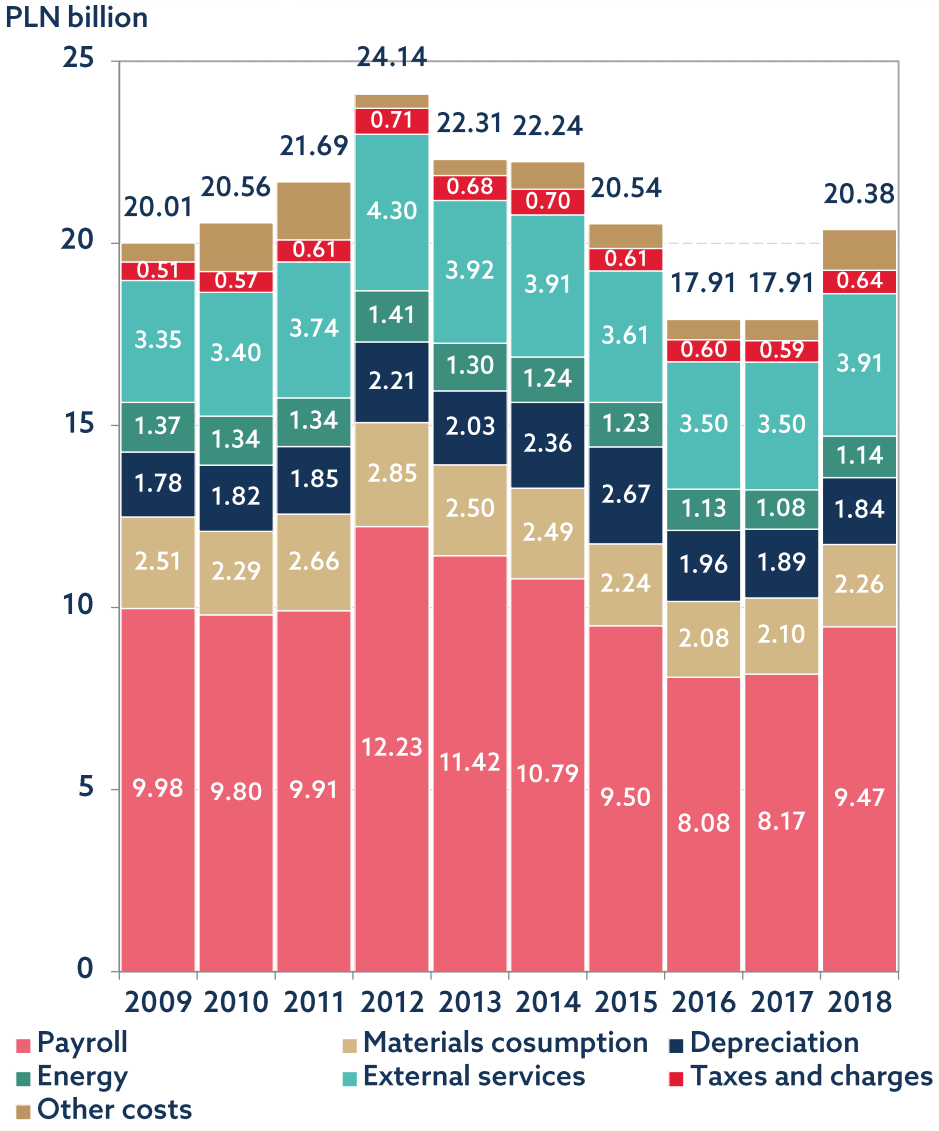
Capital expenditures versus the output

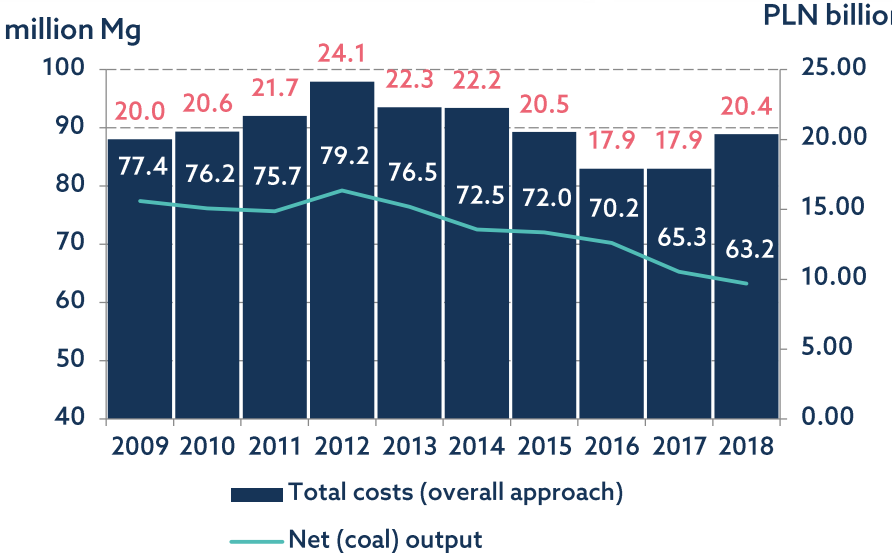


- The capital expenditure, converted to coal output, in the hard coal mining sector in 2018 went up to PLN 44.6/Mg, reaching a level almost highest in the period. This signals the sector revival.
- In 2018 the capital expenditure increased in all reported segments.
- One can also notice increased expenditures on underground construction, which is forced by savings made in this segment in the years 2015-2018. The limitation of expenditure on mine workings is a popular method of improving the liquidity of mining companies, but maintained long-term results in the output reduction.

MEERI PAS study based on ARP SA data.

Hard coal mining costs

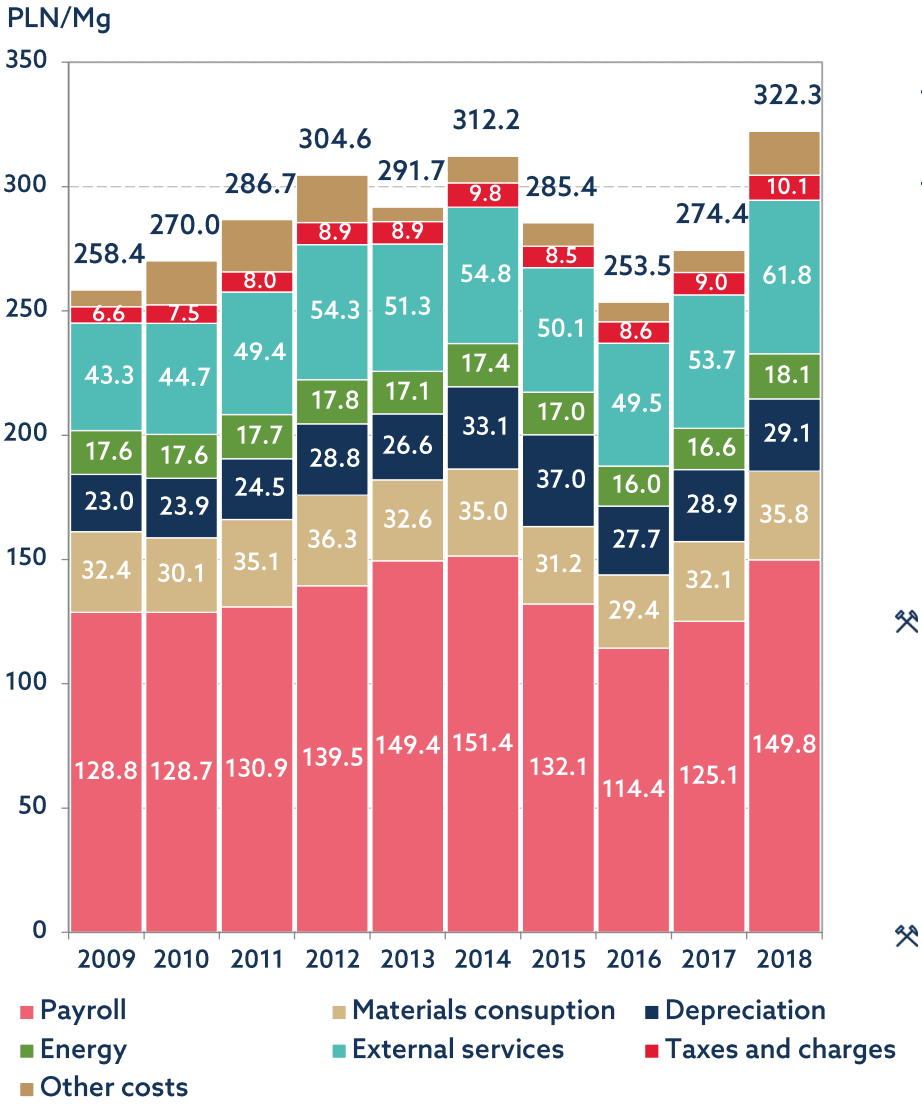


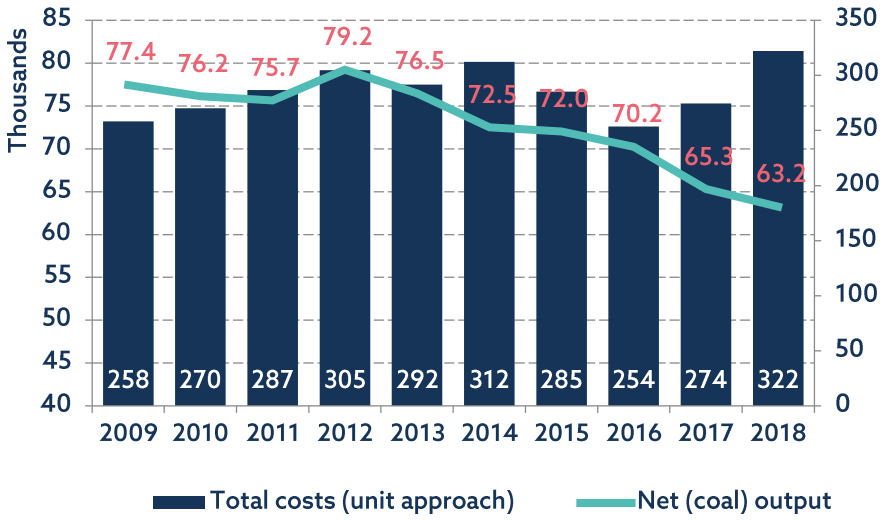


- In recent years mines try to cut their costs, however 2018 witnessed their growth, mainly due to pay rises.
- The maintaining cost level is not reflected in the level of output, which systematically has been going down from 2012. This results in a larger and larger consumption of revenues by the operating costs.

MEERI PAS study based on ARP SA data.

Hard coal mining costs - a unit approach

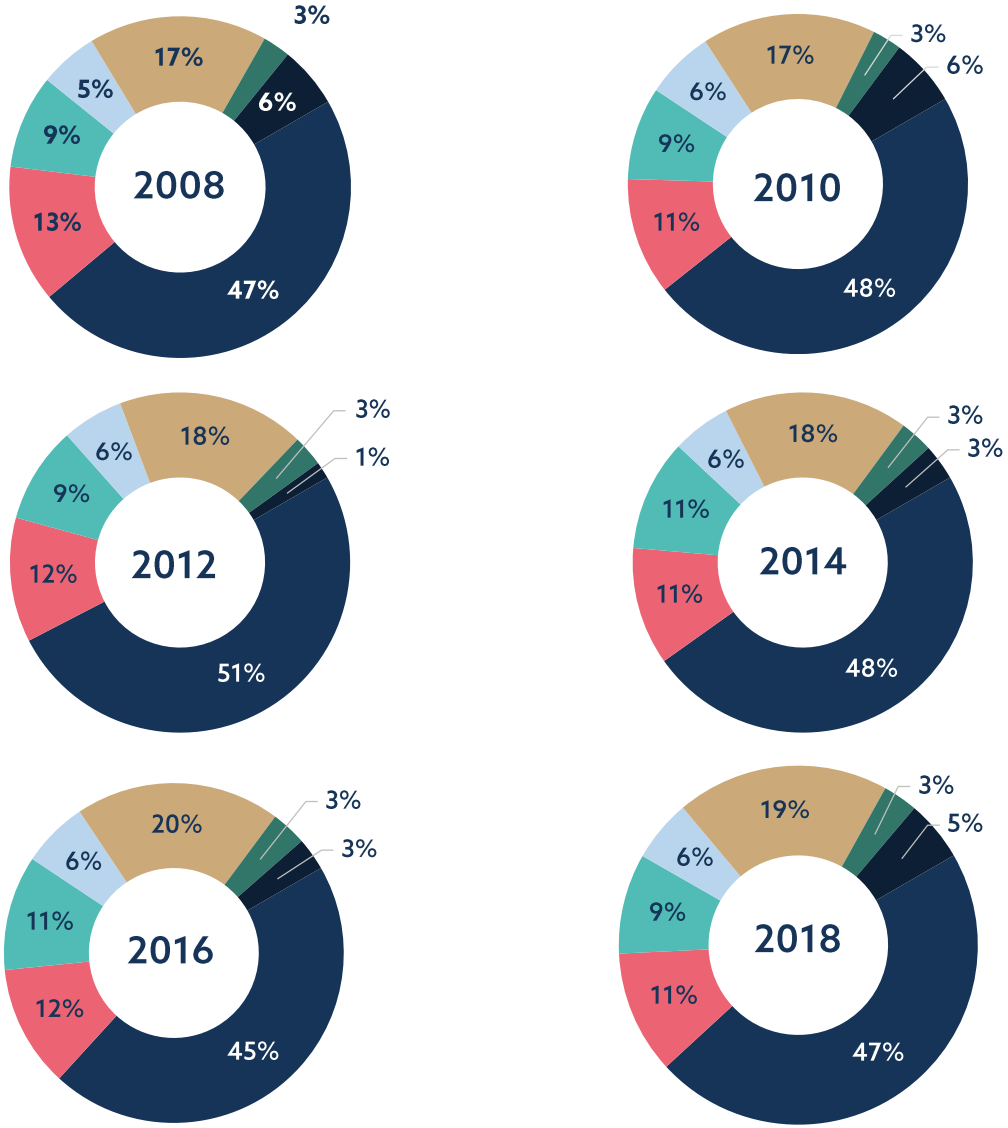




- The unit cost of coal mining was increasing in the years 2008-2013 and then fell to PLN 277 in 2017. However, in 2018 it went up suddenly and reached the highest level in the studied period. This results from the increase in the payroll costs and a simultaneous decline of output. Both these effects start to show a trend, which is a dangerous signal for the sector.
- Both effects are strengthened by the limited application of such management methods as awarding bonuses for performance or project management, and by the trade unions pressure.

MEERI PAS study based on ARP SA data.

Structure by type of operating costs in the hard coal mining

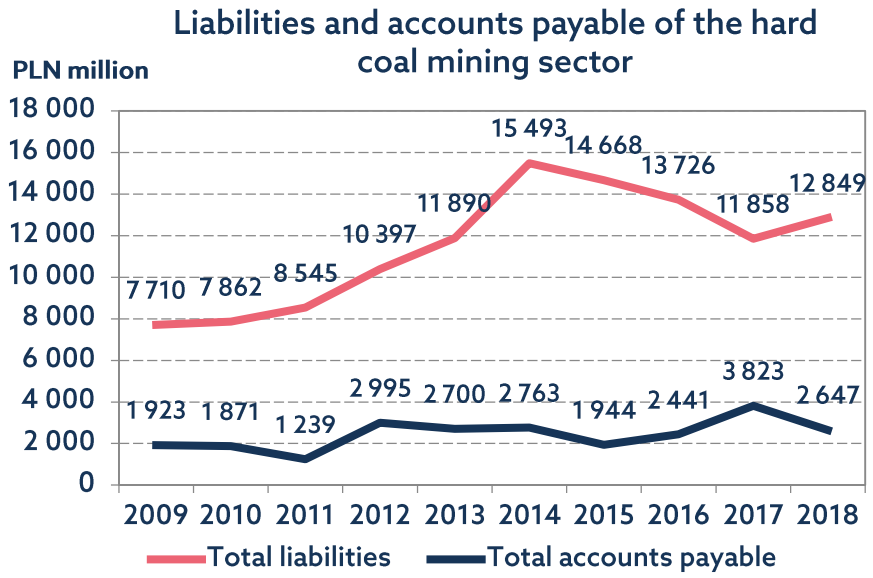


- The structure of costs in hard coal mines is stable. This results from low flexibility of project fixed costs, which are a significant majority – they are estimated as 65 - 90% of total costs.
- In the entire period the payroll and external services have the largest share in operating costs, and the cost of energy consumption, taxes and charges as well as other costs - the smallest.

MEERI PAS study based on ARP SA data.

Basic economic and financial figures of the hard coal sector

Specification	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Revenue from coal sales	18 838	20 730	25 874	24 327	29 760	19 366	18 978	17 993	20 548	21 502
Cost of coal sold	18 005	18 771	21 706	22 165	29 870	21 592	20 947	18 502	17 892	20 180
Result on coal sales	832	1 958	4 167	2 162	- 484	- 2 226	- 1 969	- 509	2 656	1 322
Net financial result	- 184	1 160	3 014	1 500	- 273	- 1 502	- 1 898	- 427	3 611	1 250
Total liabilities	7 710	7 862	8 545	10 397	11 890	15 493	14 668	13 726	11 858	12 849
Total accounts payable	1 923	1 871	1 239	2 995	2 700	2 763	1 944	2 441	3 823	2 647



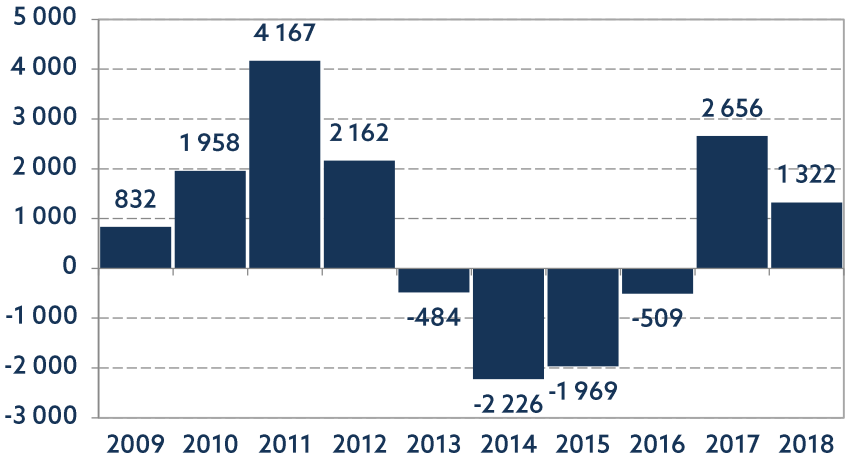
- In 2017, as a result of coal prices increase, the sector results improved substantially. In 2018 they again diminished, majority of coal companies registered much lower profits (or higher losses) than in the previous year. However, the Polska Grupa Górnicza - the biggest Polish mining company – has noted a slightly higher profit.
- In 2018 both the revenue from sales and the costs went up, but the latter to a much bigger and worrying degree.
- In the analysed year the visible from 2014 trend of declining liabilities level stopped, which partially can result from an increase in the investments.

MEERI PAS study based on ARP SA data.

Financial results of the hard coal sector

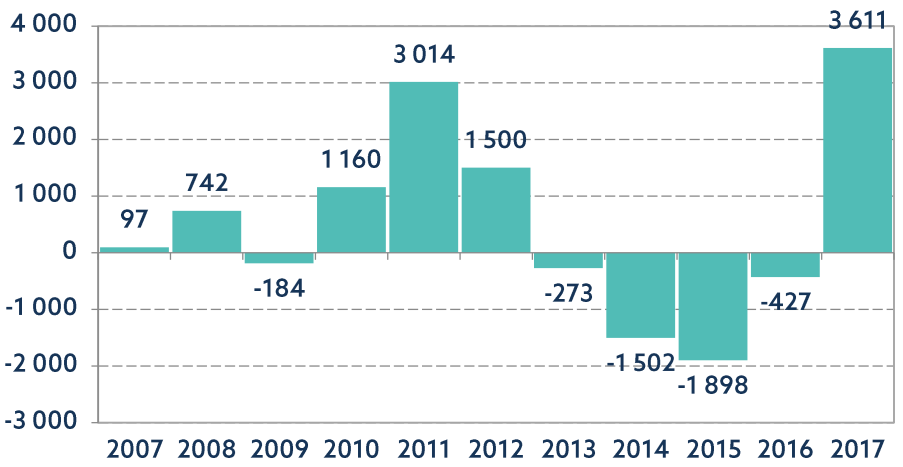
PLN million

Result on coal sales



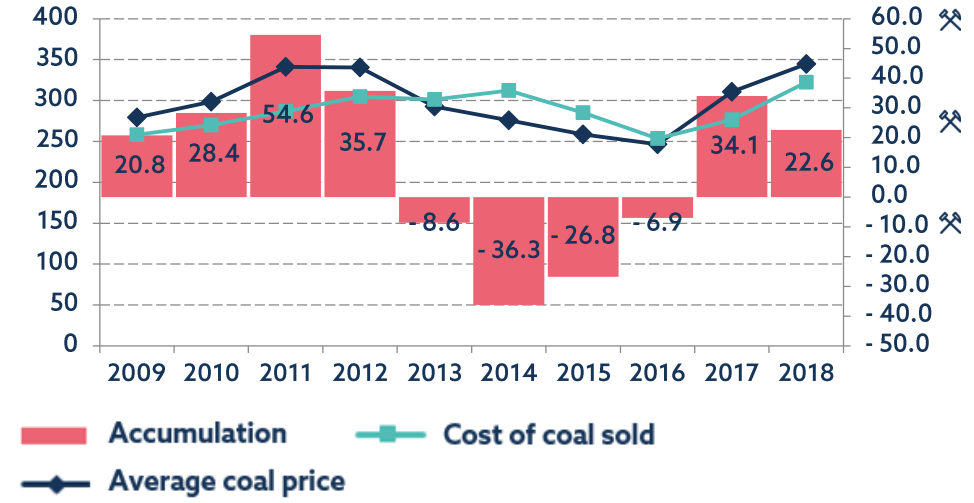
PLN million

Net financial result



PLN million

Accumulation



After a period of downturn, in recent two years the sector recorded profits, though much lower in 2018.

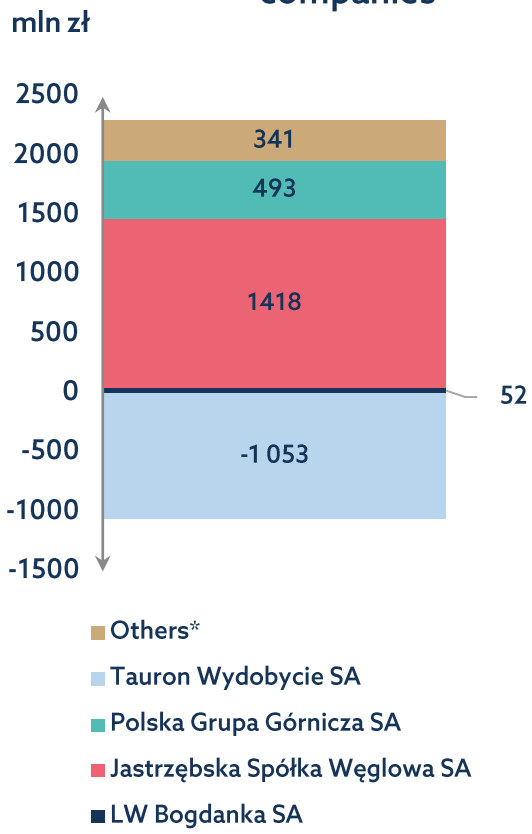
In 2018 the recorded profitability of net sales was approx. 4.7% and the ROA was 3.5%.

In 2018 the coal price went up as against the previous year, but the accumulation went down to PLN 22.6/Mg.

MEERI PAS study based on ARP SA data.

Financial indices for the hard coal mining sector

Net financial result of the hard coal mining sector in 2018 broken down by mining companies

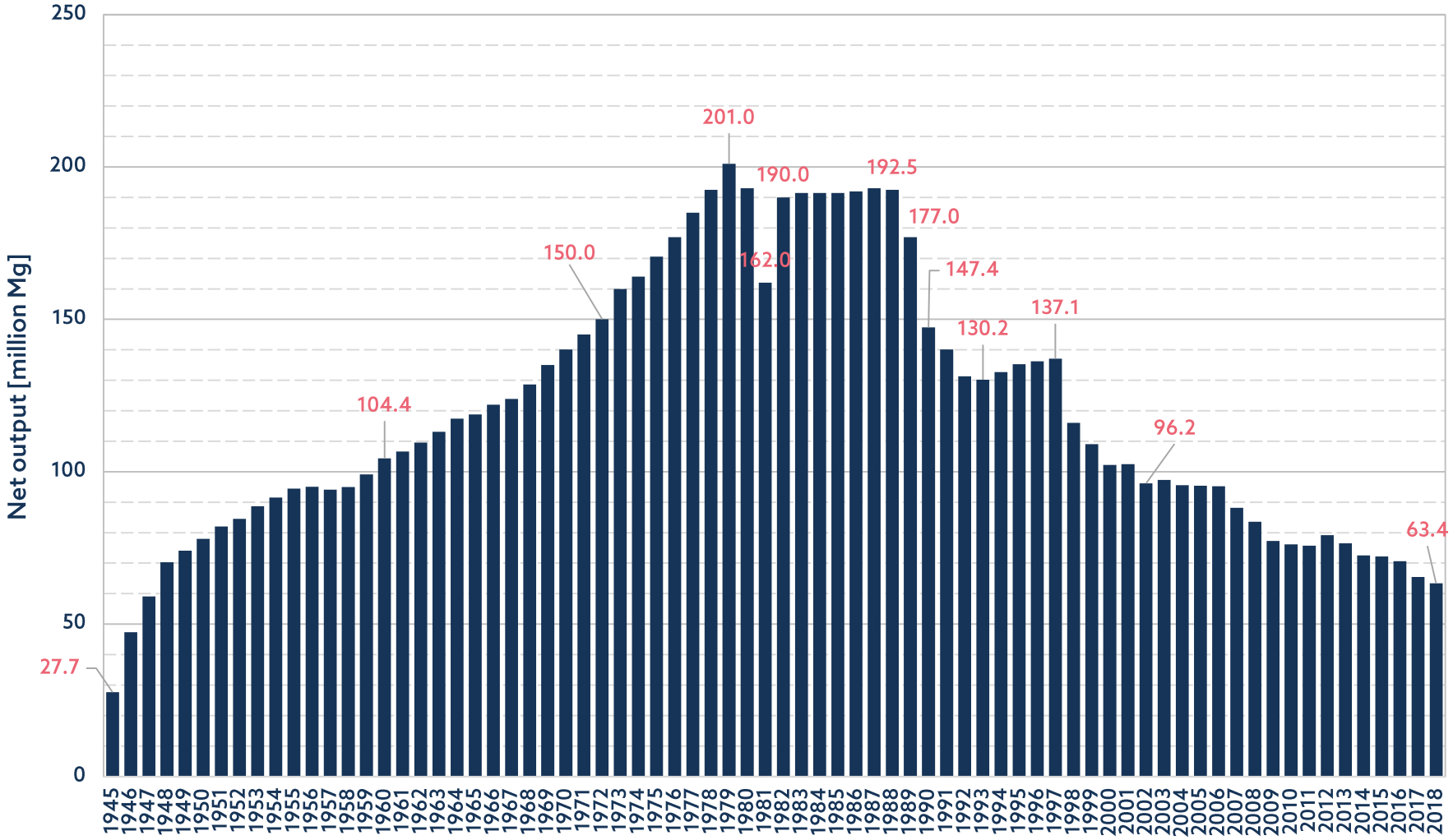


* Including companies, which in 2018 were subject to restructuring or liquidation.

- The financial result of hard coal mining was most affected by a high, albeit more than 40% lower than in 2017, profit of Jastrzębska Spółka Węglowa.
- Also results of Polska Grupa Górnicza are improving, though it is a subject to restructuring and produces mostly coal blends for power purposes. In 2018 the company has shown a profit more than 400 million higher than in the previous year.
- A significant loss shown by the company Tauron Wydobycie SA is worrying, which translates into reduced profits of the entire capital group - in 2017 they amounted to PLN 1,382 million, and in 2018 - only PLN 207 million.
- The LW Bogdanka SA in 2018 has shown lower profits than in the previous year, however, they integrate with the company strategy - a high 2017 result was mainly the outcome of financial operations.
- The importance of the other, frequently private mining entities, in creation of the hard coal mining sector results is marginal.

MEERI PAS study based on ARP SA data.

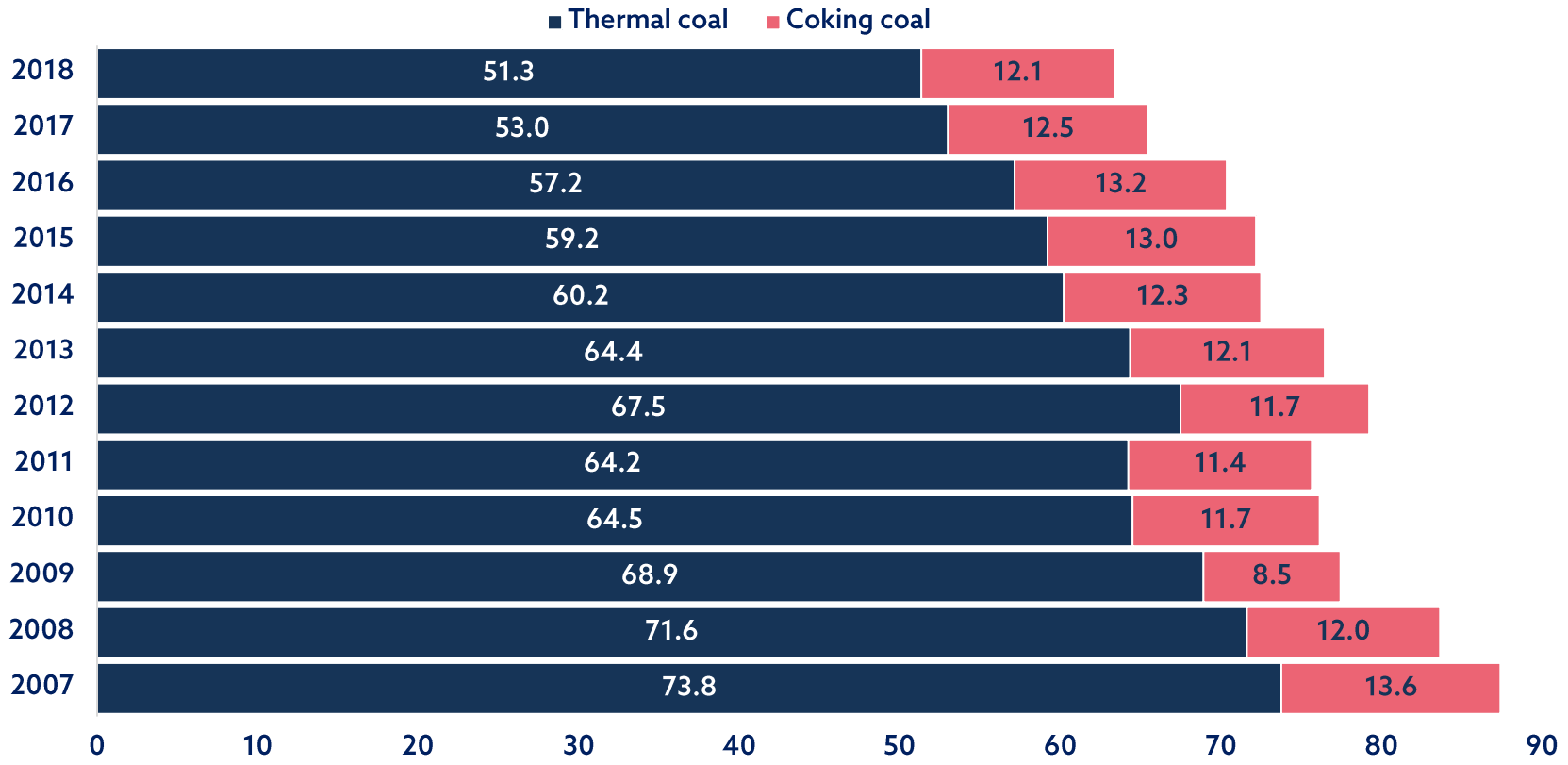
Hard coal output in Poland in the years 1945-2018



Hard Coal Market in Poland

Hard coal output in Poland in the years 2007-2018

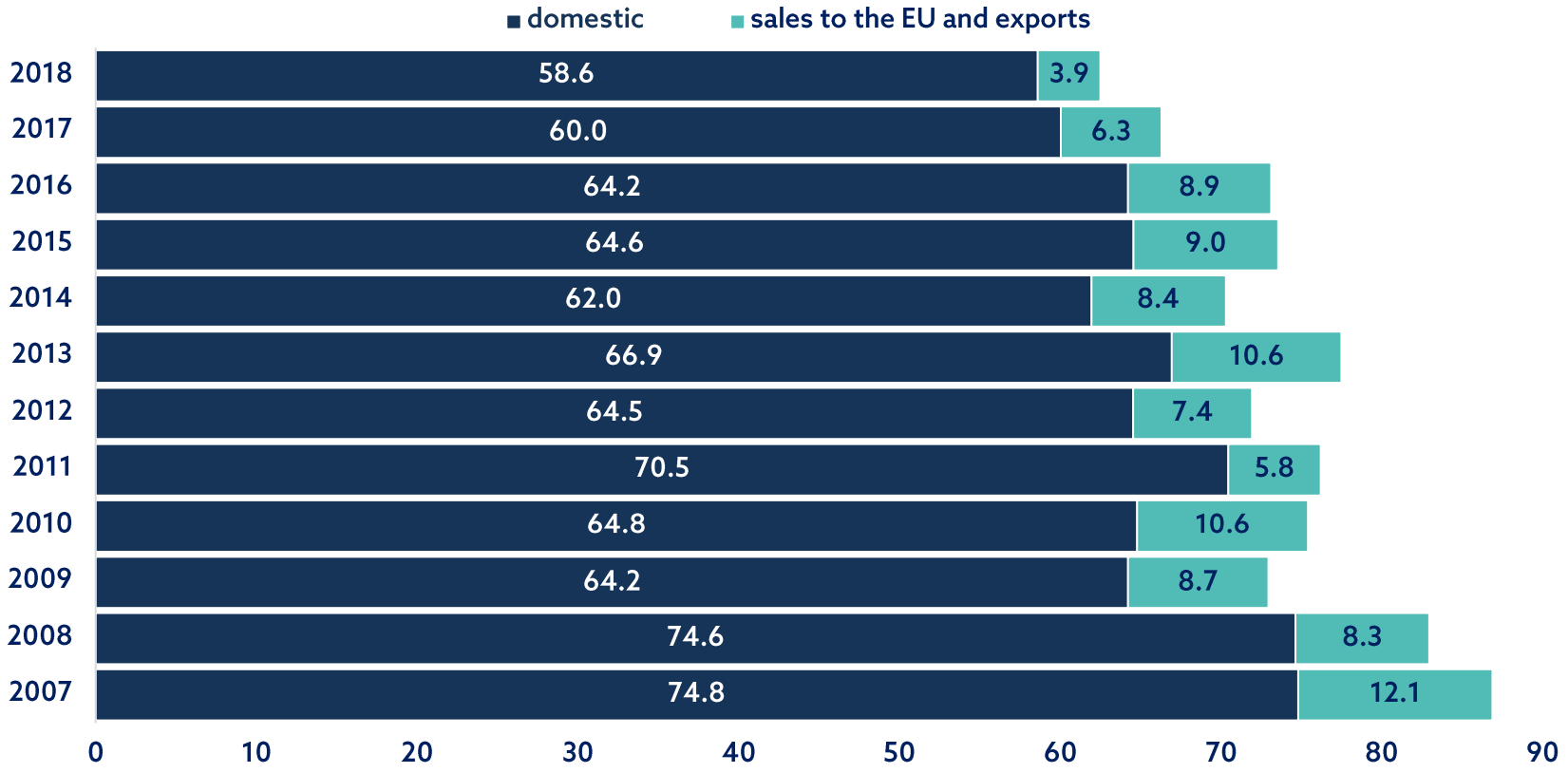
In the period of 2007 - 2018 the domestic hard coal output went down by 27.5%, mainly as a result of thermal coal output decline by 30.4%.



MEERI PAS study based on ARP SA data.

Sales of domestic coal broken down by markets [million Mg]

In the structure of hard coal sales the share of domestic market in the years 2007-2018 ranged from 86 to 94%.

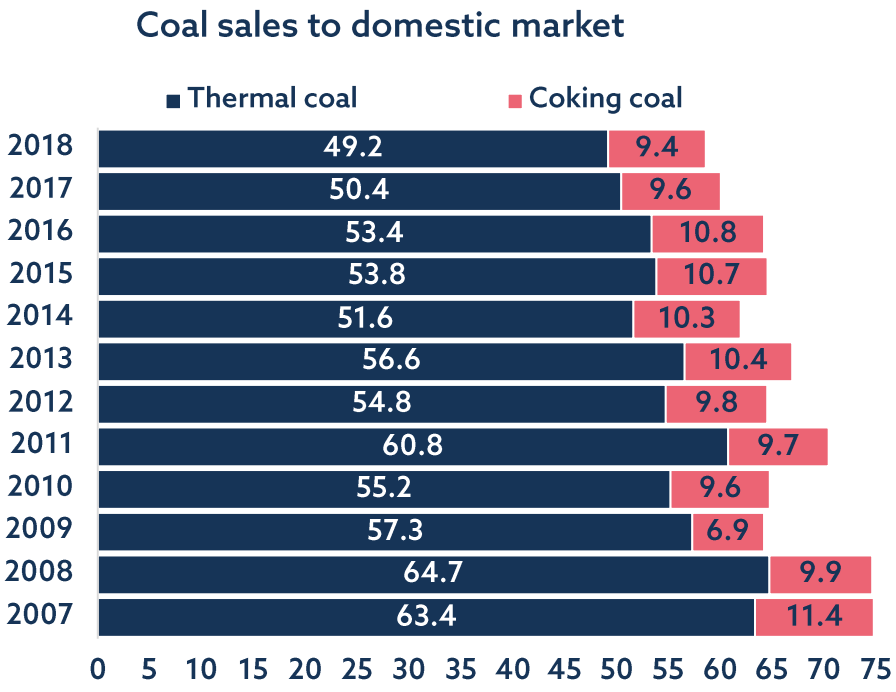


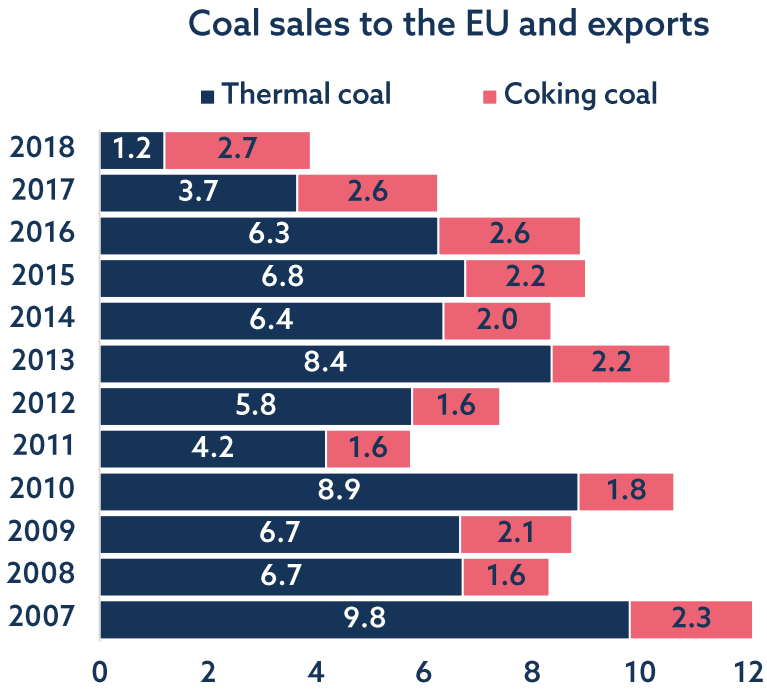
MEERI PAS study based on ARP SA data.

Sales of domestic coal broken down by markets [million Mg]

In 2018 the coal sales on the domestic market went down as against 2007 by nearly 22%, while a fall of coal sales into the EU and for exports was much higher - 68%, mainly due to diminishing sales of thermal coal.

The share of thermal coal in the structure of coal sales on the domestic market is approx. 85%.

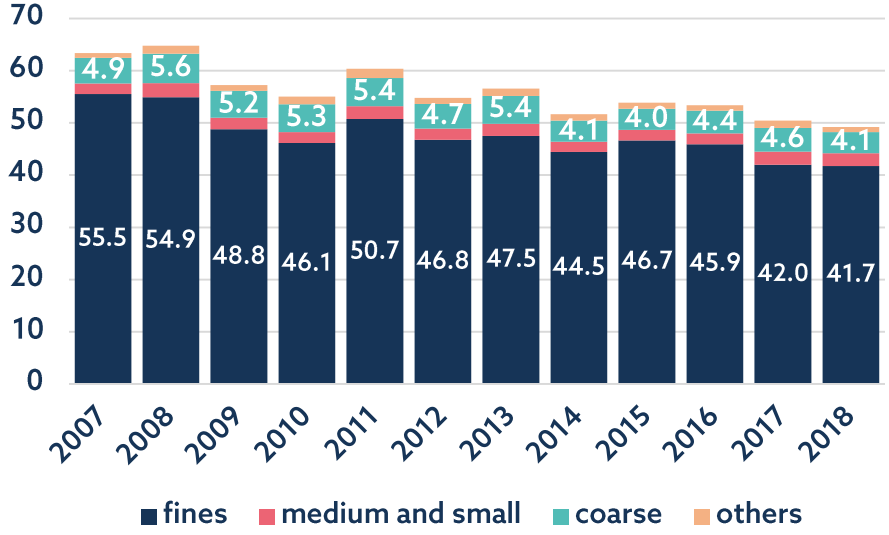




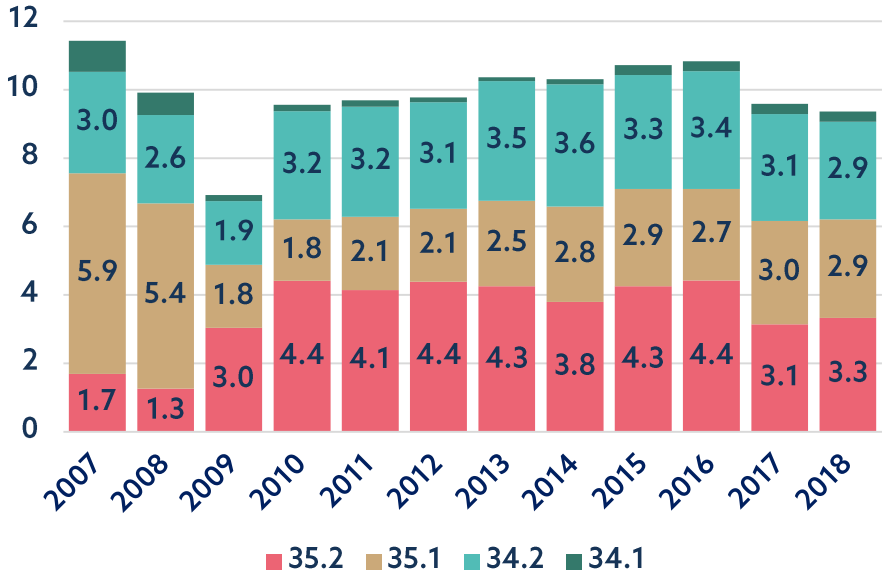
MEERI PAS study based on ARP SA data.

Coal sales to domestic market [million Mg]

Thermal coal sales by coal sizes



Coking coal sales by grades

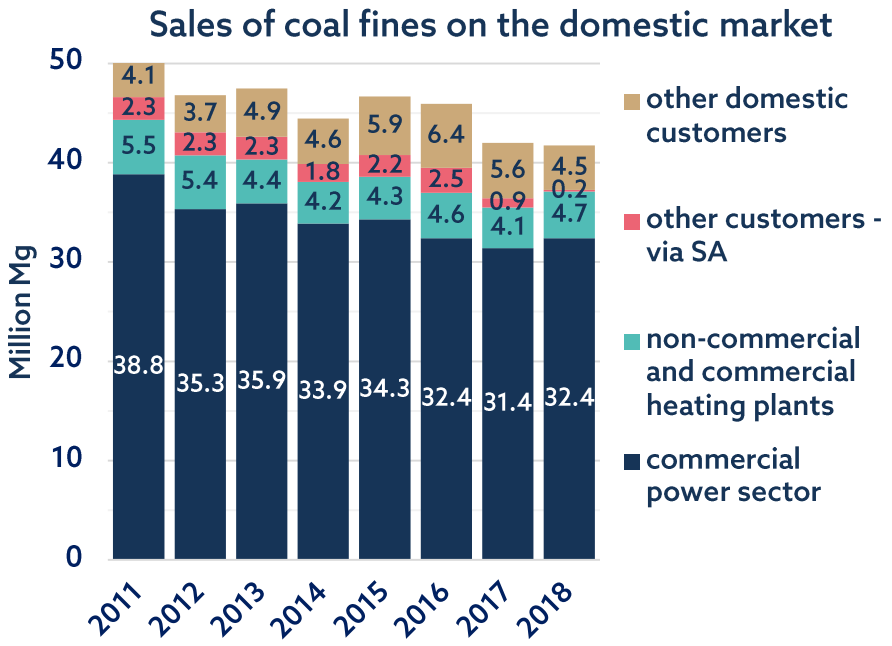


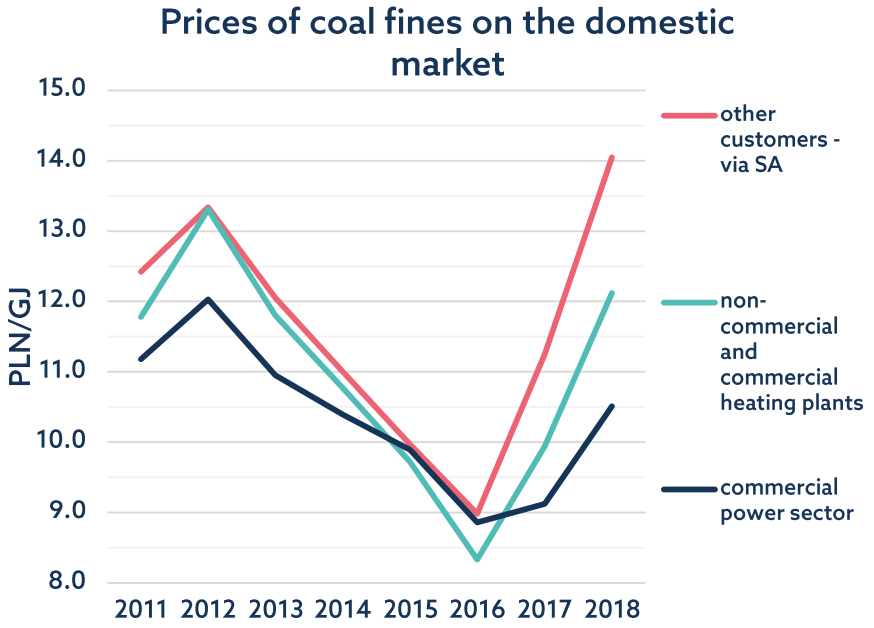
Fines are the key grade, which share in the thermal coal sales on the domestic markets maintains at approx. 85%.

In the coking coal sales the share of hard type coals (type 35.1 and 35.2 acc. to Polish Norm) is approx. 66%.

MEERI PAS study based on ARP SA data.

Sales of thermal coal fines on the domestic market





- The biggest group of customers consists of the commercial power industry and of heating plants (non-commercial and commercial).
- After four years of price decline, in 2017 average annual prices of fines in deliveries to the commercial power industry went up (y/y) by 2.9%, and in deliveries to heating plants - by 19.3%, while to the group of other domestic customers by 25.3%. In 2018 the price rise as against 2017 was - 15.2%, 21.9%, and 24.9%, respectively.

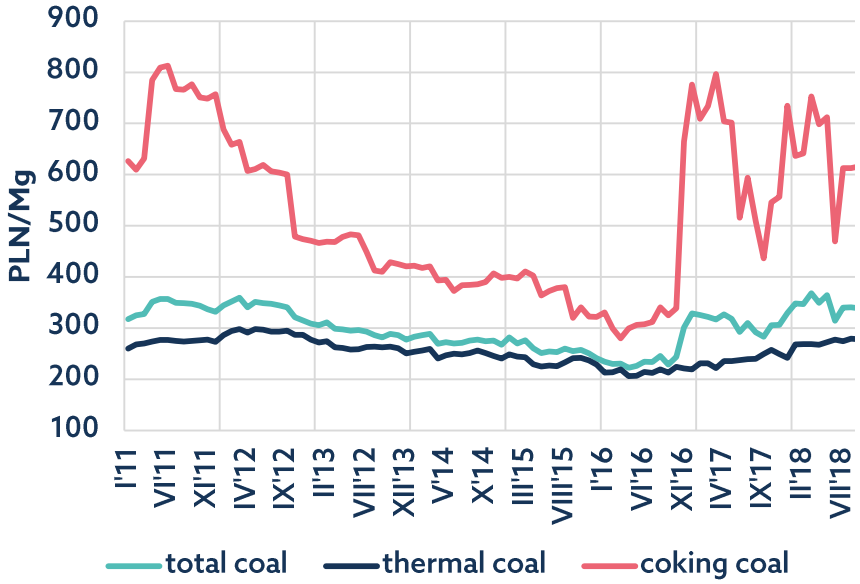
MEERI PAS study based on ARP SA data.

Production costs, sales prices, and the result on the domestic hard coal production

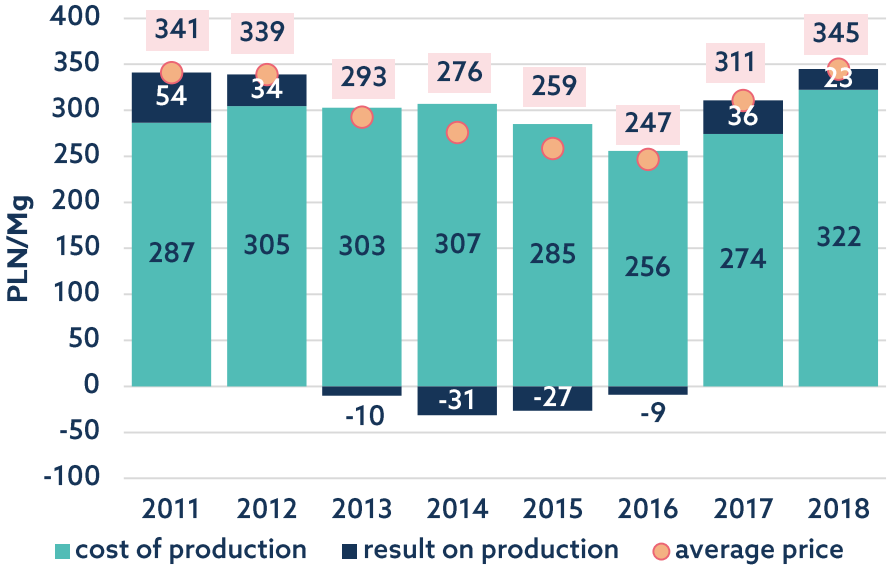
An upward trend in coal prices on the international markets, which appeared in the second half of 2016, was not reflected on the domestic market, in particular in the case of thermal coal. An average price of thermal coal went down (y/y) by 8.4%, while in the case of coking coal the increase in sales price in Q4 caused, that the annual average price was higher by approx. 5%. As a result, an overall coal average sales price went down as against 2015 by 4.6%.

In 2017 the overall coal average sales price went up (y/y) by 26%, while in 2018 by 11%. The maintaining price rise caused that in two recent years the net financial result of the hard coal mining sector was positive.

Average monthly coal prices

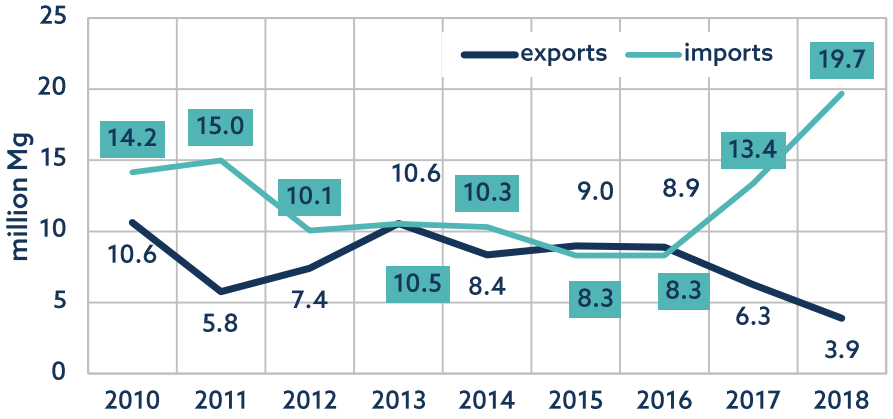


Result on 1 tonne of coal production



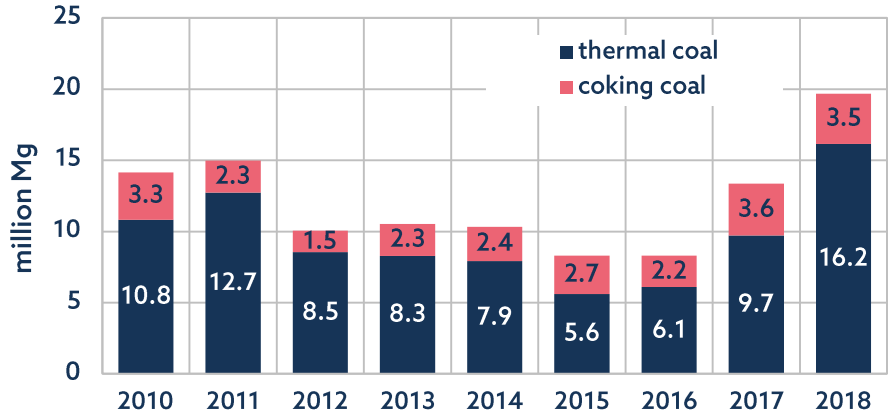
MEERI PAS study based on ARP SA data.

Hard coal imports to Poland



In the years 2010-2018, except for 2013, 2015, and 2016, Poland was a net importer of hard coal.

Imports were exceeding exports from 2.0 to 15.8 million tonnes of hard coal.



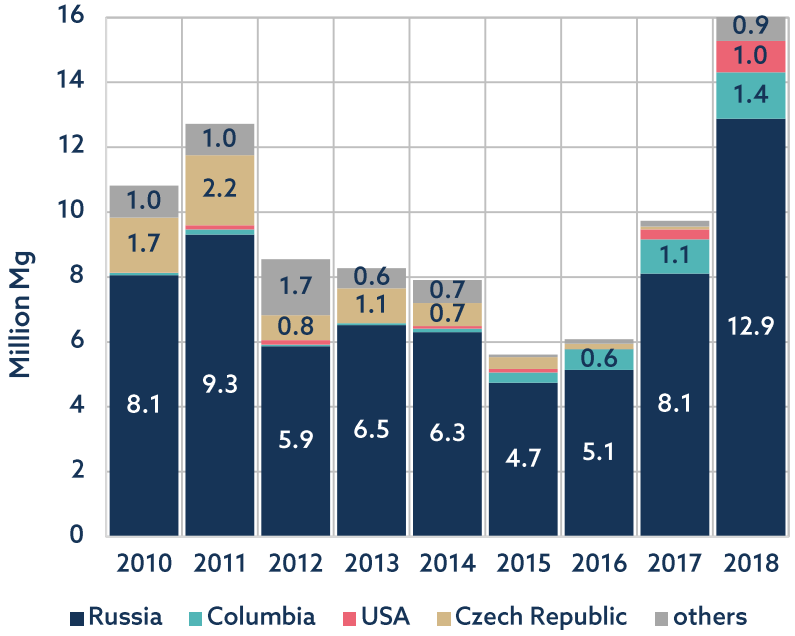
Thermal coal is the basic part of hard coal imports.

In the years 2010-2018 the share of thermal coal in total imports ranged from 68 (2015) to 85% (2011).

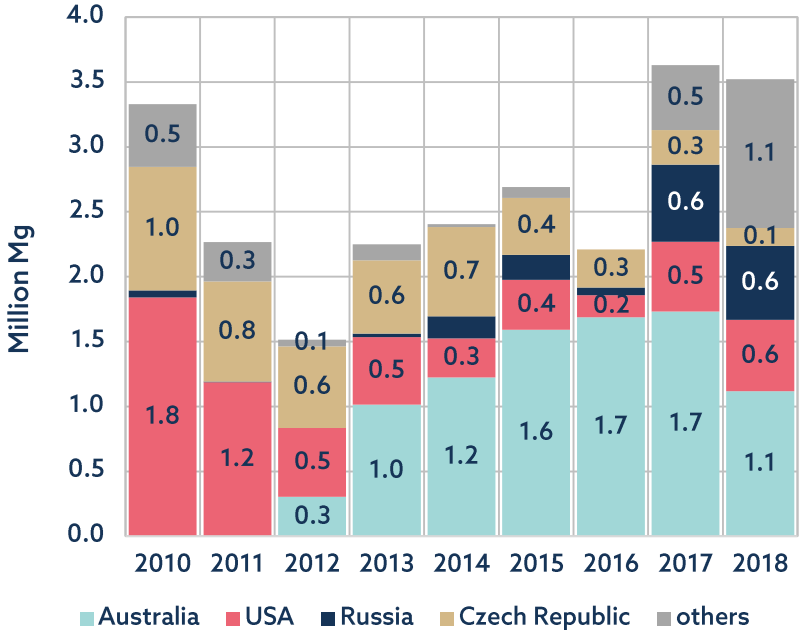
MEERI PAS study based on ARP SA data.

Hard coal imports to Poland

Thermal coal imports



Coking coal imports



Russia is the main exporter of hard coal to the Polish market. In the years 2010-2018 from 69 to 85% of this coal imports originated from Russia.

Till 2015 (inclusive) the Czech Republic was the second important supplier (with a share of 7-17%), and in the years 2016-2018 this position was taken by Columbia (9-11%).

For a few years Australia has been the most important exporter of coking coal to the Polish market.

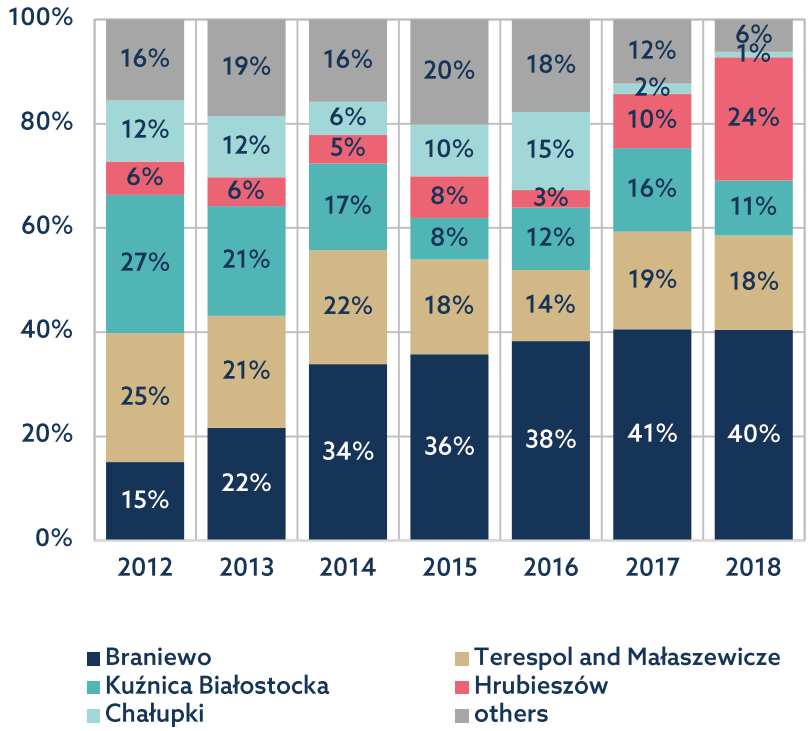
In 2013 coking coal imports from Australia amounted to 1.0 million tonnes, and in the years 2016-2018 they varied from 1.1 to 1.7 million tonnes.

MEERI PAS study based on ARP SA data.

Structure of hard coal imports by the place of border crossing

Imports by land

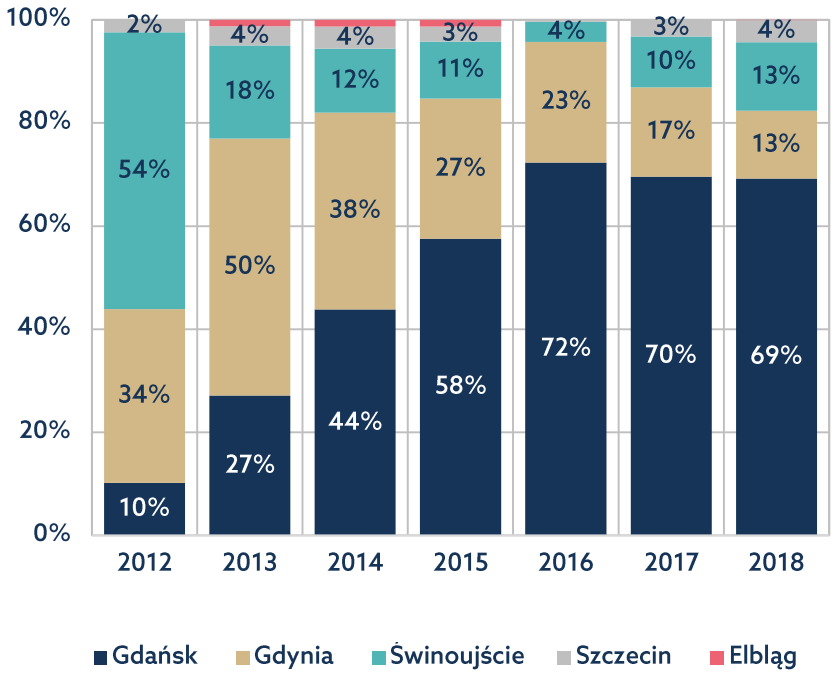
In the geographical structure of hard coal land deliveries to Poland the main role is played by three railway border crossings: Braniewo, Terespol (including the Małaszewicze terminal), and Kuźnica Białostocka. In the years 2012-2018 the total share of the three crossings in hard coal imports by land ranged from 62 to 75%.



Imports by sea

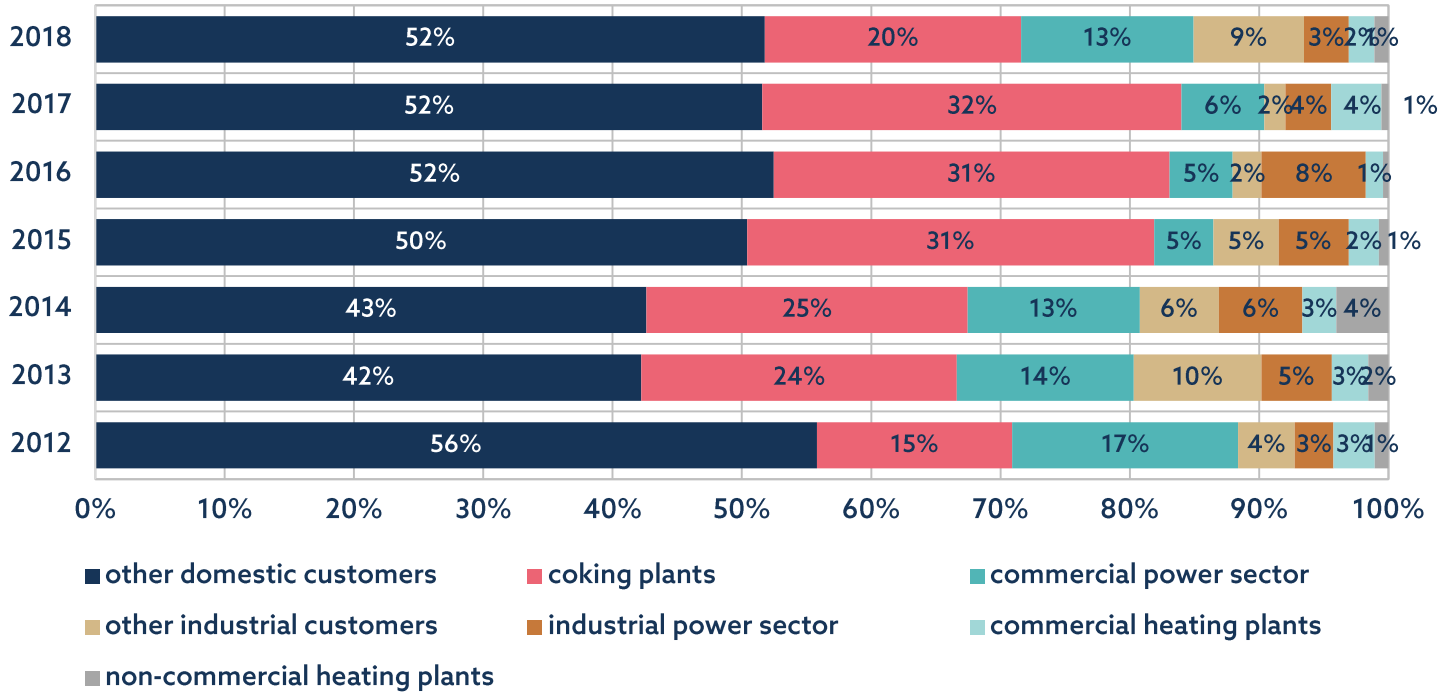
Maritime imports of hard coal to Poland is carried out mainly by four sea ports: Gdańsk, Gdynia, Świnoujście, and Szczecin. In the years 2012-2018 in total it amounted to 99-100%.

The share of imports through the Elbląg port is minor and it did not exceed 1%.



MEERI PAS study based on ARP SA data.

Structure of imported hard coal sales



Other domestic customers (including households) and coking plants are the biggest buyers of imported coal.

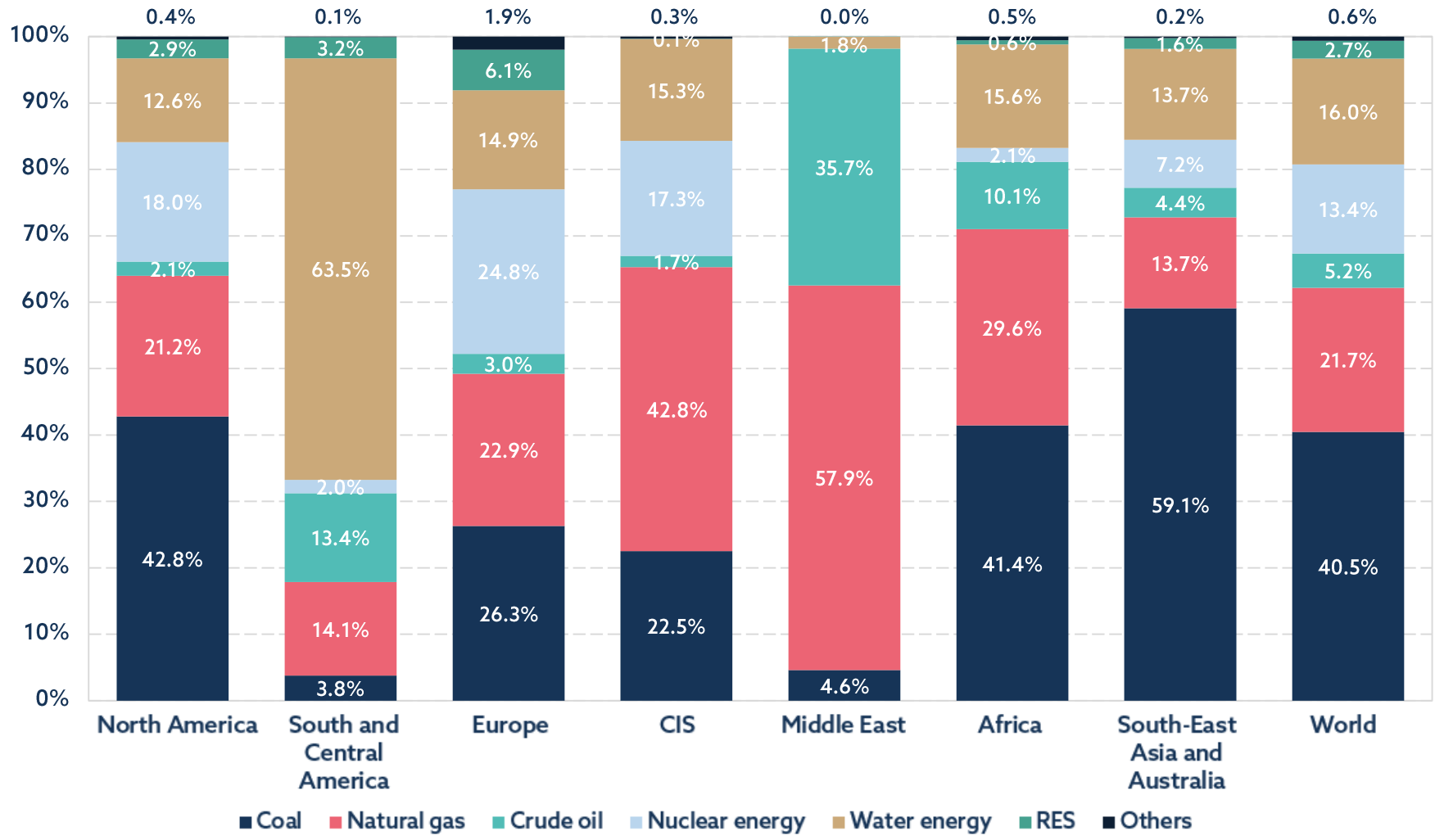
In the years 2012-2018 the share of these two groups was as many as 67-84% of imported coal sales.

The share of power sector (commercial and industrial together) was 10-20%, and of heating plants (commercial and non-commercial) 2-11%.

MEERI PAS study based on ARP SA data.

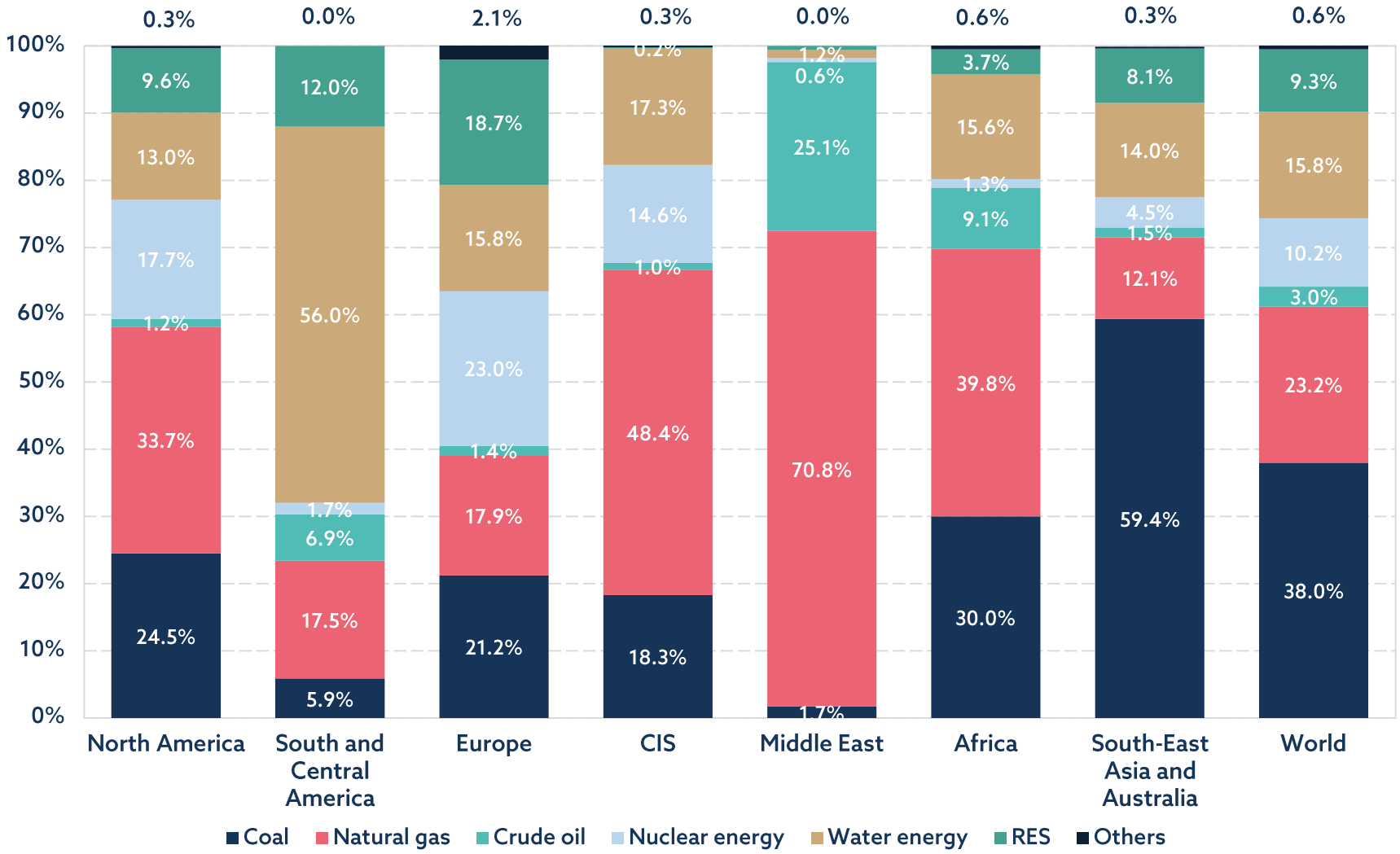
Hard Coal Role in Economy

Share of individual fuel types in the electricity generation worldwide in 2008



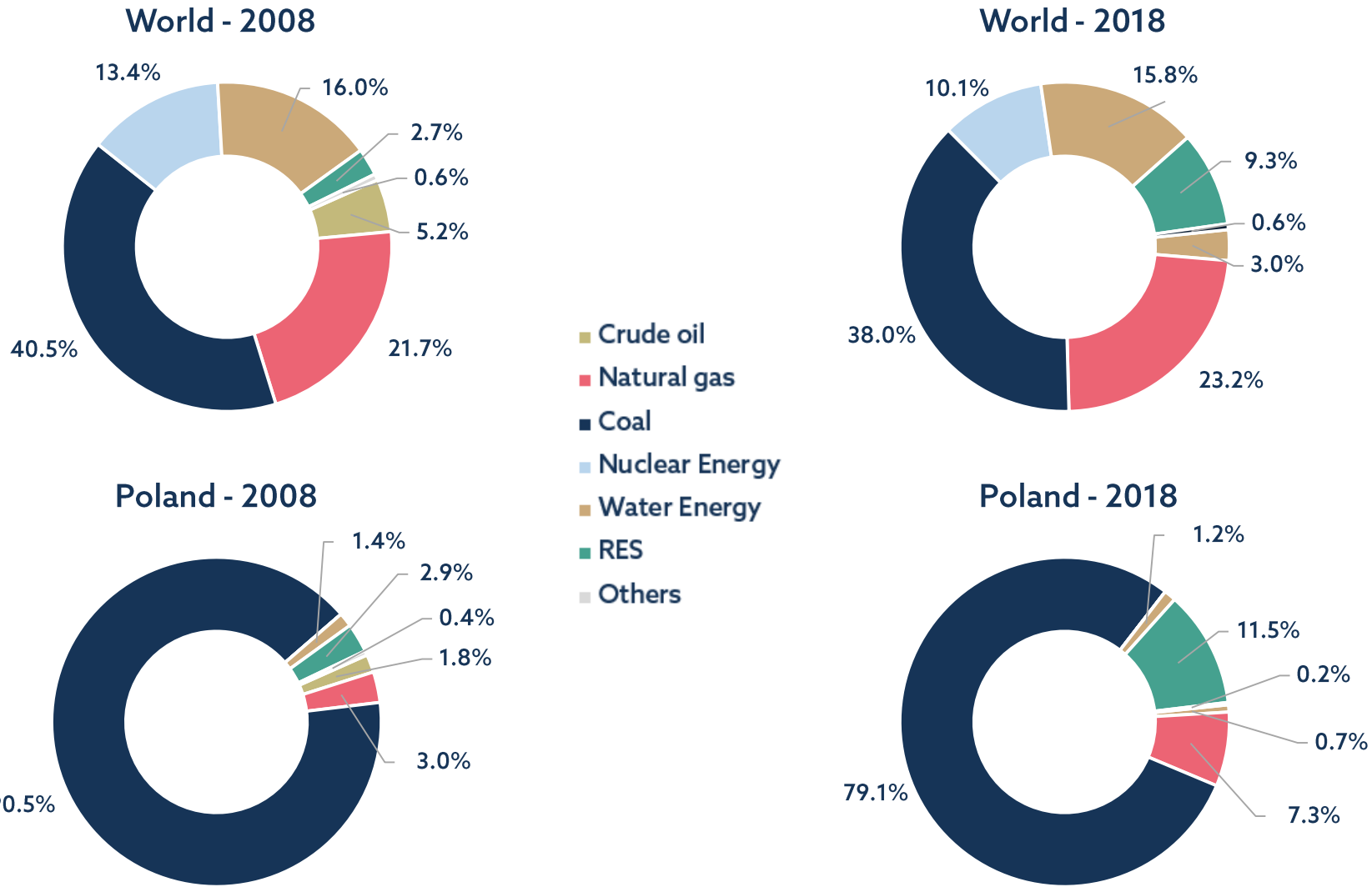
MEERI PAS study based on BP Statistical Review of World Energy 2019.

Share of individual fuel types in the electricity generation worldwide in 2018



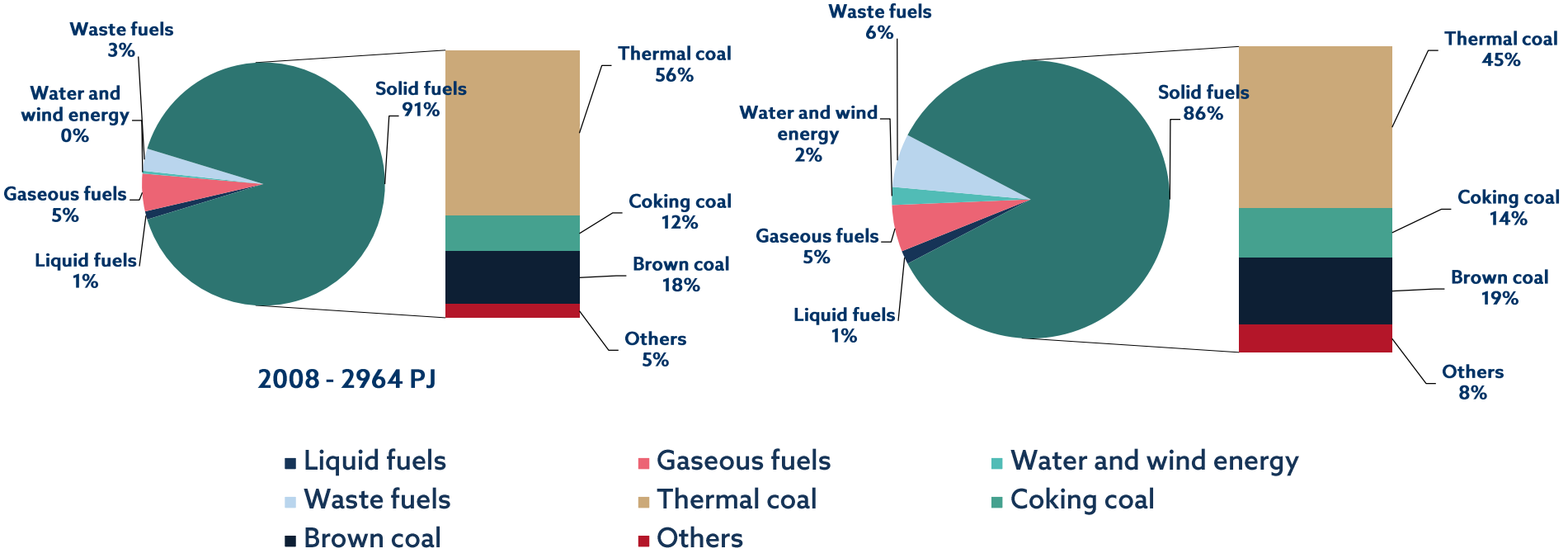
MEERI PAS study based on BP Statistical Review of World Energy 2019.

Percentage share of individual fuel types in the electricity generation in Poland and worldwide



MEERI PAS study based on BP Statistical Review of World Energy 2019.

Structure of fuels acquisition - balance of primary energy in Poland

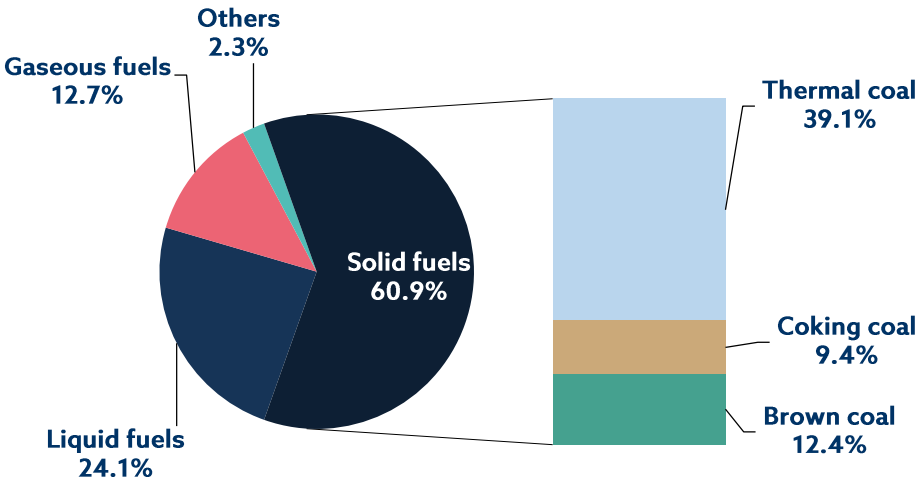


In the years 2008 - 2018 the generation of energy from wind and water increased most, by as many as 417%. However, it should be added, that this energy share in the balance is only 2.6%.

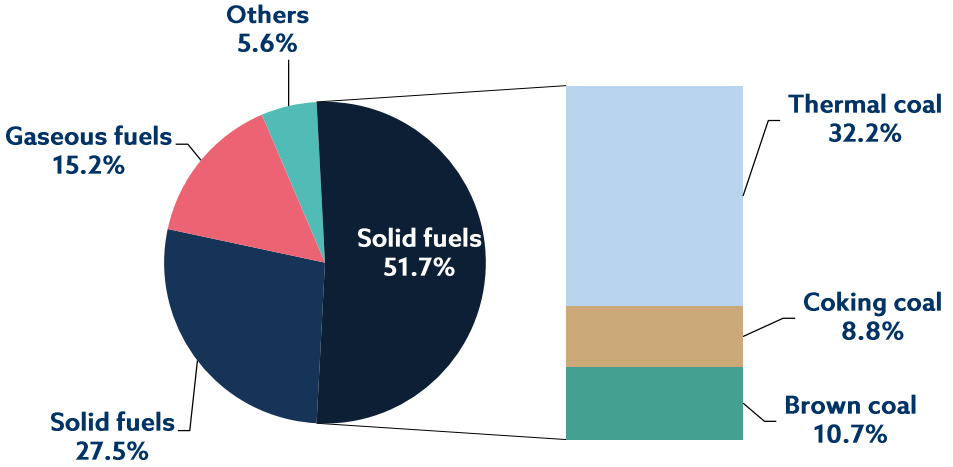
As compared with 2008, in 2018 the amount of energy generated in the country went down by 9%. The share of solid fuels decreased by 15%. The share of thermal coal fell by as many as 27%.

MEERI PAS study based on ARE - Energy Situation in Poland. National Balance of Energy.

Structure of fuels consumption - balance of primary energy in Poland



2008 - 4051 PJ

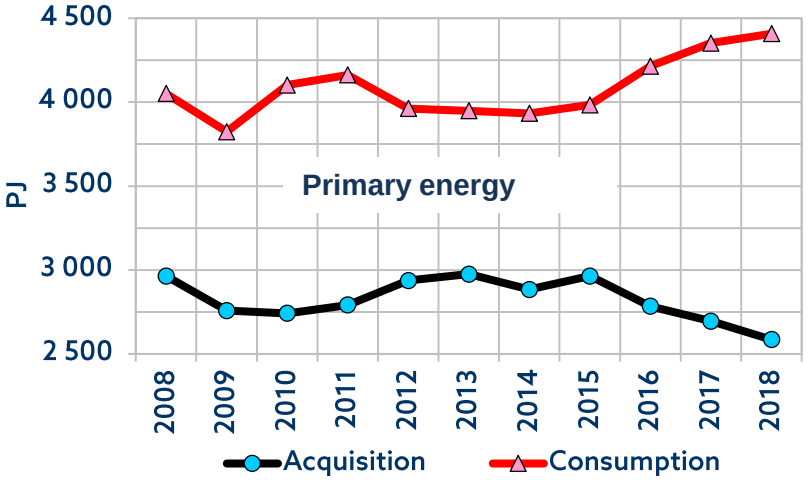


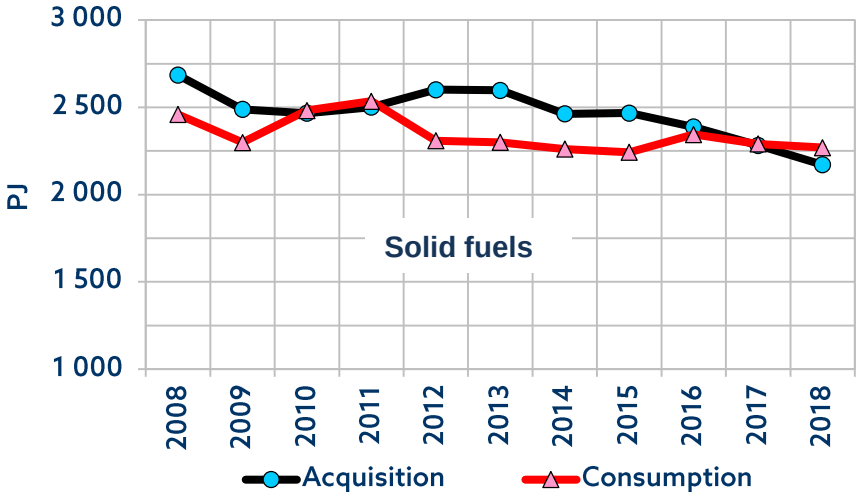
2018 - 4408 PJ

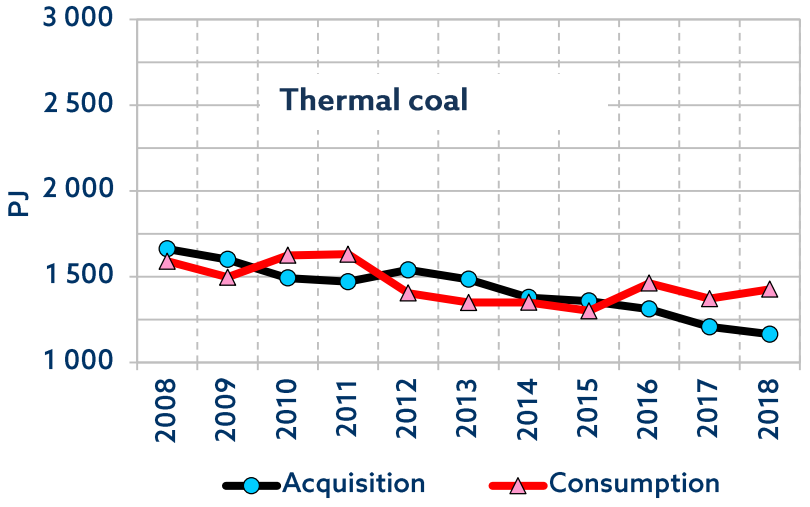
As compared with 2008 the amount of energy consumed in the country in 2018 went up by 9%, while the share of solid fuels decreased by 7%.
The thermal coal share fell by 10 percentage points.

Note: Electricity imports were not considered in the balance.

Structure of primary energy acquisition and consumption in Poland

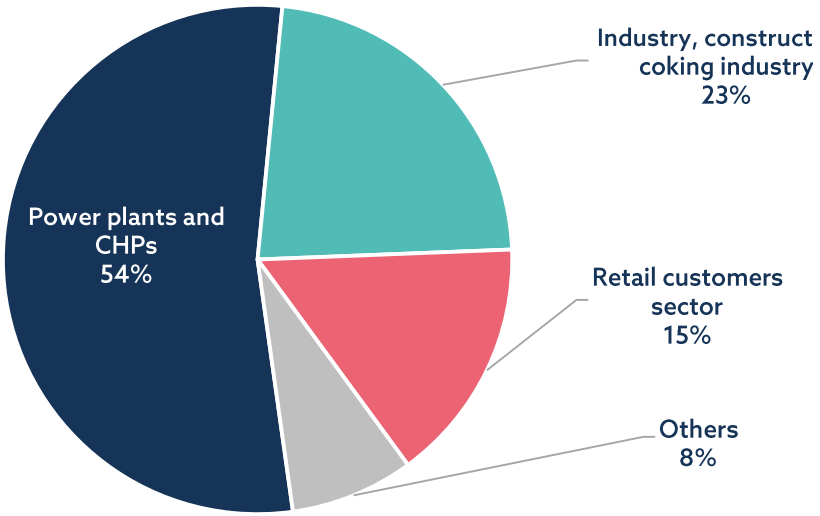




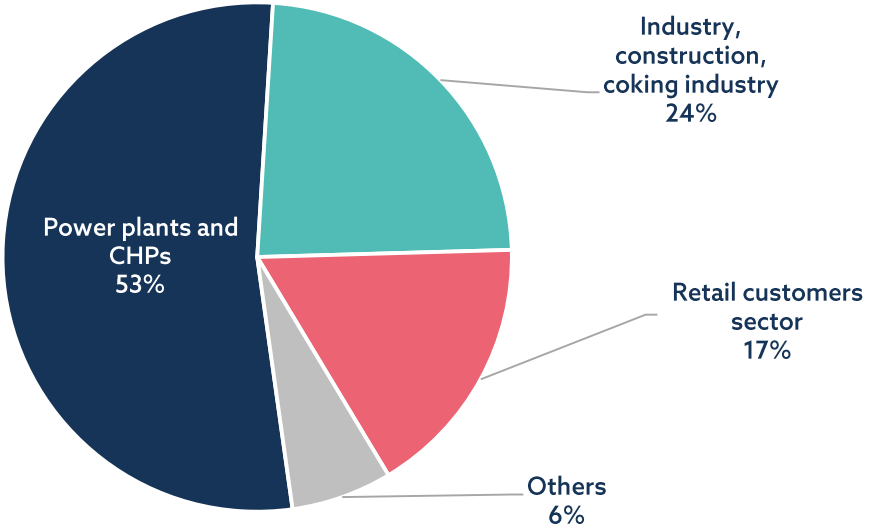


MEERI PAS study based on ARE - Energy Situation in Poland. National Balance of Energy.

Hard coal consumption broken down by main customer groups in Poland



2010 - 82 million tonnes



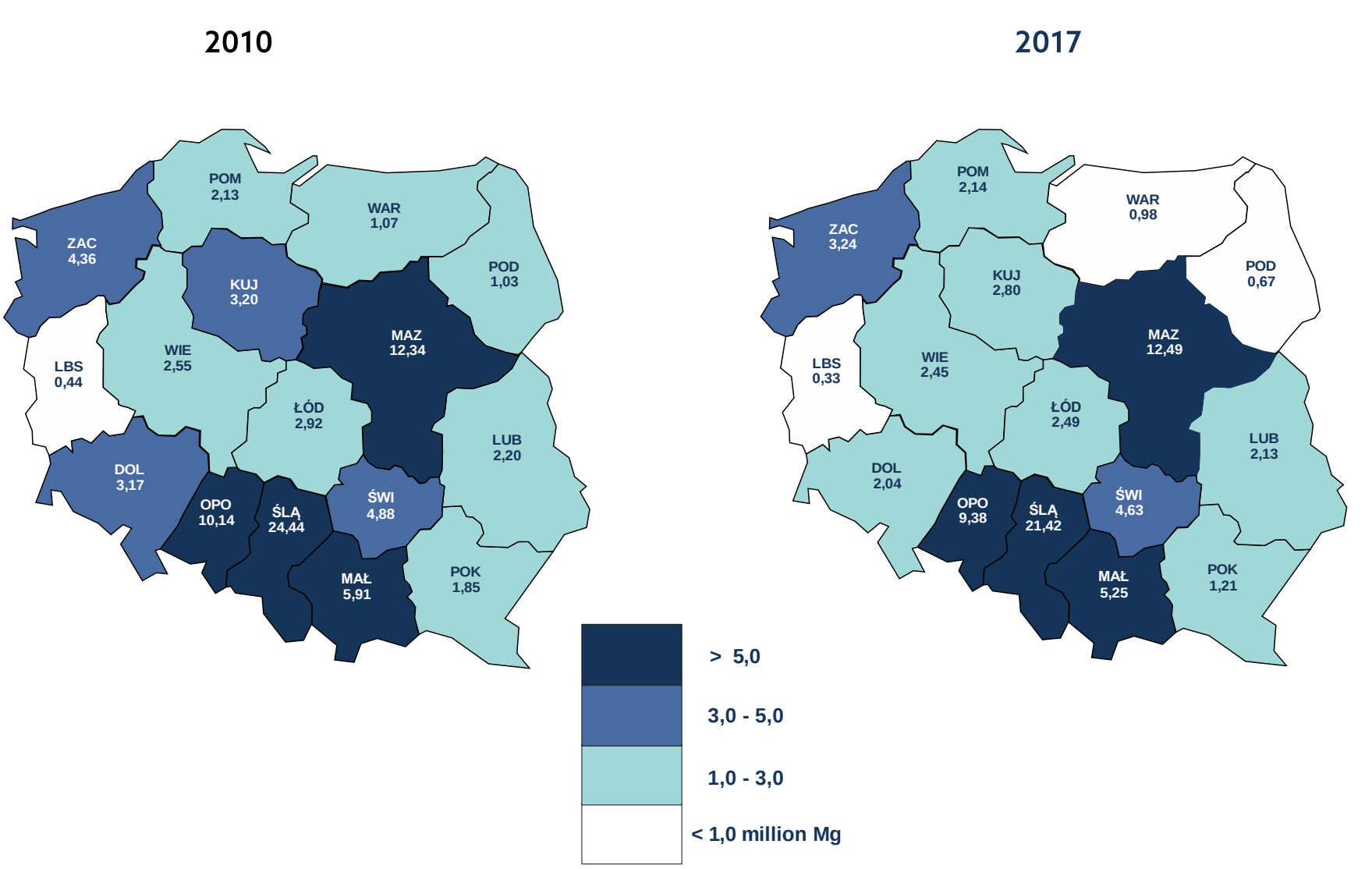
2017 - 75 million tonnes

Total hard coal consumption in the period 2010-2017 features a downward trend. Since 2010 the coal use went down by 9% (i.e. by 7 million tonnes).

The sector of retail customers (households, agriculture, and other customers) is a very important (although geographically very dispersed) sector of hard coal customers. Although the consumption maintained on a similar level (12.6 million tonnes in 2017) as against 2010 the share of this group of customers in the domestic structure of hard coal consumption increased (by 2 percentage points).

MEERI PAS study based on GUS - Consumption of fuels and energy carriers.

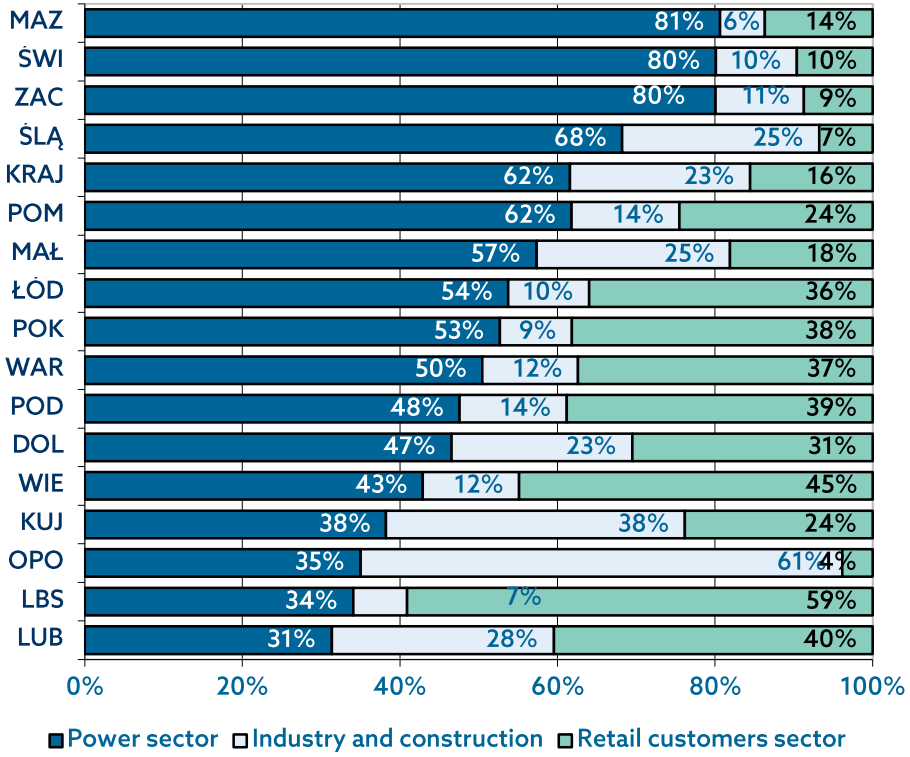
Total hard coal consumption by voivodeships

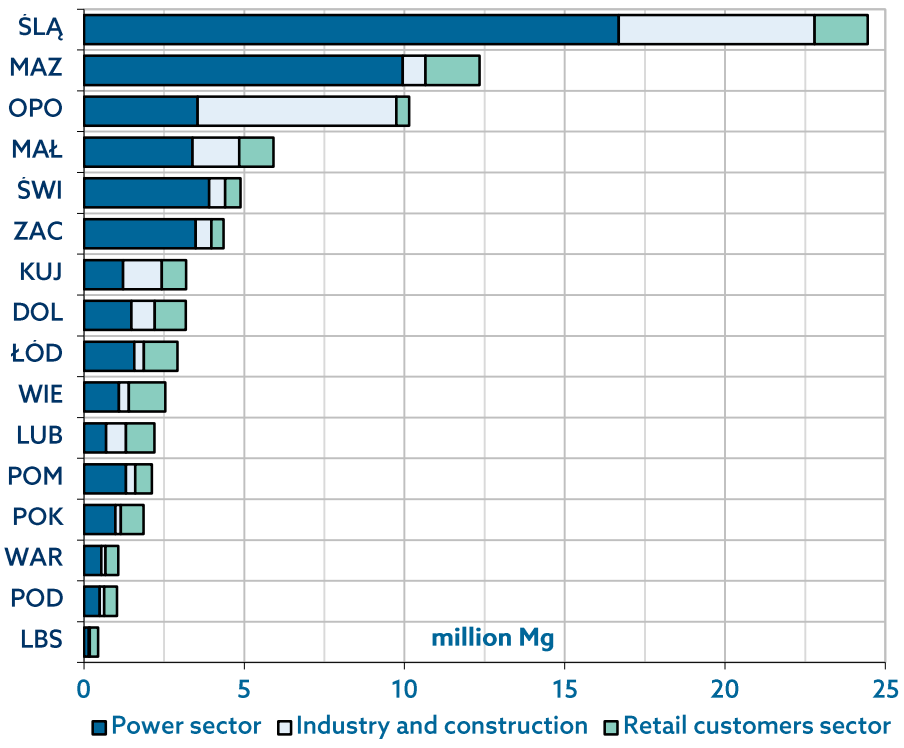


MEERI PAS study based on GUS - Consumption of fuels and energy carriers.

Structure of coal use by main user groups in voivodeships

2010



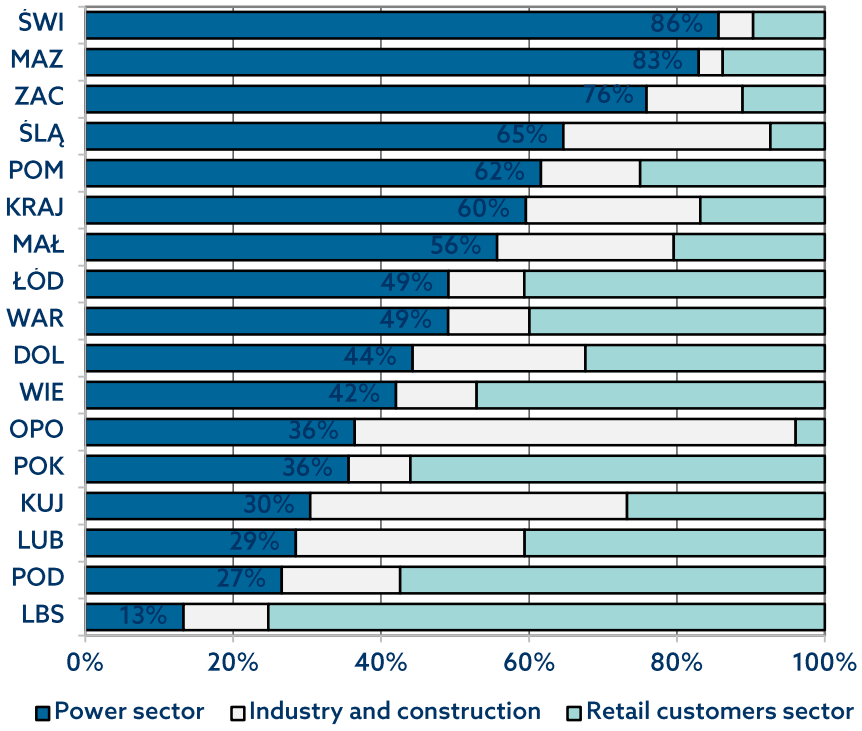


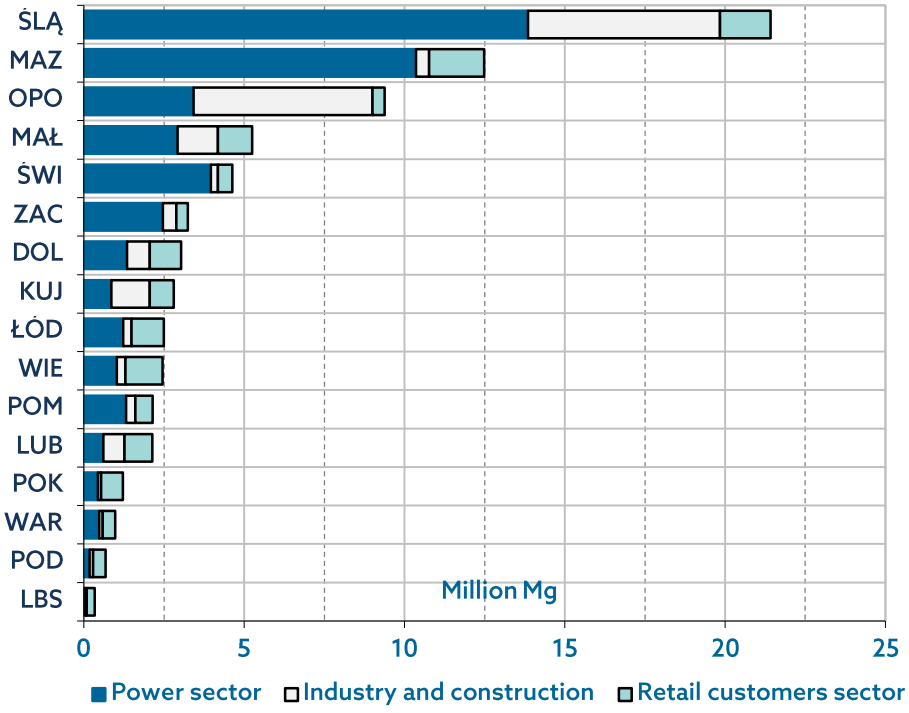
In 2010 the domestic consumption was 82 million tonnes, at a record coal imports of 14.2 million tonnes. The highest consumption in Silesian Voivodeship: 24.4 million tonnes. The first six voivodeships in the ranking consumed 62 million tonnes, i.e. 76% of the total consumption.

MEERI PAS study based on GUS - Consumption of Fuels and Energy Carriers.

Structure of coal use by main user groups in voivodeships

2017

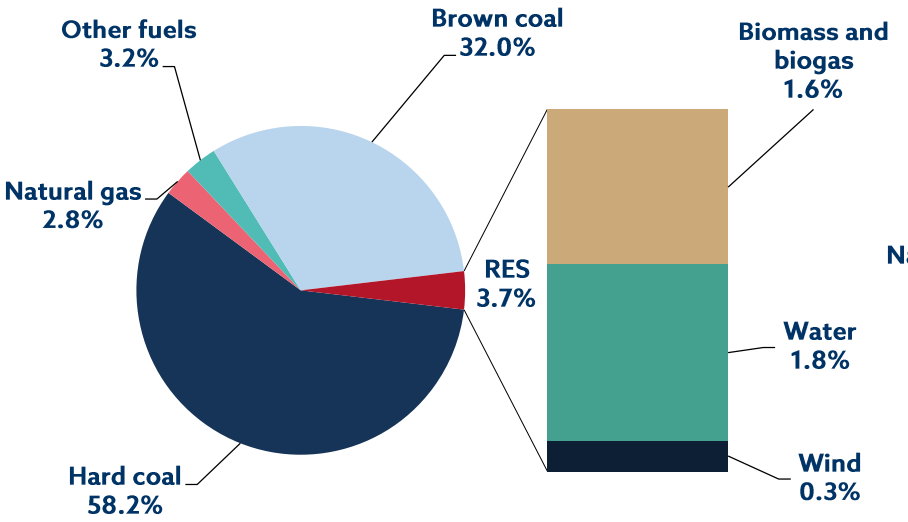




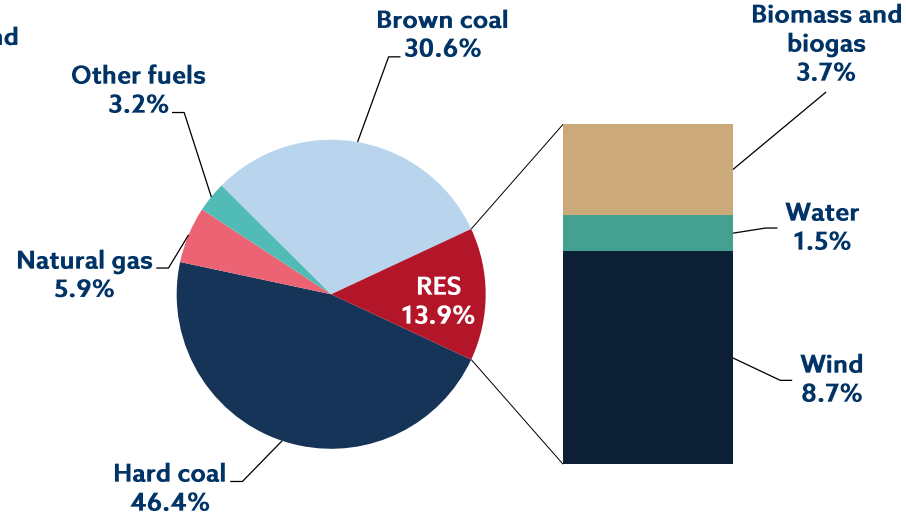
The coal consumption in the country as compared with 2010 went down by 6% and the domestic sales changed slightly. The difference between the consumption and domestic sales was covered by coal imports, which in 2016 amounted to 8.3 million tonnes. The order of voivodeships in the first six positions has been exactly the same for a few years.

MEERI PAS study based on GUS - Consumption of Fuels and Energy Carriers.

Electricity structure and generation by energy carriers in Poland



2007 – 159.3 TWh



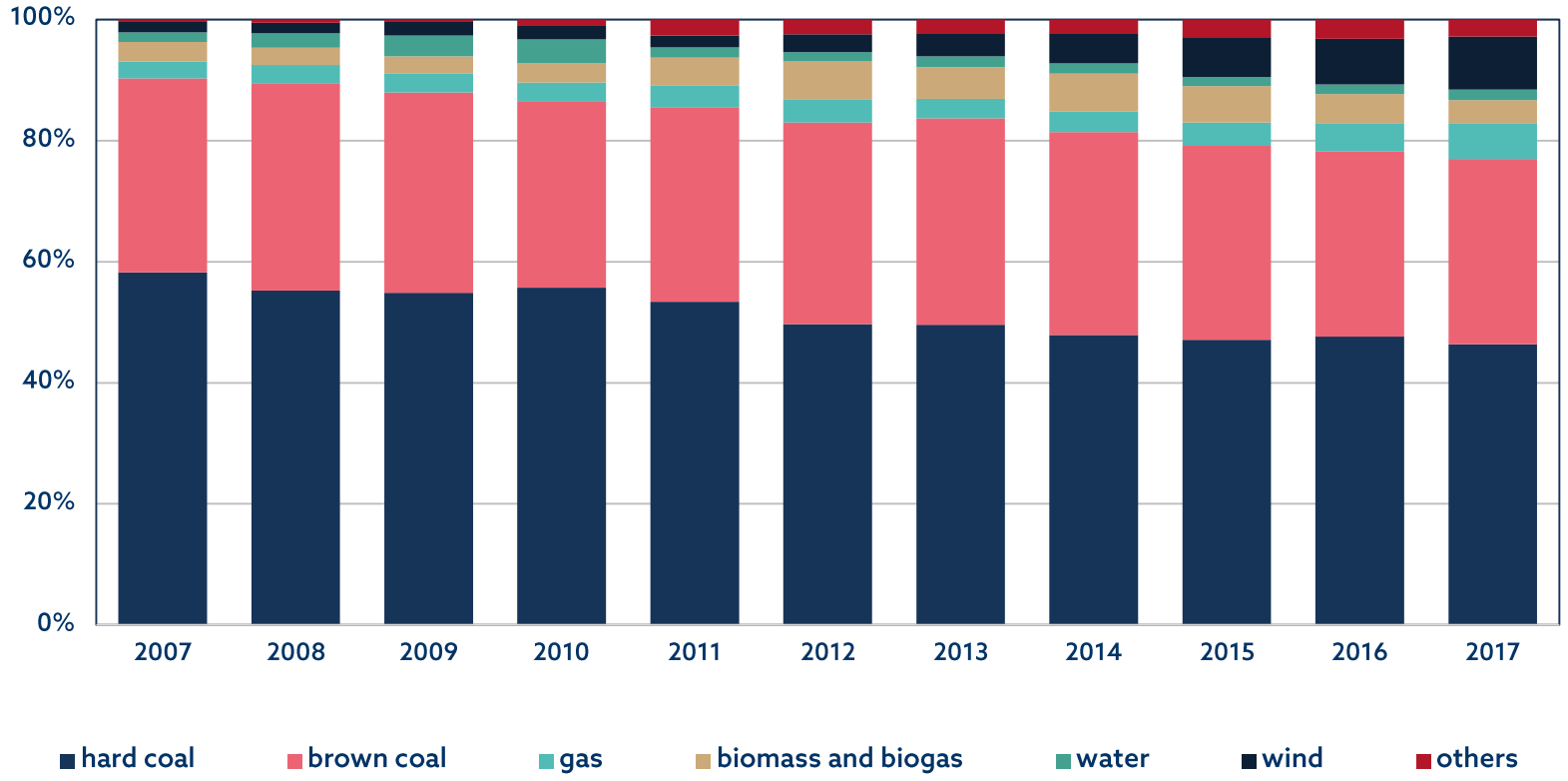
2017 – 170.5 TWh

The share of hard coal in the electricity generation went down from 90.2% in 2007 to 78.3% in 2016 and this is a permanent downward trend.

In 2017 the RES share in the electricity generation was 13.9% and this is an increase by 10.2 percentage points as against 2007. The energy from wind prevails in the electricity generation acquired from RES (i.e. 8.7% - 15 TWh in 2017).

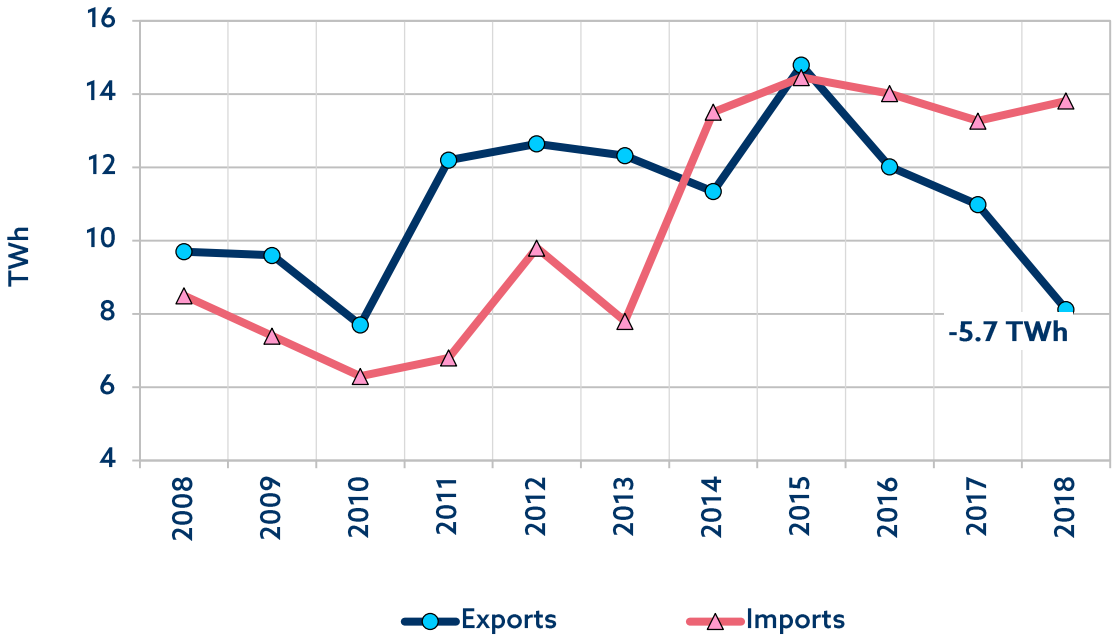
MEERI PAS study based on ARE - Polish Power Sector Statistics.

Comparison of electricity generation structure in Poland in the years 2007 - 2017



MEERI PAS study based on ARE - Polish Power Sector Statistics.

Electricity exports and imports in Poland



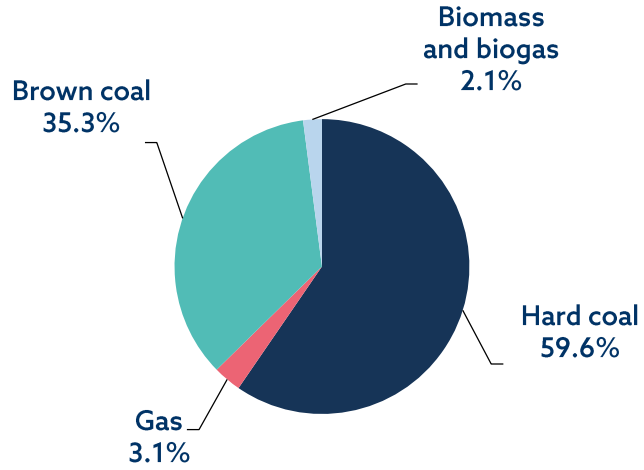
The growing share of electricity from renewable sources and a changing balance of energy exchange with foreign countries result in the change of electricity generation structure.

Overall electricity exports to imports relations in 2018 were unfavourable for Poland and the surplus of imports over exports was close to the 2011 situation and amounted to 5.7 TWh.

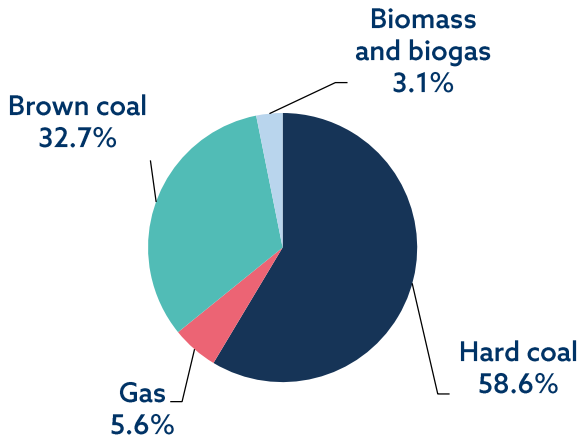
In 2008 the surplus of electricity exports over imports amounted to 1.2 TWh.

MEERI PAS study based on ARE - Polish Power Sector Statistics.

Comparison of basic fuels consumption structure in the commercial power sector



2008



2018

Co-firing dominates in the energy generation from renewable sources.

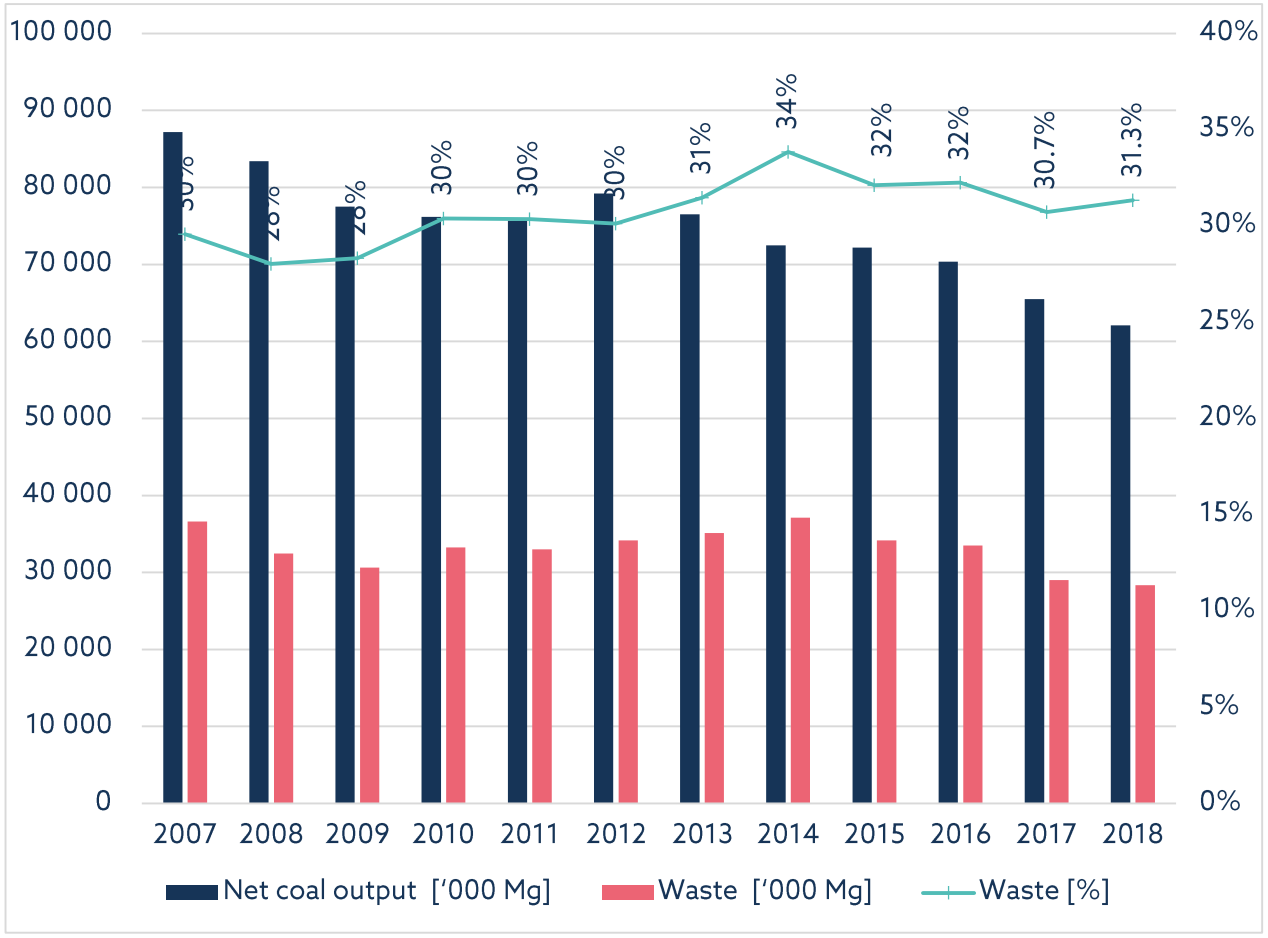
In 2018 biomass and biogas had a 3.1% share in the fuels consumption. As compared with 2008 that was nearly 50% more.

In 2018 the hard coal consumption went down by 1.9 million tonnes, (i.e. 45 PJ). Brown coal maintained its 2008 position in million tonnes, but in energy units it decreased by 55 PJ.

MEERI PAS study based on ARE - Polish Power Sector Statistics.

Hard Coal Mining Activities and the Environment

Coal and the environment - extraction waste

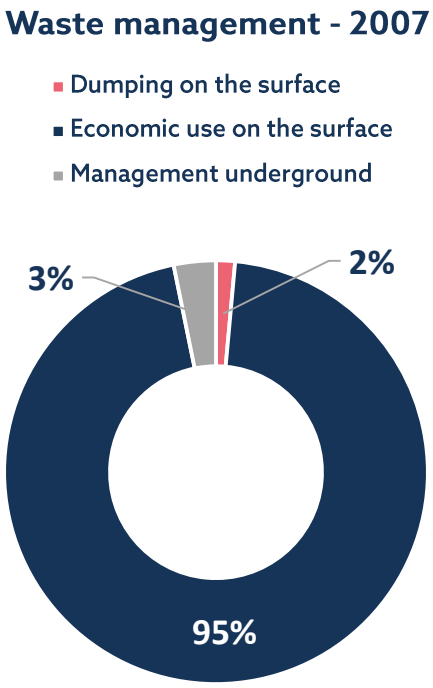


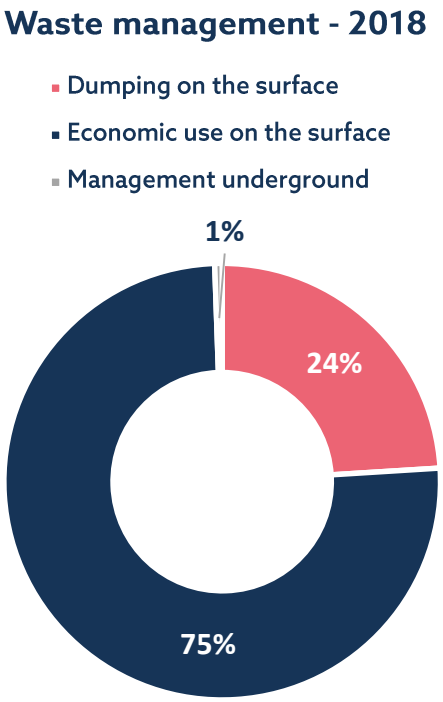
Since 2014 the decline of output is accompanied by proportional decrease in generated waste.

Since 2010 the stone content in the run-of-mine remains on an unchanged level of 30-32% of the gross output.

MEERI PAS study based on ARP SA data.

Waste in the hard coal production

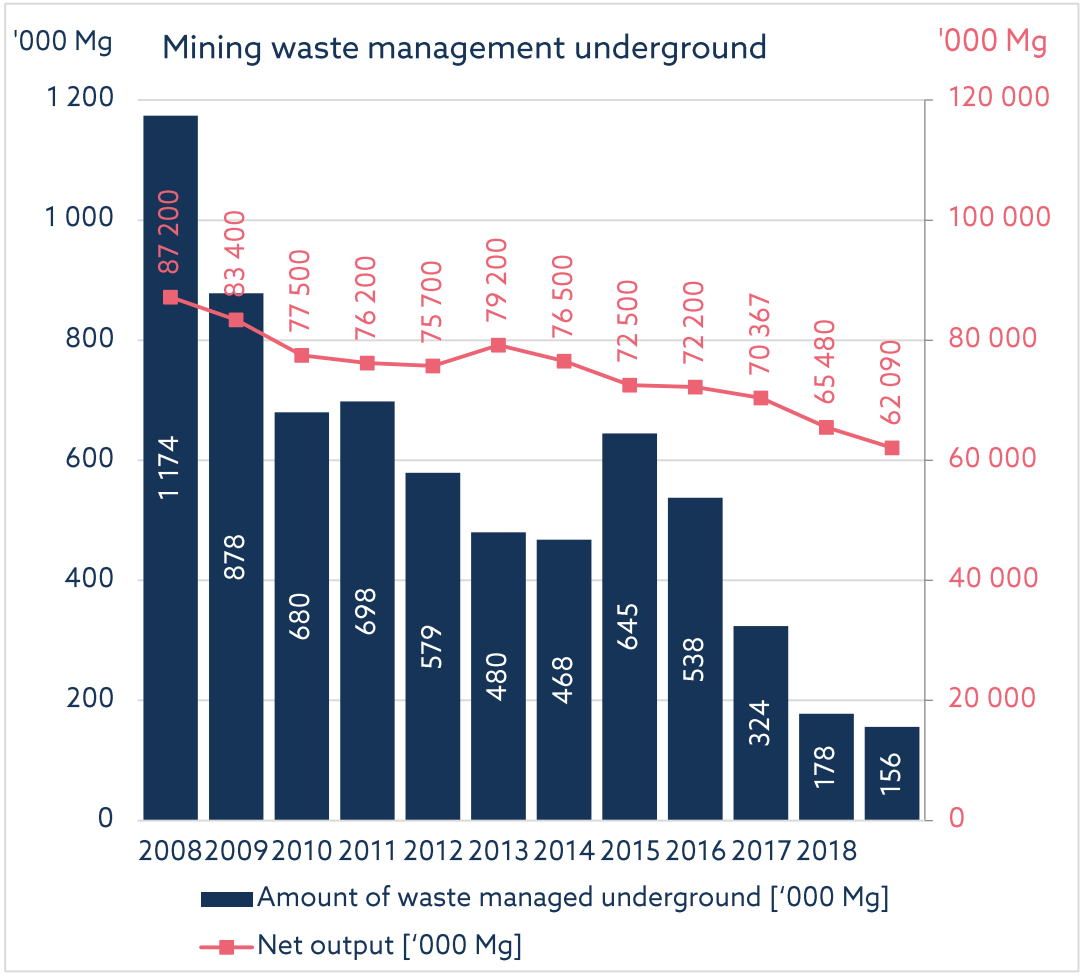




In the analysed period of 2007-2018 an unfavourable trend of rising share of waste dumped on the surface is observed in the waste management (from 2% to 24%) parallel to diminishing share of waste economically used on the surface from 95% in 2007 to slightly more than 75% in 2018. In another consecutive year also the amount of waste managed underground went down to approx. 0.5%.

MEERI PAS study based on ARP SA data.

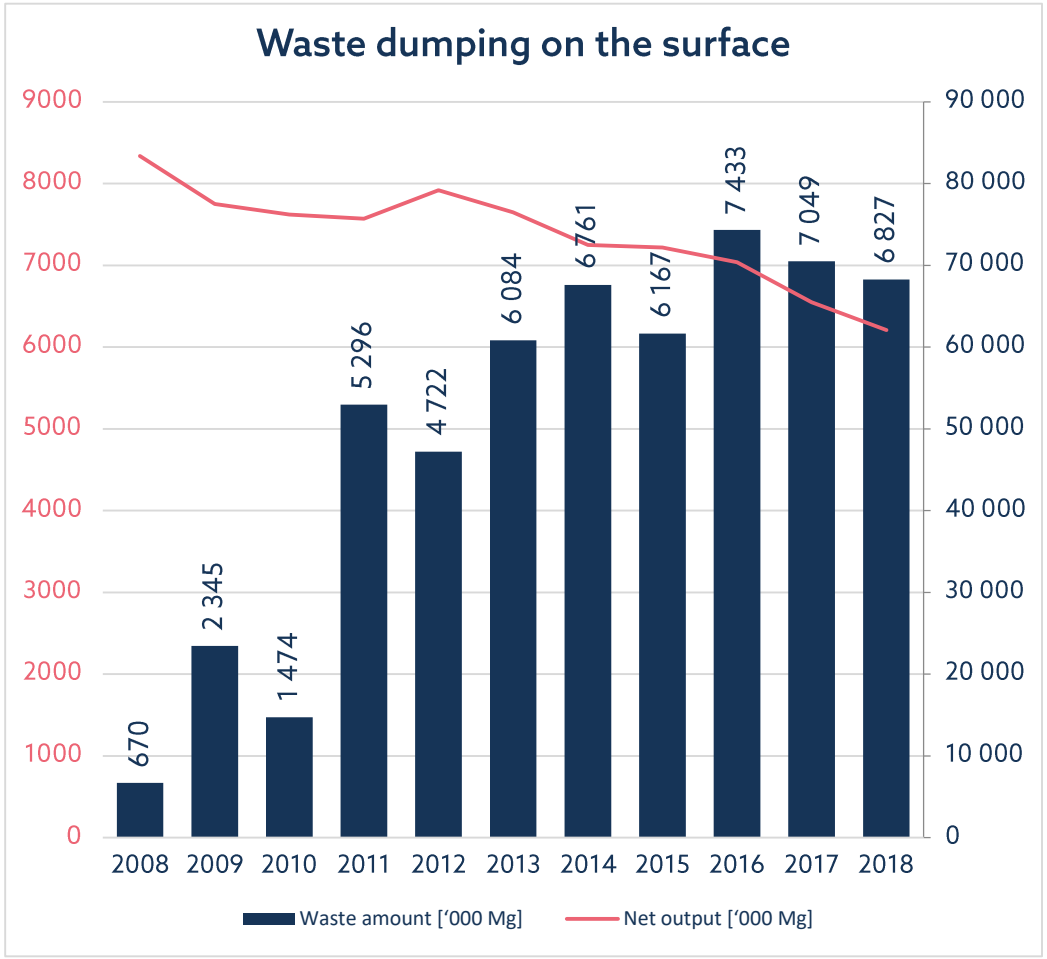
Waste in the hard coal production



- A part of generated waste is managed directly in underground workings. However, this amount is negligible in the general balance of the dirt, being only a few percent of the total mass.
- The share of dirt placed underground in the total mass of generated waste significantly decreased - from approx. 3.2% in 2007 to 0.55% in 2018, at an amount of approx. 156,000 Mg.

MEERI PAS study based on ARP SA data.

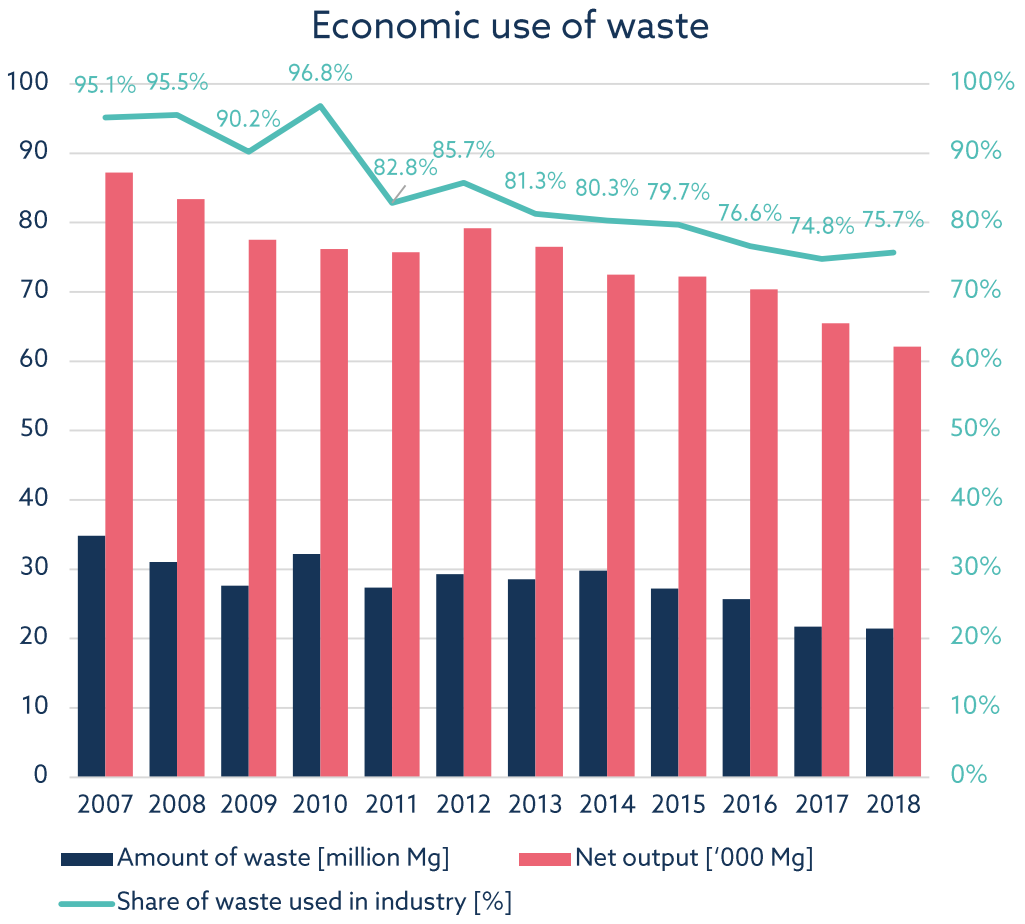
Waste dumping



- The absolute amount of waste dumped on the surface has been growing from approx. 0.67 million Mg in 2008 to approx. 6.8 million Mg in 2018 (more than 10-time growth). Also the share of such management in the total mass of generated waste has been growing (from approx. 2% in 2008 to 24% in 2018).
- It should be stated that this is not a favourable trend, in particular combined with the small share of dirt placing underground. This means a growing burden of waste to the environment.

MEERI PAS study based on ARP SA data.

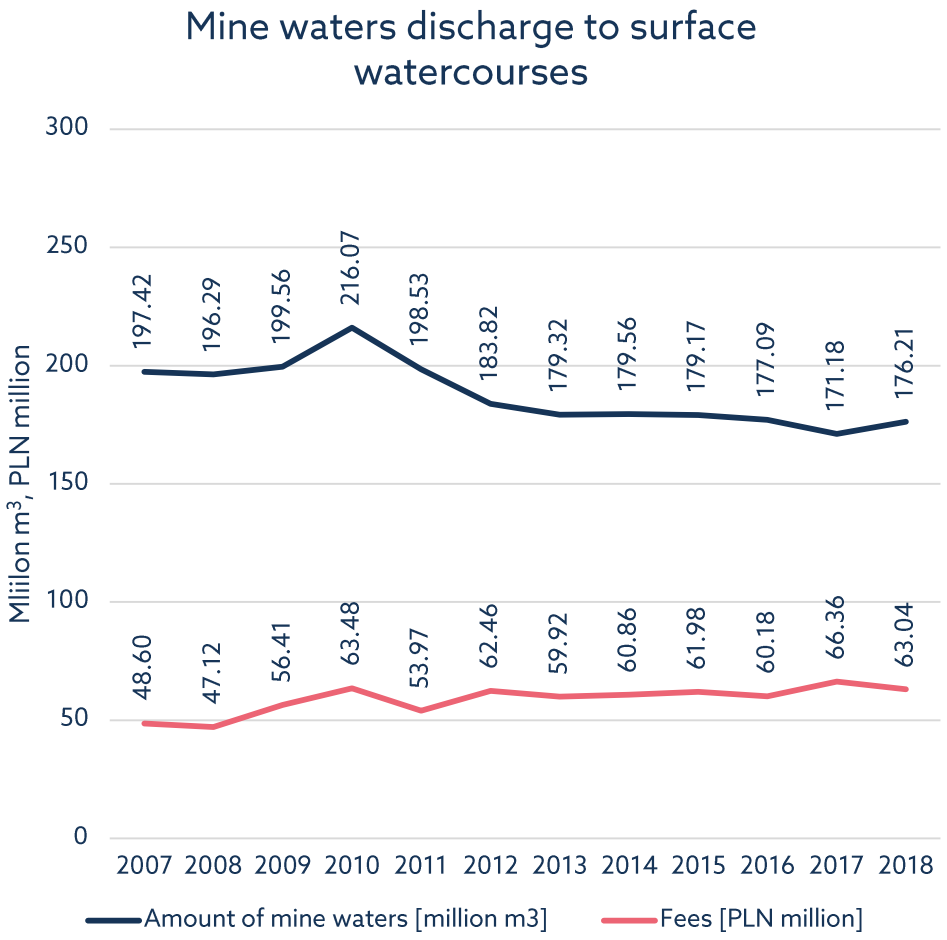
Economic use of waste



- The burden related to the waste generation is especially visible if we consider the data on the amount of waste economically used on the surface.
- The amount of waste economically used in relation to the total waste mass has been successively decreasing - from more than 95.1% in 2007 to 75.5% in 2018.

MEERI PAS study based on ARP SA data.

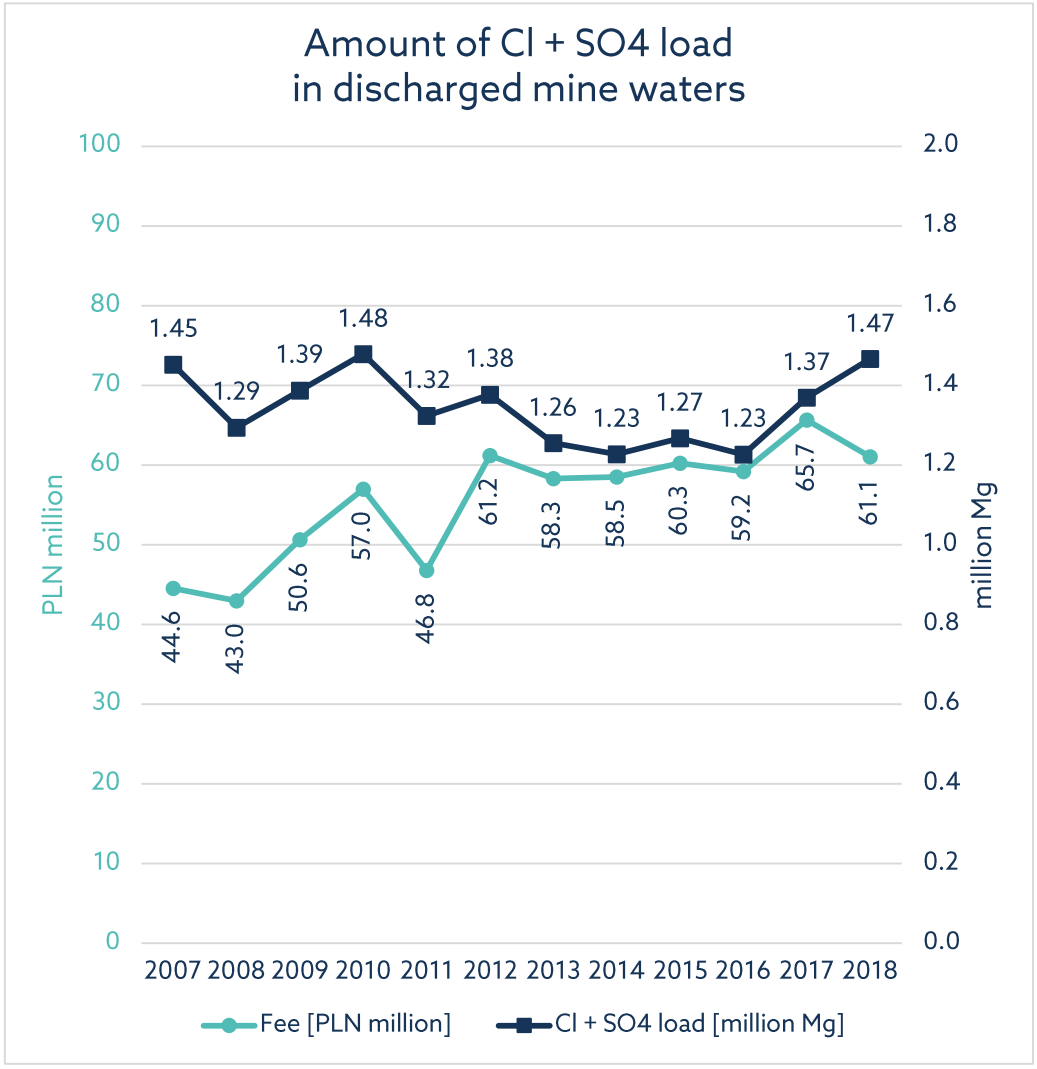
Mine waters



- Most of wastewaters consist of unmanaged mine waters, which are approx. 95-96% of total wastewaters discharged to surface watercourses, and the fees on discharge of sulphates and salts in mine waters constitute approx. 97-98% of total fees on wastewaters discharge to surface waters.
- In the years 2007-2010 the decline of the coal output was accompanied by an increase in the amount of mine waters discharged to surface watercourses from approx. 197,000 m^3 (2007) to approx. 216,100 m^3 (2010).
- From 2011 the amount of discharged mine waters has been successively going down, although the amount of discharged mine water per 1 Mg of mined coal has been growing. This is connected with mining at greater depths, in areas of increased water inflow.

MEERI PAS study based on ARP SA data.

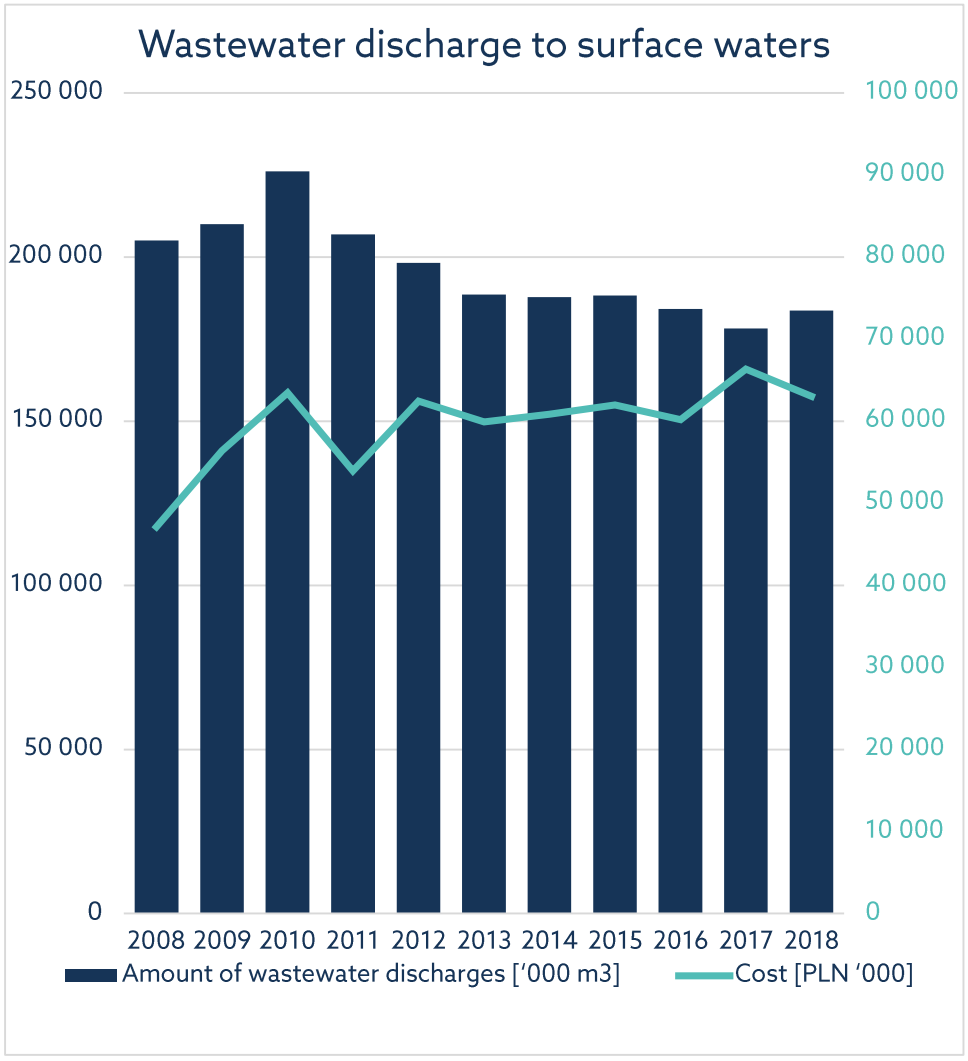
Saline waters



- In the years 2007-2018 the variability of Cl^- + SO_4^{2-} load discharged together with mine waters can be noticed. This general trend, however, does not correlate with changes of coal output; a decreasing output does not generate reduction of the discharged chlorides and sulphates load.
- Such a situation results from deteriorating geological conditions of mining in mines and moving with mining into areas of increased inflow of mine waters.
- This is related to increasing amount of related fees (from PLN 44.6 million in 2007 to PLN 61.1 million in 2018). This fact reduces the effectiveness of coal production (increasing fees on discharge at a smaller output).

MEERI PAS study based on ARP SA data.

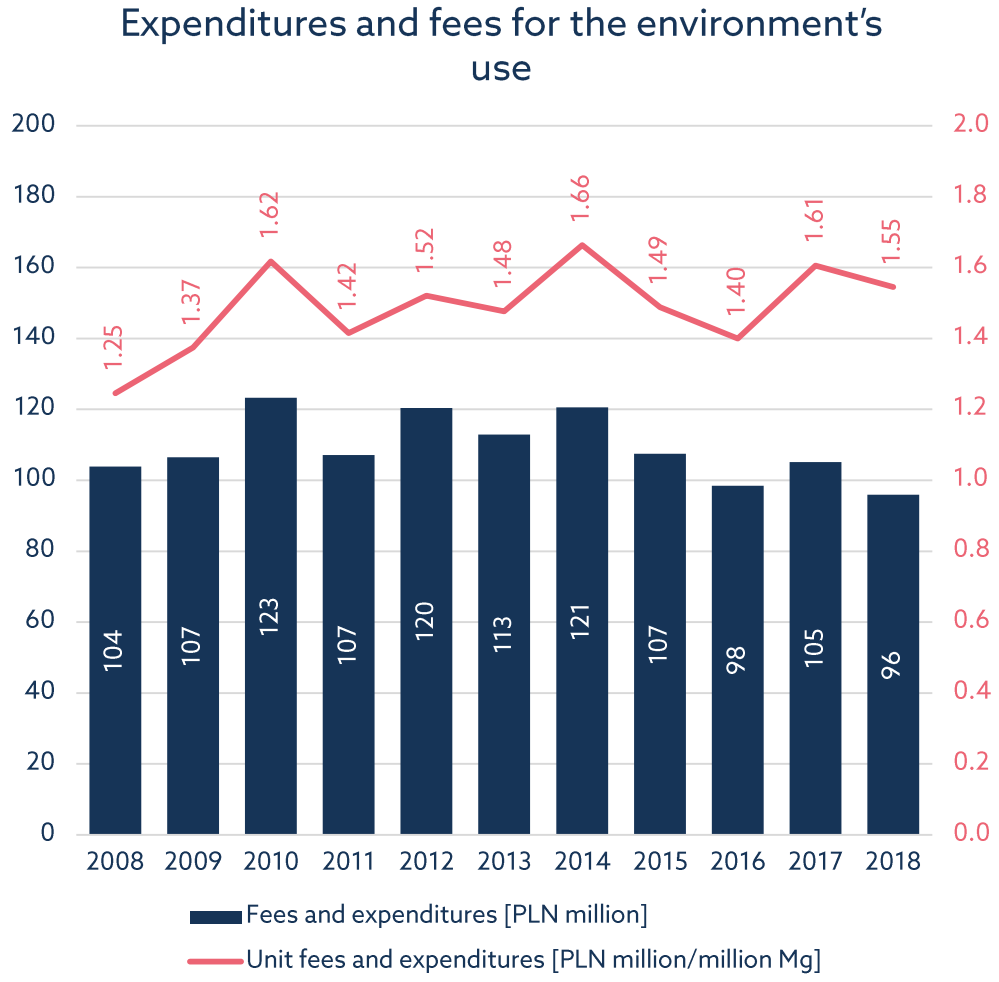
Wastewater management



- Since 2013 we have been observing a permanent increase in the amount of waste water discharge per one tonne of output (from 2.47 m^3/Mg to 2.96 m^3/Mg in 2018).
- It generates an increased amount of burden per one tonne of mined coal with the cost of wastewater discharge. In 2018 this cost went up by nearly 80% against 2008 and slightly exceeded PLN 1.02 per 1 Mg of extracted net coal.
- This is related both to the increase in the absolute amount of discharged wastewater and to the growth of the unit cost of wastewater discharge.
  However, it is necessary to notice that in 2018 this cost went down by approx. 8% as against 2017 and was PLN 0.34 per 1 m^3 of discharged wastewater.

MEERI PAS study based on ARP SA data.

Expenditures and fees for the environment's use

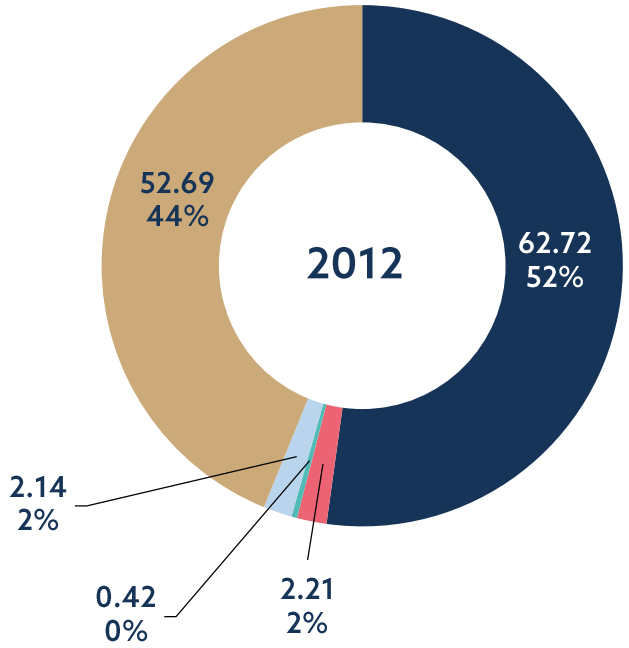


- Unit environmental fees (per 1 Mg of extracted net coal) together with expenditure on reclamation of degraded land were changing in the analysed period from PLN 1.25/Mg (2008) to PLN 1.55/Mg (2018), where in 2018 they decreased by approx. 4% as against 2017.
- On the scale of the entire mining sector the absolute environmental fees went down from approx. PLN 104 million in 2008 to approx. PLN 96 million in 2018, that is by approx. 8% - at a fall of output by 26% in the same period.

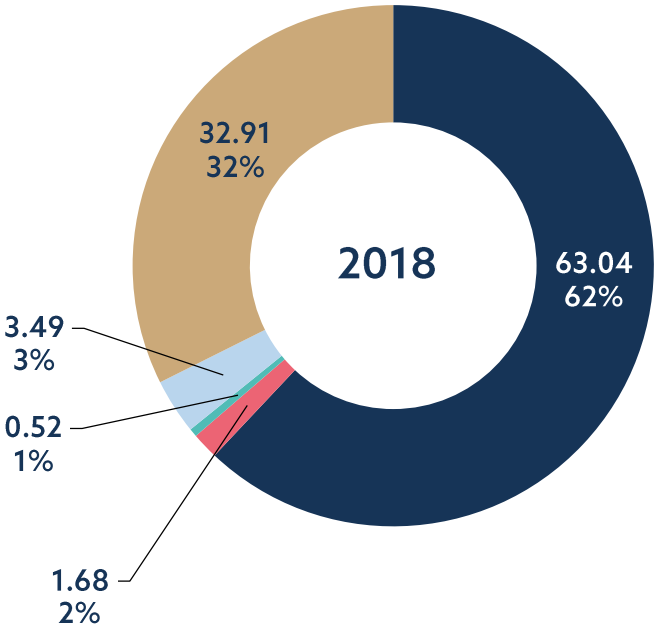
MEERI PAS study based on ARP SA data.

Expenditures and fees for the environment's use

Environmental effects of hard coal mining operations - fees and expenditures [PLN million; % share in the cost balance]



Environmental effects of hard coal mining operations - fees and expenditures [PLN million; % share in the cost balance]



- Wastewater, incl. Cl + SO4 load
- Emission of gases
- Emission of particular
- Others
- Land reclamation and development

MEERI PAS study based on ARP SA data.

Hard coal and the environment - expenditures and fees

- When comparing environmental expenditures and fees in 2012 and 2018, change can be noticed in the share of individual cost components in overall expenditure balance. This applies mainly to the cost incurred on the reclamation of degraded land and fees for wastewater discharge to surface watercourses.
- The share of reclamation expenditure went down by approx. 48% and the expenditure on fees within the waste water management increased by 0.5%. This is directly related to a diminishing area of land covered by reclamation, at unit reclamation costs (approx. PLN 118,000/ha) lower by approx. 10% as against 2012.

MEERI PAS study based on ARP SA data.

Hard coal and the environment - mine waters

For a few years the waste water management ratios maintain an unfavourable trend. Their values have been increasing since 2013, i.e.:

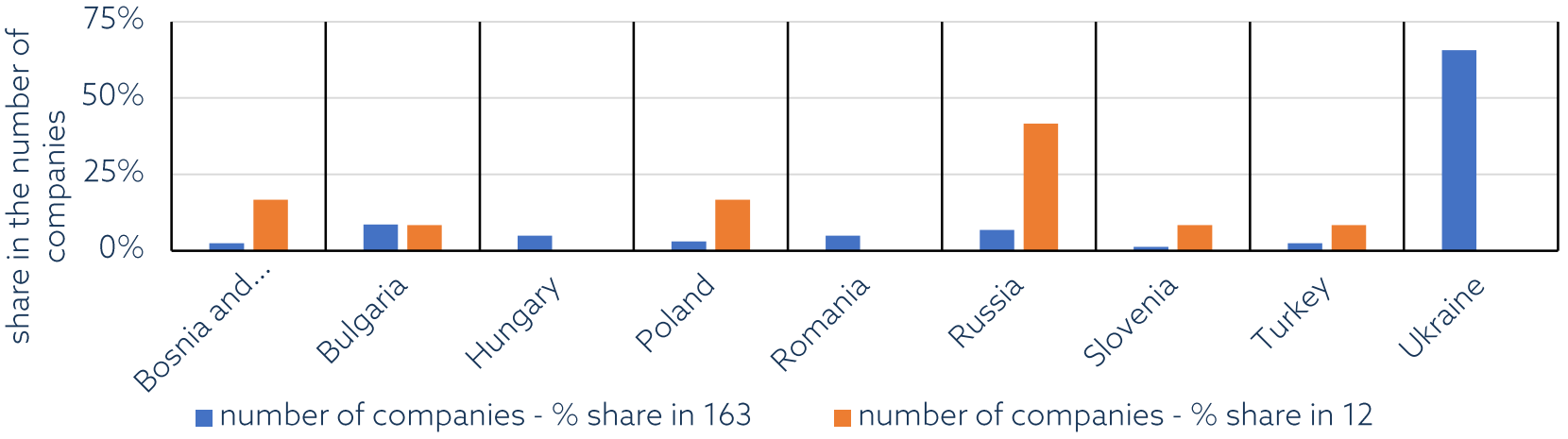
- The amount of wastewater discharged to surface waters per 1 Mg of net output (in 2013 there were 2.47 m^3 of wastewater per each tonne of coal, and in 2018 it was 2.96 m^3/Mg, which means an increase by approx. 20%).
- The unit cost of fee for discharge of 1 m^3 of wastewater per 1 Mg of extracted coal has been increasing (from PLN 0.78/m^3/1 Mg in 2013 to PLN 1.02/m^3/1 Mg in 2018). To a large extent this is related to the increase in unit fees for discharge of 1 m^3 of wastewater (an increase by 30% in the period 2013-2017).
- The unit cost of wastewater discharge per one tonne of output increases, which results from the growing amount of wastewater discharged with each tonne of mined coal.

Most of waste water consists of unmanaged mine waters, which are approx. 95-96% of total waste water discharged to surface watercourses, and the fees on discharge of salts in mine waters constitute approx. 97-98% of total fees on waste waters discharge to surface waters.

Polish Mining Companies Against a Background of Selected European Companies

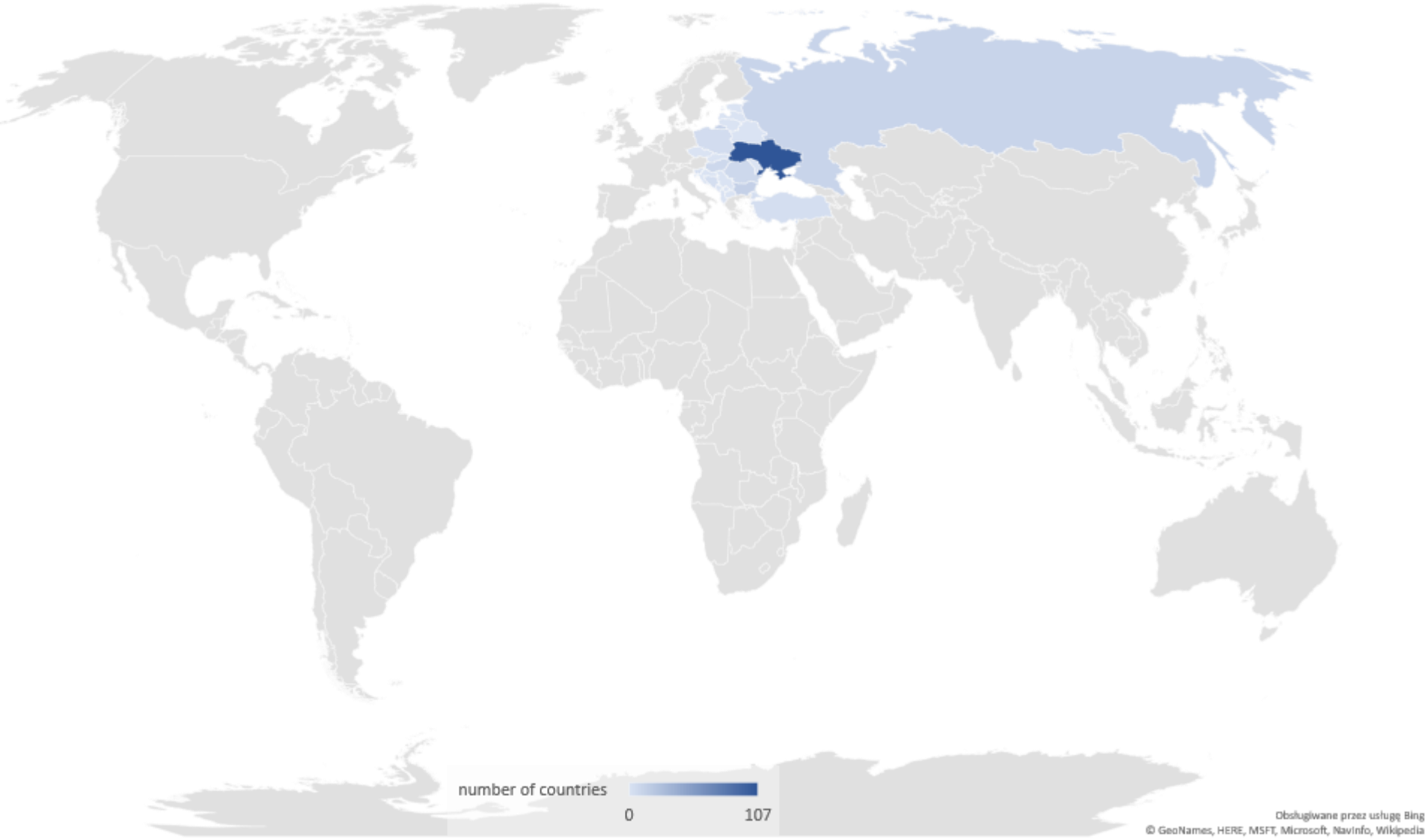
European companies

- The analysis was carried out based on the data from the EMIS (Emerging Markets Information Service) database - the service containing *inter alia* financial data of enterprises from the whole world. The analysis was limited to the CEE region comprising Poland and countries of Central and Eastern Europe (in total 22 states) - the next slide presents an accurate territorial reach. A vast majority of companies from the list of data available for 163 enterprises have a registered office in Ukraine.
- 12 biggest enterprises were selected for a detailed analysis (in terms of net revenue achieved in 2018) featuring a profile of business related mainly to the hard coal mining, therefore companies involved also in energy production were omitted. The largest number of companies, from among the chosen ones, have a registered office in Russia.
- Period of analysis: 2014-2018. The data as of 12/08/2019.



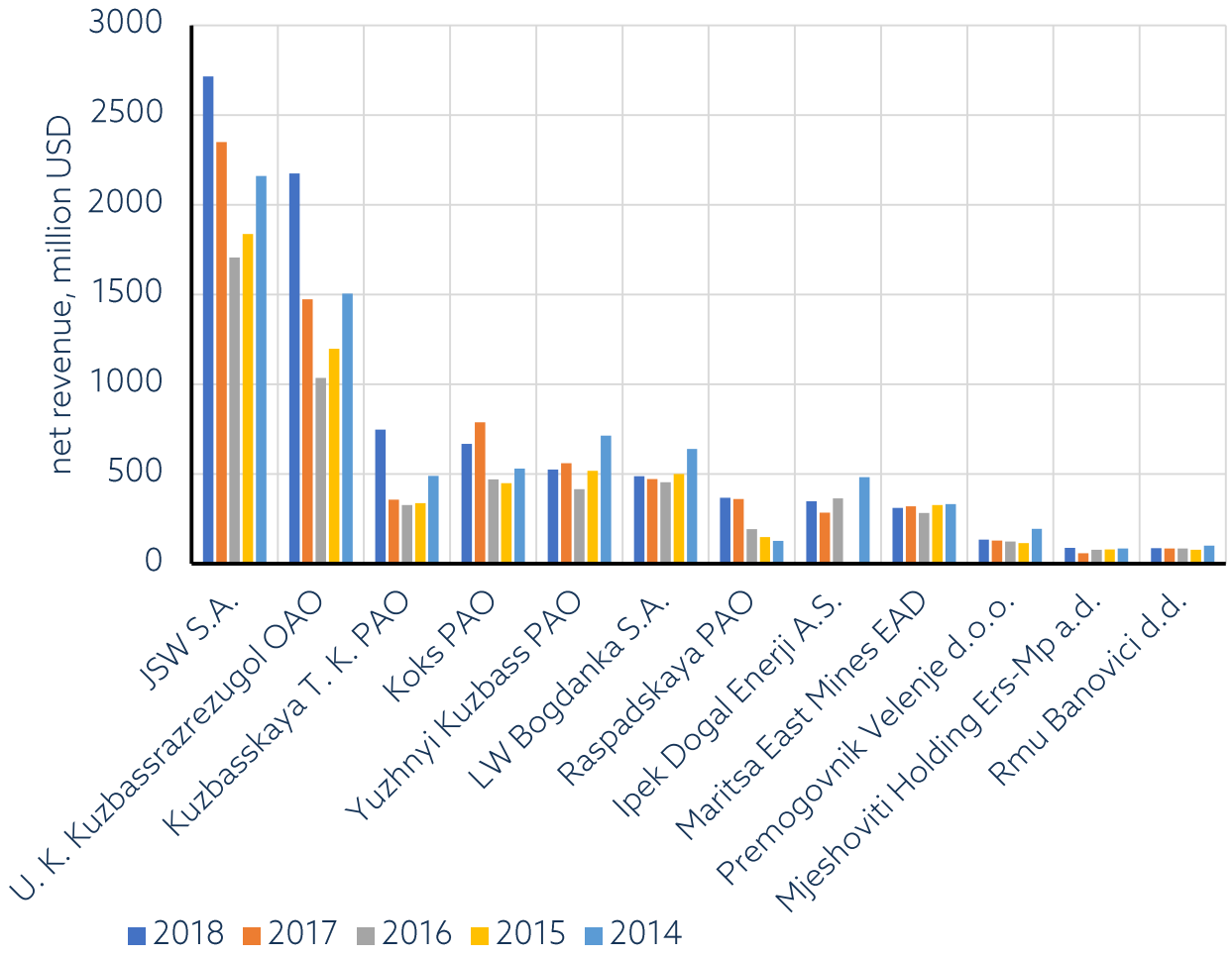
MEERI PAS study based on EMIS data.

Territorial scope of the analysis



MEERI PAS study based on EMIS data.

The biggest companies in terms of revenue



Because of the hard coal market changing in time, the change of revenue in the period of recent 5 years for most companies looks similar. Only for few of them changes related to e.g. investment activities are observed.

Despite the domination of Russian companies on the list of 12 companies in terms of revenue, Polish company listed on the GPW - JSW - is the biggest.

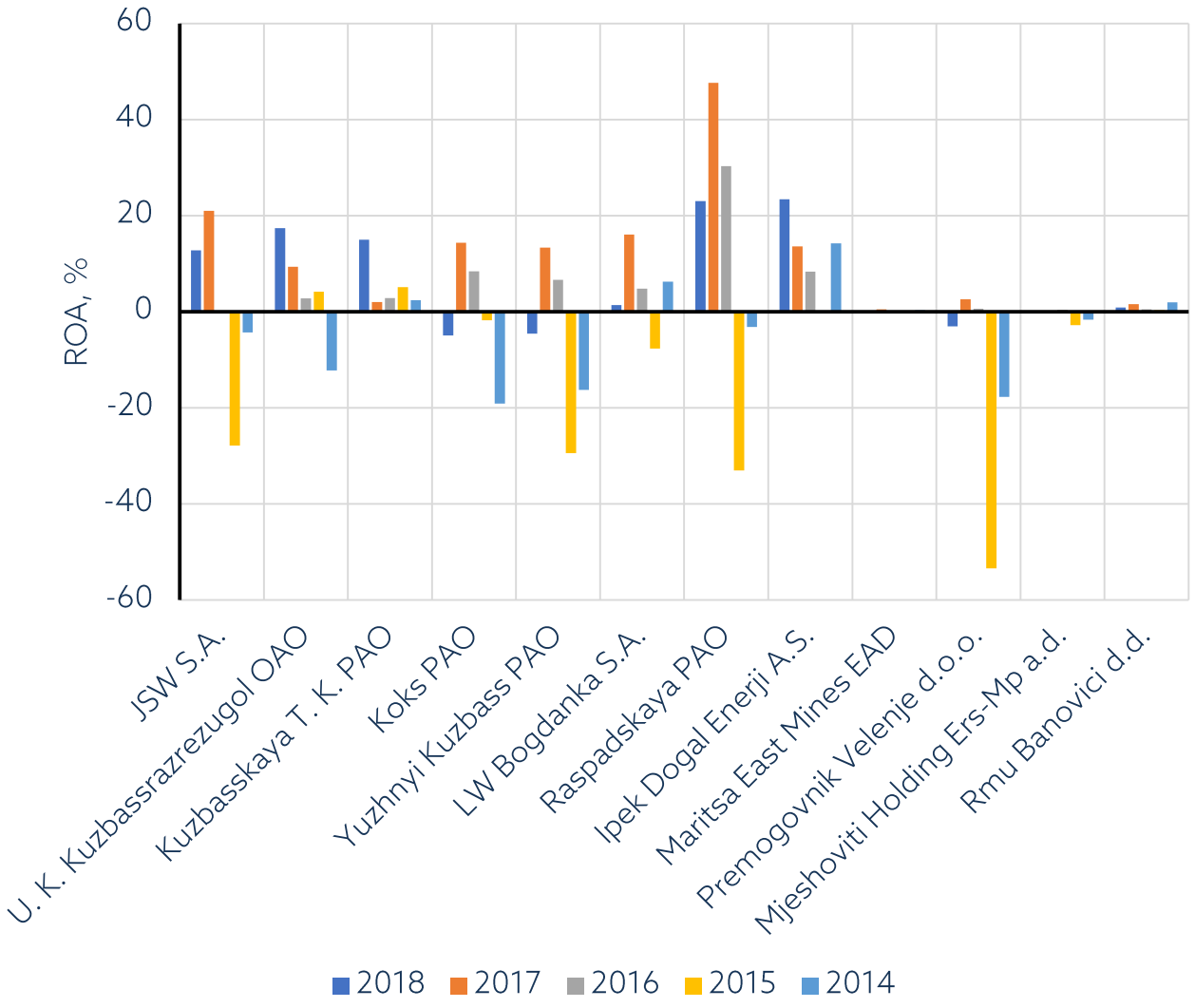
MEERI PAS study based on EMIS data.

List of analysed companies

No	Country	Company name	Specialisation	Stock exchange
1	Poland	JSW S.A.	Bituminous hard coal mine	Warsaw
2	Russia	Ugolnaya Kompaniya Kuzbassrazrezugol OAO	Surface mining of hard and brown coal	Moscow
3	Russia	Kuzbasskaya Toplivnaya Kompaniya PAO	Hard coal mining	Moscow
4	Russia	Koks PAO	Hard coal mining; Other processing of petroleum and coal products	Moscow
5	Russia	Yuzhnyi Kuzbass PAO	Hard coal mining	Moscow
6	Poland	Lubelski Wegiel Bogdanka S.A.	Hard coal mining	Warsaw
7	Russia	OF Raspadskaya AO	Hard coal mining	
8	Turkey	Ipek Dogal Enerji A.S.	Hard coal mining	Istanbul
9	Bulgaria	Maritsa East Mines EAD	Hard and brown coal mining	
10	Slovenia	Premogovnik Velenje d.o.o.	Hard and brown coal mining	
11	Bosnia and Herzegovina	Mjeshoviti Holding Ers-Mp a.d.	Hard coal mining	Banja Luka
12	Bosnia and Herzegovina	Rmu Banovici d.d.	Hard coal mining	

MEERI PAS study based on EMIS data.

ROA ratio

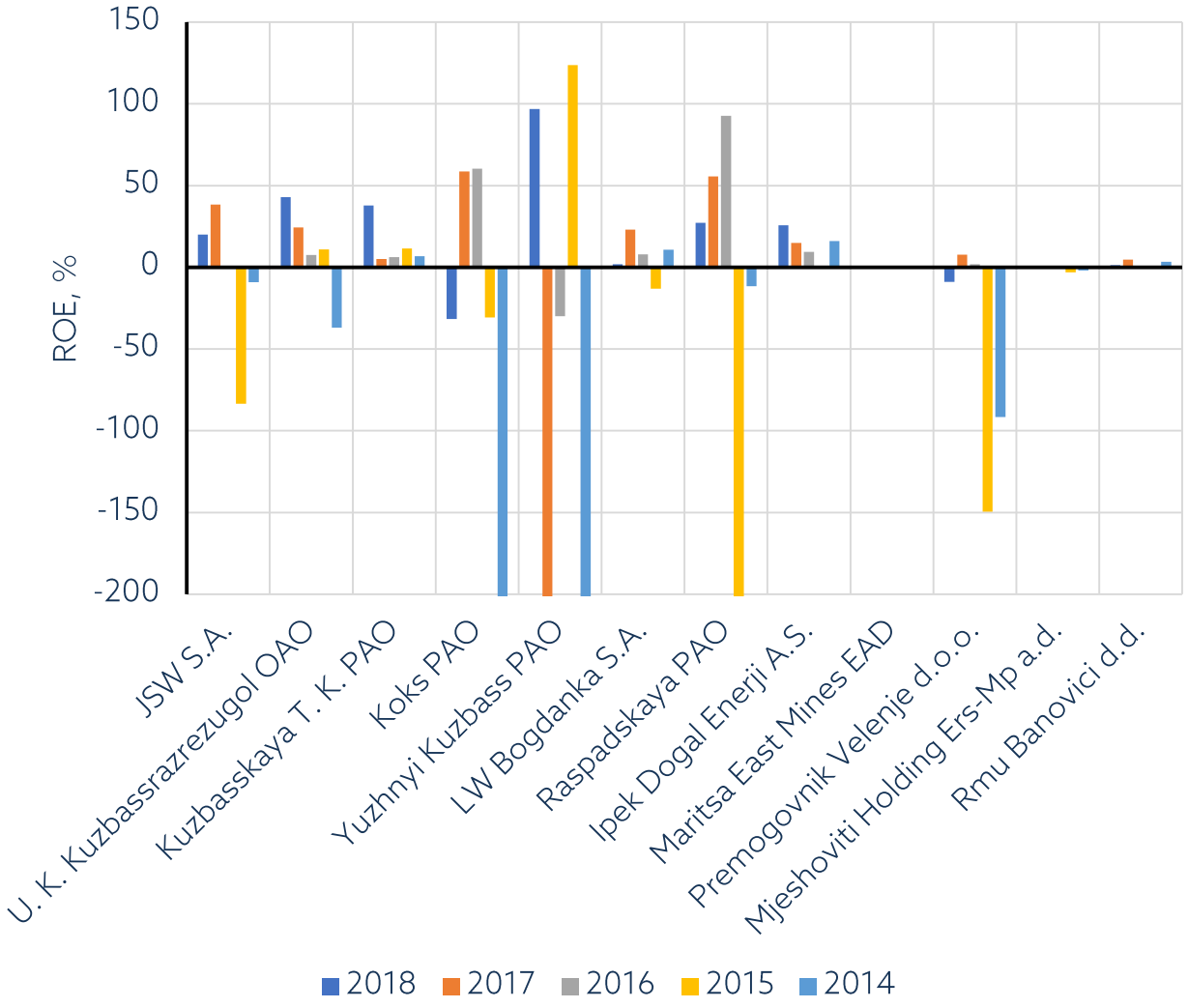


Return on assets (ROA)

Polish companies have recorded a value of ROA similar to the average, only in 2015 in the case of JSW the ROA reached one of lowest values among 12 biggest companies (apart from Slovenian company Premogovnik).

MEERI PAS study based on EMIS data.

ROE ratio



Return on equity (ROE)

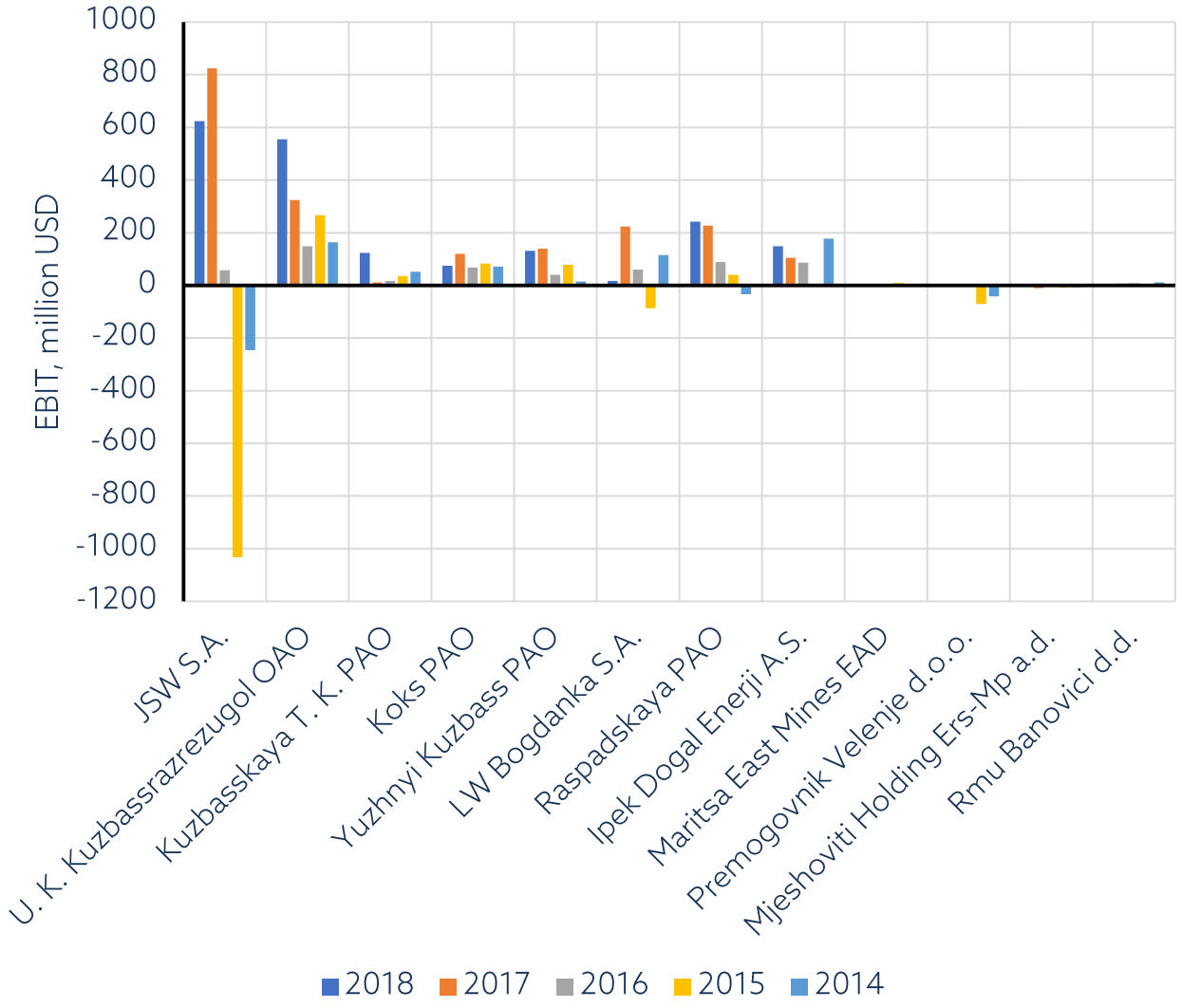
The scale of value on the vertical axis was limited to a range: -200% to 150% to enable more accurate observation of ROE values for the biggest companies.

Russian companies Koks and Yuzhnyi recorded, in particular in 2014, very low values of ROE. The ROE value for Yuzhnyi Kuzbass in 2017 was -8512.05% (due to a negative equity). Another Russian company, Raspadskaya, in 2015 recorded a value of ROE approx. -1000%.

JSW shown a negative ROE value in 2014 and 2015, and LW Bogdanka only in 2015.

MEERI PAS study based on EMIS data.

EBIT ratio

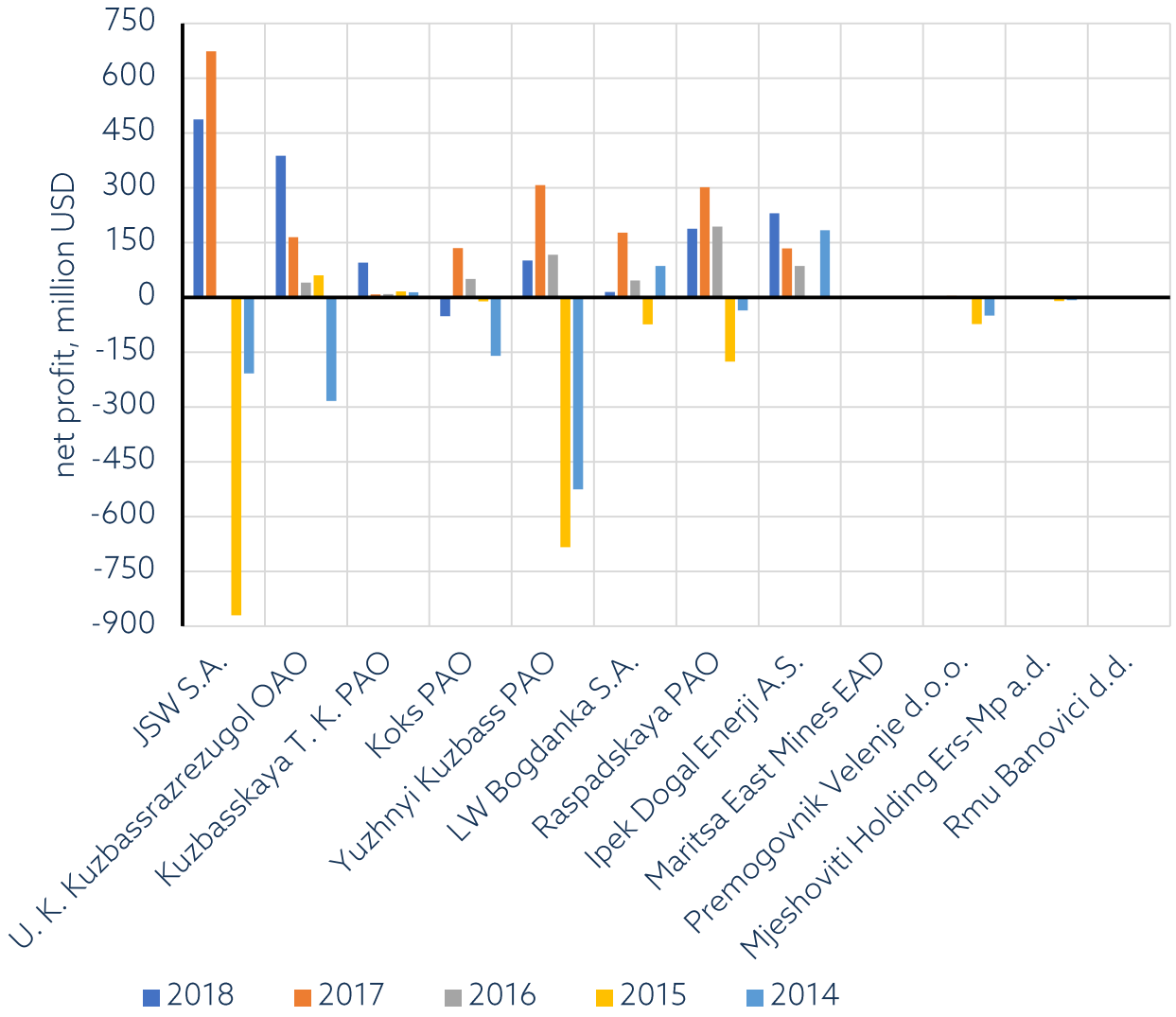


Earnings before deducting interest and taxes (EBIT)

The scale of obtained values is affected by a general level of enterprise revenues, therefore e.g. the highest and lowest EBIT values were obtained by the JSW in 2017 and 2015, respectively.

MEERI PAS study based on EMIS data.

Net profit



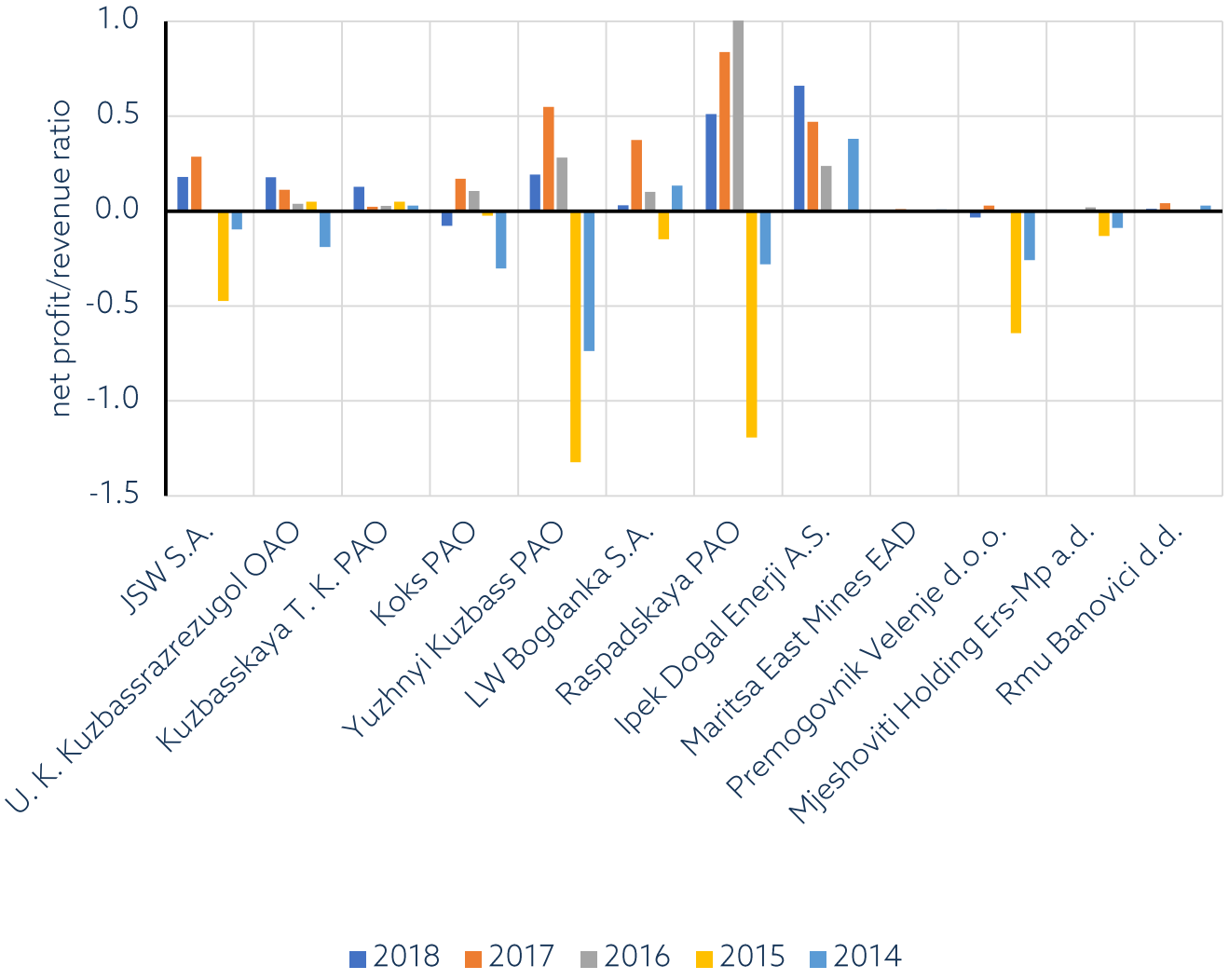
The net profit for enterprises usually does not differ from the EBIT value by more than a few dozen percent, except for companies:

- Raspadskaya PAO (2014-2017)
- Maritsa East Mines EAD (2015, 2016, 2018)
- Yuzhnyi Kuzbass PAO (2014-2016)

In recent 2 years the highest net profit was achieved by the JSW.

MEERI PAS study based on EMIS data.

Net profit/revenue ratio (ROS)



Only Kuzbasskaya T.K. and Ipek D.E. recorded in each of the analysed years always a positive ROS value (so-called net margin).

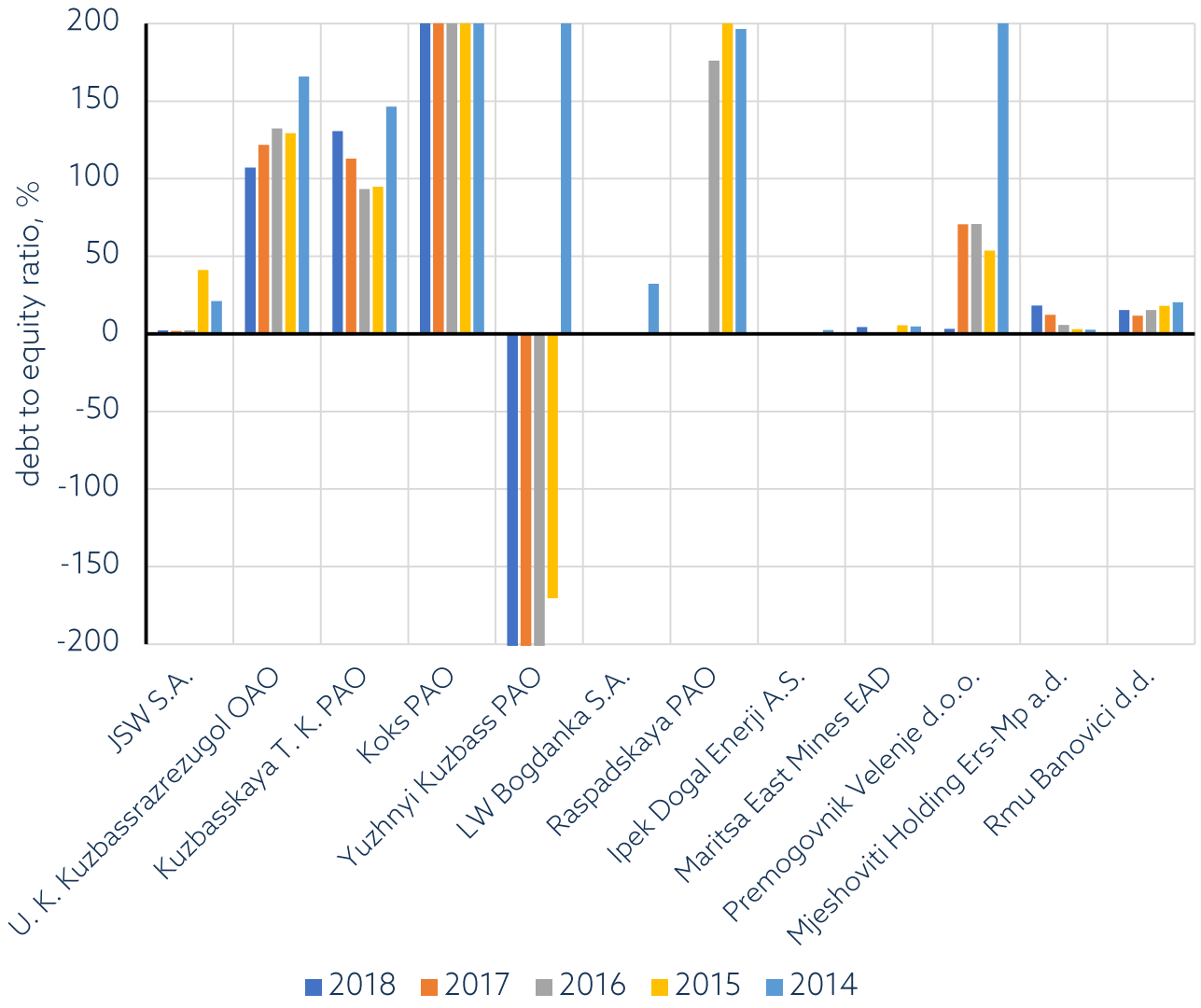
In 2018 Polish companies recorded the following net margin results:

- JSW S.A. 17.9%
- LW Bogdanka S.A. 3.1%;

these results are lower than in 2017 (28.6% and 37.5%, respectively).

MEERI PAS study based on EMIS data.

Debt to equity ratio



The debt to equity ratio (D/E)

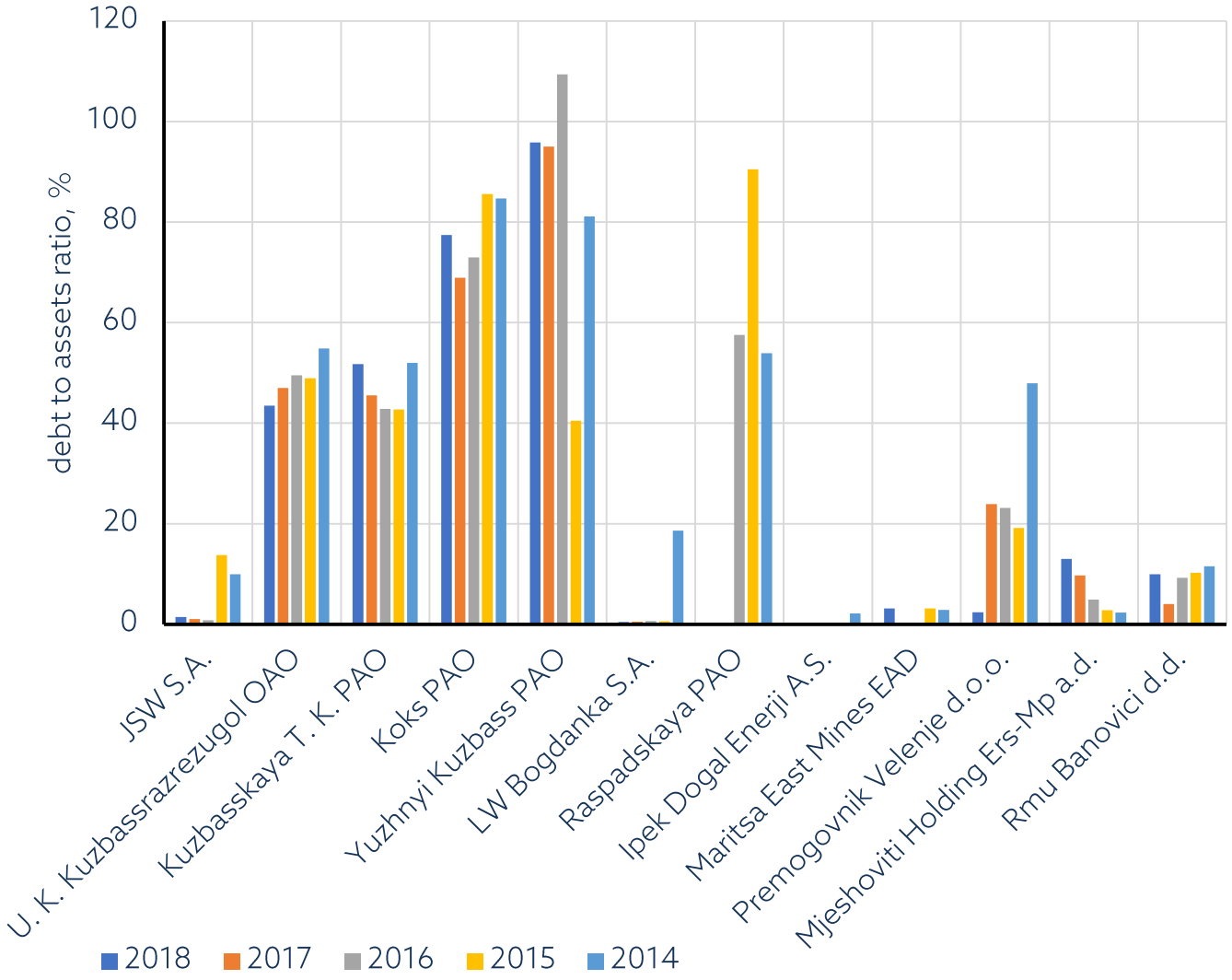
The scale of value on the vertical axis was limited to a range: -200% to 200% to enable more accurate observation of D/E values for the biggest companies.

Many Russian companies recorded either very high or very low, also negative, values because they were showing a negative equity.

JSW and LW Bogdanka in 2018 recorded the ratio values below 2%, 1.85% and 0.7%, respectively.

MEERI PAS study based on EMIS data.

Debt to assets ratio



The debt to assets ratio (D/A)

Polish companies recorded low debt to assets ratios. In recent years a decreasing value of the ratio for the JSW and LW Bogdanka is a positive effect.

The highest values of the ratio were reached by Russian companies, led by Yuzhnyi Kuzbass PAO.

MEERI PAS study based on EMIS data.

Summary

Summary

1. The hard coal mining plays an important role in Polish economy. The presented report shows numerous problems, which it will face in the nearest years, at a permanent trend being an increase in the electricity consumption, which in 2017 for the first time exceeded 170 TWh.
2. By the end of August 2020 21 licences to mine hard coal will expire. This is one of most urgent issues to resolve.
3. Hard coal mining has available a large resource base. As of 31/12/2017 this is 2,968 million tonnes of commercial reserves (on active levels). The entire resource base should be verified and updated in universally used worldwide the JORC Code system.
4. A decline of hard coal output has a permanent trend. In 2018 63.4 million tonnes of hard coal were mined, of which thermal coal constituted 51.3 million tonnes,
   The implementation of the governmental *Programme for the Hard Coal Mining Sector in Poland by 2030* is to ensure meeting the domestic demand for hard coal. Investments and innovation implementation will be necessary to realise the assumptions.
   Unfortunately, the amount of output in the years 2016-2018 does not follow even so-called low scenario, which at maintaining a downward trend means a further increase in hard coal imports. In 2018 the imports increased to 19.68 million tonnes.

Summary

5. The productivity in hard coal mines is low, as compared with 2017 only the Polska Grupa Górnicza managed to increase the productivity per one employee, the other companies recorded falls in this category: LW Bogdanka SA - 1890; PG Silesia – 910*; Tauron Wydobycie – 752; PGG SA – 708*; JSW SA - 694 [t/employee/y]).
6. In the next years the productivity will be determined by deteriorating mining and geological conditions (increase in the depth of mining and in the scale of natural hazards). Opportunities to improve productivity should be sought in a better use of mines production assets and in changes in the management process (extension of mines working time, implementation of a bonus system depending on production results). At a five-day system of work this is extremely difficult (on Saturdays and Sundays only LW Bogdanka SA, PG Silesia Sp. z o.o., and Siltech Sp. z o.o. mines work systematically). A change of mines work organisation system is just a must.
7. The 2018 economic results of mining were dominated by still maintaining high prices of hard coal, where attention should be paid to an extremely high loss of Tauron Wydobycie SA.

Company name	Profit [million]	Output [million tonnes]	Employment [pers.]
JSW SA	1 418	15,0	21 616
PGG SA	493	29,7	41 900
LW Bogdanka SA	52	9,0	4 750
PG Silesia Sp. z o.o.	b.d.	1,5	b.d.
Tauron Wydobycie SA	- 1 053	5,0	6 660

* - approximate figures

MEERI PAS study based on: ARP SA data; JSW SA Management Board report on activities in 2018; GK LW Bogdanka SA Management Board 2018 report; Consolidated 2018 Annual Report of TAURON Polska Energia SA Capital Group; press information (PGG SA and PG Silesia Sp. z o.o.)

Summary

8. The operating costs optimisation should serve improvement in the degree of mining processes organisation, especially in the field of human resources productivity (in the operating costs structure the payroll has the highest share, being from 45.1% to 50.6% of all costs in the years 2008-2018) and as good as possible usage of available operation time of machinery and equipment.
9. In 2018 a high increase in the sector's capital expenditure was recorded as against 2017. They amounted to PLN 2.82 billion and were by PLN 0.8 billion lower than in the record year 2012. In the last year mines were capable, due to a better financial standing, to allocate more funds for investments, which are indispensable to maintain the intended output level.
10. In the long-term operation of the hard coal mining sector it is necessary to determine an energy strategy and to consider close integration with the power sector, which was signalled by the *Programme for the Hard Coal Mining Sector in Poland*.

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