

## **Dominant enterprise (industry) in economic monoculture regions – a discussion of its role and importance accompanied by the analysis presented in other studies on the KGHM situation. Selected project findings.**

### **Introduction**

According to the official statistics and KGHM Polska Miedź SA data, the Company has been deeply rooted in the region, not only on account of the region's natural resources (the local occurrence of mineral deposits), but also mainly through its strong economic links and social commitment .

KGHM comprises a parent entity, 10 branches and over 70 subsidiaries (as of 2017), all making up the KGHM Capital Group. This employs a workforce of nearly 32,000, with almost 26,000 of those being Copper Belt inhabitants. The number of KGHM's suppliers stands at over 26,000, of which one-third are from Lower Silesia and 10 percent from the Copper Belt. As the Company's data show, in 2017 KGHM paid a total of PLN 583 million in taxes, fees and contributions to local self-governing authorities.

However, the real importance of the copper industry for the social and economic structures of the region is far more crucial. Analysis has been conducted as part of the studies carried out across the Copper Belt by WSB University, together with the Polish Copper Employers Union, with organizational support provided by KGHM Polska Miedź SA. This focused on examining the impact of the copper industry on the economy and social life of the region. It confirmed not only the previous assumptions, but also brought to light new areas where this impact has been occurring. The study was based on a multifaceted analysis, investigating the strength of the impact. It covered the regional employment structures and local governments' revenues, involved a detailed examination of business networks and interactions between local businesses and the copper industry, and investigated the impact on the inhabitants' lives. The results revealed several key behaviours of major, local economic and social players, among them the local community, local authorities and representatives of the business sector.

The prevailing view among the regions' inhabitants is that KGHM exerts a strong positive impact on their lives and the development of the region. Their belief is that the Company is not only a leading employer offering stable employment and substantial earnings, but it is also an active driver of the life of the community. Yet, this is not only due to the high standard of living that KGHM provides to its employees and their families, but by its social initiatives with access for all. The Company has a positive effect on the living standards of the region's entire population, thus contributing favourably to how it is perceived by investors and people from other regions. One could venture to characterise KGHM's image, as viewed by the

community, by drawing on five key areas where the Group's impact on the social and economic life across the Copper Belt can be most profoundly felt.

- it affects the professional careers of the region's inhabitants,
- it plays the role of a "donor and protector" for them,
- it is certainly a regional brand,
- it is "an object of desire" while developing a career path,
- it is a source of specific threats.

From the perspective of local businesses, mainly the SME sector, KGHM is a key partner in a number of areas, and a reliable and stable payer. It does, however, pose threats to the labour market in that it offers wages and bonuses unattainable for other businesses.

The attitudes adopted by the local governments towards this major employer could be delineated into two main strategies. Although numerous specific solutions may exist, it is possible to place them within a space bounded by two extreme attitudes ranging from tightening the links with the copper industry to searching for other alternatives for growth and development.

The analysis of the research material derived from the official statistics, KGHM's own sources and the quantitative survey carried out on the region's population enabled a picture to be drawn of the relationship between the inhabitants of the Legnica-Głogów Copper Basin (LGOM) and KGHM PM (Polish Copper) SA, the major player in the regional labour market, and a company exerting influence on actually every sphere of operation of the region, as well as its people. The latter are well aware, not only of the company's influence on the region's growth as reflected in the population's welfare, but also of the threats brought about by this specific situation and the threats generated by working in the copper industry. Nevertheless, KGHM's image among the people continues to be favourable.

### **KGHM's impact on local government entities across the Copper Belt compared to the region and country**

#### Gross Domestic Product (GDP)

Owing to the considerable rate of value-added growth (and net profit) produced by KGHM in 2005–2011, the Legnica-Głogów sub-region was notable for the highest growth rate. This resulted in Lower Silesia moving up in Poland's GDP per capita ranking from fourth to second place. (Up to 2004, Lower Silesia was placed in fourth position after the following voivodships: Masovian, Silesian and Greater Poland; since 2011 only the Masovian voivodship has been higher in the ranking.)

#### Labour market – remuneration

The measure applied in the analysis of the situation of the Copper Belt encompasses employees' remunerations, which are largely influenced by the salaries earned by the KGHM managers and workers. It is only the city of Wrocław and two LGOM poviats (counties) (Poviat of Lubin and of Polkowice), which are reported to have exceeded the voivodship average remuneration, with the other 27 poviats ranking below the average. The remunerations in the Poviat of Lubin are so high that this one poviat stands out sharply, not only from the voivodship average, but also from the city of Wrocław, ranked the second. The gap between Wrocław and the Poviat of Góra, ranked 30th, is still smaller than that between the Poviat of Lubin and Wrocław. Moreover, the Poviat of Lubin is at the very top in terms of the remunerations paid nationwide. That the Poviat of Lubin has been first in the nationwide remuneration ranking for many years has been attributed to the very high earnings of the copper industry employees. This poviat is reported to have 2.5-fold higher remunerations than the Poviat of Kępno (Greater Poland), the last in the ranking.

#### Local government budgets

Two kinds of taxes underpin the functioning of gminas (municipalities): personal income tax and property tax. Other revenues include corporate income tax, agricultural tax, the mining fee, tax on civil law transactions and tax on means of transportation. Considering that gminas vary in their demographic potential, the highest revenues in absolute terms were generated by large urban gminas such as Lubin (PLN 345.4 million) and Głogów (PLN 295.5 million), the urban-rural Gmina of Polkowice (PLN 249.8 million) and the urban Gmina of Świdnica (PLN 240.4 million). The lowest revenues were reported for the rural Gmina of Platerówka (PLN 6.9 million), which also has the smallest population (1,613).

Local governments' corporate income tax (CIT) revenues are collected according to the place of establishment of a business, while for personal income tax (PIT) revenues it is the taxpayer's place of residence. Commuting to work has a compensatory effect, which is why the neighbouring gminas have a similar level of the PIT-based revenues to those in which the KGHM branches are based.

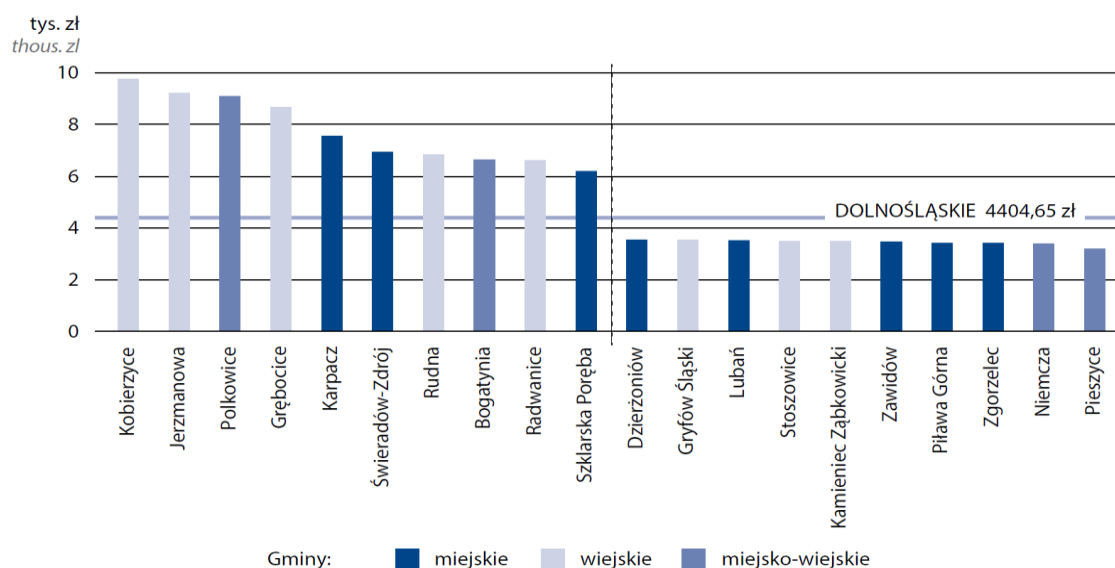
"A clear leader among the poviats with the richest gminas is the Poviat of Polkowice, whose revenues are higher by nearly 85% than of the Poviat of Dzierżoniów. Ranked in the third, fourth and fifth place are the following poviats from the north of Legnica-Głogów subregion: Lubin, Głogów, Góra. What determined the ranking of the three out of four poviats (of Polkowice, Lubin, Głogów) was their own revenues and not subsidies and grants, which accounted for 31.5%–38.8% of the overall revenues".

The highest amount per capita as generated by personal income tax is in the following rural gminas: Kobierzyce (PLN 2053.83) and Lubin (PLN 1505.73). The top ten include four gminas located in the Legnica-Głogów subregion (Lubin, a rural and the urban gminas of Jerzmanowa and Polkowice).<sup>1</sup>

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<sup>1</sup> Budgets of local self-governing entities in the Lower Silesian Voivodship in 2017. Statistical Office in Wrocław 2018, p.87

Chart: Gminas with the highest and lowest own revenues per capita in 2017.



Source: Budgets of local self-governing entities in the Lower Silesian Voivodship in 2017. Statistical Office in Wrocław, 2018, p. 87

## Findings

- CIT-based revenues per capita for the budget of Polkowice are twice the amount reported for Kobierzyce, the second gmina in the region; four times the amount reported for the third urban gmina, Lubin, and 13 times the amount of the voivodship average.
- PIT-based revenues are more important for gminas although less diverse. The rural Gmina of Lubin, the urban Gmina of Lubin, and the gminas of Jerzmanowa and Polkowice exceed more than twice the voivodship average.
- As a result, it is largely on account of KGHM that Lower Silesia has one of the richest local governments in the country and contributes to “Janosikowe” (a levy benefiting the country’s poorer local governments, paid as compensatory/regional payments under the general subsidy) at all the three tiers of the local governments (data as of 2017):
  - Corporate tax revenues form the basis of the voivodship budget, with KGHM Polska Miedź SA being, for years, the largest contributor in this respect; Lower Silesia, along with Masovia, have been the sole payer of the regional subsidy for the other 14 voivodships for many years (with the exception of 2016),
  - Out of 314 Polish poviats (excluding cities with poviat status), contributions to the compensatory part of the subsidy were made by merely 21 poviats, of which five were from Lower Silesia, including such poviats as Lubin (rank 5th), Polkowice (rank 8th) and Głogów (rank 14th),

- Out of 2412 gminas, payments were made by only 92, including 12 gminas from Lower Silesia. Polkowice was placed second, after the Gmina of Kleszczów (energy monoculture); Kobierzyce ranked fourth, Bogatynia ranked sixth (a monoculture like Kleszczów), Jerzmanowa ranked 14th, Lubin ranked 16th and Rudna ranked 23rd (there were also Grębocice, Radwanice, and others).

### **KGHM's links with the community – an analysis of the social and business relations**

#### **Impact on the labour market**

The strength of the links with the community is also revealed by the analysis of the level and structure of employment, including the commuting directions. If we compare the workforce potential – the population, the overall working population and those employed by the Group – then the picture emerging shows the Group's impact on the Lower Silesian and local labour market.

Table: KGHM Group as an employer – basic information for 2018.

Copper Belt population	414,827
Working-age population	260,736
The Copper Belt population working in industry and construction	126,796
Average employment at the KGHM Group (country)	31,779
The Copper Belt population employed at the KGHM Group	25,558

Source: KGHM PM SA data and Statistics Poland local data

#### **KGHM as a place of employment – a source of livelihood**

The research shows that KGHM PM SA and the companies making up the KGHM Capital Group represent one of the primary sources of livelihood in the Legnica-Głogów Copper Basin (LGOM). Out of all respondents surveyed, 24% work for the Group. Moreover, respondents report that their immediate or distant family members are employed by KGHM. Only a fifth of all respondents do not have family members working for KGHM. This prevalence also affects how respondents view their community – 28% believe that their neighbourhood is dominated by people working for KGHM, while for 17% of respondents KGHM employees form a clear majority.

Some 84% of all respondents consider the Company to be a very attractive employer, whereby the highest percentage of those confirming the Company's appeal was among pensioners and employees of KGHM Polska Miedź SA. Hence, a conclusion may be drawn that working for KGHM PM SA and the KGHM Capital Group carries considerable prestige

for the LGOM inhabitants, with this prestige arising from the objective stratification factors such as one's profession and income. Furthermore, there is also evidence of job succession, and, by reference, a family tradition of working for KGHM, as reflected by respondents whose parents used to work or still work for the Company (26%), as well as respondents' siblings (24.8%). The findings allow one to conclude that the professional situation in the Legnica-Głogów Copper Basin is stable, not only for the people working at KGHM PM SA and the KGHM Capital Group, but also for those employed outside KGHM.

KGHM PM SA and the Capital Group create more stable working conditions for their employees than other entities. Another factor providing evidence of a stable professional situation (and hence little job mobility) is relatively long years of service with KGHM. The average number of years with one employer is 21, while the mode, or most frequent value, is 30 years of service with one work establishment. This demonstrates a long-term relationship between employees and employers.

KGHM employees are satisfied with their workplace. That there is attachment to the employer is demonstrated by respondents' willingness to continue working in their current job. This can be clearly observed, in particular, among those employed in the Company. Over half of respondents from this category (54.5%) reported not having any thoughts about changing their job. Moreover, those who most frequently considered this option were from other work establishments (outside KGHM) – 68.8% of respondents were in this category. A relatively high percentage of those considering a job change under specific conditions was also found among respondents working at the KGHM Capital Group – 62.1%.

Furthermore, 81% of the survey participants believe that KGHM is the most important employer in the region, with 84% considering the Company an attractive employer. The highest percentage of those confirming KGHM's appeal was among pensioners and the KGHM PM SA employees. Of those employees, 85% report that they are satisfied with their current job. The key factor making KGHM stand out against other employers in the Copper Belt is earnings (33.7% indications), with the Company's size indicated as the second factor (23.3%). In addition, there is a prevailing view among respondents that KGHM is precisely where people who do not work there would be eager to work.

#### The impact on the business community (including regional business)

For the entire Group, as the data for 2018 show, the number of customers (active), both consumers and suppliers, suggests a scale of many thousands and a multibillion PLN turnover. However, what proves to be of greater significance is the analysis of their spatial aggregation points to Lower Silesia and the Copper Belt.

Table: Overview of consumers and the value of sale revenues in 2018 for the KGHM Group

Number of active customers (consumers) in the database in 2018 based in:							
<b>Other countries, of which:</b>	23,682	<b>Poland, of which:</b>	68,093	<b>Lower Silesia, of which:</b>	23,823	<b>Copper Belt, of which:</b>	10,636
<b>outside the Group</b>	23,674	<b>outside the Group</b>	68,062	<b>outside the Group</b>	23,800	<b>outside the Group</b>	10,620
<b>in the Group</b>	8	<b>in the Group</b>	31	<b>in the Group</b>	23	<b>in the Group</b>	16
Revenues (PLN thous.) generated with consumers from sale of products, goods, materials in 2018, per:							
<b>Other countries, of which:</b>	11,960,304	<b>Poland, of which:</b>	11,424,885	<b>Lower Silesia, of which:</b>	6,941,663	<b>Copper Belt, of which:</b>	5,923,579
<b>outside the Group</b>	11,902,383	<b>outside the Group</b>	5,702,582	<b>outside the Group</b>	1,261,717	<b>outside the Group</b>	359,765
<b>the Group</b>	57,921	<b>the Group</b>	5,722,303	<b>the Group</b>	5,679,946	<b>the Group</b>	5,563,814

\*Note: of which the number of health resorts' customers in 2018 is as follows (outside the Group); Poland: 47,036; Lower Silesia: 11,932; ZM (Copper Belt): 693

Source: KGHM Polska Miedź S.A.

Table: Overview of suppliers and the values generated with suppliers for the KGHM Group

Number of active suppliers in the database for 2018 based in:							
<b>Other countries</b>	502	<b>Poland</b>	26,648	<b>Lower Silesia</b>	9,765	<b>Copper Belt</b>	3,174
<b>outside the Group</b>	500	<b>outside the Group</b>	26,620	<b>outside the Group</b>	9,742	<b>outside the Group</b>	3,158
<b>in the Group</b>	2	<b>in the Group</b>	28	<b>in the Group</b>	23	<b>in the Group</b>	16
Value of purchases (PLN thous.) made with suppliers in 2018 for supplies, works, services per :							
<b>Other countries</b>	2,268,248.73	<b>Poland</b>	14,824,175.08	<b>Lower Silesia</b>	8,658,724.18	<b>Copper Belt</b>	5,472,928.31
<b>outside the Group</b>	2,261,478.83	<b>outside the Group</b>	8,327,345.17	<b>outside the Group</b>	2,364,137.01	<b>outside the Group</b>	998,952.18
<b>the Group</b>	6,769.90	<b>Group</b>	6,496,829.91	<b>the Group</b>	6,294,587.18	<b>the Group</b>	4,473,976.13

Source: KGHM Polska Miedź SA

#### Involvement in the activities of non-governmental organizations and initiatives

Through the KGHM Polska Miedź Foundation, in 2018 KGHM contributed PLN 18,438,000 to social initiatives, including initiatives from Lower Silesia for a total of PLN 13 million and from the Copper Belt for a total of PLN 7,759,000.

Table: Donations made to organizations by the KGHM Polska Miedź Foundation in 2018

Area	Number of projects	Value in PLN thous.	Location of donations	Number of projects	Amount awarded (PLN thous.)
Health and safety	74	3,686	ZM (Copper Belt)	40	1,993
			Lower Silesia	64	3,589
			Poland	74	3,686
Science and education	71	2,447	ZM	19	913
			Lower Silesia	45	1,647
			Poland	71	2,447
Sport and recreation	166	4,041	ZM	117	2,716
			Lower Silesia	135	3,266
			Poland	166	4,041
Culture and traditions	150	8,264	ZM	64	2,137
			Lower Silesia	113	5,237
			Poland	147	7,719

Source: KGHM Polska Miedź SA

Founded on 23 March 2003, the KGHM Foundation was established with a view to professionally and effectively manage the funds from the Company's budget. In 2006, the Foundation was granted the status of a public benefit organization. Roughly PLN 200 million were donated to several thousand projects up to 2018. Aid was also given to several thousand individuals. The Foundation pursues its aims, in particular, by delivering help, funding, subsidies, support and assistance to individuals and entities realising the objectives within the areas presented in the table.

Sponsorship-related and social work carried out by KGHM PM SA has also been noted by the survey participants. Asked to cite examples of the projects funded or co-funded by KGHM, respondents indicated, in the first place, sports initiatives (131 indications given as the first example and 84 as the second). There were many examples illustrating cultural initiatives (respectively, 70 and 66 indications), as well as educational initiatives and those centred around helping children (36 and 29). In addition, KGHM employees can participate in various programmes and initiatives organized for them by their employer, addressing not



only the employees, but also their families or even the entire population of the Legnica-Głogów Copper Basin. For instance, almost 40% of respondents participate in the healthcare programme (Copper Healthcare Center), including 90% of the Company's entire workforce and 76% of employees of the Capital Group including 34.4% of pensioners. The social packages, on the other hand, offered by KGHM are most likely to be used by KGHM PM SA employees (86.4%) (within the Capital Group – 69.0%) as well as pensioners (28%).

### **KGHM's image among the population of the Copper Belt**

Considering the majority of respondents' indications, KGHM's image, as seen by the Copper Belt population, could be described as follows: KGHM is a prestigious firm, offering high wages while being the major employer in the region. It is a firm which exerts influence across the region, ensures its growth and attracts specialists. It is a well-established traditional firm with a strong brand providing opportunities for the entire region. For the LGOM population, the Company's image is distinctive and positive.

Table: KGHM's image among respondents in relation to their place of work.

KGHM as a firm:		Place of work					Total n=403= 100%
		KGHM PM S. A.	KGHM Capital Group	employment outside KGHM	self-employment	retirement/pension	
1	Prestigious	86.4%	75.9%	73.7%	75.9%	78.5%	77.2%
	Non-prestigious	13.6%	24.1%	26.3%	24.1%	21.5%	22.8%
3	It represents a threat to the region	40.9%	48.3%	32.8%	34.5%	43.0%	37.7%
	It is an opportunity for the region	59.1%	51.7%	67.2%	65.5%	57.0%	62.3%
4	It attracts specialists	84.8%	72.4%	67.2%	86.2%	74.2%	73.4%
	It attracts upstarts	15.2%	27.6%	32.8%	13.8%	25.8%	26.6%
5	It ensures development	84.8%	79.3%	80.6%	79.3%	83.9%	81.9%
	It leads to stagnation	15.2%	20.7%	19.4%	20.7%	16.1%	18.1%
6	It is the most important employer in the region	84.8%	79.3%	76.9%	79.3%	87.1%	80.9%
	It is an employer of little importance	15.2%	20.7%	23.1%	20.7%	12.9%	19.1%
7	Traditional	59.1%	62.1%	62.4%	58.6%	65.6%	62.3%
	Modern	40.9%	37.9%	37.6%	41.4%	34.4%	37.7%
8	A well-known brand	97.0%	96.6%	84.4%	93.1%	90.3%	89.3%
	An unknown brand	3.0%	3.4%	15.6%	6.9%	9.7%	10.7%

9	It impacts the region's development	86.4%	79.3%	78.5%	69.0%	82.8%	80.1%
	It exerts no impact on the region's development	13.6%	20.7%	21.5%	31.0%	17.2%	19.9%

Source: Self-reported data

### Standard of living in the region

One of the key measures of standard of living is disposable income per family member. According to Statistics Poland data for 2018<sup>2</sup>, the average monthly disposable income per family member stood at PLN 1,187. Lower Silesia is among those voivodships where the monthly disposable income declared is higher than the average (the voivodship's ratio was at 103.7%, where Poland = 100). Among respondents – the inhabitants of the Legnica-Głogów Copper Belt – disposable income per household member is even higher, on average exceeding PLN 2,300.<sup>3</sup>

### Impact of KGHM on the security of the supply of raw materials<sup>4</sup>

Based on estimates of CRU International, global mined copper production in 2018 amounted to 20 917 thousand tonnes. During this same time the companies of the KGHM Group produced in total 521 thousand tonnes of mined copper, representing approx. 2.5% of global production. In terms of the ranking of the world's major mined copper producers, the KGHM Group held eighth place in 2018. Production of refined copper by the companies of the KGHM Group amounted to 522 thousand tonnes, or approx. 2.2% of global production, in the ranking of the largest copper-producing countries, Poland held tenth place.

In 2018, global mined silver production in amounted to 856 million troy ounces (estimated data by the World Silver Survey). The KGHM Polska Miedź Group during this time produced 33.9 million troy ounces of silver, representing approx. 4.0% of global production of this metal. According to the survey conducted annually by the World Silver Survey, in 2018 the KGHM Group held third place globally in terms of metallic silver production, while Poland held seventh place in the ranking of countries producing this precious metal.

In the 21st century, KGHM Polska Miedź S.A. has become a global miner active on four continents. On one hand, the magnitude of our operations substantially curtails the risk of disturbance in the continuity and quality of production, while on the other hand, it facilitates the continual transfer of knowledge and experience between its various units.

The activities of KGHM implement well the raw materials initiative of the European Commission, of which the most important assumptions are based on the support of a sustainable supply of raw materials from EU sources, an increase in the resource efficiency and supply of 'secondary raw materials' through recycling and ensuring fair and sustainable access to raw materials on global markets. These elements guarantee *security* of the supply of *raw materials* in Europe.

<sup>2</sup> The household situation in 2018 in the light of the findings of household budget surveys, news releases, Statistics Poland, 2019.

<sup>3</sup> It is an approximate amount; the calculation of the exact amount is not possible because of the way the data are gathered. The weighted arithmetic mean was applied.

<sup>4</sup> Sustainable Report of KGHM Polska Miedź S.A. for 2018

Copper and the other minerals that KGHM provides to the markets on every continent are, and will remain, critical for the development of all sectors in the foreseeable future. According to the European Copper Institute's report, copper is a sustainable material that is pivotal to building the circular economy. Copper helps reduce harmful carbon emissions, it plays an important role in the development of renewable energy sources and electromobility. Copper is an essential material in building the energy systems of the future. It plays an important role in renewable energy systems, such as solar, wind, tidal, hydro, biomass, and geothermal.<sup>5</sup> Global changes in the energy production, defined as the transition from a system dominated by finite (mainly based on fossil fuels) energy to a system using most renewable sources, will undoubtedly require more copper than we currently use.<sup>6</sup>

The largest customers for the copper produced by KGHM remain China and Germany, but the products are also sold in countries such as the United Kingdom, Italy, Switzerland, France, South Korea, the USA and Canada.

### **Sustainable development<sup>7</sup>**

KGHM achieve excellent results in the mining and production of copper, silver and other minerals. The company has retained our position as one of the world's leaders in the copper sector for many years. Thanks to rational investing KGHM is continuously developing. The company is also able to advance our non-industrial activities by introducing projects related to the environment or society which could be of service to local communities. These sustainable development goals have also been enshrined in the new, updated strategy of KGHM Polska Miedź S.A. for the years 2019-2023, which we adopted in December 2018. The main pillars of the strategy can be defined as the 4E's – efficiency, elasticity (i.e. flexibility), E-industry and ecology.

KGHM operations are based on the principles of the circular economy. The broad program of investment in the Legnica Copper Smelter and Refinery, comprising, among others, the construction of a modern RCR (Revolving Casting-Refining) furnace for processing copper scrap. This is the only installation of this type in copper recycling in Poland. KGHM is implementing solutions which will help the environment and reduce our impact on the global climate. The company is planning to build installations which will make the gases emitted during production at the Głogów Copper Smelter and Refinery cleaner. Among other things, this work includes dedusting installations for the Dörschel, convertor and electric furnaces. Also planned is the construction of an innovative installation to eliminate arsenic arising from the production process. This solution will enable arsenic to be transformed into a form resembling a naturally-occurring mineral. KGHM is investing in and promoting modern, environmentally-friendly technologies, including electric vehicles.

### **The conditions for the mining business in Europe - the need for change**

It is important to simplify the formal and legal conditions for conducting business in the raw materials sector to ensure a stable supply of raw materials from European sources. It is necessary, among others, to include simplification of administrative conditions to speed up the process of issuing permits for exploration and production, to improve the knowledge base on mineral deposits in the European Union<sup>8</sup>, and not to tighten existing environmental requirements, which are weakening the global competitiveness of European entities, that operate in a sustainable way as opposed to global competitors from Asia, Africa or South

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<sup>5</sup> European Copper Institute, Copper Alliance, Benefits of copper <https://copperalliance.eu/benefits-of-copper/>

<sup>6</sup> Benefits and Impacts of the Energy Transition for the Copper Industry, CREARA Analysis, September 2016 <https://miec-miedz.pl/jaka-role-ma-do-odegrania-miedz-w-rozwoju-oze-i-elektromobilnosci>

<sup>7</sup> Sustainable Report of KGHM Polska Miedź S.A. for 2018

<sup>8</sup> Krzysztof Galos, Mineral and Energy Economy Research Institute of the Polish Academy of Sciences (Instytut Gospodarki Surowcami Mineralnymi i Energią PAN), Kraków, Nowa Polityka Surowcowa Unii Europejskiej, Górnictwo i Geoinżynieria, 2009

America. Meeting technical and technological challenges related to sustainable mineral production requires the European Commission to maintain dedicated Research & Development & Innovation project areas that focus on innovative exploration, extraction, processing or recycling and recovery of raw materials in the Horizon Europe research and development program.