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Mining resource potential, modifying factors and the challenges of translation

A research paper published by the International Council on Mining and Metals (ICMM) in December 2020 rated countries based on the mining industry's contribution to the economy (https://www.icmm.com/website/publications/pdfs/social-performance/2020/research_mci-5.pdf) (**Fig.1**). According to this fifth bi-annual research, the Russian Federation comes 23rd out of 183 analyzed countries, between Georgia and Myanmar. Is it good or bad news? The good news is the mining industry's input to the Russian economy was acknowledged as significant.

The less good news is that according to the ICMM rating, two other countries with well-developed mining industries – Australia and Canada – are far behind in the list, i.e., Australia comes to the 36th and Canada – the 50th place. While the contribution of mining to the economy in these countries is significant, the national economies are more diversified. Still less in percentage terms is the mining industry's contribution in China, another mining giant, which goes the 70th. The two neighbors of Russia, i.e., Kazakhstan and Uzbekistan, go in front of Russia. Their economy is more dependent on the mining industry.

The ICMM index uses the following four measures of the contribution of the mining industry to the economy. (based on UNCTAD and other sources for 2018).

- Mineral and metal export contribution 2018;

- Increase/decrease in mineral and metal export contribution between 2013-2018;
- Mineral production value expressed as a percentage of GDP in 2018;
- Mineral rent as a percentage of GDP in 2018.

When compared to the previous ICMM2016 research, Russia moved three positions up; in other words, the mining industry's contribution to the economy increased. Disregarding the merits or shortfalls of the methodology, it is both significant and disturbing news that needs to be considered.

The economic contribution of mining is the so-called resource potential; it is the degree to which this potential has been converted into actual mining projects and the value achieved by investors. For the top three countries in the ICMM rating, e.g., Suriname, Democratic Republic of Congo, and Mongolia – the mining industry is the only option available to large investors. In the developed countries with significant resource potential, the mining industry competes for investors' money with other sectors.

Investors by and large are industry agnostic, *ceteris paribus* investing in assets with a higher return on capital and lower risks. Moreover, their preferences change over time. In May 1896, the first Dow Jones index was dominated by commodity and mining companies. Today, there are no commodity sector companies in the global top ten by market capitalization (**Table 1**). Saudi Aramco is the exception that proves the rule. Mining companies, as the companies from traditional

industries, find it increasingly more challenging to compete for investor's attention with the companies of the «new economy». The leading technology firms have a market capitalization of over a trillion dollars, while thirty years ago, some of them may have not even existed. To illustrate the relative proportions – the market capitalization of the world's largest mining company is about US\$ 230bn, i.e., almost ten times lower. The largest gold and coal companies have market capitalization four times lower than the largest mining company. It does not take long to understand where capital flows from and where it goes in the global economy.

High risks make the stock market the natural source of financing for the mining industry, resulting in most companies listed at a stock exchange and backed up by an international investor pool. In addition, the global dislocation of the mine supply and commodities demand, a finite life of any individual mine mean that mining majors are diversified geographically.

There are but a few foreign projects in the portfolios of the largest Russian mining companies. The rare exceptions include Polymetal's Bakyrchyk project in Kazakhstan¹ and the African projects of NordGold, which, however, positions itself as an international gold company with assets in Russia. At the same time, the largest Russian mining companies are listed in London (NordGold reportedly contemplates returning to LSE)² and therefore are required to follow the regulatory reporting rules of the international stock exchanges.

A handful of Russian mining assets are owned by foreign companies, including two international majors, i.e., Canadian Kinross (Kupul, Dvoinoy, Chulbatkan)³, and recently KAZ Minerals from Kazakhstan (Baimskaya)⁴. Accidentally, both companies own projects in the northern Chukotka region of Russia, where the realization of the resource potential is most challenging due to logistics and infrastructure factors. Chinese

Fig 1.

Countries with the largest contribution of the mining industry to economy ICMM 2020 (top 27 of 183 in total). Source: ICMM 2020

1	2	3	4	5	6	7	8	9
5th edition rank	Country	5th edition MCI score	Metallic mineral, metals and coal export contribution 2018	Change in min. exp. contr. 2013-18 (perc. points)	Metallic mineral and coal production value 2018 (as % of GDP)	Mineral rent (as % of GDP)	4th edition rank	Difference in rank between 5th and 4th editions
1	Suriname	98.1	80.1%	39.2 pp	45.28%	19.92	1	0
2	Congo, Dem. Rep.	97.6	91.1%	17.5 pp	32.97%	16.17	2	0
3	Mongolia	95.7	85.6%	5.7 pp	37.61%	28.88	16	13
4	Zambia	95.5	76.1%	8.4 pp	20.64%	14.62	24	20
5	Guinea	94.6	82.6%	15.3 pp	14.30%	9.68	3	-2
6	Burkina Faso	94.4	76.6%	14.5 pp	16.06%	9.64	4	-2
7	Kyrgyz Republic	91.3	54.4%	8.0 pp	11.89%	11.18	5	-2
8	Sudan	91.3	40.6%	15.6 pp	12.15%	12.70	22	14
9	Mali	90.0	75.6%	2.7 pp	16.03%	8.19	6	-3
10	Zimbabwe	88.2	44.5%	4.6 pp	17.00%	3.74	19	9
11	Peru	88.0	60.5%	2.0 pp	13.04%	8.21	21	10
12	Bolivia	87.8	43.3%	19.7 pp	6.66%	4.11	17	5
13	Mozambique	87.6	67.2%	20.3 pp	11.13%	0.62	39	26
14	Namibia	86.7	50.6%	6.4 pp	6.61%	4.19	11	-3
15	Ghana	85.5	38.3%	5.7 pp	8.48%	5.65	9	-6
16	Uzbekistan	82.7	27.1%	2.0 pp	9.50%	7.37	10	-6
17	Kazakhstan	79.2	13.2%	1.7 pp	11.57%	4.18	27	10
18	Senegal	78.4	24.2%	5.3 pp	2.55%	1.11	18	0
19	Colombia	77.2	22.8%	6.3 pp	3.13%	0.52	30	11
20	Guyana	77.1	59.2%	-2.7 pp	19.99%	15.13	20	0
21	Jamaica	76.7	47.9%	3.9 pp	0.62%	1.17	36	15
22	Georgia	74.7	19.7%	9.0 pp	1.06%	0.48	31	9
23	Russian Federation	73.9	11.0%	2.1 pp	3.27%	1.01	26	3
24	Myanmar	73.8	11.0%	2.7 pp	2.03%	1.26	77	53
25	Botswana	73.5	91.5%	-1.0 pp	13.39%	0.54	13	-12
26	Armenia	73.4	44.4%	-1.1 pp	9.44%	6.32	14	-12
27	Chile	73.1	54.1%	-4.6 pp	13.73%	11.46	35	8

investors also develop several projects. It is worth noting that Chinese firms' direct outbound foreign investments have lately been in a sharp decline.

A combination of the competition among investors and a favorable investment climate in the country results in the highest mineral resources valuation. Said otherwise, the more investors there are in the country, the higher the value of its mining assets. It makes the task of attracting investors, both national and international, a priority for the resource-rich countries. The lack of investment makes the realization of the mineral rent value impossible. The historical commodities price dynamics have not proved Harold Hotelling's theory⁵ claiming that resources increase in value at the rate of interest. Moreover, an analysis of the market prices indicates that the value of resources «in situ» is only a fraction of the metal market value⁶ (**Table 2**). It is not only due to time and CAPEX for mine and processing plant development, but to a more considerable extent, because of the other modifying factors, including investment risks, influencing how resources convert into reserves, and sometimes the other way around. The magnitude of a possible error in assessing a resource potential has been well documented by multiple cases of value destruction by even the largest and savvy mining companies. In 2011 Rio Tinto paid for a coal asset in Mozambique, almost US\$ 4bn, to sell it in just two years for US\$ 50 million⁷.

The international cooperation in mining creates additional synergies and value through the exchange of industry knowledge and advanced technologies. In the past, heap leaching became such technology, and more recently, it was autoclave treatment of refractory ores. It is hardly a secret that the international expansion of Chinese firms, including acquisitions of mining companies in Canada and Australia, was primarily driven by the desire to acquire knowledge, develop competencies and obtain access to state-of-the-art technologies.

There has long been a consensus that a global industry with a diversified pool of international investors needs common or at least harmonized reporting rules. It was behind the development of the international financial reporting standards and the CRIRSCO compliant mining reporting codes, including JORC, NI43 101, SAMREC, and the Russian «NAEN» Code. In addition, the project mobility of geologists and mining engineers and the experience they gain working at different mines in various countries is a major source of knowledge and competence. It creates value for their companies and themselves, enhancing the total human capital value of the global mining industry. It may be a surprise to some, but the lack of international experience is among the reasons why international

Table 1.
The largest companies by industry (as of 18.05.21)

Company	Industry	Market Capitalization, US\$, bn
Apple	Technologies	2 083
Microsoft	Technologies	1 831
Google	Technologies	1 529
BHP Billiton	Mining	235
Newmont	Gold	60
Shenhua Energy	Coal	60

Table 2.
“In Situ” value of resources Base metals (% of metal value).
Source: Ludeman 2000

Stage	From:	To:
Early exploration	1.0	2.0
Inferred resources	2.0	3.0
Measured and Indicated resources	3.0	5.0
Feasibility study	5.0	7.5
Production	10.0+	

public companies do not select otherwise qualified and competent Russian mining specialists for preparing resource and reserves reports.

The competition for investor money will only increase with time, and the risks of the mining companies will not decline. A new factor has recently been stigmatizing mining and its appeal to international investors, particularly institutional investors and banks. The transition to the low-carbon economy is a risk to energy-intensive industries and producers of fossil fuels.

The mining industry that crushes and hauls enormous amounts of rock and ore and subsequently ships its products worldwide is highly energy-intensive. The coal companies are increasingly referenced as suppliers of the dirtiest and highly polluting fuel. Europe accelerates the closure of lignite mines and power plants. Who would invest pension money in an industry that, in a couple of decades, will shrink or lose a significant portion of its profits? A recent report by IEA calls for an immediate refusal to invest in any new oil and gas or coal projects to meet the net-zero targets by 2050⁸. The claim may surprise, coming at the time when commodity prices are at their local historical peaks and rising. That said, the investment cycle in the energy and mining industries is notoriously long, so investment decisions are not or should not be based on a current situation but on the longer-term market sentiment and price outlook. The EU has already announced a new CO2 tax on imports⁹. It seems unlikely that Asian countries will follow suit any time soon, but who can guaranty the situation

will not change? China has recently re-confirmed its commitment to meet the Paris Agreement targets.

Another factor is the exponentially growing popularity of the ESG narrative. Despite the fact that some skeptics view it as just another fad, the responsible mining principles may eventually result in a de-commoditization of the resource industries, including the mining industry. The companies that will fail to get an ESG certification may be required to pay a CO2 tax but may not be allowed to supply to specific markets. It is worth noting that the codes of reporting resources and reserves do not explicitly consider respective risks, which may become the new modifying factors due to which part of reserves may be reclassified as resources or even declassified as resources.

The above raises a question – considering the evolution of the investment narrative for the mining industry and related risks, what could help realize the resource potential of the Russian mining industry? There is no quick and easy answer to this question. At the minimum, an active discussion of this question would be a good starting point. Some may argue that the current outlook for the Russian mining industry looks bright – metals and minerals prices are at their cyclical peaks, the resource life of the largest Russian mining companies is longer than the world's average, and for some companies, the highest in the world. Russian Federation is a net-exporter of most metals and minerals it mines. Additionally, new mines are being built and commissioned; in many metals and minerals, over a half of the mine produce is exported. However, by looking not at the volumes but the value created in mining, it becomes clear that the resource potential of the Russian mining industry remains underappreciated. It is, therefore, more appropriate to rephrase the question mentioned earlier as follows - is there a way to increase and maximize the value of the resource potential of the Russian mining industry?

There is little doubt there are ways to achieve it, and we can expect to learn about various significant initiatives, including necessary changes in the laws and regulations. At the same time, some practical steps can also be undertaken to resolve certain confusing remnants of the transition from the previous economic and regulatory framework of mining in the early 1990s, when the Soviet industry practices have been patched with international mining principles and norms.

The first thing to note – resource potential will remain just that, a potential, unless developed using capital and initiative of the investor, it will not create taxes to the budget, employment to the regions, where there are usually a few if any, employment opportunities outside the resource industry. Natural resources are rarely found in most developed areas.

Given mining's reputation as a high-risk industry, the mining investors need to be treated with utmost respect and care. A mere acknowledgment that risk is the only source of return to a mining investor, and this return is a major source of tax to the state and earnings for millions of its citizens, could help to develop various initiatives and change the regulatory focus from subsidies and privileges to removing the barriers for investment and promoting favorable investment climate, matching or exceeding the offering to the investors compared to available in other developed countries with a significant resource potential.

The stock market is a critical institutional element that traditionally supported the development of the mining industry in such countries as Canada and Australia. There are some 1 300 listed mining companies in Canada. Some 650 mining companies are listed in Australia¹⁰. Russian stock market investors can choose from a handful of mining companies, dreaming that this number could grow to tens of companies, let alone hundreds. The stock exchanges in Russian have so far not been places where mining companies raise capital. The largest Russian miners use the local stock exchange primarily as a place for the secondary listing. Unlike Toronto or Sydney stock exchanges, where junior miners are the dominant part, the Russian stock exchange does not have such a category at all. At the same time, for junior miners, favorable investors' sentiment is an existential question. It is rarely mentioned, but the business model or a junior mining company is radically different from what firms in other industries follow. A typical company evolves from an idea to a growing profitable business with an IPO in its zenith. It is precisely the opposite for a junior mining company. They often do an IPO in the beginning, with the survivors moving to be acquired by a mining major, usually also a public company. Where there is no active junior stock exchange, there are no mining juniors.

A junior segment cannot be created by a regulator's decree. The risks of juniors are so high that the financier for the sector at large can only be a "collective" mass investor. In a typical year, the total

1. Kyzyl | Polymetal (polymetalinternational.com)

2. Nordgold подогрел слухи о re-IPO щедрой дивидендной политикой и обновлением СД (interfax.ru)

3. Кинросс в России - Kinrossgold

4. KAZ Minerals | Баимская

5. The Economics of Exhaustible Resources on JSTOR

6. Ludeman, Frank L.: A Decade of Deals: Gold & Copper Ore Reserve Acquisition Costs, 1990-1999, Three Volumes. Castle Rock, Colorado, 2000

7. Rio takes massive loss on Mozambique sale (afr.com)

8. Net Zero by 2050 – Analysis- IEA

9. How to Understand the EU's Carbon Import Levy- Bloomberg

losses of the junior mining companies are estimated in billions of US dollars. And almost every year is like a typical year for the segment. Occasionally, there are years when the total losses are a bit smaller, but also years when the losses are way higher.

Another factor to consider – while most mining juniors work on projects all around the world, they are predominantly listed on TSX in Canada and ASX in Australia. There were several attempts to create alternative listing destinations which failed. If Russia would seriously consider developing its own junior sector, it could become a home for the third major listing venue for mining juniors. In an environment when an increasing number of financial instruments provides negative returns, the stock market, even though not a «safe harbor», is an attractive alternative for investors. In the previous five months, more new money came to the stock market than in the previous twelve years¹¹. In 2020 the number of individual Russian stock investors doubled to ten million broker accounts¹². Does it look like the best time for developing the junior sector and the mining segment on the Russian stock market?

The risks of the mining industry require an extra layer of protection to be developed for private investors. To mitigate these risks the codes for reporting resources and reserves were developed. The lack of consistent disclosure requirements was partly responsible for the scandal that involved fraud and falsification of the resources data in the mid-1990s in the ill-famed discovery of the Busang gold mine in Indonesia by a Calgary-based junior company Bre-X Minerals. In 1996 the exploration company listed initially at the Alberta Stock Exchange and later at Toronto Stock Exchange in Canada and NASDAQ in the US announced a discovery of a gold mine with resources estimated by an independent consultant Kilborn Engineering (a division of SNC-Lavalin) at 2,200 tonnes of gold¹³. Later the company representatives claimed that the resource potential of the mine could be as high as 200 million ounces, or 6.2 thousand tonnes of gold; at the time, it was equivalent to over 8% of all world's gold reserves. Within a short period of time, the price of the shares of the company has risen from a few cents to 170 dollars, translating into the market capitalization of 4.4 billion US dollars (7.1 billion in 2020 US dollars). After the fraud was unraveled, the share price collapsed to virtually zero, resulting in considerable losses to many investors, including Canadian pension funds. The Bre-X scandal became the largest in the history of the Canadian stock exchanges¹⁴.

The need to protect investors, individual or institutional alike, gave rise to the development of the reporting codes for public mining companies in Canada – NI43-101, Australia – JORC, and

South Africa – SAMREC. Similar in all significant aspects, they have minor terminological and disclosure differences. All of the codes require a qualified specialist to sign off on the reports for public disclosure – in some countries, the function of preparing reports is called competent person report or CPR, in some – qualified person reports or QPR. In the Russian mining industry, the "competent person" term is mainly used. However, it does not fully convey the original intent of this function. And it is a function indeed, not a title, position, or qualification. The role of CPR or QPR for public disclosure purposes can be performed by competent and qualified personnel of a company or external consultants hired to perform this function. For example, Polyus uses external consultants to prepare resources and reserves reporting to comply with the requirements of the foreign stock exchanges¹⁵. In contrast, Polymetal assigns this function to its staff¹⁶.

A report signed off by a qualified and competent specialist does not say that the project is a good or bad investment. It only states that resources and reserves were estimated correctly and according to the prevailing reporting standard. It is important to stress that «properly» does not mean that any two specialists will agree on the estimate of resources and reserves. On the contrary, a difference in the estimates is almost guaranteed since an estimate will depend on the interpretation of limited geological data and due to the inherent margin of error of measurement. Yet, in high-risk situations, this difference is a boon, not a disadvantage. The use of independent competent specialists is particularly important due to the complexity of the evaluation methods, high level of uncertainty, and the professional jargon, which individual investors often do not understand.

Luckily, there were not similar scandals in Russia, which may in part be because there is no developed market for mining companies. The Russian NAEN reporting code used the same principles as the other CRIRSO-family codes and was accepted by the regulators in many countries. Regretfully, for about ten years NAEN Code exists it was not used in practice.

Another point to be addressed in a discussion about the ways of realizing the resource potential of the Russian mining industry is the fact that it is not accidentally called a resource potential. Geologists are well aware that resources can be converted to reserves by applying the so-called "modifying factors" that demonstrate the economic feasibility of resources. What often remains forgotten that resources are also an economical category. The material that has no prospects of being mined cannot be classified as resources. Moreover, reserves are part of better-explored resources that can be

profitably mined using technologies and assuming prices, mining costs, and cost of capital prevailing at the date of the estimate. The above implies that the very next day, the reserves change, either increase or decrease. It is why very few countries maintain an equivalent of a state balance of mining reserves, using instead statistical forms for reporting mining resources and reserves harmonized with resources reporting practices of CRIRSCO.

The practice of reporting mining reserves on the state balance that has been used since the Soviet times may had its merits for the period when the state was the owner of resources, as well as the investor and financier of mineral projects. It is noteworthy to recall the history of GKZ¹⁷. Established on May 31, 1927, «*the Special Commission for calculating the reserves of the minerals in USSR*» was assigned to analyze the methods of reserves calculation, review and approval of the reserves amounts, and the reserves categorization. The Decree of VSNKh USSR № 881 dated June 24, 1927, stated that the need for establishing a uniform system for accounting of the explored reserves was driven by the following: «*By acknowledging that the new mines and processing plants can only be established when and where there exist previously confirmed and sufficient ore reserves, Presidium of VSNKh USSR concluded that in the future when a new trust, which process mineral resources, is established or when a new department is organized within existing such trust (open pit mine, underground mine, a plant, etc.), which should have a sufficient supply of mineral reserves, the sufficiency of these reserves has to be confirmed by a relevant report issued by Geolcom*». As we may see, initially, the idea was very similar to that of a modern feasibility study, i.e., to confirm the sufficiency of reserves for building a new mine or a processing plant, in which case the Special Commission was effectively the specialist with the required competency and qualifications, engaged in preparing a report for an investment committee of the time, with the state as the investor.

Today, when the mining industry is dominated by private companies and the decision about the «sufficiency» of reserves is the responsibility and risk of a private investor, the procedure of approval of resource and reserves estimates looks excessive. For public mining companies, additional disclosure requirements, similar to those used in other countries, could be implemented. The Canadian

website SEDAR (<https://www.sedar.com/>) provided convenient access to technical reports required by the stock exchange rules for any interested party. This way, not only geologists but also investment funds and companies focused on investing in mining can obtain relevant reports, which in turn enhances the quality of their analysis and ultimately the value of mining companies.

Unfortunately, the establishing of the Special Commission gave rise to a lasting terminological confusion due to the use of the word "calculation" in respect to the process of estimating resources and reserves; later, it was adopted in other regulatory documents. Geologists of the time and today know well that resources and reserves can only be estimated with various degrees of confidence. The limited accuracy of any estimate, including estimates of resources or reserves, and a multitude of modifying factors that impact the amount of the reserves, with once reported remain unchanged for years and sometimes decades, make balance reserves a questionable parameter even for booking on the state accounts, let alone for a market investor. The situation is somewhat similar to that with the financial reporting of mining companies, when the book value of a mining company's assets often conveys little useful information for investment decision making, including estimating the true economic value of the mining assets.

The linguistic peculiarity of a hundred years ago has never been corrected. All current mining regulatory documents use the term "calculation" when talking about resources and reserves estimates. It may well be that in 1927 the use of the word "calculation" in respect to resources and reserves was intended to convey a sense of assurance sounding more scientific. In practice, this kind of «assurance» is questionable and may create a false sense of comfort in the theoretical possibility of developing 100% reliable resource estimates to be used for "risk-free" decisions. The terminological confusions may be traced in the two Russian translations^{18,19} of the JORC Code²⁰.

The reading of one of the two Russian translations of JORC2012²¹, referenced below, leave no doubt that in reporting resources and reserves, only the term estimate may be used: «*[para 25] Mineral Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling*

10. ASX Metals & Mining Companies | Full List | Updated Daily (listcorp.com)

11. More money poured into stocks in past 5 months than over last 12 years- BofA | Reuters

12. Число частных инвесторов на Мосбирже выросло до 10 млн :: Новости :: РБК Инвестиции (rbc.ru)

13. Bre-X- Wikipedia

14. Bre-X scandal: A history timeline- MINING.COM

15. Polyus reports Ore Reserves of 104 Million Ounces Gold — Polyus

16. Ore Reserves, Mineral Resources and Exploration update as at 1 January 2021 | Polymetal (polymetalinternational.com)

17. Федеральное агентство по недропользованию : ГЛАВНАЯ ТЕМА : 90 лет Государственной комиссии по запасам полезных ископаемых (rosnedra.gov.ru)

results...in the case of Inferred Mineral Resources, by qualification with terms such as 'approximately' and to emphasize the imprecise nature of a Mineral Resource, the final result should always be referred to as an estimate not a calculation.»

«[para 33]. Ore Reserve estimates are not precise calculations. Reporting of tonnage and grade estimates should reflect the relative uncertainty of the estimate by rounding off to appropriately significant figures. Refer also to Clause 25.

To emphasize the imprecise nature of an Ore Reserve, the final result should always be referred to as an estimate and not a calculation.»

At the same time, the translation also talks about «calculation parameters» and that «*For minerals that are defined by a specification, has the ore reserve calculation [in the original English Text – estimation] been based on the appropriate mineralogy to meet the specifications?*». Of course, it just a nuisance, a typo of the translator who was used to the Russian mining terminology, and it most likely has later been spotted and corrected. There is no doubt the practicing geologists well know the difference between *an estimate* and a *calculation* and the significant inherent uncertainty of the estimates in mining. We only use the above example to illustrate the degree to which the professional language adopted the terminology of «calculation». This terminological confusion also crept into the NAEN Code²², but it should not be difficult to correct it in the next edition.

Another important question – classification of mining resources and reserves. Until the 1970s, the Soviet classification was acknowledged by various foreign specialists among the most advanced in the world. If an active market for public mining companies formed in Russia, in time, it could have transformed into a reporting code similar to JORC, NI43-101, and SAMREC. However, it was not what happened, and the discussions on how to update the existing mining resources and reserves classification continue²³. It is a separate and significant topic related to possible changes in the mining legislation, which the author is not competent to discuss. At the same time, the debates on the matter have been rather heated. The only suggestion in that respect – a more straightforward classification would be better than a more complex one, and

the one harmonized with international codes would be most useful.

In case the existing reporting of the mining reserves would be replaced with submission of the resources and reserves reports as statistical forms, the reporting to the state statistic bodies and stock exchanges could be harmonized using the disclosure principles of the public companies as a basis. Where there will be a need to review the reports provided as part of a statistical package to put the reserves on the state balance, this function could be performed by the experts selected by a respective government agency. This mechanism has already been used in the cadaster valuation of real estate, where a state agency has been created and assigned to perform statutory valuations. Such reviews may follow particular rules and methods. Most importantly, it will not require the time and effort of the private mining investors, saving their costs.

It may be more appropriate to focus statutory reporting on resources. Since it is the resources that emphasize the resource potential for the future development of the mining industry and the long-term state planning purposes, after all, resources are less volatile than reserves, the latter being a "modified" part of the resources. More so, since the economic factors usually have a major impact while being fundamentally unpredictable and ever-changing. The resource reporting is successfully used in many countries where both the economy and mining sector are well developed, and the latter is ranked high in terms of investor appeal.

Last but not least is the information factor. It may even be a priority for the successful transformation of the mining industry. Information is critical for investment decision-making in high-risk industries. Today, Russian mining companies are left alone when it concerns the industry intelligence, which they can only purchase from foreign consultants and specialized agencies, such as Argus, Platts, CRU, Metal Focus, or Consensus Economics. The list may be continued. The information they provide is of high quality, but it has a high cost, and is data on the mining sector in Russian CIS is often limited.

Interestingly, Russian companies, banks, and auditors use the same foreign analytics and demand it to be referenced if a financing application is discussed or part of an annual IFRS audit. A question

18. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewiG3Mq6q9vwwAhVnhosKHTCeCq8QFjABegQIAxAD&url=http%3A%2F%2Fwww.naen.ru%2Fjournal_nedropolzovanie_xxi%2Fprilozheniya-k-zhurnalu%2FJORC_code_preview.pdf&usg=AOvVaw1KVLzyDhaPesqm6VxbHj5d

19. <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewj7jM7HstvwAhUilYsKHRJPBzMQFjAAegQIAxAD&url=http%3A%2F%2Fwww.imcmontan.ru%2Ffiles%2Fjorc.pdf&usg=AOvVaw2w6sWsU-TJ4Zbk-nxE5MaT>

20. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewiW5t_ZqtvwAhVomlsKHANbB9MQFjABegQIAxAD&url=http%3A%2F%2Fwww.jorc.org%2Fdocs%2Fjorc_code_2012.pdf&usg=AOvVaw0q5Yz1PRDuEH1bfrzADbKH

21. <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewj7jM7HstvwAhUilYsKHRJPBzMQFjAAegQIAxAD&url=http%3A%2F%2Fwww.imcmontan.ru%2Ffiles%2Fjorc.pdf&usg=AOvVaw2w6sWsU-TJ4Zbk-nxE5MaT>

22. http://naen.ru/journal_nedropolzovanie_xxi/prilozheniya-k-zhurnalu/Russian_Code_NAEN_2014.pdf

23. [О проблемах новой Классификации запасов и ресурсов твердых полезных ископаемых (zolteh.ru)]

Fig. 2,3

Historical prices for gold and copper 2001-2021. Source: GoldPrice.org, Macrotrends



Table 3

Long-term price forecast (Consensus Economics), May 2021

Market price	May 2021	Year-end 2021	2026 - 2030
Copper, \$/t	10 257	8 743	7 874
Nickel, \$/t	17 723	16 631	17 352
Gold, \$/oz	1 854	1 727	1 631

then arises – if this is useful for the whole mining industry if it helps to develop the resource potential of the country, then would not creating such analytical companies in Russia be in its best interest? Particularly when considering the importance of developing an active public mining segment on the stock exchange and the benefits to the public interest? So far, however, the large companies, both from the mining and financial sectors, developed their analytical departments or paid for the quality information. Therefore, they are not interested in wasting time and money to make such information readily available and affordable to other miners. On the other hand, the mining industry associations, i.e., NAEN or OERN, could become centers of competence for the industry offering information support. In addition, they could seed the future mining think tanks, similar to China's actively developed ones.

It looks unlikely that this problem can be resolved with the support of the government. Particularly, since creating a national mining analytics agency – and there better be more than

one – could be an example where replacing the essential services that are currently imported with local alternatives could be a genuinely strategic step. Should these agencies be government-owned? Assuming the perspective of working with foreign mining investors and expansion into CIS and Asian countries – government ownership would not be a plus. More so, since such agencies could grow through M&A in other countries, where government ownership will be a minus, as the case of China showed.

Why is making Russian mining resources more appealing to investors essential for realizing Russia's resource potential when the mining industry is doing well, and some analysts prophesize the next "supercycle" in resources? Despite all the harm and damage brought by the COVID19 pandemic, it did not significantly affect the global mining industry, which fared better than other industries in 2020. Moreover, structural changes in demand, logistics disruption, and unprecedented liquidity injection for the global economy resulted in a local deficit in certain metals and significant price increases. A 3,000 percent hike in Rhodium price was one of the highest. Does it look like a déjà vu of 2011? Those more senior in age can remember other periods like this in the history of the fundamentally cyclical mining industry (**Fig.2,3**).

The current situation in the global markets, however, looks different in the following respect. On the one hand, the expectations of a possible hike in inflation, exacerbated by the supply disruptions due to the pandemic, triggered a discussion about the beginning of a new commodity supercycle. On the other hand, the measures to meet the requirements imposed by the Paris Accord and a change in the economic trends and investment priorities, highlighted by the pandemics, can radically change the dynamics and structure of the demand for commodities, including metals and minerals (**table 3**). A look at the recent consensus forecast for most metals anticipates corrections from the current peaks. The demand for metals and minerals produced by mining companies will not disappear in the foreseeable future. At the same time, it is essential to remember that future mine production will depend on the investor that will come to the industry today. The uncertainty makes the risks of a strategic error exceptionally high for them.

The mining industry in Russia has a long and rich history, large mining companies, world-class mines, and significant resource potential. The country's resource potential must be realized in full, creating the highest value and providing a substantial contribution to economic growth. A reassessment of the fundamental concepts and approaches to the regulation of the mining industry would be a significant step in this direction. **XXI**