



# Ferrous Metallurgy Production in Russia: How Will the COVID-19 Pandemic Affect?

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## Abstract

Metallurgy is one of the key industries both in Russia and in the world. It has a significant influence on the situation in related industries. Therefore, the current state analysis of ferrous metallurgy production and its formation based on the short-term technological forecast is essential. Based on the foregoing, the research was aimed at analyzing the current state of ferrous metallurgy production in Russia and the impact of the COVID-19 pandemic on the prospects for industry development in the short term. The research studies the state of the ferrous metallurgy production in Russia and abroad before the COVID-19 pandemic, as well as the volume of industrial production in ferrous metallurgy and the industry structure. The COVID-19 pandemic has triggered a serious global recession, necessitating an analysis of the forecast for the development of the ferrous metallurgy industry. The research concludes that the Russian ferrous metals market is so far affected to a lesser extent compared to the European one.

**Keywords:** Priority strategies, Steel, Forecast, Demand, Prices

## 1. Introduction

Russian metallurgy is one of the most important industries, its share in the gross domestic product is about 5%, in industrial production - about 12%, in exports - slightly above 10%. Being a consumer of products and services of natural governmental monopolies, metallurgy consumes about 2% of electric power, 5.4% of natural gas, in railroad transit its share is 18.8%. In addition, it has a significant impact on the situation in related industries [1].

The main indices of development of the metallurgy market and global industrial economy are the performances of production and consumption of rolled metal products. In total, from 2000 to 2018 global steel production increased more than by two times. This trend evidences the high demand for metals.

However, several factors influence the decline in the production of ferrous metallurgy in the world (Table 1)

In Russia, the annual production of steel is about 70 MMT, whereas the domestic consumption is nearly twice as low, significant portion of consumption in Russia up till now is comprised of imported rolled products: from 12% to 17% every year.

Russian metallurgy is characterized by high-tech production capacities. This is attributed to the active investment policy of companies which only in the recent 15 years invested about 3.3 billion rubles to the modernization of the industry. This reduced the depreciation of fixed assets from 54% to 40%. Nowadays the domestic companies can produce a wide range of metal products [2, 3].

Table 1.

**Factors, declining the production of ferrous metallurgy**

No	Factor
1	The general slowdown in economic growth in the countries of the main metal consumption (SEA, Europe), due to the termination of the stimulation of capital investment in investment projects
2	The decline in production in industries that consume ferrous metallurgy products (automotive, construction)
3	The decline in international trading of rolled metal products due to trade war (US-China) and the limitations imposed by anti-dumping and protective duties
4	The uncontrolled growth of ferrous metallurgy products in China, which has led since 2015 to the growth of export expansion of China, the decline in and volatility of prices, and rising international competition

Metallurgy is one of the most advanced industries highly interested in challenging innovations. To a greater extent, this relates to the implementation of process innovations that are aimed at the reduction of production expenses. Herewith, about two-thirds of companies spend from 5% to 15% of total profits on innovation activities.

Nowadays companies of ferrous metallurgy are interested in the acquisition of new technologies as well as in market researches aimed at searching for new markets and products.

The industrial innovations are related to the implementation of energy conservation, alternative power engineering, electronic document management, robotics of business processes, automation of single and chain of business processes, internet of things (machine-to-machine communication, IoT technologies), development of augmented and virtual reality, blockchain technology, big data work, and development of machine intelligence.

## 2. Methods

Companies of ferrous metallurgy were analyzed using statistic data of commercial enterprises, questionnaire survey, and long-term industry development was forecasted.

To determine the forecasting procedure for the development of Russian metallurgy companies, we used the well-known practice of revealing new technology trends as well as related main methods [4].

Monitoring was based on qualitative and quantitative forecasts such as an overview of published data, interviews, questionnaire surveys. The main quantitative forecast procedures were comprised of bibliometric analysis, online data acquisition and generalization, and the like.

Taking into account the existing limitations of the literature review method (the quality of the selected literature, the quality and relevance of data on the Internet, their completeness, and the subjective position of the authors), the authors of the article conducted an expert survey to assess the reliability of the selected literature sources.

Structurally, the research involved the consistent analysis of the state of the metallurgical industry in Russia as well as forecasting the indicators of ferrous metallurgy production.

At the first stage of the research, the selected information was grouped according to the type of documents.

The first group of literature sources included statistical and analytical information from the WSA, Deloitte CIS Research Center, S&P Global Market Intelligence, MegaResearch marketing agency, Analytical Credit Rating Agency (ACRA), National credit ratings agency; each source of the data obtained was indicated. The second group of documents included scientific research on the characteristics of the state of the metallurgical industry in Russia, as well as the forecast for ferrous metallurgy production (articles from scientific peer-reviewed journals indexed in Scopus and Web of Science over the past 10 years).

At the second stage of the research, the authors contacted 11 Russian experts in the field of ferrous metallurgy. The selection criteria for experts were the availability of at least three articles on the studied topic published in journals indexed in the Scopus or Web of Science Citation databases. E-mails were sent to the experts with a request to assess the reliability of the material selected for the research. A questionnaire was compiled by the authors that contained ten questions to assess the documents selected for the research. The experts used the Harrington scale for the assessment [5]. Two questions were open-ended and experts could indicate proposals for increasing/decreasing the number of important literature sources, commenting on their answers. The questionnaire results are summarized in Table 2.

Table 2.

**The results of the expert survey to assess the reliability of selected documents**

No.	Main characteristics	Results
1	The number of proposals sent to experts	11
2	The number of questionnaires received from experts	8
3	The average reliability level of statistical information	0.77 scores
4	The average reliability level of research results/expert information	0.72 scores
5	The number of new documents added by experts to improve reliability	5

The experts were sent the same questionnaire and were given an equal number of calendar days to fill it out. Three experts referred to being busy and declined to answer. The limited time frame and simultaneous dispatch allowed for a level playing field for experts. On average, the experts rated the selected documents high (according to the Harrington scale, the "high" value started from 0.64-0.8).

At the third stage of the research, the collected information was processed, distributed according to the degree of significance. As a result, the current state of the metallurgical industry in Russia, the prospects for its development, and the impact of the COVID-19 pandemic on the forecast of ferrous metallurgy production were determined.

### 3. Results

In total, the state of Russian metallurgy in 2017 as well as the challenges of its development can be evaluated as positive. The beginning of 2018 was successful. In January 2018 the metallurgical production increased by 5% in comparison with the previous January, steel production increased by 9%, the output of rolled products increased by 3.5% [6, 7].

Chinese market of ferrous metallurgy has a significant impact on the global metal market. In 2016 China started reduction of domestic steel melting capacities by 150 MMT per year during 3-5 years. In 2018, the government of China specifies the target for national metallurgy to shut down during a year deteriorated facilities with a cumulative annual output of 30 MMT. Moreover, the government of China requires to shut down coal production facilities with an annual output of 150 MMT in 2018 [8].

Global production of ferrous metallurgy in 2017 increased by 5.3% in comparison with the previous year due to the increase in demand for metal items and, respectively, the increase in prices and output reaching 1.69 billion tons which corresponded to the level of 2010 [9, 10].

In 2017 the Russian metallurgy produced 73.1 MMT of steel, which was 2.4% higher than in 2016. The annual output of finished rolled products in comparison with 2016 increased by 0.7% amounting to 60.9 MMT. The output of cast iron in comparison with 2016 increased by 0.55% amounting to 52.2 MMT [11].

Positive results of Russian metallurgy were achieved due to positive changes in mechanical engineering, automotive industry, construction sector which consumed metal products. The year 2017 was marked by an increase in production of vehicles, including passenger cars, stabilization and starting increase in retail sales, increased amount of construction works, and investments in capital assets.

In 2017, Russian metallurgists were competitive in global markets, the average utilization of metallurgical capacities in Russia remains above 80% [12].

Three top factors which could stimulate the development of Russian metallurgical companies are as follows:

- Decrease in production costs (50%) [13];
- Increased demand in Russia (40%);
- Improved engineering potential (commissioning of new facilities) (30%).

In comparison with the previous year, a new strategic trend appeared in the activity of Russian metallurgical companies related to the substitution of imported products in the domestic market.

All aforementioned strategies evidence recovery of the ferrous market in Russia.

Six major ferrous companies produce more than 75% of Russian output. The industrial output of these companies in 2019-2020 is illustrated in Table 3.

Table 3. Financial indicators of the leading metallurgical companies in Russia [14]

	Earning, million USD				EBITDA, million USD				EBITDA profitability (%)			
	1П 2019	1П 2020	9M 2019	9M 2020	1П 2019	1П 2020	9M 2019	9M 2020	1П 2019	1П 2020	9M 2019	9M 2020
EVRAZ	6,140	4,983	n/a	n/a	1,482	1,073	n/a	n/a	24	22	n/a	n/a
NLMK	5,666	4,631	8,242	6,860	1,430	1,176	2,084	1,755	25	25	25	26
Severstal	4,208	3,367	6,319	5,242	1,416	1,056	2,203	1,712	34	31	35	33
MMK	3,835	2,978	5,844	4,543	937	668	1,462	1,018	24	22	25	22
Metalloinvest	3,584	3,075	5,328	4,572	1,410	1,059	2,115	1,632	39	34	40	36
Mechel	2,353	1,901	3,404	2,720	466	318	686	435	20	17	20	16

The major Russian ferrous metallurgy companies in terms of production are Evraz Holding, Novolipetsk Steel (NLMK), Metalloinvest, Magnitogorsk Iron & Steel Works (MMK), and Severstal.

### 4. Discussion

According to the Deloitte Research Center, in 2019, steel production in Russia decreased by 0.6% (71.7 million tons). At the end of 2019, Russia became the fifth steel producer in the world after China, India, Japan, and the United States with a share of about 4% in global production. In January-September 2020, steel production decreased by 2.9% YoY to 52.5 million tons [14].

Nevertheless, the final result of 2020 can be considered, if not successful, then satisfactory, because in the ferrous metallurgy production increased even by 0.6%. According to the results of 2020, Russia moved to the fourth position from the fifth among the largest steel producers in the world with an output of 72.8 million

tons, which is 4% of global production. Metallurgical enterprises of Russia produced 52 million tons of cast iron in 2020, which is 1.5% higher than the volumes of 2019. The production of finished rolled products amounted to 61.8 million tons, an increase of 0.5%. Steel production also increased by 1.1%. In 2020 the share of oxygen-blown steel and electrical steel in the total volume of steel smelting amounted to 97.8% (at the level of 2019) [15].

One can state that in general, the pandemic caused a short-term shock in the ferrous metallurgy just for one quarter in the middle of 2020. However, since July there has been a period of intense recovery of the metallurgical market with a significant jump in prices and a shortage of supply. The outstripping growth in demand over the supply in several regions of the world, and domestic demand from housing construction and mechanical engineering will support the further growth of ferrous metallurgy [16].

Thus, the coronavirus pandemic forced the metal products market players to work in 2020 in conditions of high uncertainty and volatility against the background of a decline in business activity, as well as a general decline in the national economy. By

the end of 2020, the apparent consumption of metal products in Russia decreased by 3.5%, to 45.5 million tons. Quarantine measures introduced at the end of March led to a drop in metal consumption in Russia in April–June by more than 18%, and the suspension of the activities of companies in the industry for almost a month. After the restrictions were lifted, demand began to recover at a very rapid pace. Consumers of ferrous metals have increased their activity, trying to compensate for the losses caused by forced downtime. In the third quarter, metal consumption in Russia exceeded the indicators of the same period in 2019 by 1.3%. Metallurgists began to work almost with a full load of production capacities. In the last three months of 2020, demand in the domestic market increased even more, caused by increased activity in the construction sector. During the year, prices in the Russian ferrous metallurgy corresponded to the dynamics of demand on the domestic and global markets. The growth in the first quarter was replaced by a decline in April–June, and by the end of 2020, prices again showed positive dynamics [16].

At that, according to the Association of Ferrous Metallurgy Enterprises "Russian Steel", which unites the largest producers of metallurgical products in Russia (producers of 98% of Russian cast iron, about 90% of steel and Russian rolled products, about 60% of pipes, as well as a significant share of raw materials for the metallurgical industry), such as, EvrazHolding, NLMK, MMK, OEMK (Metalloinvest), Mechel, OMK, Severstal, TMK and PMH Management Company, preliminary results for the 1st half of 2021 showed that production volume has increased by 5% (up to 38 million tons) compared to the same period in 2019. According to the results of the first half of the year, the industry's tax payments will amount to more than 200 billion rubles, which is almost twice as high as in 2020 (Russian steel [17]).

The Ministry of Industry and Trade of the Russian Federation (Minpromtorg RF) predicts an increase in the volume of the ferrous metallurgy market in Russia in 2021 by more than a third compared to the previous year, namely, to 5.45 trillion rubles. This is stated in the annual report of the Ministry. The industry's production volumes in monetary terms will also amount to about 5.45 trillion rubles, compared to 4.09 trillion rubles in 2020. At the same time, the Ministry in 2021 plans to reduce the volume of financing of ferrous metallurgy by 43% – down to 1.3 billion rubles.

The EBITDA margin of Russian steel companies will reach the level of 35–40% by the end of 2021, which is about twice the level of 2020. This will be facilitated by state incentives for the recovery of the industry in different countries, a gradual increase in business activity, and a seasonal increase in demand from the construction sector in the middle of the year. A new incentive will be the growing demand for steel for manufacturing turbines for wind farms, as well as the American infrastructure plan proposed by the administration of President Joe Biden. The limiting factors will be the tightening of environmental policy in China, as well as "increased control of the governments of some countries over the commodity markets" [17].

One of the main factors for the further increase in production and revenue in ferrous metallurgy is the restoration of the supply of metal products by other regions of the world (except China), which is still lagging behind the growing demand. Within Russia, the demand is supported by housing construction projects and the positive dynamics of the machinery-producing industry (the implementation of national projects, the growth in the displacement

of contemporary vessels). In addition, China is implementing a policy to reduce carbon dioxide emissions by 30% by 2030, which is expected to lead to a decrease in the local production of ferrous metals. According to the NKR (National Credit Rating), against the background of these factors and an increase in prices by about 5% per year, the revenue of Russian metallurgists in 2021 may grow by 10% [16].

The production of ferrous metallurgy is further facilitated by China, which is the world's largest consumer of ferrous metals, and its demand largely determines the global market dynamics. Due to the powerful fiscal incentives that the Chinese government resorted to in the spring of 2020 to restore national economy after the pandemic, the country's GDP grew by 2.3% in 2020. Against this background, steel consumption increased by about 7.7% in annual terms.

Moreover, in April 2021, the WorldSteel International Metallurgical Association significantly improved the forecast of global consumption of steel products for 2021–2022 compared to the October estimate. In 2020, the apparent consumption of steel in the world decreased by 0.2% compared to the previous year to 1.77 billion tons. In 2021, it is expected to grow by 5.8% to 1.87 billion tons, and next year – by another 2.7% to 1.93 billion tons [16].

## 5. Conclusion

It should be mentioned finally that a peculiar feature of modern Russian metallurgy is determined by the reduction of power consumption of the production. Factors that could stimulate the development of Russian metallurgical companies are the reduction of production costs and the increase in demand in Russia as well as the commissioning of new facilities. The main priority strategies of development of Russian metallurgical companies are market launching of new products, the substitution of imported products in the domestic market, expansion into new markets, improvement of production potential (production efficiency), and business development due to natural increase. The main issues of Russian metallurgical companies are imperfection of government regulation of the industry, insufficient capacity for production of metals, corruption, weak attractiveness of Russian industrial sector for foreign investors as well as insufficient qualified personal, top managers in particular.

Today, even in the context of the COVID-19 pandemic, Russian companies are still operating as usual, without stopping production, and the main changes boil down to the fact that, firstly, companies have reduced funding for investment programs and postponed major costly projects; secondly, the period of forced self-isolation is used by enterprises for scheduled repairs, with a minimum number of workers; thirdly, employees who are not directly involved in production processes work remotely; fourthly, there are no difficulties with the supply of raw materials, equipment, and components; and, fifthly, the depreciation of the ruble has already affected the cost of production - in April 2020, it increased by 10–15%.

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