GMK CENTER

THE IRON&STEEL INDUSTRY

GLOBAL TRENDS 2020

In partnership with:

METINVEST

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Prepared in partnership with Metinvest Group

Metinvest Group is a vertically integrated group of steel and mining companies that manages every link of the value chain, from mining and processing iron ore and coal to making and selling semi-finished and finished steel products. It comprises steel and mining production facilities located in Ukraine, Europe and the US, as well as a sales network covering all key global markets. Metinvest is among the TOP-50 largest steelmakers in the world and holds the 8th position among the largest pellet producers globally.

Strategic vision of Metinvest is to become a leading vertically integrated steel producer in Europe, delivering sustainable growth and profitability resilient to business cycles. Monitoring trends and understanding possible changes in the future in the face of a high pace of global changes are relevant as never before. Therefore, Metinvest Group acts as a partner of the study "The Iron&Steel Industry: Global Trends 2020".

METINVEST

The Iron&Steel Industry is a basic sector even for the world's major economies

The Iron&Steel Industry is a basic sector of the economy not only in Ukraine, but also in major economies worldwide, a tool for ensuring national security and a source of employment and income for many people.

The Iron&Steel Industry contribution to the economy

	Ukraine	Worldwide
Share of the Iron&Steel Industry in GDP, including related sectors	12%	3.8%
Number of jobs in related industries generated by one job in the Iron&Steel Industry	2.5	14.7
GDP in related industries generated by $1 of GDP in the Iron&Steel Industry	$4.8	$4.8
Share of the Iron&Steel Industry in employment, including related sectors	8.5%	2.9%

Sources: World Steel Association, GMK Center estimations

The indirect impact (supply chain) and induced effect (consumption spending of employees and supplier companies) is much stronger than that of direct impact (Iron&Steel Industry only). This is manifested in the number of jobs and GDP share generated by the Iron&Steel Industry in related sectors.

In the next 5–10 years, the global Iron&Steel Industry will change under the influence of global trends. Product requirements are increasing, thus increasing a demand for innovation. Business models will change due to trends in availability of raw materials and environmental requirements. A number of market factors will cause a weak growth in demand for steel products. These market factors will be attended with industrial policy trends worldwide, such as import restrictions and industrial promotion measures.

GMK Center has prepared this document to provide all stakeholders with an insight into processes in the industry. This is important for forecasting the situation both in the industry and in the economy of Ukraine and other countries.

The share of Iron&Steel Industry in GDP (total impact) in Ukraine is 12.0%, while globally – 3.8%.

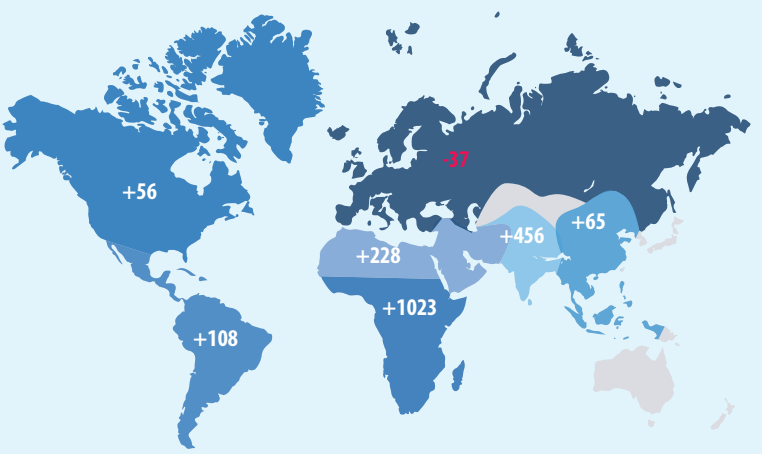
> **"The Iron&Steel Industry of Ukraine is one of those industries that bring revenue to the state budget and allow the IT sector to develop and avoid paying taxes."**

Taras Kachka
Deputy Minister for Development of Economy, Trade and Agriculture of Ukraine

The global population growth is regional in nature

According to the UN, the global population could grow from an estimated 7.7 billion people to around 8.5 billion in 2030 and 9.7 billion in 2050, of whom 68% will live in cities. Construction of houses and related urban infrastructure will maintain the demand for steel.

Projected growth of the global population in 2020–2050, million people



Source: UN

Over the past 50 years, the share of urban population increased by 50%, while steel consumption rose by 3.3 times.

The urban population is projected to grow by another 60% (from 4.1 billion in 2019 to 6.6 billion in 2050).

The population growth will be highly dependent on the region.

The population growth and urbanization indirectly impact the construction sector that consumes 50% of steel. These processes are accompanied with an increase in infrastructure investment, industrial production, employment and consumer spending.

The population growth is regional in nature. More than half of the projected increase in the global population by 2050 will be concentrated in 9 countries: India, Nigeria, Pakistan, Congo, Ethiopia, Tanzania, Indonesia, Egypt and the U.S. India is projected to surpass China as the world's most populous country around 2027.

By contrast, populations in Europe and Northern America are projected to remain almost the same in the next 30 years. This means the demand for steel will grow unevenly. Sub-Saharan Africa, Central and Southern Asia will be the most promising markets.

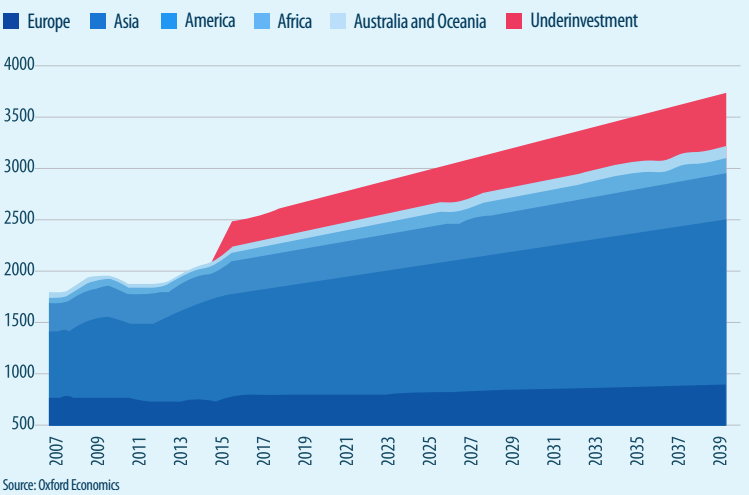
> **"A favorable demographic situation and economic growth shed light on such a complex continent as Africa. Africa has a potential to become a global manufacturing hub and a prosperous region for decades to come."**

Stephen Gold
President and CEO, Manufacturers Alliance for Productivity and Innovation

Global infrastructure investment is insufficient

Construction and infrastructure development account for up to 50% of steel demand. According to the Oxford Economics, current infrastructure investment is insufficient. Economies will face the need to increase infrastructure investment in the future. Hence, a delayed demand for steel is being accumulated.

Infrastructure investment trends, $ billion



Source: Oxford Economics

Projected investment volume by 2040 — $4 trillion per annum. Yet this is insufficient. The need for investment is 15% higher.

54% of investment needs account for Asia and 22% for America.

Some countries are attempting to overcome the problem of insufficient investment in infrastructure by increasing public spending in its development.

For instance, in India, infrastructure investment for 5 years is projected at $1.5 trillion. The purchase of metal products will account for 60% of infrastructure spending. Priority projects include development of railways ($14.11 billion for 2019–2020) and road network.

In China, the government approved 21 projects, including construction of railways and airports, with a total value of $108 billion. A specific feature of China is financing abroad infrastructure projects.

In the United States, $803 billion were allocated in the 2020 federal budget, including $300 billion for construction of bridges and $300 billion for construction of water infrastructure facilities. For comparison, the amount of public investment in the U.S. infrastructure totaled $194 billion in 2019.

According to the Research and Markets, the Export-Import Bank of China and the China Development Bank are investing some $334 billion in infrastructure projects globally.

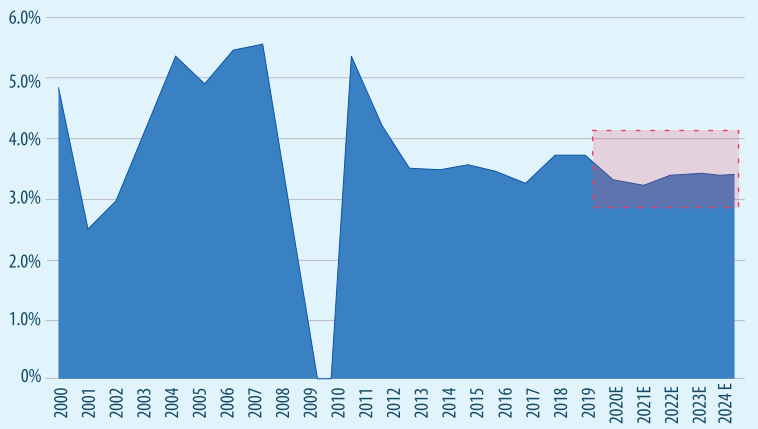
> **"I believe investment in infrastructure pays dividends for decades and is a wise investment of taxpayer dollars."**

Douglas R. Oberhelman
former Caterpillar CEO

The global economic growth slows down, risks accumulate

A global decline in the industrial sector was recorded in 2019. A similar situation in the past would have meant the economy plunging into a recession. However, the structure of the economy has changed, and the service sector currently provides a positive trend. In a long-term perspective, the global economic growth will slow down to 3.2% per annum according to a consensus forecast.

Consensus forecast for the global economic growth in 2020–2024



Source: IMF, World Bank, The Conference Board, Global Forecasting Services, OECD

The IMF expects a long-term economic growth rate of 3.6%.

Consensus forecast for 2020–2024 is +3.2%.

The average growth rate was 4.0% in 2000–2011 despite two crises during that period, and 3.4% in 2012–2019.

In 2017–2018, the global economic growth reached its peak of 3.7% since 2011. Therefore, the situation in the steel markets was favorable. In 2019, the IMF projects a minimum growth of global GDP since 2008–2009 at 3.0%. The growth in the processing industry is slowing due to increased protectionism and a decline in the automotive industry. Hence, the situation in the steel market is worsening, while competition is increasing.

In the next year or two, the market will continue to expect a cyclical crisis, the likelihood of which increases every year. 2020 is the year of the U.S. presidential election. Ahead of it, measures will be taken to curb a possible recession. The likelihood of a recession in 2020 is lower than in 2021.

The following are the risks for the global economy:

1. Trade wars and a wave of protectionism in the markets;
2. Crisis in emerging economies due to a fall in raw material prices;
3. High national and corporate debts;
4. A bubble in China's real estate market.

According to IMF estimates, the result of existing monetary incentives is +0.5 percentage points to GDP growth in 2019–2020.
However, the reserves of monetary policy are almost exhausted: its effectiveness will be limited amid crisis.

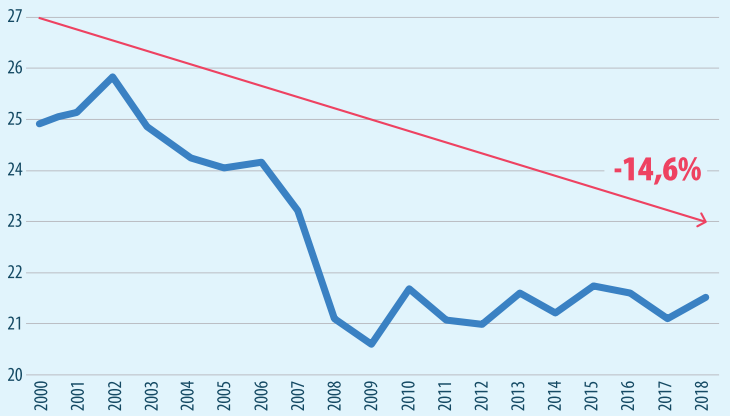
> **"The good news is that a recession during an election year is very unlikely. Since 1950, only two have started during an election year."**

Ben Levison
Managing Editor of Barron's

Deindustrialization results in lower demand for steel

Dependence of the steel demand on the population size and global economic growth has lost its linear focus.
Industry 4.0 requires less steel per $1 of manufactured product. National economies will develop at the expense of less metal-intensive industries. The economy growth will therefore require less steel in the future.

Metal intensity of the global economy, tons of steel per $1 million of global GDP



Source: IMF, World Steel Association

Steel production and consumption per GDP unit is gradually decreasing, although this process has slowed down since 2010.

Structural changes are going on in the economy: the share of industry in global GDP fell by 8 pp to 25.4% in 1994–2018.

The main hopes for an increasing demand for steel are pinned on emerging economies, in particular on India. Yet these expectations could be overestimated, as emerging economies are affected by deindustrialization trends in modern conditions.

Steel consumption per capita is determined, apart from economic growth, by the structure of the economy. The share of the services sector in emerging economies is growing, while technological advances require less steel to manufacture an industrial production unit. This means that countries require less steel to develop their economy than before.

The peak values of steel consumption per capita in emerging economies will be reached earlier and will be much lower than those of developed economies at a corresponding stage of development. This will adversely affect future steel consumption.

In India, the share of industry in GDP started to decline following an increase in 2000–2012. At the end of 2018, this indicator was 2.7 pp down from 2012.

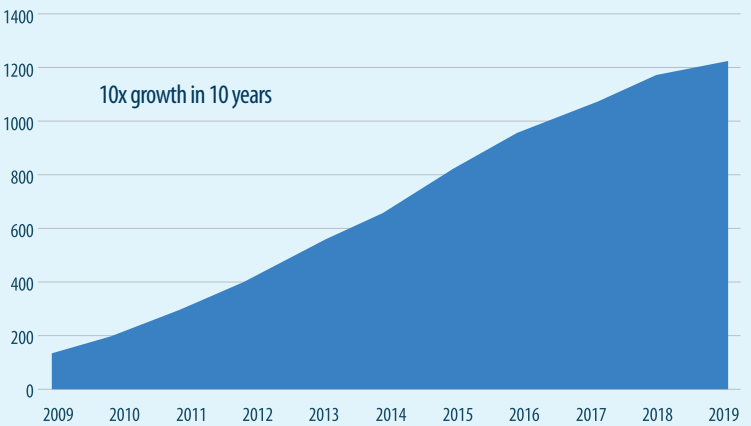
> **"A dramatic trend is deindustrialization in the developing countries. This is appropriately called premature deindustrialisation, since it means that many (if not most) developing nations are becoming service economies without having had a proper experience of industrialisation."**

Dani Rodrick
Professor, Harvard Kennedy School

Protectionism is a new normal

The Iron&Steel Industry faced a number of trade restrictive measures over the past two years. Apart from distorted competitive advantages and increased competition in barrier-free markets, protectionism results in slowing global economic growth and, in the long run, decreasing demand for steel.

Number of restrictive measures on trade in metal products in 2009–2019, cumulative



Source: Global Trade Alert

1,234 restrictive measures were imposed globally on trade in steel products in 2009–2019.

The U.S. takes a lead with 17.6% of the total number of restrictions.

The most popular instruments are anti-dumping measures (22.6%) and protective import tariffs (15.4%).

Development of protectionism is a logical consequence of global processes:

1. The increasing popularity of nationalist sentiments, greater influence of right-wing forces on political and economic processes.

2. The peak of globalization, no development opportunities, openness ceased to be profitable, which caused a reverse contraction process.

3. The crisis of the WTO – weak discipline of some members, suspension of the WTO Appeals Body, conflicting approaches of key stakeholders to reform the organization.

4. Pressure on employment amid technological changes, reflected in changes in industrial policies of developed economies.

Hence, neither cancellation nor mitigation of protectionist measures should be anticipated in the coming years. Conversely, they are likely to be toughened.

Given this situation, development of trade is possible through conclusion of bilateral agreements.

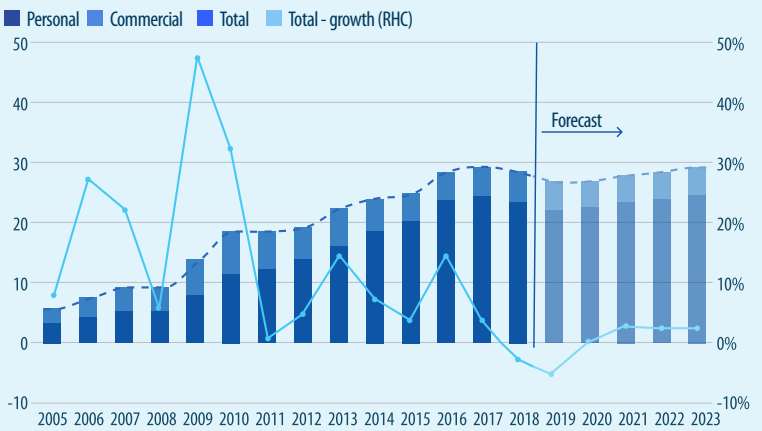
According to WTO estimates, the growth rate of international trade in 2019 was lower than the global economic growth level for the first time ever since the 2008 financial crisis.

> **"Globalization has peaked, and there is a significant and underappreciated risk that the world will start to de-globalize over the coming years. A mix of restrictions on trade in specific sectors and products seems likely, as does some sort of technological iron curtain. Were this to happen, it would have a more deleterious effect on global growth, not to mention geopolitical stability."**
>
> **Neil Schering**
> Chief Economist, Capital Economics

Global car sales peak is around the corner

Global car sales peaked in 2017. After this, the market has experienced a decline caused by weak sales in China for two years in a raw. This adversely affected the steel market. It will take up to 5 years to restore sales. In the future, a number of factors pose a potential threat to the demand for steel in a long-term perspective: development of shared services (sharing), car weight reduction.

Car sales in China, million units



Source: CRU

The global fleet of cars is becoming obsolete. Their average age reached a record of 11.8 years in 2019. This will create a delayed demand.

CRU however expects weak growth in the next 5 years with an average rate of 2–3% per annum, McKinsey — 2%. The weakness of emerging markets and technological changes will impede sales.

The main reason for the decline in car sales in China is the abolition of VAT benefits for car purchases. The market is gradually becoming saturated. In the largest metropolises — Beijing, Hangzhou, Tianjin — the number of cars per 100 households is 45–50. There is a potential for growth in rural areas, but its quick fulfilment is impeded by the economic slowdown.

The development of sharing services will decrease car sales in a long-term perspective. PWC expects that by 2030, 17–23% of car rides will be made through sharing services, mainly though autonomous taxis. According to McKinsey, one car in ten sold could be a shared car in 2030.

Changes in urban architecture will discourage the use of personal cars. Prices for cars will be higher (new engine technologies, digital technologies), whereas robo-taxis will be available for fraction of the price.

Global car sales fell by 0.8% in 2018, by another 4.4% in 2019 compared to an average annual increase of 4.1% in 2011–2017.
In the next 5 years, the annual growth rate will slow down to 2–3%.

The impetus of the car market has shifted to emerging economies. This is where the maximum decline in sales is recorded. Car sales in China dropped by 8.2% in 2019. China holds a share of around 30% of the global market.

A decline in car sales is both a symptom and a factor of weakness of the global economy, since the car sector accounts for 5.7% of global GDP.

Although the car sector holds just 13% of steel consumption, it secures 50% of steelmakers' EBITDA.

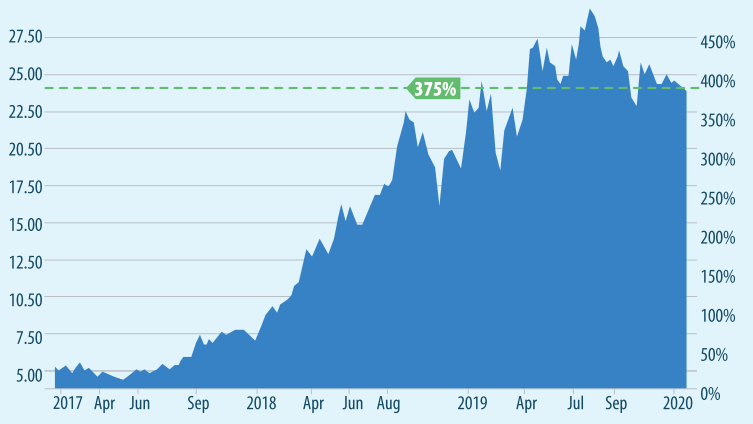
> **"The distorting effects of tax changes may be masking the saturation of at least some sections of the domestic market for passenger cars in China."**

John Kemp
market analyst, Reuters

Decarbonization enhances the need for investment

All production chains should be environmental friendly, according to last trends. Although steelmaking is not the major source of emissions, but steelmakers actively invest in eco-friendly technologies. In the EU and China, state regulatory policies put pressure on emission reductions.

Price of CO2 emission allowances in the EU, EUR per ton



Source: Markets Insider

In 2017, the share of steelmaking companies in global CO2 emissions was 5%.

CO2 emissions per ton of steel decreased by 13.7% in 2009–2018.

The price of 1 ton of CO2 emissions in the EU tripled in 2018–2019.

Available technologies restrict opportunities to curb CO2 emissions. Development and implementation of new technologies require substantial investment. In the EU, all research and pilot decarbonization projects are partly funded by governments.

Amid growing expenses associated with emissions charges, steelmakers announced a transition to carbon-free steel production:

- Liberty Steel — by 2030;
- ArcelorMittal — by 2050;
- ThyssenKrupp — by 2050;
- Voestalpine — an 80% cut in CO2 emissions by 2050.

The EU launched a discussion of a carbon border tax — a special import tax aimed at shielding European steelmakers against cheaper imports from countries with less stringent CO2 emission standards.

The introduction of the carbon border tax in the EU to increase investment in other regions in order to achieve compliance with the European emission standards.

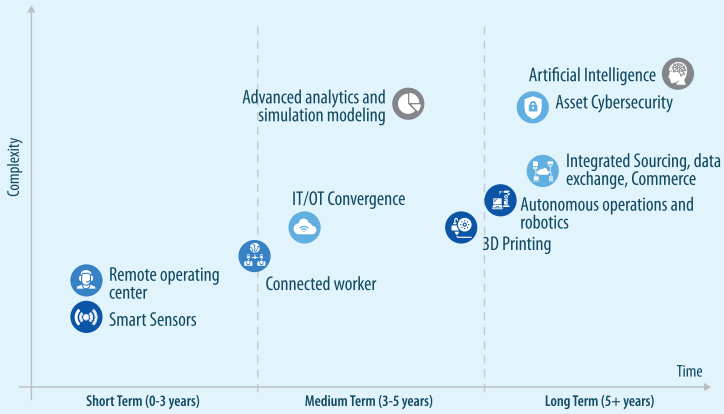
> **"While steel has a lower carbon intensity than many other materials, the large volumes produced globally mean that the industry emits more than three gigatons of CO2 annually. With the demand for steel ever increasing, we know we have a role to play and a clear responsibility to significantly reduce the carbon footprint of steel."**

Alan Knight
Corporate Responsibility General Manager, ArcelorMittal

Digitalization as a must to maintain competitiveness

The Iron&Steel Industry is believed to less use digital technologies than industries oriented towards end users. Yet the situation is changing. Industry 4.0 requires large-scale digitalization of production. For steelmaking companies, therefore, adoption of digital technologies is a matter of maintaining competitiveness.

Prospects for the development of digital innovations in the Iron&Steel Industry



Source: Accenture, World Economic Forum

In a short-term perspective, the greatest chances will come from technologies offering new forms of interaction of workers and equipment.

Much more effort will be needed for the development of technologies linked to integrated platforms and new methods of data analysis.

The main areas of digitalization of the Iron&Steel companies are:

- automation, robotics, introduction of new operating equipment, including smart sensors and 3D printers;

- digital support of labor force — equipping employees with electronic devices allowing them to receive data in real time, use virtual and augmented reality technologies;

- creation of integrated platforms and ecosystems — integrating various operations, IT solutions and devices that previously worked separately into one system;

- creation of new-generation analytical systems — developing new data processing algorithms, including those linked to AI.

According to the World Economic Forum, 10 years of digitalization will yield steel companies $320 billion in operating earnings.

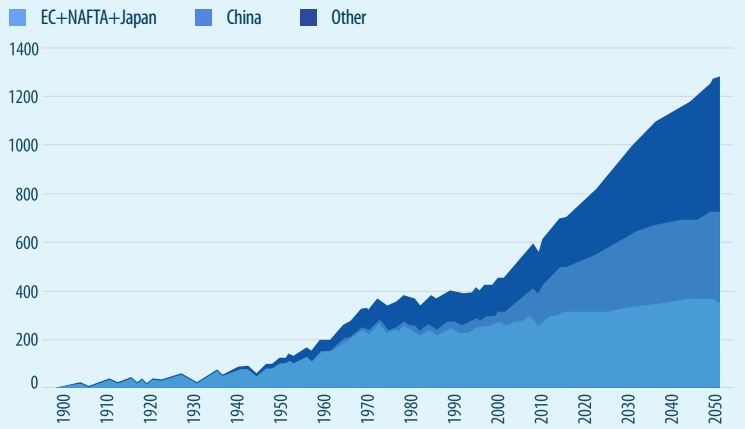
> **"The next phase of manufacturing goes beyond the automation and robotics. It involves this whole interconnected data universe where you don't just have automated machines, but you have machines that talk to one another."**

Matt Meyer
Vice President of Digital Innovation, Kloeckner Metals Corp.

Recycling to change competitiveness of steelmaking companies

Availability of scrap and its offer into the global market will increase in the coming years. This will mainly be driven by China. This factor will reduce cost advantages for vertically integrated companies which they currently have due to access to iron ore.

Global scrap availability by region, million tons



Source: World Steel Association

The volume of available global scrap is expected to grow from 620 million tons in 2016 to 1.3 billion tons in 2050.

The main growth will take place in China and other emerging countries.

In 60 years, enough scrap will be collected worldwide to meet 70% of the demand for steel.

A shift to carbon-free steel production will give an impetus to greater use of scrap. Specifically, CO2 emissions of electric steelmaking are almost 5 times lower compared to the blast furnace-basic oxygen furnace cycle (0.4 tons per ton of steel against 1.9 tons).

The use of iron ore for steel production may be more expensive in the future. According to the German Scrap Federation, the use of scrap instead of iron ore could have an economic effect of up to $235 per ton of steel due to lower emissions.

About 50% of the steelmakers' EBITDA is the raw materials segment (iron ore, coal) and another 50% the steel segment.

In the opinion of McKinsey & Company, it is access to raw materials that determines to a large extent the cost of steel products (i.e. competitiveness of companies). Hence, with a decrease in demand for iron ore in the future, vertically integrated companies with raw material advantage will lose competitiveness.

Due to increasing scrap supply in China, the demand for iron ore in the global market will reach its peak by 2050 according to some estimates. According to other estimates, the peak will be reached already in the 2020s.

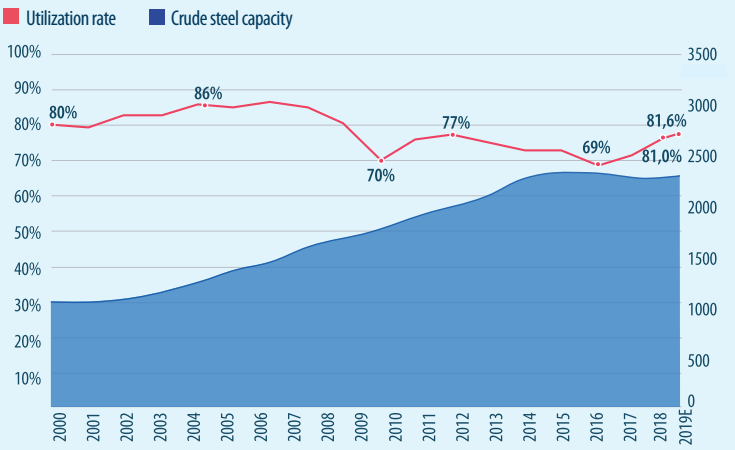
> **"We must move our UK steel-making industry towards recycled steel. The UK, with its strong climate policy, mature stocks of steel, and great history of innovation, is perfectly placed to be world-leading with a sustainable steel industry."**

Julian Allwood
Professor of Engineering and the Environment, University of Cambridge

Excess capacity in the industry is a problem without a solution

The global level of excess capacity reached a record minimum in 2019 over the past decade. Yet this mainly happened due to the consumption and production of steel, not a decrease in capacity. Therefore, with the aggravation of the demand situation, the market may face this problem again.

Crude steel production capacity (million tons) and capacity utilization rate



Source: World Steel Association, OECD

In 2015, global excess capacity touched a record high level of 700 million tons.

In 2018, it amounted to 425 million tons, a record minimum over the past decade.

The Global Forum on Steel Excess Capacity was set up to coordinate efforts of the largest steelmakers to combat excess capacity. This is a non-binding initiative of the G-20 countries. Of all the participants, only China undertook to decrease capacity. Other countries used other, milder stimulus measures.

The decrease in global capacity is due to China, which set a goal for 2016–2020 to decommission 150 million tons of steelmaking capacity and achieved it ahead of schedule back in 2018. Yet according to Platts, China's capacity increased to 1.2 billion tons in 2019 against 1.13 billion tons in 2013 because of retroactive revision of data. There are no reliable data on capacities in China.

In 2019–2021, global capacity may increase by 4–5% (88–110 million tons). The commissioning of 88 million tons of capacity is under way, another 22 million tons are at the stage of planning. The largest contribution to the increase in capacity will be made by Asia (63 million tons) and the Middle East (27.7 million tons). If these plans are implemented, the average global capacity utilization rate will drop from 81.6% in 2019 to 80% in 2021.

Almost 50% of new capacity (42 million tons) is funded by Chinese companies. Despite this, China opposed the extension of the mandate of the Global Forum on Steel Excess Capacity. The mandate ended in November 2019.

According to the OECD, global nominal steel capacity was 2.233 billion tons in 2018, 0.3% down from 2017. The steel capacity reduction has been recorded for a third year in a row.

Data on capacities in China are understated. The capacity utilization rate was 90% in 2018. An increase in China's steel production amounted to 8.3% in 2019.

> **"I do not think the problem of excess capacity will be solved, at least in this century. This is what we have to learn and cope with."**
>
> **Becky Hites**
> President, Steel-Insights

Conclusion: the industry is in the grip of a weak market and the need for investment

Global trends will cause a weak steel demand in the coming decades. Excess capacity and development of protectionism form a highly competitive environment and steel price volatility.

Consequences of the weak steel demand:

1. Exacerbation of the excess capacity problem;
2. Development of protectionism (one of the factors);
3. Low margins, price volatility, constant pressure on steelmakers when risk factors appear;
4. Factors in the markets of raw materials will have a stronger impact on the prices for finished products;
5. Increase in M&A transactions with 'stressful' companies.

Decarbonization, digitalization, possible changes in supply chains and other trends increase the need for capital investment in the meantime.

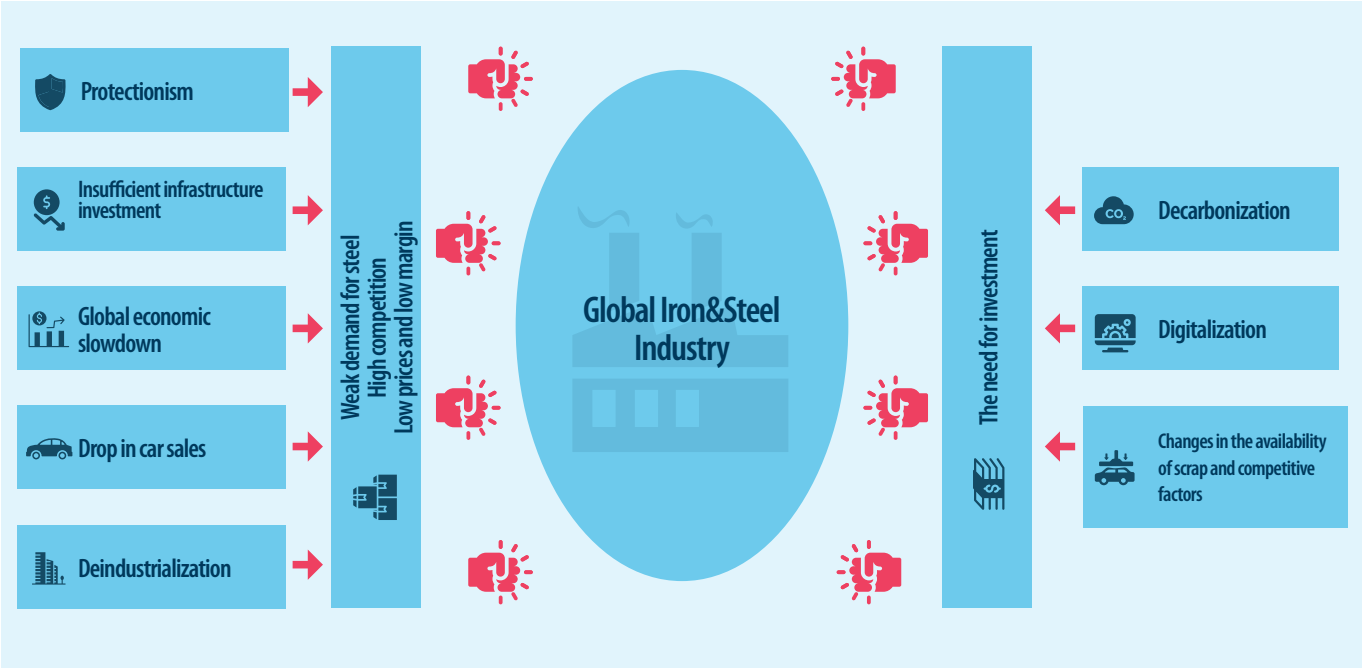
Hence, the global Iron&Steel Industry is in the grip of a weak market and poor financial results on the one hand, and the increased demand for investment on the other.

Each of the trends not only poses risks, but also offers opportunities. The advantage will be with companies that could adapt their activities to a changing environment, and with countries that create appropriate conditions for this.

The advantage will be given to countries with access to affordable capital, developed domestic markets of metal products, active tools of industrial policy.

According to the World Steel Association, the demand for steel will in grow by 1% per annum in a long-term perspective, which is not news for the sector.

The annual average demand growth of 1.1% was recorded over 25 years, from 1976 to 2000.



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Kyiv 2020

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