INTERPIPE
*Partner of the study*

GMK CENTER

## Investment outlook of Ukrainian iron & steel companies

# IRON & STEEL SECTOR OF UKRAINE:

# INVESTMENTS IN THE FUTURE

# TABLE OF CONTENTS

# FOREWORD

***Stanislav Zinchenko,***
*GMK Center Director*

The report you are holding represents the very first comprehensive study of investment activities of Ukrainian iron & steel companies and their contribution to the Ukrainian economy. For decades, companies of the iron & steel sector have been providing jobs, paying taxes, financing social projects in their regions of presence, and in no small way investing to survive in the future.

Investments create new possibilities. Possibilities for growth and development. It is crucial whether the investment volumes are permanent and how much they can be reckoned on in the future. Iron & steel companies are a unique case. Considering the specific nature of their operation, their investments are stable: the sector accounts for appx. 10% of the total volume of CAPEX in Ukraine.

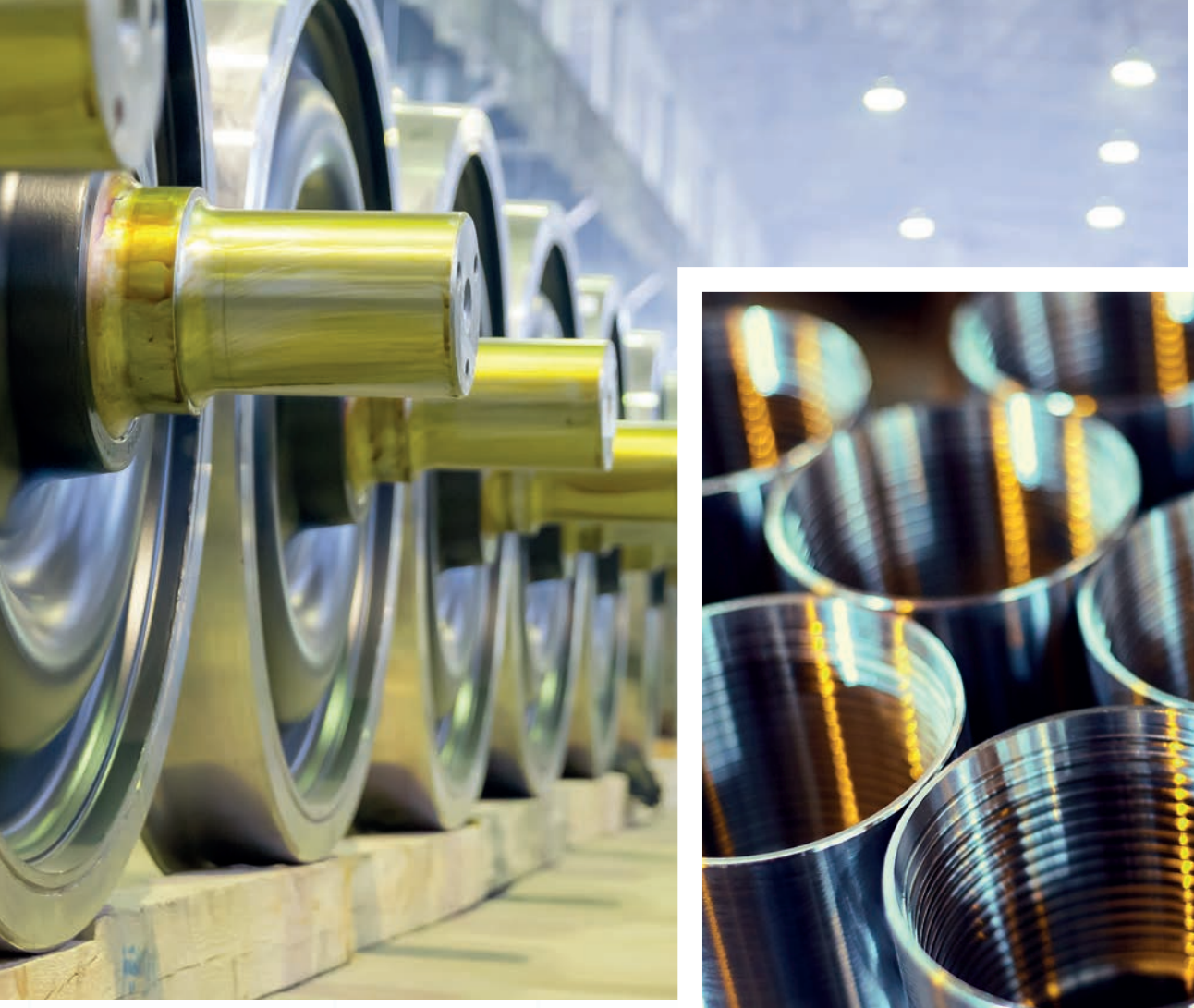
Iron & steel companies support the country's macroeconomic stability more than any other businesses. We can see this from changes in Ukraine's GDP, which decreases in parallel with a drop in capital investment by iron & steel companies. CAPEX of iron & steel companies today defines output of mechanical engineering companies, the volume of transported cargo and the volume of generated electricity tomorrow.

In spite of all the difficulties and volatility of the total investments in iron & steel sector, we can see a positive trend, i.e. the amount of CAPEX per ton of steel and iron ore concentrate is gradually increasing. It means that the sector recognizes its prospects and is ready to further support the Ukrainian economy.

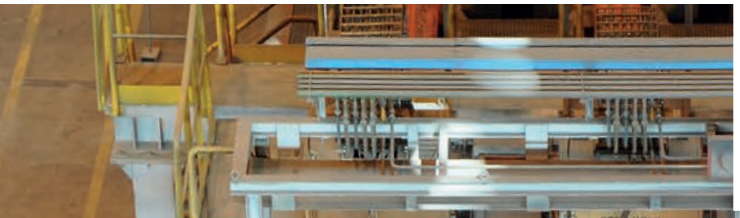
The economy model is certainly going to change in the framework of green energy transition. However, it requires green (i.e. zero carbon footprint) steel. That's why iron & steel companies are already setting the basis for production of such steel. This study is prepared in partnership with the Interpipe, one of the largest investors in the Ukrainian industry. Interpipe managed to implement a unique project — construction of an EAF mill from greenfield. It`s the largest environmental investment in Ukraine as the new Interpipe Steel plant features environmental indicators on a par with the world's best practices.

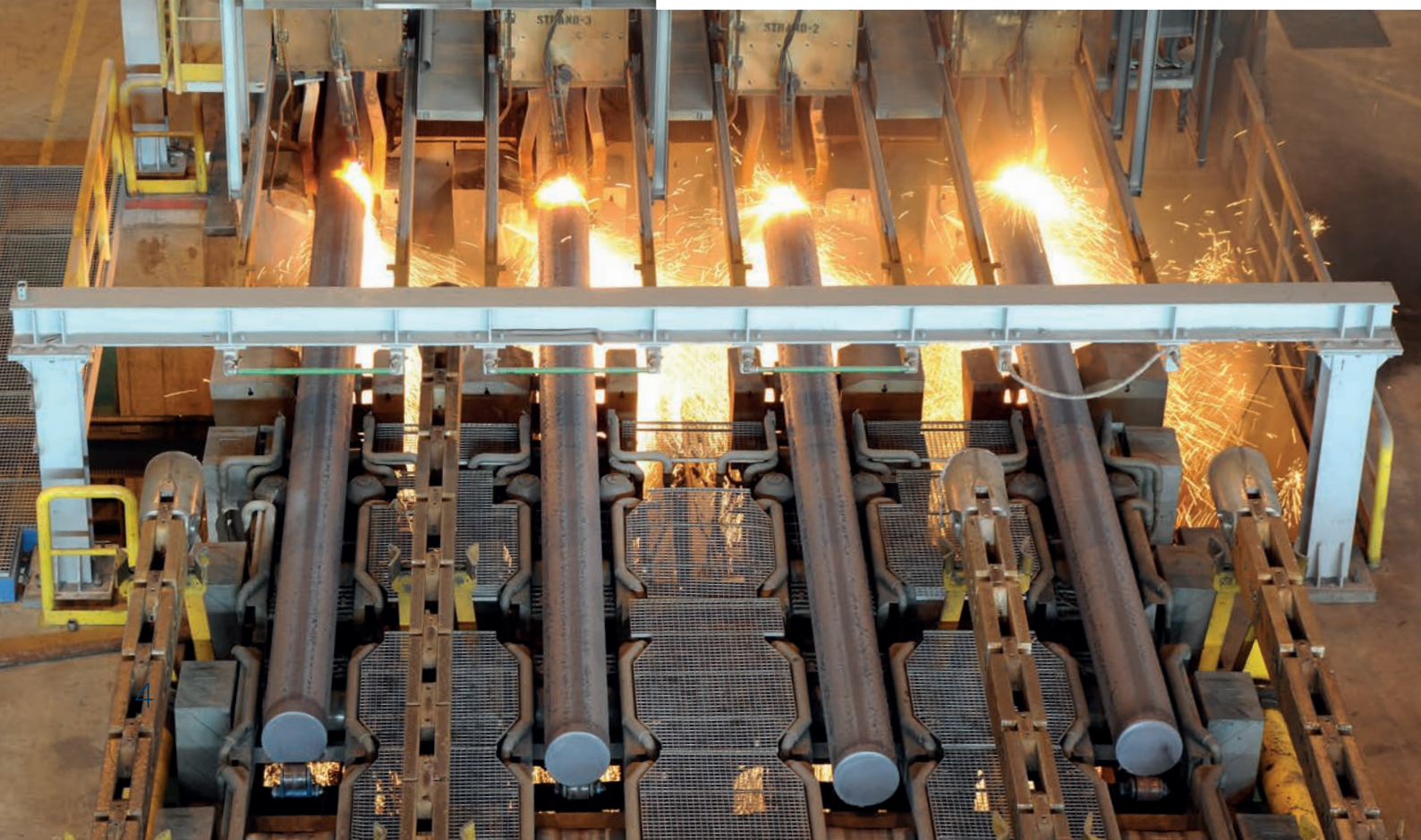
However, few of the stakeholders care to muse upon problems and obstacles faced by steelmaking companies in Ukraine. Ukrainian iron & steel companies CAPEX depend on dynamics in steel prices. And this dependence is significantly stronger than their direct competitors from Russia, Turkey, and the EU. It happens because Ukrainian manufacturers have no access to cheap debt funding and therefore are forced to count solely on their own funds.

Considering the impact of Ukrainian iron & steel sector to the domestic economy, its investment activity should be facilitated by the government. Public institutions in the U.S., Canada, Australia, and the EU countries allocate funds to investment projects in the iron & steel sector directly (through grants, soft loans, interest rate compensations etc.). Ukraine has no comprehensive policy on encouraging investments in the iron & steel sector. We hope introduction of such a policy is a prospect for the nearest future and our study is here to help by laying a groundwork for public and expert discussions.



INTERPIPE





# INCREASING HVA PRODUCTS SALES IS OUR STRATEGY

***Denys Morozov,***
*Deputy CEO at Interpipe*

Interpipe, a global producer of steel pipes and railway products, has been implementing a strategy for increasing the share of high value-added products in its portfolio for over 10 years. The key element of this strategy is a long-term investment program that ensures deployment of new production facilities.

Construction of a new EAF plant, Interpipe Steel, together with related infrastructure to replace an outdated, pollutant-intensive open-hearth production facility has become the first such investment that amounted to $1 billion. Apparently, achieving required characteristics of premium-grade products — pipes as well as wheels — is impossible without high-quality steel.

Today, Interpipe can cope with virtually any grade of steel according to our clients' needs. This is our strategic advantage in the market: we are much more flexible than other manufacturers and we are able to master commercial production, from steel grade to final product.

The "green" component of our steel production comes as an additional advantage. All the major European companies have already declared decarbonizing as their goal. $CO_2$ emission content in our EAF steel is several times lower than in the BOF route, which enables clients to have a more environmentally-friendly supply chain and lower $CO_2$ footprint.

After investing in steelmaking, we focused on development of innovative facilities for pipes and wheels production. In general, the Company has invested around $200 million in pipes and wheels production since 2004.

In the pipe segment, we significantly expanded our product portfolio with premium products for oil & gas sectors. We have become the fourth company in the world to obtain a manufacture patent CAL IV level premium connections for drilling in tough conditions. In 2020, in spite of the COVID-19 pandemic, we invested $10 million in a new pipe-threading line manufactured by Danobat (Spain).

In parallel with the investment program, we are implementing a long-term program of premium product introduction and certification. Last year alone, we passed pre-qualification with such oil & gas giants as ADNOC (UAE), Qatar Petroleum, Turkish Petroleum and started debut supplies.

The result of consistent investments in the railway product segment is demonstrated by the next data: two out of three freight railcars in Europe are equipped with our wheels. We designed a special Ultimate line of railway wheels for heavy duty transport, allowing our products to be used for trains running both in sands of Saudi Arabia and cold regions of North America.

We have also become the first CIS company to master production of railway wheels for high-speed trains, alongside with the development of products for rail cargo segment. We launched supplies of railway wheels for the German national rail transport operator Deutsche Bahn AG at the end of last year and designed new wheel type for German passenger trains this year.

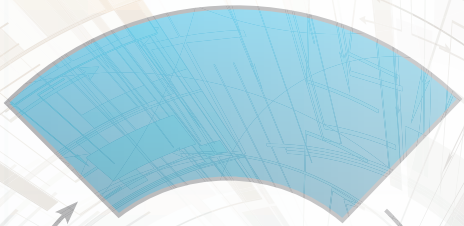
Currently, Interpipe investment portfolio is amounts to $100 million. All the projects include an environmental component, such as further reduction of $CO_2$ and pollutant emissions, waste disposal, increase in energy efficiency.

To be competitive on export markets, from Europe to America and from Ukraine to Singapore, we need to make constant progress, i.e. master new products that are demanded on the market, offer innovative technology solutions, etc. That would be impossible without systemic investments in production.

# FACTS AND FIGURES

**$22,2 billion**
total CAPEX of Ukrainian iron & steel companies* in 2010–2020

**$2,0 billion**
average yearly CAPEX of Ukrainian iron & steel companies



**24,9%**
share of iron & steel sector in total CAPEX of industrial sectors in 2020

**$138 million**
environmental CAPEX of Ukrainian iron & steel companies in 2020

**$25,5 billion**
to be invested by Ukrainian steelmakers for decarbonizing steel production

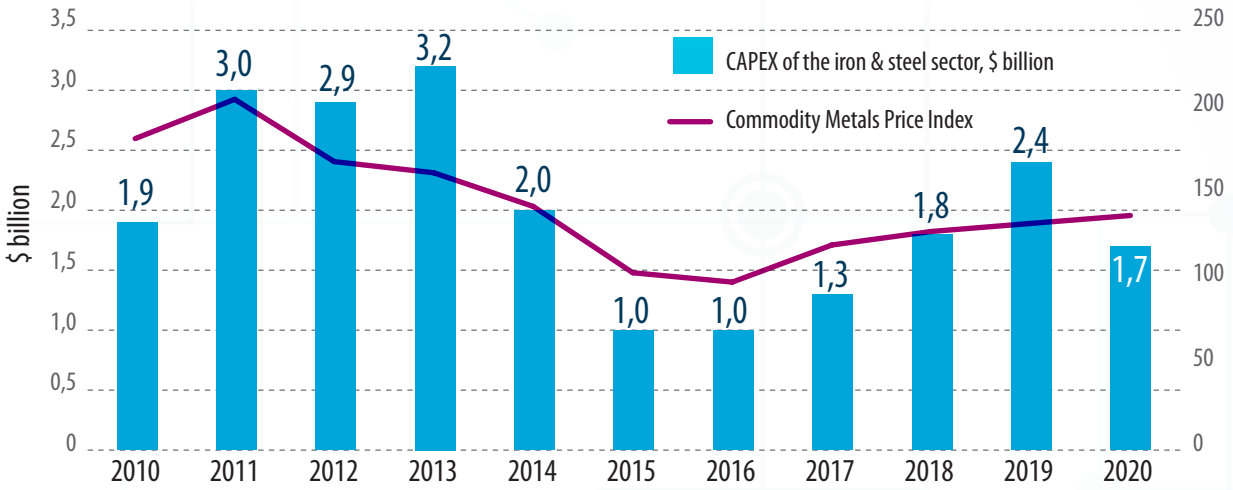
** The following activities are included in the iron & steel sector under the Standard Industrial Classification (SIC): coal mining, mining of metal ores, metallurgical production (including pig iron, steel, ferrous alloy production), production of finished metal products (except machinery and equipment).*

# 1. INVESTMENTS IN THE IRON & STEEL SECTOR: KEY TRENDS

Investment is an important factor of economic growth. On the one hand, it is a component of GDP. Investments growth means economy growth and the higher living standards. At the same time, investments have multiplicative effect, as they create a demand in other sectors (mechanical engineering, construction, transport, electricity). Investing today, companies are setting the ground for continuing their activity in the future. I.e., investments deliver a long-term effect.

Without investments it is impossible to maintain competitive ability and market presence in the long run. Investments at a micro-level do the groundwork for economic growth at a macro-level. Investments in capital-intensive sectors, such as iron & steel sector, are particularly important.

## Capital investments in the iron & steel sector of Ukraine and metals price movements




*Data sources: State Statistics Service, IMF, GMK Center estimations*

An average annual volume of CAPEX in the iron & steel sector through 2010–2020 amounted to $2.0 billion. A unique event took place between 2010 and 2012 — a new Interpipe Steel plant was constructed from greenfield. This is the only case of a new metallurgical plant constructed in Ukraine through the period of its independence. Thanks to Interpipe's contribution in 2010–2012 a higher level of capital investment was reached across the whole iron & steel sector of Ukraine.

However, starting from 2015, the amount of CAPEX in the iron & steel sector has decreased due to a number of factors. First of all, control over some plants in Donetsk and Luhansk regions was lost. It caused a decline in steel production. At the same time, there was a period of low prices on the global market that can be tracked in the Commodity Metals Price Index chart. Companies were earning less so their investment opportunities lowered. However, investments per ton of steel has grown. An average CAPEX per ton of steel in 2016–2020 was $29.2, vs. $23.0 in 2010–2015. Ukrainian companies gradually started to catch up postponed investment opportunities.

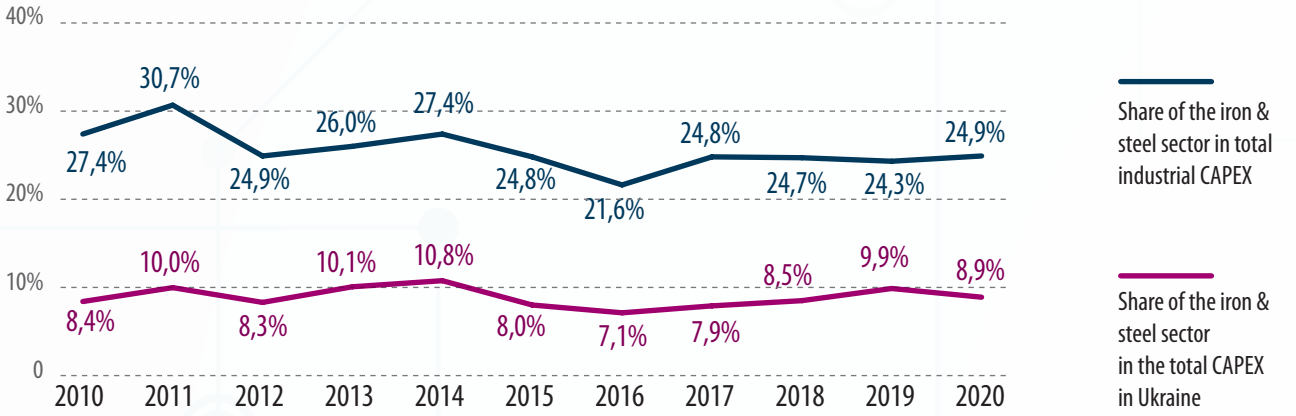
Importantly, that investment activities of Ukrainian iron & steel companies depend on price dynamics on the global market significantly higher than their foreign competitors. The reason is that Ukrainian companies rely more on their own resources and don`t have an adequate access to debt funding. During periods of high prices for steel and iron ore, domestic companies gain opportunities to earn more and, consequently, invest more.

During periods of weak prices, investment opportunities contract, investments in the Ukrainian iron & steel sector reduce. As a result, Ukraine's GDP goes down. For instance, Ukraine's real GDP dropped by 6.6% in 2014, when investments in the iron & steel sector reduced to $1.0 billion.

In 2015, iron & steel sector investments remained at the same level, but GDP contracted further by 9.8%. In 2020, investments in the iron & steel sector reduced to $1.7 billion and GDP dropped by 4.0%.

Steelmakers had to put freeze on a number of projects in 2020 due to the COVID-19 pandemic, which had a negative effect on investment sentiments. GMK Center estimates an increase in CAPEX to $2.2 billion in 2021, which is above the average level. More specifically, the Metinvest Group announced intention to invest $1.0 billion this year. Other companies intensify their investment activity as well.

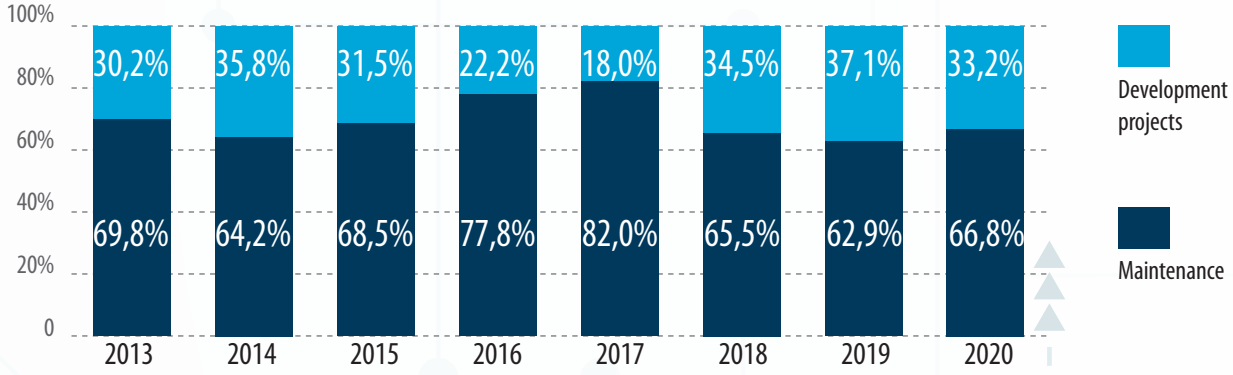
## Role of the iron & steel sector of Ukraine in investment processes




*Data sources: State Statistics Service, GMK Center estimations*

Iron & steel companies are among the major investors in Ukraine. They steadily account for 25–30% of capital investment in industrial sectors and 7–11% of the total CAPEX in Ukraine. These amounts are the precondition for introduction of new technologies, technical redesign of facilities, employment in the sector, maintaining export supplies, future tax revenues at all levels, mitigation of the environmental impact of steelmaking and iron ore beneficiation operations.

## Composition of iron & steel companies CAPEX in Ukraine




*Data Source: corporate reports, GMK Center estimations*

Around 70% of CAPEX are related to maintenance of production facilities. I.e., a minimum of $700 million a year is required to maintain facilities in operable condition. There is no way of investing less than $700 million a year, because it will cause phase-down of production in Ukraine and potential loss of capacities (by 1–2% a year). Investments in development require extra resources.

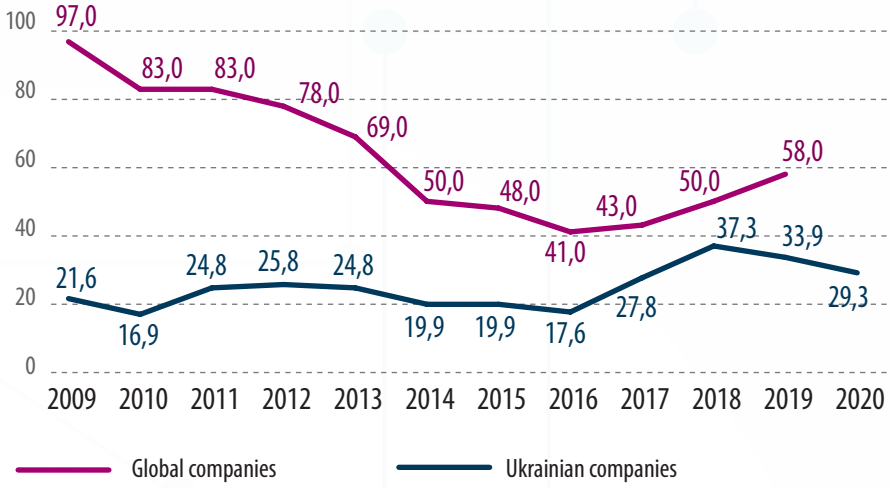
If the investment amount is calculated per ton of steel, Ukrainian steelmakers invested less than international ones. This is partly explained by the fact that financing terms are simpler for international companies, while Ukrainian companies traditionally have higher interest rates and fewer possibilities of debt refinancing. Thus, if the economic

situation changes for the worse over the course of an investment project implementation, Ukrainian steelmaking companies more often face a threat of bankruptcy. CAPEX per ton of steel of Ukrainian companies grew noticeably over the last 3 years (2018–2020). Companies have actively invested in modernization of BF and BOF facilities to establish a basis for competitiveness of finished steel products.

CAPEX per ton of iron ore concentrate of local iron ore producers in 2016–2017 was on a par with that of Australian companies and considerably higher in 2018–2019. A positive trend is evident: the amount of CAPEX by Ukrainian iron ore producers per ton of iron ore concentrate has been growing since 2017.

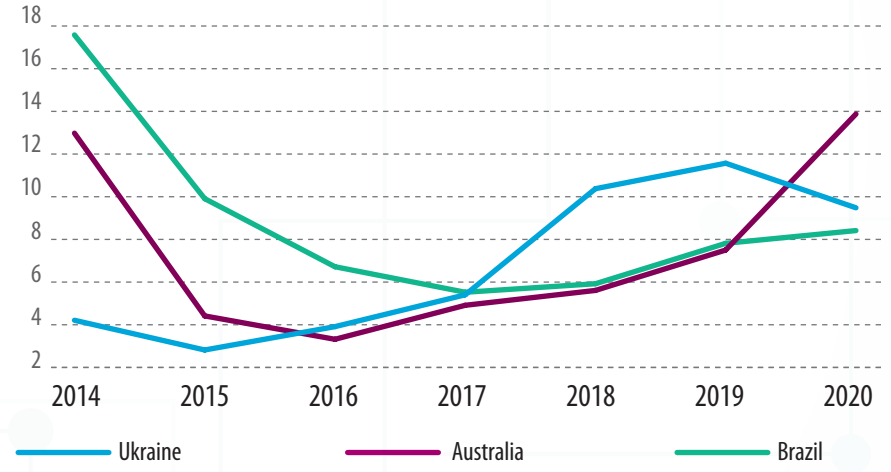
It should be considered that Ukrainian companies explore iron ore deposits with lower Fe content. For example, the average Fe content of iron ore in Ukraine is 35% vs. 58% in Brazil and 64% in Australia. So, Ukrainian companies need to add concentration and beneficiation stages to production process. While Brazilian and Australian producers only mill and grade iron ore to get finished product. In view of a more complicated processing chain, Ukrainian iron ore companies have higher demand for CAPEX.

## CAPEX in the steel industry, $ per ton steel




*Data source: Ukrmetallurgprom, Bloomberg, GMK Center estimations*

## CAPEX in the iron ore industry, $ per ton of iron ore concentrate



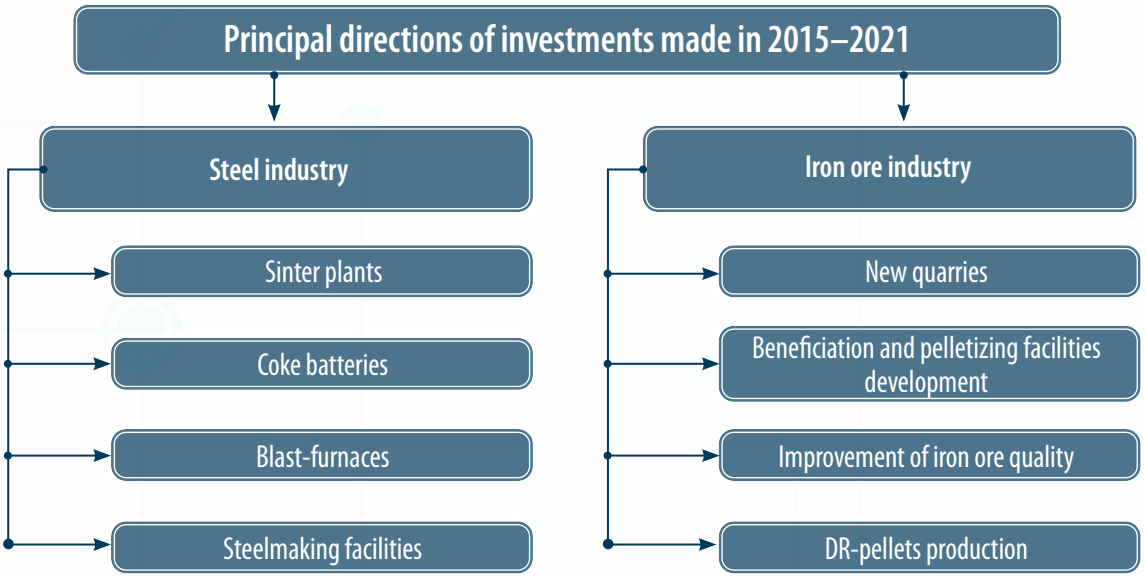

*Data Source: corporate reports, GMK Center estimations*

Ukrainian iron & steel companies mainly rely on their own resources in investment projects. Own resources are limited, but debt funding is complicated. Besides, Ukraine implements no national policy to encourage investment processes. As a result, steelmaking and iron ore industries in Ukraine remain underinvested, as recognized in global benchmarks, despite large amounts of CAPEX. Increase in fiscal burden on steelmaking and iron ore mining businesses will further widen this gap.

Increase in investment inflows requires effective work toward improvement of the investment environment and incentives for investors at the government level. Specifically, Australia and Brazil, unlike Ukraine, place a premium on raw materials export and encourage it using all available means: seaport and railroad network development using public financing instruments

# 2. INVESTMENTS IN THE IRON & STEEL SECTOR YESTERDAY

Almost 60% of all investment projects of steelmaking companies within the last 5 years were related to primary production stages, i.e. production of sinter, coke pig iron and crude steel. It is quite reasonable, because these operations are at the beginning of production chain and directly affect the quality and costs of finished products.




## Major technologies, invested in by iron & steel companies:

- **Injection of pulverized coal in blast furnaces.** Allows to achieve energy saving (by giving up natural gas and reducing coke consumption).
- **Continuous steel casting.** Three continuous billet casting machines are built at two steel works. This technology reduces waste and increases billet quality as compared to the outdated mold casting technology.
- **Air emission cleaning.** As the bulk of pollutant emissions accrues to blast-furnace and sinter production, all the projects related to these conversions went hand in hand with explicit environmental effects (reduction of dust emissions by 50% and more, in particular).
- **Increasing Fe content in finished products.** Higher quality of iron ore entails not only higher price premium for conventional products, but also more possibilities for reducing emissions of $CO_2$ and other pollutants in steel production.
- **DR-pellets production.** Having launched production of iron ore concentrate with Fe content of 67% and more, Poltava Mining and Central GOK established production of DR-pellets used for direct reduced iron (DRI) production. This technology is associated with substantial potential for decarbonization of the steelmaking industry in the future.

## Investments in new production capacities

- In 2019, a new Metipol plant for production of coated flat products was opened (the sum of investments was not disclosed).
- In 2011, Yeristovo Mining (Ferrexpo) was opened: investments in quarry and related infrastructure from start of operations through 2020 amounted to $742.5 million. This sum is bound to rise because constant investments in overburden operations, machinery fleet renewal, etc. are needed for sustainable iron ore mining
- BIn 2020, stripping works at Belanovo Mining (Ferrexpo) were started. It is another project, which implementation will allow Ferrexpo to double pellet production in the future.

**$742,5 million**
invested in construction of Yeristovo Mining from greenfield (2011–2020)

## Investment projects implemented in 2015–2021

| Year of completion | Company | Production stages | Project description | Effect | CAPEX, $ mln |
|---|---|---|---|---|---|
| 2015 | Azovstal | BF | Reconstruction of the blast furnace No. 4 | Extension of life-cycle by 5 years | 90 |
| 2015 (frozen) | Yenakieve Iron and Steel Works | Auxiliary | Construction of infrastructure for an air separation unit | Increase in productivity up to 1.5 million tons of pig iron a year | 33* |
| 2015 | Zaporizhstal | BF | Overhaul of blast furnace No. 2 with elements of reconstruction | Reduction of dust emissions by 340 tons a year | 9 |
| 2016 | Azovstal | Auxiliary | Replacement of air turbo blower No.3 | Achieving dust emission standard below 30 mg/m3 | 16 |
| 2016 | Azovstal | BF | Construction of a pulverized coal injection unit at the blast furnace No. 4 | Industrial gas cost reduction by 25% | 17 |
| 2016 | Ilyich Steel | BF | Overhaul of blast furnace No. 4 | Restoration of blast furnace overhaul period | n/a |
| 2016 | Ilyich Steel | Steelmaking | Overhaul of BOF No. 2 | Energy efficiency improvement Emissions reduction | 9 |
| 2016 | Yenakieve Iron and Steel Works | BF | Construction of pulverized coal injection units at two blast furnaces | Yearly economy of over 7 million cubic meters of natural gas | 116 |
| 2016 | Interpipe | HVA | Expansion of railway wheels production and wheel set assembly capacities | Increase in productivity of the blast furnace | 16 |
| 2017 | Southern GOK | Mining and processing | Overhaul of technological sections at the beneficiation plant No. 1 | Giving up natural gas | 15 |
| 2017 | Azovstal | BF | Construction of pulverized coal injection units at the blast furnace No. 2 | Coke economy up to 31.3 kg per ton of pig iron | n/a |
| 2017 | Zaporizhstal | BF | Reconstruction of the blast furnace No. 3 | Maintaining pig iron production volumes | 57 |
| 2018 | Northern GOK | Mining and processing | Replacement of gas cleaning systems of Lurgi 552-B roasting machine | Reduction of dust emissions to the standard 50 mg/m3 | 12 |
| 2018 | Dnipro Metallurgical Plant | BF | Overhaul of blast furnace No. 3 | Restoration of blast furnace overhaul period | 11 |
| 2018 | AMKR | Steelmaking | Construction of two continuous casting machines | Emissions reduction | 144 |
| 2018 | AMKR | Coke production | Construction of coke batteries No. 5 and 6 | Production cost reduction | 160 |
| 2018 | AMKR | Mining and processing | Construction of a new iron ore transportation complex | Product quality improvement | 44 |
| 2018 | Southern GOK | Mining and processing | Overhaul of technological sections at the beneficiation plant No. 1 | Transition to full coke self-sufficiency | 25 |
| 2019 | Ilyich Steel | Steelmaking | Construction of continuous casting machine No. 4 | Increase in iron ore extraction volumes using the underground mining method | 150 |

*Continued on p. 14*

INTERPIPE

# About Interpipe

Interpipe is a Ukrainian industrial company, one of the top global exporters of steel pipes and rail¬way wheels. The Company's products are supplied to over 80 countries around the world.

Interpipe is one of the largest investors in industrial development of Ukraine. Interpipe has invested $1 billion in construction of innovative EAF steelmaking plant Interpipe Steel along with related facilities. Interpipe Steel remains the only steelmaking plant constructed from greenfield over the 30 years of Ukrainian independence.

## Facts and figures 2020

**TOP 3**

World's leading producers of railway wheels

**11 000**

Number of employees

**TOP 10**

World's largest exporters of seamless pipes

**2.5** billion UAH

Taxes paid at all levels

## Key operational results 2020

Steel production

**760** thousand tons

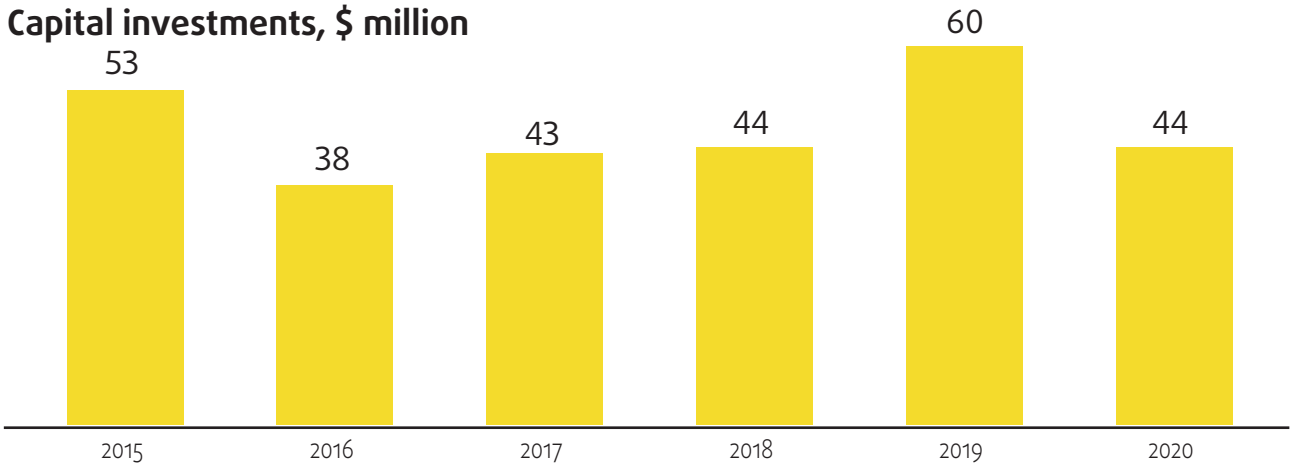
Pipes production

**464** thousand tons

Railway wheels

**190** thousand tons

## Capital investments, $ million



## Investments

**$100 million**

**INTERPIPE is a large investor. The Company's investment portfolio is worth $100 million today. All the projects are aimed at ramping up high-value-added product output. At the same time, each project includes an environmental component, such as further reduction of $CO_2$ and pollutant emissions, waste disposal, increase in energy efficiency.**

## Key investment projects

| | | | |
|---|---|---|---|
| Interpipe NTRP | Construction of a new line for full-profile mechanical treatment of railway wheels, installation of two finishing machines | **$14 million** | Completed in 2020 |
| Interpipe NIKO TUBE | Construction of a new Danobat pipe threading and coupling line for production of pipes with premium connections | **$10 million** | Completed in 2019 |
| Interpipe NIKO TUBE | Installation of portal type machine for unbreakable pipe control | **≈$5 million** | To be completed in 2022 |
| Interpipe NIKO TUBE | Construction of pipe thermal treatment line | **≈$40 million** | To be completed in 2022 |
| Interpipe NTRP | Construction of a new wheelset assembly facilities | **≈$6 million** | To be completed in 2021 |

## Environment

**$1 billion**

**INTERPIPE has realized the largest environmental investment project in Ukraine amounting to $1 billion of CAPEX by constructing an innovative EAF plant – Interpipe Steel to replace an energy-intensive open-hearth facility**

## Interpipe Steel

**↓10 times**
lower $CO_2$ emissions, appx. 250 kg per ton of steel

**↓8 times**
lower gas consumption, appx. 18 $m^3$ per ton of steel

**↓2.5 times**
less gross emissions of pollutants, at a level lower than specified by the EU standards

**↓0.0**
water disposal due to closed-cycle water supply system

## Interesting facts

**1 in 3**
buildings in Dubai is built using Interpipe pipes

**1 in 4**
Interpipe is one of the four premium connection pipes producers in the world

**2 in 3**
freight wagons in Europe are equipped with Interpipe wheels

**No.1**
Interpipe is the only CIS supplier of wheels for high-speed passenger trains in the EU

| Year of completion | Company | Production stages | Project description | Effect | CAPEX, $ mln |
|---|---|---|---|---|---|
| 2019 | Azovstal | BF | Construction of pulverized coal injection units at the blast furnace No. 3 | Product quality improvement | 24 |
| 2019 | Azovstal | BF | Overhaul of blast furnace No. 3 | Better working conditions for employees | 60 |
| 2019 | Ilyich Steel | Rolling | Reconstruction of rolling mill 1700 | Increase in slab production by 2.5 million tons per annum | 110 |
| 2019 | Azovstal | BF | Overhaul of blast furnace No. 6 | Giving up natural gas | n/a |
| 2019 | Dnipro Metallurgical Plant | BF | Overhaul of blast furnace No. 2 | Reduction of coke consumption | 11 |
| 2019 | Zaporizhstal | BF | Overhaul of blast furnace No. 2 | Increase in annual pig iron production capacity by 0.5–0.8 million tons (up to 1.3–1.6 million tons) | 9 |
| 2019 | Dnipro Metallurgical Plant | Coke production | Overhaul of coke battery No. 5 | Emissions reduction<br>Natural gas economy due to full utilization of coke gas | 6 |
| 2019 | INTERPIPE NIKO TUBE | Pipes production | Construction of a new Danobat pipe threading and coupling line for production of pipes with premium connections | Production growth<br>Product range expansion | 10 |
| 2019 | Dniprovskyi Iron and Steel Works | BF | Overhaul of blast furnace No. 9 | Prolongation of BF life cycle<br>Pig iron production growth | 10 |
| 2019 | Metipol | Rolling | Construction of a new plant for production of coated flat products | Growth of coated coil production | n/a |
| 2020 | Ilyich Steel | Sinter | Reconstruction of the sinter plant | 90% reduction in dust emissions<br>46% reduction in sulfur emissions | 160 |
| 2020 | Central GOK | Mining and processing | Re-equipment of beneficiation facilities to produce DR-pellets | Product range expansion | 20 |
| 2020 | Ilyich Steel | BF | Reconstruction of the existing and construction of new gas cleaning systems at the blast furnace No. 3 | Emissions reduction | 20 |
| 2020 | Ilyich Steel | BF | Reconstruction of the existing and construction of new gas cleaning systems at the blast furnace No. 5 | Emissions reduction | 20 |
| 2020 | Ferrexpo | Mining and processing | Concentrate production capacity increase at Poltava Mining by 1.5–2.0 million tons per annum | Iron ore pellets production increase to 12 million tons per annum | 65 |
| 2020 | Avdiyivka Coke Plant | Coke production | Overhaul of coke batteries No. 5, 6, 7, 8 | Coke production increase by 1,000 tons per day | 10 |
| 2020 | Northern GOK | Mining and processing | Modernization of OK-306 roastingmachines (1st line) | Quality improvement<br>Emissions reduction | n/a |

| Year of completion | Company | Production stages | Project description | Effect | CAPEX, $ mln |
|---|---|---|---|---|---|
| 2020 | INTERPIPE NTRP | HVA | Construction of a new line for full-profile mechanical treatment of railway wheels, installation of two finishing machines | Product range expansion | 14 |
| 2021 | Ferrexpo | Mining and processing | Construction of iron ore concentrate warehouse at Poltava Mining | Growth in concentrate production<br>Increased operational flexibility | 36 |
| 2021 | Ferrexpo | Renewable energy | Construction of a pilot solar power system (5 MW) | Study of solar energy potential for industrial applications | 4 |
| 2021 | Ingulets GOK | Mining and processing | Construction of crusher and conveyor system compound (Western and Eastern lines) | Reduction of operational expenses<br>Reduction of dust emissions during ore transportation | 50 |
| 2021 | Dnipro Metallurgical Plant | Coke production | Overhaul of coke battery No. 4 | Performance improvement<br>Emissions reduction | 6 |

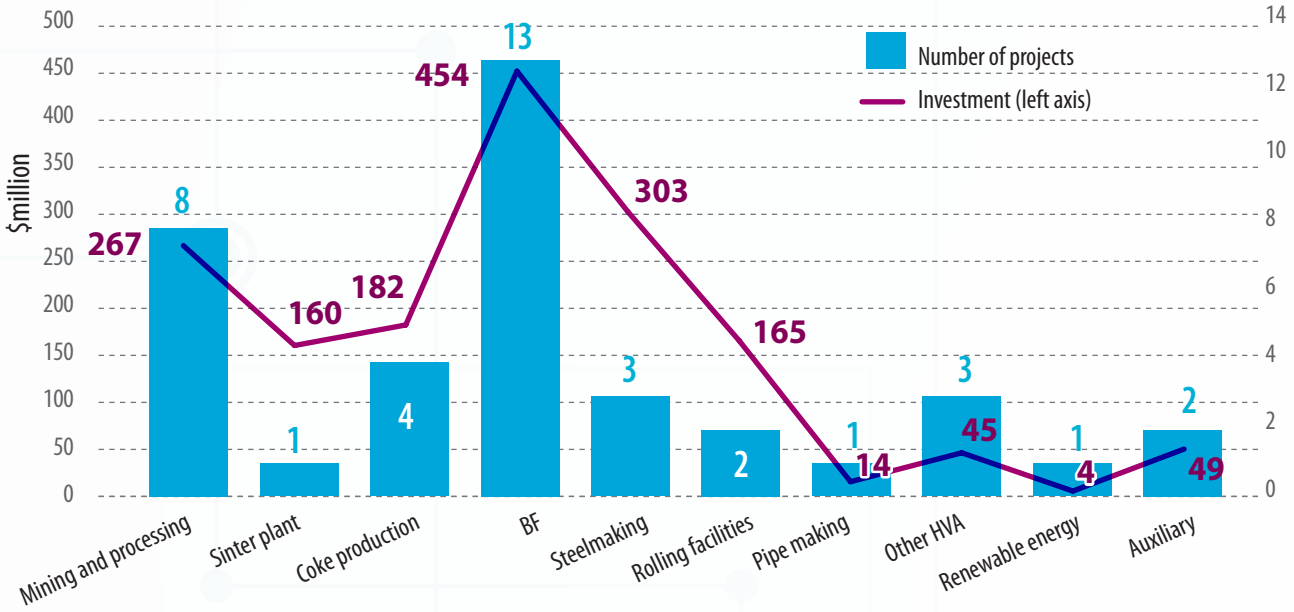
**Total project cost upon its full implementation* *** Production of high value-added products*

*Data Source: corporate reports, media*

Most of the projects in 2015–2021 were related to BF maintenance and development — 13 projects. The greatest amount of major steelmakers' investments, almost $0.5 billion, accrues to these projects as well.

The second place in terms of the number of projects and amount of investments goes to mining and processing facilities modernization at iron ore production companies. There were significantly less investment activity at the rolling and HVA facilities: 1 project in the pipe line development and 3 projects with respect to other high value-added products were implemented as well. Development of this production segment is a result of Interpipe's efforts aimed at satisfying clients' needs and expanding exports.

## Investment activities of iron & steel companies by production stage (2015–2021)

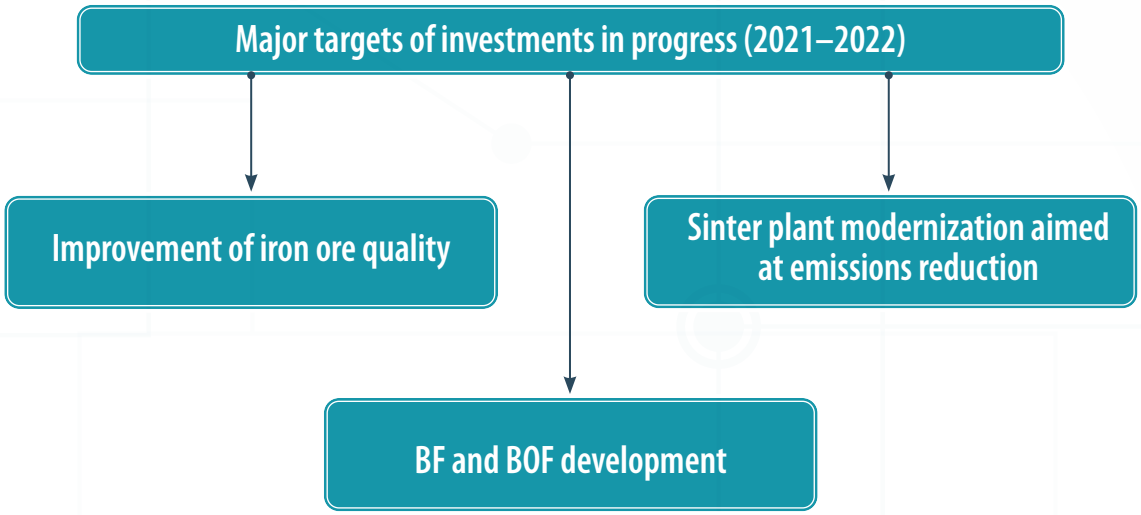



*Data sources: corporate reports, media, GMK Center estimations*

# 3. INVESTMENTS IN THE IRON & STEEL SECTOR TODAY

Iron & steel companies of Ukraine are currently finalizing implementation of projects, aimed at modernization of primary production stages. Metallurgical plants are renewing gas cleaning systems at sinter, BF, and BOF shops to reach emission standards for dust and other pollutants.

Mining and processing plants are investing in iron ore production growth as well as its quality improvement through development of pellet production. Increasing use of pellets in BF processes, according to the CRU, allows to reduce $CO_2$ emissions by 40% per ton of steel as compared to sinter usage.




Ongoing investment projects implemented by Ukrainian iron & steel companies are directly connected with preparation for introduction of the Emissions Trading System and approximation of the Ukrainian emission standards to European ones. The system of monitoring and verification of greenhouse gas emissions expected to be fully functional starting 2022. It will be the first step towards implementation of CO2 allowances trading system in Ukraine.

## Prices for CO2 allowances in the EU ETS, euro/ton


*Data source: ember-climate.org*

The price of emission allowances in the EU market is growing permanently. Ukrainian iron & steel companies realize that this trend will be typical for the Ukrainian emissions trading system as well. That is why preparations to this scenario have already begun in terms of planning and implementation of production decarbonization projects and increasing energy efficiency.

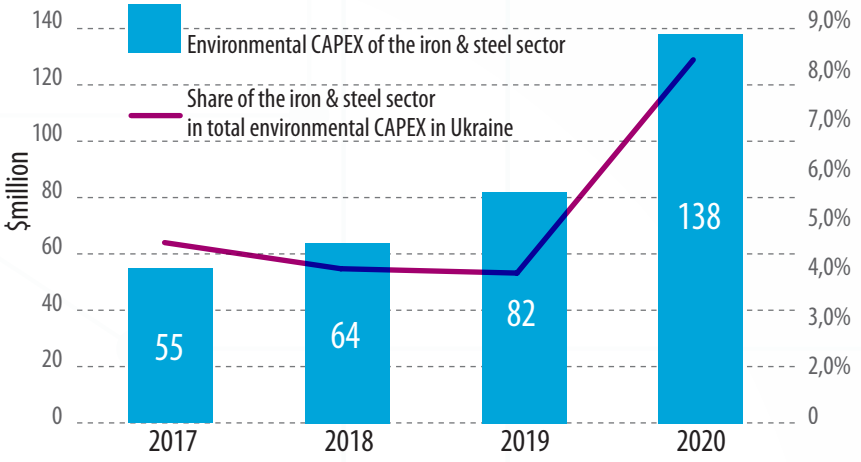
## Investment projects underway (2021–2022)

| Expected year of completion | Company | Production stages | Project description | Effect | CAPEX, $ mln |
|---|---|---|---|---|---|
| 2021 | Northern GOK | Mining and processing | Construction of a crusher and conveying system at Pervomaisk open pit | Output sustenance<br>Reduction of operational expenses | n/a |
| 2021 | Dniprovskyi Iron and Steel Works | Sinter production | Reconstruction of gas cleaning systems of the sinter shop | Emissions reduction | n/a |
| 2021 | AMKR | Sinter production | Reconstruction of gas cleaning systems of the sinter shop No. 2 | Emissions reduction | 180 |
| 2021 | AMKR | Steelmaking | BOF reconstruction along with construction of new gas cleaning systems | Restoration of units overhaul period<br>Emissions reduction | 100 |
| 2021 | Ferrexpo | Mining and processing | Modernization of pelletizing lines at Poltava Mining | Growth in iron ore pellets production by 0.5–1.0 million tons<br>Pellet quality improvement<br>Natural gas consumption reduction | 10 |
| 2021 | Ferrexpo | Mining and processing | Crushing lines expansion (2nd phase) | Iron ore processing increase by 800 tons per hour | 8 |
| 2021 | INTERPIPE NTRP | HVA | Construction of a new wheelset assembly zone | Wheelset production growth | ≈$6 |
| 2022 | Ilyich Steel | Auxiliary | Construction of air separation unit | Growth in oxygen and nitrogen output for steel production<br>Reduced risk of steel production capacity outage | 80 |
| 2022 | Ilyich Steel | BF | Reconstruction of blast furnace No. 4 with construction of new gas cleaning systems | Emissions reduction | 27 |
| 2022 | Azovstal | Steelmaking | Reconstruction of gas cleaning systems for basic oxygen furnaces No. 1 and No. 2 | Emissions reduction | n/a |
| 2022 | Northern GOK | Mining and processing | Replacement of gas cleaning systems on Lurgi 278-A roasting machines | Dust emissions reduction | n/a |
| 2022 | Northern GOK | Mining and processing | Replacement of gas cleaning systems of Lurgi 552-A roasting machine | Dust emissions reduction | n/a |
| 2022 | Zaporizhzhia Coke Plant | Coke production | Overhaul of coke batteries No. 5–6 | Restoration of the battery overhaul period<br>Product quality improvement<br>Environmental impact reduction | 9 |
| 2022 | INTERPIPE NIKO TUBE | Pipes production | Construction of pipe thermal treatment line | Product range expansion | ≈$40 |
| 2022 | INTERPIPE NIKO TUBE | Pipes production | Installation of portal type machine for unbreakable pipe control | Quality improvement | ≈$5 |

# 4. INVESTMENTS IN THE IRON & STEEL SECTOR TOMORROW

Environmental investments are playing ever larger part as of late. Their amounts are growing in both monetary and percentage terms. Thus, 8.3% of the sector's capital investments targeted at environment protection projects in 2020 vs. 4.1% in 2017. And this environmental component of CAPEX is bound to keep increasing in the future, because industrial sectors become more and more oriented to production decarbonization in the context of combating climate change.

## Environmental CAPEX in the iron & steel sector of Ukraine




*Data sources: State Statistics Service, GMK Center estimations*

In the framework of the Green Deal, the EU has set the target to reach carbon neutrality by 2050. Most of global steelmakers have declared similar targets. Ukrainian steel producers cannot stay away from global trends and are working towards decarbonization. The Interpipe Group has already contributed to emissions reduction by building an EAF mill to replace an open-hearth facility. As a result, Interpipe demonstrates lower production-bound CO2 emissions than its major competitors. It gave the Company a competitive advantage, i.e. by using "green" products offered by Interpipe, clients reach their climate targets as regards emissions across the entire supply chain.

According to the updated Nationally Determined Contribution under the Paris Agreement (NDC$_2$), Ukraine intends to reduce $CO_2$ emissions by 2030 by 65% of the 1990 level. Ukraine's economy is expected to reach carbon neutrality by 2060. A significant part in the decarbonization process is played by Ukraine's steel industry, which accounts for 26% of $CO_2$ emissions in Ukraine. Besides, the steel industry's contribution to the total carbon emissions in Ukraine is much higher than the global average; only 6% of global $CO_2$ emissions accrue to steelmaking companies.

In view of the need for investments in maintaining the existing production capacities and the need to achieve environmental goals, Ukrainian steelmakers will experience higher demand for investment resources.:

**$6,6 billion**
of investments are needed to introduce best available techniques (BATs) associated with air emissions at Ukrainian iron & steel companies, according to GMK Center estimates

**$25,5 billion**
of investments are required for the Ukrainian steel industry to reach carbon neutrality, according to GMK Center estimates

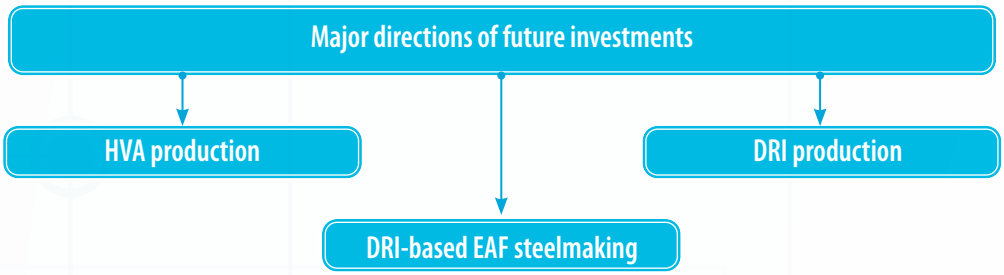
Investment cycle in the steel industry is about 20 years. That`s why decisions on introduction of certain decarbonizing technologies are to be made within the nearest 10 years in order to achieve the set goals. Even now Ukrainian iron & steel companies show interest in decarbonizing technologies. For instance, Metinvest is considering a possibility of constructing a new steelmaking facilities to include direct reduced iron (DRI) production modules and an EAF facility for hot DRI processing. This project requires at least $3–3.5 billion of CAPEX. Central GOK (Metinvest) and Poltava Mining (Ferrexpo) have launched production of DR-pellets that are raw material for DRI production.

Some Ukrainian companies have already announced their plans of investments required to achieve the set environmental goals.

## Investment plans of Ukrainian iron & steel companies

| Company | Carbon neutrality status | Investments |
|---|---|---|
| **ArcelorMittal Kryvyi Rih** | Achieving carbon neutrality by 2050 | **$1 billion** of environmental CAPEX in 2022–2032 ("steel billion") |
| **Metinvest** | Carbon Neutrality Roadmap is being drafted | **$670 million** of environmental CAPEX in 2019–2025 |
| **Interpipe** | Carbon intensity on a par with best technologies is achieved (200 kg of $CO_2$ per ton of steel) | **$136 million** in 2020–2022 for business development |

New investment projects show a trend of shifting from primary production stages to the development of rolling facilities and HVA production. On the one hand, BF and BOF facilities have basically undergone modernization in the previous periods. On the other hand, decarbonization-related projects in the steel industry have become increasingly important recently. Decarbonization route of Ukrainian steel industry has not yet been fully determined, but all Ukrainian steelmaking companies are choosing appropriate technologies to reduce carbon footprint and achieve carbon neutrality.




Ukrainian steel industry will redesign itself over the next 30 to 40 years. And a favorable investment environment needs to be created tod`ay so that domestic producers keep their positions on the global market.

## Future investment projects

| Expected year of completion | Company | Production stages | Project description | Effect | CAPEX, $ mln |
|---|---|---|---|---|---|
| **2023** | **AMKR** | **Mining and processing** | Construction of a pelletizing factory | Pollutant emissions reduction by 78 thousand tons per annum $CO_2$ emissions reduction by 800 thousand tons per annum | **250** |
| **2023** | **AMKR** | **BF** | Reconstruction of the blast furnace No. 9 | Pig iron production growth<br>Giving up natural gas<br>Emissions reduction | **270** |
| **2023** | **Module Ukraine** | **Rolling facilities** | Expansion of polymer coated coil capacities from 80 to 120 thousand tons per annum | Production growth | **n/a** |
| **2023** | **Northern GOK** | **Mining and processing** | Construction of pulp thickening plant | Energy and water consumption reduction | **110** |
| **2024** | **Ilyich Steel** | **Rolling facilities** | Construction of a new cold-rolling mill, galvanizing and coating lines | Production growth<br>Emissions of harmful substances 1.5–3 times lower than the maximum permissible limits established in Ukraine<br>Creation of over 230 jobs | **800** |
| **2024** | **Ferrexpo** | **Mining and processing** | Disc filter replacement at Poltava Mining pelletizing area | Improvement of iron ore pellet quality due to reduction in humidity | **115** |
| **2035** | **Metinvest** | **Steelmaking** | Construction of an EAF steelmaking plant with DRI modules | Carbon-neutral production of 5 million tons of steel per annum | **3500** |

# THE FUTURE FOCUS OF INVESTMENTS IN THE IRON & STEEL SECTOR

***Andrii Tarasenko,***
*GMK Center Chief Analyst*

The steel industry is a capital-intensive sector. In Ukraine, the iron & sector requires $700 million of annual CAPEX only to stay where it is. This is the required amount of investments in maintenance projects. But everyone knows that standing still means retrograding. Consequently, we need to double this amount to move forward.

Firstly, we need to eliminate the backlog accumulated in the last five years. From 2015 through 2019, because of the challenges associated with military aggression, regionalization of trading and weak market conditions, domestic companies fell behind their competitors by $2.2–2.5 billion. And we will stay a step behind our competitors unless we increase investments.

Secondly, to strengthen their positions in the international markets, our companies should work along the following lines:

- Cost leadership. Ukrainian steelmaking companies need to aim for the first quartile on production costs for all product types to reduce risks. Those are projects aimed at resource intensity improvement and productivity growth, among other things through the use of digital technologies. For instance, Metinvest announced that their annual cost savings amounted to $50 million due to digitalization projects. Interpipe has been actively introducing digital technology for the last ten years.
- Increase in the share of high added-value products that will be a source of growth in the face of stagnating demand. Examples include cold rolling mill construction project at Ilyich Steel, promotion of premium connection pipe production projects at Interpipe, small-section mill reconstruction at AMKR.
- Strengthening vertical integration benefits that will enable the sector to enhance its strong points (self-sufficiency with iron ore reserves) as well as to adapt to the growing demand for scrap. We can observe certain activity in all these areas already, such as DR-pellets production projects at Southern GOK, Central GOK, Ferrexpo facilities. Thirdly, decarbonization presents a significant challenge for the next decades, because it requires a total redesign of production processes. Domestic sector needs $25 billion within the next 20 to 30 years to achieve carbon neutrality. In this regard, the government has a key role to play, because a sound environmental policy is becoming a factor of producers' competitive ability.

It means that Ukrainian companies actively implement development project when the market gives them such opportunities. There's an obvious significant correlation between the iron & steel sector investments and global market steel prices. 2021 has been the most successful period within the past 10–12 years, so companies announce a lot of new projects, undertake large-scale construction and modernization. However, this year's circumstances might be luck that may never repeat itself in the future, and we cannot count on the "high" market's support over a long-term horizon. Most probably, the market will put obstacles in the context of stagnating demand.

That`s why a comprehensive policy, aimed at the following aspects, is so important to reduce dependence on market factors, ensure the sector's sustainability and a sustained high level of investments:

• Improvement of the investment environment in Ukraine, balanced fiscal and monetary policies.

• Development of the domestic steel consumption market (investment in infrastructure renovation, defense industry development, implementation of leasing and interest rate reimbursement programs for purchasers of Ukrainian mechanical engineering products).

• Implementation of a comprehensive environmental policy (creating conditions for faster decarbonization, including environmental taxation system reform, launching greenhouse emission trade system).

• Resistance to protectionism (trade diplomacy, conclusion of bilateral trade agreements, proactive attitude of the government towards anti-dumping investigations).

The route to development lies through investments. The best timing for investment was yesterday. Consequently, appropriate conditions should have been created yesterday. But we'd better get started today.

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