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Metals & Mining Practice

The future of the European steel industry

A road map toward economic and environmental sustainability

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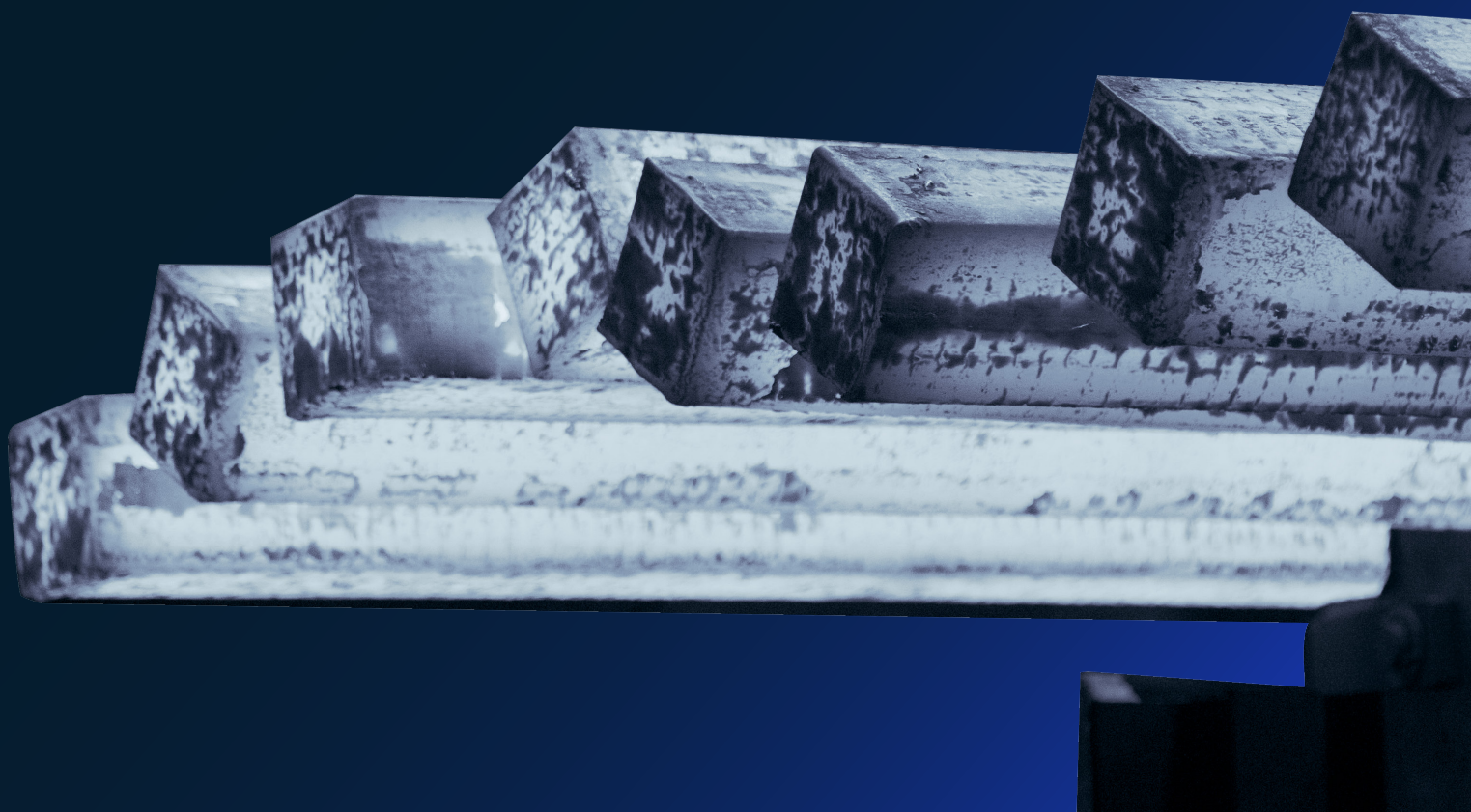

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This report was a collaborative effort by Frank Bekaert, Toralf Hagenbruch, Emanuel Kastl, Sigurd Mareels, Michel Van Hoey, Steven Vercammen, and Benedikt Zeumer, representing views from McKinsey's Metals & Mining Practice.

Executive summary

The steel industry is a backbone of the European economy and a key supplier to Europe's automotive, machinery, and other flagship industries. However, total returns to shareholders have been lackluster compared to those in other heavy industries, such as mining or energy (Exhibit 1).

Following the global financial crisis in 2008–09, the European steel industry experienced a severe and permanent demand loss of approximately 35 million tons, from 188 million tons (average 2004–08) to 153 million tons (average 2011–19). This loss was driven by a decline in demand from all end-use sectors, in particular from construction following the end of the construction boom (especially in southern Europe) and from the oil and gas industry, due to declining drilling activity and the lack of large pipeline projects.

The EU28 used to be a net exporter of steel products, but it has been a net importer since 2016, with net imports reaching around 9 million tons in 2019. Increasing imports accelerated the decline of capacity utilization in addition to the decline in demand.

The COVID-19 crisis exacerbated the decline of the European steel industry—EU28 capacity utilization in 2020 could drop to approximately 65 percent. In the medium term (until 2023), capacity utilization is expected to recover to between 70 and 75 percent with an expected "next normal" apparent annual steel demand of approximately 140 million to 150 million tons, as the long-term drop in demand remains. A reduction of 25 million to 30 million tons of surplus capacity would thus be required to achieve a sustainable capacity utilization of about 85 percent.

Going forward, the European steel industry faces three main challenges:

1
An increase in overcapacity following a further demand loss of 10 million to 15 million tons due to COVID-19.

2
The risk that additional CO_2 emissions taxes will add costs and make the industry less competitive.

3
The possibility that decarbonizing the EU28 steel industry in the medium to long term will require significant investments.

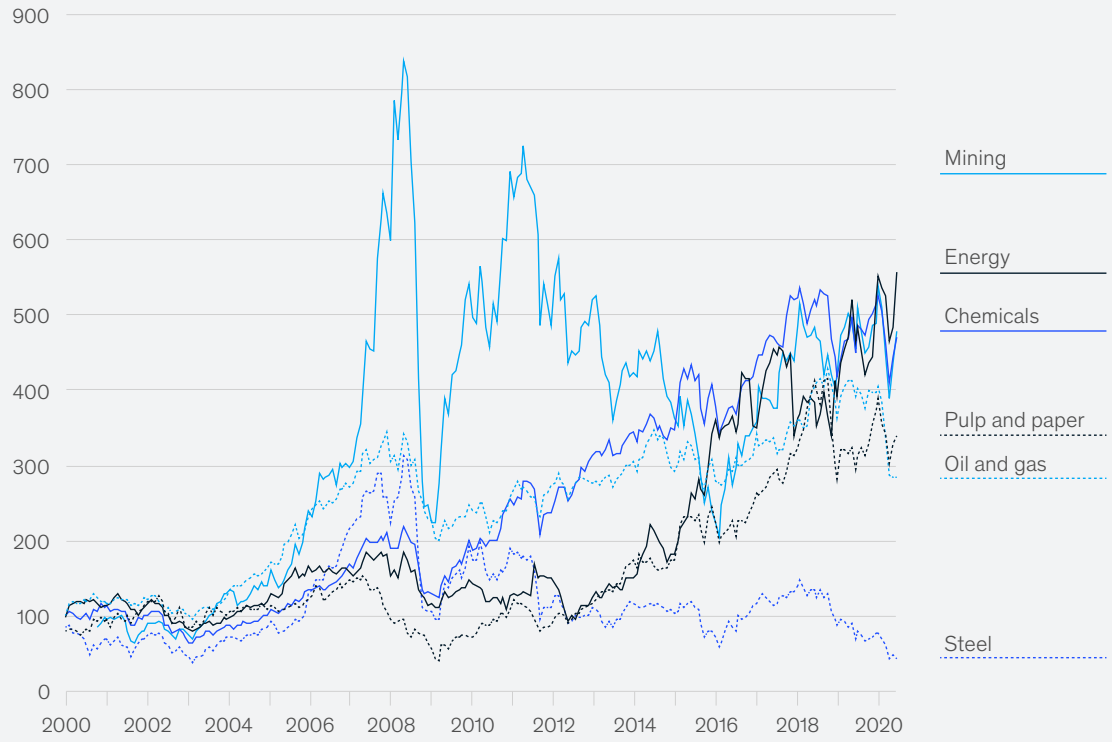
European steel producers should consider making a series of short-term operational and medium- to long-term strategic moves to ensure economic and environmental sustainability going forward. These strategic moves could encompass restructuring steps aimed at capacity reduction, steps toward strengthening the position of steel companies by diversifying their capabilities, and sustainability moves toward low- and no-carbon steel.

This paper describes the evolution of the European steel industry to date and identifies the main challenges for the industry going forward. It ends with suggestions and discussion starters on how the European steel industry can build an economically viable and environmentally sustainable future. As the Davignon Plan demonstrated in the late 1970s and 1980s, to be most effective such an initiative should be a European effort that brings together EU member states.

Exhibit 1

The European steel industry has had the lowest total returns to shareholders since 2000, as compared with other industries.

Bloomberg European 500 by industry, total returns to shareholders (gross dividends), index (Jan 2000 = 100)



Source: Bloomberg

1 The evolution of the European steel industry

A cornerstone of the EU28[1] economy

One of the most important materials in engineering and construction, steel has an impact on nearly all aspects of our lives. Steel plays a particularly significant role in the EU economy: in 2019, the European steel industry provided direct employment for approximately 330,000 people and indirect employment for more than two million more throughout the supply chain and from induced activities (Exhibit 2).

Steel contributes about €83 billion in direct value added to Europe's economy. As a core raw material for other key industries—such as automotive, machinery, and construction—it also contributes more than €1.4 trillion in value added in those industries. Overall, the steel industry and key customer industries represent approximately nine percent of overall value added in Europe.

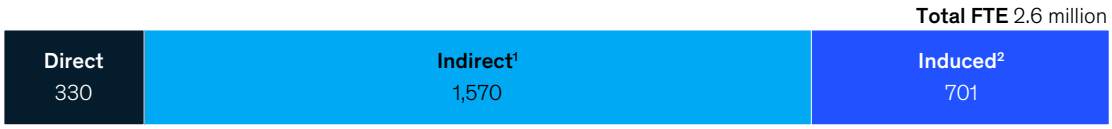
Three sectors vital to Europe's economy—construction, automotive, and machinery—account for about 70 percent of total apparent finished steel consumption. In 2019, this was estimated to be 105 million metric tons out of a total of 154 million metric tons.

[1] We refer to the EU28 nations as "Europe" in this paper, as most of the analyzed data is from 2019, when the United Kingdom was still part of the European Union (it withdrew on January 31, 2020).

Exhibit 2

The European steel industry drives employment in Europe—both directly and indirectly.

Employment in EU28, 2019, thousands



[1]"Indirect" refers to jobs in the steel industry's EU-based supply chain.
[2]"Induced" refers to jobs supported by money spent by indirect and direct employees of the both EU's steel industry and supply chain.
Source: Oxford Economics, EUROFER

Following the global financial crisis in 2008–09, the EU28 steel industry experienced a severe and permanent annual demand loss of approximately 35 million tons.

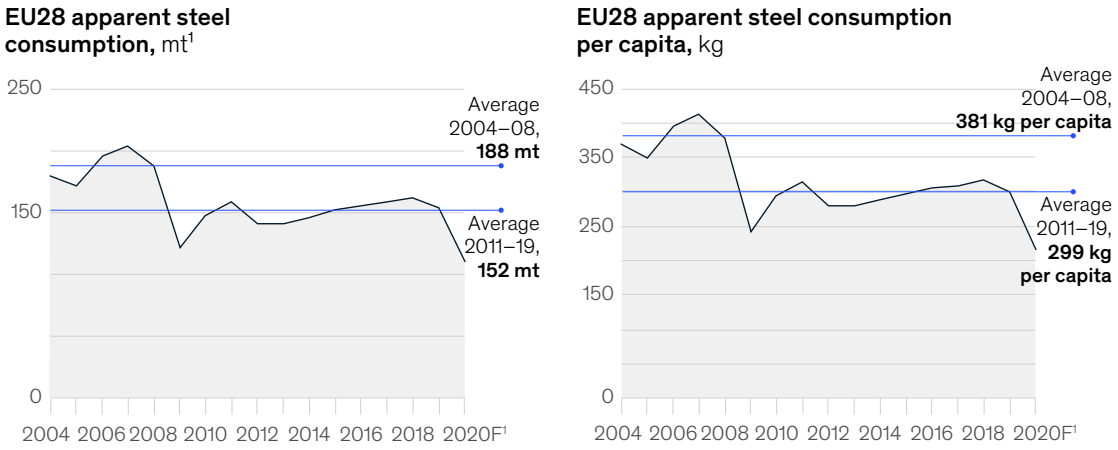
Steel is of strategic relevance to these key steel-using sectors, requiring close geographical proximity for just-in-time delivery, a robust supply chain with short lead times despite the COVID-19 crisis, and joint product innovation.

A long-term fall in demand

Following the global financial crisis in 2008–09, the EU28 steel industry experienced a large-scale and permanent drop in annual demand of around 36 million metric tons: from an average of 188 million metric tons in 2004–08 to an average of 152 million metric tons in 2011–19 (Exhibit 3). This loss was propelled by a decline in demand across all end-use sectors. The largest decline (–16 million metric tons) was in construction following the end of a construction boom, particularly in southern Europe. The oil and gas industry lost about six million metric tons of steel demand as drilling activity slowed down and investments in large pipeline projects halted, affecting steel tubes.

Exhibit 3

Steel consumption dropped significantly after the global financial crisis and never recovered.



[1]Million tons.
[2]McKinsey estimate, according to the COVID-19 muted-world recovery A1 scenario.
Source: Eurofer

EU28 capacity utilization is expected to be 60–70 percent in 2020, down from 76 percent in 2019.

This decline is also reflected in per-capita consumption. In 2008, the average European citizen accounted for about 380 kilograms of steel per year. In 2019, consumption dropped to about 300 kilograms, with the majority of this 80-kilogram decline coming from construction, tubes (oil and gas market), and machinery (declining demand and relocation of production outside the EU28).

Pressure on utilization

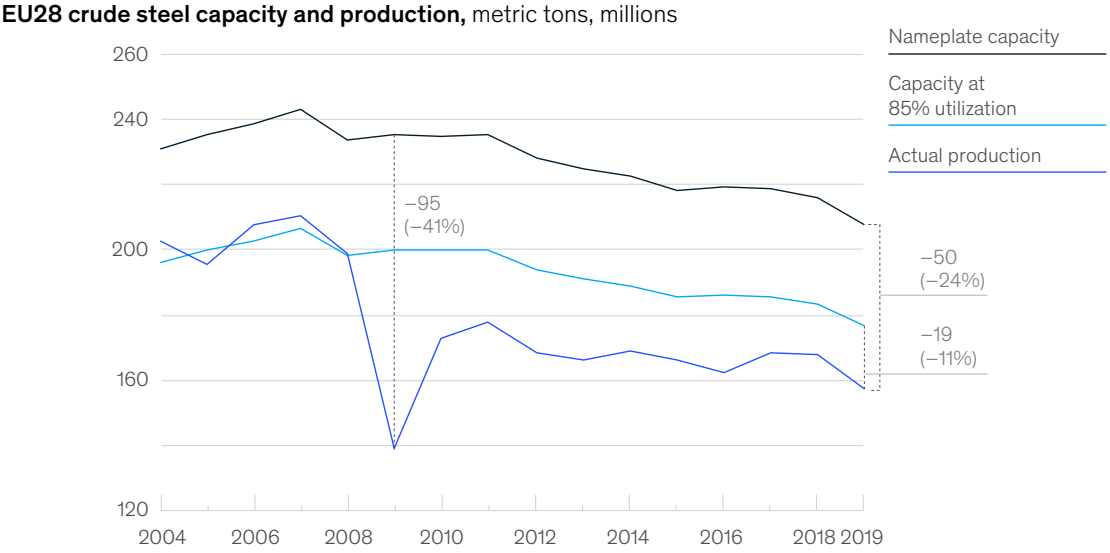
Over the past decade, utilization of installed, crude steel production capacity averaged around 75 percent. The projection for 2020 is a capacity utilization of between 60 and 70 percent, depending on the industry's recovery in the second half of 2020 (Exhibit 4).

In line with the large-scale and permanent demand loss following the global financial crisis, the EU28 steel industry produced approximately 40 million metric tons less crude steel in 2019 than in a typical year before the global financial crisis: around 199 million metric tons (average 2004–08) versus about 158 million metric tons in 2019.

Exhibit 4

Increasing imports accelerated the decline of utilization and lowered demand.

EU28 crude steel capacity and production, metric tons, millions



Source: McKinsey crude steel capacity model

Producers have already reduced production capacity, but not enough to reach healthier utilization levels. In addition to declining demand, increasing steel imports further accelerated the decline of capacity utilization of the assets of EU steel producers. Historically, the EU28 has been a net exporter of finished steel products. From 2010 to 2015, net exports were between five million and 15 million metric tons. As of 2016, however, the EU28 has shifted from being a net exporter to a net importer, with net imports reaching approximately nine million metric tons in 2018, followed by about five million metric tons in 2019. The increased imports to the EU28 mainly came from Russia, Ukraine, and Turkey. The US market closed (Section 232),[2] while the import volume from China decreased.

The share of steel production in the EU28 using the electric arc furnace (EAF) route has been stable in the past two decades, representing around 40 percent of total crude steel production. For comparison, EAF crude steel production in North America represents about 67 percent. To some extent, this difference reflects Europe's focus on high-value-added steel products benefiting from ore-based metallics, but this is not the sole reason for these regional differences. Scrap availability in Europe would have allowed for further EAF crude steel production, for example, but scrap has been exported to other parts of the world: net exports in 2019 were 18.9 million metric tons, growing 2 percent a year since 2010. However, steel producers—especially in Germany, Belgium, the Netherlands, Scandinavia, and other northern European regions—continually invested in expanding and upgrading existing integrated steel facilities rather than shutting down integrated assets permanently and investing in greenfield EAF steel mills.

Competitive headwinds

From a macro perspective, production of steel in EU28 countries is not cost competitive compared to other major steel-producing regions globally, such as the Commonwealth of Independent States (CIS), India, top-quartile players in NAFTA, and developed countries in Asia (Exhibit 5). This is primarily because Europe faces higher costs for landed raw material, energy, labor, and other factors.

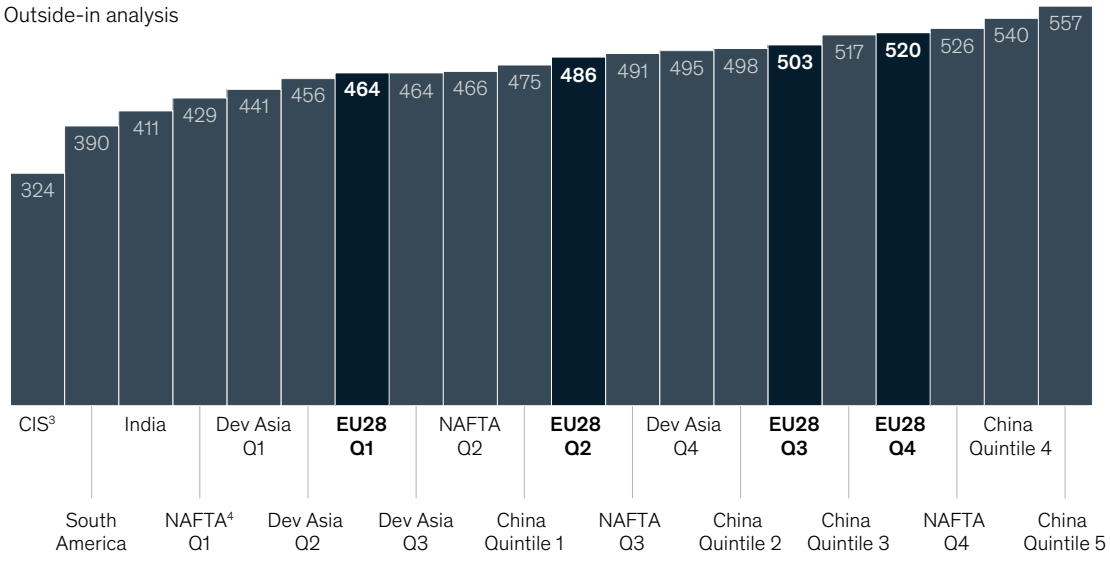
Compared to other producers globally, the EU28 steel industry could have been the cost leader due to factors such as labor productivity and energy efficiency. However, EU28 steel producers cut back workforce in line with the decline in crude steel production, so labor productivity did not improve beyond the production decline to compensate for factors such as labor cost inflation.

[2] Section 232 of the Trade Expansion Act of 1962 allowed the president of the United States to impose tariffs on steel imports from other countries based on a recommendation from the US secretary of commerce, given that steel products are being imported into the United States in such quantities or under such circumstances that they threaten or impair national security.

Exhibit 5

EU28 producers have not been competitive globally because of factor-cost disadvantages.

Average HRC operating cost,[1] ex-works,[2] 2019, $/ton



Note: All raw materials (eg, iron ore, coal, coke, scrap, and other metallic input), energy, and labor costs are normalized to be same as a sample Chinese plant across all plants. No captive raw materials.
[1]"HRC" refers to hot-rolled coiled steel. Assuming 90 percent standard utilization, operating costs excluding depreciation and amortization, capital cost, and other interests, such as selling and general and administrative costs, as capacity-weighted averages.
[2]In international trade, ex-works refers to products for which buyers must cover transportation costs.
[3]The Commonwealth of Independent States.
[4]The North American Free Trade Agreement.
Source: McKinsey flat steel cost model 2019

Increased price volatility for iron ore and metallurgical coal emerged as an additional challenge for EU28 steel producers after the global financial crisis. Steel producers cannot easily pass on increased raw-material prices to their customers in industries such as automotive and machinery/equipment, because the majority of their contracts are still fixed-price.

In 2010, iron-ore prices switched from a historically well-established, annual benchmark pricing system to a mix of index-based pricing and quarterly benchmark pricing, while the iron ore price delivered to China became the global reference.

The metallurgical-coal market has experienced a similar shift. The annual benchmark pricing system from FOB Australia discontinuted, and the quarterly benchmark prices from FOB Australia became the new normal.

As raw material prices remained strong in 2019, margins over raw materials for the standard product hot-rolled coiled steel (HRC) dropped sharply to approximately €230 per ton in 2019. This was still higher than in 2009 (Exhibit 6).

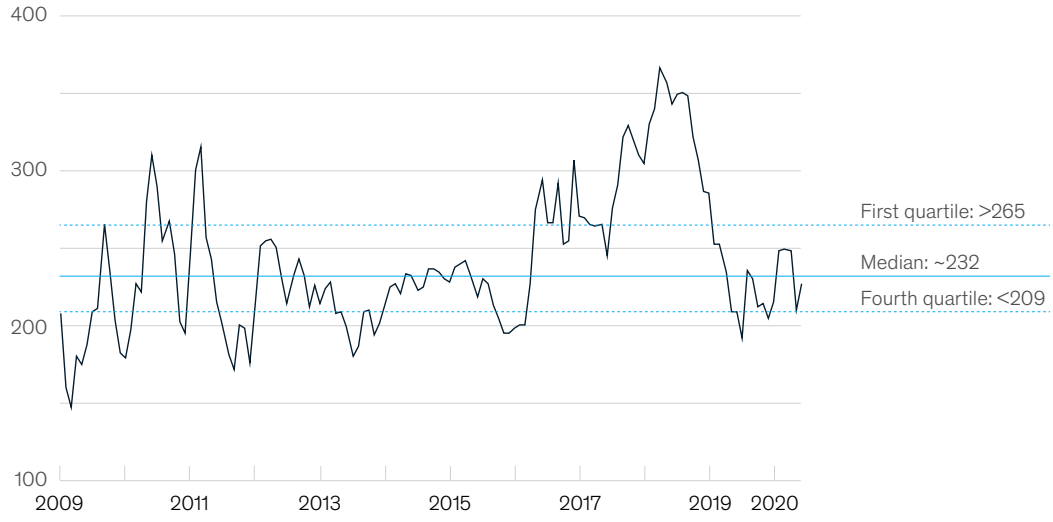
Despite efficient operations, EU28 producers are on average not cost competitive compared to select other regions because of higher costs for landed raw material, labor, and other factors.

The EU28 steel industry is fairly consolidated, with the top five producers accounting for about 57 percent of crude steel production capacity. EU28 steel producers have shown the lowest average profitability globally since 2016 (about eight percent EBITDA margin) and have not returned to pre-2008 EBITDA levels (about 16 percent). Average EU28 EBITDA margins in 2019 fell to 5.7 percent, close to the 5.0 percent drop in 2009. Historical analysis shows that in the long term, profitability is highly correlated with capacity utilization. As expected, the permanent reduction in demand following the global financial crisis of 2008–09 has gone hand in hand with a decline in profitability.

Exhibit 6

The margin for raw materials dropped to less than €230 per ton—still not as low as 2009.

Margin over raw materials for HRC[1] integrated route, €/ton



[1]Hot-rolled coiled steel.
Source: McKinsey margin over raw materials model

2 Primary challenges facing the European steel industry

The EU28 steel industry will face three main challenges going forward:

1. An increase in long-term capacity following a demand loss of 10 million to 15 million metric tons due to the COVID-19 crisis

2. The risk that CO_2 taxation will add to costs for EU28 steel producers and reduce their competitiveness

3. The possibility that decarbonizing the EU28 steel industry in the medium to long term will require significant investments

Long-term overcapacity and demand loss

We expect demand for steel to drop by 10 million to 15 million metric tons in the EU28 by 2023 compared to 2019. This is primarily because players in key customer industries, such as automotive, are taking advantage of the COVID-19 crisis to adjust their footprints by closing or relocating production from Europe to other regions. Furthermore, a permanent lower demand for office space after the COVID-19 crisis due to increased remote work may reduce demand for office buildings, which in turn will lower demand for steel from the construction sector.

This permanent loss in demand even after partial recovery from the through year 2020 could result in a long-term capacity utilization of 70 to 75 percent for EU28 steel producers. The surplus capacity that would need to be closed to reach a sustainable utilization of around 85 percent is 25 million to 30 million metric tons (see Chapter 3 for discussion points on this topic and possible solutions).

Higher costs related to CO_2 emissions taxes

Costs related to CO_2 in Europe significantly increased from below €5 per ton of CO_2 in 2016–17 to about €28 per ton in July 2020. Looking ahead, CO_2 prices are expected to increase significantly to €40 to €100 per ton by 2030 to achieve EU28 decarbonization targets.

The EU's CO_2 emissions commitments would add around €45 to €50 per ton for EU28-produced HRC, so they have an impact on the global competitiveness of the EU28 steel industry. On July 21, 2020, the European Council agreed to draft a carbon-border-adjustment policy and implement it by January 1, 2023.

Required investments for the decarbonization of the EU28 steel industry

To regain competitiveness, EU steel producers should not only consider reducing overcapacity but should also assess investments in innovative technologies such as smart carbon usage (SCU) and carbon-direct-avoidance (CDA) technologies.

To regain competitiveness, EU steel producers should not only consider reducing overcapacity but should also assess investments in innovative technologies.

One possible avenue is to replace fossil fuels in the direct reduced iron (DRI) process with renewable energy or hydrogen. This is not yet cost competitive, but leading steel players in Europe are testing hydrogen-based steel production to take a step toward "blue steel."[3]

However, adoption of low-CO_2 technologies will require significant investments—€40 billion to €50 billion[4] by 2050—from EU28 producers, depending on the scale of new and retrofitted facilities. This may allow for a reduction of CO_2 emissions of up to 75 percent in 2050 (versus 1990).

In its currently dire situation regarding capacity utilization and profitability, the EU28 steel industry is unlikely to be able to shoulder this investment on its own. The following chapter will elaborate on potential pathways.

[3] Hydrogen-based steel production that uses direct reduction in combination with EAFs. For more, see Christian Hoffmann, Michel Van Hoey, and Benedikt Zeumer, "Decarbonization challenge for steel," June 3, 2020, McKinsey.com.
[4] The estimated investments include only the capital expenditure for retrofitting or replacing existing plants. They do not include factors such as capital expenditure for new energy infrastructure or required demolition costs.

The COVID-19 crisis and the implications for 2020

The condition of the European steel industry had already deteriorated by 2019, with steelmaker profits reaching a critical level of approximately one percent earnings before interest, taxes, depreciation, and amortization (EBITDA) in the fourth quarter. The COVID-19 crisis, with lockdowns and heightened uncertainty, exacerbated the problem due to an unprecedented drop in both supply and demand, particularly in the automotive and construction industries.

European steel order entries in April and May 2020 were at 30 to 40 percent of 2019 levels, which were already lower than in previous years. Capacity utilization temporarily fell below 50 percent, and steel producers reacted promptly by idling steel production capacity, in particular blast furnace capacity. Steel producers also had to respond to the crisis on other fronts: ensuring a safe working environment (including making contingency plans in case of infection), managing tight cash, and adapting to virtual meetings and customer visits. From a technical and organizational perspective, as well as from a financial one, 2020 has already proven to be one of the most challenging years ever for European steel producers.

On an annualized basis, European steel producers' capacity utilization could drop to as low as 70 to 60 percent in 2020,[1] down from 76 percent in 2019. This increases the pressure on the European steel industry to restructure. However, government stimulus packages on both the national and European levels, such as stimulus spending on infrastructure and public building projects, may provide a positive short- to medium-term counterweight to the demand drop.

[1] Based on Q3 company reports.

3 How to ensure sustainability in the future

A series of operational and strategic moves can help European steel producers weather the crisis and accelerate the transition to a sustainable future for steel as a strategically important industry for Europe. These moves could also help ensure a robust, high-quality steel supply for European flagship industries such as automotive and machinery.

Short-term operational moves

European steel players can respond directly to the worsening loss of profitability by making the following four moves:

Manage costs and cash, including raw-material flexibilization

European steel players must manage costs tightly in these uncertain times. The crisis presents an opportunity to realize cost savings that may not have been captured while steel prices were booming from 2016 until early 2019. With high average prices for raw materials and increased volatility—for example, relatively high iron ore prices, volatile metallurgical coal and steel scrap prices—margins over raw materials get squeezed. To pass on this price volatility, steel producers may need to renegotiate their sales contracts with the automotive, machinery and equipment, and other industries to include floating instead of fixed prices. These new contracts would also mean that producers would forgo the benefit of potential raw-material price drops in the future.

Defer capital expenditure

Capital-expenditure deferrals may be necessary for several reasons, including government restrictions (foreign as well as domestic), contractor bankruptcy, and liquidity management. In order to manage cash during the COVID-19 crisis and maintain some room to maneuver in times of uncertainty, EU28 steel producers may need to revisit their capital-expenditure plans, and pause or postpone large investments. Globally, steel and mining companies have announced capital-expenditure reductions of 15 to 25 percent due to the COVID-19 crisis.

Accelerate digitization across operational and commercial functions

During the COVID-19 crisis, we surveyed more than 100 leading metals companies across the world on their digital and analytics journeys. More than about 80 percent of these companies elevated digital topics to the top priority in their strategies and are pursuing a digital transformation across the value chain, from procurement (eg, predictive pricing algorithms and automated contract management), to production (eg, digitally enabled maintenance and automation of internal logistics), to sales and the go-to-market approach, in which B2B customers are increasingly buying online and are becoming less

loyal and more demanding of a smooth customer journey. The survey also highlighted clear differences in how Chinese and European metals companies are addressing the digital opportunity, with Chinese players focusing much more on robotization and automation.

Develop new demand segments

As European steelmakers reimagine the post-COVID-19 world, they need to identify and assess emerging pockets of demand, such as increased demand for steel from electric vehicles or electrical steel for use in electric motors.

Structural moves aimed at capacity reduction

Crude steel capacity utilization in the EU28 is likely to decline to 65 to 75 percent in the medium term, depending on how much demand is permanently lost due to the COVID-19 crisis. To reach sustainable levels of capacity utilization (85 percent or higher), European steelmakers may need to consider several moves to reduce capacity:

Consolidate steel production capacity through mergers

In the face of unsustainably low capacity utilization, the industry could bring together all key stakeholders in the EU for a discussion about the future of the industry. This discussion could take place through the Global Forum on Steel Excess Capacity (GFSEC). To enable all key G20 steel-producing nations to participate in this forum, the German government plans to bring China back to the GFSEC table.[5]

M&A could support industry rationalization. Programmatic M&A is a strategic, proactive, and disciplined approach to creating deal flow, resulting in a series of related transactions that support a clear business plan. It needs to be designed to systematically rebuild internationally competitive steel businesses.

[5] *Für eine starke Stahlindustrie in Deutschland und Europa!: Handlungskonzept Stahl*, Bundesministerium für Wirtschaft und Energie (BMWi), July 2020, bmwi.de.

85%

To reach sustainable levels of capacity utilization (85 percent or higher), European steelmakers may need to consider several moves to reduce capacity.

A study of the top 1,000 global firms in terms of market capitalization across sectors showed that companies following programmatic M&A emerged from the global financial crisis ahead of those that pursued large-deal M&As and other M&A types, showing higher total returns to shareholders.

Reach higher utilization through shared assets
If industry-wide consolidation is not an option, steel players could reach higher utilization by sharing production assets or jointly producing inputs, such as hydrogen or DRI.

Engage other stakeholders
Public or private financing partners and other stakeholders could provide liquidity to propel consolidation and significant steps toward new technologies, such as an industry cluster for the production of "blue steel."[6] These partners would not necessarily need to be steel-focused investors.

Sustainability moves toward low- and no-carbon steel

Depending on how CO_2 prices and price enforcement evolve in combination with varying levels of structural support from EU policy makers, three potential long-term scenarios emerge.

Business as usual: Low CO_2 prices of €20 to €40 per ton and low EU structural support
Steel companies would continue to pull available no- and low-capital expenditure levers, such as maximizing scrap rate in basic oxygen furnaces, improving burden mix (high-Fe lump ores or pellets), and rationalizing capacity through sintering, coke batteries, blast furnaces, and other methods.

Scaling up low-carbon technologies: Medium to high CO_2 prices and high EU structural support
Using the European Emissions Trading System to price CO_2 emissions provides monetary incentives to reduce CO_2.

Policy makers would need to take two points into consideration when assessing the support for scaling up low-carbon technologies:

1. They need to show a migration path toward low-carbon steel (a first step is the introduction of the Emissions Trading System).

2. They should consider providing additional financial support for new technologies—such as hydrogen-based steel production—because proceeds from a CO_2 tax will not come quickly enough to make significant advances in low- and no-carbon steel production within the next ten years.

Closing or offshoring upstream capacity: High CO_2 prices (more than €80 per ton) and low EU structural support
Higher CO_2 prices and stricter environmental regulations without support from policy makers or financing partners may lead to closures of blast-furnace or basic oxygen-furnace capacity[7] (re-rolling in Europe) and increased imports of semifinished and finished steel.

[6] Hydrogen-based steel production that uses direct reduction in combination with EAFs.
[7] These capacity closures due to CO_2 pricing and regulation may happen even if the structural overcapacity challenge is solved.

Strategic steps to move beyond steel

The profit pool represented by the conversion of iron ore or scrap to steel has been, and continues to be, under pressure, with rising and more volatile prices for raw materials. The potential remains to further trim conversion costs through continuous efficiency improvements. However, in the face of long-term overcapacity, only slim or possibly unsustainable margins will remain for "pure" steel-conversion players that lack upstream integration.

While conversion and labor only make up about 19 percent of the HRC direct operating costs incurred by steel players, raw materials and energy make up approximately 73 percent and 7 percent, respectively. Steel players could consider expanding their reach beyond the conversion step and tapping profit pools elsewhere in the steel-making value chain. Options could include expanding into raw materials or energy.

As far as raw materials are concerned, iron ore and scrap hold promise. Consider the following:

— *Iron ore.* Does it make sense to invest in high-grade iron ore supply such as DRI pellets, DRI pellet feed, or high-grade lump ore? Will iron ore still play a role in steel production 20 years from now?

— *Scrap.* Should steel players build an even stronger position in the scrap industry to secure supply and position themselves toward the production of low-CO_2 steel?

With regard to energy, steel players could consider either actively investing in energy by building an industry cluster that includes energy production, or establishing a partnership with an energy provider to help balance energy supply and demand in the grid. The latter could be achieved by, for example, moving to batch production, with EAFs absorbing peak electricity supply (or only producing in low-demand times).

Toward a sustainable future

In conclusion, the European steel industry needs to make both short-term operational changes and medium- to long-term strategic moves to build an economically viable and environmentally sustainable future. This will require the steel industry and policy makers to be aligned and willing to cooperate, as the German government indicated in its *Handlungskonzept Stahl* in June 2020. However, similar to the Davignon Plan in the late 1970s and 1980s, this needs to be a European effort that brings together EU member states—not simply a country-led initiative.

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