Iron: from ore to steel

Iron, the most abundant metal used by human industry, is at the heart of modern metallurgy. Transformed into steel, an indispensable alloy in infrastructure, construction, the automotive industry, aeronautics, and electronics, it constitutes one of the pillars of the global economy.

Understanding its value chain, from ore extraction to finished steel production, is essential for evaluating investment opportunities and risks in raw materials, industrial materials, and related markets.

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1. From ore to metal: anatomy of an industrial cycle

Iron does not exist in metallic form in its natural state; it is present in ores rich in iron oxides, mainly as haematite (Fe_2O_3) or magnetite (Fe_3O_4). These ores are extracted in large mining complexes in Australia, Brazil, China, India, and South Africa, then transformed into usable metallic iron. **Nearly 98% of extracted ore is used for steel production.**

Iron ore is first crushed and ground, then subjected to chemical reduction where oxygen is removed from the oxides to release the iron. This step takes place in blast furnaces fuelled by coke, producing crude pig iron. This is then refined, particularly in oxygen converters or electric furnaces, to obtain liquid steel.

The steel thus produced can be shaped into slabs, billets or coils, then transformed into finished products (sheets, bars, rails, tubes) suitable for a wide range of economic sectors.

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2. Central role of steel in the global economy

Steel is one of the most strategic industrial materials: it is used to build bridges, buildings, vehicles, rails, pipelines, and industrial machinery, representing an essential foundation for urbanisation, heavy industry, and energy infrastructure. The sector is therefore a leading indicator of global economic activity, sensitive to economic cycles, public policies, and fixed capital investment projects (infrastructure, housing, energy).

The steel industry is also a major sector in terms of employment and international trade, with integrated global chains ranging from iron ore extraction to the production and distribution of finished steel.

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3. Global iron ore and steel production (2025)

In 2025, global production flows show that:

Iron Ore

Iron ore remains the main input for steelmaking, with global production maintaining around ~2 billion tonnes annually, the vast majority of which is used to produce steel.

Crude Steel Production

Global crude steel production regularly exceeds 1.7 billion tonnes, with a dominant share from Asian countries, notably China, which remains the world's leading producer.

Main Producers

India, the United States, Japan, and Russia complete the top list of main producers, reflecting the diversity of industrial markets.

In terms of prices, iron ore is trading around **~106 USD/tonne** at the end of 2025, after a record level in a previous period, movements influenced by steel demand and the trade policies of major consuming countries.

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4. Volatility factors: markets, geopolitics, and technologies

Raw material volatility

The balance between ore supply and steel demand is sensitive to economic cycles, infrastructure demand, and industrial policies. When steel demand slows (for example, in China, the world's largest producer), this can exert downward pressure on iron ore prices, even if overall demand remains high to support international production.

International competition and trade policy

Regulations such as the introduction of export licences for certain steel products in China aim to balance global supply and ease tensions in international markets, directly influencing trade flows and the competitive positions of major global steelmakers.

Innovation and decarbonisation

The pressure to reduce the steel industry's carbon footprint also pushes the industry to explore alternative avenues, such as direct reduction of ore with hydrogen or increasing the share of production based on recycled steels. These technologies can gradually alter production costs and market structures in the long term.

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5. Sectoral outlook and investment opportunities

For investors, several key trends shape the future of the sector:

Urbanisation and infrastructure

Steel demand remains correlated with public and private investment in construction, transport, and energy, particularly in emerging economies.

Energy transition

The development of "green" steel and the increasing integration of recycled materials open up opportunities in sustainable manufacturing technologies and low-emission materials.

Supply concentration

Major ore producers (Australia, Brazil, China) and large steel groups continue to invest in capacity expansion and process diversification, fostering a dynamic of powerful players in global markets.

However, investors must monitor cyclical demand, trade regulations, and environmental pressures, which can affect the margins and valuation of companies in the iron and steel value chain.

Conclusion

> From ore extracted in large mining complexes to steel incorporated into the structures of cities, transport, or industrial machinery, iron remains a fundamental strategic asset of the global economy. Its transformation into steel illustrates the complexity of a capital-intensive industry, sensitive to economic cycles and technological advancements.

For investors, understanding these dynamics is essential for identifying opportunities and risks in a key sector for global industrial growth.

Sources

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