

Metallurgical Coal: A Crucial Resource Facing an Urgent Need for Change

Metallurgical coal, also known as coking coal, plays a vital role in the global industrial ecosystem, particularly in steel production. Unlike thermal coal, which is used for power generation, metallurgical coal is used to produce coke, a key ingredient in blast furnace steelmaking. Despite its significance, growing environmental concerns and technological innovation are prompting a search for more sustainable alternatives.

What Is Metallurgical Coal?

Metallurgical coal is a grade of coal that can withstand high temperatures and is used primarily in steelmaking. When heated in the absence of oxygen, a process known as coking, this coal softens, liquefies, and resolidifies into a hard, porous material called coke. Coke is then used to reduce iron ore into molten iron in blast furnaces, forming the backbone of modern steel production.

Environmental Impact of Coking Coal

Steelmaking accounts for approximately 7-9% of global carbon dioxide (CO₂) emissions, much of which is attributed to the use of metallurgical coal. The coking process itself releases large amounts of CO₂, along with other pollutants like sulfur dioxide, nitrogen oxides, and particulate matter. Additionally, coal mining leads to land degradation, habitat loss, and water pollution through acid mine drainage.

"Essential to steel, and vital to progress, metallurgical coal also reminds us that every advancement carries a responsibility to the planet,"

- Gustavo Candelaria, CEO and Co-Founder, Mirá Biotech

Global Market Outlook

The global metallurgical coal market was valued at approximately USD 220 billion in 2023 and is expected to grow steadily over the coming decade, driven by rising steel demand in construction, automotive, and infrastructure sectors—especially in emerging economies.

Industries That Rely on Metallurgical Coal

While steelmaking is the primary user of coking coal, several other sectors indirectly depend on it due to their reliance on steel products. These include:

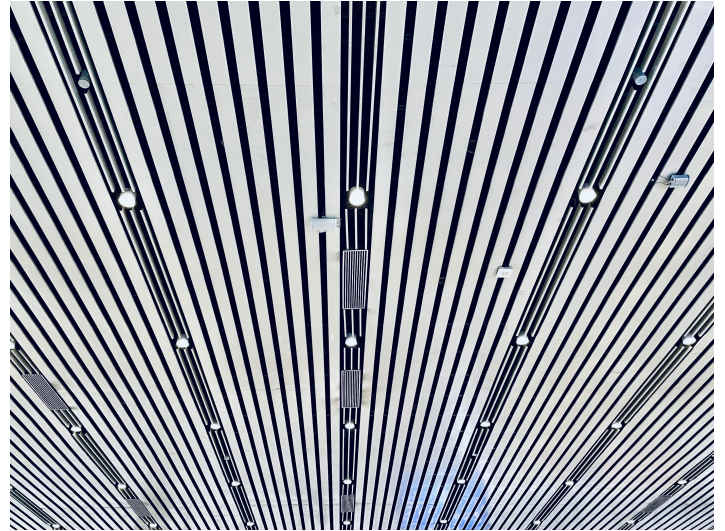
- Construction: Skyscrapers, bridges, and tunnels
- Automotive: Car frames and components
- Shipbuilding and Aerospace: Hulls, fuselages, and structural supports
- Machinery and Tools: Industrial equipment and transportation infrastructure



The Search for Sustainable Alternatives

Recognizing the urgent need to reduce emissions, industries and innovators are exploring alternative methods and materials to replace or reduce the use of metallurgical coal.

An avenue gaining traction is biomass-based carbon sources, and this is where innovation is beginning to bear fruit.



Mirá Biotech: Turning Agricultural Waste into the Future of Steel

One exciting development is emerging from Mirá Biotech, a company leveraging agricultural waste to produce high-carbon biomass pellets as a potential substitute for metallurgical coal.

These pellets, made from residues such as husks, stalks, and other farm byproducts, are currently being tested in lab environments. Early results show a solid carbon content of 53%, with ongoing optimization expected to raise that figure to 70–75%, bringing them closer to the performance requirements of traditional coke.

By using agricultural waste—often burned or discarded, Mirá Biotech not only diverts biomass from waste streams but also reduces dependency on coal extraction and combustion. If scalable, this could revolutionize the steel industry's carbon footprint.

Looking Ahead

The role of metallurgical coal in global industry cannot be overstated—but neither can its environmental cost. With international climate commitments tightening and innovative solutions like those from Mirá Biotech on the horizon, the future may see a steel industry powered not by coal, but by circular, sustainable alternatives.

As biomass carbon solutions advance from lab to industrial scale, the hope is clear: to preserve the utility of steel while forging a cleaner, greener path forward.

