

Helios creates cutting-edge metal refining technologies that reduce production costs while minimizing environmental impact and maximizing resource efficiency.

The steel industry's main challenges:



Scarcity of High-grade iron ore

High-grade iron ore (67% iron) is relatively scarce, only about 4% of the global iron ore supply. Extracting and processing the existing lower-grade ores is more expensive, leading to higher production costs for steel manufacturers.



Environmental Impact

Lower-grade ores require more processing, which increases energy consumption and emissions, exacerbating environmental concerns. Converting low-grade ores into steel requires extensive energy consumption and using carbon to refine it. This makes the iron and steel industries responsible for 8% of humanity's carbon footprint.



Challenges conclusion

These challenges, combined with fluctuating raw material costs and the need for substantial investment in cleaner technologies, create a complex landscape for steel producers striving to achieve profitability and sustainability.

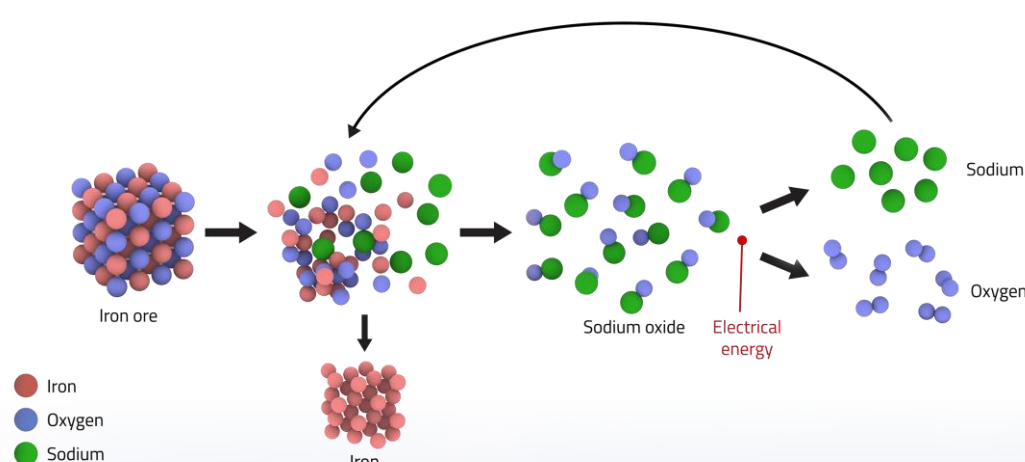
Helios technological breakthrough:

Helios developed the Helios cycle™, a process that produces iron from low-grade iron ore and even from tailings (mining waste). The process is clean, energy-efficient, and reduces production costs without relying on external carbon incentives all while dramatically minimizing the environmental impact of the entire value chain.

How does it work:

Helios technology is based on sodium as a reducing agent instead of carbon or hydrogen. The Helios cycle™ is a two-step process in which sodium is used to reduce first-row transition metals (like Iron), and in the second step, the byproduct sodium oxide is dissociated to reclaim the sodium in metal form and keep it in a closed loop within the system. The required input is iron ore and electricity, the output is 99+% iron.

In contrast to hydrogen or carbon monoxide that are currently being used for ironmaking, the use of sodium makes the whole process safer, with significantly reduced risk to operators and the environment.



From iron ore to green steel Helios new efficient production flow

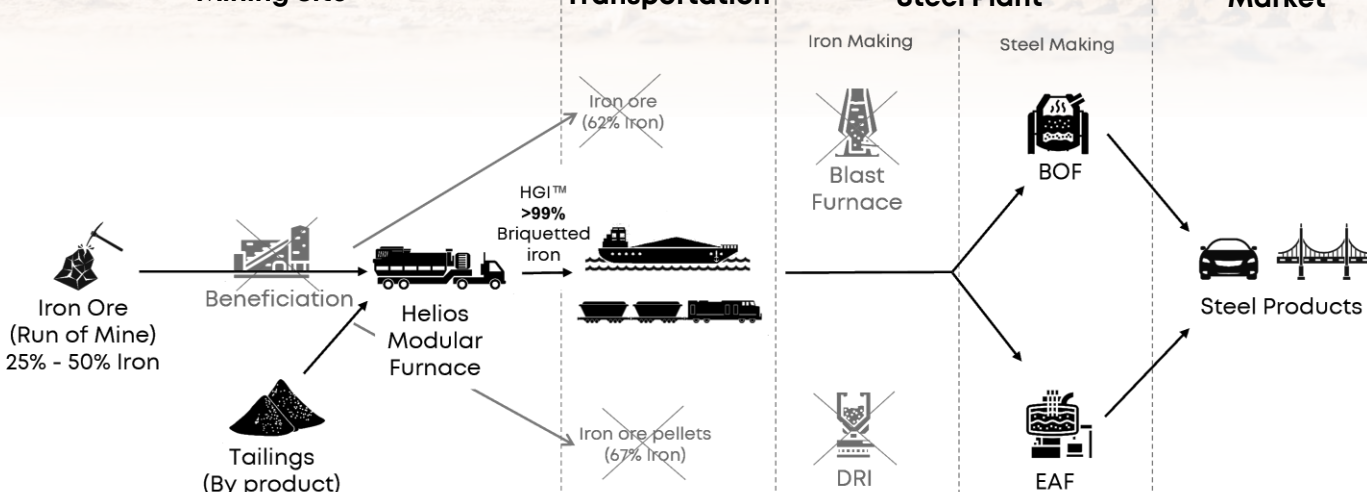
The Helios Cycle™ impact is beyond improving ironmaking to be more cost-efficient and cleaner. It literally optimizes the whole value chain; making the two most energy and carbon intensive links in the value chain redundant (ironmaking and ore beneficiation) and significantly increasing the efficiency of its other parts – transportation and steelmaking.

Mining Site

Transportation

Steel Plant

Market



Technological advantages:

Compatible with low-grade ores

The Helios Cycle™ allows for the utilization of low-grade ores and tailings which are largely unusable today, thereby lowering the overall cost of iron production.

Lower temperature and energy consumption

Whereas current iron production methods necessitate temperatures of 1,000°C to 2,000°C, the Helios Cycle™ uses temperatures of between 250°C to 350°C. The process requires up to 4MWh to produce a ton of iron, which is lower than competing technologies.

No direct carbon emissions

The Helios Cycle™ emits only oxygen as a byproduct. When powered by a renewable energy source, the entire process is free of carbon emissions.

No hydrogen

Hydrogen use necessitates the construction of specialized infrastructure near the plant. Additionally, the production of green hydrogen significantly raises the cost of steelmaking. The Helios Cycle™ does not require hydrogen and won't be affected by the expected bottleneck of hydrogen making scale up and high costs.



Commercial advantages:

Can process ore tailings

Tailings, the leftover waste stream of the iron ore beneficiation process, can be used as well as feedstock raw material in the Helios Cycle™. This reduces raw material costs, increases the sustainable usage of raw materials, and unlocks new revenue streams.

Lower operational cost

Stronger unit economics due to overall lower energy consumption and lower ore grade requirements → less operational expenditure per ton of iron produced.

Modular furnaces

The Helios Cycle™'s fast kinetics allow for high production capacity in a smaller volume. This enables faster market penetration, using small and mobile furnaces.

Proximity to mining sites

The mobile modular furnace approach allows for production near mines, so outgoing shipments are iron (vs. iron ore). This cuts shipping costs and emissions.

Iron is only the beginning:

Helios targeted the iron industry because of its high energy consumption and significant environmental impact. However, Helios' technologies extend beyond iron: We offer a greener approach to extracting other critical elements, including Nickel, Copper, Cobalt, and lithium. Our technology offers a more sustainable method for resource extraction, benefiting the planet across multiple industries.

About Helios

- 39 employees, 8 PhD, 41% women
- Located in Zur Yigal, Israel
- Member of World Steel Association
- Top Innovator by the World Economic Forum

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