



The Transition to Carbon Neutral Iron

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Technical Sales & Marketing

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Midrex at-a-Glance

Midrex has a unique blend of existing and new technologies to create a sustainable future of iron and steel. Our DR plants produce low CO₂ iron for captive steel production for export to steelmakers around the world.



50+

Years of Commercial Operation



20+

Countries with MIDREX® Plants



MIDREX® Process

MIDREX Plants Produce about 80% of the World's Low CO₂ DRI



R&D

State-of-the-Art Research and Development



HQ

Charlotte, NC Headquarters +Global Offices (UK, India, China, UAE)

SMALL TEAM

BIG WORK



Research & Development Technology Center

Resources

10 miles from HQ

Over 30 Engineers
and Technicians

Supports Technology
Improvements,
Licensees and Partners



Analytical Capabilities

- Wet Chemistry
- Carbon / Sulfur
- Elemental Analysis: XRF, ICP
- Compound Analysis: XRD
- Gas Analysis: MS, GC
- Microscopy: SEM w/ EDX
- DRI Reactivity
- Physical Testing

Raw Material Evaluation (RME)

- Hot Load
- ISO 11256
- ISO 11257
- ISO 11258

DRI Production

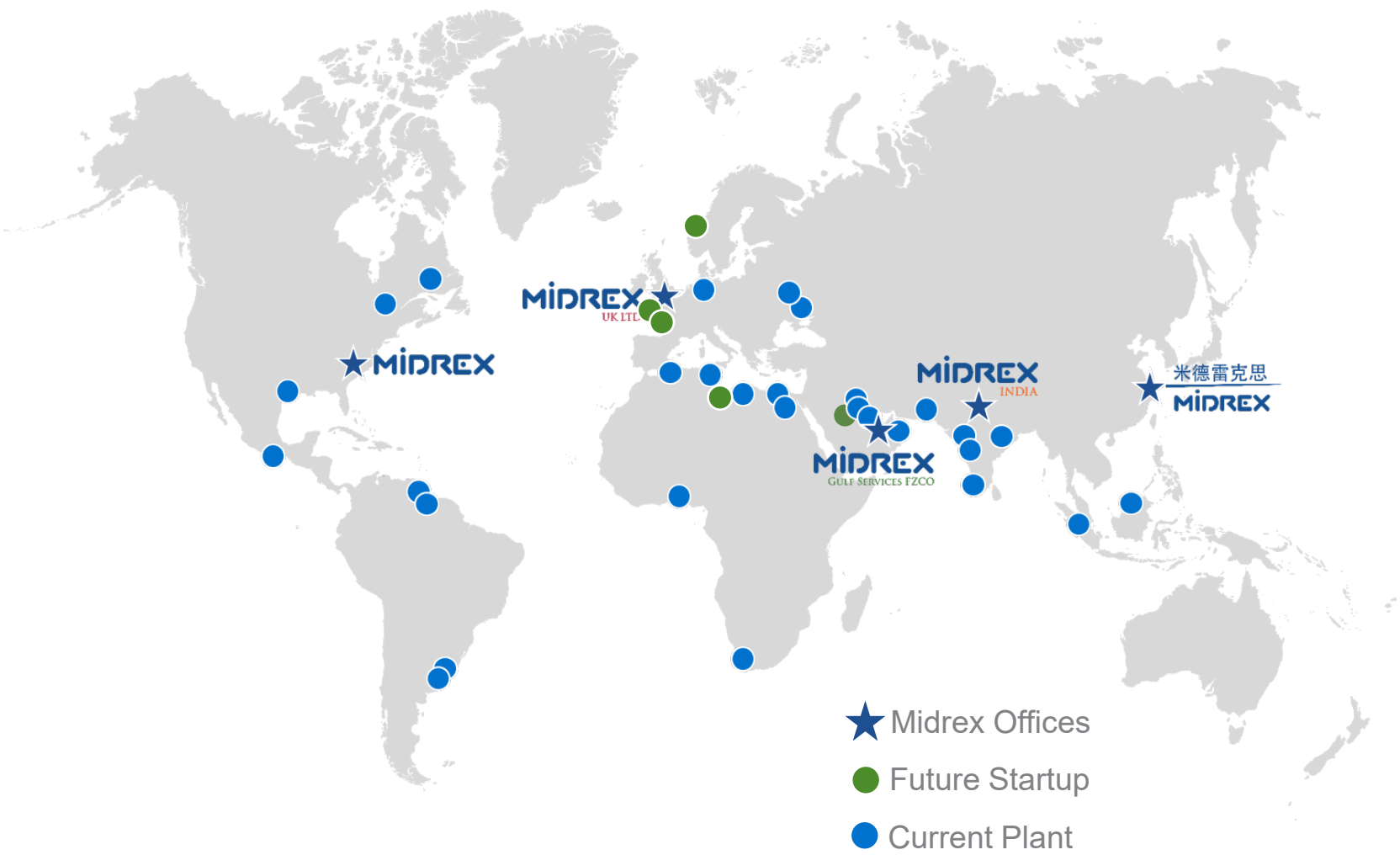
- Up to 400kg, incl.
- reformed NG
- reformed H₂

Pilot Equipment

- Catalyst Pilot Facility
- Hot & Cold Briquetting
- Electric Smelting Furnace
- Rotary Hearth Furnace



MIDREX Plants Locations



Current Projects

MIDREX Flex[®]



DILLINGER

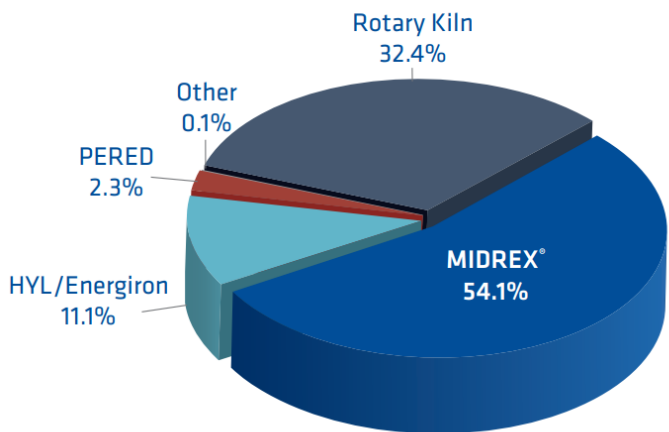
MIDREX H₂[™]

 Stegra

Global DRI Production (2024)

Midrex Plants produced about 80% of the world's low CO₂ DRI in 2024

2024 World DRI Production by Process



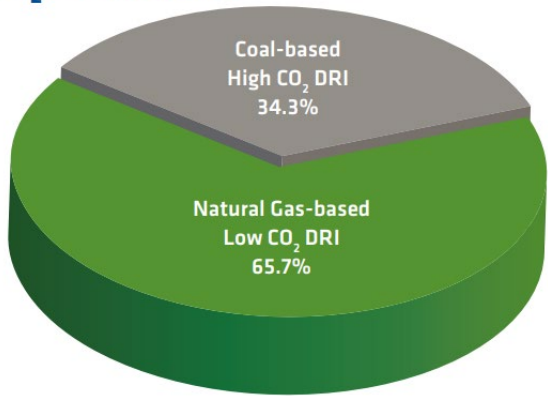
Note: Percentages are rounded to the nearest decimal.

Total World Production: 140.8 Mt

	2022	2023	2024
MIDREX®	57.8%	55.8%	54.1%
HYL/Energiron	12.1%	12.2%	11.1%
PERED	2.2%	2.3%	2.3%
Other	0.1%	0.1%	0.1%
Rotary Kiln	27.9%	29.6%	32.4%

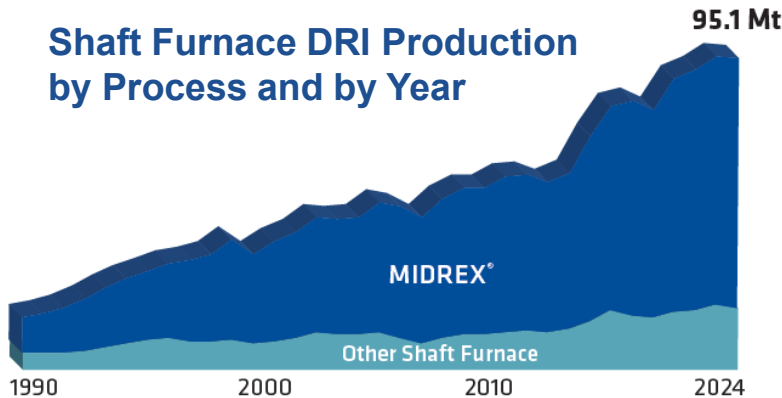
Source: Midrex Technologies, Inc.

2024 World DRI Production by CO₂ Emissions



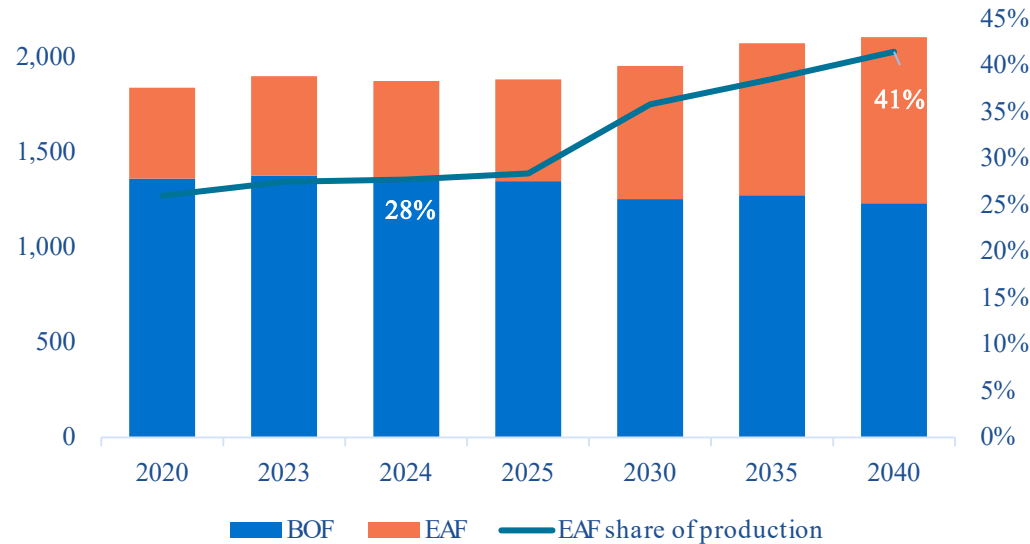
- Ironmaking is the most energy intensive step in producing steel
- Recycling scrap significantly reduces emissions, but there is not sufficient high-quality scrap to produce high-grade steel
- Decarbonization and the need to supplement scrap are dramatically increasing the demand for DRI
- Not all DRI is low CO₂ : DRI produced in rotary kilns have much higher emissions (mostly in India), and growing

Shaft Furnace DRI Production by Process and by Year

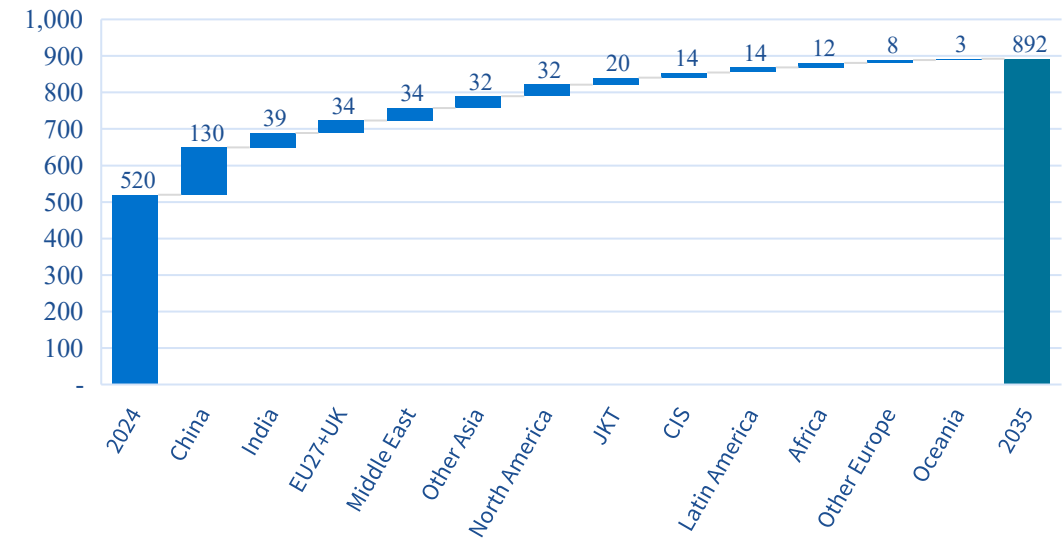


Crude steel production growth to be driven by EAFs MIDREX

Global Crude Steel Production (Mt)



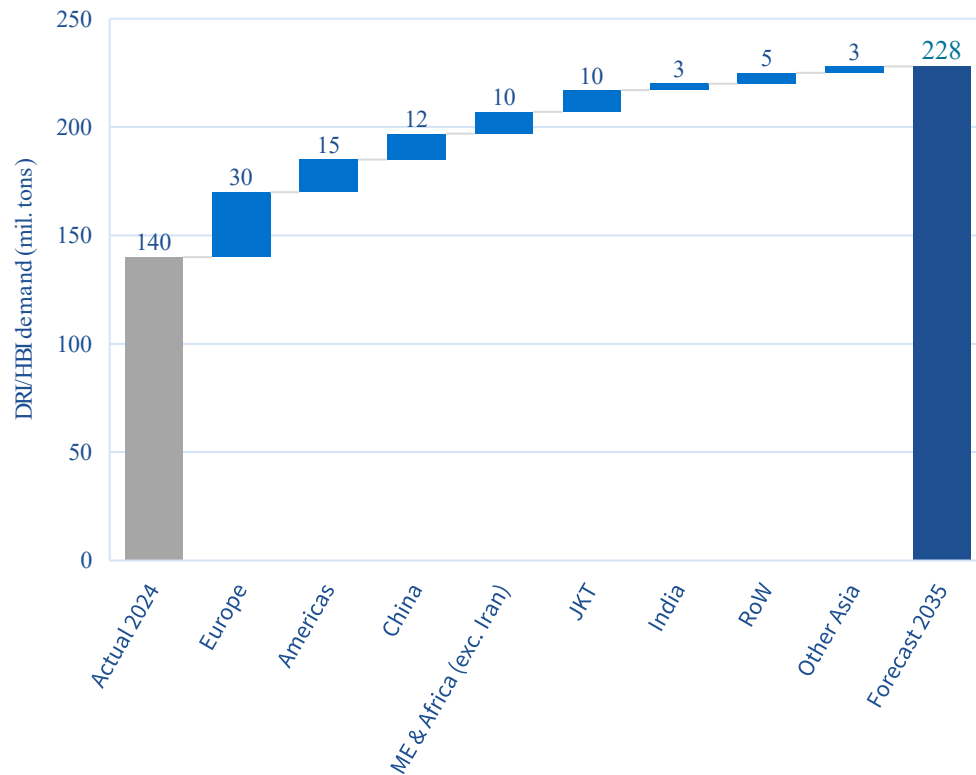
Global EAF Steel Production increase 2024-2035 (Mt)



- The shift towards EAF steelmaking is accelerating, from 28% in 2024 to around 40% by 2040, driven by new capacity in the EU28, US and Northeast Asia, unlocking long term demand for DRI/HBI.
- India and Southeast Asia will buck the trend, adding new BOF capacity, focusing on flat steel supply for growing domestic demand.
- Decarbonization efforts will lift DRI/HBI and scrap consumption.
- *Scrap alone will not meet demand*, solidifying DRI's role as a critical feedstock.

Demand for DRI/HBI projected to expand across most regions

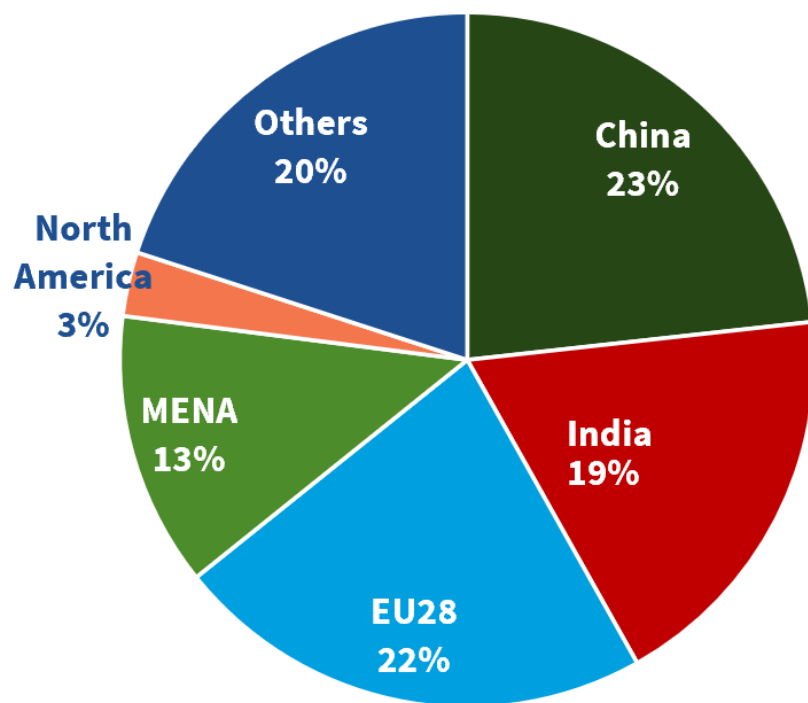
Growth in DRI/HBI demand 2024 - 2035



- At the current pace of decarbonization, DRI/HBI demand excluding Iran is expected to grow by 88 Mt to reach 228 Mt (range 220 – 240 Mt) by 2035.
- Demand will be driven by expanding Electric Arc Furnace (EAF) capacity, tighter scrap availability, and regulatory frameworks such as the European Union (EU)'s CBAM.
- Regionally, Middle East and North Africa (MENA) will remain the anchor for both consumption and exports, India will sustain the largest absolute demand albeit with a coal-heavy profile, Europe will see the sharpest growth as it transitions away from BF-BOF, and North America will double its requirements as flat-rolled EAF capacity expands. China remains a wildcard: even modest growth to 10–15 Mt by 2035 would have major implications for seaborne HBI flows.

Hydrogen optimism fades as challenges mount

General consensus forecast:
H2-based DRI EAF production,
% share by region, 2040 (80-100 Mt total)

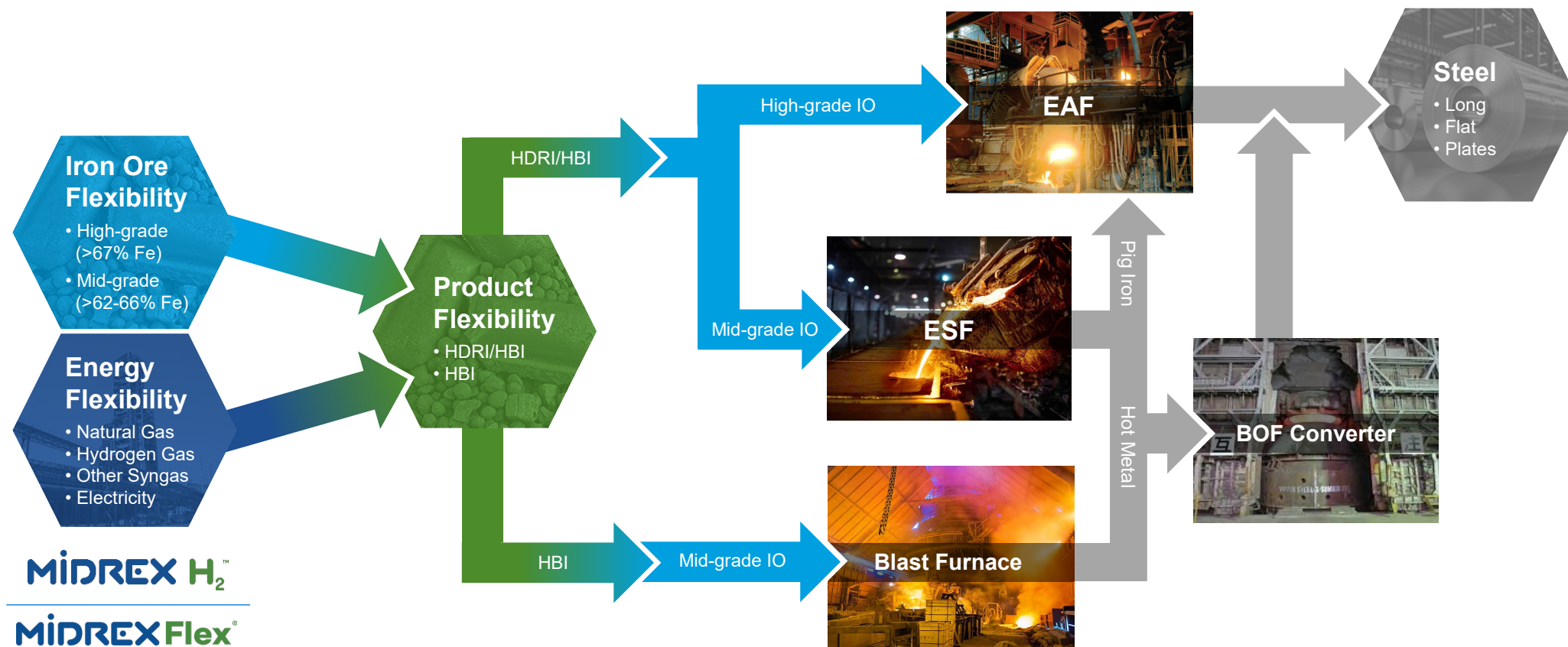


Source: General consensus
Others: Other Europe, CIS, Other Asia, Africa, Latin America and Oceania

Midrex perspective

- It is not a question of whether the steel industry decarbonizes; it is a question of how quickly.
- Most forecasts for H2-based steelmaking are overly ambitious and underestimate the pace and complexity of deployment.
- Nevertheless, some existing steelmakers and newcomers are implementing lighthouse projects that provide a glimpse of the future.
- Many steelmakers are delaying or scaling back “H2 now” steel projects due to limited renewable energy infrastructure, policy uncertainty, high capital costs and supply constraints.
- The EU will continue to lead the charge even though green steel progress has been hampered by weak steel industry profitability despite significant government subsidies.
- Bottom line: Hydrogen is lagging so more cost-effective, near-term options for “greener” iron like a gradual transition from NG to H2 are a more attractive, stepwise alternative.

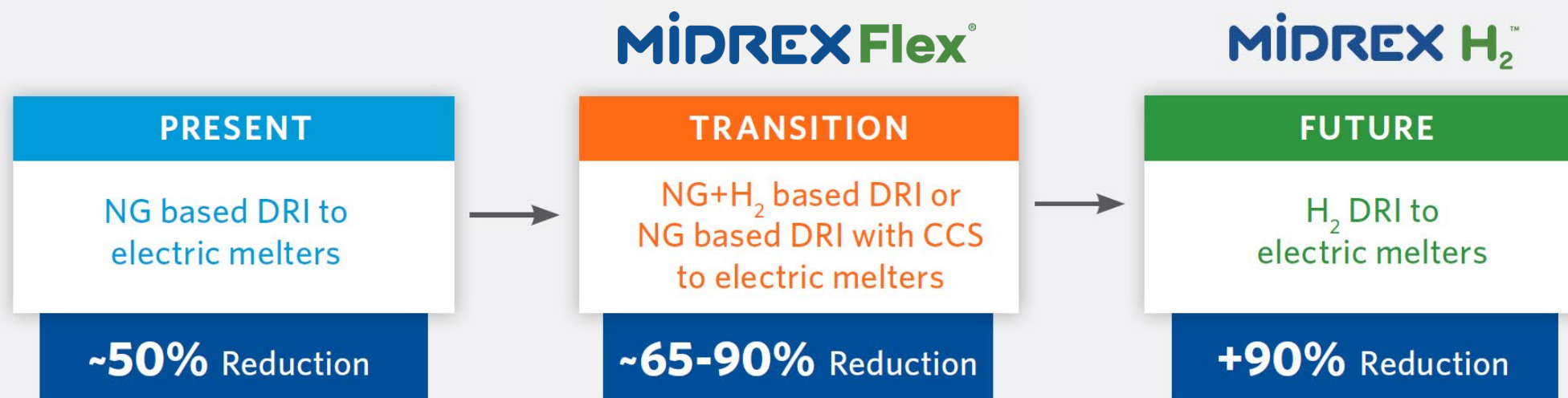
DRI Flexibility: Key for transition to carbon neutral



With Optional Carbon Capture

What is Midrex doing to reduce CO₂ emissions?

TRANSITION FROM FOSSIL TO HYDROGEN ECONOMY



Emissions compared to traditional steelmaking

1

Hydrogen Ready

Use up to 100% H₂ as the reductant. Midrex has solutions ready to accommodate the entire range of input gas compositions at new and existing facilities.

2

MIDREX[®] Reformer

The MIDREX Reformer ensures optimum reducing gas conditions throughout the entire range of the transition.

3

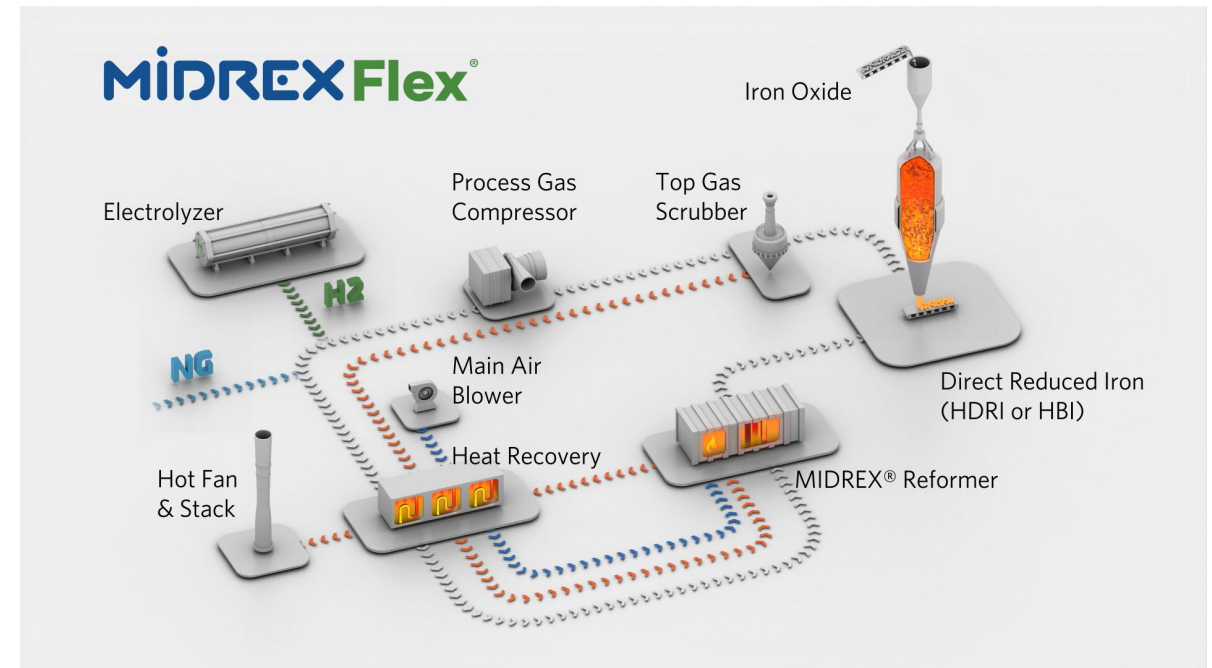
MIDREX[®] Shaft Furnace

Delivers consistent product quality throughout the transition. The influence of endothermic hydrogen reduction is mitigated by the MIDREX Reformer and uniform burden movement.

4

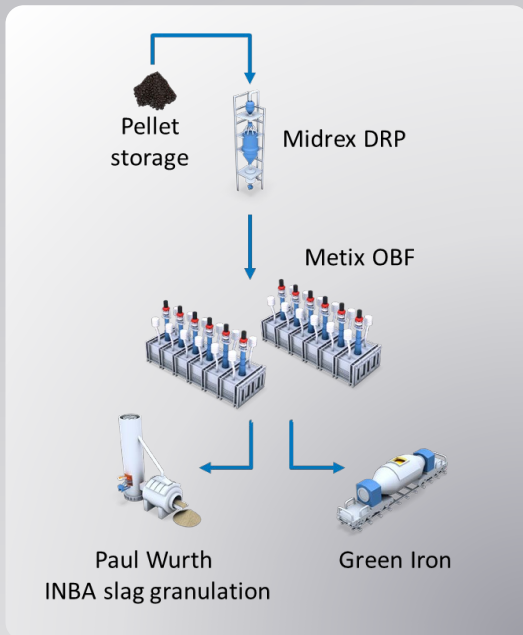
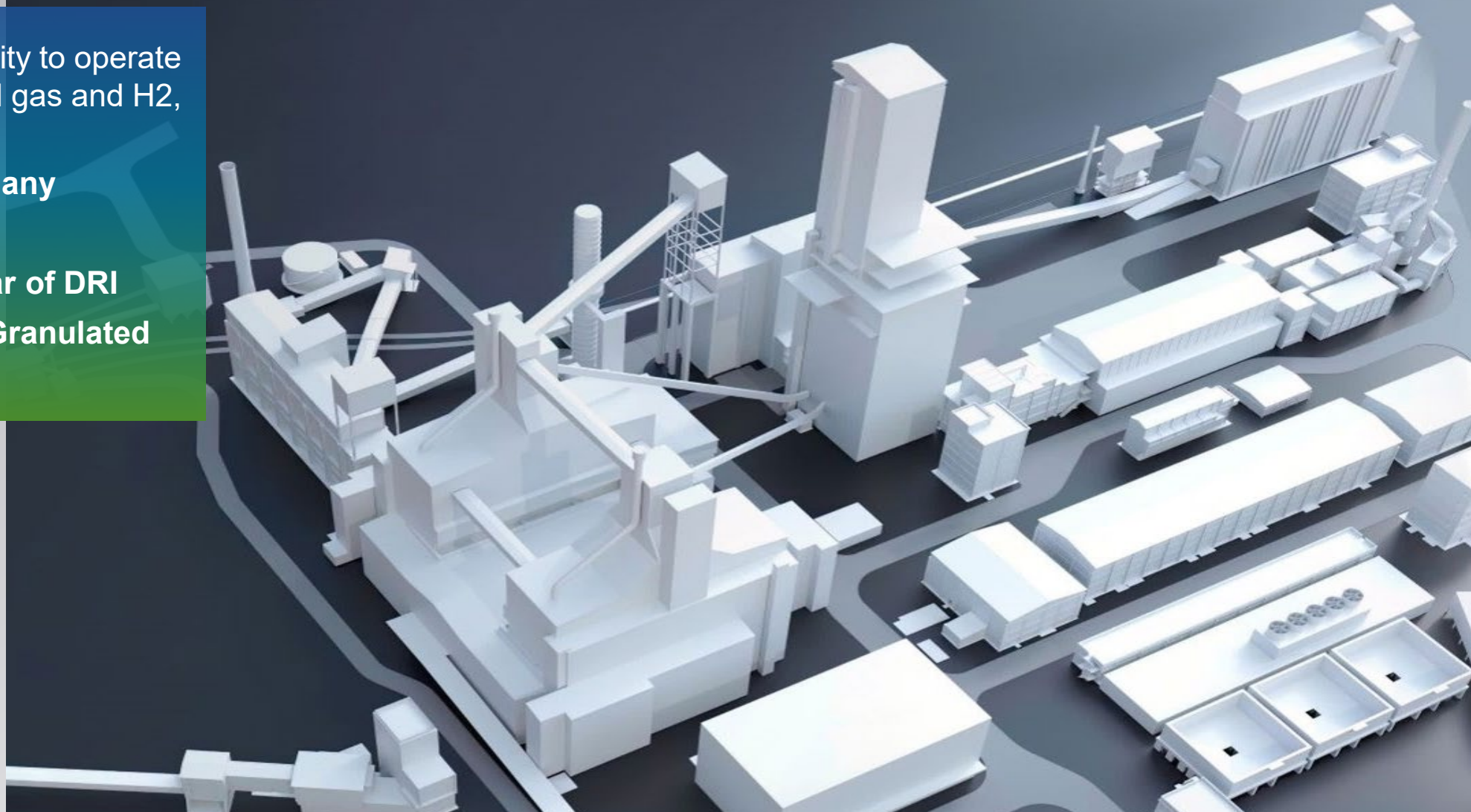
Carbon Capture & Storage

Carbon capture and storage can be applied to several different process streams. CO₂ capture of 50% to nearly 100%. Available for addition to existing facilities or new installations.



thyssenkrupp SE

- › Plant designed with flexibility to operate at different ratios of natural gas and H₂, up to 100% H₂
- › Based at **Duisburg, Germany**
- › First green iron: **Q4/2026**
- › Capacity: **2.5 million t/year of DRI**
- › Products: **Hot Metal** and **Granulated Slag**



MIDREX Flex[®]

MIDREX

SMS  group

MIDREX H₂[™] — The Future Today

01

Optimized for 100% H₂

The MIDREX H₂ plant can operate without any fossil fuel input. Hydrogen recovery in the Top Gas Fuel maximizes the process efficiency

02

Electrical Heater

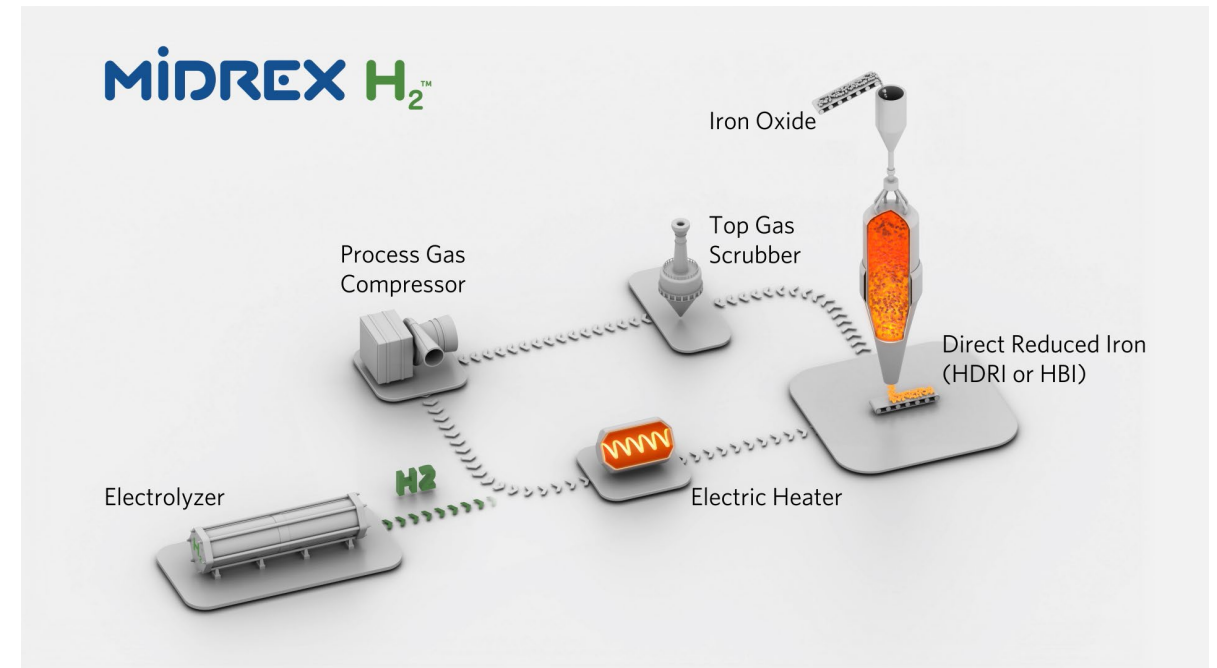
Strong collaboration with Midrex's partner, TUTCO SureHeat, allows for the application of direct electric heating to the Process Gas.



03

Product Quality

Ready to deliver maximum CO₂ reduction with 0% carbon DRI, or deliver carbon-containing DRI for the downstream user. Special attention to the electric heater design and Top Gas Fuel hydrogen recovery allows for this flexible operation while avoiding undesirable side reactions.



The world's first 100% hydrogen-based steel plant

Secured funding of close to €6.5 billion

- signed definitive debt financing agreements for €4.2 billion in January '24
- total equity funding of €2.1 billion
- awarded a €250 million grant from the EU Innovation Fund

- CONTRACT STRUCTURE: EPS

- › Based near **Boden, Northern Sweden**
- › Start-up of first plant: **2025**
- › **Giga-scale electrolysis** → DR → EAF



The **world's first**
commercial 100%
hydrogen DRI plant



Removes **up to 95%**
of carbon emissions



Phase 1 produces
2.1 million t/y of
HDRI/HBI



Innovative **electric**
heater for recirculating
hydrogen gas

MIDREX

New Plant project update

TOSYALI 2 began production in December 2024

LOCATION: Oran, Algeria



Dillinger and ROGESA selects Midrex for Major Decarbonization Project

German steel producer Dillinger and ROGESA signed a contract with Midrex Technologies, Inc. and Primetals Technologies for the supply of a new production complex, including a direct reduced iron (DRI) plant and an EAF Ultimate electric arc furnace plant. The solutions from Midrex and Primetals will support Dillinger's goal of reducing CO₂ emissions by 4.8 million tons per year within six years.

"This partnership with Midrex and Primetals represents an important building block on the way to climate-friendly steel production here in Germany. We are convinced that we can successfully launch our Power4Steel decarbonization project on schedule with such an experienced and reliable partner." - Dr. Peter Maagh, Chief Technical Officer - Dillinger

01

Dillinger and ROGESA will deploy MIDREX®Flex technology to create a DRI plant with an annual production capacity of 2 million tons.

02

The new production complex will include an electric arc furnace (EAF) and advanced systems for material handling, water treatment, and process automation. The design allows for tailored solutions that facilitate integration with existing facilities, optimizing operational efficiency while maintaining high-quality DRI output through the DRIPAX expert system.

03

This project is part of Dillinger Group's broader Pure Steel + program, aiming for carbon neutrality by 2045. The initiative is supported by funding from the German state and the European Union, highlighting a strategic investment in sustainable steel production and a significant step toward long-term environmental goals.



TOSYALI SULB Awards Order to Midrex and SMS group for DRI Complex

Libya intends to become a supplier of direct reduced iron (DRI) in the Mediterranean basin and beyond with the announcement of a DRI complex based on MIDREX Flex® technology to be built in the Benghazi region. TOSYALI SULB Steel Industries will immediately commence the first phase with the construction of a 2.5 million ton cold DRI (CDRI) plant.

"We are excited to use our expertise in DRI plant operation and value-added steel production to transform the Libyan steel industry into an ecosystem that produces high-quality green steel products with low carbon emissions... With MIDREX technology, we will leverage the flexible use of natural gas and hydrogen to support the production of low-carbon, high-quality steel, creating value for both the region and the world..." - Fuat Tosalı, Chairman of TOSYALI Holding

01

TOSYALI SULB will utilize MIDREX Flex® technology similar to what equips the two DRI plants owned and operated by TOSYALI Algerie in Bethioua (Oran), Algeria.

02

The DRI plant will be supplied by Midrex and our consortium partner, Paul Wurth, part of SMS group, which supplied both HDRI (hot DRI)/CDRI plants for our first TOSYALI plant, TOSYALI Algerie which commenced production in November 2018.

03

When this investment is completed, TOSYALI SULB will be one of the key suppliers of DRI in the world.





MIDREX

Thank You

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