2024 WORLD DIRECT REDUCTION STATISTICS

MIDREX

THE WORLD LEADER
IN DIRECT REDUCTION TECHNOLOGY

CONTENTS

Audited by WSD WORLD STEEL DYNAMICS®

World DRI production reaches 140.8 Mt in 2024

Sets a fourth straight annual production record

The annual global direct reduced iron (DRI) production in 2024 was 140.8 million tons (Mt), up by 5.1 Mt (3.8%) from the previous record of 135.7 Mt set in 2023. This growth was primarily driven by rotary kiln-based production in India, which rose by 5.6 Mt (13.9%), while gas-based shaft furnace output saw a slight contraction of -0.3 Mt (-0.4%). Combined, India and Iran accounted for over 60% of global DRI production, with year-on-year increases of 10.9% and 2.1% respectively. New natural gas-based capacity came online in Algeria, China, and Iran.

Since 2019, worldwide DRI output has grown by 32.7 million tons per annum (Mta), or approximately 30.3%. During this same period, coal-based rotary kiln DRI production in India increased by almost 20 Mta, or 76.5% and natural gas-based DRI production in Iran grew by 19.7%. In the last decade, DRI production has grown by 66.2 Mta, or approximately 89%, for a compounded annual growth rate of 6.6%. In these 10 years, shaft furnace production increased by 35.9 Mta / 60.6% (CAGR=4.9%) and rotary kiln by 30.3 Mta / 197% (CAGR=11.5%).

The production of hot DRI (HDRI), which is fed directly to a nearby melt shop for energy savings and productivity gains,

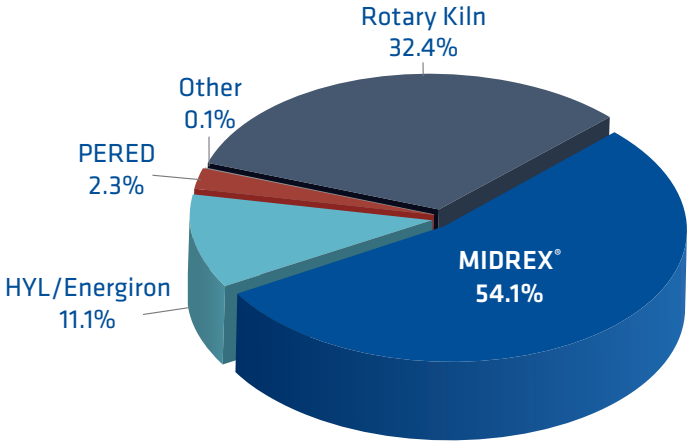
(Continued on page 3)

2024 Top 5 DRI Producing Nations

COUNTRY	PRODUCTION (Million Tons)
India	54.7
Iran	34.1
Russia	8.0
Saudi Arabia	6.6
Egypt	6.4

Source: World Steel Association, SIMA, and Midrex Technologies, Inc.

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.

was 17.0 Mt, a 13.5% increase compared to 2023, and made up 12.0% of the total DRI produced in 2024. The production of hot briquetted iron (HBI) – a compacted form of DRI ideally suited for shipping to Electric Arc Furnaces and Blast Furnaces – is estimated to have been 11.2 Mt, a 8.3% decrease over 2023.

MIDREX® Plants produced 76.2 Mt of DRI in 2024, which is 0.6% more than the 75.7 Mt produced in 2023, both annual records. The MIDREX Process accounted for 54.1% of total DRI produced, and 80.1% of the DRI produced in shaft furnaces. The total production for 2024 was calculated based on 38.3 Mt confirmed by plants outside Iran and Russia, and an estimated 37.9 Mt from plants within Iran and Russia, using data reported by the World Steel Association (Worldsteel). Almost 12.9 Mt of HDRI (76% share) and 10.0 Mt of HBI (90% share) were produced by MIDREX Plants in this period.

Natural gas is generally the main source of reducing gas in shaft furnace-based processes, and DRI produced using natural gas has significantly lower CO_2 emissions than DRI produced using coal directly in rotary kilns, or indirectly in shaft furnaces using coke-oven gas, COREX® gas or coal gasification. For plants using a combination, DRI production is pro-rated on an energy basis. In 2024, approximately 65.7% of the DRI produced was natural gas-based (i.e., low CO_2 DRI), whereas the balance, 34.3%, was coal-based (i.e., high CO_2 DRI). The proportion of low CO_2 DRI has steadily decreased in the last 4 years due to the faster growth in DRI produced in India via rotary kilns.

Since 1970, the cumulative production of DRI is 2.4 billion tons (Bt), of which shaft-furnaces have produced 1.9 Bt. The cumulative production of HBI is 251.0 Mt (since 1977) and of HDRI is 181.3 Mt (since 1998). Through the end of 2023, MIDREX Plants have produced a cumulative total of over 1.46 Bt of all forms of DRI (Cold DRI or CDRI, HDRI, and HBI).

BEHIND THE NUMBERS

The production of DRI is strongly influenced by steel demand, iron ore pricing and availability, and energy cost. Energy – whether natural gas or coal – acts as a reductant in the DRI process and often accounts for the largest share of variability of production costs between plants. The impact of these drivers varies significantly by region and technology type (i.e. gas or coal-based production). This publication highlights only global and regional trends that influence DRI production.

Crude Steel Production

Crude steel production remains a key proxy for steel demand. Worldsteel reported the world crude steel production as 1,885 Mt in 2024, a 1.0% decrease from the revised 2023 production figure of 1,904 Mt. The contraction was broad-based across major producing regions, reflecting softer demand from construction and manufacturing, ongoing destocking cycles and margin pressure at steel mills. Notable exceptions included India, Türkiye, and Vietnam, where domestic stimulus measures, capacity additions and competitive exports supported year-on-year growth. China accounted for the largest drop of approximately 24 Mt.

Demand for DRI-based steelmaking, although relatively strong, still fell throughout the year. Steel pricing fell more sharply than input costs, leading to significant margin compression throughout the year.

THE TOP 5 STEEL PRODUCING NATIONS IN 2024

CHINA	**1,005.1 Mt** (down 2.3% from 2023)
INDIA	**149.4 Mt** (up 6.2% from 2023)
JAPAN	**84.0 Mt** (down 3.4% from 2023)
USA	**79.5 Mt** (down 2.4% from 2023)
RUSSIA	**71.0 Mt** (down 6.6% from 2023)

The top 5 producing regions were:

1. **Asia** produced **1,386.8 Mt**, down 1.3% over 2023 production. Worldsteel listed China, India, Japan, South Korea, and Vietnam as the top 5 producing countries in Asia.

2. **The European Union (27)** produced **130.0 Mt** in 2024, an increase of 2.7% compared to 2023. Germany, Italy, Spain, and France each produced over 10 Mt.

3. **North America** produced **106.1 Mt** in 2024, a 4.0% decrease compared to 2023, led by the United States, Mexico, and Canada.

4. **Russia & Other CIS + Ukraine** production in 2024 was

87.0 Mt, a 3.8% decrease over 2023.

5. **Middle East** produced **54.8 Mt** in 2024, an increase of 1.2% over 2023, with Iran, Saudi Arabia, United Arab Emirates, Oman, and Iraq as the top 5 producing countries in the region.

Iron ore supply and steel demand

The iron ore supply was relatively stable in 2024, with pricing trending downward throughout the year, with lower volatility than previous years. For 62% Fe iron ore, the highest price was in early January and the lowest price in September; it remained relatively flat for the balance of the year, around $100/ton. Pellet feed and DR pellet premiums followed a similar downward trend.

Direct reduced iron production

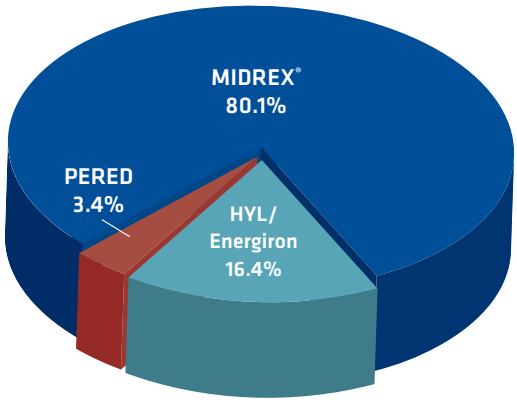
As in previous years, **India** continued to be the largest DRI producer worldwide, producing a record **54.7 Mt** of DRI, an 11.1% increase overall, according to the Sponge Iron Manufacturers Association (SIMA) of India. India DRI production includes 45.5 Mt from coal-based rotary kilns (an increase from 39.9 Mt in 2023) and 9.4 Mt by gas-based processes (a 0.2% decrease from 9.4 Mt in 2023). Rotary kiln-based DRI production saw a year-on-year jump of 13.9%, following a 12.8% increase in 2023, a 17.8% increase in 2022, and an 18.7% increase in 2021. Coal-based DRI production in India constitutes most of the high CO_2 DRI produced in 2024.

Production of DRI in **Iran** was **34.1 Mt,** a 2.1% increase from 33.4 Mt in 2023. All Iranian DRI production is from natural gas-based processes. The MIDREX Process accounts for ~90% of DRI production in Iran, with 3 new plants started in 2024. PERED® plants produced an estimated 3.2 Mt with one additional module in 2024.

Russia maintained its 3rd place as a DRI-producing nation with **8.0 Mt** in 2024, a 3.5% increase over its production of 7.8 Mt in 2023. All Russian DRI is produced from natural gas-based processes.

Saudi Arabia retained its 4th place with **6.5 Mt**, a - 0.5% reduction in output from 6.7 Mt in 2023.

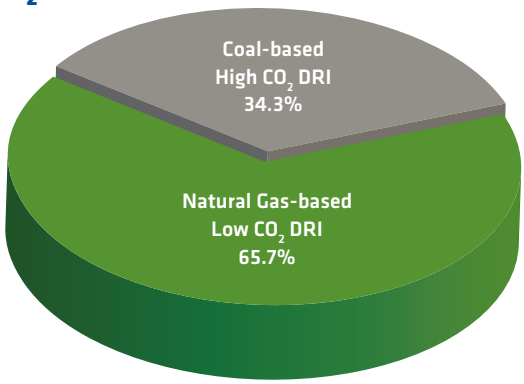
2024 World Shaft Furnace Production by Process



	2022	2023	2024
MIDREX®	80.2%	79.4%	80.1%
HYL / Energiron	16.8%	17.4%	16.4%
PERED	3.0%	3.2%	3.4%

Source: Midrex Technologies, Inc.

2024 World DRI Production by CO_2 Emissions



	2022	2023	2024
High CO_2 DRI	29.9%	31.5%	34.3%
Low CO_2 DRI	70.1%	68.5%	65.7%

Source: Midrex Technologies, Inc.

For the second year in a row, **Egypt** maintained its 5th place, with **6.4 Mt** in 2024 (-0.7%).

The DRI production in the **U.S.** (**5.2Mt**, - 4.8%) surpassed **Mexico** (**4.7 Mt**, - 20.8%). **Algeria** increased its output, with 3 MIDREX Plants at Tosyali Algerie and Algerian Qatari Steel (AQS) combining to produce **4.6 Mt** of DRI in 2024.

Venezuela continued to produce well below rated capacity, around **0.5 Mt**.

NEW CAPACITY STARTED OR ANNOUNCED IN 2024

MIDREX

In July 2024, Blastr Green Steel (Blastr) selected Midrex and Primetals to build a 2.0 Mtpa MIDREX H_2™ Plant in Inkoo, Finland. The MIDREX H_2 Plant, powered by up to 100% green hydrogen, will produce HDRI for direct charging to the steel mill, as well as HBI, enabling Blastr to provide ultra-low-carbon iron feedstock for its customers.

Tosyali 2 in Oran, Algeria produced its first DRI in August 2024.

In October 2024, Dillinger and ROGESA awarded Midrex and Primetals the contract for a DR plant paired with an EAF. The 2.0 Mtpa HDRI/CDRI combo MIDREX Flex® Plant will be located in Dillingen, Saarland, Germany. This project will replace the current blast furnace and reduce CO_2 emissions by 4.8 Mt per year within six years.

Three Midrex Plants were confirmed to have started in 2024 in Iran: Khouzestan Steel VI, Sirjan Jahan Co. 2 and Gol-e-Gohar III. Nine additional MIDREX Plants are under various stages of construction.

Tosyali Module I and II (MIDREX®)

HYL / ENERGIRON®

In January 2024, Baosteel Zhanjiang Iron & Steel Co. Ltd. in Guangdong Province, China produced its first DRI in their 1.0 Mtpa Energiron® plant. The plant uses natural gas enriched with hydrogen extracted from coke oven gas.

In February 2024, LKAB selected Energiron for their 100% hydrogen-based DR plant in Gällivare, Sweden. This module will have a capacity of 1.35 Mtpa and integrate technologies from HYBRIT and Energiron.

Libyan Iron and Steel Company (LISCO) and Danieli signed a memorandum of understanding regarding a direct reduction plant to produce 2 Mtpa of DRI and HBI.

Tata Steel Nederlands contracted Tenova and Danieli in May 2024 for the basic engineering of a DR plant and an EAF to replace an existing blast furnace in IJmuiden, Netherlands.

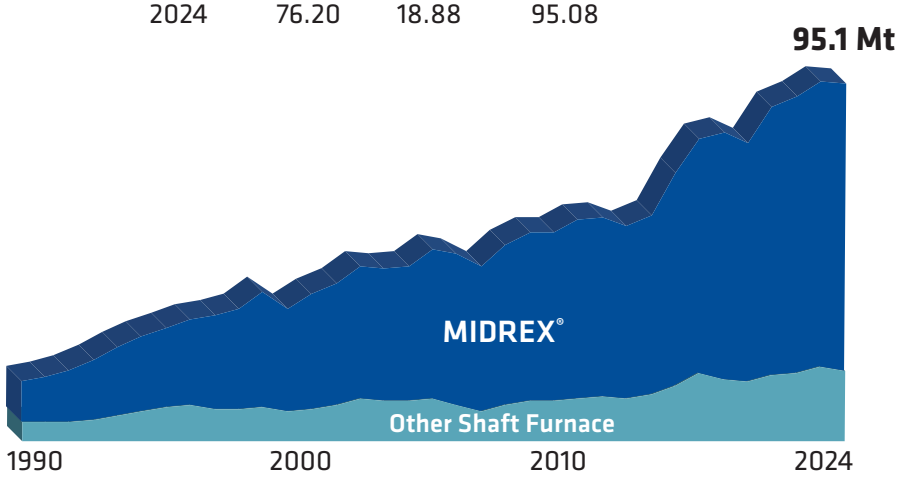
PERED

The second module at Baft steel company in Kerman province started operation. One additional plant is seemingly under construction in Hormozgan province.

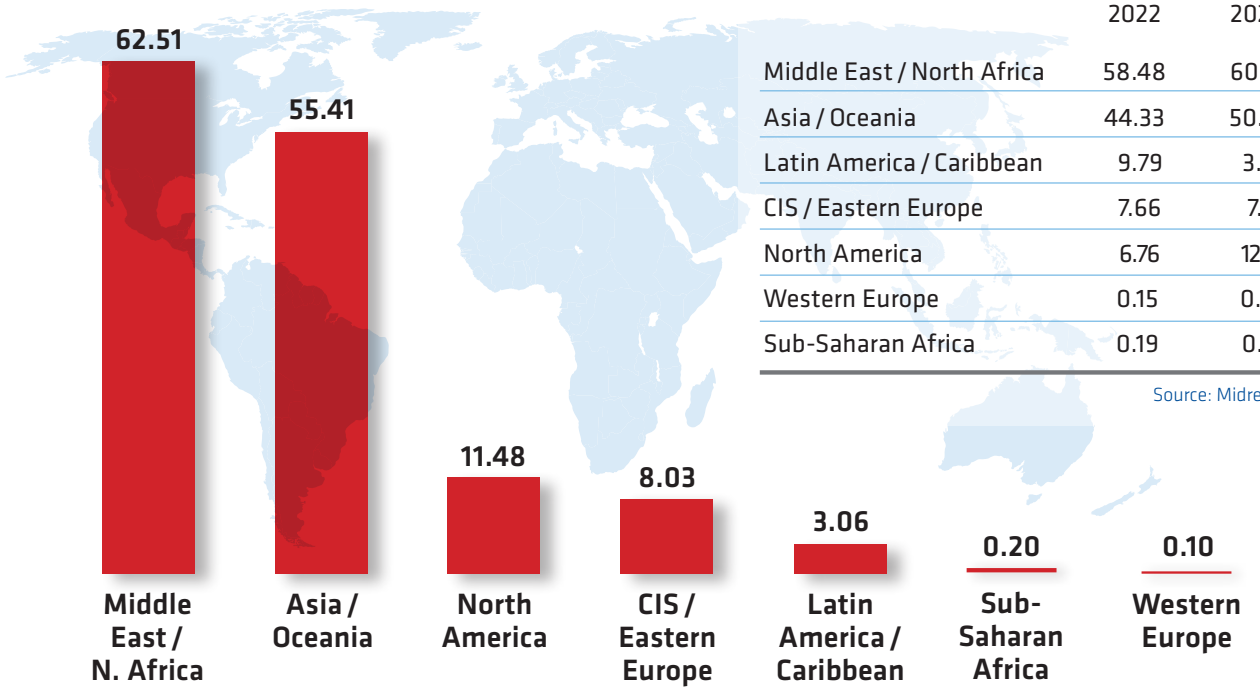
Note: The new capacity announcements only cover the commercial plants, and does not include pilot plants.

Shaft Furnace DRI Production by Process and by Year

Year	MIDREX®	Other Shaft Furnace	Total
1990	10.73	5.25	15.98
1991	11.96	5.40	17.36
1992	13.26	5.29	18.55
1993	15.91	5.73	21.64
1994	17.83	7.01	24.84
1995	19.86	8.15	28.01
1996	21.03	9.12	30.15
1997	23.08	9.55	32.63
1998	24.82	8.52	33.34
1999	26.12	8.81	34.93
2000	30.12	9.39	39.51
2001	26.99	8.04	35.03
2002	30.11	8.88	38.99
2003	32.06	9.72	41.78
2004	35.01	11.34	46.35
2005	34.96	11.00	45.96
2006	35.71	10.91	46.62
2007	39.72	11.20	50.92
2008	39.85	9.84	49.69
2009	38.62	7.88	46.50
2010	42.01	9.81	51.82
2011	44.38	11.03	55.41
2012	44.76	10.79	55.55
2013	47.56	11.29	58.85
2014	47.12	12.04	59.16
2015	45.77	11.62	57.39
2016	47.14	12.66	59.80
2017	56.65	14.68	71.33
2018	62.10	18.11	80.21
2019	65.37	16.57	81.94
2020	63.07	16.03	79.10
2021	70.85	17.84	88.69
2022	73.55	18.12	91.68
2023	75.73	19.68	95.41
2024	76.20	18.88	95.08



2024 World DRI Production by Region (Mt)



	2022	2023	2024
Middle East / North Africa	58.48	60.89	62.51
Asia / Oceania	44.33	50.24	55.41
Latin America / Caribbean	9.79	3.57	3.06
CIS / Eastern Europe	7.66	7.76	8.03
North America	6.76	12.96	11.48
Western Europe	0.15	0.08	0.10
Sub-Saharan Africa	0.19	0.22	0.20

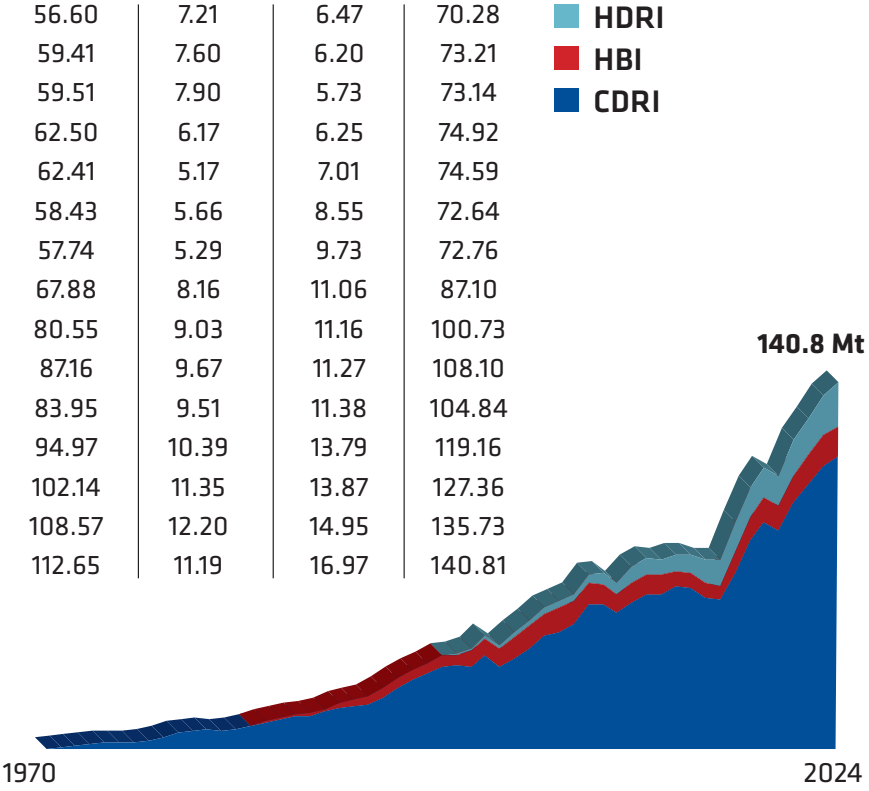
Source: Midrex Technologies, Inc.

World DRI Production by Year (Mt)

Source: Midrex Technologies, Inc.

Year	Total	Year	Total
'72	1.39	'91	19.32
'73	1.90	'92	20.51
'74	2.72	'93	23.65
'75	2.81	'94	27.37
'76	3.02	'95	30.67
'77	3.52	'96	33.30
'78	5.00	'97	36.19
'79	6.64	'98	36.96
'80	7.14	'99	38.60
'81	7.92	'00	43.78
'82	7.28	'01	40.32
'83	7.90	'02	45.08
'84	9.34	'03	49.45
'85	11.17	'04	54.60
'86	12.53	'05	56.87
'87	13.52	'06	59.70
'88	14.09	'07	67.12
'89	15.63	'08	67.95
'90	17.68	'09	64.33

Year	CDRI	HBI	HDRI	Total
'10	56.60	7.21	6.47	70.28
'11	59.41	7.60	6.20	73.21
'12	59.51	7.90	5.73	73.14
'13	62.50	6.17	6.25	74.92
'14	62.41	5.17	7.01	74.59
'15	58.43	5.66	8.55	72.64
'16	57.74	5.29	9.73	72.76
'17	67.88	8.16	11.06	87.10
'18	80.55	9.03	11.16	100.73
'19	87.16	9.67	11.27	108.10
'20	83.95	9.51	11.38	104.84
'21	94.97	10.39	13.79	119.16
'22	102.14	11.35	13.87	127.36
'23	108.57	12.20	14.95	135.73
'24	112.65	11.19	16.97	140.81



1970-2013 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'70-'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13
Latin America											
ARGENTINA	29.18	1.74	1.83	1.95	1.81	1.86	0.81	1.57	1.68	1.61	1.54
BRAZIL	8.70	0.44	0.43	0.38	0.36	0.30	0.01	–	–	–	–
PERU	1.17	0.08	0.09	0.14	0.09	0.07	0.10	0.10	0.09	0.10	0.10
TRINIDAD AND TOBAGO	21.34	2.36	2.25	2.08	3.47	2.78	1.99	3.08	3.03	3.25	3.29
VENEZUELA	96.74	7.83	8.95	8.61	7.71	6.87	5.61	3.79	4.47	4.61	2.77
Middle East/N. Africa											
ALGERIA	–	–	–	–	–	–	–	–	–	–	–
BAHRAIN	–	–	–	–	–	–	–	–	–	–	0.78
EGYPT	21.91	3.02	2.90	3.10	2.79	2.64	2.91	2.86	2.97	2.84	3.43
IRAN	46.27	6.41	6.85	6.85	7.44	7.46	8.20	9.35	10.37	11.58	14.46
LIBYA	14.24	1.58	1.65	1.63	1.64	1.57	1.11	1.27	0.30	0.51	0.95
OMAN	–	–	–	–	–	–	–	–	1.11	1.46	1.47
QATAR	14.11	0.83	0.82	0.88	1.30	1.68	2.10	2.16	2.23	2.42	2.39
SAUDI ARABIA	38.43	3.41	3.63	3.58	4.34	4.97	5.03	5.51	5.81	5.66	6.07
UAE	–	–	–	–	–	–	–	1.18	2.25	2.72	3.07
Asia/Oceania											
AUSTRALIA	5.22	0.69	–	–	–	–	–	–	–	–	–
CHINA	0.80	0.43	0.41	0.41	0.60	0.18	0.08	–	–	–	–
INDIA	59.77	9.37	12.04	14.74	19.06	21.20	22.03	23.42	21.97	20.05	17.77
INDONESIA	30.59	1.47	1.27	1.20	1.32	1.21	1.12	1.27	1.23	0.52	0.76
MALAYSIA	17.58	1.68	1.38	1.54	1.84	1.94	2.30	2.39	2.16	2.01	1.40
MYANMAR	0.55	0.04	–	–	–	–	–	–	–	–	–
PAKISTAN	–	–	–	–	–	–	–	–	–	–	0.06
North America											
CANADA	21.42	1.09	0.59	0.45	0.91	0.69	0.34	0.60	0.70	0.84	1.25
MEXICO	86.25	6.54	5.98	6.17	6.26	6.01	4.15	5.37	5.85	5.59	6.13
USA	16.31	0.18	0.22	0.24	0.25	0.26	–	–	–	–	–
CIS/Eastern Europe											
RUSSIA	32.93	3.14	3.34	3.28	3.41	4.56	4.67	4.79	5.20	5.24	5.33
Sub-Saharan Africa											
NIGERIA	1.53	–	–	–	–	0.20	–	–	–	–	–
SOUTH AFRICA	20.66	1.63	1.78	1.75	1.74	1.18	1.39	1.12	1.41	1.57	1.41
Western Europe											
GERMANY	10.33	0.61	0.44	0.58	0.59	0.52	0.38	0.45	0.38	0.56	0.50
Other Nations	0.47	–	–	–	–	–	–	–	–	–	–
WORLD TOTAL	596.50	54.60	56.87	59.70	67.12	67.95	64.33	70.28	73.21	73.14	74.92

1970-2013 World DRI Production by Process (Mt)

NAME	'70-'03	'04	'05	'06	'07	'08	'9	'10	'11	'12	'13
MIDREX®	375.44	35.01	34.96	35.71	39.72	39.85	38.62	42.01	44.38	44.76	47.56
HYL/Energiron	157.55	11.34	11.00	10.91	11.20	9.84	7.88	9.81	11.03	10.79	11.29
PERED	–	–	–	–	–	–	-	–	–	–	–
Rotary Kiln	47.09	6.41	9.17	11.53	14.90	16.92	17.33	18.12	17.32	17.06	15.93
Other *	16.43	1.66	1.70	1.53	1.29	1.33	0.76	0.34	0.48	0.53	0.14
WORLD TOTAL	596.50	54.60	56.87	59.70	67.12	67.95	64.33	70.28	73.21	73.14	74.92

* Other: A variety of processes using retorts, shaft furnaces, fluidized bed furnaces and hearths.
e - estimated

2014-2024 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

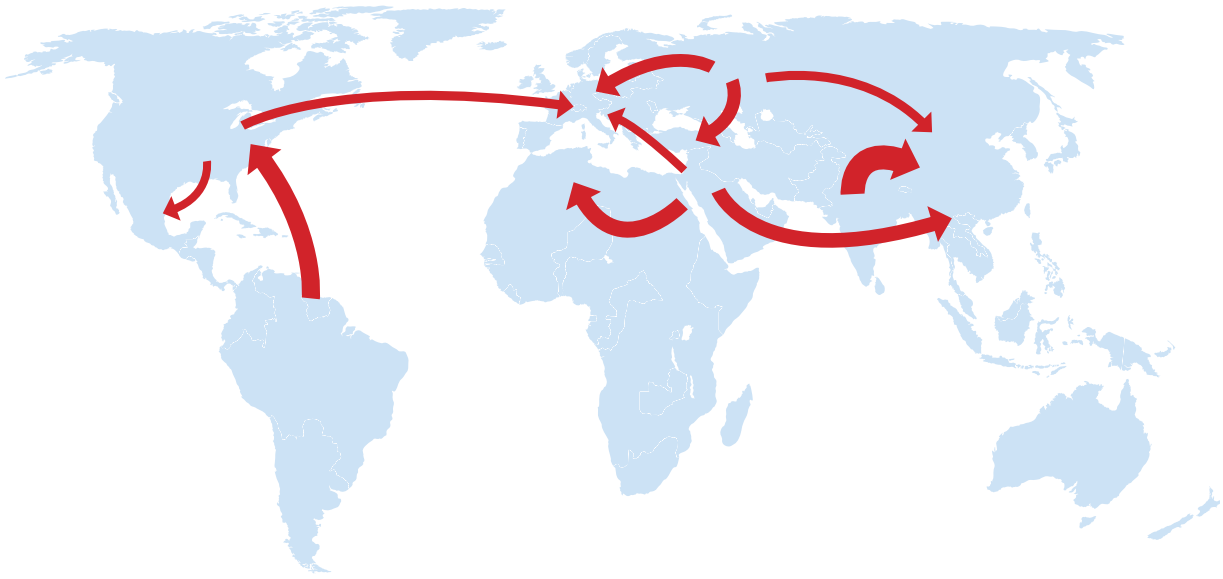
NAME	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24
Latin America											
ARGENTINA	1.67	1.26	0.78	1.23	1.61	1.09	0.53	1.41	1.51	1.49	1.07
BRAZIL	–	–	–	–	–	–	–	–	–	–	–
PERU	0.09	0.07	0.01	–	–	–	–	–	–	–	–
TRINIDAD AND TOBAGO	3.24	2.52	1.50	1.59	1.54	1.70	1.34	1.62	1.43	1.39	1.52
VENEZUELA	1.68	2.75	1.59	1.68	0.99	1.01	0.89	0.76	1.01	0.69	0.47
Middle East/N. Africa											
ALGERIA	–	–	–	–	0.11	1.54	2.23	3.08	3.88	4.17	4.60
BAHRAIN	1.44	1.23	1.26	1.26	1.60	1.45	1.38	1.51	1.42	1.62	1.53
EGYPT	2.88	2.73	2.82	4.67	5.22e	4.05	4.71	5.23	5.82	6.42	6.37
IRAN	14.55	14.55	16.01	20.55	25.75	28.52	30.21	31.85	32.90	33.45	34.15
LIBYA	1.00	0.45	0.69	0.56	0.61	0.87	0.83	0.88	1.10	1.65	1.77
OMAN	1.45	1.48	1.46	1.51	1.50	1.75	1.73	1.70	1.82	1.60	1.95
QATAR	2.64	2.71	2.58	2.63	2.63	2.49	0.78	0.79	1.62	1.71	2.03
SAUDI ARABIA	6.46	5.80	5.89	5.74	6.00	5.79	5.19	6.13	6.48	6.68	6.65
UAE	2.41	3.19	3.48	3.61	3.78	3.67	2.96	3.66	3.45	3.59	3.48
Asia/Oceania											
AUSTRALIA	–	–	–	–	–	–	–	–	–	–	–
CHINA	–	–	–	–	–	–	–	–	–	–	–
INDIA	17.31	17.68	18.47	22.34	28.11	33.74	32.98	39.11	43.55	49.33	54.72
INDONESIA	0.16	0.05	–	–	0.24	-e	-e	-e	-e	-e	-e
MALAYSIA	1.33	0.96	0.66	0.57	0.75	0.59	0.73	0.36	0.78	0.71	0.44
MYANMAR	–	–	–	–	–	–	–	–	–	–	–
PAKISTAN	–	–	–	–	–	–	–	–	–	–	–
North America											
CANADA	1.55	1.50	1.40	1.61	1.67	1.44	1.17	1.65	1.52	1.55	1.58
MEXICO	5.98	5.50	5.31	6.01	5.97e	5.97	5.17	5.83	5.84	5.92	4.69
USA	1.30	1.10	1.81	2.99	3.35	3.24	3.35	5.01	5.24	5.48	5.22
CIS/Eastern Europe											
RUSSIA	5.35	5.44	5.70	6.99	7.90e	8.03	7.93	7.89	7.66	7.76	8.03
Sub-Saharan Africa											
NIGERIA	–	–	–	–	–	–	–	–	–	–	
SOUTH AFRICA	1.55	1.12	0.70	0.93	0.83	0.66	0.18	0.20	0.19	0.22	0.20
Western Europe											
GERMANY	0.57	0.55	0.60	0.63	0.56	0.47	0.53	0.50	0.15	0.08	0.10
Other Nations	–	–	–	–	–	–	–	–	–	–	
WORLD TOTAL	74.59	72.64	72.71	87.10	100.73	108.10	104.84	119.16	127.36	135.73	140.81

2014-2024 World DRI Production by Process (Mt)

NAME	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24
MIDREX®	47.12	45.77	47.14	56.65	61.96	65.37	63.07	70.85	73.55	75.73	76.20
HYL/Energiron	12.08	11.62	12.66	14.68	15.85	14.26	12.98	15.16	15.36	16.61	15.64
PERED	–	–	–	**	2.40	2.31	3.05e	2.67e	2.76	3.08	3.24
Rotary Kiln	15.39	14.74	12.67	15.34	20.31	25.98	25.50	30.30	35.57	40.16	45.65
Other *	–	0.51	0.24	0.44	0.22	0.18	0.24	0.16	0.11	0.15	0.08
WORLD TOTAL	74.59	72.64	72.71	87.10	100.73	108.10	104.84	119.16	127.36	135.73	140.81

* Other: A variety of processes using retorts, shaft furnaces, fluidized bed furnaces and hearths.
** Included in Other
e - estimated

Major Trade Routes for International Trade of DRI



The map shows the major routes of international transport of DRI in 2024 by regions. The starting and end points are not meant to indicate specific countries. The width of the lines indicates the amount of DRI products that traveled over the regional routes. **NOTE: Domestic and smaller trade routes are not shown.**

MAJOR TRADE ROUTES FOR INTERNATIONAL TRADE OF DRI:

Total shipments of DRI - including both domestic and international shipments - increased to 28.6 Mt in 2024, or 16.3% more than last year, establishing a new record. Land shipments made up the majority of the total in 2024, amounting to 18.4 Mt, a 21.8% increase over 2023. Water shipments showed a 7.5% increase compared to 2023, totaling 10.3 Mt.

International trade routes were estimated from trade data at 11.7 Mt. Accounting for missing data from sanctioned countries, the international trade of DRI was more likely in the range of 13.3 Mt in 2024.

	Importing Region							
Exporting Region	**MENA**	**Asia/ Oceania**	**Latin America**	**CIS/ E. Europe**	**North America**	**Sub-Saharan Africa**	**Western Europe**	**Total Mt**
MENA	1.43	1.30	-	-	-	-	0.53	3.26
Asia/Oceania	0.07	2.09	-	0.00	-	0.00	-	2.17
Latin America	0.11	-	-	-	1.52	-	0.30	1.93
CIS/Eastern Europe	1.08	0.64	-	-	-	-	1.04	2.76
North America	0.35	0.00	0.03	-	0.43	-	0.71	1.51
Sub-Saharan Africa	-	0.03	-	-	-	-	0.00	0.03
Western Europe	0.01	0.00	-	-	-	-	0.06	0.07
Total Mt	3.04	4.06	0.03	0.00	1.95	0.00	2.65	
							Grand Total	11.73

Note: Regional Trade showing "0.00" indicates trades of less than 10,000 tons. Absence of regional trades is listed as "-"

Major Trade Routes for International Trade of DRI

SUPPLIERS

According to filtered data from ISSB, 39 countries exported significant quantities of DRI/HBI. Russia is the leading exporter with approximately 3.1 Mt of DRI products, shipping predominantly HBI to Asia and Western Europe. However, this figure includes 0.35 Mt of DRI/HBI reported as shipped to "countries not specified" and therefore excluded from the trade table. Additionally, as much as 1.2 Mt of DRI/HBI from Russia is likely under-reported, based on the discrepancy between reported production and reported trade of Russian DRI/HBI.

Iran became the second leading exporter at 1.6 Mt, edging Trinidad and Tobago (1.5 Mt), India (1.4 Mt) and the USA (1.4 Mt). India is reported shipping DRI mostly to Nepal and Bangladesh.

DESTINATIONS

According to filtered data from ISSB, 54 countries imported significant quantities of DRI/HBI. The top five importers were USA (1.5 Mt, 1.3 Mt in 2023), Türkiye (1.2 Mt; 0.7 Mt in 2023), India (0.9 Mt; 1.6 Mt in 2023), Mexico (0.8 Mt, 0.4 Mt in 2023) and Italy (0.7 Mt, 1.0 Mt in 2023). China imported more DRI in 2024 than in 2023 (0.5 Mt and 0.3 Mt respectively), from Iran and Russia. Similarly, most of India's DRI is imported from Iran and Russia.

OUTLOOK

The trade of DRI products in 2025 is not expected to change drastically compared to 2024, following the same major trade routes. Trade regulations, tariffs and sanctions are again likely to impact global trade.

Data Source

Data for the table and the map was taken from three sources: International Iron Metallics Association (IIMA), the International Steel Statistics Bureau (ISSB), the Sponge Iron Manufacturers Association (SIMA) and reports from individual operating DR plants. IIMA information derives from a variety of sources. Data from the ISSB originates with national export and import records, for instance, from the US Customs Bureau. It should be stressed that a significant portion of the export data does not match the import data. Shipments to re-exporting countries are excluded to avoid double-counting. Individual plants report CDRI and HBI shipments tonnage and mean (land or water), but do not report destinations.

The arrows do not originate and terminate in specific countries. Rather, sums for dispatch and arrival were totaled by region and the arrows flow from region to region. For instance, the wide arrow originating from the north coast of South America shows DRI and HBI coming from the Caribbean (Venezuela plus Trinidad and Tobago) and being transported to North America.

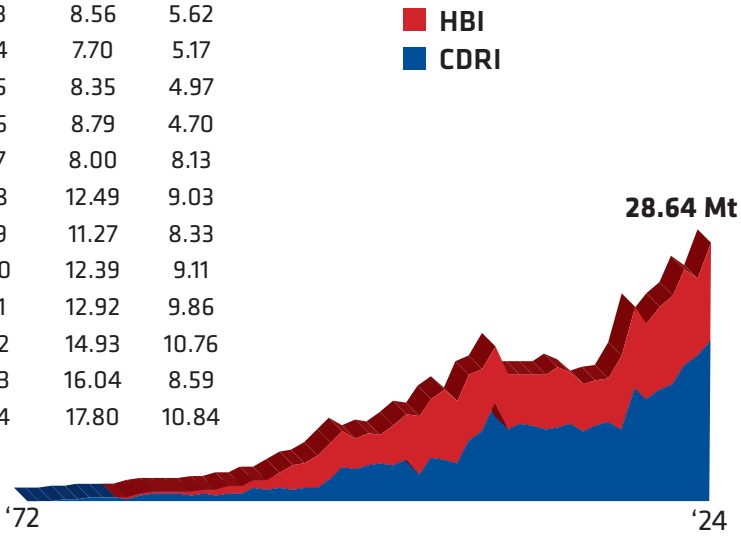
Footnotes:

- All references to tons are metric unless otherwise stated. Bt = Billion tons, Mt = Million tons; Mta = Million tons per annum.
- A Direct Reduction Plant can include one or more modules.
- The Russian production and trade numbers were inferred from several sources. The production figures are of a good degree of certainty. However, the amount of traded HBI is significantly lower than production.
- The list of plants only includes commercial plants that are operating, idled or under construction (defined as process equipment installed on site). Announced projects and dismantled plants have been removed from the list. Pilot plants are not included. For 2024, the list has been updated to reflect the original design capacity. Some plants have higher production capacity due to upgrades, but it is not shown in the table.
- The list of rotary kilns was removed from the 2023 publication due to lack of recent, accurate information matching the increased coal-based DRI production.

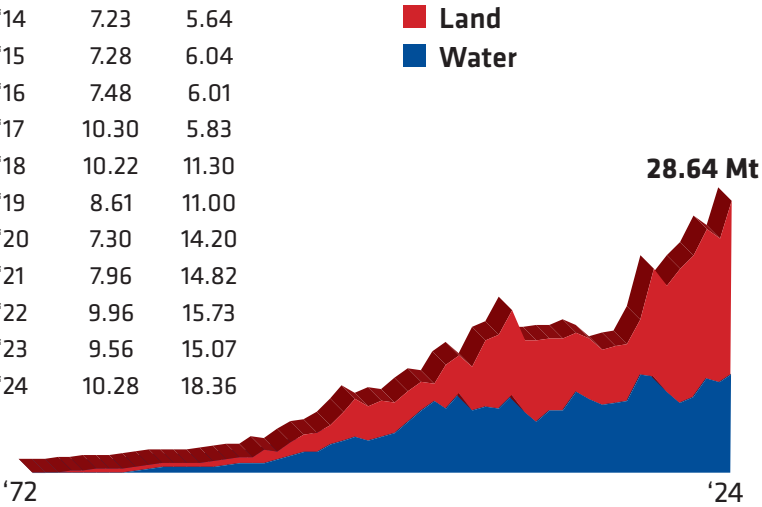
World DRI Shipments (Mt)

Source: Midrex Technologies, Inc.

Year	CDRI	HBI	Year	CDRI	HBI	Year	CDRI	HBI
'72	0.08	–	'90	1.46	1.71	'08	8.01	5.99
'73	0.13	–	'91	1.29	2.67	'09	8.50	5.38
'74	0.26	–	'92	1.45	2.71	'10	8.42	5.60
'75	0.34	–	'93	1.45	3.56	'11	7.97	6.06
'76	0.37	–	'94	2.44	3.93	'12	8.17	6.58
'77	0.32	–	'95	3.69	3.98	'13	8.56	5.62
'78	0.28	0.11	'96	3.58	3.20	'14	7.70	5.17
'79	0.66	0.12	'97	3.99	3.51	'15	8.35	4.97
'80	0.81	0.25	'98	4.24	3.00	'16	8.79	4.70
'81	0.83	0.25	'99	4.01	4.41	'17	8.00	8.13
'82	0.80	0.18	'00	4.54	5.02	'18	12.49	9.03
'83	0.59	0.36	'01	2.83	6.58	'19	11.27	8.33
'84	0.83	0.39	'02	4.85	6.45	'20	12.39	9.11
'85	0.71	0.61	'03	4.63	7.63	'21	12.92	9.86
'86	0.89	0.73	'04	4.26	6.82	'22	14.93	10.76
'87	0.85	0.77	'05	6.76	7.12	'23	16.04	8.59
'88	1.48	0.83	'06	7.81	6.75	'24	17.80	10.84
'89	1.27	0.94	'07	10.82	6.24			



Year	Water	Land	Year	Water	Land	Year	Water	Land
'72	0.01	0.07	'90	1.79	1.38	'08	6.41	7.59
'73	0.02	0.12	'91	2.25	1.71	'09	5.39	8.48
'74	0.03	0.23	'92	2.24	1.93	'10	6.61	7.42
'75	0.06	0.28	'93	2.90	2.11	'11	6.49	7.55
'76	0.10	0.26	'94	3.46	2.91	'12	8.48	6.27
'77	0.04	0.27	'95	3.76	3.92	'13	7.79	6.39
'78	0.12	0.57	'96	3.40	3.50	'14	7.23	5.64
'79	0.33	0.45	'97	3.81	3.80	'15	7.28	6.04
'80	0.54	0.52	'98	4.22	3.11	'16	7.48	6.01
'81	0.53	0.55	'99	5.45	3.00	'17	10.30	5.83
'82	0.65	0.33	'00	6.66	2.90	'18	10.22	11.30
'83	0.67	0.28	'01	7.59	1.82	'19	8.61	11.00
'84	0.69	0.53	'02	6.74	4.56	'20	7.30	14.20
'85	0.81	0.51	'03	8.31	3.94	'21	7.96	14.82
'86	0.99	0.63	'04	6.57	4.51	'22	9.96	15.73
'87	0.95	0.67	'05	7.02	6.86	'23	9.56	15.07
'88	1.08	1.23	'06	6.80	7.75	'24	10.28	18.36
'89	1.34	0.87	'07	8.19	8.87			



Note regarding land shipments: It is estimated that about 25% of the DRI produced in India is transported domestically to nearby melting furnaces. This tonnage is included in the figures given above.

World Direct Reduction Plants (as of 12/31/24)

Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
MIDREX®						
ArcelorMittal Hamburg	Hamburg, Germany	0.40	1	CDRI	'71	O
ArcelorMittal Canada 1	Contrecoeur, Quebec, Canada	0.40	1	CDRI	'73	O
Tenaris Siderca	Campana, Argentina	0.40	1	CDRI	'76	O
ArcelorMittal Canada 2	Contrecoeur, Quebec, Canada	0.60	1	CDRI	'77	O
SIDOR I	Matanzas, Venezuela	0.35	1	CDRI	'77	I
Acindar	Villa Constitucion, Argentina	0.60	1	CDRI	'78	O
Qatar Steel 1	Mesaieed, Qatar	0.40	1	CDRI	'78	O
SIDOR IIA, IIB, IIC	Matanzas, Venezuela	1.28	3	CDRI	'79	O
ArcelorMittal Point Lisas I & II	Point Lisas, Trinidad & Tobago	0.84	2	CDRI	'80/'82	I
Delta Steel I & II	Warri, Nigeria	1.02	2	CDRI	'82	I
Hadeed A & B	Al-Jubail, Saudi Arabia	0.80	2	CDRI	'82/'83	O
OEMK I - IV	Stary Oskol, Russia	1.66	4	CDRI	'83/'85/'85/'87	O
Antara Steel Mills	Labuan Island, Malaysia	0.65	1	HBI	'84	O
EZDK I	El Dikheila, Egypt	0.72	1	CDRI	'86	O
Khouzestan Steel Co. I - III	Ahvaz, Iran	1.20	3	CDRI	'89/'90/'92	O
LISCO 1 & 2	Misurata, Libya	1.10	2	CDRI	'89/'90	O
AM/NS India I & II	Hazira, India	0.88	2	CDRI/HDRI	'90	O
FMO	Puerto Ordaz, Venezuela	1.00	1	HBI	'90	O
VENPRECAR	Matanzas, Venezuela	0.82	1	HBI	'90	O
AM/NS India III	Hazira, India	0.44	1	HBI/HDRI	'92	O
Hadeed C	Al-Jubail, Saudi Arabia	0.65	1	CDRI	'92	O
Mobarakeh Steel A - E	Mobarakeh, Iran	3.20	5	CDRI	'92/'93/'94	O
JSW Steel Ltd.	Dolvi, Maharashtra, India	1.00	1	CDRI	'94	O
EZDK II	El Dikheila, Egypt	0.80	1	CDRI	'97	O
LISCO 3	Misurata, Libya	0.65	1	HBI	'97	O
ArcelorMittal Lázaro Cárdenas	Lázaro Cárdenas, Mexico	1.20	1	CDRI	'97	O
COMSIGUA	Matanzas, Venezuela	1.00	1	HBI	'98	O
ArcelorMittal Point Lisas III	Point Lisas, Trinidad & Tobago	1.36	1	CDRI	'99	I
ArcelorMittal South Africa	Saldanha Bay, South Africa	0.80	1	CDRI	'99	I
EZDK III	El Dikheila, Egypt	0.80	1	CDRI	'00	O
Khouzestan Steel IV	Ahvaz, Iran	0.80	1	CDRI	'01	O
AM/NS India IV	Hazira, India	1.00	1	HBI/HDRI	'04	O
Nu-Iron	Point Lisas, Trinidad & Tobago	1.60	1	CDRI	'06	O
AM/NS India V	Hazira, India	1.50	1	HBI/HDRI	'06	O
Mobarakeh Steel F	Mobarakeh, Iran	0.80	1	CDRI	'06	O
DRIC I & II	Dammam, Saudi Arabia	1.00	2	CDRI	'07	O
Hadeed E	Al-Jubail, Saudi Arabia	1.76	1	HDRI/CDRI	'07	O
LGOK HBI-2	Gubkin, Russia	1.40	1	HBI	'07	O
Qatar Steel 2	Mesaieed, Qatar	1.50	1	CDRI/HBI	'07	O
Khouzestan Steel V	Ahvaz, Iran	0.96	1	CDRI	'08	O
Lion DRI	Banting, Malaysia	1.54	1	HDRI/HBI	'08	I
Hormozgan A & B	Bandar Abbas, Iran	1.65	2	CDRI	'09/'10	O
AM/NS India VI	Hazira, India	1.50	1	CDRI	'10	O
Khorasan Steel I	Neyshabur, Khorasan Razavi, Iran	0.80	1	CDRI	'10	O
JindalShadeed	Sohar, Oman	1.50	1	HDRI/HBI	'10	O

*** Status Codes: O – Operating I – Idle C– Under Contract or Construction**

World Direct Reduction Plants (as of 12/31/24)

Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
MIDREX® *(Continued)*						
Ghadir Iron and Steel Company	Ardakan (Yazd), Iran	0.80	1	CDRI	'11	O
Khorasan Steel II	Neyshabur, Khorasan Razavi, Iran	0.80	1	CDRI	'11	O
South Kaveh Steel A & B	Bandar Abbas, Iran	1.86	2	CDRI	'12	O
Mobarakeh Steel (Kharazi A & B)	Mobarakeh, Iran	3.00	2	CDRI	'12/'14	O
Tuwairqi Steel Mills	Karachi, Pakistan	1.28	1	HDRI/CDRI	'13	I
SULB	Hidd, Bahrain	1.50	1	HDRI/CDRI	'13	O
Arfa Steel Company	Ardakan (Yazd), Iran	0.80	1	CDRI	'13	O
Mobarakeh Steel (Saba)	Chamgordan, Isfahan, Iran	1.38	1	CDRI	'13	O
JSW Steel Ltd.	Toranagallu, Karnataka, India	1.20	1	HDRI/CDRI	'14	O
Sirjan Iranian Co.	Bardsir, Kerman, Iran	0.80	1	CDRI	'14	O
Jindal Steel & Power	Angul, Odisha, India	1.80	1	HDRI/CDRI	'14	O
ESISCO	Sadat City, Egypt	1.76	1	HDRI/CDRI	'15	I
Sirjan Jahan Co. 1	Sirjan, Kerman, Iran	0.96	1	CDRI	'15	O
Golgohar Iron & Steel Development 1	Sirjan, Kerman, Iran	1.76	1	CDRI	'15	O
ArcelorMittal Texas HBI	Corpus Christi, Texas, USA	2.00	1	HBI	'16	O
Sefid Dasht Steel	Sefiddasht, Iran	0.80	1	CDRI	'16	O
LGOK HBI-3	Gubkin, Russia	1.80	1	HBI	'17	O
Persian Gulf Saba Steel	Bandar Abbas, Iran	1.50	1	HBI	'17	O
Sabzevar Steel Company	Khorasan Razavi, Iran	0.80	1	CDRI	'18	O
Golgohar Iron & Steel Development 2	Sirjan, Kerman, Iran	1.85	1	CDRI	'18	O
Tosyali Algérie 1	Oran, Algeria	2.50	1	HDRI/CDRI	'18	O
Chadormalu M & I Co.	Ardakan (Yazd), Iran	1.50	1	HDRI/CDRI	'18	O
Pasargad Steel	Shiraz, Fars, Iran	1.76	1	HDRI/CDRI	'19	O
Ardakan Steel	Ardakan (Yazd), Iran	0.96	1	CDRI	'20	O
Cleveland-Cliffs HBI Plant	Toledo, Ohio, USA	1.60	1	HBI	'20	O
Algerian Qatari Steel (AQS)	Bellara, Algeria	2.50	1	HDRI/CDRI	'21	O
Ghaenat	Nimbolook, South Khorasan, Iran	0.80	1	CDRI	'22	O
Bafgh Mineral Company (BMISCO)	Bafgh, Yazd, Iran	0.80		CDRI	'22	O
Khouzestan Steel VI	Ahvaz, Khuzestan, Iran	1.76	1	CDRI	'24	O
Tosyali Algerie 2	Oran, Algeria	2.50	1	HDRI/CDRI	'24	O
Sirjan Jahan Co. 2	Sirjan, Kerman, Iran	0.96	1	CDRI	'24	O
Gol-e-Gohar III (TOOBA)	Sirjan, Kerman, Iran	1.80	1	HDRI/CDRI	'24	O
Stegra	Boden Sweden	2.10	1	HDRI/HBI	'26	C
Makran	Chabahar, Sistan Baluchestan, Iran	1.60	1	HBI		C
Torbat	Shirabad, Razavi Khorasan, Iran	1.85	1	CDRI		C
South Kaveh Steel	Bandar Abbas, Homozgan, Iran	1.00	1	CDRI		C
Eqlid Steel Company	Eghlid, Fars, Iran	1.00	1	CDRI		C
Persian Gulf Saba No.2	Bandar Abbas, Homozgan, Iran	2.50	1	HBI		C
Sirjan Iranian Co. 2 (Mega DRI)	Bardsir, Kerman, Iran	1.70	1	CDRI/HDRI		C
Sarmad Iron and Steel Complex	Abarkuh, Yazd Iran	1.20	1	CDRI/HDRI		C
BAFAQ STEEL CO	Bafgh, Yazd, Iran	1.70	1	CDRI/HDRI		C
		109.87	106			

*** Status Codes: O – Operating I – Idle C– Under Contract or Construction**

World Direct Reduction Plants (as of 12/31/24)

Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
HYL/ENERGIRON						
Ternium 3M5	Monterrey, Mexico	0.50	1	CDRI	'83	O
ArcelorMittal Lázaro Cárdenas I	Lázaro Cárdenas, Mexico	1.00	2	CDRI	'88	O
ArcelorMittal Lázaro Cárdenas II	Lázaro Cárdenas, Mexico	1.00	2	CDRI	'91	O
JSW Salav**	Raigad, India	0.90	1	HBI/CDRI	'93	O
PT Krakatau Steel	Cilegon, Indonesia	1.35	2	CDRI	'93	I
Perwaja Steel	Kemaman, Malaysia	1.20	2	CDRI	'93	I
Usiba	Salvador Bahia, Brazil	0.31	1	CDRI	'94	I
Ternium 2P5	Puebla, Mexico	0.61	1	CDRI	'95	O
Ternium 4M	Monterrey, Mexico	0.68	1	HDRI/CDRI	'98	O
LGOK HBI-1	Gubkin, Russia	0.90	1	HBI	'99	O
Hadeed D	Al-Jubail, Saudi Arabia	1.10	1	CDRI	'99	O
Briqven	Matanzas, Venezuela	1.50	2	HBI	'00	I
Emirates Steel I (GHC)	Abu Dhabi, UAE	2.00	1	HDRI/CDRI	'09	O
Emirates Steel III	Abu Dhabi, UAE	0.20	1	CDRI	'10	O
Emirates Steel II (GHC)	Abu Dhabi, UAE	2.00	1	HDRI/CDRI	'11	O
Suez Steel	Adabia, Egypt	1.95	1	HDRI/CDRI	'13	O
Nucor Steel Louisiana	Convent, Louisiana, USA	2.50	1	CDRI	'13	O
Ezz Rolling Mills	Ain Sukhna, Egypt	1.90	1	CDRI	'15	O
Hebei Iron and Steel	Zhangjiakou, Hebei, China	0.55	1	CDRI	'23	O
Baosteel Zhanjiang	Zhanjiang, Guangdong, China	1.00	1	CDRI	'24	O
Mutún Steel	Puerto Suarez, SC, Bolivia	0.25	1	CDRI		C
Salzgitter AG	Salzgitter, Germany	2.10	1	HDRI		C
		26.00	28			
PERED						
Shadegan Steel	Shadegan, Khouzestan, Iran	0.80	1	CDRI	'17	O
Mianeh Steel	Mianeh, East Azerbaijan, Iran	0.80	1	CDRI	'17	O
Neyriz Steel	Neyriz, Fars, Iran	0.80	1	CDRI	'18	O
Baft Steel	Baft, Kerman, Iran	0.80	1	CDRI	'19	O
Shanxi Taihang Mining	Jinzhong City, Shanxi Province, China	0.30	1	CDRI	'23	O
Baft Steel II	Baft, Kerman, Iran	0.80	1	CDRI	'24	O
Setareh Simin Hormoz	Bandar Abbas, Hormozgan, Iran	1.70	1	CDRI/HDRI		C
		4.30	7			
OTHERS						
FINMET						
BriqOri	Matanzas, Venezuela	2.20	4	HBI	'00	O
CIRCORED						
Arcelor Mittal Trinidad	Point Lisas, Trinidad & Tobago	0.50	1	HBI	'99	I
FIOR						
Operaciones RDI	Matanzas, Venezuela	0.40	1	HBI	'76	I

** JSW Salav has two reduction furnaces but only one reformer. The reformer can supply either reduction furnace, but not simultaneously.

Note 1: This list does not include plants that are inoperable or that have been dismantled.

Note 2: This list only includes plants processing feed materials with total iron content of 60% or higher and producing DRI with metallization of 85% or higher.

*** Status Codes: O – Operating I – Idle C– Under Contract or Construction**

2024 WORLD DIRECT REDUCTION STATISTICS is compiled by Midrex Technologies, Inc. annually as a resource for the global iron and steel industry.

Direct reduced iron (DRI) is a high-quality metallic product produced from iron ore used as a feedstock in electric arc furnaces, blast furnaces, and other iron and steelmaking applications. Hot briquetted iron (HBI) is a compacted form of DRI designed for ease of shipping, handling, and storage.

Midrex Technologies, Inc. is the world leader in direct reduction ironmaking technology and aftermarket solutions for the steel industry. As the technology provider of the MIDREX® Process for 50+ years, Midrex designs direct reduced iron (DRI) plants, providing engineering, proprietary equipment, and project development services. The MIDREX Process is unsurpassed in the industry in terms of production, reliability, and process flexibility to meet the constantly evolving nature of steelmakers and ore-based metallics providers.

The following organizations supplied or assisted in collecting data for this issue of 2024 WORLD DIRECT REDUCTION STATISTICS:

Sponge Iron Manufacturers Association – India
World Steel Association – Belgium
International Iron Metallics Association – UK
South East Asia Iron and Steel Institute – Malaysia
International Steel Statistics Bureau – UK
Kobe Steel Ltd. – Japan
All Individual MIDREX® Direct Reduction Plants
Other Direct Reduction Plants
Various company correspondence

For updates check **www.midrex.com**
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***World Steel Dynamics (WSD)** has audited Midrex's collection and preparation process of the "2024 World Direct Reduction Statistics", i.e. "The Booklet". It is our observation that at the present, Midrex receives inputs from all over the world from practically every known direct reduction producer either directly or indirectly through partner organizations. Midrex invites all producers to participate directly. In instances where plant information is not available directly from producers, Midrex deduces that information from publicly available data. WSD has reviewed the data collection and preparation procedures and can confirm the documentation substantiates the methodology and accuracy of the data to be published in The Booklet for the world direct reduction industry in 2024.*

Audited by
WSD WORLD STEEL DYNAMICS®
Englewood Cliffs, New Jersey, U.S.A.
Sept, 2025

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