2020 WORLD DIRECT REDUCTION STATISTICS

MIDREX

THE WORLD LEADER IN DIRECT REDUCTION TECHNOLOGY

CONTENTS

2 World DRI Production

6 World DRI Production by Region/Year

7 World DRI Production Tables

9 Major Trade Routes for International Trade of DRI

10 World DRI Shipments

11 World Direct Reduction Plants

Audited by WSD WORLD STEEL DYNAMICS®

9.14.21

World DRI production reaches 104.4 Mt in 2020 despite global COVID-19 pandemic

(Editor's note: all references to tons are metric unless otherwise stated)

Annual global Direct Reduced Iron (DRI) production in 2020 was 104.4 million tons (Mt). DRI output was down 3.4 % from the record 108.1 Mt produced in 2019. Once again, the combination of India and Iran produced well over half of the global DRI.

From 2015-2019, worldwide DRI output increased by 35.5 Mt, or nearly 49%, primarily driven by the increase in coal-based DRI in India, the high capacity utilization of existing and new gas-based plants in Iran, and the ramp up of new capacity, such as Tosyali Holding's MIDREX® Plant in Algeria. However, the onset of the global COVID-19 pandemic in early 2020, had a ripple effect on DRI production in 2020, as well as the completion and start-up of new capacity.

2020 Top 5 DRI Producing Nations

COUNTRY	PRODUCTION (Million Tons)
India	32.98
Iran	30.21
Russia	7.93
Saudi Arabia	5.19
Mexico	5.17

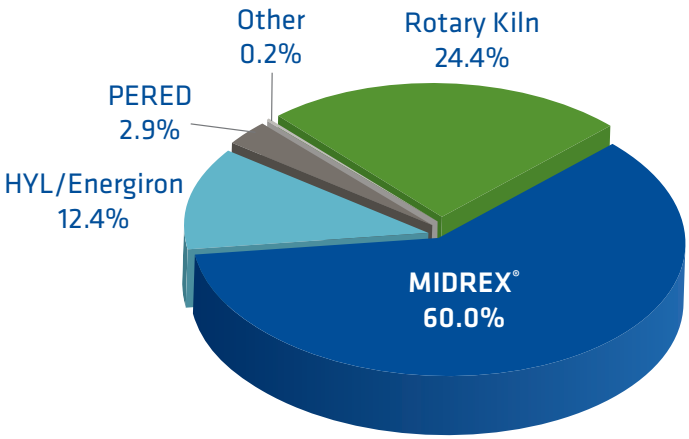
Source: World Steel Association, SIMA, and Midrex Technologies, Inc.

The production of Hot DRI (HDRI), which is fed directly to a nearby melt shop for energy savings, was 11.4 Mt (a 1.0% increase compared to 2019), making up 10.9% of the total in 2020. The production of Hot Briquetted Iron (HBI) – a compacted form of DRI suitable for shipping and use in the blast furnace – is estimated to have been 9.1 Mt, a 6.2% decrease from 2019.

MIDREX Plants produced 62.63 Mt in 2020. The production for 2020 was calculated from the 35.47 Mt confirmed by MIDREX Plants located outside of Iran and 27.16 Mt for the

(Continued on page 3)

2020 World DRI Production by Process



Total World Production: 104.4 Mt

	2018	2019	2020
MIDREX®	61.5%	60.5%	60.0%
HYL/Energiron	15.7%	13.2%	12.4%
PERED	2.4%	2.1%	2.9%(e)
Other	0.2%	0.2%	0.2%
Rotary Kiln	20.2%	24.0%	24.4%

(e) estimated

Source: Midrex Technologies, Inc.

MIDREX Plants in Iran. Over 8.2 Mt of HDRI were produced by MIDREX Plants worldwide, which were consumed in nearby steel shops to assist them in reducing their energy consumption per ton of steel produced and increasing their productivity.

MIDREX Technology continued to account for ~80% of worldwide production of DRI by shaft furnaces. MIDREX Plants have produced a cumulative total of more than 1,165 Mt of all forms of DRI (CDRI, HDRI, and HBI) through the end of 2020.

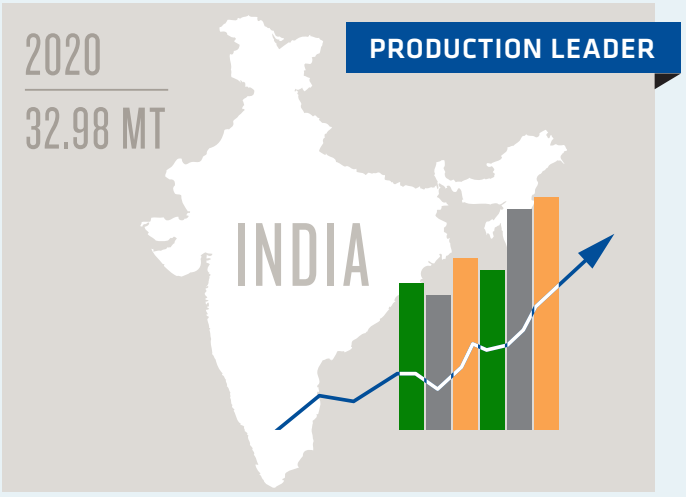
BEHIND THE NUMBERS

Crude Steel Production

The year 2020 was marked by the COVID-19 pandemic that disrupted industry, commerce, and life on a global scale. Global crude steel production (1,864 Mt) was down 0.9% compared with 2019, although Asia's production was up 1.5% and China's output increased by 5.2%, according to WSA.

- Asia produced 1,374.9 Mt in 2020, with China's share reaching 1,053 Mt. India's production for 2020 was 99.6 Mt, down by 10.6% from 2019, while Japan was down 16.2%, to 83.2 Mt, and South Korea dropped 6% from 2019, to 67.1 Mt.
- The EU produced 138.8 Mt in 2020, a decrease of 11.8% compared to 2019, with Germany leading the way producing 35.7 Mt, down 10.0%.
- In the CIS, production was 102.0 Mt in 2020, up by 1.5% from 2019. Russia's share is estimated to have been 73.4 Mt, up 2.6%, and Ukraine produced 20.6 Mt, down 1.1%.
- Crude steel production in North America was 101.1 Mt in 2020, down 15.5% from 2019. The United States produced 72.7 Mt of the NA total, down 17.2%.
- The Middle East produced 45.4 Mt in 2020, an increase of 2.5% from 2019. Iran is estimated to have produced 29.0 Mt, up by 13.4%.
- Annual crude steel production for South America was 38.2 Mt, a decrease of 8.4% from 2019. Brazil produced 31.0 Mt in 2020, down by 4.9%.
- Turkey's production was 35.8 Mt, up by 6.0% from 2019.
- Africa produced 17.2 Mt in 2020, the same as in 2019.
- Oceania (Australia, New Zealand, and the N. & S. Pacific Islands) produced 6.1 Mt of crude steel in 2020, down 1.4% from 2019.

Direct Reduced Iron Production



India continued its streak as the number one DRI producer worldwide, producing 32.98 Mt of DRI in 2020 – 25.34 Mt in rotary kilns and 7.64 Mt by gas-based processes – a 2.3% decrease overall. According to the Sponge Iron Manufacturers Association (SIMA) of India, rotary kilns saw a 1.6% decrease from 2019, which had seen a 27.9% increase from 2018

following a 35% increase from 2017. Production by gas-based DRI plants posted a decrease last year, down 4.4% from 2019.

Production of DRI in Iran was a record 30.2 Mt, all from natural gas-based processes. This is a 5.9% increase over 2019. The MIDREX Process accounts for ~ 90% of DRI production in Iran. Several MIDREX Modules that either started production or ramped up during 2020 were responsible for the bulk of the growth. Most of the plants using the MIDREX Process operated at or near full capacity utilization. PERED plants produced an estimated 3.05 Mt.

Russia maintained its 3rd place as a producing nation with 7.93 Mt, after establishing a record mark of 8.03 Mt in 2019. The Russian MIDREX HBI plants experienced record-breaking productivity in 2020, benefiting from captive iron ore, low natural gas prices, and sustained demand for HBI.

Saudi Arabia regained its 4th place from Mexico, with both countries posting virtually the same production numbers: 5.2 Mt, compared to 5.8 and 6.0 Mt in 2019, respectively, with production declining due to market pressures. Other countries in the Middle East and North Africa region (MENA) saw declines, notably Qatar, but Egypt experienced a recovery with a 16.3% increase. Another exception was Algeria, where production increased by 45% over 2019, in the second full-year operation of Tosyali Algérie, which started production of its MIDREX HDRI/CDRI combo plant in late 2018.

In South America, Argentinian production of DRI suffered from poor local market conditions and natural gas curtailment in addition to COVID. Venezuela continued to produce well below rated capacity, due to limited availability of iron ore and spare parts, producing only limited amounts of HBI for export.

Tosyali Holding's 2.5 Mt/year (Mt/y) combination module (Tosyali Algérie), located in Bethioua, near Oran, Algeria, produced more than 2.23 Mt of direct reduced iron (DRI) – a world record for a single direct reduction module.

NEW CAPACITY AND PLANTS UNDER CONSTRUCTION

Algerian Qatari Steel (AQS)

MIDREX

Two new MIDREX Modules completed construction in 2020 and were ready to start operations: a 2.5 Mt/y module designed to produce CDRI and HDRI, owned by Algerian Qatari Steel (AQS) in Bellara, Algeria, and a 1.6 Mt/y HBI module belonging to Cleveland-Cliffs in Toledo, Ohio, USA that started operations at the end of the 4Q of 2020. A third MIDREX Module, belonging to Ardakan Steel in Iran, started up in 2020.

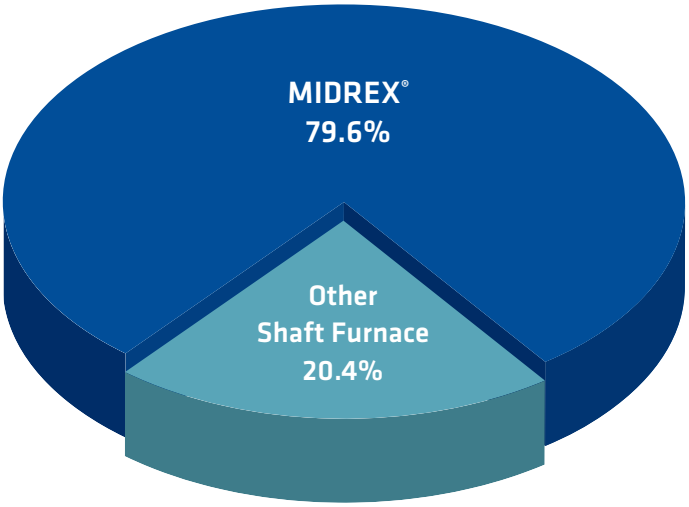
AQS announced the start-up of its MIDREX Plant on February 13, 2021, and produced its first Direct Reduced Iron (DRI) on March 18. The first HDRI was charged in the nearby AQS electric arc furnace (EAF) on March 24, 2021.

Cleveland-Cliffs began production at its Toledo HBI plant in December 2020, and expected shipments from its HBI plant to begin late in the first quarter and to reach full capacity by the second quarter.

HYL/ENERGIRON

Russian steel pipe and railway wheel manufacturer OMK announced in September a contract for a 2.5 million Mt/y DRI plant using ENERGIRON technology. The plant will be located at the Vyksa Steel Works and will transfer hot DRI to a new EAF melt shop.

2020 World Shaft Furnace Production by Process



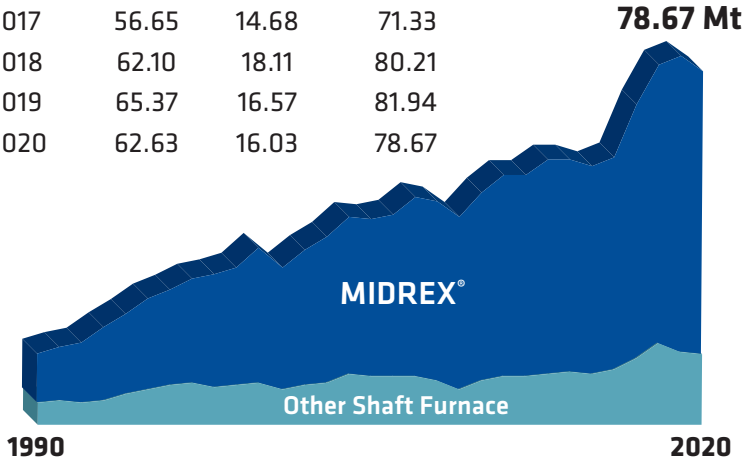
Total World Production: 78.67 Mt

	2018	2019	2020
MIDREX®	77.2%	79.8%	79.6%
Other Shaft Furnace	22.8%	20.2%	20.4%

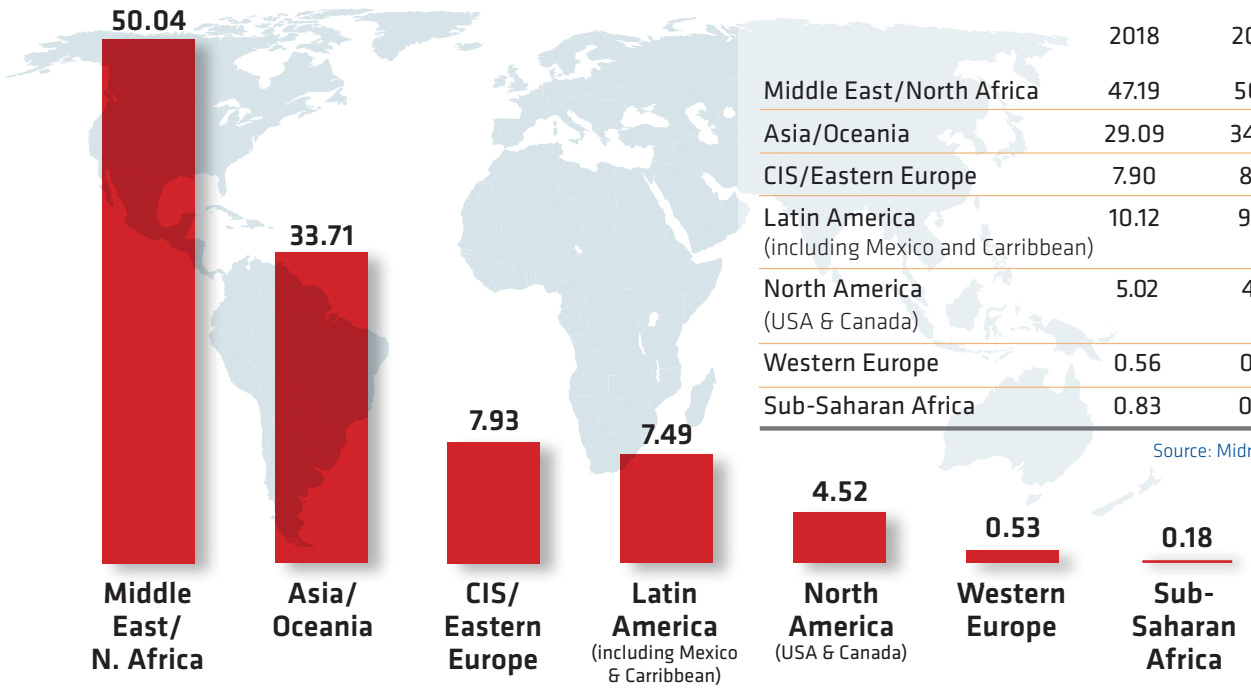
Source: Midrex Technologies, Inc.

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	62.63	16.03	78.67



2020 World DRI Production by Region (Mt)



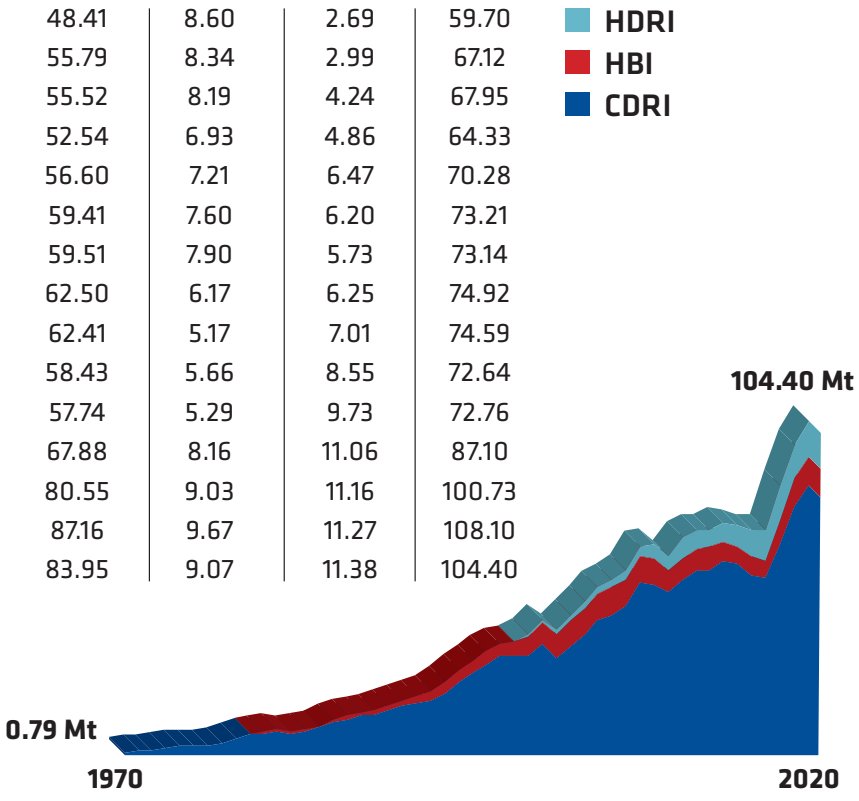
	2018	2019	2020
Middle East/North Africa	47.19	50.15	50.04
Asia/Oceania	29.09	34.33	33.71
CIS/Eastern Europe	7.90	8.03	7.93
Latin America (including Mexico and Carribbean)	10.12	9.77	7.49
North America (USA & Canada)	5.02	4.68	4.52
Western Europe	0.56	0.47	0.53
Sub-Saharan Africa	0.83	0.66	0.18

Source: Midrex Technologies, Inc.

World DRI Production by Year (Mt)

Source: Midrex Technologies, Inc.

Year	Total	Year	Total	Year	CDRI	HBI	HDRI	Total
1970	0.79	'88	14.09	'06	48.41	8.60	2.69	59.70
'71	0.95	'89	15.63	'07	55.79	8.34	2.99	67.12
'72	1.39	'90	17.68	'08	55.52	8.19	4.24	67.95
'73	1.90	'91	19.32	'09	52.54	6.93	4.86	64.33
'74	2.72	'92	20.51	'10	56.60	7.21	6.47	70.28
'75	2.81	'93	23.65	'11	59.41	7.60	6.20	73.21
'76	3.02	'94	27.37	'12	59.51	7.90	5.73	73.14
'77	3.52	'95	30.67	'13	62.50	6.17	6.25	74.92
'78	5.00	'96	33.30	'14	62.41	5.17	7.01	74.59
'79	6.64	'97	36.19	'15	58.43	5.66	8.55	72.64
'80	7.14	'98	36.96	'16	57.74	5.29	9.73	72.76
'81	7.92	'99	38.60	'17	67.88	8.16	11.06	87.10
'82	7.28	'00	43.78	'18	80.55	9.03	11.16	100.73
'83	7.90	'01	40.32	'19	87.16	9.67	11.27	108.10
'84	9.34	'02	45.08	'20	83.95	9.07	11.38	104.40
'85	11.17	'03	49.45					
'86	12.53	'04	54.60					
'87	13.52	'05	56.87					



9.14.21

2020 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'70-'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09
Latin America											
ARGENTINA	23.28	1.42	1.28	1.46	1.74	1.74	1.83	1.95	1.81	1.86	0.81
BRAZIL	7.08	0.42	0.43	0.36	0.41	0.44	0.43	0.38	0.36	0.30	0.01
MEXICO	66.23	5.83	3.67	4.90	5.62	6.54	5.98	6.17	6.26	6.01	4.15
PERU	0.91	0.08	0.07	0.03	0.08	0.08	0.09	0.14	0.09	0.07	0.10
TRINIDAD AND TOBAGO	12.90	1.53	2.31	2.32	2.28	2.36	2.25	2.08	3.47	2.78	1.99
VENEZUELA	69.88	6.69	6.38	6.89	6.90	7.83	8.95	8.61	7.71	6.87	5.61
Middle East/N. Africa											
ALGERIA	–	–	–	–	–	–	–	–	–	–	–
BAHRAIN	–	–	–	–	–	–	–	–	–	–	–
EGYPT	12.03	2.11	2.37	2.53	2.87	3.02	2.90	3.10	2.79	2.64	2.91
IRAN	25.63	4.74	5.00	5.28	5.62	6.41	6.85	6.85	7.44	7.46	8.20
LIBYA	9.14	1.50	1.09	1.17	1.34	1.58	1.65	1.63	1.64	1.57	1.11
OMAN	–	–	–	–	–	–	–	–	–	–	–
QATAR	11.23	0.62	0.73	0.75	0.78	0.83	0.82	0.88	1.30	1.68	2.10
SAUDI ARABIA	25.88	3.09	2.88	3.29	3.29	3.41	3.63	3.58	4.34	4.97	5.03
UAE	–	–	–	–	–	–	–	–	–	–	–
Asia/Oceania											
AUSTRALIA	0.32	0.56	1.37	1.02	1.95	0.69	–	–	–	–	–
CHINA	0.11	0.05	0.11	0.22	0.31	0.43	0.41	0.41	0.60	0.18	0.08
INDIA	34.48	5.44	5.59	6.59	7.67	9.37	12.04	14.74	19.06	21.20	22.03
INDONESIA	24.56	1.82	1.48	1.50	1.23	1.47	1.27	1.20	1.32	1.21	1.12
MALAYSIA	12.52	1.26	1.12	1.08	1.60	1.68	1.38	1.54	1.84	1.94	2.30
MYANMAR	0.39	0.04	0.04	0.04	0.04	0.04	–	–	–	–	–
PAKISTAN	–	–	–	–	–	–	–	–	–	–	–
North America											
CANADA	19.61	1.13	–	0.18	0.50	1.09	0.59	0.45	0.91	0.69	0.34
USA	13.95	1.56	0.12	0.47	0.21	0.18	0.22	0.24	0.25	0.26	–
CIS/Eastern Europe											
RUSSIA	22.68	1.92	2.51	2.91	2.91	3.14	3.34	3.28	3.41	4.56	4.67
Sub-Saharan Africa											
NIGERIA	1.53	–	–	–	–	–	–	–	–	0.20	–
SOUTH AFRICA	14.48	1.53	1.56	1.55	1.54	1.63	1.78	1.75	1.74	1.18	1.39
Western Europe											
GERMANY	8.53	0.46	0.21	0.54	0.59	0.61	0.44	0.58	0.59	0.52	0.38
Other Nations	0.47	–	–	–	–	–	–	–	–	–	–
WORLD TOTAL	417.82	43.80	40.32	45.08	49.48	54.60	56.87	59.70	67.12	67.95	64.33

2020 World DRI Production by Process (Mt)

NAME	'70-'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09
MIDREX®	256.04	30.16	27.03	30.10	32.11	35.01	34.96	35.71	39.72	39.85	38.62
HYL/Energiron	121.52	9.39	8.04	8.88	9.72	11.34	11.00	10.91	11.20	9.84	7.88
PERED	–	–	–	–	–	–	–	–	–	–	-
Rotary Kiln	31.30	3.14	3.18	4.43	5.04	6.41	9.17	11.53	14.90	16.92	17.33
Other *	8.97	1.11	2.07	1.67	2.61	1.66	1.70	1.53	1.29	1.33	0.76
WORLD TOTAL	417.82	43.80	40.32	45.08	49.48	54.60	56.87	59.70	67.12	67.95	64.33

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

2020 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
Latin America											
ARGENTINA	1.57	1.68	1.61	1.54	1.67	1.26	0.78	1.23	1.61	1.09	0.53
BRAZIL	–	–	–	–	–	–	–	–	–	–	–
MEXICO	5.37	5.85	5.59	6.13	5.98	5.50	5.31	6.01	5.97e	5.97	5.17
PERU	0.10	0.09	0.10	0.10	0.09	0.07	0.01	–	–	–	–
TRINIDAD AND TOBAGO	3.08	3.03	3.25	3.29	3.24	2.52	1.50	1.59	1.54	1.70	1.34
VENEZUELA	3.79	4.47	4.61	2.77	1.68	2.75	1.59	1.68	0.99	1.01	0.46e
Middle East/N. Africa											
ALGERIA	–	–	–	–	–	–	–	–	0.11	1.54	2.23
BAHRAIN	–	–	–	0.78	1.44	1.23	1.26	1.26	1.60	1.45	1.38
EGYPT	2.86	2.97	2.84	3.43	2.88	2.73	2.82	4.67	5.22e	4.05	4.71
IRAN	9.35	10.37	11.58	14.46	14.55	14.55	16.01	20.55	25.75	28.52	30.21
LIBYA	1.27	0.30	0.51	0.95	1.00	0.45	0.69	0.56	0.61	0.87	0.83
OMAN	–	1.11	1.46	1.47	1.45	1.48	1.46	1.51	1.50	1.75	1.73
QATAR	2.16	2.23	2.42	2.39	2.64	2.71	2.58	2.63	2.63	2.49	0.78
SAUDI ARABIA	5.51	5.81	5.66	6.07	6.46	5.80	5.89	5.74	6.00	5.79	5.19
UAE	1.18	2.25	2.72	3.07	2.41	3.19	3.48	3.61	3.78	3.67	2.96
Asia/Oceania											
AUSTRALIA	–	–	–	–	–	–	–	–	–	–	–
CHINA	–	–	–	–	–	–	–	–	–	–	–
INDIA	23.42	21.97	20.05	17.77	17.31	17.68	18.47	22.34	28.11	33.74	32.98
INDONESIA	1.27	1.23	0.52	0.76	0.16	0.05	–	–	0.24	-e	-e
MALAYSIA	2.39	2.16	2.01	1.40	1.33	0.96	0.66	0.57	0.75	0.59	0.73
MYANMAR	–	–	–	–	–	–	–	–	–	–	–
PAKISTAN	–	–	–	0.06	–	–	–	–	–	–	–
North America											
CANADA	0.60	0.70	0.84	1.25	1.55	1.50	1.40	1.61	1.67	1.44	1.17
USA	–	–	–	–	1.30	1.10	1.81	2.99	3.35	3.24	3.35
CIS/Eastern Europe											
RUSSIA	4.79	5.20	5.24	5.33	5.35	5.44	5.70	6.99	7.90e	8.03	7.93
Sub-Saharan Africa											
NIGERIA	–	–	–	–	–	–	–	–	–	–	–
SOUTH AFRICA	1.12	1.41	1.57	1.41	1.55	1.12	0.70	0.93	0.83	0.66	0.18
Western Europe											
GERMANY	0.45	0.38	.56	0.50	0.57	0.55	0.60	0.63	0.56	0.47	0.53
Other Nations	–	–	–	–	–	–	–	–	–	–	–
WORLD TOTAL	70.28	73.21	73.14	74.92	74.59	72.64	72.71	87.10	100.73	108.10	104.40

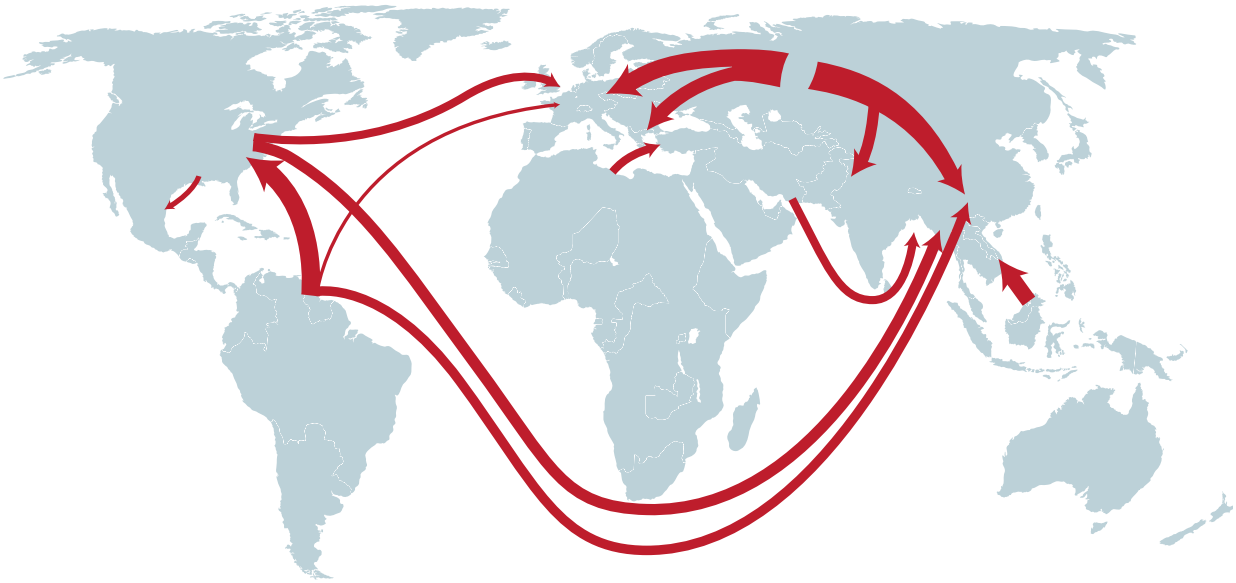
2020 World DRI Production by Process (Mt)

NAME	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
MIDREX®	42.01	44.38	44.76	47.56	47.12	45.77	47.14	56.65	61.96	65.37	62.63
HYL/Energiron	9.81	11.03	10.79	11.29	12.08	11.62	12.66	14.68	15.85	14.26	12.98
PERED	–	–	–	–	–	–	–	**	2.40	2.31	3.05e
Rotary Kiln	18.12	17.32	17.06	15.93	15.39	14.74	12.67	15.34	20.31	25.98	25.50
Other *	0.34	0.48	0.53	0.14	–	0.51	0.24	0.44	0.22	0.18	0.24
WORLD TOTAL	70.28	73.21	73.14	74.92	74.59	72.64	72.71	87.10	100.73	108.10	104.40

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

9.14.21

Major Trade Routes for International Trade of DRI



The map shows the major routes of international transport of DRI in 2020. The width of the lines indicates the amount of DRI products that traveled over the individual routes. **NOTE: Domestic and smaller trade routes are not shown.**

MAJOR TRADE ROUTES FOR INTERNATIONAL TRADE OF DRI:

Shipments of DRI increased to 21.1 Mt in 2020, up from the 19.6 Mt in 2019, but slightly less than the record 21.5 Mt in 2018. Land shipments in 2020 totaled 14.2 Mt, a significant increase over previous years.

SUPPLIERS

Russia led all exporters with over 3.8 Mt of DRI products, most coming from the three HBI plants at Lebedinsky GOK. Trinidad and Tobago exported over 1.3 Mt of CDRI, all going to the USA. The USA also exported over 1.0 Mt of HBI, approximately 50% of it to China. Venezuela and Malaysia rounded out the top five exporting countries according to data from the ISSB.

DESTINATIONS

According to data from ISSB, 28 countries imported significant quantities of DRI/HBI. The top three importers were China, USA and Italy, with 3.2 Mt, 1.4 Mt and 0.9 Mt, respectively.

OUTLOOK

The trade of DRI products in 2021 is expected to increase over 2020, although the volume could be impacted by the continuing effects of COVID-19.

Data Source

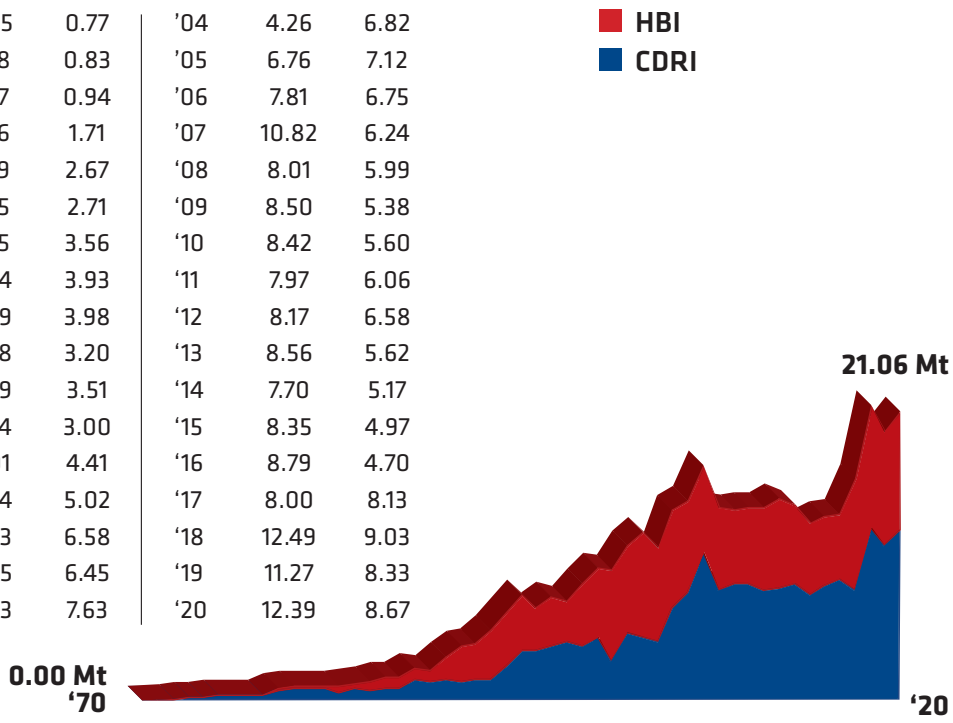
Data for the map was taken from three sources: International Steel Statistics Bureau (ISSB), International Iron Metallics Association (IIMA), and reports from individual operating DR plants. Data from the ISSB originates with national export and import records; for instance, from the US Customs Bureau. IIMA information derives from a variety of sources. It should be stressed that a significant portion of the export data does not match the import data. Also, reports from individual plants show large tonnages for which the destination is unknown.

The arrows do not originate and terminate at 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, Asia and Europe.

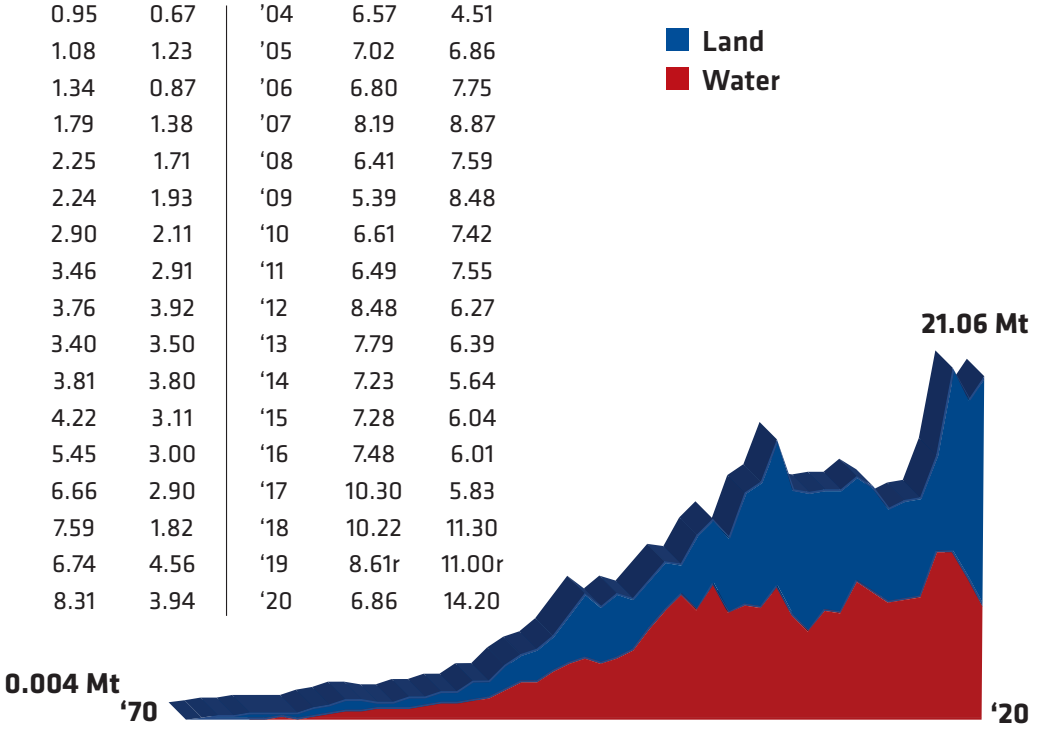
World DRI Shipments (Mt)

Source: Midrex Technologies, Inc.

Year	CDRI	HBI	Year	CDRI	HBI	Year	CDRI	HBI
1970	0.00	–	'87	0.85	0.77	'04	4.26	6.82
'71	0.04	–	'88	1.48	0.83	'05	6.76	7.12
'72	0.08	–	'89	1.27	0.94	'06	7.81	6.75
'73	0.13	–	'90	1.46	1.71	'07	10.82	6.24
'74	0.26	–	'91	1.29	2.67	'08	8.01	5.99
'75	0.34	–	'92	1.45	2.71	'09	8.50	5.38
'76	0.37	–	'93	1.45	3.56	'10	8.42	5.60
'77	0.32	–	'94	2.44	3.93	'11	7.97	6.06
'78	0.28	0.11	'95	3.69	3.98	'12	8.17	6.58
'79	0.66	0.12	'96	3.58	3.20	'13	8.56	5.62
'80	0.81	0.25	'97	3.99	3.51	'14	7.70	5.17
'81	0.83	0.25	'98	4.24	3.00	'15	8.35	4.97
'82	0.80	0.18	'99	4.01	4.41	'16	8.79	4.70
'83	0.59	0.36	'00	4.54	5.02	'17	8.00	8.13
'84	0.83	0.39	'01	2.83	6.58	'18	12.49	9.03
'85	0.71	0.61	'02	4.85	6.45	'19	11.27	8.33
'86	0.89	0.73	'03	4.63	7.63	'20	12.39	8.67



Year	Water	Land	Year	Water	Land	Year	Water	Land
1970	–	0.004	'87	0.95	0.67	'04	6.57	4.51
'71	–	0.04	'88	1.08	1.23	'05	7.02	6.86
'72	0.01	0.07	'89	1.34	0.87	'06	6.80	7.75
'73	0.02	0.12	'90	1.79	1.38	'07	8.19	8.87
'74	0.03	0.23	'91	2.25	1.71	'08	6.41	7.59
'75	0.06	0.28	'92	2.24	1.93	'09	5.39	8.48
'76	0.10	0.26	'93	2.90	2.11	'10	6.61	7.42
'77	0.04	0.27	'94	3.46	2.91	'11	6.49	7.55
'78	0.12	0.57	'95	3.76	3.92	'12	8.48	6.27
'79	0.33	0.45	'96	3.40	3.50	'13	7.79	6.39
'80	0.54	0.52	'97	3.81	3.80	'14	7.23	5.64
'81	0.53	0.55	'98	4.22	3.11	'15	7.28	6.04
'82	0.65	0.33	'99	5.45	3.00	'16	7.48	6.01
'83	0.67	0.28	'00	6.66	2.90	'17	10.30	5.83
'84	0.69	0.53	'01	7.59	1.82	'18	10.22	11.30
'85	0.81	0.51	'02	6.74	4.56	'19	8.61r	11.00r
'86	0.99	0.63	'03	8.31	3.94	'20	6.86	14.20



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

Status as of 12/31/20 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	1.29	3	CDRI	'79	I
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	1.67	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	2.05	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	I
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	4.00	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	0.85	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	0.85	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	I
Khouzestan Steel V	Ahvaz, Iran	0.92	1	CDRI	'08	O
Lion DRI	Banting, Malaysia	1.54	1	HDRI/HBI	'08	I
Hormozgan A & B	Bandar Abbas, Iran	1.66	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

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.
Note 3: There are nearly 300 small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list.
Note 4: Only a representative sample of rotary kiln facilities larger than 50,000 tons per year are shown.

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

World Direct Reduction Plants

Status as of 12/31/20 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	2.76	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	1.56	1	CDRI	'15	O
voestalpine Texas	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	1.70	1	CDRI	'18	O
Tosyali Algérie	Oran, Algeria	2.50	1	HDRI/CDRI	'18	O
Chadormalu M & I Co.	Ardakan (Yazd), Iran	1.55	1	HDRI/CDRI	'18	O
Pasargad Steel	Shiraz, Fars, Iran	1.50	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	C
Qaenat	Nimbolook, South Khorasan, Iran	0.80	1	CDRI	'21	C
Makran	Chabahar, Sistan Baluchestan, Iran	1.60	1	HBI	'21	C
Sirjan Jahan Co. 2	Sirjan, Kerman, Iran	0.90	1	CDRI		C
Torbat	Shirabad, Razavi Khorasan, Iran	1.85	1	CDRI		C
Saqqez	Saqqez, Kurdestan, Iran	1.00	1	HBI		C
		92.69	96			
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

** 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.

Note 3: There are nearly 300 small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list.

Note 4: Only a representative sample of rotary kiln facilities larger than 50,000 tons per year are shown.

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

World Direct Reduction Plants

Status as of 12/31/20 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
HYL/ENERGIRON *(Continued)*						
Emirates Steel I (GHC)	Abu Dhabi, UAE	2.00	1	HDRI/CDRI	'09	O
Gulf Sponge Iron	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
Mutún Steel	Puerto Suarez, SC, Bolivia	0.25	1	CDRI		C
OMK	Vyksa, Russia	2.50	1	HDRI		C
		24.35	25			
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	'21	C
		3.50	5			
OTHER						
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
ROTARY KILN						
SL/RN						
Piratini	Charquedas, Brazil	0.06	1	CDRI	'73	I
SIIL	Paloncha, India	0.06	2	CDRI	'80/'85	O
Siderperu	Chimbote, Peru	0.10	3	CDRI	'80	I
ISCOR	Vanderbijlpark, South Africa	0.72	4	CDRI	'84	O
Prakash Industries	Champa, India	0.40	2	CDRI	'93/'96	O
Nova Iron & Steel	Bilaspur, India	0.15	1	CDRI	'94	O
Ashirwad	Jamshedpur, India	0.05	2	CDRI	'00	O
Vandana Global	Siltara, Raigarh, India	0.05	1	CDRI		O
Prakash Industry	Champa, India	0.60		CDRI		O
JINDAL						
Jindal Steel & Power	Raigarh, India	0.90	6	CDRI	'93/'94/'95/'96/'00	O
Monnet Ispat	Ispat Raipur, India	0.30	2	CDRI	'93/'98	O
Rexon Strips Ltd.	Via Lathikata, India	0.06	2	CDRI	'93/'00	O
DRC						
Scaw Metals I	Germiston, South Africa	0.18	2	CDRI	'83/'89	O
Scaw Metals II	Germiston, South Africa	0.15	1	CDRI	'97	O

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.
Note 3: There are nearly 300 small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list.
Note 4: Only a representative sample of rotary kiln facilities larger than 50,000 tons per year are shown.

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

9.14.21

World Direct Reduction Plants

Status as of 12/31/20 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
ROTARY KILN *(Continued)*						
DRC *(Continued)*						
Tianjin Iron & Steel	Tianjin, China	0.30	2	CDRI	'97	I
CODIR						
Dunswart	Benoni, South Africa	0.15	1	CDRI	'73	O
Sunflag	Bhandara, India	0.15	1	CDRI	'89	O
TISCO						
Tata Sponge Iron, Ltd.	Keonjhar, Orissa, India	0.40	2	CDRI	'86/'98	O
Vallabh Steels	Ludhiana, Punjab, India	0.12	1	CDRI		O
SIIL						
Bellary Steel & Alloys	Bellary, Karnataka, India	0.06	2	CDRI	'92/'93	O
HEG	Borai, India	0.09	2	CDRI	'92	O
Kumar Met.	Nalgonda, India	0.06	2	CDRI	'93	O
Aceros Arequipa	Pisco, Peru	0.08	2	CDRI	'96	O
Rungta Mines	Barbil, India					
OSIL						
OSIL	Keonjhar, Orissa, India	0.10	1	CDRI	'83	O
Lloyd's Metals & Eng.	Ghugus, India	0.27		CDRI	'95	O
DAV						
Davsteel	Cullinan, South Africa	0.04	1	CDRI	'85	O
BGRIMM						
ArcelorMittal South Africa	Vanderbijlpark, South Africa	0.30	2	CDRI	'09	O
OTHER						
Mahalaxmi TMT Bars	Wardha, Maharashtra India	0.24	1	CDRI	'11	O
BMM Ispat Ltd	Danapura, Hospet, Karnataka, India	0.73		CDRI		O
Sarda Energy and Minerals, Ltd.	Siltara, Raipur, India	0.36		CDRI		O
Godawari Power and Ispat	Siltara, Raipur, India	0.50		CDRI		O
Nalwa Steel and Power Ltd.	Raigarh, Chhattisgarh, India	0.18		CDRI		O
Janki Corp., Ltd.	Sidiginamola, Bellary, Karnataka	0.18		CDRI		O
Andhunik Metaliks, Ltd.	Chadrihariharpur, Orissa, India	0.30		CDRI		O
Shyam SEL Ltd.	West Bengal and Odisha, India	0.80		CDRI		O
Shri Bajrang Power and Ispat	Raipur, India	0.36		CDRI		O
Gallantt Metal, Ltd.	Kutch, Gujarat, India	0.20		CDRI		O
SKS Ispat, Ltd.	Raipur, Chhattisgarh, India	0.27		CDRI		O
Bhushan Power and Steel Ltd.	Sambalpur, Odisha, India	1.50		CDRI	11-'12	O
Bhushan Steel Ltd.	Angul, Odisha, India	1.50		CDRI		O
Electrotherm (India) Ltd.	Kutch, Gujarat, India	0.15		CDRI		O
Jayaswal Neco Industries Ltd.	Raipur, Chhattisgarh, India	0.25		CDRI		O
SMC Power Generation Ltd.	Jharsuguda, Odisha, India	0.20		CDRI		O
Electrotherm	Kutch, India	0.18		CDRI		O
PT Meratus Jaya	Kalimantan Selatan, Indonesia	0.32		CDRI		O

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.
Note 3: There are nearly 300 small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list.
Note 4: Only a representative sample of rotary kiln facilities larger than 50,000 tons per year are shown.

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

2020 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 that is 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 for 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 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 2020 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**
For more information or general comments, please e-mail: **info@midrex.com**

USA / CORPORATE HEADQUARTERS:
Midrex Technologies, Inc.
3735 Glen Lake Drive, Suite 400
Charlotte, NC 28208 USA
Tel: +1 (704) 373 1600

***World Steel Dynamics (WSD)** has audited Midrex's collection and preparation process of the "2020 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 2020.*

Audited by
WSD WORLD STEEL DYNAMICS®
Englewood Cliffs, New Jersey, U.S.A.
Sept, 2021

MIDREX

9.14.21