



2019

WORLD DIRECT REDUCTION STATISTICS

MIDREX

THE WORLD LEADER
IN DIRECT REDUCTION
TECHNOLOGY



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WORLD
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DYNAMICS®

9.4.20



World DRI production surpasses 108M tons in 2019 from production increases in India, Iran and Algeria

Annual global DRI production reached another record in 2019 with 108.1M tons produced. DRI output was up 7.3% from 2018, the fourth consecutive record year. Since 2015, worldwide DRI output has increased by 35.5M tons, or nearly 49%. For 2019, the growth was 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 Tosyali's MIDREX® Plant in Algeria. Once more, the combination of India and Iran produced more than half of the global DRI.

The production of hot DRI (HDRI), which is fed directly to a nearby meltshop for energy savings, slightly increased to

2019 Top 5 DRI Producing Nations

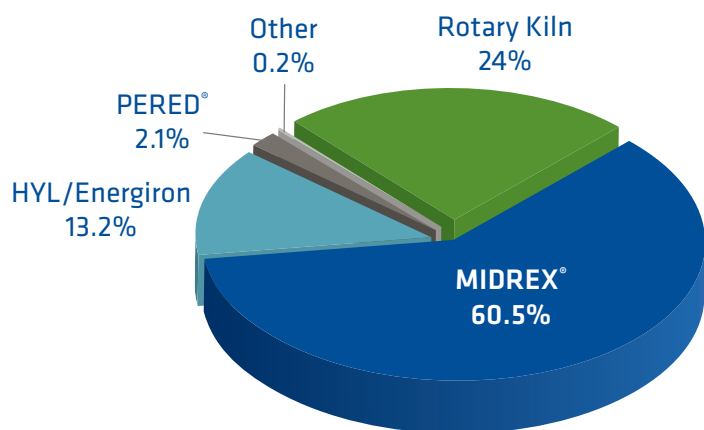
COUNTRY	PRODUCTION (Million Tons)
India	33.74
Iran	28.52
Russia	8.03
Mexico	5.97
Saudi Arabia	5.79

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

11.3M tons, a 1% gain from 2018. Hot briquetted iron (HBI), which is a compacted form of DRI suitable for shipping, jumped to 9.7M tons, a 7.1% increase year-on-year.

The MIDREX Process was responsible for 65.4M tons, or 60.5% of all DRI produced globally, and 79.8% of all gas-based DRI. The production from MIDREX Plants increase by 5.3% year-on-year, whereas the production from other gas-based processes decreased by 8.5%.

2019 World DRI Production by Process



Total World Production: 108.1 Mt

	2017	2018(r)	2019
MIDREX®	64.8%	61.5%	60.5%
HYL/Energiron	16.9%	15.7%	13.2%
PERED®	*	2.4%	2.1%
Other	0.7%	0.2%	0.2%
Rotary Kiln	17.6%	20.2%	24.0%

* included in 'other'
(r) revised

Source: Midrex Technologies, Inc.

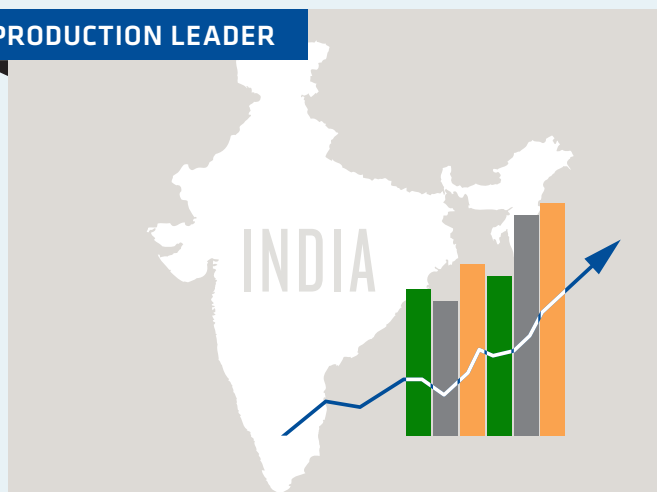




BEHIND THE NUMBERS

The year 2019 was marked by high volatility in iron ore pricing and availability, following the dam breach in Brazil, inclement weather in Australia, and other events. The 62% Fe iron ore sinter fine index started at \$70/t in January, peaked near \$120/t in July, and settled around \$80-90/t for most of the second half of the year. Pellet premiums also experienced volatility during the year. On the other hand, the price for steel products decreased during the same period. Overall, plants with a captive iron ore source fared better than plants relying on market pellets, which saw diminishing margins between higher ore price and decreasing steel price. In the latter case, some plants elected to take outages or increased their scrap usage, as it was more available internationally than in previous years.

PRODUCTION LEADER



In 2019, India continued its streak as the number one DRI producer worldwide. This past year, the substantial growth was due to increased demand for steel products and the productivity gains of the rotary kilns, which were able to use higher quality coal imported from South Africa and Indonesia, according to the Sponge Iron Manufacturers Association (SIMA). Rotary kilns saw a 27.9% jump from 2018, which was already a 35% increase from 2017. Gas-based DRI plants benefited from lower natural gas pricing, as the global price of LNG decreased and the country invested in LNG infrastructure.

Production of DRI in Iran was a record 28.5M tons, all from natural gas-based processes. This was a 10.9% increase over 2018. The MIDREX Process accounts for nearly 92% of DRI

production in Iran. Several MIDREX Modules that either started production or ramped up during 2019 were responsible for the bulk of the growth. Most of the plants using the MIDREX Process operated at or very near full capacity utilization. Another six MIDREX Modules are under construction. The four PERED® modules produced slightly less tonnage than in 2018.

Russia maintained its 3rd place as a producing nation with another record of 8.0M tons produced after establishing the mark of 7.9M in 2018. Almost all Russian DRI plants experienced record-breaking productivity in 2019, benefiting from captive iron ore, low natural gas price, and an increased demand for HBI.

Mexico regained its 4th place from Saudi Arabia and posted virtually the same production numbers as in 2018: 5.97M tons. Saudi Arabia's production declined from 6.0M to 5.79M tons due to market pressures. Most countries in the Middle East and North Africa region (MENA) saw similar declines; Egypt suffered the most with a drop of nearly 29%. One notable exception was Oman, where production increased by 17% over 2018. Both Libya and Algeria posted positive gains from 2018; Algerian DRI production jumped almost 15-fold due to ramp up of Tosyali Algérie, which started production of its MIDREX HDRI/CDRI combo plant, rated at 2.5M tons per year, in late 2018.

In South America, Argentinian production of DRI suffered from poor local market conditions and natural gas curtailment. Venezuela continued to produce at less than 15% of the rated capacity, due to limited availability of iron ore and spare parts; Venezuela is only making HBI for export.



Algerian plant Tosyali Algérie started production late 2018





NEW CAPACITY AND PLANTS UNDER CONSTRUCTION

No new large scale direct reduction capacity was contracted in 2019. The start-up of Algerian Qatari Steel (AQS) in Algeria and Cleveland-Cliffs in the USA will add 4.4 million tons of capacity in 2021. In Iran, Pasargad reported starting up a 1.5Mt/y MIDREX Plant in 2019; Eight other projects, including 6 in Iran, with a total capacity of 7.55M tons are at various phases of execution.

MIDREX

UNDER CONSTRUCTION

Algerian Qatari Steel (AQS)

Construction of a 2.5M tons per year MIDREX Combination DRI Plant for Algerian Qatari Steel (AQS) continued throughout 2019. AQS is a joint venture between Qatar Steel International, the Algerian investment group SIDER, and the National Investment Fund of Algeria. The plant, located in Bellara, Algeria, 375 km east of Algiers, will provide HDRI and CDRI to a nearby EAF melt shop, which will produce 2.0M tons per year of rebar and wire rod.

Construction was impacted by COVID-19 in the spring of 2020; the plant will be ready to start-up in the near future.



Cleveland-Cliffs

Construction of a 1.6M tons per year MIDREX HBI Plant for Cleveland-Cliffs, Inc. continued in 2019 and is on target to start in the last quarter of 2020. Cleveland-Cliffs announced plans to build the plant on a brownfield site at the Port of Toledo (Ohio, USA) in June of 2017. Groundbreaking for the plant was in April of 2018.

The Toledo location was chosen due to its proximity to several future customers, as well as its logistics advantages including affordable gas availability and access by multiple rail carriers. It will provide a domestic source of HBI for electric arc furnace steelmakers in the Great Lakes region when it begins operation. The construction of the plant was temporarily shut down in March 2020 due to mandatory COVID-19 related measures. The workforce was remobilized in June to complete the project.



HYL / Energiron:

In January 2019, China's Sinosteel Equipment and Engineering contracted Tenova HYL to supply a micro-module for "Empresa Siderúrgica del Mutún" (ESM) at Puerto Suárez in Bolivia. The cold DRI plant has a capacity of 0.25M t/y.

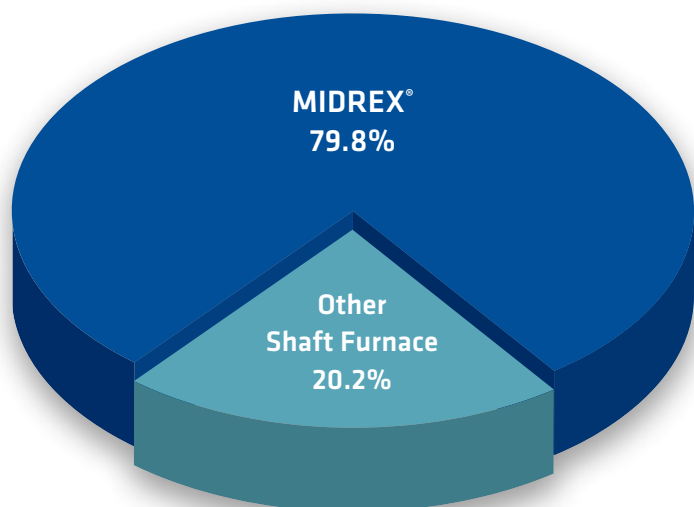
PERED

Construction of the 0.3M t/y DRI module fed by coke oven gas for Shanxi Taihang Mining, contracted in 2013, is in progress.





2019 World Shaft Furnace Production by Process



Total World Production: 81.9 Mt

	2017	2018(r)	2019
MIDREX®	79.0%	77.2%	79.8%
Other Shaft Furnace	21.0%	22.8%	20.2%

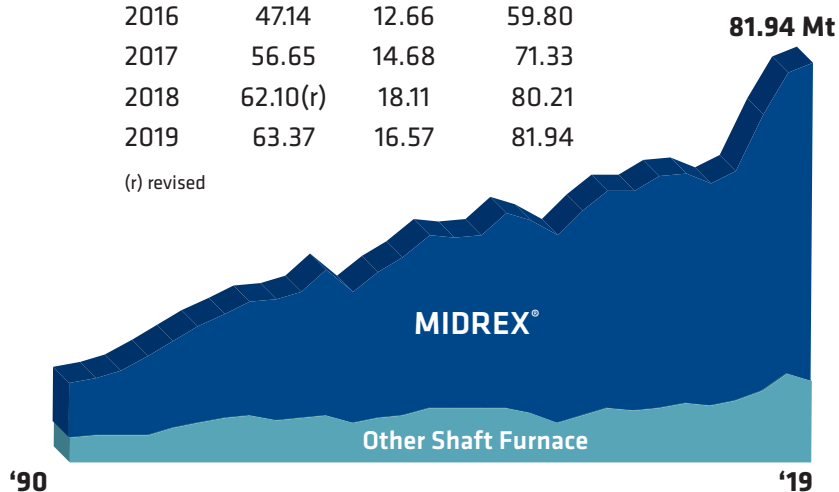
Source: Midrex Technologies, Inc.

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

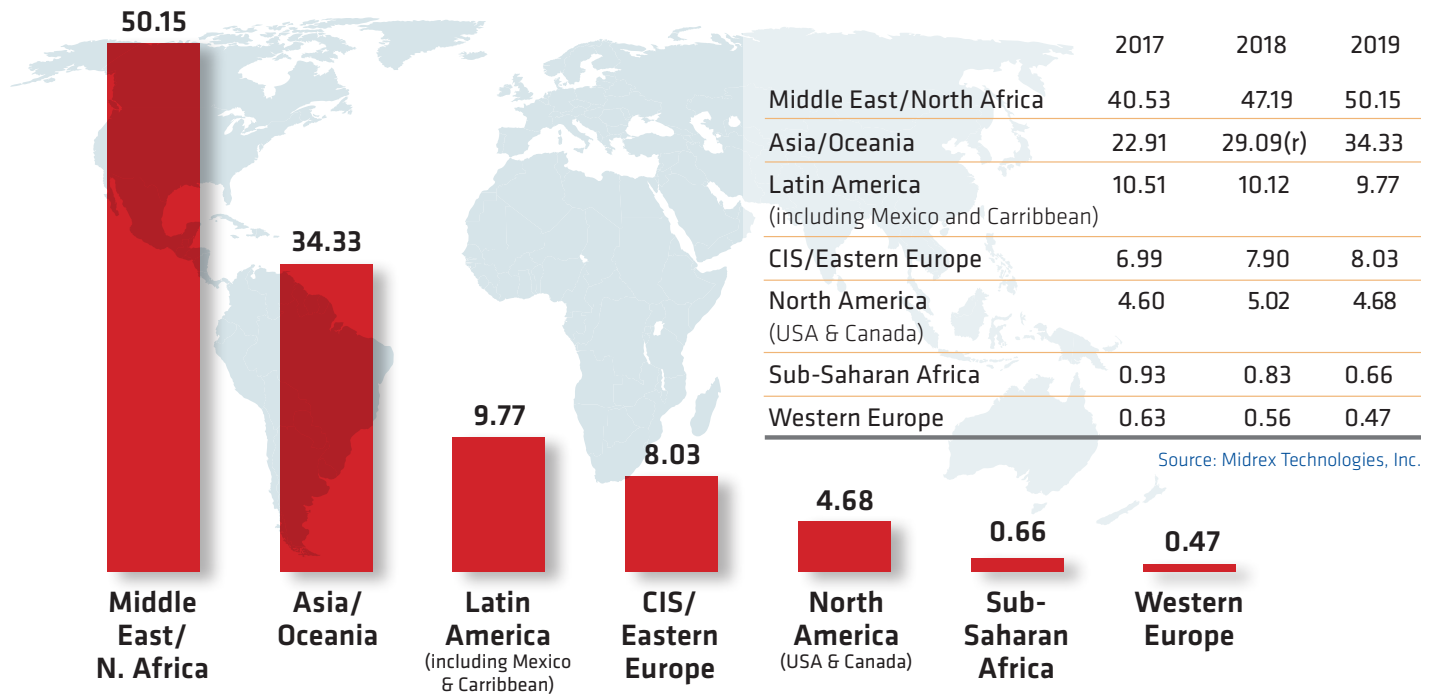
Year	MIDREX®	Other Shaft Furnace	Total
2007	39.72	11.20	50.92
2008	39.85	9.84	49.69
2009	38.62	7.88	46.50
2010	42.01	9.81	51.82
2011	44.38	11.03	55.41
2012	44.76	10.79	55.55
2013	47.56	11.29	58.85
2014	47.12	12.04	59.16
2015	45.77	11.62	57.39
2016	47.14	12.66	59.80
2017	56.65	14.68	71.33
2018	62.10(r)	18.11	80.21
2019	63.37	16.57	81.94

(r) revised



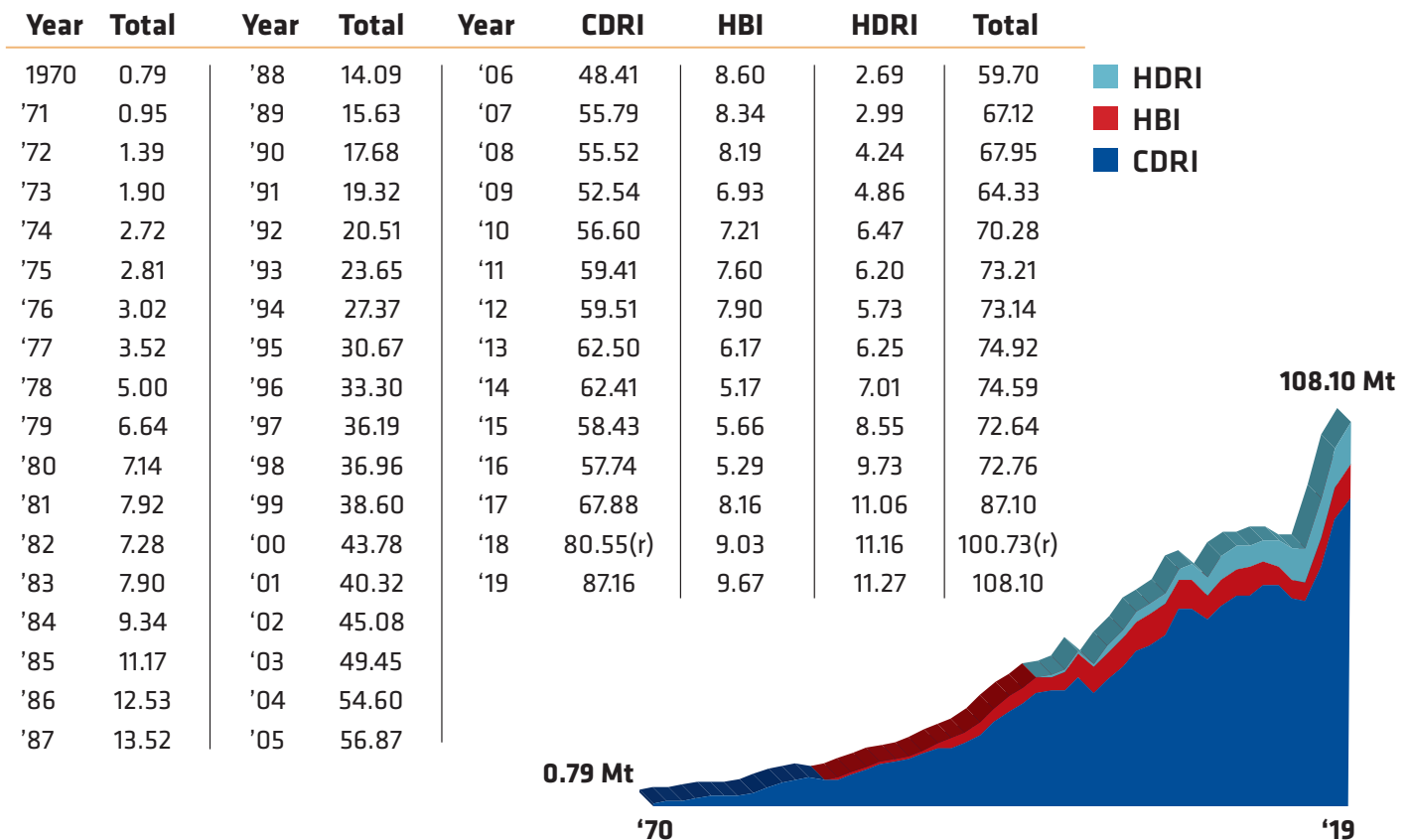


2019 World DRI Production by Region (Mt)



World DRI Production by Year (Mt)

Source: Midrex Technologies, Inc.





2019 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'70-'99	'00	'01	'02	'03	'04	'05	'06	'07	'08
Latin America										
ARGENTINA	23.28	1.42	1.28	1.46	1.74	1.74	1.83	1.95	1.81	1.86
BRAZIL	7.08	0.42	0.43	0.36	0.41	0.44	0.43	0.38	0.36	0.30
MEXICO	66.23	5.83	3.67	4.90	5.62	6.54	5.98	6.17	6.26	6.01
PERU	0.91	0.08	0.07	0.03	0.08	0.08	0.09	0.14	0.09	0.07
TRINIDAD AND TOBAGO	12.90	1.53	2.31	2.32	2.28	2.36	2.25	2.08	3.47	2.78
VENEZUELA	69.88	6.69	6.38	6.89	6.90	7.83	8.95	8.61	7.71	6.87
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
IRAN	25.63	4.74	5.00	5.28	5.62	6.41	6.85	6.85	7.44	7.46
LIBYA	9.14	1.50	1.09	1.17	1.34	1.58	1.65	1.63	1.64	1.57
OMAN	-	-	-	-	-	-	-	-	-	-
QATAR	11.23	0.62	0.73	0.75	0.78	0.83	0.82	0.88	1.30	1.68
SAUDI ARABIA	25.88	3.09	2.88	3.29	3.29	3.41	3.63	3.58	4.34	4.97
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
INDIA	34.48	5.44	5.59	6.59	7.67	9.37	12.04	14.74	19.06	21.20
INDONESIA	24.56	1.82	1.48	1.50	1.23	1.47	1.27	1.20	1.32	1.21
MALAYSIA	12.52	1.26	1.12	1.08	1.60	1.68	1.38	1.54	1.84	1.94
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
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
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
Western Europe										
GERMANY	8.53	0.46	0.21	0.54	0.59	0.61	0.44	0.58	0.59	0.52
Other Nations										
	0.47	-	-	-	-	-	-	-	-	-
WORLD TOTAL	379.23	43.80	40.32	45.08	49.48	54.60	56.87	59.70	67.12	67.95

2019 World DRI Production by Process (Mt)

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

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





2019 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19
Latin America											
ARGENTINA	0.81	1.57	1.68	1.61	1.54	1.67	1.26	0.78	1.23	1.61	1.09
BRAZIL	0.01	-	-	-	-	-	-	-	-	-	-
MEXICO	4.15	5.37	5.85	5.59	6.13	5.98	5.50	5.31	6.01	5.97e	5.97
PERU	0.10	0.10	0.09	0.10	0.10	0.09	0.07	0.01	-	-	-
TRINIDAD AND TOBAGO	1.99	3.08	3.03	3.25	3.29	3.24	2.52	1.50	1.59	1.54	1.70
VENEZUELA	5.61	3.79	4.47	4.61	2.77	1.68	2.75	1.59	1.68	0.99	1.01
Middle East/N. Africa											
ALGERIA	-	-	-	-	-	-	-	-	-	0.11	1.54
BAHRAIN	-	-	-	-	0.78	1.44	1.23	1.26	1.26	1.60	1.45
EGYPT	2.91	2.86	2.97	2.84	3.43	2.88	2.73	2.82	4.67	5.22e	4.05
IRAN	8.20	9.35	10.37	11.58	14.46	14.55	14.55	16.01	20.55	25.75	28.52
LIBYA	1.11	1.27	0.30	0.51	0.95	1.00	0.45	0.69	0.56	0.61	0.87
OMAN	-	-	1.11	1.46	1.47	1.45	1.48	1.46	1.51	1.50	1.75
QATAR	2.10	2.16	2.23	2.42	2.39	2.64	2.71	2.58	2.63	2.63	2.49
SAUDI ARABIA	5.03	5.51	5.81	5.66	6.07	6.46	5.80	5.89	5.74	6.00	5.79
UAE	-	1.18	2.25	2.72	3.07	2.41	3.19	3.48	3.61	3.78	3.67
Asia/Oceania											
AUSTRALIA	-	-	-	-	-	-	-	-	-	-	-
CHINA	0.08	-	-	-	-	-	-	-	-	-	-
INDIA	22.03	23.42	21.97	20.05	17.77	17.31	17.68	18.47	22.34	28.11	33.74
INDONESIA	1.12	1.27	1.23	0.52	0.76	0.16r	0.05	-	-	0.24r	-e
MALAYSIA	2.30	2.39	2.16	2.01	1.40	1.33	0.96	0.66	0.57	0.75	0.59
MYANMAR	-	-	-	-	-	-	-	-	-	-	-
PAKISTAN	-	-	-	-	0.06	-	-	-	-	-	-
North America											
CANADA	0.34	0.60	0.70	0.84	1.25	1.55	1.50	1.40	1.61	1.67	1.44
USA	-	-	-	-	-	1.30	1.10	1.81	2.99	3.35	3.24
CIS/Eastern Europe											
RUSSIA	4.67	4.79	5.20	5.24	5.33	5.35	5.44	5.70	6.99	7.90e	8.03
Sub-Saharan Africa											
NIGERIA	-	-	-	-	-	-	-	-	-	-	-
SOUTH AFRICA	1.39	1.12	1.41	1.57	1.41	1.55	1.12	0.70	0.93	0.83	0.66
Western Europe											
GERMANY	0.38	0.45	0.38	.56	0.50	0.57	0.55	0.60	0.63	0.56	0.47
Other Nations											
	-	-	-	-	-	-	-	-	-	-	-
WORLD TOTAL	64.33	70.28	73.21	73.14	74.92	74.59	72.64	72.71	87.10	100.73r	108.10

2019 World DRI Production by Process (Mt)

NAME	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19
MIDREX®	38.62	42.01	44.38	44.76	47.56	47.12	45.77	47.14	56.65	61.96	65.37
HYL/Energiron	7.88	9.81	11.03	10.79	11.29	12.08	11.62	12.66	14.68	15.85	14.26
PERED®	-	-	-	-	-	-	-	-	**	2.4	2.31
Rotary Kiln	17.33	18.12	17.32	17.06	15.93	15.39	14.74	12.67	15.34	20.31	25.98
Other *	0.76	0.34	0.48	0.53	0.14	-	0.51	0.24	0.44	0.22	0.18
WORLD TOTAL	64.33	70.28	73.21	73.14	74.92	74.59	72.64	72.71	87.10	100.73r	108.10

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

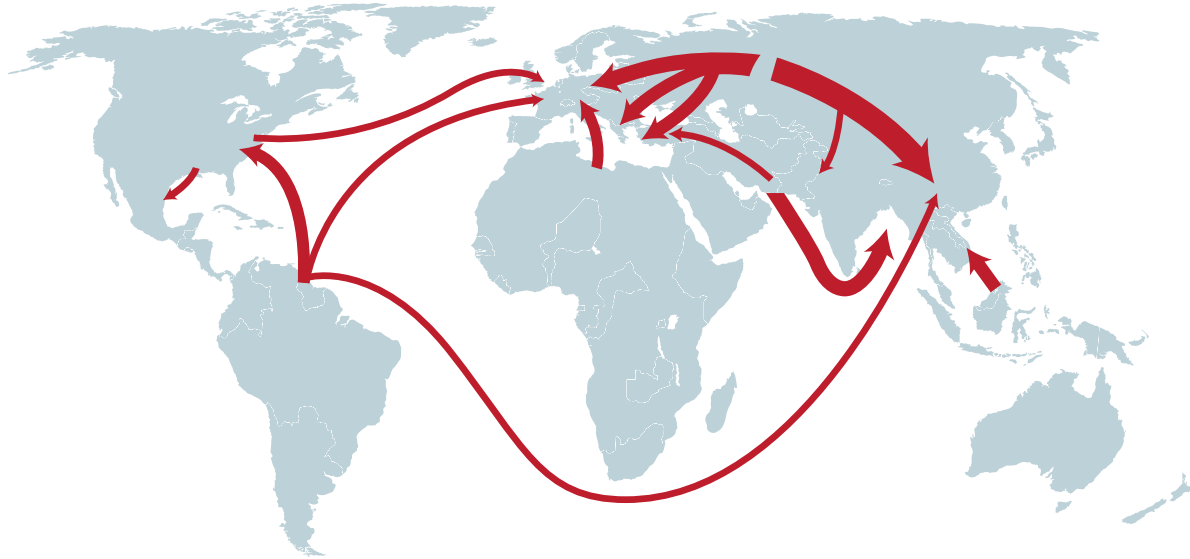
** Included in Other

e - estimated r - revised





Major Trade Routes for International Trade of DRI



The map shows the major routes of international transport of DRI in 2019. 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 decreased to 19.61M tons in 2019, a slight drop from the record 21.52M tons in 2018. Still, 2019 was the second largest shipping year. Water shipments in 2019 totaled nearly 11M tons, exceeding previous years.

SUPPLIERS

Russia led all exporters with over 3.6M tons of DRI products, most coming from the three HBI plants at Lebedinsky GOK. Trinidad and Tobago exported about 1.7M tons of cold DRI, almost all going to the USA. The USA also exported over 0.8M tons of HBI, mostly to Mexico and Austria. Malaysia and Iran rounded out the top five exporting countries according to data from the ISSB.

DESTINATIONS

According to data from ISSB, 30 countries imported significant quantities of DRI/HBI. The top three importers were Italy, USA, and China, with all three countries importing virtually the same amount, between 1.6M and 1.8M.

OUTLOOK

The trade of DRI products in 2020 is expected to follow the same trends as in 2019, although the volume will be impacted by COVID-19.

Data Source

Data for the map was taken from three sources: International Steel Statistics Bureau (ISSB), International Iron Metallurgical 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.

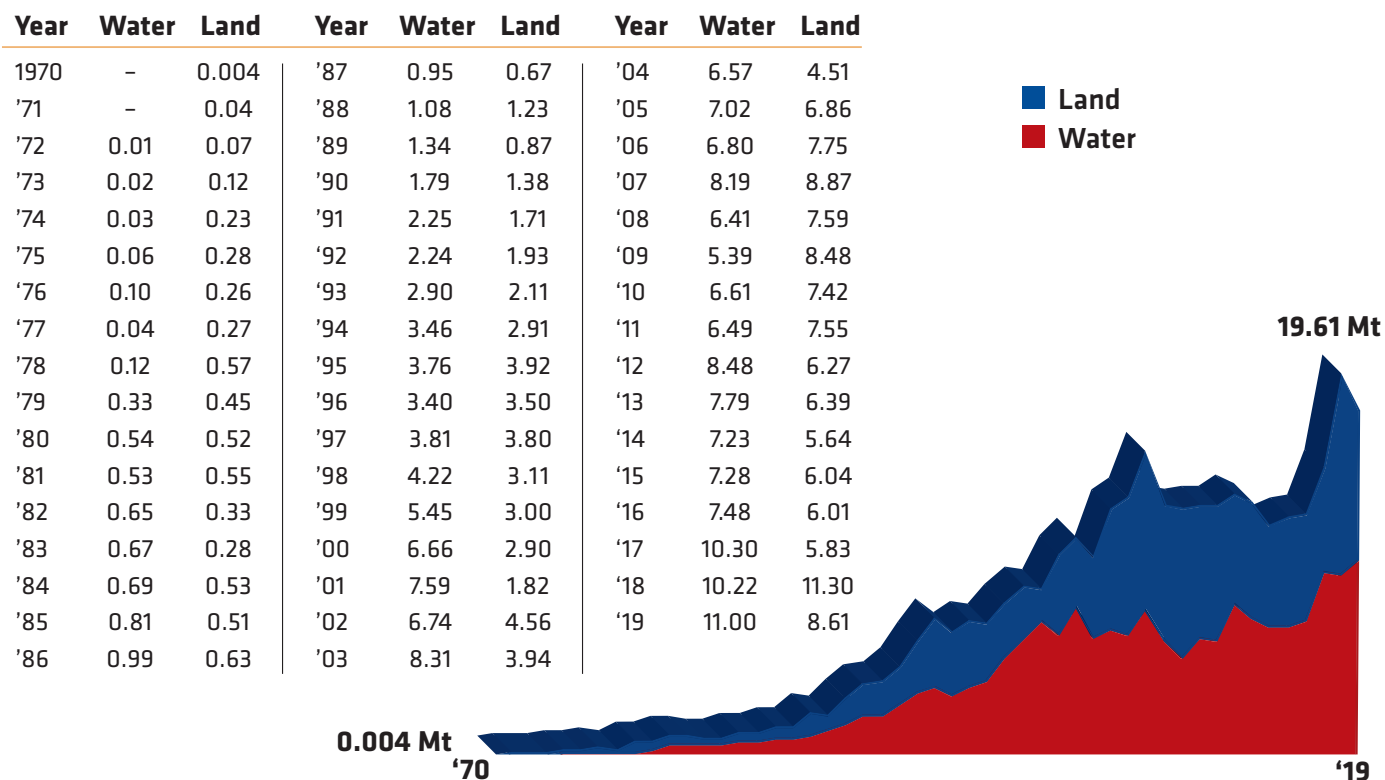
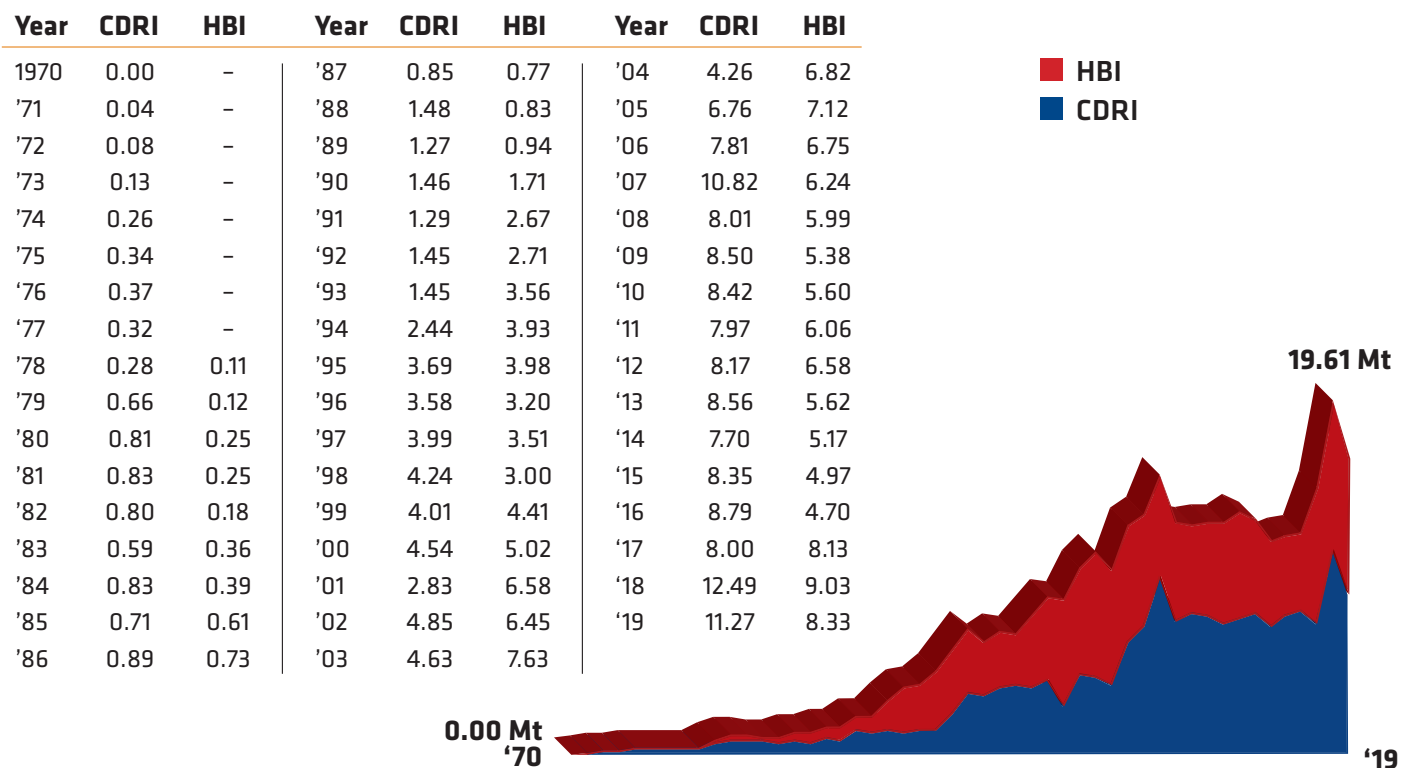
The arrows do not originate and terminate at specific countries. Rather, sums for dispatch and arrival were totaled by region and the arrows flow from region to region. For instance, the wide arrow originating from the north coast of South America shows DRI and HBI coming from the Caribbean (Venezuela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





World DRI Shipments (Mt)

Source: Midrex Technologies, Inc.



Note regarding land shipments: It is estimated that about 30% 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 6/30/19 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
MIDREX®						
ArcelorMittal Hamburg	Hamburg, Germany	0.40	1	CDRI	'71	0
ArcelorMittal Canada 1	Contrecoeur, Quebec, Canada	0.40	1	CDRI	'73	0
Tenaris Siderca	Campana, Argentina	0.40	1	CDRI	'76	0
ArcelorMittal Canada 2	Contrecoeur, Quebec, Canada	0.60	1	CDRI	'77	0
SIDOR I	Matanzas, Venezuela	0.35	1	CDRI	'77	0
Acindar	Villa Constitucion, Argentina	0.60	1	CDRI	'78	0
Qatar Steel 1	Mesaieed, Qatar	0.40	1	CDRI	'78	0
SIDOR IIA, IIB, IIC	Matanzas, Venezuela	1.29	3	CDRI	'79	I I 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	0
OEMK I - IV	Stary Oskol, Russia	1.67	4	CDRI	'83/'85/'85/'87	0
Antara Steel Mills	Labuan Island, Malaysia	0.65	1	HBI	'84	0
EZDK I	El Dikheila, Egypt	0.72	1	CDRI	'86	0
Khouzestan Steel Co. I - III	Ahvaz, Iran	2.05	3	CDRI	'89/'90/'92	0
LISCO 1 & 2	Misurata, Libya	1.10	2	CDRI	'89/'90	0
AM/NS India I & II	Hazira, India	0.88	2	HBI/HDRI	'90	0
FMO	Puerto Ordaz, Venezuela	1.00	1	HBI	'90	0
VENPRECAR	Matanzas, Venezuela	0.82	1	HBI	'90	0
AM/NS India III	Hazira, India	0.44	1	HBI/HDRI	'92	0
Hadeed C	Al-Jubail, Saudi Arabia	0.65	1	CDRI	'92	0
Mobarakeh Steel A - E	Mobarakeh, Iran	4.0	5	CDRI	'92/'93/'94	0
JSW Dolvi Works	Raigad, India	1.00	1	CDRI	'94	0
EZDK II	El Dikheila, Egypt	0.80	1	CDRI	'97	0
LISCO 3	Misurata, Libya	0.65	1	HBI	'97	0
ArcelorMittal Lázaro Cárdenas	Lázaro Cárdenas, Mexico	1.20	1	CDRI	'97	0
COMSIGUA	Matanzas, Venezuela	1.00	1	HBI	'98	0
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	0
EZDK III	El Dikheila, Egypt	0.80	1	CDRI	'00	0
Khouzestan Steel IV	Ahvaz, Iran	0.85	1	CDRI	'01	0
AM/NS India IV	Hazira, India	1.00	1	HBI/HDRI	'04	0
Nu-Iron	Point Lisas, Trinidad & Tobago	1.60	1	CDRI	'06	0
AM/NS India V	Hazira, India	1.50	1	HBI/HDRI	'06	0
Mobarakeh Steel F	Mobarakeh, Iran	0.85	1	CDRI	'06	0
DRIC I & II	Dammam, Saudi Arabia	1.00	2	CDRI	'07	0
Hadeed E	Al-Jubail, Saudi Arabia	1.76	1	HDRI/CDRI	'07	0
LGOK HBI-2	Gubkin, Russia	1.40	1	HBI	'07	0
Qatar Steel 2	Mesaieed, Qatar	1.50	1	CDRI/HBI	'07	0
Khouzestan Steel V	Ahvaz, Iran	0.92	1	CDRI	'08	0
Lion DRI	Banting, Malaysia	1.54	1	HDRI/HBI	'08	I
Hormozgan A & B	Bandar Abbas, Iran	1.66	2	CDRI	'09/'10	0
AM/NS India VI	Hazira, India	1.50	1	CDRI	'10	0
Khorasan Steel I	Neyshabur, Khorasan Razavi, Iran	0.80	1	CDRI	'10	0
JindalShadeed	Sohar, Oman	1.50	1	HDRI/HBI	'11	0

(Continued next page)

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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: 0 – Operating I – Idle C – Under Contract or Construction





World Direct Reduction Plants

Status as of 6/30/19 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	'12	O
Khorasan Steel II	Neyshabur, Khorasan Razavi, Iran	0.80	1	CDRI	'12	O
South Kaveh Steel A & B	Bandar Abbas, Iran	1.86	2	CDRI	'12/'13	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 Projects Ltd.	Toranagallu, Karnataka, India	1.20	1	HDRI/CDRI	'14	O
Sirjan Iranian Co.	Bardsir, Kerman, Iran	0.8	1	CDRI	'14	O
ESISCO	Sadat City, Egypt	1.76	1	HDRI/CDRI	'15	I
Jindal Steel & Power	Angul, India	1.80	1	HDRI/CDRI	'15	O
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	'18	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
AQS Algerian Qatari Steel	Bellara, Algeria	2.50	1	HDRI/CDRI	'20	C
Cleveland-Cliffs HBI Plant	Toledo, Ohio, USA	1.60	1	HBI	'20	C
Ardakan Steel	Ardakan (Yazd), Iran	0.96	1	CDRI	'20	C
Qaenat	Nimbolook, South Khorasan, Iran	0.80	1	CDRI	'20	C
Makran	Chabahar, Sistan Baluchestan, Iran	1.60	1	HBI	'20	C
Sirjan Jahan Co. 2	Sirjan, Kerman, Iran	0.90	1	CDRI		C
Torbat	Shirabad, Razavi Khorasan, Iran	1.85	1	CDRI		C
Saqquez	Saqquez, Kurdistan, 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.

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World Direct Reduction Plants

Status as of 6/30/19 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		
		22.65	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

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World Direct Reduction Plants

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Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
ROTARY KILN (Continued)						
DRC						
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	0.5		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	0.3		CDRI		O
Shyam SEL Ltd.	West Bengal and Odisha, India	0.8		CDRI		O
Shri Bajrang Power and Ispat	Raipur, India	0.36		CDRI		O
Gallantt Metal, Ltd.	Kutch, Gujarat, India	0.2		CDRI		O
SKS Ispat, Ltd.	Raipur, Chhattisgarh, India	0.27		CDRI		O
Bhushan Power and Steel Ltd.	Sambalpur, Odisha, India	1.5		CDRI	11-'12	O
Bhushan Steel Ltd.	Angul, Odisha, India	1.5		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	0.2		CDRI		O
Electrotherm	Kutch, India	0.18		CDRI		O
PT Meratus Jaya	Kalimantan Selatan, Indonesia	0.32		CDRI		O

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2019 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 2019 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
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World Steel Dynamics (WSD) has audited Midrex's collection and preparation process of the "2019 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 2019.

Audited by



Englewood Cliffs,
 New Jersey, U.S.A.
 Aug, 2020

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