



2015

WORLD

DIRECT REDUCTION STATISTICS

MIDREX

www.midrex.com

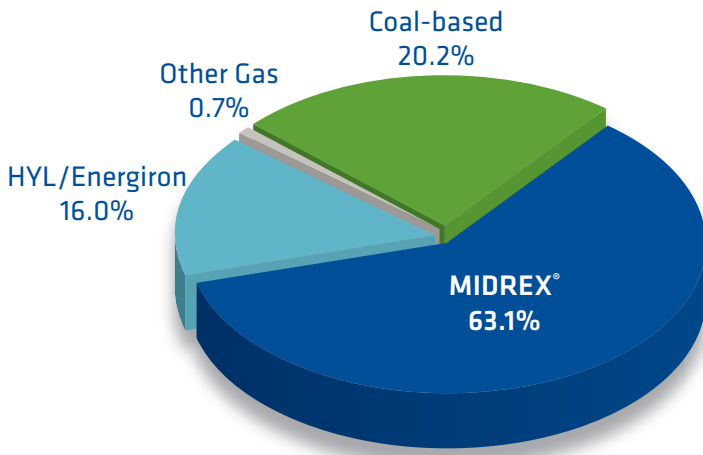


CONTENTS

- 2** World DRI Production
- 6** World DRI Production by Region/Year
- 7** World DRI Production Tables
- 9** Major Trade Routes for DRI Products
- 10** World DRI Shipments
- 11** World Direct Reduction Plants



2015 World DRI Production by Process



Total World Production: 72.6 Mt

	2013	2014	2015
MIDREX®	63.5%	63.2%	63.1%
HYL/Energiron	15.1%	16.2%	16.0%
Other Gas	0.2%	0.0%	0.7%
Coal-based	21.3%	20.6%	20.2%

Source: Midrex Technologies, Inc.

2015 World DRI Production at 72.6 Million Tons:

New DR plants continue to come on stream

25 million tons per year of DR capacity is under construction

World steel industry slows

Worldwide, direct reduction plants produced 72.57 million tons in 2015, based upon data collected by Midrex Technologies, Inc. and audited by World Steel Dynamics. This was nearly two million tons lower than 2014, a decline of 2.7%. The slowdown was commensurate with the rest of the steel industry, which fell by 2.5% worldwide and by 2.9% if China is excluded from the data. The primary cause of the lower production of DRI was dropping prices for steel and resultant fall in steel production that arose from a slowdown in Chinese demand combined with extreme steelmaking overcapacity within China. DRI growth was seen in some nations, particularly Venezuela and the UAE. Production by plants

employing MIDREX® Direct Reduction Technology was 45.75 million tons, or 63% of the world total. This was the 37th consecutive year that production by MIDREX® Plants exceeded half of the world's total DRI output.

Approximately 25 million tons of new DR capacity is under construction. In Iran alone, eight new MIDREX® Plants are in progress. Of the remaining, non-Iranian capacity being built, MIDREX Plants account for 8.8 million tons.

Although growth suffered from two setbacks over the past few years the financial crisis in 2008-2009 and the steel industry slowdown in 2015 when viewed over the longer term, direct reduction has enjoyed excellent growth averaging 4.3% per year since 2001. Major factors driving growth continue to be the need for iron metalics in many parts of the world where scrap steel is scarce relative to the demand from EAF steelmakers and the ability of DRI to provide low residual iron for manufacture of high quality steels.

DRI production continued to be concentrated in the MENA region and, as the new plants built there continue to ramp-up, this trend is expected to continue. New national production records were set by four countries: Oman, Qatar, Russia and the UAE.

FORCES AFFECTING THE INDUSTRY

The main force affecting the world steel industry, and in turn direct reduction, is the massive over capacity of ironmaking and steelmaking in China. To supply feedstock for China's



rapid growth, Australia, Brazil, and other iron ore suppliers developed gargantuan capability for production of ore. Once China’s economy began to slow, it proved difficult to stop iron ore mining projects since many of them were already so far along. Thus, the world went from a situation in which iron ore and metallurgical coal were in extremely tight supply, to a situation where supply is plentiful. The result has been plummeting prices for the two commodities. Similar conditions exist throughout the steelmaking chain, from hot metal through treating and coating of steel. Iron ore is especially important because it has become the leading indicator of the direction of the steel industry. The price of the world’s bellwether market for ore, 62% sinter fines to northeast China, declined by nearly 5-to-1 from its peak in early-2011 until it bottomed in December 2015. In parallel to iron ore, pricing for nearly all types of iron and steel products fell dramatically.

With China having such a large over capacity, the Chinese industry has exported, and often dumped, steel on the world markets. The result in many locales, especially those closer to China, has been disastrous. The DR industry has suffered alongside the rest of the steel industry. At least twelve natural gas-fueled modules were shuttered in 2015 and remain idled.

Since the market bottom in December, there has been a substantial recovery. However, most analysts doubt the sustainability of the recovery as the driving force behind the over build of capacity rapid fixed asset investment within China, which is widely predicted to continue to slow.

Most nations experienced slight declines in DRI production commensurate with the general steel industry trend. A few showed noteworthy changes, both positive and negative:

- In Argentina, a sharp decline in the world oil price, in combination with the falling price of steel, caused the decrease in production of DRI to be somewhat greater than the norm, as one of the modules operating there was built specifically to enable manufacture of oil country tubular goods (OCTG). Argentina’s DRI output in 2015 was down by nearly one-fourth relative to 2014.
- Production in Trinidad and Tobago was also down by almost 25% compared to the prior year as the Arcelor Mittal Point Lisas steel works was moving toward shutdown.
- Venezuela managed to increase its production by over one million tons as two of its HBI plants, BriqOri (the old Orinoco Iron) and BriqVen came back into operation. However, even with this increase to 2.75 million tons, national DRI production was only about 30% of

Venezuela’s peak ten years earlier.

- Libya continued to experience severe political strife which caused DRI production to fall to 0.45 million tons, less than half of the previous year.
- The UAE enjoyed a ramp up of capacity of its two larger modules which had undergone expansion in 2014. National DRI production increased to 3.19 million tons.
- As in many other locales, South Africa suffered from strong pricing pressure by Chinese steel exports. DRI production declined by approximately 25%, to 1.12 million tons.
- Malaysian output was also strongly suppressed by pressure from Chinese steel. The production by the two remaining DR modules fell by about one-third to 0.94 million tons.

The top five producing nations continued to be India, Iran, Saudi Arabia, Mexico and Russia. Combined, they produced over two-thirds of the world’s DRI.

2015 Top Producing Nations

	Million Tons
India	17.68
Iran	14.55
Saudi Arabia	5.80
Mexico	5.50
Russia	5.44

Source: Midrex Technologies, Inc.

It should be noted that a large quantity of the DRI made in India is produced in rotary kilns using coal; therefore, Iran had the largest production by plants using natural gas as the fuel/reductant.





NEW CAPACITY AND PLANTS UNDER CONSTRUCTION

MIDREX®

New modules begin operations

Three new MIDREX® Plants began operation in 2015. Rated at 1.76 million tons per year of either Hot DRI or Cold DRI, the MIDREX® Plant at Egyptian Sponge Iron and Steel Co. (ESISCO) was commissioned at Sadat City, a modern industrial city about 100 km north-west of Cairo. Also, two new modules began operation in Iran, a 0.96 million ton per year MIDREX® Plant operated by Sirjan Jahan Steel and a 1.70 million ton per year MIDREX® Plant run by the Gol-e-Gohar Iron Ore Company. Both are in Kerman Province and both produce Cold DRI.

Under Construction

Twelve MIDREX® Plants are currently under construction; eight in Iran, two in Algeria and one each in Russia and the United States. Five of the plants in Iran are nearing completion and are due for commissioning within the next year. Three of these are CDRI plants to make 0.80 million tons per year each, one at Qaenat Steel in South Khorasan, one at Sabzevar Steel at Khorasan Razavi and the third at Sepiddasht Steel in Char Mahal Bakhtiari Province. A 1.50 million ton per year MIDREX® HBI Plant is being built at Persian Gulf Saba Steel in Bandar Abbas and a 1.55 million ton per year MIDREX® HDRI Plant is under construction for Chador Malu Steel in Ardakan in Yazd Province. The other three plants began construction more recently and are scheduled for commissioning in 2017 and 2018. They are a 0.80 million ton per year MIDREX® CDRI Plant for Ardakan Steel in Ardakan, Yazd, a second MIDREX® CDRI Plant for Gol-e-Gohar Iron Ore Company which will be slightly larger than the first at 1.80 million tons per year, and a second module at Sirjan Iranian Steel Co. (SISCO).

The two plants in Algeria are a 2.50 million ton per year HDRI and CDRI MIDREX® DRI Combo Plant for Tosyali Algeria being built in Bethioua, Oran and another 2.50 million ton per year HDRI/CDRI plant for Algerian Qatari Steel at Jijel.

In Russia, the LebgOK III MIDREX® HBI Plant at Gubkin in Belgorod is expected to start-up in 2016 supplying 1.80 million tons per year of HBI to LebgOK's customers worldwide. And in the United States the voestalpine Texas MIDREX® HBI Plant will begin operation in 2016 making HBI for voestalpine's blast furnaces in Austria as well as for three North American EAF customers. It will be the world's largest HBI plant.



voestalpine Texas MIDREX® HBI Plant located near Corpus Christi, Texas, will be the world's largest HBI plant.

HYL/ENERGIRON

New module begins operation

One HYL/Energiron plant began operation in 2015, the 1.90 million ton per year CDRI plant at Ezz Rolling Mills facility in Soukna, Egypt.

Under Construction

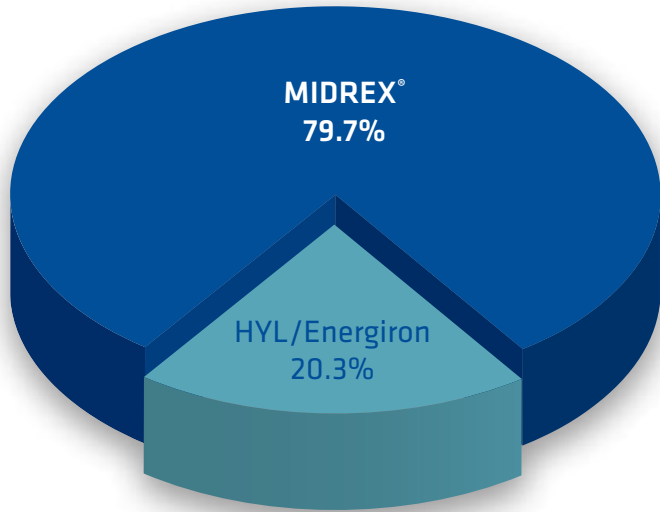
Two HYL/Energiron modules are under construction, one at Sidor in Puerto Ordaz, Venezuela and the other at JSPL's Angul site in Odisha, India. Both of these facilities have apparently been put on hold as no progress has been seen on either site for a few years.

Rotary Kiln Coal-based

Production by rotary kiln modules continued to decline. In 2015 it had fallen to 14.7 million tons, down by almost 20% from the peak of over 18.1 million tons in 2010. A primary reason for the decline is the difficulty of sourcing coal of a suitable specification and at an acceptable price within India, where nearly all of the rotary kiln DRI industry is located. Also, environmental costs continue to stress the economic viability of these plants.



2015 World Shaft Furnace Production by Process



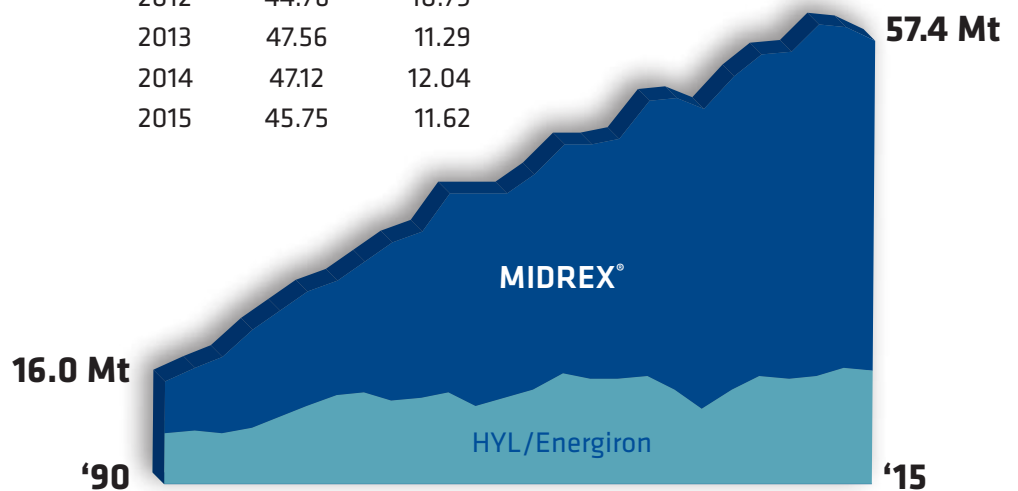
Total World Production: 57.4 Mt

	2013	2014	2015
MIDREX®	80.8%	79.6%	79.7%
HYL/Energiron	19.2%	20.4%	20.3%

Source: Midrex Technologies, Inc.

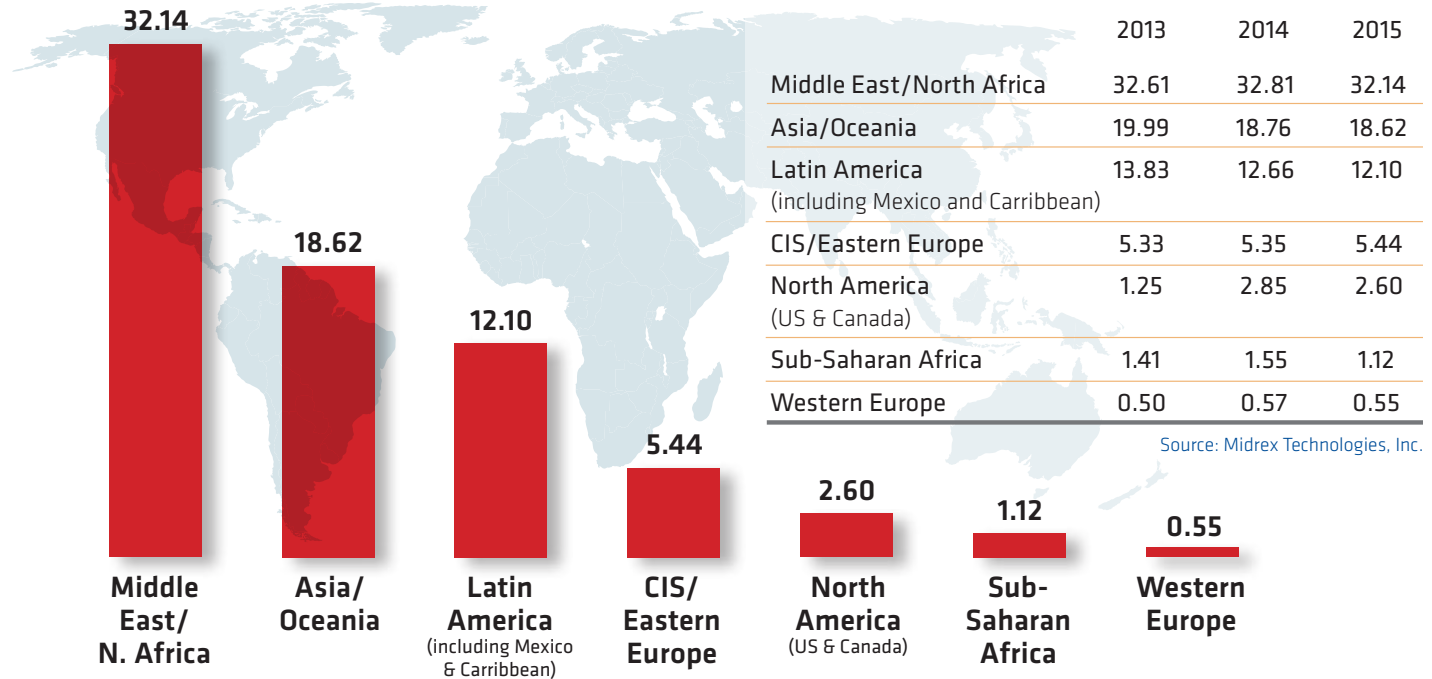
Shaft Furnace DRI Production by Process and by Year

Year	MIDREX®	HYL/Energiron	Year	MIDREX®	HYL/Energiron
1990	10.73	5.25	2004	35.01	11.34
1991	11.96	5.40	2005	34.96	11.00
1992	13.26	5.29	2006	35.71	10.91
1993	15.91	5.73	2007	39.72	11.20
1994	17.83	7.01	2008	39.85	9.84
1995	19.86	8.15	2009	38.62	7.88
1996	21.03	9.12	2010	42.01	9.81
1997	23.08	9.55	2011	44.38	11.03
1998	24.82	8.52	2012	44.76	10.79
1999	26.12	8.81	2013	47.56	11.29
2000	30.12	9.39	2014	47.12	12.04
2001	26.99	8.04	2015	45.75	11.62
2002	30.11	8.88			
2003	32.06	9.72			



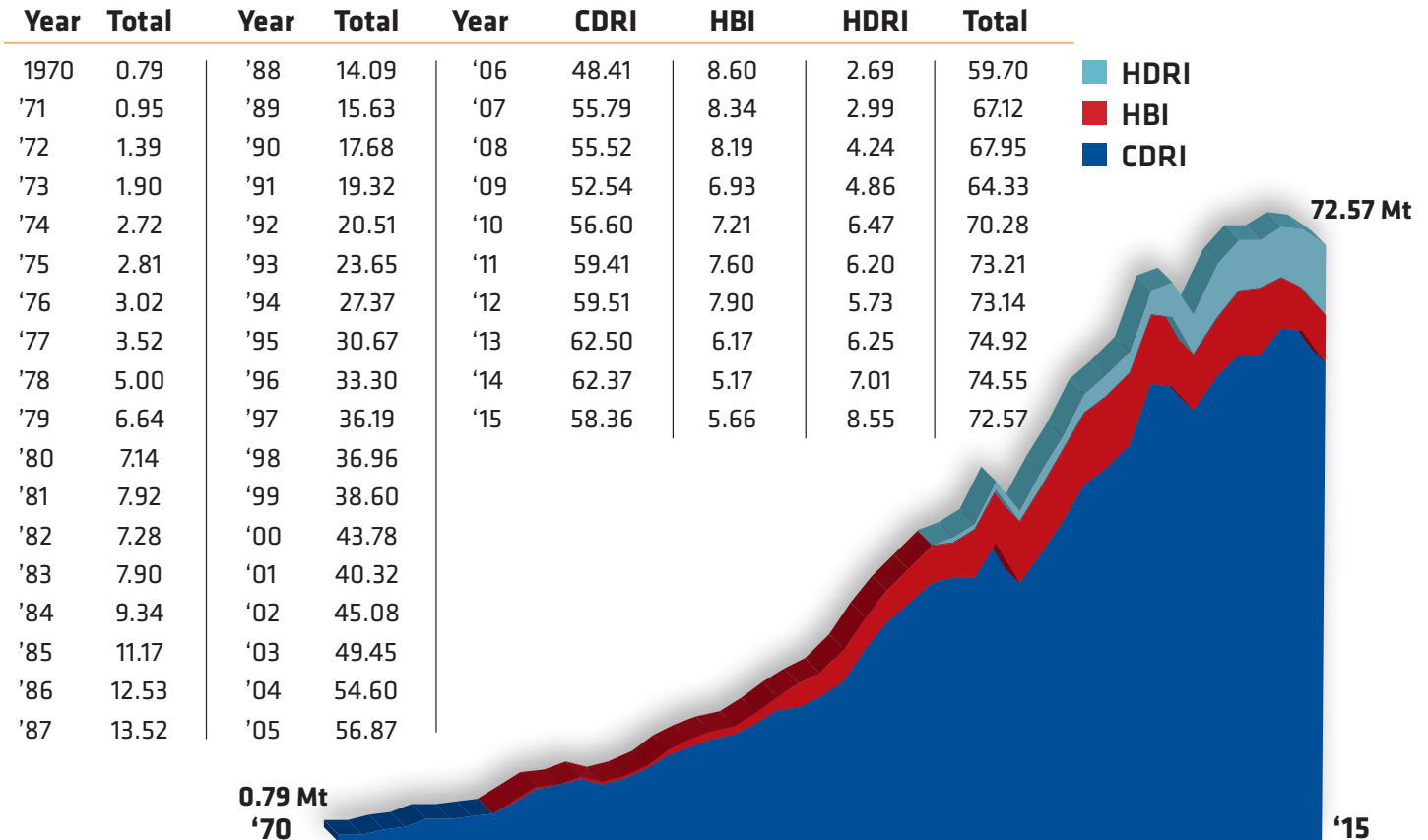


2015 World DRI Production by Region (Mt)



World DRI Production by Year (Mt)

Source: Midrex Technologies, Inc.





2015 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'70-'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
Latin America										
ARGENTINA	17.83	1.42	1.50	1.54	0.99	1.42	1.28	1.46	1.74	1.74
BRAZIL	5.68	0.34	0.32	0.34	0.40	0.42	0.43	0.36	0.41	0.44
MEXICO	45.87	3.90	4.54	5.68	6.24	5.83	3.67	4.90	5.62	6.54
PERU	0.61	0.02	0.12	0.11	0.05	0.08	0.07	0.03	0.08	0.08
TRINIDAD & TOBAGO	8.15	1.07	1.24	1.14	1.30	1.53	2.31	2.32	2.28	2.36
VENEZUELA	49.07	5.34	5.36	5.06	5.05	6.69	6.38	6.89	6.90	7.83
Middle East/N. Africa										
BAHRAIN	-	-	-	-	-	-	-	-	-	-
EGYPT	6.73	0.83	1.19	1.61	1.67	2.11	2.37	2.53	2.87	3.02
IRAN	9.63	3.81	4.38	3.69	4.12	4.74	5.00	5.28	5.62	6.41
LIBYA	4.98	0.83	0.99	1.01	1.33	1.50	1.09	1.17	1.34	1.58
OMAN	-	-	-	-	-	-	-	-	-	-
QATAR	8.64	0.64	0.57	0.71	0.67	0.62	0.73	0.75	0.78	0.83
SAUDI ARABIA	16.84	2.30	2.11	2.27	2.36	3.09	2.88	3.29	3.29	3.41
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
INDIA	13.94	4.84	5.26	5.26	5.22	5.44	5.59	6.59	7.67	9.37
INDONESIA	17.78	1.80	1.60	1.64	1.74	1.82	1.48	1.50	1.23	1.47
MALAYSIA	7.45	1.48	1.72	0.91	0.96	1.26	1.12	1.08	1.60	1.68
MYANMAR	0.24	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04
PAKISTAN	-	-	-	-	-	-	-	-	-	-
North America										
CANADA	14.64	1.42	1.39	1.24	0.92	1.13	-	0.18	0.50	1.09
US	9.72	0.45	0.51	1.60	1.67	1.56	0.12	0.47	0.21	0.18
CIS/Eastern Europe										
RUSSIA	16.02	1.50	1.73	1.55	1.88	1.92	2.51	2.91	2.91	3.14
Sub-Saharan Africa										
NIGERIA	1.51	0.02	-	-	-	-	-	-	-	-
SOUTH AFRICA	10.28	0.90	1.09	1.05	1.16	1.53	1.56	1.55	1.54	1.63
Western Europe										
GERMANY	6.84	0.37	0.47	0.45	0.40	0.46	0.21	0.54	0.59	0.61
Other Nations										
	0.47	-	-	-	-	-	-	-	0.47	-
WORLD TOTAL	272.90	33.30	36.19	36.90	38.59	43.78	40.32	45.08	49.45	54.60

2015 World DRI Production by Process (Mt)

NAME	'70-'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
MIDREX®	160.86	21.03	23.08	24.82	26.12	30.12	26.99	30.11	32.06	35.01
HYL/Energiron	85.52	9.12	9.55	8.52	8.81	9.39	8.04	8.88	9.72	11.34
Fluidized Bed Processes	5.83	0.44	0.48	0.40	0.66	0.96	1.93	1.63	2.57	1.62
Rotary Kiln, Coal-based	19.85	2.56	3.01	2.94	2.94	3.14	3.18	4.43	5.04	6.41
Other Processes*	0.84	0.15	0.1	0.09	0.07	0.15	0.14	0.04	0.04	0.04
WORLD TOTAL	272.90	33.30	36.19	36.90	38.59	43.78	40.32	45.08	49.45	54.60

* Other Processes: A variety of processes using retorts, shaft furnaces and hearths that have had limited commercial success.





2015 World DRI Production by Region (Mt)

Source: Midrex Technologies, Inc.

NAME	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15
Latin America											
ARGENTINA	1.83	1.95	1.81	1.86	0.81	1.57	1.68	1.61	1.54	1.67	1.26
BRAZIL	0.43	0.38	0.36	0.30	0.01	-	-	-	-	-	-
MEXICO	5.98	6.17	6.26	6.01	4.15	5.37	5.85	5.59	6.13	5.98	5.50
PERU	0.09	0.14	0.09	0.07	0.10	0.10	0.09	0.10	0.10	0.09	0.07
TRINIDAD & TOBAGO	2.25	2.08	3.47	2.78	1.99	3.08	3.03	3.25	3.29	3.24	2.52
VENEZUELA	8.95	8.61	7.71	6.87	5.61	3.79	4.47	4.61	2.77	1.68	2.75
Middle East/N. Africa											
BAHRAIN	-	-	-	-	-	-	-	-	0.78	1.44	1.23
EGYPT	2.90	3.10	2.79	2.64	2.91	2.86	2.97	2.84	3.43	2.88	2.73
IRAN	6.85	6.85	7.44	7.46	8.20	9.35	10.37	11.58	14.46	14.55	14.55
LIBYA	1.65	1.63	1.64	1.57	1.11	1.27	0.30	0.51	0.95	1.00	0.45
OMAN	-	-	-	-	-	-	1.11	1.46	1.47	1.45	1.48
QATAR	0.82	0.88	1.30	1.68	2.10	2.16	2.23	2.42	2.39	2.64	2.71
SAUDI ARABIA	3.63	3.58	4.34	4.97	5.03	5.51	5.81	5.66	6.07	6.46	5.80
UAE	-	-	-	-	-	1.18	2.25	2.72	3.07	2.41	3.19
Asia/Oceania											
AUSTRALIA	-	-	-	-	-	-	-	-	-	-	-
CHINA	0.41	0.41	0.60	0.18	0.08	-	-	-	-	-	-
INDIA	12.04	14.74	19.06	21.20	22.03	23.42	21.97	20.05	17.77	17.31	17.68
INDONESIA	1.27	1.20	1.32	1.21	1.12	1.27	1.23	0.52	0.76	0.12	-
MALAYSIA	1.38	1.54	1.84	1.94	2.30	2.39	2.16	2.01	1.40	1.33	0.94
MYANMAR	-	-	-	-	-	-	-	-	-	-	-
PAKISTAN	-	-	-	-	-	-	-	-	0.06	-	-
North America											
CANADA	0.59	0.45	0.91	0.69	0.34	0.60	0.70	0.84	1.25	1.55	1.50
US	0.22	0.24	0.25	0.26	-	-	-	-	-	1.30	1.10
CIS/Eastern Europe											
RUSSIA	3.34	3.28	3.41	4.56	4.67	4.79	5.20	5.24	5.33	5.35	5.44
Sub-Saharan Africa											
NIGERIA	-	-	0.15	0.20	-	-	-	-	-	-	-
SOUTH AFRICA	1.78	1.75	1.74	1.18	1.39	1.12	1.41	1.57	1.41	1.55	1.12
Western Europe											
GERMANY	0.44	0.58	0.59	0.52	0.38	0.45	0.38	.56	0.50	0.57	0.55
Other Nations											
	-	-	-	-	-	-	-	-	-	-	-
WORLD TOTAL	56.87	59.70	67.12	67.95	64.33	70.28	73.21	73.14	74.92	74.55	72.57

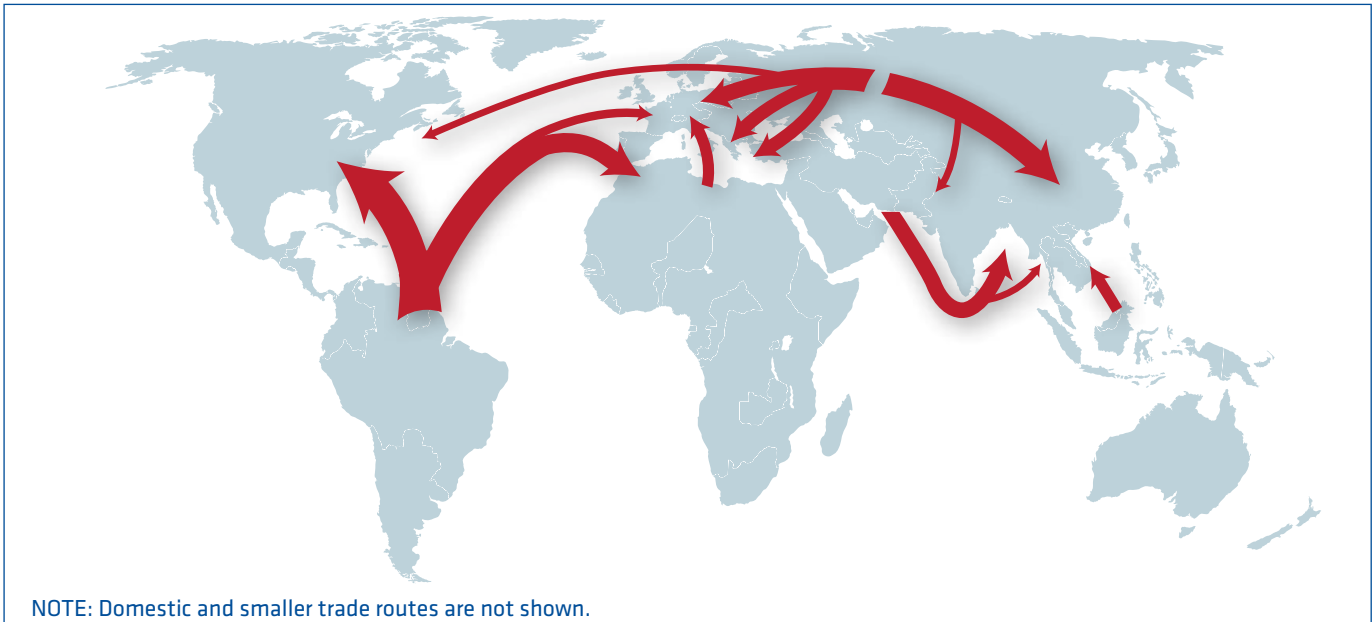
2015 World DRI Production by Process (Mt)

NAME	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15
MIDREX®	34.96	35.71	39.72	39.85	38.62	42.01	44.38	44.76	47.56	47.12	45.75
HYL/Energiron	11.00	10.91	11.20	9.84	7.88	9.81	11.03	10.79	11.29	12.04	11.62
Fluidized Bed Processes	1.52	1.31	1.05	1.08	0.50	0.34	0.48	0.53	0.14	-	0.51
Rotary Kiln, Coal-based	9.17	11.53	14.90	16.92	17.33	18.12	17.32	17.06	15.93	15.39	14.69
Other Processes*	0.18	0.22	0.24	0.25	0.26	-	-	-	-	-	-
WORLD TOTAL	56.87	59.70	67.12	67.95	64.33	70.28	73.21	73.14	74.92	74.55	72.57

* Other Processes: A variety of processes using retorts, shaft furnaces and hearths that have had limited commercial success.



Major Trade Routes For International Trade of DRI (HBI and CDRI)



The map shows the major routes of international transport of DRI in 2015. The width of the lines indicates the amount of DRI that traveled over the individual routes.

Data for the map was taken from three sources: the Iron and Steel Statistics Association (ISSB) in London, The International Iron Metallurgy Association (IIMA) in Rotherham, UK, 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. Specifically, reports from individual plants show over two million tons of shipments 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 widest 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 (Canada, the United States and Mexico). The regions for the purpose of these statistics are: North America, Caribbean, South America, NW Europe (UK, Scandinavia, Benelux, France, and Germany), Mediterranean Europe (mostly Spain and Italy) and Turkey, Eastern Europe, North Africa, the CIS nations, Arabian Gulf plus Oman, South Asia, SE Asia, East Asia and Oceania (Indonesia and Malaysia).

Shipments were up slightly from 2014 as 13.3 million tons of CDRI and HBI were transported. Nearly 60% of these were international shipments. The nations dispatching the most material were again Russia and Trinidad; Russia leading with nearly 2.6 million tons and Trinidad close behind sending out almost 2.3 million tons. Combined, they exported nearly two-thirds of the total international trade.

As production at some of the HBI plants in Venezuela recovered somewhat, that nation notably increased its exports to over 850 thousand tons. Other nations exporting more than 100 thousand tons included Oman, Bahrain, Qatar and Libya.

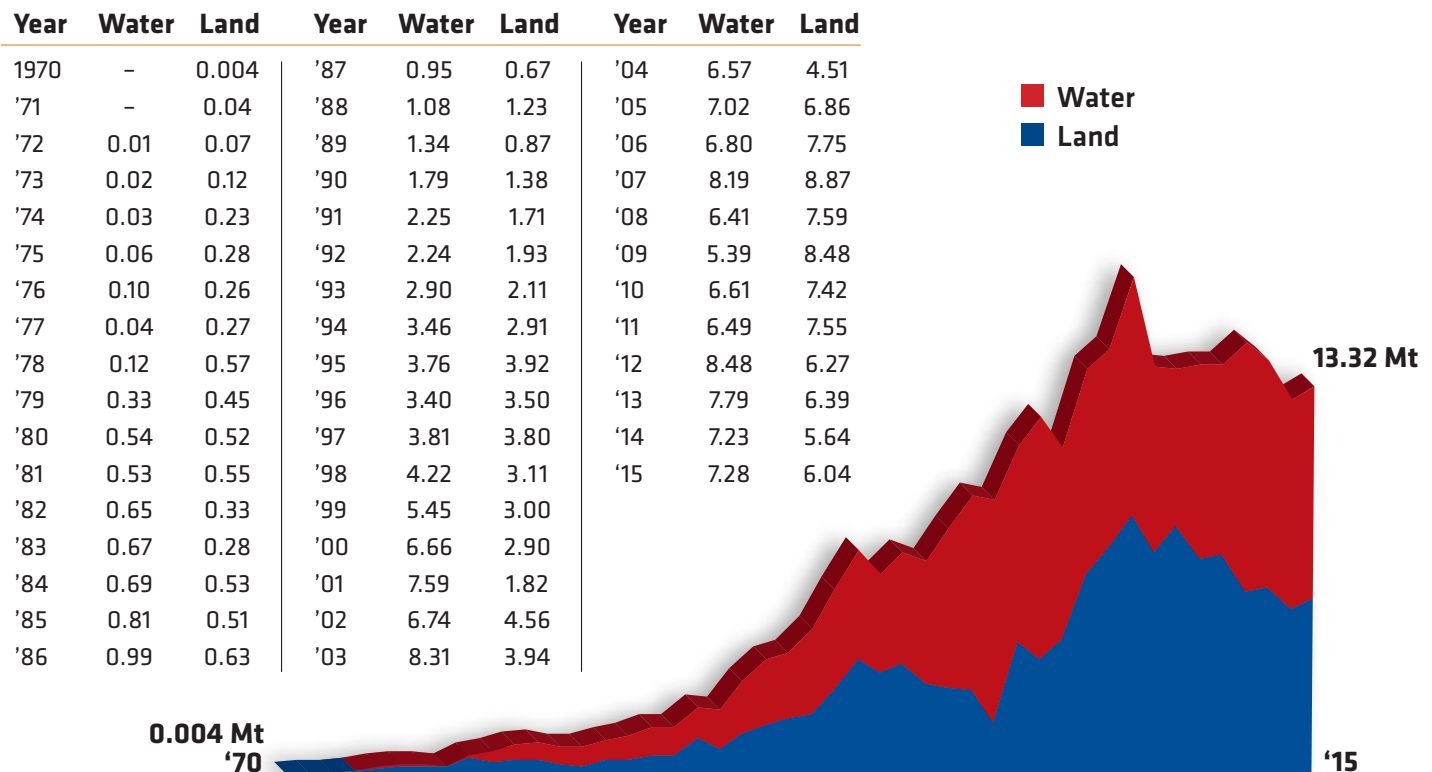
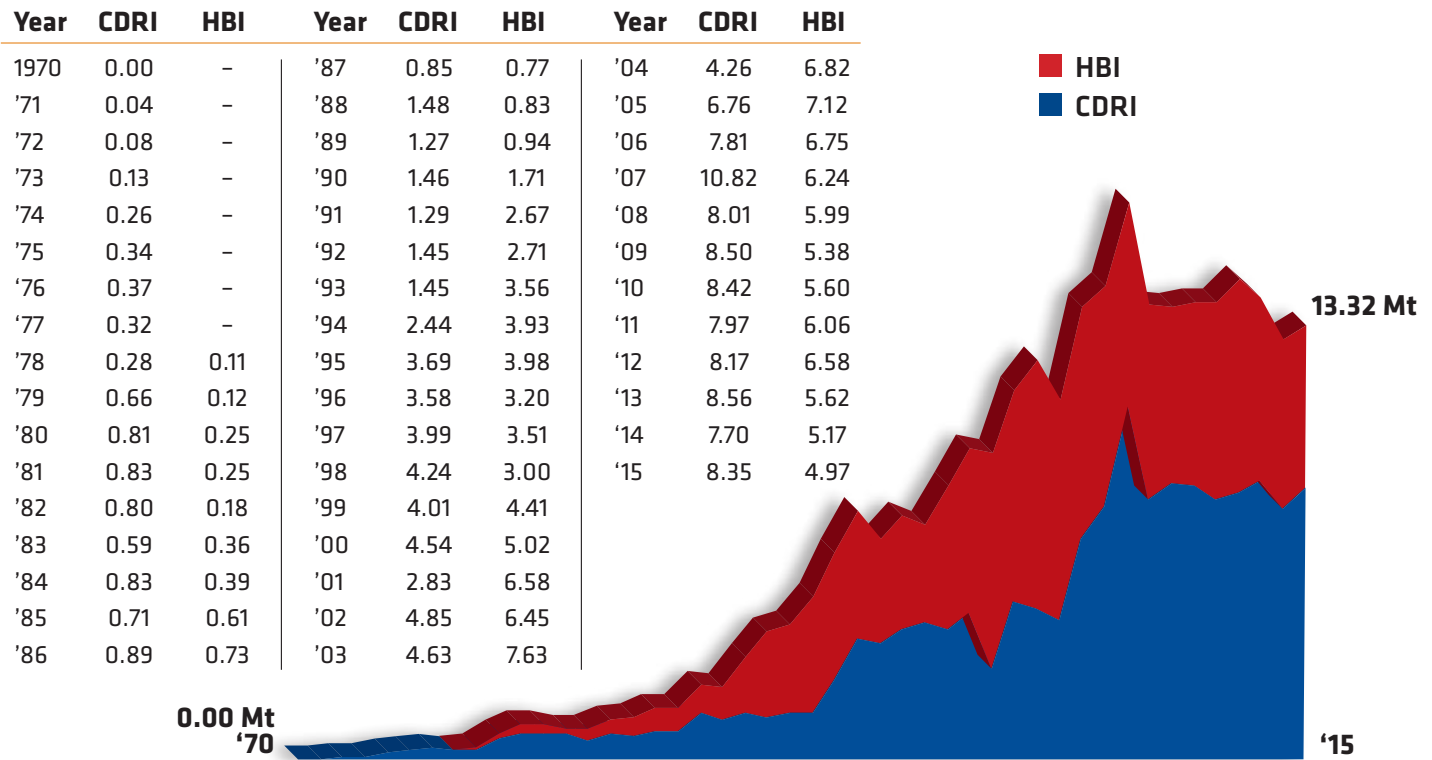
As in previous years, the largest market for DRI and HBI was the United States which imported nearly 1.9 million tons, over 90% of which came from Trinidad. The concentration of EAF flat products steel mills in the U.S. was the driving factor for the high import figures. These mills use DRI and HBI to enable manufacture of high quality steels containing very low amounts of residual metals, such as copper, and low levels of the gases nitrogen and hydrogen.

As new HBI plants come on stream, the volume of international trade will increase. Two HBI plants will begin operation in 2016, the voestalpine Texas plant in Corpus Christi, Texas, USA and the Lebgok III plant at Gubkin in Belgorod, Russia. Combined, these plants will increase annual shipments by nearly four million tons per year.



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 5/31/16 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
SHAFT FURNACE TECHNOLOGY						
MIDREX® PROCESS						
ArcelorMittal Hamburg	Hamburg, Germany	0.40	1	CDRI	'71	0
ArcelorMittal Montreal 1	Contrecoeur, Quebec, Canada	0.40	1	CDRI	'73	0
TenarisSiderca	Campana, Argentina	0.40	1	CDRI	'76	0
ArcelorMittal Montreal 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 I	Mesaieed, Qatar	0.40	1	CDRI	'78	0
SIDOR II	Matanzas, Venezuela	1.29	3	CDRI	'79	0 0 I
ArcelorMittal Point Lisas I & II	Point Lisas, Trinidad & Tobago	0.84	2	CDRI	'80/'82	I
Global Steel Holdings	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
Khouzestan Steel Co. I - IV	Ahwaz, Iran	1.84	4	CDRI	'89/'90/'92/'01	0
EZDK I	El Dikheila, Egypt	0.72	1	CDRI	'86	0
LISCO 1 & 2	Misurata, Libya	1.10	2	CDRI	'89/'90	I 0
Essar Steel I & II	Hazira, India	0.88	2	HBI/HDRI	'90	I
FMO	Puerto Ordaz, Venezuela	1.00	1	HBI	'90	0
VENPRECAR	Matanzas, Venezuela	0.82	1	HBI	'90	0
Essar Steel III	Hazira, India	0.44	1	HBI/HDRI	'92	I
Hadeed C	Al-Jubail, Saudi Arabia	0.65	1	CDRI	'92	0
Mobarakeh Steel A - E	Mobarakeh, Iran	3.20	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
Essar Steel IV	Hazira, India	1.00	1	HBI/HDRI	'04	I
Nu-Iron	Point Lisas, Trinidad & Tobago	1.60	1	CDRI	'06	0
Essar Steel V	Hazira, India	1.50	1	HBI/HDRI	'06	0
Mobarakeh Steel F	Mobarakeh, Iran	0.80	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 II	Gubkin, Russia	1.40	1	HBI	'07	0
Qatar Steel II	Mesaieed, Qatar	1.50	1	CDRI/HBI	'07	0
Khouzestan Steel V	Ahwaz, Iran	0.80	1	CDRI	'08	0
Lion DRI	Banting, Malaysia	1.54	1	HDRI/HBI	'08	0
HOSCO I & II	Bandar Abbas, Iran	1.65	2	CDRI	'09/'10	0
Essar Steel VI	Hazira, India	1.50	1	CDRI	'10	0
Khorasan Steel I	Khorasan (Mashad), Iran	0.80	1	CDRI	'10	0
Jindal Shadeed	Sohar, Oman	1.50	1	HDRI/HBI	'11	0

(Continued next page)

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 hundreds of small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list. The total capacity of all rotary kilns in India is estimated to be 19.5 Mt/y.

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 5/31/16 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
SHAFT FURNACE TECHNOLOGY						
MIDREX® PROCESS (Continued)						
IGISCO	Ardakan (Yazd), Iran	0.80	1	CDRI	'12	O
Khorasan Steel II	Khorasan, Iran	0.80	1	CDRI	'12	O
South Kaveh Steel	Bandar Abbas, Iran	1.86	2	CDRI	'12/'13	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	Ardakan (Yazd), Iran	0.80	1	CDRI	'13	O
Mobarakeh Steel (Saba)	Esfahan, Iran	1.50	1	CDRI	'14	O
JSW Projects Ltd.	Toranagallu, Karnataka, India	1.20	1	HDRI/CDRI	'14	O
Mobarakeh Steel (Kharazi A & B)	Esfahan, Iran	3.0	2	CDRI	'14	O
Sirjan Iranian Co.	Kerman, Iran	0.8	1	CDRI	'14	O
ESISCO	Sadat City, Egypt	1.76	1	HDRI/CDRI	'15	O
Jindal Steel & Power	Angul, India	1.80	1	HDRI/CDRI	'15	O
Sirjan Jahan Steel	Kerman, Iran	0.96	1	CDRI	'15	O
Gol-e-Gohar	Kerman, Iran	1.70	1	CDRI	'15	O
voestalpine Texas	Corpus Christi, Texas, USA	2.00	1	HBI	'16	C
LGOK III	Gubkin, Russia	1.80	1	HBI	'16	C
Qaenat	South Khorasan, Iran	0.80	1	CDRI	'16	C
Sabzevar	Khorasan Razavi, Iran	0.80	1	CDRI	'16	C
Sepiddasht	Char Mahal and Bakhtiari, Iran	0.80	1	CDRI	'16	C
Persian Gulf Saba	Bandar Abbas, Iran	1.50	1	HBI	'16	C
Chador Malu	Ardakan (Yazd), Iran	1.55	1	HDRI	'16	C
Ardakan Steel	Ardakan (Yazd), Iran	0.80	1	CDRI	'17	C
Tosyali Algeria	Oran, Algeria	2.50	1	HDRI/CDRI	'17	C
Algerian Qatari Steel	Bellara, Algeria	2.50	1	HDRI/CDRI	'18	C
Gol-e-Gohar	Kerman, Iran	1.80	1	CDRI	'18	C
Sirjan Iranian Co. 2	Kerman, Iran	0.80	1	CDRI	'18	C
		83.44	91			
HYL/ENERGIRON PROCESS						
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	0.75	1	HBI/CDRI	'93	I
PT Krakatau Steel	Cilegon, Indonesia	1.35	2	CDRI	'93	I
Khouzestan Steel (ASCO)	Ahwaz, Iran	1.03	3	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	'98	O
Lebedinsky GOK	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	O
JSW Salav 2	Raigad, India	0.90	1	CDRI	'07	I
Emirates Steel I (GHC)	Abu Dhabi, UAE	1.60	1	HDRI	'09	O
Gulf Sponge Iron	Abu Dhabi, UAE	0.20	1	CDRI	'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 hundreds of small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list. The total capacity of all rotary kilns in India is estimated to be 19.5 Mt/y.

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 5/31/16 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
SHAFT FURNACE TECHNOLOGY						
HYL/ENERGIRON PROCESS (Continued)						
Emirates Steel II (GHC)	Abu Dhabi, UAE	1.60	1	HDMI	'11	O
Suez Steel	Adabia, Egypt	1.95	1	HDMI/CDRI	'13	O
Nucor Steel Louisiana	Convent, Louisiana, USA	2.50	1	CDRI	'13	O
Ezz Rolling Mills	Sokhna, Egypt	1.90	1	CDRI	'15	O
JSPL	Raigarh, India	2.50	1	HDMI	'17	C
Sidor	Matanzas, Venezuela	0.80	1	CDRI	'17	C
		<u>25.88</u>	<u>29</u>			
FLUIDIZED BED TECHNOLOGY						
FINMET PROCESS						
Briq Ori	Matanzas, Venezuela	2.20	4	HBI	'00	O
CIRCORED PROCESS						
Mittal - ISG Trinidad	Point Lisas, Trinidad & Tobago	0.50	1	HBI	'99	I
FIOR PROCESS						
Operaciones RDI	Matanzas, Venezuela	0.40	1	HBI	'76	I
ROTARY KILN TECHNOLOGY						
SL/RN PROCESS						
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
Bihar Sponge Iron, Ltd.	Chandil, India	0.15	1	CDRI	'89	O
Prakash Industries	Champa, India	0.40	2	CDRI	'93/'96	O
Nova Iron & Steel	Bilaspur, India	0.15	1	CDRI	'94	O
Sree Metalics	Keonjhar, India	0.06	3	CDRI	'99/'00	O
Ashirwad	Jamshedpur, India	0.05	2	CDRI	'00	O
Vandana Global	Siltara, Raigarh, India	0.05	1	CDRI		O
		<u>1.80</u>	<u>20</u>			
JINDAL PROCESS						
Jindal Steel & Power	Raigarh, India	0.90	6	CDRI	'93/'94/'95/'96/'00	O
Monnet Ispat	Raipur, India	0.30	2	CDRI	'93/'98	O
Rexon Strips Ltd.	Via Lathikata, India	0.06	2	CDRI	'93/'00	O
		<u>1.26</u>	<u>10</u>			
DRC PROCESS						
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
Tianjin Iron & Steel	Tianjin, China	0.30	2	CDRI	'97	I
		<u>0.63</u>	<u>5</u>			
CODIR PROCESS						
Dunswart	Benoni, South Africa	0.15	1	CDRI	'73	O
Sunflag	Bhandara, India	0.15	1	CDRI	'89	O

(Continued next page)

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 hundreds of small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list. The total capacity of all rotary kilns in India is estimated to be 19.5 Mt/y.

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 5/31/16 Source: Midrex Technologies, Inc.

Plant	Location	Capacity (Mt/y)	Modules	Product	Start-up	Status*
ROTARY KILN TECHNOLOGY						
CODIR PROCESS (Continued)						
Goldstar	Mallividu, India	0.22	2	CDRI	'92	I
		0.52	4			
SHENWU RHF PROCESS						
Tianjin Rockcheck	Tianjin, China	0.50	1	CDRI	'14	I
TISCO PROCESS						
Tata Sponge Iron, Ltd.	Keonjhar, Orissa, India	0.24	2	CDRI	'86/'98	O
Vallabh Steels	Ludhiana, Punjab, India	0.12	1	CDRI		O
		0.36	3			
SIIL PROCESS						
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
		0.29	8			
OSIL PROCESS						
OSIL	Keonjhar, Orissa, India	0.10	1	CDRI	'83	O
Lloyd's Metals & Eng.	Ghugus, India	0.15	1	CDRI	'95	O
		0.25	2			
DAV PROCESS						
Davsteel	Cullinan, South Africa	0.04	1	CDRI	'85	O
BGRIMM PROCESS						
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
Anhunik 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	0.21		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	0.25		CDRI		O
SMC Power Generation Ltd.	Jharsuguda, Odisha, India	0.2		CDRI		O
		7.57				

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 hundreds of small rotary kilns in India with annual capacities of 10,000-30,000 tons per year that are not included on this list. The total capacity of all rotary kilns in India is estimated to be 19.5 Mt/y.

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





2015 WORLD DIRECT REDUCTION STATISTICS is compiled by Midrex Technologies, Inc., Charlotte, North Carolina, USA. The publication is posted annually on the Midrex web site.

Midrex Technologies, Inc. compiles world DRI production data on an annual basis as a service to 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 an international process engineering and technology company that provides global process technology solutions to various industries and is principally known for the MIDREX® Direct Reduction Process that converts iron ore into a high-purity DRI or HBI for use in steelmaking, ironmaking, and foundry applications. Midrex continues to develop new technologies relating to its traditional iron and steel roots.

The following organizations supplied or assisted in collecting data for this issue of 2015 WORLD DIRECT REDUCTION STATISTICS:

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

MIDREX® is a registered trademark of Kobe Steel, Ltd.
MXCOL® is a registered trademark of Kobe Steel Ltd.
COREX® is a registered trademark of Primetals Technologies

For updates check www.midrex.com
 For more information or general comments,
 please e-mail: info@midrex.com

World Steel Dynamics (WSD) has audited Midrex's collection and preparation process of the "2015 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 2015.

Audited by



Englewood Cliffs,
 New Jersey, U.S.A.
 June, 2016

© 2016 Midrex Technologies, Inc.

MIDREX
 Designed for Today,
 Engineered for Tomorrow™

