Evolving steelmakers' metallics balances: long-term downside pressure on steel scrap and iron ore prices

The global metallics balance for the steel and foundry industries often has as great impact on hot-rolled band (HRB) export prices as the steelmaking supply/demand balance. The global metallics requirement in 2016 for the steel and foundry industries was about 2.0 billion metric tons, consisting of about 1.2 billion metric tons of pig iron, 78 million metric tons of steel scrap substitutes and 738 million metric tons of steel scrap. The steel scrap usage figure includes about 200 million metric tons of home scrap, 198 million metric tons of new scrap (largely returned by factories) and 353 million metric tons of obsolete steel scrap (of which about 75 million metric tons is generated in China). All steelmakers' metallics, and some other steel-related materials reside in the same global bathtub — including iron ore, coking coal, metallurgical coke, pig iron, steel scrap and steel scrap substitutes.

By 2025, the metallics requirement for the steel and foundry industries may be little changed from 2016 assuming that lower Chinese steel production is offset by gains principally in the developing countries. Versus 2016, global pig iron production may drop 74 million metric tons, or about 6%, while steel scrap substitute production may rise 31 million metric tons, or 40%.

New steel scrap generated by factories may rise to 209 million metric tons, while home scrap generation may fall 12% to 176 million metric tons.

Table 1

Global Metallics Summary 2016 (million metric ton). Source: WSD's Global Metallics Balance System

	Total metallics requirement	Pig iron	DRI/HBI	Total scrap requirement	Obsolete scrap	Iron ore requirement
Advanced countries	540	260	9.7	270	160	394
Japan	126	81	0.1	45	25	132
Western Europe	198	86	2.3	104	62	124
United States	103	31	5.0	67	44	42
Small cap. adv.	113	62	2.0	54	29	96
China	989	740	2.3	247	73	1,181
Developing World Ex-China	476	189	74.0	213	112	442
Africa	8	4	1.1	3	2	8
Brazil	42	23	0.2	18	11	34
CIS	129	66	3.6	60	37	132
India	116	59	21.0	36	9	130
Latin America	36	7	10.0	21	11	29
Turkey	39	10	0.4	28	20	16
Middle East and North Africa	45	6	33.0	7	1	63
Others	61	14	6.0	40	22	30
World total	2,005	1,189	86.0	730	345	2,017

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The obsolete steel scrap requirement in 2025, at 373 million metric tons, is only 29 million metric tons higher than in 2016. Yet, the obsolete steel scrap reservoir 10–40 years old, on average will be about 37% higher at about 580 million metric tons. On this basis, the global obsolete steel scrap recovery ratio, as a share of the scrap reservoir that's on average 10–40 years old, declines to 66% in 2025 from 86% in 2016. Such a low recovery ratio for 2025 is hard to fathom unless the price of steel scrap is so depressed that its collection is retarded. Yet demolition projects often go ahead no matter what the price of the steel scrap. Demolition may account for as much as 50% of the recovery of obsolete steel scrap apart from that recovered via the recycling of automobiles and appliances (often processed in shredders in advanced countries).

Table 2

Global Metallics Summary 2025 (million metric ton). Source: WSD's Global Metallics Balance System

	Total metallics requirement	Pig iron	DRI/HBI	Total scrap requirement	Obsolete scrap	Iron ore requirement
Advanced countries	588	273	15.7	299	181	422
Japan	116	79	0.1	38	19	128
Western Europe	225	96	3.6	125	77	139
United States	119	29	9.6	81	54	49
Small cap. adv.	128	69	2.0	55	31	106
China	802	582	6.7	213	69	935
Developing World Ex-China	601	261	95.0	246	123	596
Africa	9	4	1.3	3	2	9
Brazil	48	29	0.3	19	10	41
CIS	144	79	2.4	63	38	154
India	167	88	27.6	51	11	188
Latin America	58	11	15.2	25	15	41
Turkey	49	13	0.5	36	25	20
Middle East and North Africa	62	8	43.5	10	2	85
Others	64	30	4.0	39	20	58
World total	1,991	1,116	117.4	758	373	1,953

What's the upshot? Looking down the road 10 years, the growing obsolete steel scrap reservoir will be a force driving down both steel scrap prices and iron ore prices and, on balance, work to diminish the "economic rent" of integrated steelmakers.

Massive Chinese pig iron production: 1% of the global total

The huge rise in Chinese pig iron production the past two decades has strongly impacted the relationships between the various components of the global metallics balance system — with the consumption of steel scrap being much lower than would otherwise be the case. Chinese pig iron output now amounts to about 740 million metric tons per year, or 61% of the global total. In 2000, the figures were 128 million metric tons and 22%, respectively. By way of comparison, China's steel production now amounts to about 800 million metric tons per year annualized, or 49% of the global total,

Table 3

Chinese Blast Furnaces: 2011 to 2016. Source: WSD estimates

Year	New blast furnaces	Capacity	Total cubic meters	No. of blast furnaces by volume (m^3)			
				<1,000	1,000–2,000	2,000–4,000	>4,000
2011	73	87	103,200				
2012	48	60	71,230	4	33	10	1
2013	39	48	54,737	2	30	6	1
2014	20	26	29,680	0	14	6	0
2015	9	17	20,000	0	4	4	1
2016e	7	12	13,690	0	4	2	1
Total	196	250	292,537				

versus 130 million metric tons in 2000, or 15% of the global total.

While more than 100 smaller-sized blast furnaces have been closed since 2011 because they were highly inefficient and caused pollution, the construction of larger-sized blast furnaces in China has been prodigious. From 2011 to 2015, 189 new blast furnaces were built with a capacity of 238 million metric tons per annum, with another 7 planned for completion in 2016 with a capacity of 12 million metric tons per annum.

China's BOF steelmaking furnaces currently use only 6–7% steel scrap in their metallics charge, with much of that being home scrap. What about the future granted an 11% yield loss in BOF steelmaking furnaces, the same as at present, and with BOF steelmaking holding at about 90% of the total? If Chinese steel production in 2025 is 700 million metric tons and steel scrap more than doubles to 15% of the metallics charge, the usage of steel scrap in the BOF would rise to 105 million metric tons versus 52 million metric tons in 2016.

Regarding EAF steel production, if it remains at 10% of China's total and the yield loss is 9.5% from metallics to crude steel, steel scrap usage in the EAF would decline to 77 million metric tons in 2025 versus 88 million metric tons at present — for a reduction of 11 million metric tons. On this basis, the net gain in steel scrap usage in the BOF and EAF, assuming no usage of pig iron in the EAF steelmaking furnaces, is 41 million metric tons.

In comparison, the reservoir of China's obsolete steel scrap that's on average 10–40 years old, by 2025, rises to 219 million metric tons versus 89 million metric tons in 2016, for a gain of 130 million metric tons. If so, it's inevitable that, by about 2020, China will become a significant net steel scrap exporter.

This report includes forward-looking statements that are based on current expectations about future events and are subject to uncertainties and factors relating to operations and the business environment, all of which are difficult to predict. Although WSD believes that the expectations reflected in its forward-looking statements are reasonable, they can be affected by inaccurate assumptions made or by known or unknown risks and uncertainties, including, among other things, changes in prices, shifts in demand, variations in supply, movements in international currency, developments in technology, actions by governments and/or other factors. ✦