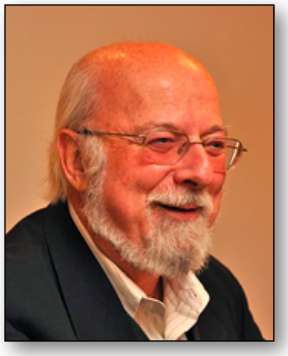
SPECIAL EDITION

THE JACK LIFTON REPORT

The Supply Issue For All Metals

By Jack Lifton – Founding Editor



BEIJING, Apr 23, 2010 - In 2009, the People's Republic of China produced more than one-half of all of the metals produced in the world. Almost all of this metal production, as a percentage, was of raw steel and pig iron (53.2%), which in combination I will refer to as "iron". It may well have been the first time since 1948, that any one nation has produced more than half of both the world's steel and pig iron.

In 1948, the global production of raw steel was "only" 141 million tonnes, of which the USA produced 80.4 million tonnes (57%) and China produced little or none. In 2009, the global production of raw steel was 1.1 billion tonnes of which the PRC produced 550 million tonnes (50%). In 2009, the USA produced 92 million tons of raw steel (8.4%).

The all time high production for the USA was reached in 1973, when the USA produced 137 million tonnes (20%) of raw steel out of a world total in 1973 of 698 million tonnes. Note that from the end of World War II onwards, although American steel production was climbing on the average from year to year, America's share of world production was declining steadily.

The world's total new production of all metals in 2009 was 2.068 billion tonnes, of which raw steel and pig iron, i.e., iron with mostly small additions of carbon, accounted for 94.8% of the total or 1.96 billion tonnes.

Eight metals produced at a rate of more than 1 million tonnes per year, accounted for 106.2 million tonnes or 5.1% of the total.

11 metals produced at a rate of between 32,000 tonnes and 1 million tonnes per year, accounted for 2.02 million tonnes or 0.098% of the total.

32 metals produced at an annual rate below 32,000 tonnes per year accounted for 112,014 tonnes or 0.005% of all of the metals produced in 2009.

My definition of a rare metal in 2010 is one that was produced at a rate of less than 32,000 tonnes per year in 2009. This may seem arbitrary and it is certainly fluid. Last year my cutoff metal, i.e., my first "rare metal," was lithium; this year it is silver, and lithium, which I thought last year would be increased in production in 2009 over 2008 enough so as to remove it from my definition of rare metals for 2009, instead declined in production substantially so that it remains for 2010 a rare metal as I define them.

In effect, lithium is rarer in 2010 than it was in 2009. In 2009 I used lithium as my threshold "rare metal," only because it was produced in 2008 at a rate of just over 25,000 tonnes which means that just 4 grams of lithium were produced in 2008, for each human being on earth. Just think about that number for a moment. If natural resources were distributed equally among the human race, then there would only have been enough lithium produced in 2008 to allow each person to have one cell phone rechargeable battery, and after that there would have been no new lithium for anything else whatsoever.

Compare that with iron, of which enough in the form of raw steel and pig iron was produced in 2008, to give each person on the earth 333 kg; enough certainly for a small car or at least a new motorbike for every human being on the planet.

The ratio of the production rate of iron to that of lithium in 2008 was 80,000:1.

So, you see that 25,000 tonnes per year is not really arbitrary. Anything produced at that level or below is rare. Just one more example will suffice; if all of the gold produced in 2008 were distributed equally, then each person would be entitled to 400 milligrams and if the same calculation is applied to platinum, the per capita figure becomes just 40 milligrams. This means that the production rate for iron was 7,500,000 times greater than that of platinum.

One of the reasons I am defining rare metals and placing them in the context of total world production, is to distinguish rare metals from the rare earth metals. These two categories are almost universally confused by the investment community. Yet the term "rare earth metals" is simply an historical tradition for describing a group of closely related chemical elements typically found together and very difficult to separate and purify even now.

"By my definition of rare metals, two of the rare earth metals, cerium and lanthanum, are not rare metals."

By my definition of rare metals, two of the rare earth metals, cerium and lanthanum, are not rare metals. The remaining total of 15 rare earth metals, and metals traditionally associated with them, scandium, yttrium, and thorium, typically in their deposits are indeed rare in 2010.

Those metals qualifying as rare metals in 2010, by their production rates, are listed in the Appendix to this report in decreasing order of their total production in 2009: in fact the production rates of seven of them are so small as to be unknown or unquantifiable.

Iron as steel is not only the most commonly produced metal in the world, but is has been since the last quarter of the nineteenth century. This is when processes to mass produce it in consistent, reproducible, large tonnages were first developed, principally in Great Britain and quickly from there spread first to continental Europe, then to North America, and finally around the world. By the beginning of the twentieth century, in 1900, America alone was producing 9 million tonnes of raw steel annually. America's all time peak percentage of total world production occurred in 1948 when it produced 57% of a global total of 141 million tonnes (In 1945 American produced 71% of the world's steel but that was measured against the sharp decline in European and Japanese production that year due to the devastation of World War II and its end; America's production in that year, 1945, was actually less in tonnage than it would be in 1948).

In 1948 it should be noted that America's gold reserves were 50% of the world's then known physical above-ground tonnage of that metal.

In the entire 20th century America's steel mills turned out approximately 7 billion tonnes of raw steel. America's 21st century production, which has averaged more than 90 million tonnes a year, still produces a billion tons of raw steel per decade.

Since 2000, a growing and dynamic Chinese steel industry produced nearly 2 billion tons of steel in the first decade (2000-2009) of the 21st century. If the estimates for the Chinese steel industry production rate growth hold, or even if the Chinese steel industry just maintains the pace it is setting now, China will have produced by the end of this second decade of the 21st century decade as much raw steel in the first twenty years of the 21st century, as the United States has already produced and will have produced between 1900 and 2020 - the production of 120 years repeated in just 20 years!

If then China maintains just the pace of raw steel production predicted in the table below, then by 2050 China will have produced as much steel per capita in 50 years as the USA, will have done in 150 years. If steel production is a barometer then sometime between 2020 and 2050, China may well become the pre-eminent industrial power as well as the wealthiest nation on earth per capita.

I am telling the above story to emphasize that the production and consumption of pig iron and raw steel, the

structural metal of our modern civilization, is the key measure of the economy of metals.

The current emphasis on the production and supply of the rare earth metals being concentrated almost completely in China, is only the tip of the iceberg of the changing patterns of the world's supply and demand for metals in the last generation. The value at the mill of the 1.1 billion tonnes of raw steel produced in 2009, was more than US$ 250 billion; the value of all 17 traditionally defined rare earth metals in purified form, could not have exceeded more than 1% of that. The comparison is even more striking when we look at the value of the final products created with raw steel, compared with the same value for the rare earth metals. I have no doubt that the rare earth metals, especially the metals used to make permanent magnets (neodymium, samarium, dysprosium, and terbium) are strategic to the manufacturing of not only US$ 6 billion worth of permanent magnets, but also to the construction of hundreds of billions of dollars worth of end use products. However the raw steel produced is used to manufacture several trillion dollars of final products - probably 10 - 50 times the final value of those products made using rare earth metals.

China steel supply and demand

China's steel market supply and demand

(in million tonnes)	07A	08A	09CL	10CL	11CL	12CL
Supply						
Crude Steel Output	487.6	497.9	568.7	625.0	668.8	715.6
% YoY	*15.4*	*2.1*	*14.2*	*9.9*	*7.0*	*7.0*
Total steel output - finished products	560.1	574.7	675.9	737.5	789.1	844.4
% YoY	*20.0*	*2.6*	*17.6*	*9.1*	*7.0*	*7.0*
Underlying finished product	470.1	469.7	542.4	591.9	633.3	677.6
% YoY	*15.5*	*(0.1)*	*15.5*	*9.1*	*7.0*	*7.0*
Overall imports (exports)	(51.8)	(45.8)	(4.4)	(16.0)	(18.0)	(23.0)
Demand						
Apparent crude consumption	435.8	452.1	564.3	609.0	650.8	692.6
% YoY	*10.8*	*3.7*	*24.8*	*7.9*	*6.9*	*6.4*
Underlying real demand	413.7	456.7	506.5	565.9	615.3	654.6
% YoY	*11.9*	*10.4*	*10.9*	*11.7*	*8.7*	*6.4*
Underlying demand - Construction	208.0	212.0	197.2	212.9	221.5	230.3
% YoY	*10.6*	*1.9*	*(7.0)*	*8.0*	*4.0*	*4.0*
Underlying demand-Non Construction	205.7	244.7	309.4	352.9	393.8	424.3
% YoY	*13.1*	*19.0*	*26.4*	*14.1*	*11.6*	*7.7*

Source: CSI, CLSA Asia-Pacific Markets

There are many large deposits of the rare earth metals geographically distributed globally; some of them have been worked previously and shut down by economics. The economic driving force for adding rare earth metals production outside of China today is growing Chinese demand. There are some strategic reasons being promoted and used as political drivers to create or re-open rare earth metals production and refining outside of China, but unless the prices of the rare earth metals increase dramatically, these political drivers for production of the rare earths can be met by small government subsidized operations or by recycling.

The real issue in the world, is whether or not China and Southeast Asia's demand for all metals, will create a supply crisis across the spectrum of metals in the next generation. It takes time, technological innovation, and immense amounts of capital to find, develop, and produce the ore concentrates that will become the metals we need. The question is simply this: will there be enough time and capital to do the job before the law of supply and demand slows down or stops economic growth? We have been lulled into a false sense of security by iron and steel production. Even at current demand. we have 200 years or more of high enough grade accessible iron ore, coking coal, and limestone. In addition, so long as we have ample supplies of energy we will be able to recycle steel. This business, the collection of iron and steel scrap, is the second largest metals business on earth, after pig iron and steel production. Steel is the structural metal of our civilization. The problem is not the supply of the iron ore, coking coal, limestone, and scrap iron and steel; the problem is the growing demand for almost all of the other metals, with the exception of the second structural metal, aluminum, of which we have enough high grade ores also.

Keep in mind that metals production is energy intensive, so that the energy supply issue and the metals supply issue are intertwined inextricably.

The rare earths supply issue is one of contemporary economics not of scarcity. I think we are now beginning to see the issue of absolute scarcity of some of the technology metals, as I call the rare metals that underpin all of our technology and which appear in the chart in the Appendix, almost entirely as metals produced at a rate lower than that of lanthanum (32,000 tonnes in 2009).

If the goal of future society is to live in a world of unlimited consumption then it will fail; it's time to make some very long term plans and make choices about the allocation of human intellectual as well as financial capital to ensure the best life for the most people. The problems are water, energy, and metals.

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About the Author: Jack Lifton is an independent consultant, prolific author and popular speaker who specializes in the market fundamentals and end use trends of rare metals. His work covers exploration and mining, separation and refining, and recovery of rare metal values by the recycling of not only rare metals and their alloys but also of metal-based chemicals used as raw materials for component manufacturing.

Mr. Lifton has more than 48 years of experience in the global OEM automotive, heavy equipment, electrical & electronic, mining, smelting & refining industries. Today he primarily consults to institutional investors doing due diligence on metals related opportunities. He can be emailed via jack@jackliftonreport.com.

Annual Global Production of New Metal

Metal	New mine production (metric tonnes)								
	2005	2006	Δ (%)	2007	Δ (%)	2008	Δ (%)	2009	Δ (%)
Iron Ore	1,520,000,000	1,690,000,000	11.2	2,000,000,000	18.3	2,200,000,000	10.0	2,300,000,000	4.5
Raw Steel	1,130,000,000	1,170,000,000	3.5	1,340,000,000	14.5	1,330,000,000	-0.7	1,100,000,000	-17.3
Pig Iron	825,000,000	865,000,000	4.8	947,000,000	9.5	932,000,000	-1.6	860,000,000	-7.7
Aluminum	31,900,000	33,100,000	3.8	38,000,000	14.8	39,000,000	2.6	36,900,000	-5.4
Chromium	19,600,000	20,000,000	2.0	21,500,000	7.5	23,800,000	10.7	23,000,000	-3.4
Copper	15,000,000	15,100,000	0.7	15,400,000	2.0	15,400,000	0.0	15,800,000	2.6
Zinc	9,930,000	10,300,000	3.7	10,900,000	5.8	11,600,000	6.4	11,100,000	-4.3
Manganese	11,000,000	12,200,000	10.9	12,600,000	3.3	13,300,000	5.6	9,600,000	-27.8
Boron	4,840,000	3,580,000	-26.0	3,840,000	7.3	4,350,000	13.3	4,500,000	3.4
Lead	3,520,000	3,650,000	3.7	3,770,000	3.3	3,840,000	1.9	3,900,000	1.6
Nickel	1,460,000	1,560,000	6.8	1,660,000	6.4	1,570,000	-5.4	1,430,000	-8.9
Magnesium	622,000	675,000	8.5	775,000	14.8	671,000	-13.4	570,000	-15.1
Strontium	494,000	550,000	11.3	511,000	-7.1	496,000	-2.9	420,000	-15.3
Tin	305,000	296,000	-3.0	326,000	10.1	299,000	-8.3	307,000	2.7
Molybdenum	186,000	187,000	0.5	209,000	11.8	218,000	4.3	200,000	-8.3
Antimony	171,000	173,000	1.2	170,000	-1.7	197,000	15.9	187,000	-5.1
Cerium (REE)	62,484	62,992	0.8	62,992	0.0	62,992	0.0	62,992	0.0
Cobalt	58,600	63,400	8.2	65,500	3.3	75,900	15.9	62,000	-18.3
Niobium	60,300	51,200	-15.1	60,400	18.0	62,900	4.1	62,000	-1.4
Tungsten	59,600	56,600	-5.0	54,500	-3.7	55,900	2.6	58,000	3.8

Annual Global Production of New Metal

Metal	New mine production (metric tonnes)								
	2005	2006	Δ (%)	2007	Δ (%)	2008	Δ (%)	2009	Δ (%)
Vanadium	56,400	57,900	2.7	59,100	2.1	55,000	-6.9	54,000	-1.8
Uranium				41,279					
Lanthanum	32,450	32,860	1.3	32,860	0.0	32,860	0.0	32,860	0.0
Silver	20,800	20,400	-1.9	21,100	3.4	21,300	0.9	21,400	0.5
Neodymium	18,942	19,096	0.8	19,096	0.0	19,096	0.0	19,096	0.0
Cadmium	20,100	19,900	-1.0	19,400	-2.5	19,600	1.0	18,800	-4.1
Lithium	21,500	24,400	13.5	25,800	5.7	25,400	-1.6	18,000	-29.1
Yttrium	6,080	8,900	46.4	8,900	0.0	8,900	0.0	8,900	0.0
Bismuth	5,400	5,800	7.4	6,200	6.9	7,700	24.2	7,300	-5.2
Praseodymium	6,100	6,150	0.8	6,150	0.0	6,150	0.0	6,150	0.0
Gold	2,480	2,370	-4.4	2,340	-1.3	2,260	-3.4	2,350	4.0
Dysprosium	1,240	2,000	61.3	2,000	0.0	2,000	0.0	2,000	0.0
Selenium	1,340	1,440	7.5	1,540	6.9	1,510	-1.9	1,500	-0.7
Samarium	1,353	1,364	0.8	1,364	0.0	1,364	0.0	1,364	0.0
Zirconium	1,180	1,180	0.0	1,430	21.2	1,280	-10.5	1,230	-3.9
Tantalum	1,470	964	-34.4	815	-15.5	1170	43.6	1160	-0.9
Gadolinium	738	744	0.8	744	0.0	744	0.0	744	0.0
Indium	493	578	17.2	553	-4.3	568	2.7	600	5.6
Terbium	372	450	21.0	450	0.0	450	0.0	450	0.0
Europium	269	272	1.1	272	0.0	272	0.0	272	0.0

Annual Global Production of New Metal

Metal	New mine production (metric tonnes)								
	2005	2006	Δ (%)	2007	Δ (%)	2008	Δ (%)	2009	Δ (%)
Palladium	216	222	2.8	219	-1.4	204	-6.8	195	-4.4
Platinum	211	216	2.4	213	-1.4	189	-11.3	178	-5.8
Germanium	90	90	0.0	100	11.1	140	40.0	140	0.0
Gallium	69	69	0.0	80	15.9	111	38.8	78	-29.7
Rhenium	49	47	-4.1	51	8.5	57	11.8	52	-8.8
Rhodium	30	30	0.0	30	0.0	30	0.0	30	0.0
Hafnium	22	22	0.0	26	18.2	26	0.0	25	-3.8
Erbium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Holmium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Lutetium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Scandium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Thulium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Ytterbium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Tellurium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	
Thorium	UNKNOWN	UNKNOWN		UNKNOWN		UNKNOWN		UNKNOWN	

Source Data: US Geological Survey