

Non-ferrous Extractive Metallurgy
Prof. L. Pugazhenth
Department of Metallurgical and Materials Engineering
Indian Institute of Technology, Kharagpur

Lecture No. # 39
Nonferrous Metals in India - Unleashing its true potential

Hello there, warm welcome to all of you. At the outset, I should thank my esteemed colleague and Professor, Professor H.S. Ray who has delivered about 38 lectures on various aspects of nonferrous metals and it was at his request, that I am able to join this program and share my knowledge, my experience and give an industry orientation to the nonferrous metals industry in India, how it is poised for a quantum growth and where it is heading for, in the coming years.

Professor H. S. Ray has done numerous publications, authored numerous books on nonferrous metals and this program is going to be unique for the country. It is going to be very useful, informative to the upcoming metallurgical engineers, material scientists. And in one shot, in one go, when they go through these 40 presentations, they will be updated on the extractive metallurgy part of nonferrous metals, their applications, the role of energy environment and the way the industry is likely to grow in the coming few years. And the conclusion would give you an overall view of where India stands at the current movement with respect to nonferrous metals.

To introduce myself, my name, very difficult name, Pugazhenth, it is a Tamil name and most of my colleagues call me as Mister Pug. I was the immediate past president of the Indians of metals, I took over last year and handed over in July this year and currently I am the executive director, **in**, of India Lead Zinc Development Association based in Delhi.

The Indians of metals has given me so much exposure, so much contact with the Indian industry, both steel and nonferrous industry, as well as those involved in research, in teaching and thereby, I could assimilate and gather so much knowledge, data and information, which I am going to share with you.

Coming to my organization, India Lead Zinc development Association, this organization is about 46 years old in this country, set up as an Indian office of a global group to disseminate information to the lead and zinc users, how to use these 2 metals in a more efficient economic manner. And this organization, ILZDA as it is called currently, is playing very critical role with the industry, with the policy planners and the government, and also guiding the industry in market development, in standardization, in environmental policies, in recycling, etcetera.

To give you a brief background about myself, I did metallurgical engineering from the good old REC Trichy, now called NIT Trichy, followed by Post-Graduation in business management and marketing management. I have a unique blend of about 35 years experience in nonferrous metals industry, particularly in the downstream applications of lead and zinc. In my initial years after my graduation, I also had privilege of undergoing a special advanced industrial training in U.K. under program of the confederation of British industry. By virtue of my experience, my knowledge, I am a member of several committees in mines ministry, which deals with all the nonferrous metals, base metals, also ministry of environment forest, central pollution control board, etcetera. And currently, I am the chairman of the sectional committee in Bureau of Indian Standards and dealing with lead, zinc, tin antimony and their alloys.

Internationally, I am also very active in the various committees, market development committee, R and D committee, etcetera in the International Zinc Association, in the Lead Development Association, U.K., as well as the International Lead Zinc Research Organization based in North Carolina in U.S.

Having done so much work, the industry, the global industry was kind enough to place on record, whatever little work or good work I did and they honored me by presenting an international lead award at Macau, China as latest in September 2009 in an international event, and I consider that as a very positive motivating factor in my career.

Coming to the lecture per say, as you saw in the title, nonferrous metals in India unleashing its true potential, the title is very deliberate and intentional. It is only now, nearly after about 60 years, that the full potential of nonferrous metals is being exploited by India

For longtime, nonferrous metals, as well as the steel industry, they had a very stunted growth due to the restrictive government policies in licensing, in trade, in creating new capacities, in expanding existing players, there were a lot of restrictions. But the post India is a dark chapter in the case of metals; very limited growth, restrictive outlook with the government. But after 1991, suddenly India has realized huge potential not only in production, but also in domestic consumption, as well as, in exports, in international trade and today, India apart from China, is a major driving force in nonferrous metals, particularly in driving the dynamics of the nonferrous metals, of market their production, consumption, prices, stocks, etcetera. So, China and India are the major players in nonferrous metals in today's situation.

Nonferrous metals, everything other than steel, that you see in the world, comprises of numerous nonferrous metals, starting from aluminium, copper, lead, zinc, tin, gold, nickel, titanium, uranium, you can go on and on.

In respect of size, this industry is becoming bigger and bigger in the country, the nonferrous metals are relatively priced, higher in few cases, much higher in many other cases and therefore, the value of nonferrous metals produced and consumed in the country, if one looks at, it will be a huge mind boggling figure with respect to steel for instance.

And also, this sector, nonferrous metal sector being highly priced commodities, they also give plenty of revenue to the government through import duty, sales tax, excise duty, etcetera to the exchequer, it brings in plenty of money. Apart from their size in terms of revenue generation or the volumes, they play very critical roles in our daily lives.

It so happens, steel is highly visible, steel is seen everywhere, steel occupies the front page in newspapers, the banner headlines, but nonferrous metals are somehow not given so much coverage or publicity or the common man does not notice the developments pertaining to nonferrous metals. Many exciting things have happened in this country during the last few years and if I am going to, I am going to telling you very shortly and you will be surprised, that so much has happened in this country in this sector, which was not known to many across the country.

Coming to nonferrous metals, I was mentioning, they play such vital roles in our economy, in our daily lives, in our society. In the kitchen, we use aluminium in the form of pressure cookers, aluminium utensils, aluminium tiffin carriers, a plenty of things that you use in the kitchen. We also have pipes, steel pipes bringing drinking water to the kitchen or to the bathroom and they are all coated with zinc in the form of galvanized coating for corrosion prevention of the steel pipes, which brings water to your house. But while you call it steel pipes, the zinc that is given there to coat the product pipe, nobody mentioned that or nobody recognizes that zinc is there.

You drive your cars, you drive your scooters, there are plenty of aluminium components like carburetors, fuel pumps, door locks, variety of components, which are all made of aluminium for instance, and very soon you will have aluminium, a light weight metal, material to be replaced by still lighter weight in nature, another nonferrous metal, magnesium, to bring down the weight of the cars to make your fuel consumption more economical when you use these vehicles.

You also use, for instance, the men folk, they use a razor Mach 3 in the morning, they, when they take it and they start shaving, the razor is made of Zinc die-cast body. We also use in our daily life zippers, metal zippers and sliders in our travel goods, purses, ladies bags and jeans, everywhere your metal zippers and slides, sliders made of zinc.

A bathroom faucet, a bathroom fitting, when you open the tap water, the body of the faucet, the bathroom fitting is made of a brass casting or zinc die-casting. Then, later on, given chromium plating, chrome plating or you give variety of finishes, like gold plating and silver plating, you give different types of finishes and textures. So, nonferrous metals go for not only the body, even for plating them to give a good pleasing aesthetic appearance.

Women use plenty of jewellery, gold, silver; now, more and more young girls are going for platinum jewellery. To our houses, to the offices, to the industrial establishments, power is produced somewhere at a long distance, hydroelectric source or thermal source, but the power is transmitted through aluminium conductors to long distances because aluminium has got a very good electrical conductivity property.

Many of the gadgets, that we use - a laptop, the casing, or your mobile casing - they are made of magnesium-cast product there. So, what I am trying to tell you is that we use so many metals and materials in our daily life, except steel, we do not notice all these nonferrous metals. They play such a very critical, strategic role in our daily lives, nonferrous metals play a very silent role, but very, very important roles in our daily life.

(Refer Slide Time: 15:53)



The slide features a blue background with yellow text. The title 'India's Rich Heritage in Non Ferrous Metals' is at the top. Below it is a table with four rows. To the right of the table is a photograph of an ancient site with stone structures. In the bottom left corner is the NPTEL logo.

Bronze Age	3000 BC
Lead Metal, Indus Valley	2500 BC
Gold Mine	500 BC
Zinc Smelting, Zawar	1200 AD

Coming to the nonferrous metals industry, if you go through the pages of history, India had a very rich heritage in nonferrous metals. Some of the historic ages, eras were called after nonferrous metals: bronze age, somewhere around 3000 BC; lead metal used in plumbing, for drinking water, etcetera, was used in the Indus valley, somewhere around 2500 BC; gold mines we did have in our country, approximately 500 BC. Coming to zinc, in a place like Zawar, Rajasthan, as early as 1200 AD, India had zinc smelting. It is very difficult to appreciate today, how our ancestors, they would have melted a natural resource and recovered zinc out of it in a crude brick structure, that what you see in the screen, a crude distillation column and that site is historic site. Even today in Rajasthan, one could see near Rajasthan and it is the international heritage site declared by the American society of metals. So, India had a primitive advantage, a very old history I would say, with respect to nonferrous metals.

Somewhere after industrial revolution, last century, we lost our way, other countries took over. India, Egypt, China, these are the countries, which had very primitive history in

nonferrous metals. But it so happens, after going full circle, the ball has come back to our court once again. As I told you earlier, it is India along with China, which is now driving the nonferrous metals industry, nonferrous metals market. So, things have come full circle.

(Refer Slide Time: 18:22)



If you see here in this picture, beautiful creations, God alone knows how they would have made this kind of intricate castings. Bronze casting, Lord Nataraja there, and also Rama's statues, beautiful one's in 13th century, the Hanuman statue there and even the bronze bell castings, which you see in this screen. Again, how they would have melted, given shape to them, made intricate designs, it is something that we cannot appreciate in today's context.

(Refer Slide Time: 19:06)



As I said we have come full circle, if you look at India, post-independent India, we were largely import dependent. India was depending more on import of nonferrous metals from other countries and we had very little domestic production. Most of the nonferrous metals were in the hands of public sector enterprises, public sector undertakings and the public sector undertakings had very tight restrictive direction from the government and therefore, they were never allowed to expand, they were never allowed to go for exploration or mining, for international trade. The slogan of those days was to create a self-sufficient India in nonferrous metals, that is, whatever you produce, consume within the country and do very little of imports. And if you can bring down the imports or if you can have import substituted items in the country, that was all encouraged those days.

So, domestic production was less, import we were trying to discourage and as I said, exploration, mining and production, they were all sort of restricted or curbed those days. And in the post-independent India, when India had become independent, the priorities were also different: agriculture, irrigation, education, health, so, so many other criteria, other priorities were there. Therefore, the industry, industry's role or nonferrous industry's growth, etcetera, was very restricted, as I mentioned very rigid industrial and trade policies.

And it so happened, those days, post-independent India, again India did not have plenty of foreign exchange, today we are sitting on a very comfortable foreign exchange,

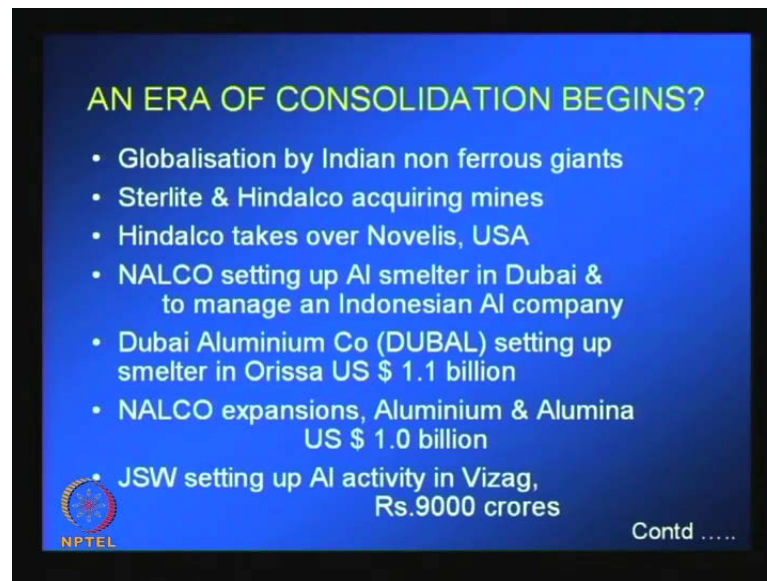
reserves of around 275, 300 billion U.S. dollars, today that is our reserves, we are very comfortable foreign exchange reserves-wise, but if you look at post-independent India, we had very acute foreign exchange crises in the country. We were not; we were wanting to use those foreign exchange, more for import of essentials like oil or food, etcetera and not for things, like nonferrous metals or capital goods, etcetera. Therefore, foreign exchange reserves limitations was another negative factor.

And fortunately, in 1991, India made a major shift, a major turnaround, all the policies, like trade policies, industrial policies, they were all given up and India became here, free trade, a free economy and there began the story of India. India becoming suddenly a big player in many sectors: service, manufacturing sector, automobiles, etcetera. So, that is how the story of India, beginning from 1991 started and from that time onwards, it is really an era of consolidation, as I always call it.

Suddenly, you found Indian nonferrous companies having global vision. A country, where nonferrous players were only looking inward, they started looking all around the world, post 1991. And after 1991, when the economic reforms, economic liberalization was introduced, suddenly you found, one after the other, the nonferrous companies, which were with the government were privatized. Sterlite is one, Vedanta as most of you would know, Mister Anil Agarwal, a global nonferrous player trying to become as become as L.N. Mittal, is there in the global steel picture.

So, Vedanta took over Hindustan Zinc, they took over Bharat Aluminium and today suddenly, you find their capacities have been increased, the markets have expanded, they have gone for expansion in mining, they have gone for their own power generation, they have gone for global acquisitions also.

(Refer Slide Time: 24:12)



AN ERA OF CONSOLIDATION BEGINS?

- Globalisation by Indian non ferrous giants
- Sterlite & Hindalco acquiring mines
- Hindalco takes over Novelis, USA
- NALCO setting up Al smelter in Dubai & to manage an Indonesian Al company
- Dubai Aluminium Co (DUBAL) setting up smelter in Orissa US \$ 1.1 billion
- NALCO expansions, Aluminium & Alumina US \$ 1.0 billion
- JSW setting up Al activity in Vizag, Rs.9000 crores

NPTEL

Contd

A company like Hindalco, Birlas, Hindustan Aluminium Company, Hindalco industries, which was again a private sector company right from the beginning, but again due to the restrictive policies, they were not allowed to expand or go in a big way and they all started acquiring mines. Sterlite and Hindalco, they had taken over mines in Zambia, in Australia, so that they can bring the natural resources, copper concentrates from those countries, copper concentrate rich countries like Australia and Zambia to India and do the smelting here, because mining takes a longtime and you may succeed or you may not succeed. Whereas, existing mines, which were doing well and during the depression days, when things were bad globally, the overseas mines were looking for buyers, international buyers and immediately, Sterlite and Hindalco started acquiring mines, that is a strategic acquisition, I would say and that is going to be a huge backup for any expansion of our production.

Hindalco again, took over one of the largest global acquisitions, as I would call it, like Tata's taking over Corus in the US, Hindalco took over Novelis in the U.S., that is a downstream company making aluminium beverage cans and ((C)), etcetera. So, Hindalco being a primary producer, they could, took, take over a downstream company, a big company in a 6 billion dollar acquisition and that was a ready market for them. Whatever they could produce, they could send it to those countries, that are mainly U.S., and that is how they could build a synergy.

Coming to a company like National Aluminium Company, even today a public sector who were looking at domestic market, only self-sufficiency as I said earlier, now they are trying to setup an aluminium smelter in Dubai.

India has got huge wonderful bauxite reserves and therefore, NALCO wants to have a smelter, an aluminium smelter in a country like Dubai, where power is cheaper. As you all know, aluminium or even nonferrous metals extraction, most of them are power intensive operations. Therefore, taking the bauxite from here to a country, where power is cheaper, so we will have tremendous advantage in value addition. NALCO is also planning to take over and manage an Indonesian aluminium company.

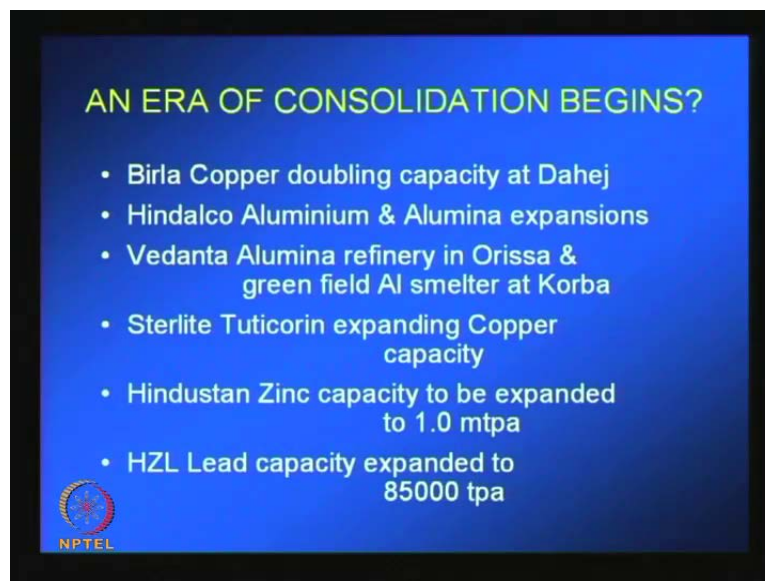
Similarly, globalization is a two-way affair. Dubai Aluminium Company, Dubai is trying to setup a smelter, aluminium smelter in Orissa with a huge investment of about 1.1 billion U S dollars.

NALCO is also currently going through expansions, aluminium and alumina, for a value of about U.S. 1 billion dollar. Suddenly, PSU in aluminium, NALCO is trying to expand in a big way.

Can you believe, a company in steel, Jindal south-west, they are also now getting into nonferrous metals, they are now setting up a big aluminium activity in Vizag, where bauxites are, bauxite resource are available there and at a huge investment of 9000 crore rupees, again a big investment there. So, that is the way things are happening.

Now, Birla Copper or even Sterlite Copper in Tuticorin, Birla Copper in Dahej in Gujarat, a country where we used to talk of capacities like 50000 tons per year or 1 lakh tonnes per year, today these companies are talking of global scales of production, global economic scales of production, 1 million tons smelters for copper in Dahej and in Tuticorin, that is going to be huge affair and India will be one of the big copper producers.

(Refer Slide Time: 28:46)



Hindalco, as I said earlier, they are also going for big expansions in aluminium and alumina. Vedanta Alumina refinery, again that is coming up in Orissa and they are also in the process of coming up with a Greenfield aluminium smelter at Korba.

Hindustan Zinc in Udaipur, Rajasthan, which used to be a small player in the pre-liberalization regime with about 1 lakh, 50000 tons or 2 lakh tons capacity. Today, they are gradually expanding their capacities to 1 million tons, like zinc, copper they are doing. Sterlite, Tuticorin, Hindustan Zinc, they are also expanding the capacities to 1 million ton per annum, again another global level scale and that way, Hindustan Zinc will become one of the world's top ranking zinc producers. Hindustan Zinc is also expanding the primary lead capacity to 85000 tons.

But talking about all these I should tell you, it is only now India is doing plenty of expansions, expansion under mining, acquiring mines in other countries, expanding their production, expanding their domestic market. This is the way industry has been growing in the last few years and that is where this going to be huge amount of opportunities for everyone, for the entrepreneur, for those who are employed, for those who are coming up with ancillary industry, etcetera.

The story does not end with only Indian players. All the global mining companies, well known big names, they are all very active in India; they see the way India has been

growing. Suddenly, fastest growing economy in the world after China and they are all now very active having their own activities, their offices, project activities.

(Refer Slide Time: 30:51)



International Mining Companies in India	
• BHP Billiton	Aluminium, Copper, Lead, Zinc
• Rio Tinto	Diamonds
• De Beers	Diamonds
• Phelps Dodge	Copper, Lead, Zinc, Gold, Silver
• Geo Mysore	Gold, Diamonds
• Anglo American	Lead, Zinc, Copper, Nickel, Gold
• Hitachi Metals	Aluminium Components, Wheels

(Source: Business World)

BHP Billiton for instance, in aluminium, copper, lead, zinc, etcetera; Rio Tinto, De Beers, Phelps dodge in copper, lead, zinc, etcetera; Geo Mysore, gold for instance; Anglo American in many nonferrous metals and even a company like Hitachi metals wanting to go for a downstream product like aluminium components, wheels for our cars, etcetera.

So, the global companies are very, very active. One Australian company is already active in Rajasthan, another one in Karnataka in gold, etcetera. So, we are now trying to exploit our natural resources, which we were not doing so far in the past.

(Refer Slide Time: 31:36)

NON FERROUS METALS - GLOBAL PRODUCTION, 2009 & 2020 (million tonnes)		
	2009 (E)	2010
Aluminium	38.00	40.00
Copper	18.10	18.20
Zinc	11.14	12.26
Lead	8.99	9.65
Nickel	1.28	1.44

Coming to the nonferrous metals global production, if you have, you can have a look at this slide. Aluminium, copper, zinc, lead, nickel, etcetera 2009 production, they are all given there. 2010, there is a growth in all the sectors and all the metals. 38 to 40 in aluminium, million tons; 18.1 to 18.2, 11.14 to 12.26 million tons in zinc; lead, 8.99 million tons to 9.65 million tons; nickel, 1.28 million tons to 1.44 million tons, that is the growth story in production and consumption.

(Refer Slide Time: 32:26)

NON FERROUS METALS - GLOBAL CONSUMPTION, 2009 & 2020 (million tonnes)		
	2009 (E)	2010
Aluminium	37.50	39.5
Copper	17.73	17.68
Zinc	10.76	12.04
Lead	8.91	9.57
Nickel	1.21	1.35

Let us go to the consumption. Now, this is the picture, here again growth in consumption and aluminium, copper, zinc, lead, nickel estimated production is there and also 2010, all in million tons.

(Refer Slide Time: 32:43)

INDIA - ALUMINIUM SMELTING PRODUCTION CAPACITIES (000 tonnes)			
	2004-05	Addition	Expanded Capacities after 2007-2008
NALCO	345	115	460
HINDALCO	429	85	514
VEDANTA	136	245	381
TOTAL	910	445	1355
Production of Al in 2007: 1.2 million tonnes			

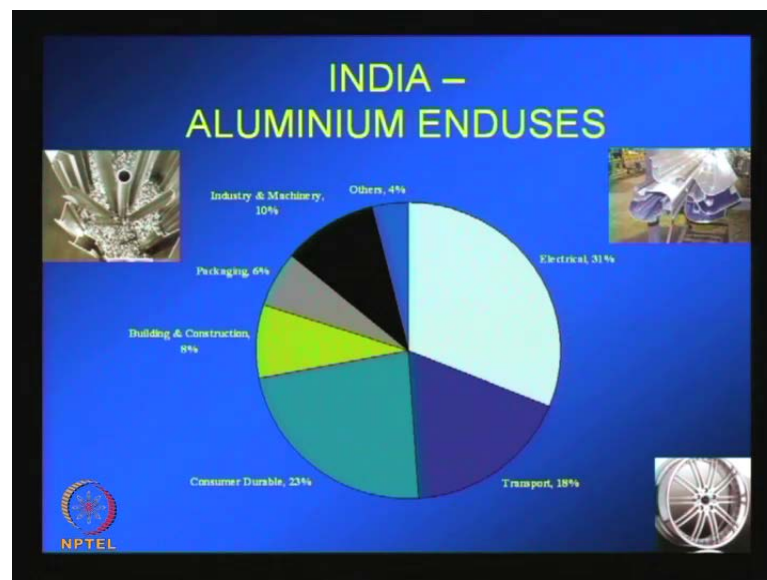
Now, let us have a look at the picture. In India, 2004 to 2005, we have the capacities in NALCO, Hindalco, Vedanta and thereafter, additions were made in their capacities. The expanded capacities are shown there, 460000 tons in NALCO, Hindalco 514000 tons, Vedanta 381000 tons, in addition of about 0.445 million tons and that takes India to 1.3 million tons.

(Refer Slide Time: 33:30)

INDIA ALUMINIUM PRODUCTION (tonnes)	
2006-07	1.15 million
2007-08	1.23 million
2008-09	1.32 million

And the production in 2006 – 2007 was somewhere around 1.15 million tons in India; 2007-8, 1.25; 2008-2009, 1.32. So, that is how it goes.

(Refer Slide Time: 33:43)

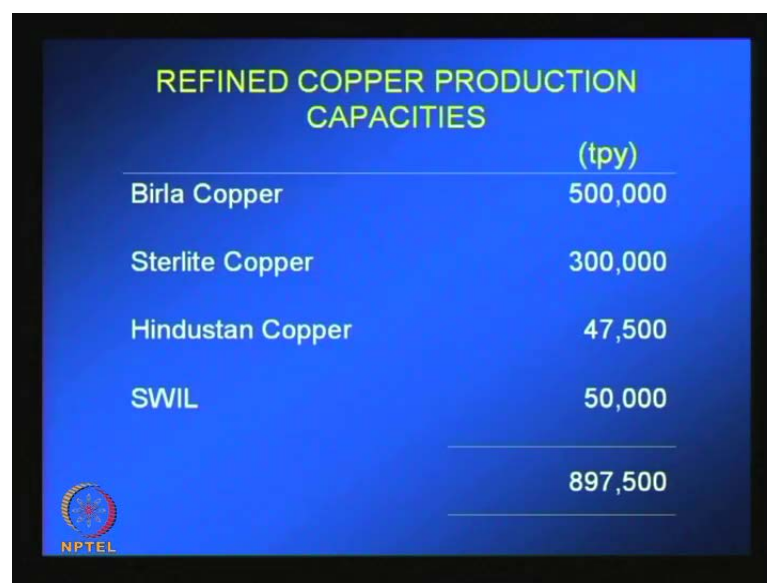


Now, you see in this picture, beautiful illustration here, aluminium end uses, about 31 percent goes in the electrical sector, consumer durable about 23, transport 18, building and construction 8 percent, packaging 6 percent, industry and machinery 10 percent, others 4 percent, aluminium alloy wheels, extruded section of aluminium in the picture,

you see in the slide. So, the important point to be noted here is, plenty grows in the electrical sector and then, the consumer durable sector.

What I want to mention to you here is, India is now on a big boom in building and construction infrastructural activity. So, that 8 percent, you have huge market potential. So, if the case in transport 18 percent, again a huge (()), and packaging aluminium foils, aluminium cans, aluminium collapsible tubes, so, so many things, that we use in our daily life and that one is 6 percent. Again, there is a huge market business potential there.

(Refer Slide Time: 34:57)




REFINED COPPER PRODUCTION CAPACITIES	
	(tpy)
Birla Copper	500,000
Sterlite Copper	300,000
Hindustan Copper	47,500
SWIL	50,000
	897,500

Coming to copper, Birla Copper 500,000 tons, Sterlite Copper 300,000 tons, Hindustan Copper, see the typical scale of economy those days, 47,500 tons is the capacity of Hindustan Copper. And Birla Copper and Sterlite Copper are now talking of taking their capacities to 1 million tons in the next few years. SWIL or Jhagadia Copper as we call it now, and that is about 50000 ton, that is a capacity of copper in the country 897,500 tons.

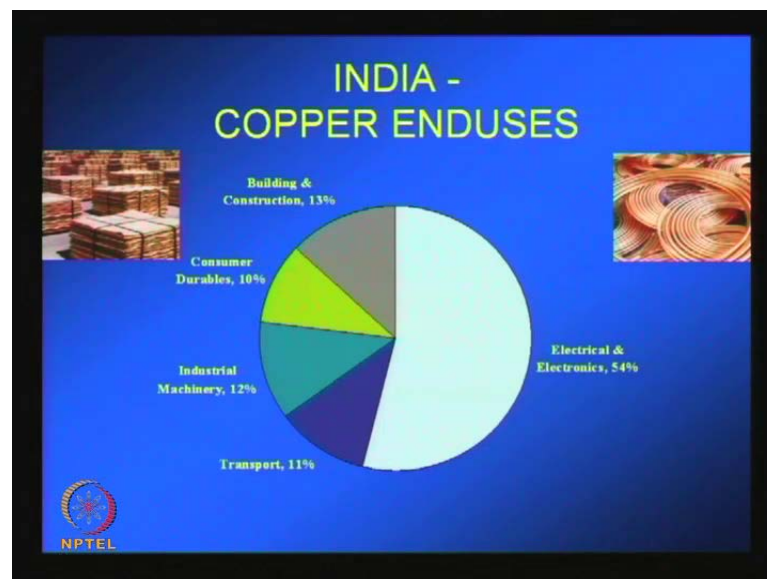
(Refer Slide Time: 35:34)

INDIA - REFINED COPPER PRODUCTION* (tonnes)	
2006-07	657,584
2007-08	717,982
2008-09	651,754

 including recycling sector also

Production, you see here, refined copper production 657000 tons to 651, there is a slight increase and then again decrease, that is something to do with the way prices moved in the last few years. When prices went up suddenly, copper prices went very high last year and that was a great disincentive, many were trying to curtail or bring down their usage patterns and therefore, it had a setback in demand and production, etcetera.

(Refer Slide Time: 36:16)



Again you are seeing here beautiful illustration, the end uses of copper, again 54 percent in electrical sector, transport 11, industrial machinery 12 percent, consumer durables 10

percent, **building and...**13 percent. You see beautiful sheets there, copper sheets and copper tubes, copper tube mainly go for your air conditioners and refrigerators.

Copper play such an important role, your mixie for instance, electrical gadget, whatever you use, copper is used in transformers in as winding wires, in electrical sector, copper plays a very quiet role again.

(Refer Slide Time: 37:01)

ZINC & LEAD PRODUCTION CAPACITIES (tpa)	
ZINC	
1. HZL- Chanderiya, Debari & Vizag	589,000
2. BINANI ZINC - Kochi	38,000
	627,000
LEAD	
1. HZL	85,000



Coming to zinc and lead production capacities, you are seeing here Hindustan Zinc Chanderiya, Debari in Rajasthan and Vizag, their capacity is around 589000 tons and Binani Zinc in Kochi, based on imported zinc concentrates, a capacity of 38000 tons, a total capacity of 627,000 tons, as far as zinc is concerned. And Hindustan Zinc limited has a primary lead production capacity of 85000 tons.

(Refer Slide Time: 37:36)

ZINC & LEAD (PRIMARY) PRODUCTION (tonnes)		
YEAR	ZINC	PRIMARY LEAD*
2006-07	380,940	44,553
2007-08	457,075	58,247
2008-09	582,189	60,323
* significant lead recycling in India		
Growth Rates		
Zinc - 15% & Lead 10%		

Coming to the production, you saw, that capacities in the earlier one, you see, is the way zinc production has increased from 380,000 to about 582,000 tons from 2006 to 2009 and primary lead again is increasing, 44000, 58000 and 60000, etcetera.

But the important point there, you see a star there, significant lead recycling in India, this is only primary lead. What you are seeing here has production from the native ores in Rajasthan and plenty of lead is going in lead acid batteries, car batteries, scooter batteries, batteries used in your houses for inverters, in hospitals, in offices, many other areas and all the batteries are, when they are scraped, when they are disposed off, then you can have them for recovery of lead metal, that is sizable in India. We should be one of the largest lead recycling nations in the world, may be about 3, 3.5 lakh tons of lead being recycled in the country.

It is recycled, reused, recycled, reused and there, that is a way it goes and there is no loss in property or in the functional performance of the metals when you recycle them.

You can see the growth rate, zinc and lead about 15 percent, something remarkable; lead 10 percent. While most of the developed countries in the world, they are all having very low growth rates, European Union or the North American continent or the other countries in Australia, etcetera, they are all witnessing marginal growths, 2 percent, 3

percent, 1.5 percent growths, etcetera, whereas India is seeing 15, 10 percent growth levels and that is the way the country is growing.

(Refer Slide Time: 39:37)



	Avg. Production (million tonnes/year)
Rampura Agucha *	3.75 (5 mtpa by 2008)
Rajpura Dariba *	0.75 (1.25 mtpa by 2008)
Zawar *	1.02 (1.35 mtpa by 2010)

All in Rajasthan

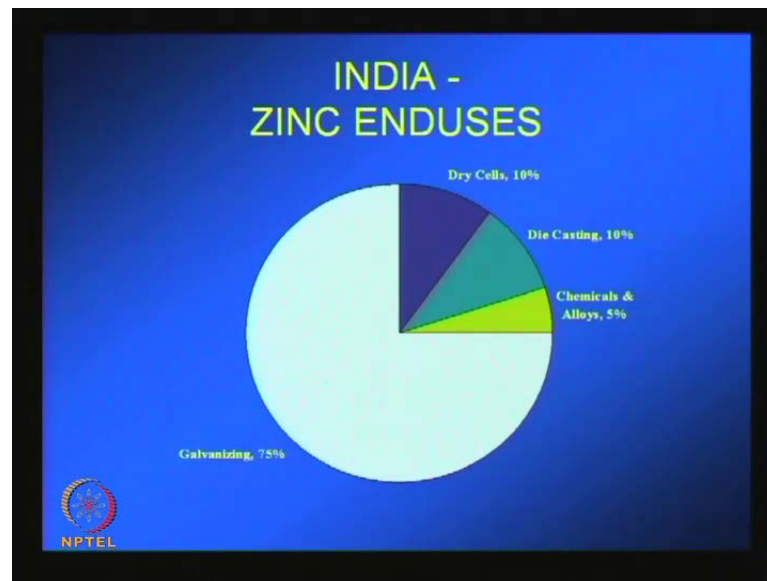
NPTEL

Now, mineable reserve at Hindustan Zinc limited, you can see, do we have enough sources? That is a very key question, the country may be requiring more metals, but do we have the resources?

Rampura Agucha is one of the best zinc, lead resources in the world and like bauxite in the east coast of India, which is very good compared to many other locations; Rampura, which has got one of the best natural containing very high amount of lead and zinc and production, mining production 3.75 million tons. Earlier in 2008, they had increased, expanded the capacity of 5 million tons.

Rajpura Dariba, again another mine, 0.75 million tons became 1.25 million tons in 2008. Zawar mines, 1.02 million tons becoming 1.35 million tons by 2010. All of them are in Rajasthan as you see here and there are other parts of the country, where you have plenty of resources, like uranium in Meghalaya, so gold in Rajasthan, Karnataka, etcetera, many other areas, Orissa, Sikkim, where we have plenty of minable resources, we have to exploit them fully.

(Refer Slide Time: 41:08)

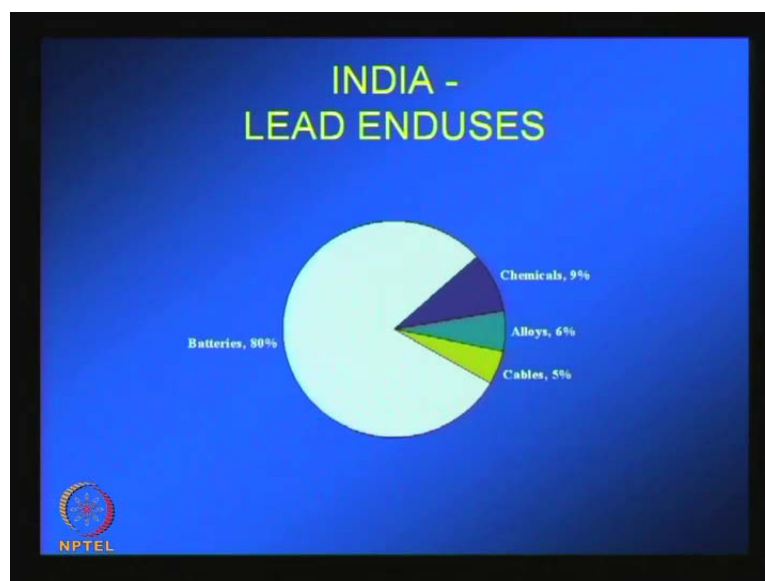


Coming to the Zinc end uses applications, whatever zinc, that we produce or recycled or imported, about 75 percent of them goes for galvanizing, coating of iron and steel in different forms, sheets, pipes, wires, buckets, crash barriers, guardrails in the highways use zinc; in all these products 75 percent goes.

The 10 percent in dry cells, all of us use dry cell, it contain this zinc sheet on the outer can, what is called (()) , and we are using it, but without knowing the zinc in it and that is a very important portable power source for your razor, walkman, your torch lights, your wall clock, everywhere you use the dry cell batteries, zinc is there.

Die casting, again as you see, your 10 percent zinc goes there and chemicals and alloys, chemicals of zinc and the alloys of zinc, brass, etcetera, about 5 percent there.

(Refer Slide Time: 42:14)



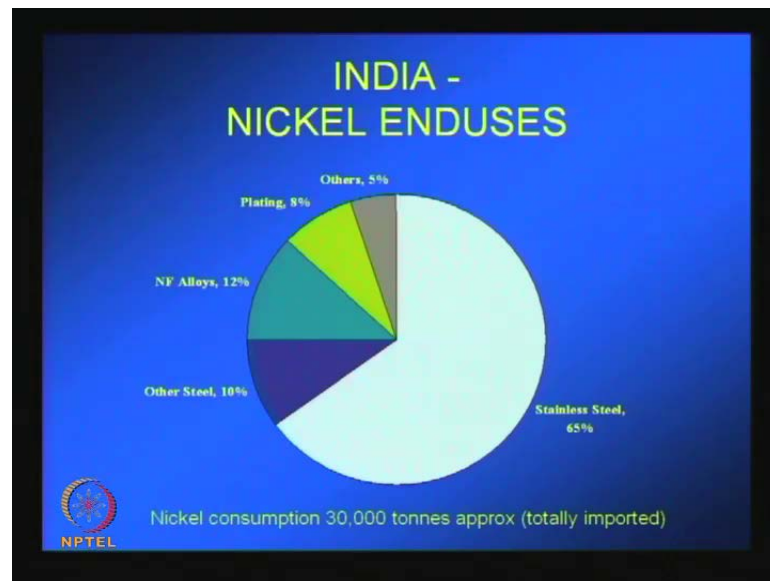
Coming to lead uses, where does India put all the lead? About 80 percent of the lead goes in the battery sector, lead batteries; chemicals about 9 percent; alloys 6 percent and cables 5 percent. 80 percent lead going in this country speaks volumes, the way the industry, a battery industry has been growing.

Battery has become a household product, which used to be an industrial product longtime ago. Every house has a computer, your children, the ladies, everyone operates computers in the house and there is a UPS below, and that contains lead acid battery for backup, energy backup for the computer. UPS and computer industry is a growing industry in the country, IT sector.

Similarly, the inverter market, many parts of India are short of power, there is power cuts round the year or peak months, peak summer months and inverter is become such an essential ingredient of every house, like you have a washing machine, like you have a micro-oven or like you have a mixie, an inverter has become an essential tool.

Therefore, the automotive population, the inverters, inverter market, the UPS market is driving the lead demand in the country.

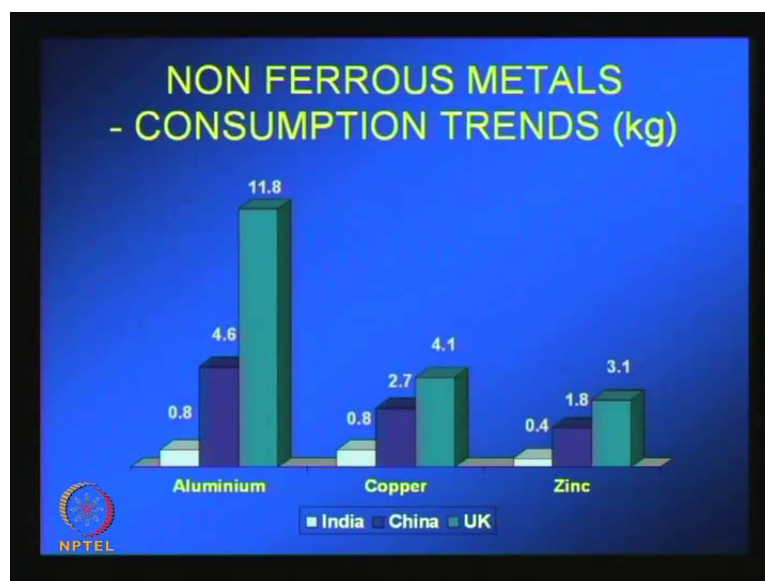
(Refer Slide Time: 43:41)



Nickel, again very important nonferrous metal, India does not produce even 1 gram of nickel, but there are resources there. Companies like Jindal stainless steel, they are trying to explore this resource and produce nickel and we consume about 30 to 35000 ton, totally imported and 65 percent goes in stainless steel manufacture, other steel. Again, nickel is put there as an ingredient to about 10 percent; nonferrous alloys 12 percent; plating, nickel plating 8 percent, others are there. So, largely, it is stainless steel is the major outlet.

Nickel again, short of price-wise last year and that was 1 year, where people were trying to produce low nickel, 0 Nickel stainless steel, etcetera.

(Refer Slide Time: 44:36)



Now, coming to the nonferrous metals per capita consumption wise, is there a potential for India or where does India stand? In this picture, you are seeing India blue there, China dark blue there and U.K. there as a greenish shade.

Now, in this if you see, India is using about 0.8 kg per head, whereas China about 4.6, both are billion population countries, China has 1.3 billion, India has 1.1, but see, if the market potential opportunity, 0.8 in India and 4.6 aluminium per head. And look at copper, again similarly, 0.8 in India, 2.7 in China and 4.1 in a developed country like U.K. See the gap between India and China, 0.8 to 2.7, almost 3 times.

Zinc, again similar story, 0.4 kg per head per capita consumption and 1.8 in China and 3.1, so that clearly is some message, how India has to gear up, more exploration, more mining, more recycling to see, that plenty of metal is available. And what is important is the industry; the producers have to look for expanding the domestic market.

The plenty of applications, the plenty of steel, which is not galvanized; the plenty of places where aluminium is not being used like in packaging, for instance; so, we have to exploit these potential. The consumer wants durable products, new products, new materials, therefore the opportunity is there, the industry has to go for creativity in market development.

(Refer Slide Time: 46:30)

NON FERROUS METALS RESOURCE BASE India vs World (million tonnes)			
	India	World	% Share India
Bauxite (Aluminium)	2926	33000	8.8
Lead Zinc Ores	48.2	340	14.2
Copper Ores	10.5	950	1.1

Now, coming to the nonferrous metals resource base, you see in this slide, is India, again a question I asked you earlier, do we have enough resources? If you see here in this slide, bauxite about, see 8.8 percent of the world bauxite resources are with India out of the total.

Lead, zinc ores, about 15 percent, good ores, lead, zinc ores we have in the country. Copper ores not plenty, may be about 1.1 percent or 1.2 percent, that is where India is going for more and more of acquisitions of copper concentrate producing countries, mines are being acquired in those countries.

Therefore, somewhere we have resources, we have to exploit fully and use it for our manufacture, create value addition, create new markets, outlets, etcetera. And in some places, where we do not have our own resources, we have to go for taking over those resources.

Now, coming to the story, India's economic growth story, you can see the whole world looks at India now. Copenhagen was the recent example, everyone wanted to have India being taken under bandwagon, so that there is an agreement there, whether it is G7 or G22, India is a key player now, and even Security Council, India is going to have a role, India is going to be a permanent member very soon. Therefore, the country is in a different frame of mind, frame of growth.

(Refer Slide Time: 48:12)



While other countries, in 2008, the global economic growth were only 3.8 percent, India's growth was 8 percent, something phenomenal. And 2009, again global average would be around 2 percent or so, global economic growth, while India's growth is already around 6.57 percent, next year the government wants to go for 8, 8.5 percent and 10 percent later.

Therefore, India is now in a different growth story, growth momentum. While many are 0 or negative growth, U.S. witnessed a marginal growth in the 3rd quarter recently, after several years of the depression, the great depression, as they call it. So, India's growth is very good and here, whatever I have shown you as the growth figures, it is all based on the IMO figures. So, that is the way India has been growing.

(Refer Slide Time: 49:06)

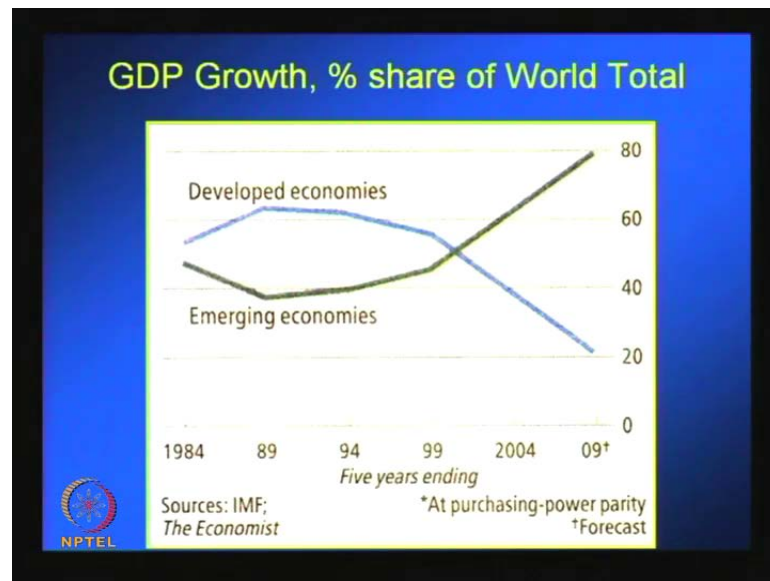


Again, we are seeing here, China became the 3rd largest economic replacing Germany. So, China has become a key player in the world and India again, another major force a trillion dollar economy. We had, now in the process of accelerating our growth momentum, India is putting lots and lots of money in many key infrastructural areas. And our billion populations in both these countries are looking for improved living standards, new lifestyles, new products and therefore, the people also want improved services, goods, etcetera. Under these 2 countries, India particularly, is now seeing many things in the country, new things, which we did not have earlier.

Cell phone for instance, everybody in the rural areas you can see having them, connectivity, instant connectivity, which is not something that they were used to earlier.

And now computers are becoming even more easily available in the rural markets; two-wheelers, three-wheelers and Nano, very soon will be a car very commonly seen in our tier-2, tier-3 cities in rural market. So, people are looking for newer and newer things and that is the way the story is changing.

(Refer Slide Time: 50:31)



Now, coming to the growth, the world economic growth from 1984-2009 you are seeing in this graph, again this is a picture from the IMF, International Monetary Fund and you can see, from 1984 onwards, the GDP growth of the developed economies as a percentage of the share of the world, has gone down continuously, and 2009 it is somewhere around 20 percent, the blue curve there. And the emerging economies, China, India, Brazil, South Africa, Russia, all these countries have increased their growth momentum, have accelerated the growth momentum and about 80 percent of the world GDP comes from these emerging economies. The pattern, the growth pattern, the economic growth pattern is completely changed now.

(Refer Slide Time: 51:35)



So, what do we do now, what do we do now in this country for nonferrous metals? It might apply to even nonferrous metals, it would apply to even steel industry also, we need conducive policies for mining and exploration. Our policy should be very investor friendly, encouraging to the users, encouraging to the entrepreneurs, there should be a proper land rehabilitation policy by which you are able to give employment in some kind of a livelihood to those who have been displaced. At the same time, we should go for exploring our mines in Orissa, in Rajasthan, in many other states.

And more importantly, we have to invest more and more in our R and D, not only in manufacture, but also in market development, in product development, in new materials, so that is where we will be having a tremendous advantage. Innovation led growth has to come in this sector also and more importantly, the companies who are producing these vital nonferrous metals, various products, they all have to join together, they all have to join together rather than competing and fighting for share, their share in the cake, they can go for expanding the cake. The country wants many, many new products, the markets are unlimited, so we have to exploit this market potential, the hidden market potential and go for expanding the cake, so that everyone prosperous in the game.

And more importantly, as I said, most of the products, whatever we are using in our daily life, industrial life, after sometime they are all scraped, whether it is electronic waste, your mobiles or your keyboard, computers, your remote, remotes, that you are using or

the pressure cooker, the dry cell battery, lead acid battery, there are electrical goods, that you are scrapping and throwing to your **kabadia** or wherever, all of them contain plenty of nonferrous metals, plenty of precious metals also, silver, lead, gold, platinum, titanium, all kinds of things are there in this gadgets, these products. So, we have to go for recycling.

Unfortunately, recycling in our country, we are not been having very environment friendly, eco-friendly recycling so far. We have had crude practices, but the country is gradually shifting from crude, primitive recycling practices to more energy, energy efficient and environment friendly recycling, so that you are recycling metal and you are able to also put them to the same use or new uses.

And this way the country will be saving perhaps plenty of investment, which will be otherwise putting in mining and exploration. In the case of zinc and lead, we are already doing and the recycling is becoming more environmental friendly. And the government wants more and more environment friendly recyclers in steel, nonferrous, e-waste, etcetera and that is the way sustainable development has to be carried forward and that is going to be good for the country forever.

Thank you very much.