



***Presentation at The Energy
Research Institute (TERI),
August 23, 2005***

Indian Aluminium Industry in Global Perspective

Dr. Alok Sheel, I.A.S.

Secretary to Government of Kerala

Labour and Fisheries Departments



The Age of Aluminium ?

- Copper used for the last 7500 years, Bronze for 4000, Iron for 3000 years, but the age of Aluminium began just 200 years ago.
- Most abundant metal on earth's crust.
- Locked in combination with other elements as bauxite.
- Relatively hard to extract, hence discovered only in 1808 by Sir Humphrey Davy.
- First process for smelting in quantity invented in 1886 simultaneously by Charles Martin Hall and Paul Heroult.

Year	Prod
1900	8000 MT
1913	65000 MT
1920	0.13 MMT
1938	0.54 MMT
1946	0.68 MMT
1999	24 MMT

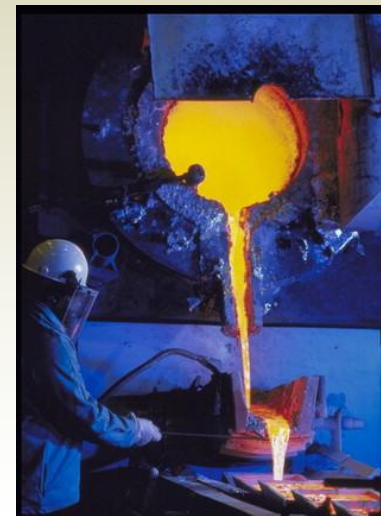
Aluminium

Global Scenario

Indian Scenario

Aluminium Production

- Bauxite (4-6 tons) refined to aluminium oxide or alumina (2 tons) through chemical (Bayer) process using caustic soda.
- In the smelter, aluminium oxide (2 tons) reduced to yield aluminium (1 ton) and carbon dioxide (2 tons) through the Hall-Heroult process.
- Smelting energy intensive: power consumption for production of one ton of aluminium in India varies between 13000 KWh (HINDALCO) and 17500 KWh (Sterlite). Global weighted average 15202 KWh.



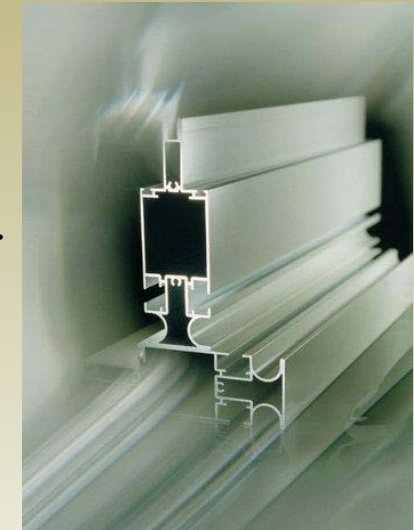
Aluminium

Global Scenario

Indian Scenario

Advantages of Aluminium

- Most abundant metal in the earth's crust
- Light in weight — about a third as heavy as copper or steel.
- Highly resistant to corrosion.
- Strong after adding small amounts of other metals in alloys.
- Excellent conductor of heat and electricity.
- Excellent reflector of heat and light.
- Naturally good looking.
- Non-toxic: used to package foods, beverages, and medicines.
- Excellent cryogenic properties — not brittle in intense cold.
- Highly workable, capable of forming by all known metalworking processes.
- Nonmagnetic property valuable around compasses and sensitive electronics.
- Scrap eminently recyclable using only 5% of the energy to make metal.
- Often touted as the metal of the 21st century.



Applications

- Power transmission and distribution
- Air crafts and space crafts
- Automobiles: road, rail and sea
- Kitchen wares
- Architectural fittings
- Grain silos
- Industrial explosives
- Defence sector
- Drinking Water purification



Aluminium

Global Scenario

Indian Scenario



Global Scenario

1. Global Bauxite Deposits
2. World Aluminium at a Glance
3. Aluminium Statistics (Capacities)
4. Global Energy Source of Aluminium Smelters.
5. Aluminium Prices
6. Continental Shares in Aluminium Production
7. Aluminium Use by Sector



Global Bauxite Deposits

- World Bauxite reserves estimated at 40 billion tons.
- India's reserves estimated at 3 billion tons (good for 300 years), 90% metallurgical grade.
- Only Australia , Guinea , Brazil and Jamaica have more reserves than India.
- India has 1.2 billion tons of high grade metallic bauxite on the east coast (Orissa).



World Aluminium at a Glance

- World Aluminium production was 27.9 MT in 2003 (including primary metal and 2.5 MMT recycled from scrap)
- Global capacity 32.7 MT, of which 8.5% is idle.
- Like other commodities, long-term volatilities in price. LME Prices currently bullish.
- ALCOA (USA), ALCAN (Canada) and Hydro Aluminium (Norway) the 'Big Three'
- ALCOA world's biggest aluminium producer.
- Australia biggest bauxite and Alumina producer.
- China has recently emerged at the world's biggest aluminium producer.
- Aluminium Pechiney's (now Alcan) AP-18 smelters the global workhorse technology.

Aluminium

Global Scenario

Indian Scenario

Aluminium Statistics 2003

MMT 2003	BAUXITE	%	ALUMINA	%	ALUMINIUM	%
Australia	55.602	35.90%	16.529	28.20%	1.857	6.70%
Brazil	18.456	11.90%	4.713	8.00%	1.381	4.90%
Guinea	17.044	11.00%	0.723	1.20%		
Jamaica	13.444	8.70%	3.843	6.60%		
China	10.989	7.10%	6.114	10.40%	5.449	19.50%
India	10.956	7.10%	2.856	4.90%	0.81	2.90%
Venezuela	5.445	3.50%	1.882	3.20%	0.601	2.20%
Russia	5.441	3.50%	3.23	5.50%	3.478	12.50%
Norway					1.18	4.20%
Canada			1.1	1.90%	2.792	10.00%
USA			4.834	8.20%	2.703	9.70%
TOTAL	155	100%	58.6	100%	27.9	100%

Aluminium

Global Scenario

Indian Scenario

Global Energy Source of Aluminium Smelters

<u>Source</u>	<u>Percentage</u>
<i>India</i>	<i>Coal</i>
Hydro	49.2%
Coal	36.1%
Other	14.7%

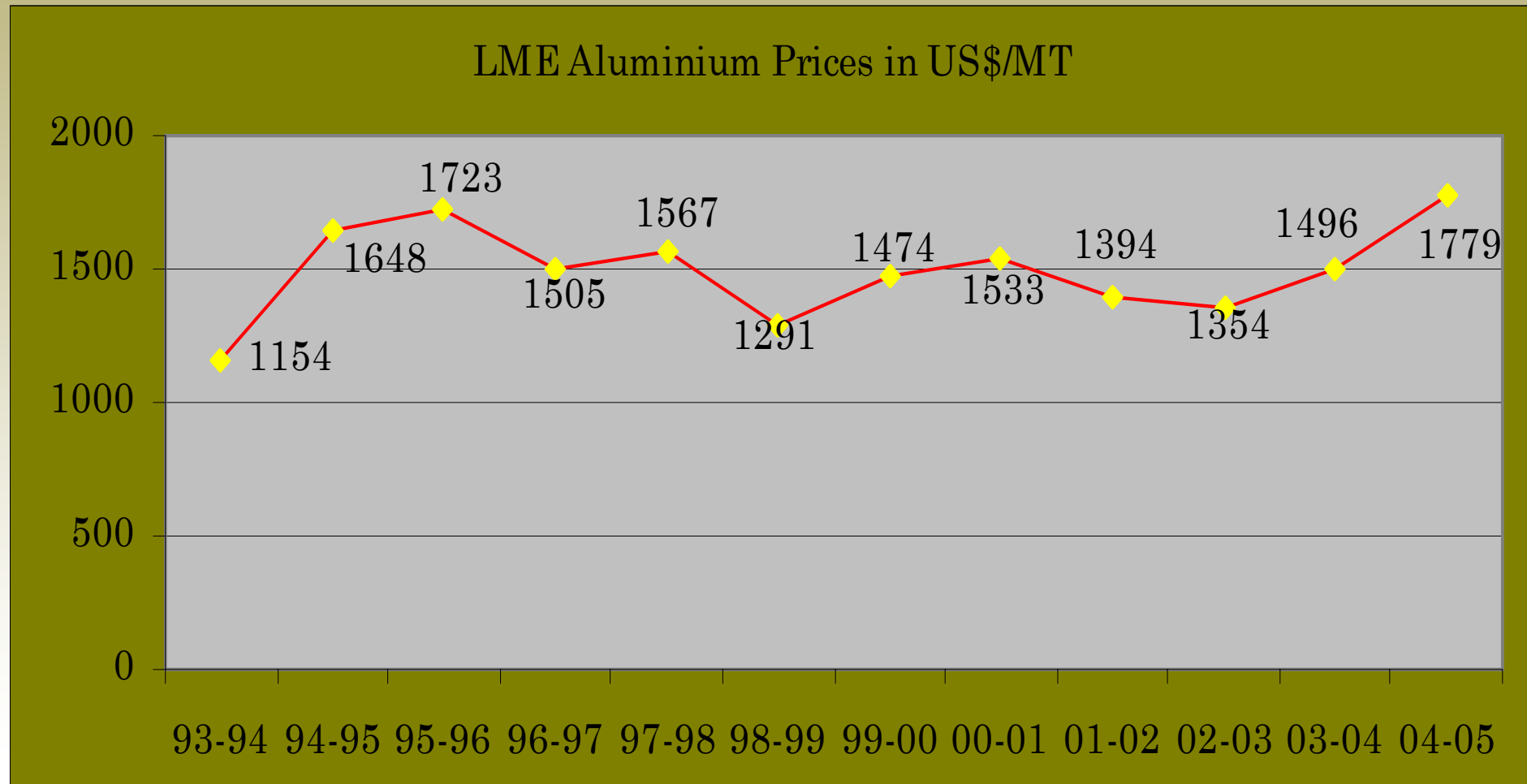
<u>Source</u>	<u>Percentage</u>
<i>India</i>	<i>Self-Gen</i>
Self-Gen	27.3%
Grid	66.3%
Other	6.1%

Aluminium

Global Scenario

Indian Scenario

Aluminium Prices



Aluminium

Global Scenario

Indian Scenario



Continental Shares in Aluminium Production

<i>Area</i>	<i>Share</i>
America	29%
Asia	24%
Europe	33%
Oceania	9%
Africa	5%
<i>TOTAL</i>	<i>100%</i>

Aluminium

Global Scenario

Indian Scenario

Aluminium Use by Sector

<i>Industry</i>	<i>Share</i>	
	<i>Global</i>	<i>India</i>
Transport	26%	17%
Packaging	22%	8%
Construction	22%	7%
Machinery	8%	
Electrical	8%	36%
Cons. Durables	7%	12%
Other	7%	20%
Total	100%	100%

Aluminium

Global Scenario

Indian Scenario



Indian Scenario

1. Indian Bauxite Deposits
2. India: Alumina
3. Alumina Refinery Capacities
4. India: Aluminium
5. Aluminium Smelter Capacities
6. Global Competitive Advantage
7. Indian Aluminium Industry: Past
8. Indian Aluminium Industry: Present
9. Profitability of Indian Aluminium Companies
10. Installed Capacities in Primary Aluminium
11. NALCO & HINDALCO Compared
12. GOI's Returns From NALCO
13. Strategic Issues: SWOT Analysis

Indian Bauxite Deposits (MMT)

State	Insitu	Recoverable
Orissa	1607	1443
Andhra Pradesh	658	592
Madhya Pradesh	278	141
Gujarat	142	108
Maharashtra	103	87
Bihar	111	61
Others	138	93
<i>TOTAL</i>	<i>3037</i>	<i>2525</i>

Aluminium

Global Scenario

Indian Scenario

India: Alumina

- Installed capacity currently just under 3 MMT.
- Most cost-effective producer in the world.
- Alumina surplus to rise from 1 MMT to 2.5 MMT with completion of expansion projects.
- Expected to reach 10-15 MMT by 2015
- Two-thirds of exports go to China, Russia and Iran taking most of the rest.
- Delay in alumina projects
 - Petty corruption in State mining leases & insistence on local processing
 - Supreme Court intervention to protect tribal rights
 - Environmental concerns because bauxite located under thick forest cover.



Aluminium

Global Scenario

Indian Scenario

Alumina Refinery Capacities (MMT)

<i>Company</i>	<i>Location</i>	<i>State</i>	<i>Existing</i>	<i>Proposed</i>	<i>Total</i>
NALCO	Damanjodi	Orissa	1.575	0.525	2.1
HINDALCO	Renukoot	U.P	0.685		0.685
	Muri	Bihar	0.11	0.39	0.5
	Belgaum	Karnataka	0.35	0.3	0.65
	(under implementation)	Orissa	0	1	1
Total			1.145	1.69	2.835
Sterlite	Korba	M.P	0.2		0.2
	Chennai	T.N	0.05		0.05
	Kalahandi	Orissa	0	1	1
Total			0.25	1	1.25
Grand Total			2.97	3.215	6.185

Aluminium

Global Scenario

Indian Scenario



India: Aluminium

- Installed Aluminium capacity just below 1 MMT.
- Almost all primary aluminium, very little recycling of scrap.
- Potential major global player: huge high grade bauxite deposits sitting next to big coal deposits.
- Consumption around 750,000 MMT in 2003.
- Consumption projected to go up @ 10% PA to 2.5 MMT by 2015.
- Exports currently about 165,000. May go up to 1 MMT after completion of ongoing expansion projects.
- Per capita consumption under 1 kg:
 - 20 kg in the US and Europe
 - 15 kg in Japan
 - 10 kg in Taiwan
 - 4 kg in China

Aluminium

Global Scenario

Indian Scenario

Aluminium Smelter Capacities (MMT)

<i>Company</i>	<i>Location</i>	<i>State</i>	<i>Existing</i>	<i>Proposed</i>	<i>Total</i>
NALCO	Angul	Orissa	0.345	0.115	0.46
HINDALCO	Renukoot	U.P	0.242		0.242
	Belgaum	Karnataka	0.117		0.117
	Hirakud	Orissa	0.065	0.018	0.083
	Allupuram	Kerala	0.031		0.031
	(proposed)	Orissa	0	0.26	0.26
	(proposed)	Jharkhand	0	0.35	0.35
	Total		0.455	0.628	1.083
Sterlite	Korba	M.P	0.1	0.25	0.35
	Chennai	T.N	0.035		0.035
	Total		0.135	0.25	0.385
Grand Total			0.935	0.993	1.928

Aluminium

Global Scenario

Indian Scenario



Global Competitive Advantage

- NALCO and HINDALCO amongst the lowest cost producers of aluminium in the world.
- India ranked third cheapest aluminium maker in the 17th Annual Report on “Aluminium Production Costs 1998”, of Industry analyst, Anthony Bird.

Country	US\$/T
Australia	960
Canada	973
India	1062
France	1068
Venezuela	1148
Brazil	1177
Norway	1198
UK	1224
Spain	1263
Germany	1280
US	1291
AVERAGE	1149

Aluminium


Global Scenario

Indian Scenario



Indian Aluminium Industry: Past

- Five vertically integrated Aluminium companies till recently:
 - NALCO and BALCO (public sector)
 - INDAL owned by ALCAN
 - HINDALCO of the Birla group
 - MALCO of the Sterlite group.
- Large number of secondary producers buying primary metal for producing rolled & extruded products, wire rods and foils.
- Major restructuring through M&As recently like elsewhere in the world.



Indian Aluminium Industry: Present

- HINDALCO bought out INDAL and merged the two companies.
- Sterlite bought a 51% strategic stake in BALCO from GOI.
- Currently three integrated aluminium Companies
 - NALCO (public sector)
 - HINDALCO (Aditya Birla group)
 - Vedanta/Sterlite group.
- NALCO and HINDALCO highly profitable, globally competitive companies with significant exports.
- The Sterlite group's aluminium assets much older, with obsolete (Soderberg VS) technology.

Profitability of Indian Al. Companies

<i>FY 2004</i>	<i>Sales</i>	<i>Net Income</i>	<i>NI/Sales</i>
	US\$Bn	US\$Bn	
Alcoa	23.5	1.3	6%
Alcan	24.9	0.3	1%
Hydro Al.	13.2	1.1	8%
Al. Co. of China	3.9	0.8	19%
<i>Hindalco</i>	<i>2.2</i>	<i>0.3</i>	14%
<i>Nalco</i>	<i>1.0</i>	<i>0.3</i>	32%

Aluminium

Global Scenario

Indian Scenario

Installed Capacities in Primary Aluminium (MMT)

Company	Present	% of	After	% of
<i>Metric Tons</i>	Capacity	Total	Expansion	Total
<i>Primary Metal</i>				
NALCO	0.345	36.9%	0.460	23.9%
HINDALCO	0.455	48.7%	1.083	56.2%
STERLITE	0.135	14.4%	0.385	20.0%
Total	0.935		1.928	
<i>Alumina</i>				
NALCO	1.575	53.0%	2.100	34.0%
HINDALCO	1.145	38.6%	2.835	45.8%
STERLITE	0.25	8.4%	1.250	20.2%
Total	2.97		6.185	

Aluminium

Global Scenario

Indian Scenario

NALCO & HINDALCO Compared

March 31 2005	HINDALCO	NALCO
Share price (12 Aug)	1418	167.8
PAT	1329.3 Cr.	1234.84 Cr
EPS	143.4	19.17
Book Value	419.92	72.91
BV ex. debt	10	72.91
Div/PAT (5 yr. av)	18%	47%
X/Revenue	25%	50%
Sensitivity of EBIDTA to 0 tariffs	40%	10%

Aluminium

Global Scenario

Indian Scenario



GOI's Returns From NALCO

- Cashflows: NPV of dividend, disinvestment proceeds, capital restructuring discounted at 10%. Tax income excluded.
- Share price of Rs. 168 on Aug 12, 2005.
- Investment Rs. 1290.6 Cr.
- Cashflow: Rs. 4916 Cr
- Share value Rs. 9433.5 Cr.
- Total: Rs. 14395.5 Cr.
- IRR 13.375%

Strategic issues: Strengths

- Highly profitable.
- Good Metal quality.
- Leveraging comparative advantage in Alumina.
- High quality big east coast bauxite reserves.
- Potential to be a major global player.



Aluminium

Global Scenario

Indian Scenario



Strategic Issues: Weaknesses

- Infrastructural constraints, esp. Power.
- Policy issues at State level: Refinery + Smelting.
- High input cost for downstream industry.
- Local levies on inter-state bauxite movement.
- Small size of Indian companies.
- Inadequate smelter capacity.
- Low investment in R&D
- Little recycling of scrap.
- Poor Corporate governance.



Strategic Issues: Opportunities

- Rapid domestic growth.
- Robust Auto & pharma sectors will fuel demand.
- Unlocking east coast bauxite reserves.
- Divestment of the remaining 49% GOI stake in BALCO.
- Privatization of NALCO?
- Further M&As: India-based Transnational Aluminium Company to take on the big three?
- Acquisition of smelters abroad where power is plentiful and cheap (esp. hydropower).



Strategic Issues: Threats

- Price volatilities
- Substitutes.
- China main competitor.
- Continuing power sector crisis.
- Trade policy uncertainties.
- Governance issues. Environmental concerns: deforestation, Red Mud, Fly ash, Mine closures and CO2 emissions.



The End