



Conference on Resource Efficiency

23-25 April 2008, Paris, France



Materials Recycling : main Trends of a new Industrial sector in Brazil

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Worldwide new materials and new products are being developed to be recyclable.

The so called eco-designed product has major contribution on natural resources efficiency :

- **extend natural resources lifetime,**
- **minimise materials consumption;**
- **enforce energy conservation and**
- **minimise environmental impacts; by recycling and reusing products and materials**

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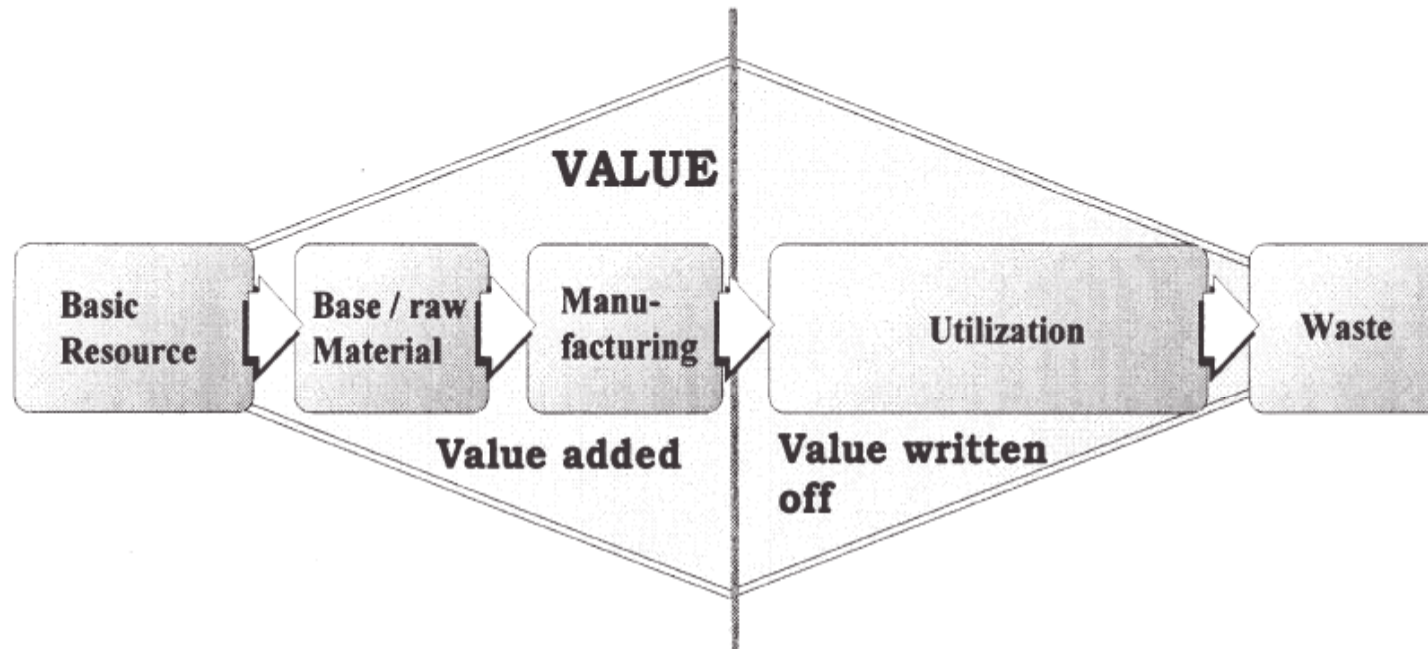
For Ecodesign purposes materials selection is the first step to get:

- **Recyclable and renewable materials**
- **Materials free from toxic substances**
- **Monomaterials or compatible ones**
- **Low energy materials etc**

Secondly, manufactured products have to be designed to be assembled and disassembled to facilitate ELP recycling.

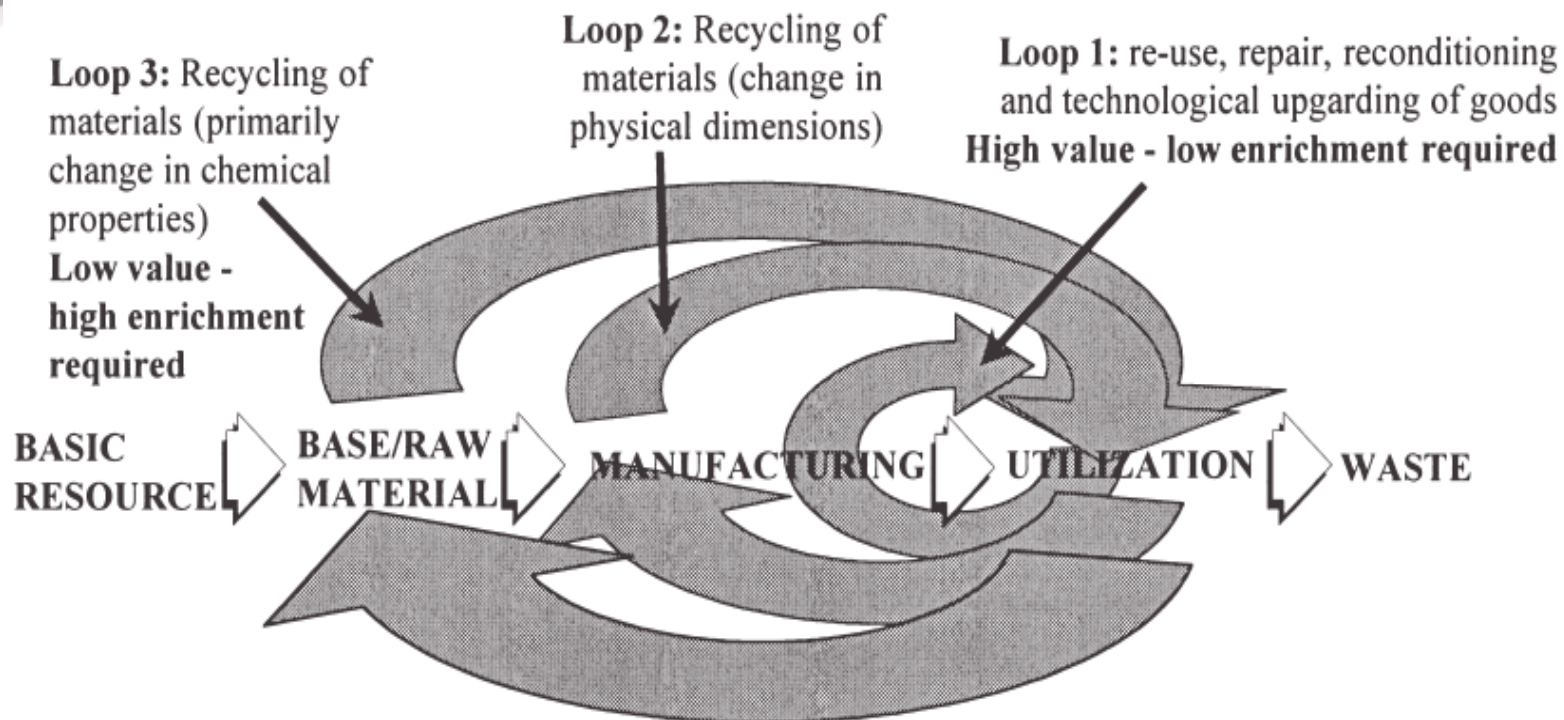
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Materials Production and Consumption Linear Flow



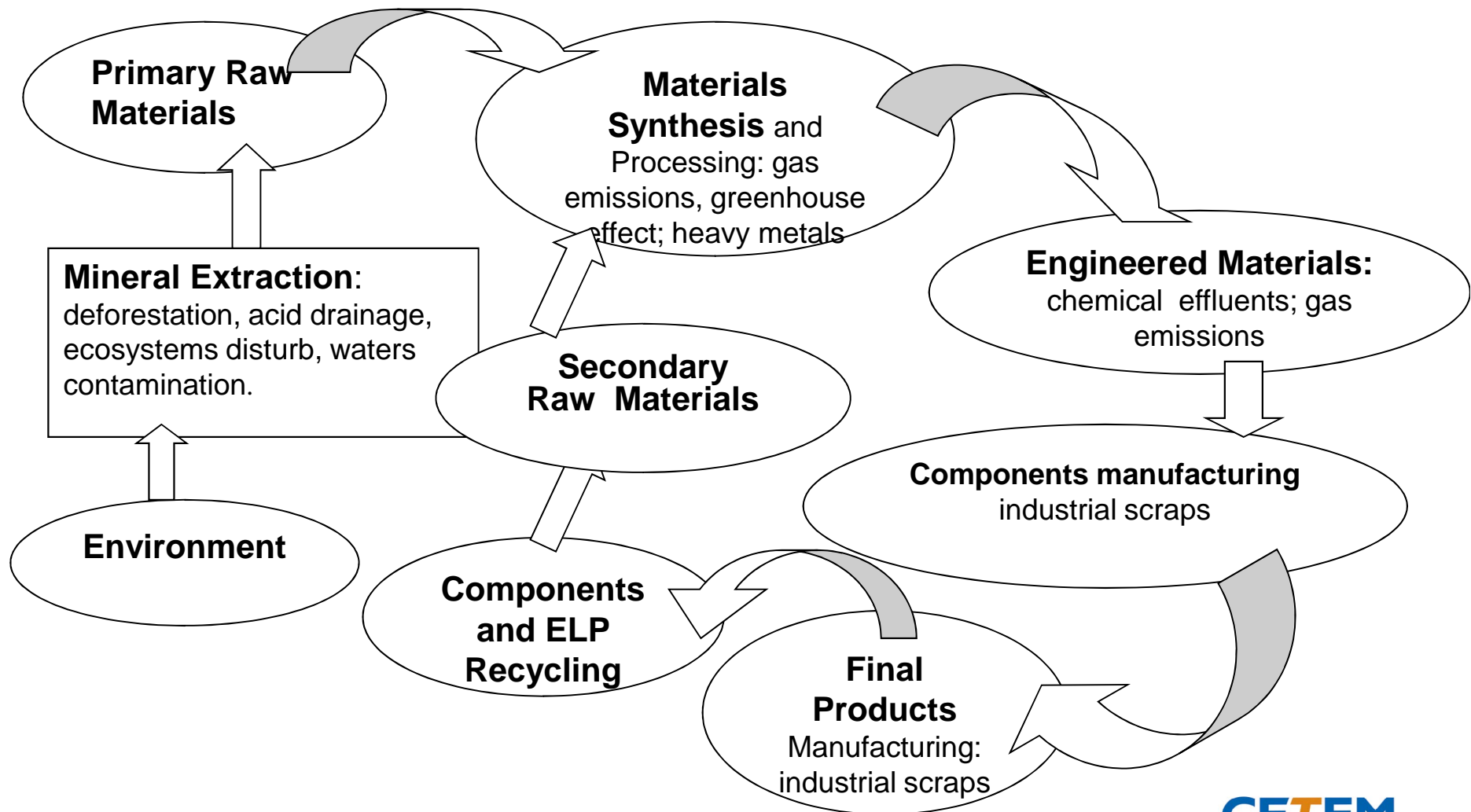
Extracted from Bellmann e Kahre (1999)

Materials Production and consumption Loop Flow



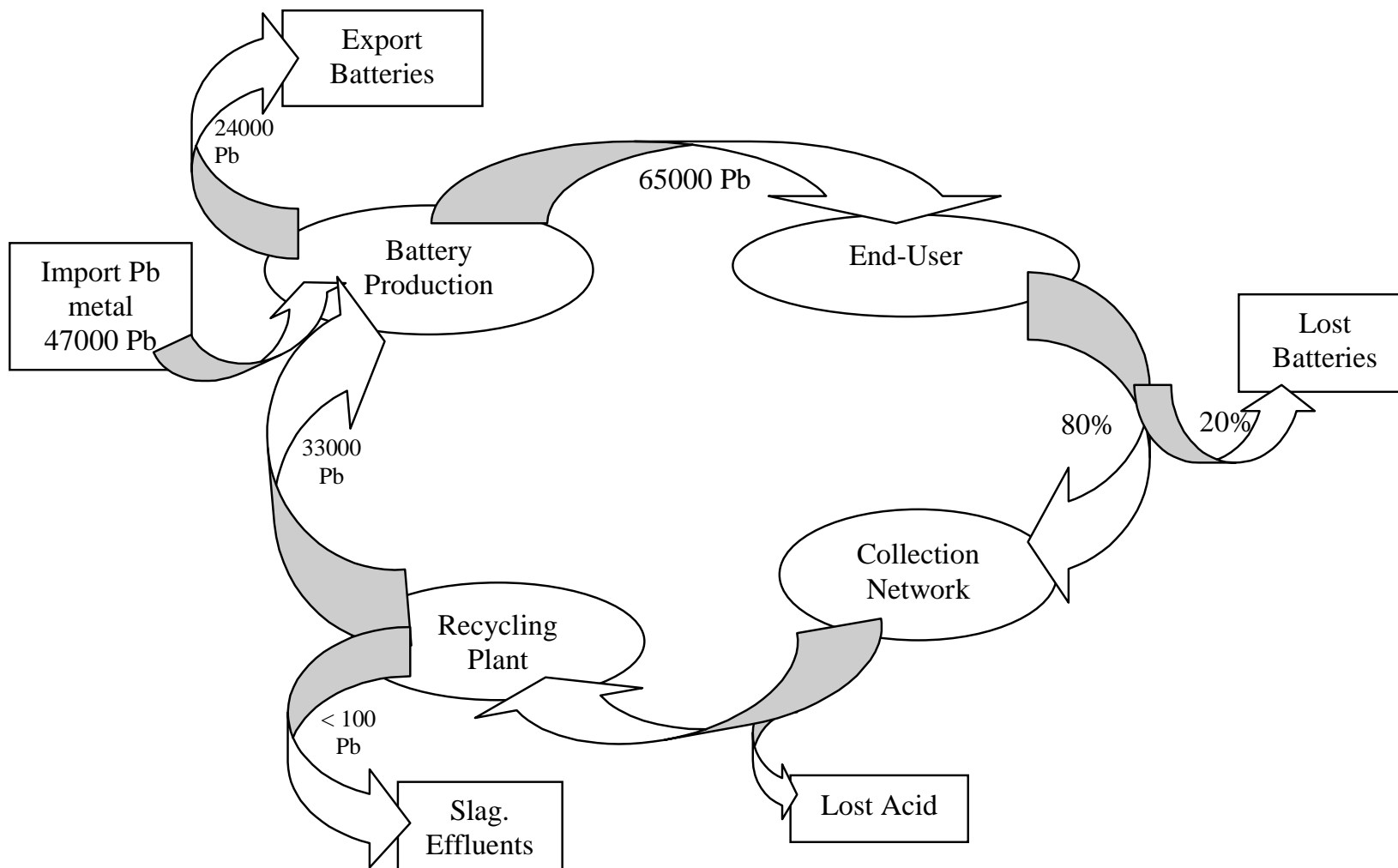
Extracted from Bellmann e Kahre (1999)

Closing Life Cycle Materials loop by Recycling



By Heloisa V. de Medina

The Recycling Loop of Lead/Acid Batteries in Brazil in 2001



Used Batteries Collection and transport according to Basel Convention

- **collection points must store the batteries in proper place and batteries should not be drained at the collection points**
- **Batteries must be well packed to be transported inside containers that should be identified by symbols and follow a predefined schedule and map.**
- **Basel Convention was enforced in Brazil by CONAMA's Resolutions 228/97, 235/98 and 257/99** that classified the used lead/acid batteries as hazardous waste and prohibited their import.





Geographic Distribution of Lead Recyclers in Brazil in 2003



Brazilian Secondary Lead Market situation

- From 1995 to 2000, most of lead recyclers plants were shut down by economic and environmental reasons.
- Up to 2005 there were still a number of informal recyclers operating under risky situation to public health and the environment.



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Since the last two decades, pollution prevention, waste minimisation, materials recovery and end-of-life products recycling has been a growing subject of interest in Brazil.

But to get recycling activities as an industrial sector, at both technical and economic levels, it was necessary to:

- develop the environmental legislation,
- enforce waste collection systems and
- have a market for secondary materials

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Recycling activities in Brazil has been motivated by many different reasons :

- **More restrict environmental legislation**
- **Unstable supply of natural resources (metals)**
- **Developed countries dependence on strategic metals**
- **Economic advantages of recycling: lower energy consumption, emissions and production costs.**
- **The emergence of new recycling technologies**
- **ELP collecting systems (aluminium can, automotive batteries, tires)**
- **DFE and DFR practices**
- **New and recyclable materials (ecomaterials)**
- **Economic opportunities in terms of income and jobs for the less developing countries.**



The Brazilian Recycling Market

From 2003 to 2004 the number of recycling companies increased of 24%. (IBGE)

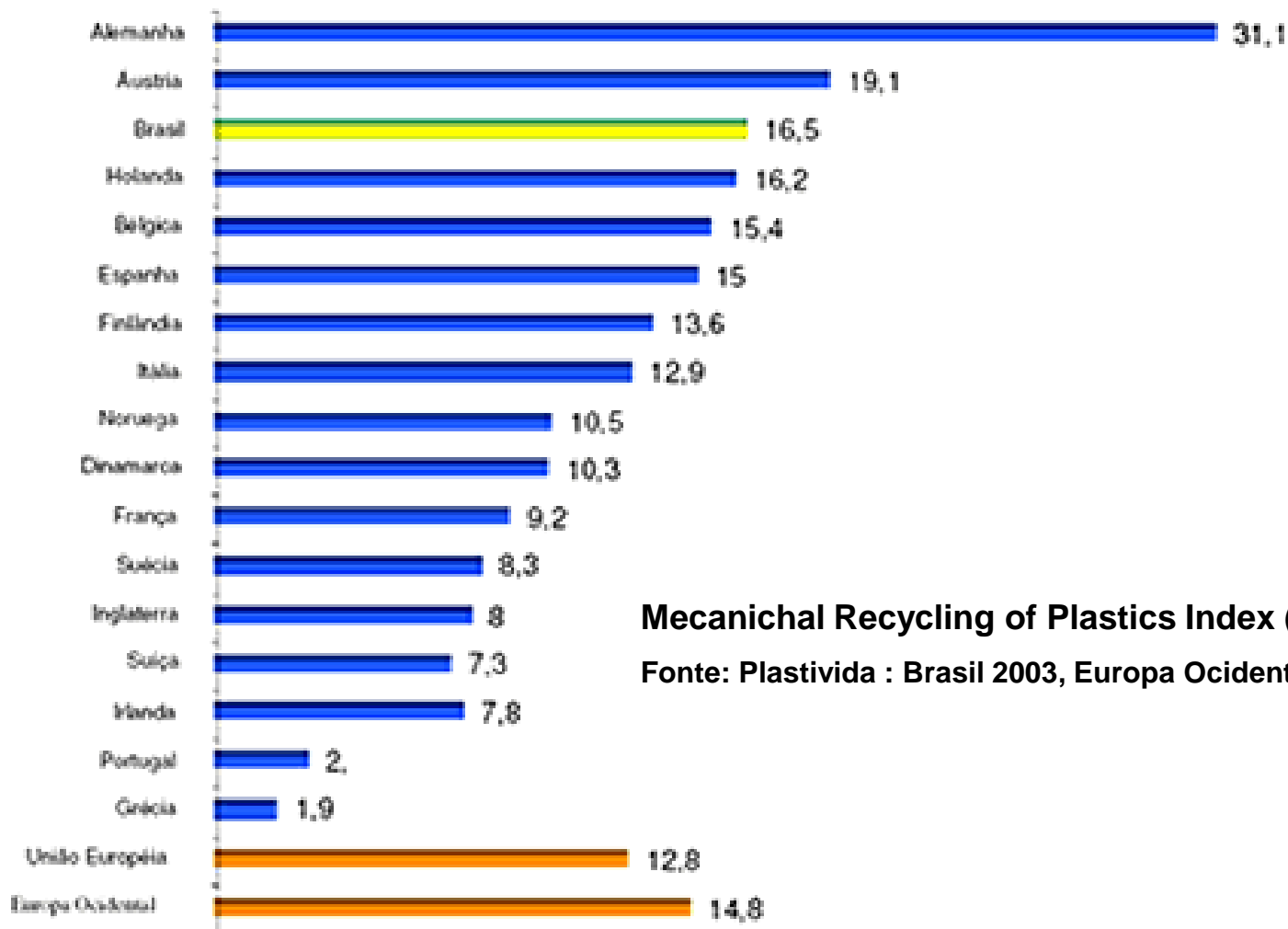
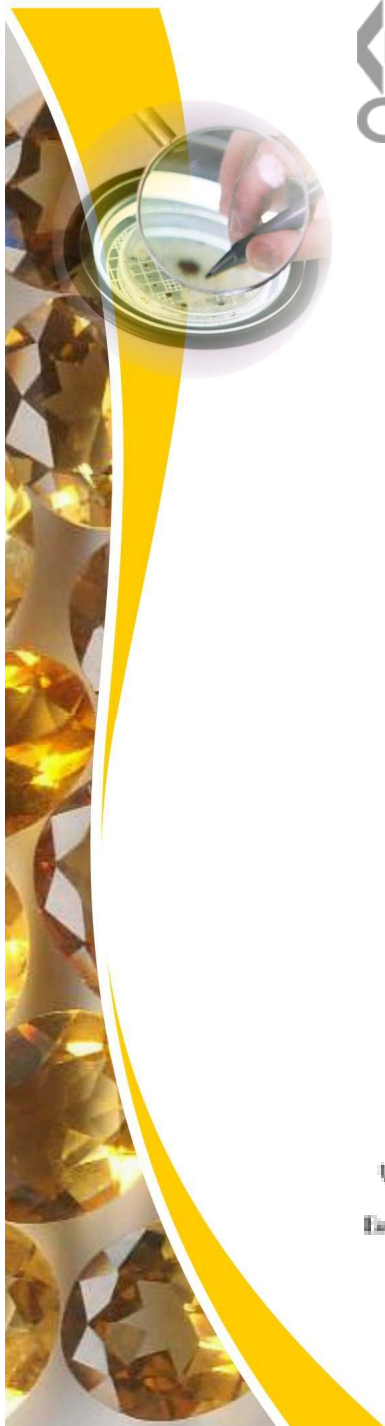
The average for all sectors was around 4%

With 613 companies (2004) the sector had two groups:

Metals recycling (108 empresas) and

Others (no metals) (505 empresas)

ELP with most important volumes for recycling are packing, electrics and electronics devices and vehicles.



Mecanichal Recycling of Plastics Index (%)

Fonte: Plastivida : Brasil 2003, Europa Ocidental 2002.



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According to Plastivida plastics recycling sector in Brazil involves more than 500 companies and US\$ 400 millions.

In 2004 over 700 thousand tons of plastic were recycled giving regular jobs to more than fifteen hundred people.

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The main materials for reprocessing are aluminium, steel, glass, paper and plastics.

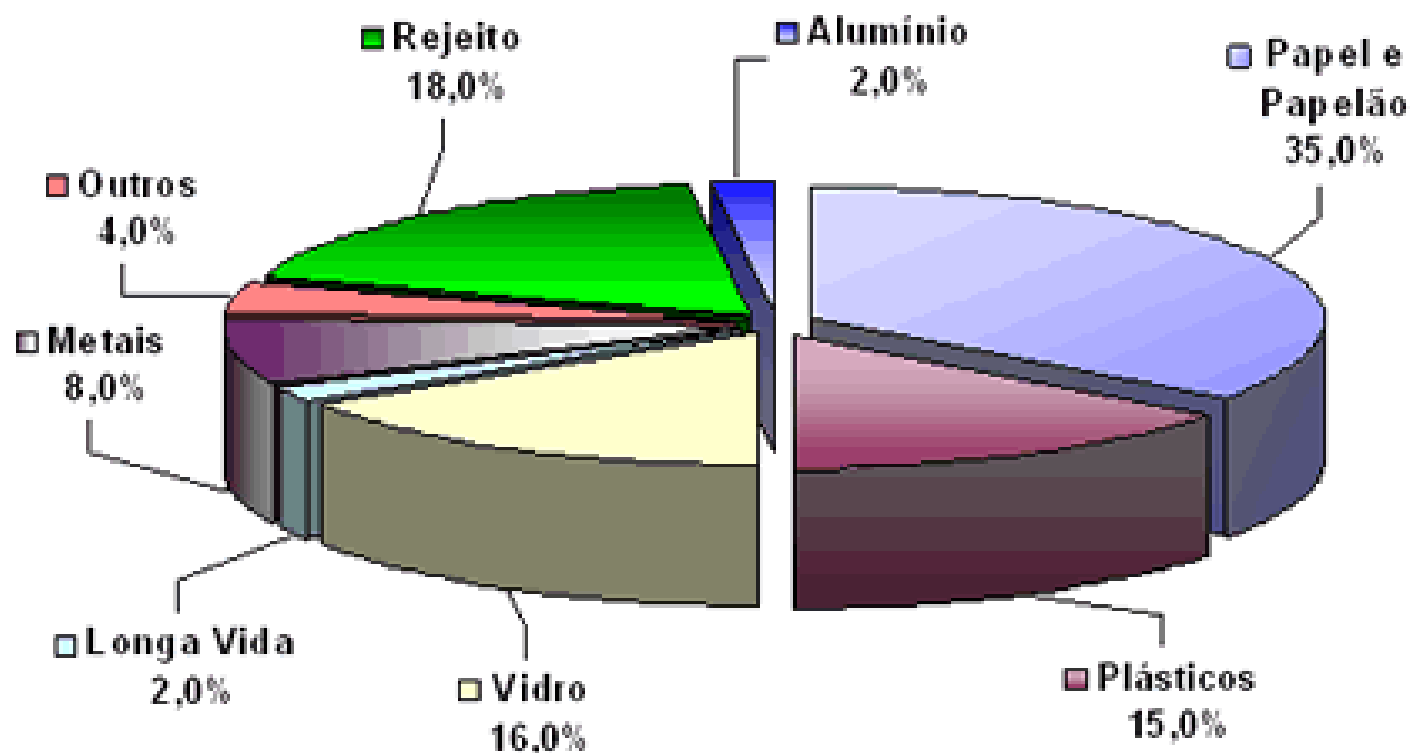
These materials came from packing, end of life products, as well as from industrial scrap from manufactured components and parts suppliers.

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Composição Média do Lixo Seletivo no Brasil (2004)



Source : CEMPRE www.cempre.org.br

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Aluminium industry in Brazil employed around 50.000 people and Aluminium Recycling Market generates more than 130 000 of non-specialised jobs.

Today the aluminium can life cycle in Brazil is less then 30 days from the first utilisation to the second or recycled one.

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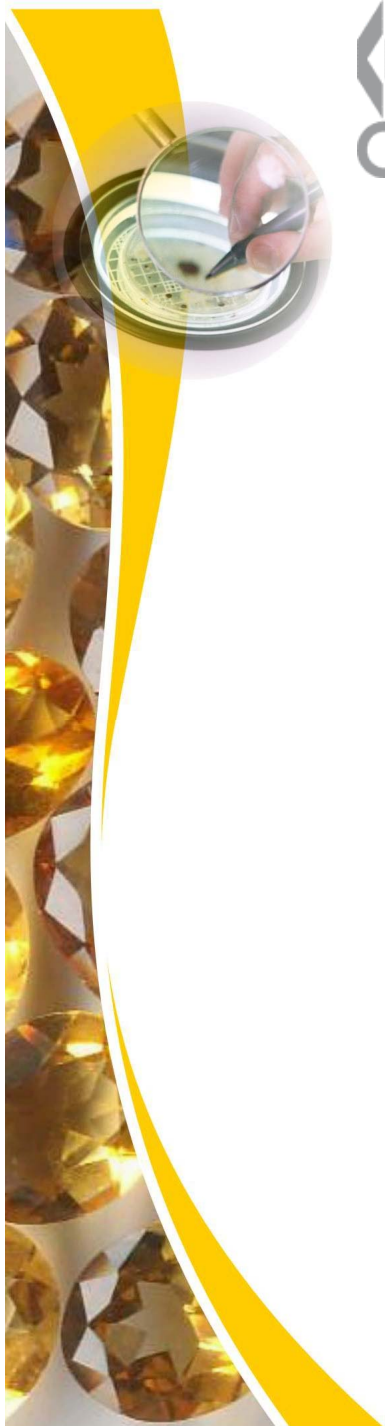


Aluminium Cans Recycling Index (%)

	2002	2003	2004	2005	2006
Argentina	78	80	78	88,1	88,2
Brazil	86,5	89	95,7	96,2	94,4
Europe	46	48	48	52	N/D
USA	53,4	50	51,2	52	51,6
Japan	83,1	81,8	86,1	91,7	90,9

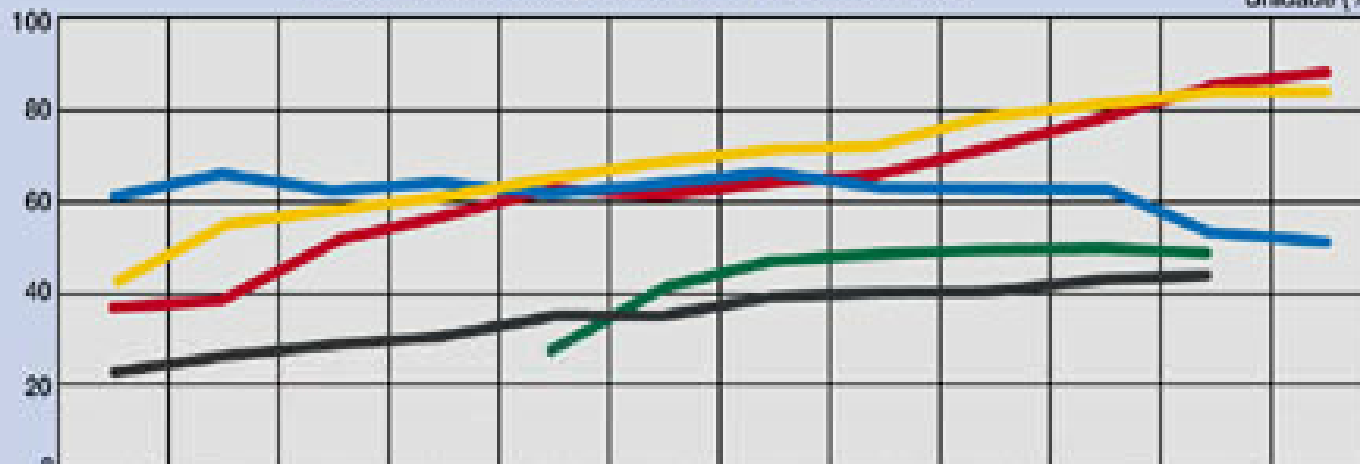
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Índice de reciclagem de latas de alumínio

Unidade (%)



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
— Argentina					25	41	48	50	51	50	52	
— Brasil	37	39	50	56	63	61	64	65	73	78	85	87
— Europa(*)	21	25	28	30	35	37	40	41	41	43	45	
— EUA	62	68	63	65	62	64	67	63	63	62	55	53
— Japão	43	54	58	61	66	70	73	74	79	81	83	83

(*) média Europa

Fonte: AIAL / The Aluminum Association / Aluminium Can Recycling Europe / Japan Aluminium Federation / Cámara Argentina del Aluminio y Metales.

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Aluminium Recycling Strengths

- **Energy Saving (95% less than mineral processing)**
- **More Cost Effective (specially for Al pure forms)**
- **Large Markets**
- **Easy to collect (from packing or industrial scrap)**
- **Easy to sort from aluminium scrap or cans**
- **Good level of R&D investments.**

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Aluminium Recycling Weakness

- **Aluminium alloyed with other metals (copper, magnesium, silicon, zinc and iron) for aerospace, automotive and other industrial uses**
- **These Al scraps often includes lacquers, paints, and plastic coatings.**
- **The Al for automobile uses has introduced dozens of alloys which are the main causes of downgrading automotive recycled aluminium.**



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Challenges to a National Policy for a Sound Recycling Management

- **Improve and control the collection system**
- **Minimize the transportation of hazardous waste**
- **Promote R&D on clean recycling technologies**
- **Extend the polluter-pays principle to the producers concerning end of life products**
- **Encourage the design for environment and design for recycling practices at all levels.**

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Final remarks

Inspite of the different local conditions on ECO-DESIGN and RECYCLING practices, the industry globalisation process is hampering an exchange of recycling technology experience between countries.

For recycling there is a great need to focus on ecomaterials options and clean processes for the next future that may be appropriate for different local scenarios of recycling.

Emerging economies as Brazil should develop or get access to appropriate materials technologies, affordable, easy to use and resource efficient encompassing innovation process.

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