



Aluminum Industry

SUSTAINABILITY OF BRAZILIAN ALUMINUM INDUSTRY

INDUSTRY MEETING FOR SUSTAINABILITY



THE SUSTAINABILITY OF BRAZILIAN ALUMINUM INDUSTRY

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CNI presentation

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CNI PRESENTATION

The diversity of the national industry and the significant availability of natural resources reveal excellent opportunities for the sustainable development of Brazil, combining economic growth, social inclusion and environmental conservation. The materialization of concerns related to sustainability in the strategic agenda of enterprises and governments is a reality. Apart from isolated cases of success, the consequences of this attitude are felt in entire sectors of the economy. Further advances are still needed, but the path has already been identified and going back is impossible.

After coordinating an unprecedented critical thinking process on sustainability with 16 industry associations, the National Industry Confederation (CNI) delivers to the Brazilian society a wide range of information on progress, challenges and opportunities yet to come. The results presented here may not portray the significance of the discussion process experienced by the industry in preparing these documents. Developments on the process will be beyond the Rio +20 Conference, and are definitely incorporated on the daily lives of companies.

The subject of sustainability is inserted differently in each of the industrial sectors. However, some elements are common to all. The continuous pursuit for efficiency in use of resources and the need to increase industrial competitiveness are on the agenda of all the sectors. Encouraging innovation and scientific and technological development is strategic on the transition to more sustainable patterns of production.

Strategies to intensify actions coordinated internally in the industrial sectors and with governments and civil society organizations are no less important. The dissemination of sustainable practices by means of the supply chain and incentives for companies to undertake the role of integrated management of the territories are powerful tools.

The sectorial volumes developed by industry associations are valuable contributions to addressing subjects such as sustainability and competitiveness of domestic industry. One of the most representative results of this process will certainly be the strengthening of structured programs of action with a focus on promoting sustainability in the

production. These initiatives will act as raw materials so that the industries involved and CNI are able to systematically publish documents presenting the national industry's developments towards the goals of sustainable production.

The documents presented here are intended to be a valuable contribution to enhance the debate on sustainability. Each of the sectorial associations is to be congratulated for their efforts.

Robson Braga de Andrade

President of the National Confederation of Industry – Brazil



SECTORIAL PRESENTATION

Brazil has the ability to lead a new low carbon economy, which – due to its intrinsic characteristics – has much to contribute to the sustainability of the main segments of the economy.

Our aluminum is “green” in its origin because it comes from clean and renewable energy sources and because it is fully recyclable. With the growing debate on climate change and the needs to cut down on the effect of greenhouse gas emissions, aluminum has gained notoriety.

In addition to being strategic to the Brazilian economy – because it creates jobs, strongly participating in the industrial GDP, and supply all industrial segments – it contributes to mitigating the effect of greenhouse gases, which is valued in a world of low carbon.

However, the Brazilian aluminum industry has for a time been losing some of its competitiveness, which can lead to unstructuring and loss of value of the aluminum industry chain.

The government, industry and society should unite their efforts so that the expected increase in the consumption of aluminum as projected for Brazil in the next few years may be supplied by companies installed in this country, creating jobs, investment and wealth – and using preferably Brazil's primary aluminum as raw material, which is less polluting than world aluminum, and recovered scrap to complete the national supply.

Adjarma Azevedo

President

Brazilian Aluminum Association – ABAL



1 INTRODUCTION

1.1 ABAL's overview

The aluminum industry has been established in Brazil since the 1950's and is distributed throughout the country, and its entire value chain – from mineral extraction to recycling – is a world reference in the sector for its economic, social and environmental aspects.

It is a highly strategic industry for the country because it serves the main economic segments with diverse and quality aluminum products, which are also exported to the international market including alumina and bauxite, generating wealth for the nation.

Associação Brasileira do Alumínio – ABAL (Brazilian Aluminum Association), which represents 100% of the production of primary aluminum and 80% of consumption of aluminum transformed products, was founded in 1970 when the industry was beginning to take shape and about to experience its first leap in growth.

1.2 Goals

The purpose of this edition is to show the contribution of aluminum to a low carbon economy and that Brazil has the ability to lead this new economy by virtue of its enormous consumption potential in the next few years and the comparative advantages of its industry in relation to other countries.

Because of its properties – lightweight, durability, corrosion and weather resistance, and recyclability, aluminum contributes to the sustainability of the most different segments of the economy where it is used – packaging, transports, electricity, building & construction, and consumer goods.

Brazilian aluminum has a further advantage in that it uses hydroelectricity, a clean and renewable source of energy, which contributes to the total air emission of the

production chain of 4.2 ton of CO₂eq/ton of aluminum – from mining to recycling – a much lower rate than the world average of 9.7 tonCO₂eq/ton of aluminum.

Another comparative advantage is that Brazil has one of the highest rates of metal recycling. The country ranks first in the recycling of beverage cans and the rate of aluminum scrap recovered, which is integrated to the supply of metal for processing is higher than 36% against the world average of 28% (2010 data).

These two factors – high recycling rate and production of primary aluminum from hydroelectricity – give products fabricated in the country with Brazilian aluminum a lower carbon footprint than that of imported products, almost always produced from aluminum generated from fossil sources.

This is an opportunity for Brazil to explore, especially now, when the country sees strong increase in the use of aluminum on account of housing programmes, infrastructure works, major sporting events in 2014 and 2016; and the pre-salt layer exploration, which will demand a large volume of aluminum for building & construction, electrical wires and cables, machinery and equipment among others. The pressure on the automotive industry to reduce the fuel consumption and air emissions and which extends to other means of transports finds in aluminum a major ally to reduce the weight of vehicles.

Current estimates are that world production of primary aluminum will double by 2020 to face the increase in demand. In Brazil, studies conducted by ABAL indicate that the domestic consumption of aluminum will grow up to 9% a year on average in the next fifteen years, taking per capita consumption in Brazil to the level of the most developed countries in Europe.

However, this promising scenario for the Brazilian economy may not be accompanied by the industry installed here since it has been heavily losing its competitiveness due to the cost of production of primary aluminum (mainly electrical power); costs incurred in the production chain (taxes and Brazil's cost); and the invasion of semi-finished and finished imported products of greater added value coming mainly from Asian countries.

The risk of an imminent process of deindustrialization of the sector has called the attention of the Brazilian government, who, on 13 July 2011, published the Inter-Ministerial Administrative Act no. 436, which created the "Aluminum Working Group" with a view to studying alternatives to promote competitiveness of the aluminum production chain in the country. Coordinated by the Ministry of Mining and Energy (Ministério de Minas e Energia), the Aluminum Working Group also gathered representatives nominated by the Ministry of Finance (Ministério da Fazenda); Ministry of Development Industry and Foreign Trade (Ministério do Desenvolvimento, Indústria e Comércio Exterior); Energy Research Company (Empresa de Pesquisa Energética – EPE); and the National Bank for Social and Economic Development (Banco Nacional de Desenvolvimento Econômico e Social – BNDES).

It is essential for the survival of the Brazilian aluminum industry that the legislation and the commitments assumed by the country to produce the expected results for the safety of the planet's climate will not reduce the sector's competitiveness when it enables imports of products with a higher carbon footprint coming from countries which do not face the same limitations.



2 SECTOR'S SOCIAL, ENVIRONMENT AND ECONOMIC ASPECTS

2.1 Economic aspects

BRAZILIAN ALUMINUM INDUSTRY PROFILE

TABLE 1. BRAZILIAN ALUMINUM INDUSTRY PROFILE		
Composition	2009	2010
Jobs (direct, indirect and recycling) (31/12)	346,000	384,000
Revenue (US\$ billions)	12.7	14.7
• Participation in GDP (%)	0.8	0.7
• Participation in Industrial GDP (%)	3.6	3.1
Investments (US\$ billions)	1.9	1.4
Taxes paid (US\$ billions)	2.5	2.8
Production of primary aluminum (000's tons)	1,535	1,536
Aluminum domestic consumption (000's tons)	1,024	1,342
Per capita consumption (kg/inhabitant)	5.3	6.9
Exports (000's tons) (aluminum weight)	925	756
Imports (000's tons) (aluminum weight)	160	263
Trade balance – aluminum industry (US\$ million FOB) ⁽¹⁾		
• Exports	3,258	3,930
• Imports	656	1,176
• Balance	2,602	2,754
Participation of aluminum in Brazilian exports	2.1%	1.9%

(1) Includes Bauxite and Alumina.

Source: ABAL's Yearbook – 2010.

BRAZIL'S PARTICIPATION IN THE ALUMINUM INDUSTRY

Brazil is the fourth largest world bauxite producer and has a third of the mineral reserve; it is the third largest world producer of alumina, however it occupies only the seventh position in primary aluminium production, a situation that is getting worse due to issues relating to the cost of energy, which affects our industry's global competitiveness.

The world production of primary aluminum in 2010 was 41.1 million tons (source: World Metal Statistics – Feb./2012) and that of Brazil, 1,536,000 tons, a decrease of 7,5% in relation to 2008, that is 125,000 tons less due to the closure of plants Valesul Alumínio S.A. (Santa Cruz/RJ) and Novelis do Brasil Ltda (Aratu/BA), as a result of lack of competitiveness relating to the cost of energy.

DESCRIPTION OF THE PRODUCTION CHAIN

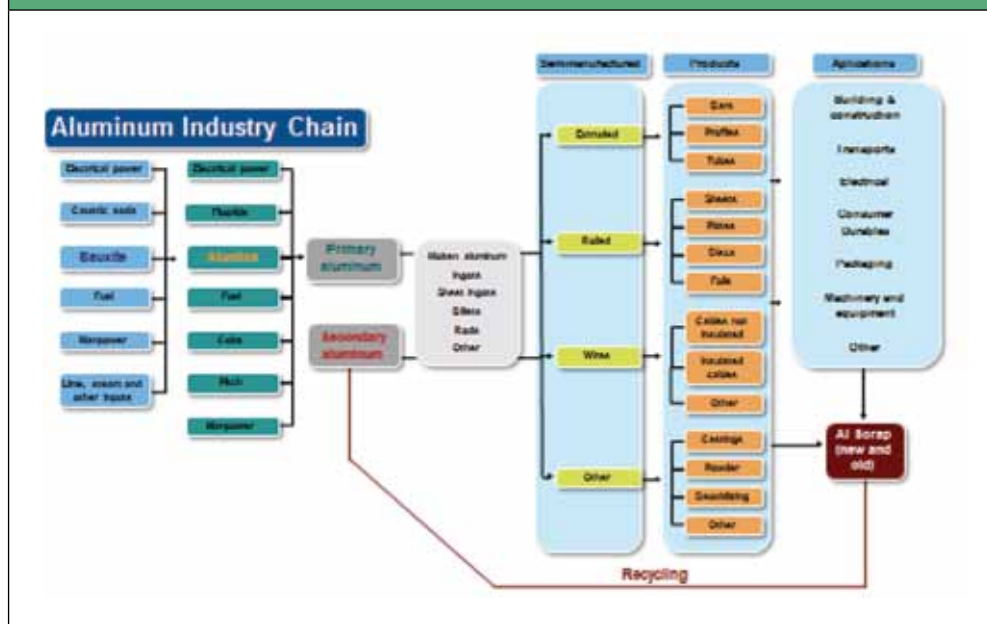
The aluminum production chain comprises the production of a large part of raw materials used in the production of the metal; its own production and recovery of metallic raw material; and the fabrication of aluminum products, which are in turn raw materials for a number of products offered in the economy such as packaging, transports materials, construction materials, wires and cables for electrical power distribution and domestic appliances; and components for electrical electronic equipment.

The aluminum production chain until to the phase of manufactured goods is made up of six main phases:

- bauxite extraction and processing;
- aluminum oxide production (alumina);
- primary aluminum;
- fabrication of semi-manufactured products;
- fabrication of end products; and
- recycling.

The last of these stages completes the aluminum value chain in Brazil starting with recovered scrap aluminum products to return into aluminum. In addition to enabling reuse of resources, avoiding waste, aluminum recycling has a positive impact on the environment such as less use of energy and of non-renewable natural resources such as bauxite.

FIGURE 1. ALUMINUM INDUSTRY CHAIN



VALUE OF SECTOR'S DOMESTIC PRODUCTION

As can be seen in the table below, in 2010 the aluminum industry chain production amounted to R\$ 29.60 billion, of which the largest share refers to processing of semi-manufactured and manufactured products amounting to R\$ 15.14 billion.

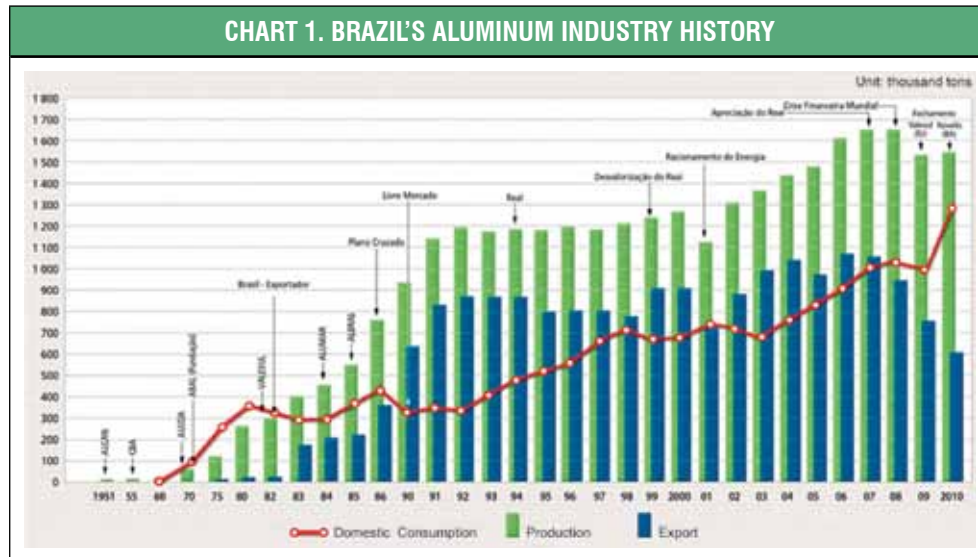
TABLE 2. ALUMINUM PRODUCTION CHAIN IN NUMBERS, 2010

Product	Quantity (million tons)	Value (R\$ billions)	Price* (R\$/ton)	Value (US\$ billions)	Price* (US\$/ton)
Bauxite	32.03	2.47	77.27	1.41	43.89
Alumina	9.48	4.43	467.27	2.52	265.45
Primary aluminum	1.54	5.88	3,825.34	3.34	2,173.12
Secondary aluminum	0.44	1.68	3,825.34	0.95	2,173.12
Semi-manufactured and manufactured **	1.31	15.14	11,591.31	8.60	6,584.85
Total production	-	29.60	-	16.82	
Consumption	1.30	15.06	11,591.31	8.56	6,584.85
Exports of semi and manufactured products	0.22	1.62	7,513.50	0.92	4,268.31
Imports of semi and manufactured products	0.23	2.38	10,249.87	1.35	5,822.80
Trade balance of semi and manufactured products	-0.02	-0.75	47,929.51	-0.43	27,228.04

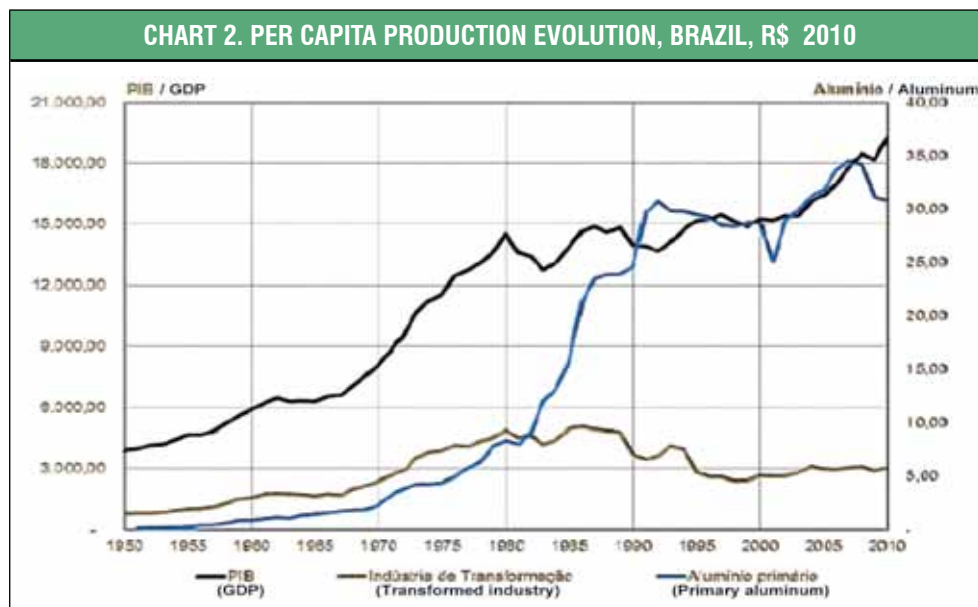
(*) In the case of exports and imports, the prices are FOB, without taxes.
 (**) Goods of the aluminum semi-manufactured and manufactured industry.
 Table from the following study "Aluminum's competitiveness in Brazil 2011-2025". Sources: ABAL, IBGE and MDIC.

SECTOR'S PRODUCTION GROWTH RATE

Since its beginnings in the 1950's, Brazil's aluminum industry has gone through various cycles of growth. From 1960 to 1980 we saw an expansion of installed capacity and of production of primary aluminum. The 1990's saw reduced growth rates in primary production and stagnant investments in expansion of installed capacity.



Source: ABAL, 2011.



Source: Study "Aluminum competitiveness in Brazil 2011-2025".

NUMBER OF JOBS CREATED BY THE INDUSTRY

In 2009, the aluminum chain in Brazil was responsible for about 384,000 direct and indirect jobs, including people from collection until the recycling of aluminum.

SECTOR'S PARTICIPATION IN BRAZIL'S INDUSTRIAL GDP

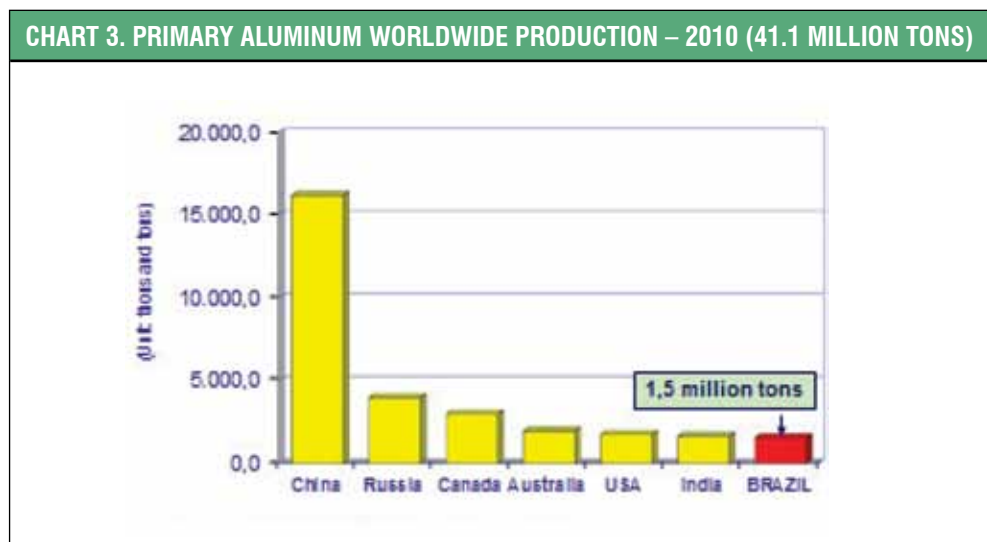
In 2010, the revenue of Brazil's aluminum industry amounted to US\$ 14.7 billion, which accounted for 3.1% of the country's industrial GDP; it invested US\$ 1.4 billion and paid US\$ 2.8 billion in taxes.

VALUE OF THE SECTOR'S EXPORTS/IMPORTS AND PARTICIPATION IN THE TOTAL EXPORTS/IMPORTS BY BRAZIL

External sales of Brazil's aluminum industry amounted to US\$ 3.9 billion (FOB) in 2010, accounting for 1.9% of the country's total exports, and the imports at the end of the year stood at US\$ 1,176 million – that is 0.6% of Brazil's imports.

BRAZIL'S PARTICIPATION IN THE WORLD PRODUCTION OF PRIMARY ALUMINUM

Brazil produced 1,536,000 tons of primary aluminum in 2010, contributing to 3.7% of the world production of aluminum that year which amounted to 41.1 million tons. Nevertheless, the country is the seventh largest producer of primary aluminum after China (which alone accounts for 40% of the world production), Russia, Canada, Australia, United States and India.



Source: World Metal Statistics – February 2012.

BRAZIL'S PARTICIPATION IN WORLD CONSUMPTION OF ALUMINUM

Domestic consumption of aluminum transformed products amounted to 1,342,000 tons in 2010, leading to a per capita consumption of 6.9 kg/inhab. That is, growth by 30% in relation to 2009 when consumption per inhabitant was 5.3 kg/inhab.

The table below shows the consumption per inhabitant of the main aluminum consumers countries.

TABLE 3. ALUMINUM CONSUMPTION PER INHABITANT OF THE MAIN COUNTRIES	
Countries selected	Per capita consumption of aluminum Year 2010 (kg/inhab.)
Norway	65.6
Iceland	42.4
Austria	30.2
Switzerland	28.8
Japan	25.7
Belgium	25.7
Australia	23.3
Italy	23.1
USA	22.4
Canada	21.9
Sweden	18.3
United Kingdom	17.2
China	14.2
Ireland	12.7
France	12.1
Finland	12.0
Brazil	6.9
Argentina	5.3

Source: Aluminium Statistical Review 2011 – The Aluminium Association.

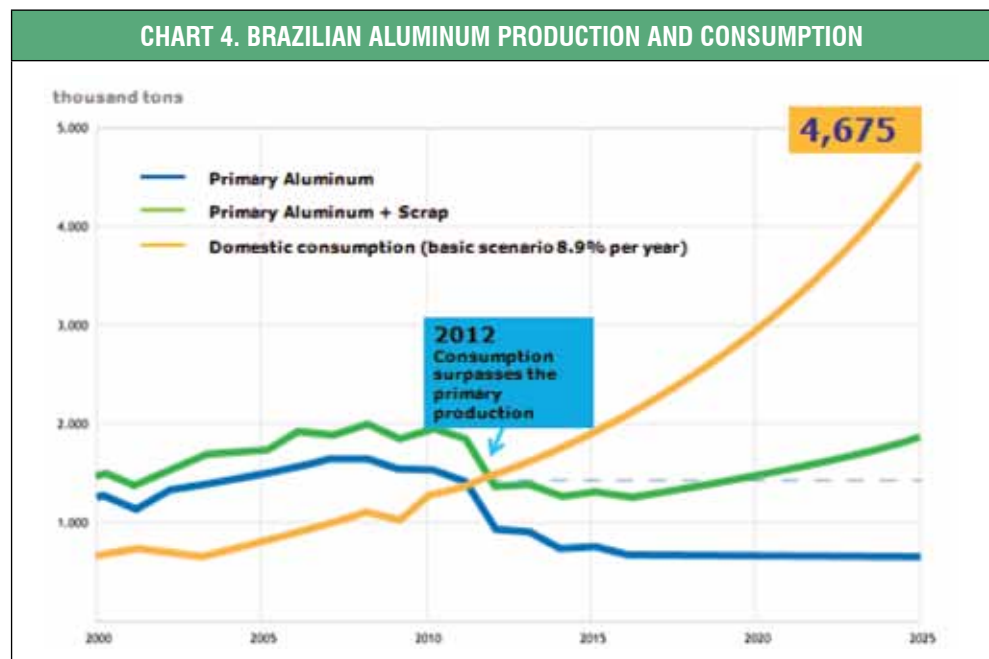
NUMBER OF COMPANIES OPERATING IN BRAZIL

ABAL estimates that about 500 companies operate directly in the aluminum industry in Brazil (i.e. producers, transformers, recyclers and consumers). Of this total, five companies are producers of primary aluminum, the others operate in other phases of the production chain – mining, refining, manufacturing and alloys recycling/production.

PROJECTION FOR FUTURE DEMAND OF ALUMINUM PRODUCTS

A study commissioned by ABAL shows that by 2025 the Brazilian Gross Domestic Product (GDP) will grow on average 5.2% per year, a rate higher than that of the world economy. This will enable aluminum consumption to grow from 8.9% to 11.3% per year in Brazil in the next 15 years.

The base scenario of 8.9% per year translates the pace of economic growth in terms of aluminum demand, taking into account elasticity- income average and the country's demographic growth. The optimistic scenario of 11.3% per year takes into account a more significant increase of aluminum use in its applications, as occurred in the past 20 years.



Source: Study "Competitiveness of Aluminum in Brazil 2011-2025".

2.2 Social environmental aspects

USE OF RESOURCES IN THE PRIMARY ALUMINUM PRODUCTION CHAIN

Mineral extraction process

The main aluminum mineral in Brazil is bauxite, which contains aluminum hydrate, associated with impurities, above all iron and titanium oxide, and aluminum silicate, extracted during processing.

Bauxite mining requires smaller tracts of land than other types of mining. One of the main characteristics of the extraction of bauxite in Brazil is that it occurs practically on the surface. In the rest of the world, bauxite may be found below a layer of 5 to 20 metres of rocks or clays. In Brazil, the main reserves are found in the states of Minas Gerais and Pará, where bauxite is found just below the surface, at a depth ranging from three to eight meters.

Bauxite is extracted from the soil by bulldozers and taken in trucks to the processing plant, where the mineral is crushed, ground, washed, classified according to particle size and dried. Then, it is transported to local alumina plants, or exported. Transport is generally by rail and waterways. Currently one of the plants is supplied by pipeline.

In 2010, the Brazilian production of bauxite grew by 22.8%, amounting to 32,028,000 tons. Of this total, 22,468,000 tons were used to supply the domestic demand for the production of alumina, which in turn had a production volume of 9,433,000 tons. The domestic consumption of alumina for production of primary aluminum was 2,860,000 tons and exports amounted to 6,420,000 tons.

Recovery of mining areas

The mining industry uses land temporarily, which is later recovered by the use of management techniques, essential for the soil after mining.

Bauxite mining operations in Brazil aim at recovering mined areas according to current legislation, and return them to their former condition so that they may become self-sustainable ecosystems to enable use of land to meet the interests of local communities.

Bauxite mining areas are benefited from the recovery process of native fauna and flora. Companies develop their own programmes for planting with seed production nurseries to recover to the maximum biodiversity of each region where the manufacturing plant is installed.

Brazil's aluminum industry has obtained recognition for several initiatives in the application of high standard policies and practices and today 85% of bauxite mining areas in Brazil have been recovered and returned almost in their entirety to its original state with native vegetation and the remaining 15% is still being mined or have permanent facilities.

FIGURE 2. EXTRACTION OF BAUXITE



(credit: Mineração Rio do Norte)

FIGURE 3. REHABILITATION OF BAUXITE MINED AREAS



(credit: Mineração Rio do Norte)

Alumina production

Alumina is produced by Bayer process. Bauxite is mixed in a solution of caustic soda until alumina is dissolved which is then precipitated by cooling into hydrate and sent to a calcination oven to be transformed into calcined alumina. A white powder is then obtained which is the raw material for the production of primary aluminum.

The consumption of the main raw materials for the alumina production relating to 2010 are shown below:

TABLE 4. INPUTS FOR THE PRODUCTION OF ALUMINA	
Raw materials	2010
Bauxite (000's tons)	22,468.1
Fuel oil (000's tons)	937.4
Caustic soda (000's tons)	1,014.9
Electrical power (GWh)	1,942.4
Lime (000's tons)	180.0

Source: Statistics Yearbook ABAL – 2010

Primary aluminum production

Primary aluminum is produced from calcined alumina by electrolysis in a process known as Hall-Héroult.

TABLE 5. MAIN RAW MATERIALS FOR THE PRODUCTION OF PRIMARY ALUMINUM	
Raw materials	2010
Alumina (000's tons)	2,860.0
Electrical power (GWh)	23,982.0
Fuel oil (000's tons)	30.7
Coke (000's tons)	550.6
Pitch (000's tons)	172.4
Fluoride (000's tons)	33.9
Cryolite (000's tons)	8.2

Source: Statistics Yearbook ABAL – 2010

CONSUMPTION OF ENERGY IN THE ENTIRE PRODUCTION CHAIN

Only the electrolytic production of primary aluminum is electricity intensive. In the other stages of the production chain the use of energy is small – similar to any other industrial process.

TABLE 6. ALUMINUM INDUSTRY X ENERGY CONSUMPTION – 2010						
	Bauxite	Alumina	Primary Aluminum	Transformed Products	Recycling *	Total
Production (000's t)	32,028	9,431	1,536	1,349	488	44,832
Energy consumption (GWh)	416	2,829	23,982	675	342	28,244
Specific energy consumption (MWh/t)	0.013	0.3	15.6	0.5	0.7	–

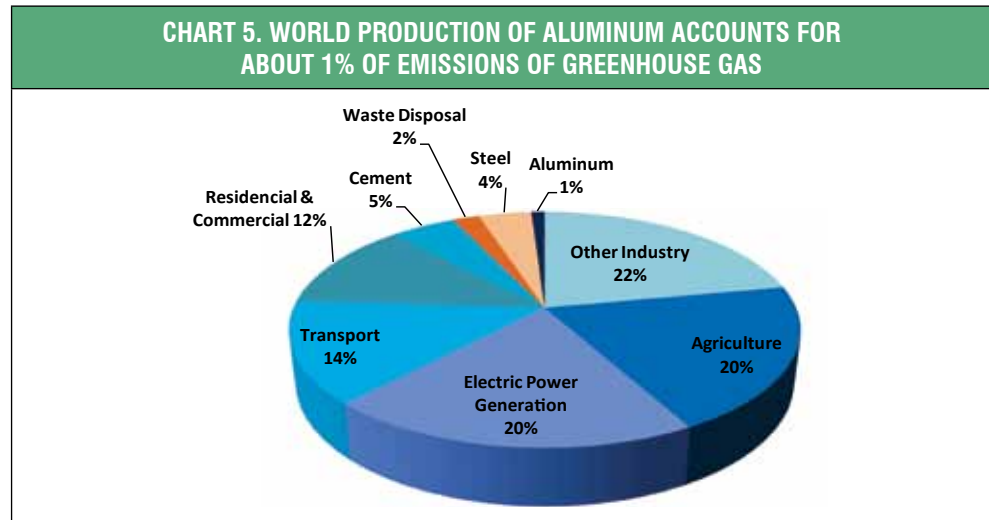
(*) Refers to recovery of scrap.

Source: ABAL, 2011.

MAIN ENVIRONMENTAL ASPECTS RELATED TO:

Climate change and greenhouse gas emissions:

Global production of primary aluminum accounts for about 1% of anthropic greenhouse gas emissions. This estimate by the International Aluminium Institute – IAI, includes indirect emissions relating to energy generated to be used in aluminum production processes.



Source: International Aluminium Institute.

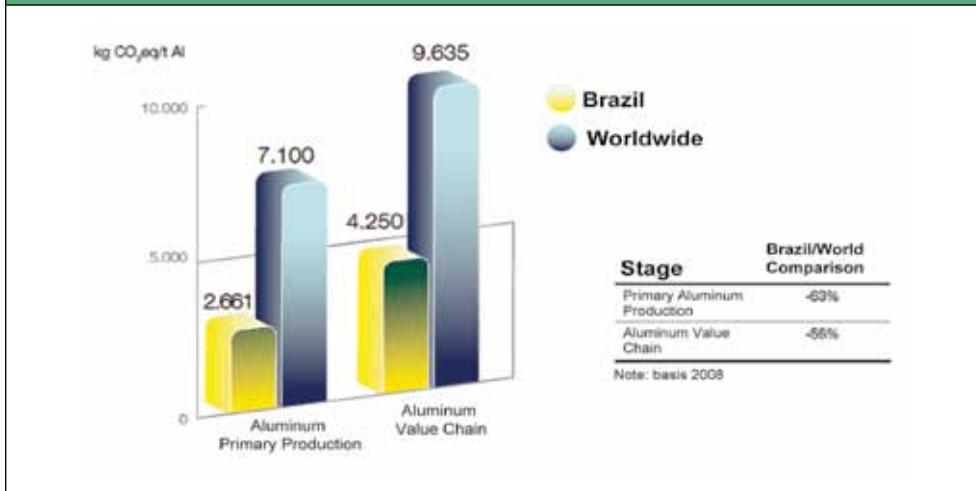
To better understand the contribution of aluminum to a green economy, more specifically savings of energy and reduction of greenhouse gas emissions, a life cycle analysis (LCA) is needed to establish a balance between the emissions generated in aluminum production and the emissions reduced with its use when compared with other materials.

ABAL, in partnership with Fundação Espaço ECO, conducted a study, “Evaluation of greenhouse gas emissions in the aluminum value chain”, to find out the contribution of the entire aluminum production chain to emissions in the country, seeking to accelerate the steps of the industry in the direction of a low carbon economy. The study was able to :

- identify the comparative advantages of Brazilian aluminum;
- contribute to positioning the industry in regulatory terms;
- guide mitigating actions;
- correctly inform clients of the production chain.

The study confirmed the comparative advantages of Brazilian aluminum in relation to other countries. Total emissions – from mining to recycling – was 4.2 t CO₂eq/t of aluminum, a factor much lower than the world average of 9.7 t CO₂eq/t of aluminum as published by the International Aluminium Institute – IAI.

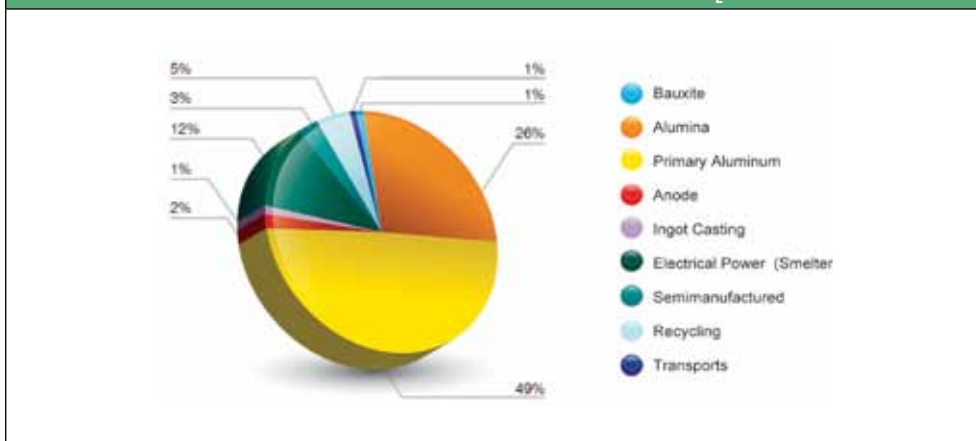
CHART 6. CO₂ EMISSIONS – BRAZILIAN ALUMINUM BENEFITS



Source: Study "Evaluation of greenhouse gas emissions in the aluminum value chain", Fundação Espaço ECO,2011.

Contribution to each phase of the process is as follows:

CHART 7. CONTRIBUTION OF THE PRODUCTION STAGES OF CO₂ EQ/T AL EMISSIONS



Source: Study "Evaluation of greenhouse gas emissions in the aluminum value chain", Fundação Espaço ECO,2011.

Methodology

The Intergovernmental Panel on Climate Change (IPCC), the Ministry of Science and Technology (MCT) – responsible for national inventories – and the International Aluminium Institute – IAI published consistent methodologies for estimates of greenhouse gas emissions (GHG) from the industrial process for production of primary aluminum.

The global emissions from this process (direct from CO₂ produced by anodes of ovens and PFCs – per fluorocarbons) in addition to emissions from electrical energy used in the ovens to produce primary aluminum represent 72% of total emissions of the entire aluminum value chain, including transport, according to a study and publications by the IAI – Folder Aluminum for Future Generations. The remainder comes from the use of fossil fuel already accounted for in national emissions from the energy sector.

The criteria used by the IPCC and by the MCT, considers emissions from the aluminum industry refer to emissions of CO₂ and PFCs related to the production process of primary aluminum. It does not include indirect emissions related to the use of energy.

Effective results

Brazil's aluminum industry has been reducing its CO₂ and PFCs emissions. This data can be found in the Reference Report on Greenhouse Gas Emissions in the Production of Aluminum published by the MCT. In spite of an increase in primary aluminum production by more than 70% since 1990, CO₂ emissions from anodes have dropped slightly in absolute numbers and PFCs emissions were reduced by more than 70% in the same period. See table below:

TABLE 7. REDUCTION OF PFCs EMISSIONS – PRIMARY ALUMINUM PRODUCTION PROCESS			
Emissions (t/t Al)	1990	2007	2007/1990
CO ₂ (carbon dioxide)	1,709	1,655	-3.2%
CF ₄ (tetrafluoromethane)	328	71	-78.4%
C ₂ F ₆ (Hexafluoroethane)	286	60	-79.0%
Production of primary aluminum (t)	930,600	1,654,800	+77.8%

Note: PFCs, or Perfluorocarbons, are greenhouse gases which have a long atmospheric life.
Source: 2nd Brazilian Inventory of GHG Emissions – MCT, June/2010.

This reduction was obtained as a result of controlling the anodic effects in the oven system reducing frequency and duration in addition to other measures relating to improvement of the process (chemical bath, additives, improvement in pot sealing, optimization of the composition and parameters for paste fabrication, reduction in variability of operational parameters among others). This places Brazil in a better position than other countries where primary aluminum is produced. When we include indirect emissions relating to energy generation in this comparison, performance of the Brazilian industry is much better, as illustrated in the table below:

TABLE 8. PERFORMANCE OF THE BRAZILIAN INDUSTRY EMISSIONS			
Composition	Direct emissions from the process (t CO ₂ eq / t Al)	Direct emissions from the process + indirect emissions (energy) (t CO ₂ eq / t Al)	Value Chain (t CO ₂ eq / t Al)
Brazilian industry	2,17	2,66	4,25
World average (*)	2,43	7,10	9,63

(*) – excludes China.

Source: Data from (ABAL/Brazil) and (International Aluminium Institute – IAI).

When we consider that the best technology is found in Europe and in the United States, Brazil's position is comfortable in terms of general emissions showing that the country has accompanied world technology. The emissions of CO₂, we note that there is not

much difference among countries. In 2007, the following was the position of the major world producers of aluminum and their process emissions:

TABLE 9. MAJOR WORLD PRODUCERS OF ALUMINUM AND THEIR PROCESS EMISSIONS									
Country	Al Production (000 t)	Share	Process Emissions (Gg CO ₂ e)	Emissions CO ₂ (Gg)	Intensity CO ₂ (t CO ₂ /t Al)	Intensity CF ₄ (kg CF ₄ /t Al)	Intensity C ₂ F ₆ (kg C ₂ F ₆ /t Al)	Intensity GHG (t CO ₂ e/t Al)	Share in total emissions excluding LULUCF ¹
Russia	3,955	10.4%	10,519	6,848.15	1.73	0.131	0.009	2.66	0.48%
Canada	3,083	8.1%	7,282	5,097.44	1.65	0.098	0.007	2.36	0.97%
USA	2,560	6.7%	8,087	4,250.84	1.66	0.192	0.027	3.16	0.11%
Australia	1,954	5.1%	3,641	3,141.48	1.61	0.033	0.004	1.86	0.67%
Brazil	1,655	4.3%	3,594	2,739.42	1.65	0.071	0.006	2.17	0.39%
Norway	1,363	3.6%	2,999	2,178.58	1.60	0.082	0.008	2.20	5.37%
Germany	554	1.5%	951	757.23	1.37	0.047	0.005	1.72	0.10%
Iceland	456	1.2%	961	679.76	1.49	0.080	0.010	2.11	21.32%
France	427	1.1%	1,135	710.07	1.66	0.114	0.028	2.66	0.21%
Spain	408	1.1%	800	675.83	1.66	0.043	0.003	1.96	0.18%
China	12,588	33.1%							
India	1,237	3.2%							
Others	7,846	20.6%							
World	38,087	100.0%							

(1) Land Use, Land-Use Change and Forestry (LULUCF). Sources: Data from inventories submitted to UNFCCC in 2010, and checked. In the case of Russia, Spain, China and India and the world total, aluminum production data is 2007 from ABAL's 2010 Yearbook. India and China are not obliged to publish annual inventories. Total emissions in Brazil were estimated for 2005, excluding Land Use, Land-Use Change and Forestry – LULUCF.

Zero emissions

Inbra Metais became the first recycling company in the aluminum industry in Brazil to eliminate carbon emission in production. The plant in question is located in the city of Itaquaquecetuba (State of Sao Paulo) with production capacity of 80,000 tons/year of secondary aluminum alloys in ingots, bars either in liquid form or as deoxidizer for the steel industry.

GHG emission inventories, conducted in 2009 and 2010, registered 8,247 tons CO₂eq and 12,541 tons CO₂eq respectively –quantities proportional to the volume of production each year. The inventories considered direct emissions (resulting from the melting process) and indirect emissions by acquired energy. The company estimated 14,000 CO₂eq tons for 2011, based on planned production and with the objective to offer a product with zero GHG emissions to its customers. The company offset the emissions by purchasing 14,000 carbon credits on the free market.

Carbon credits were purchased from Usina Hidrelétrica Barra Grande (Baesa). All the operation for credit purchasing was according to the Verified Carbon Standard (VCS), international quality reference approved by the UN (UNFCCC), and registered with NYSE Blue VCS Registry. The methodology to verify credits was that of Bureau Veritas Certification Holding (BVQ).

Residues generation and management

The industry seeks to use its residues in other activities, working to find alternatives in partnership with universities and research centres. Waste from industrial plant calcinators can be used in the refractories industry; spent pot lining (SPL) can be used as raw material for the cement industry and carbon waste is also used as fuel for cement furnaces thus contributing to reduce greenhouse gases.

When we consider the factor 0.019 tons SPL generated/ton of primary aluminum produced, it is estimated that in 2010 the volume was 29,000 tons of SPL/ton of aluminum.

All aluminum producers in Brazil are currently investing in the reuse of electrolytic potlines waste. At Alcoa, recycling started in 2001, and today it covers all residues. At Votorantim Metais-CBA, the recycling process enables integrating the aluminum production plant to cement companies that belong to the Votorantim Group. At Novelis, the potlines material, is fully recycled, not only by cement producers but also by roofing manufacturers.

Dross generated by production of primary aluminum, when adequately removed from the melting furnace and cooled, contains from 20% to 80% aluminum, being therefore a sub-product and in these conditions must be reprocessed to recover the remaining aluminum contained. Reprocessing is carried out in rotating ovens. Production of secondary aluminium (from scrap) generates dross with high contents of salts and aluminum oxide and a small percentage of metallic aluminum. The reuse of this dross to extract the aluminum contained generates a further residue. This residue can be treated and the salt recovered.

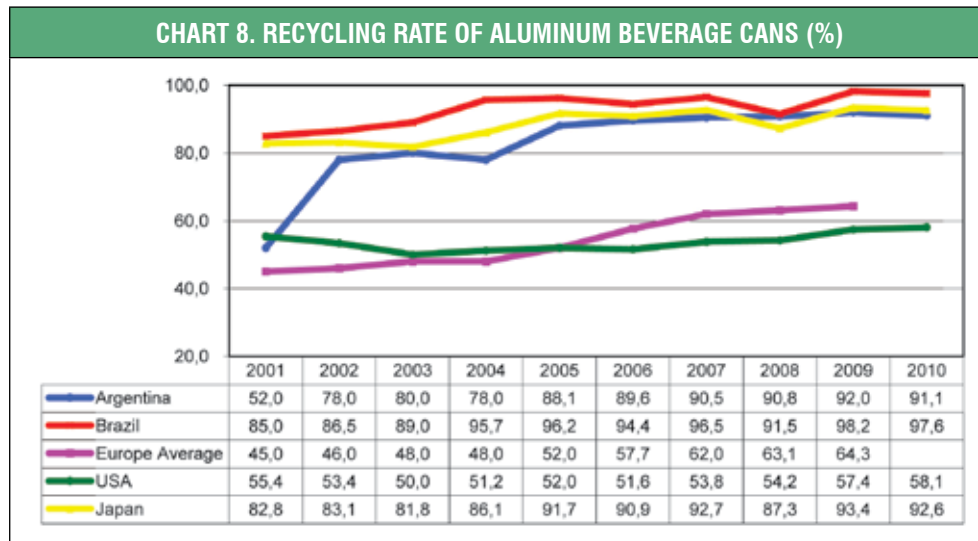
Bauxite Refining

Each ton of alumina produced generates about 700 kg to 900 kg bauxite residue. This residue, in the form of alkaline pulp and solid particles, requires care in disposal so as to avoid contamination of surface and underground waters. The areas allocated for disposal of this residue form lakes which are made impermeable with clay and PVC layers and contain draining systems at the bottom (to collect the alkaline water) and on the surface to release the neutralized water to the environment.

After the neutralized water has been drained, and only inert solid material is left, the areas are recovered with native vegetation, with underground and surface being frequently monitored. The aluminum industry also seeks ways to use bauxite residue as raw material in other activities. This residue is now starting to be used in the cement industry and its use in the ceramic industry for production of bricks and roofing (tiles).

Recycling: a model for the National Policy on Solid Waste

In recycling of aluminum, Brazil has a prominent position. It has come first for ten consecutive years since 2001 in the recycling of aluminum beverage cans. In 2010, the rate of recycled packaging amounted to 97.6% (see chart). The country also stands out in the rate of recovered scrap higher than 36% against 28% of the world average (data 2010). It is a true “energy bank” for future generations since it is estimated that more than 75% of the aluminum produced today will still be in use, being recycled countless times.



Sources: ABAL; Associação Brasileira dos Fabricantes de Latas de Alta Reciclabilidade; The Japan Aluminum Can Recycling Association; Cámara Argentina de la Industria del Aluminio y Metales Afines; The Aluminum Association; European Aluminum Association – EAA.

Model for other packaging

With Law nº 12,305/2010, which institutes the National Policy on Solid Waste in Brazil, concepts such as reverse logistics, shared responsibility and social economic inclusion of recyclable material collectors became compulsory for packaging producers and consumers.

These concepts already exist in recycling of aluminum beverage cans – this has been in use for more than 20 years when the first can factories established in the country. For this reason, the aluminum recycling chain is reference for the preparation of a sectorial agreement model, which is being developed by the Packaging Working Group of the Ministry of the Environment in the sphere of reverse logistics of the Law of dry urban solid waste.

The fact is that according to data raised by *Cempre – Compromisso Empresarial pela Reciclagem*, in the total of dry urban solid waste in the country, aluminum accounts for only 1% against 20% plastic and 40% cardboard. It clearly shows the excellent result from the efforts and resources invested in the aluminum production chain and recycling.

TABLE 10. INVESTMENTS IN THE ENVIRONMENT BY THE INDUSTRY		
Investments in environmental programs	2008 (R\$ 000)	2009 (R\$ 000)
Reduction of greenhouse gas emissions and fluorides	295,891.79	174,475.54
Processing or reutilization of residues	17,536.52	12,477.87
Environmental education programme and/or external projects	21,409.72	21,535.32
Others ⁽¹⁾	145,255.84	143,526.35
Total	480,093.87	352,015.08

(1) Takes into account investments in recovery of explored areas, technological and industrial development programmes, reduction in the consumption of fresh water, preventative actions and environmental maintenance, environmental offsetting and liabilities and environmental contingencies.
Source: ABAL's Sustainability Report – 2010.

MAIN SOCIAL ASPECTS

In the sphere of social responsibility, Brazil's aluminum industry creates programmes to promote local development and better quality of life for employees, as well as training and professional development. Continuous appreciation of its collaborators and the commitment to the development of communities near plants are integrated values to the way the sector operates, invests and does business. In 2009, the industry invested R\$ 17 million in projects involving education, culture, health and safety of employees and society.

TABLE 11. SOCIAL ENVIRONMENTAL INVESTMENTS		
Internal social investments	2008 (R\$ 000)	2009 (R\$ 000)
Compulsory social charges	299,892.84	311,266.30
Participation in profit or results	122,136.77	144,554.83
Transport	69,609.43	84,486.48
Food	44,126.58	52,209.76
Health and safety at work	38,414.01	43,576.92
Health	20,749.30	27,892.37
Health Care	16,840.51	21,205.42
Education	11,618.21	12,677.26
Others	16,614.82	11,320.37
Total	640,002.48	709,189.71

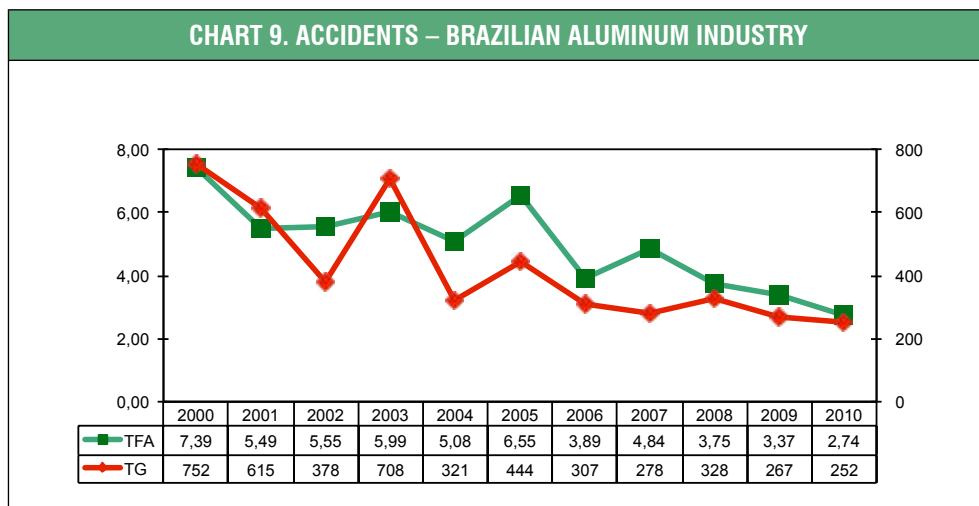
External social investments	2008 (R\$ 000)	2009 (R\$ 000)
Education	2,249.14	1,649.58
Culture	730.12	1,639.49
Health and sanitation	2,396.11	1,512.16
Others	16,006.17	12,262.77
Total (includes social charges)	21,381.54	17,064.00

Source: ABAL's Sustainability Report – 2010

Health and safety at work

The main challenge, when we talk about health and safety in the industry, is to maintain good working conditions and reduce accident rates. With the adoption of good practices and investments in safety at all stages of the production chain from mining to recycling, Brazil's aluminum industry has shown significant advances. All primary/integrated companies adopt international standards for protection and evaluation of risks i.e. SA 8000 certifications (social responsibility) and OHSAS 18001 (Occupational Health & Safety management systems).

In 2010, the Average Frequency of Accidents Rate with time-off, which is the relation of the number of accidents per million of man hours worked was 2.74 against a rate of 7.39 registered in 2000. There has been an important reduction of 63% in the period and a drop by 19% in relation to 2009. The numbers referring to Average Severity Rate of accidents also call attention because they have been greatly reduced throughout the last decade: if we take the average for 2000 as a basis, there was a reduction of 66% in 2010.



Notes: TFA – Accident with time-off Frequency Rate (per million man-hours worked).
 TG – Severity Rate (days per million man-hours worked)
 Source: A survey carried out with sector's companies by ABAL.



3 ECONOMIC AND SOCIAL ENVIRONMENTAL REGULATIONS THAT AFFECT THE SECTOR

3.1 Main international agreements and regulatory aspects: characterization of the international regulatory environment of interest to the sector

Companies associated with ABAL participate in the “Aluminum for Future Generations” programme of the International Aluminium Institute (IAI), which was launched in 2003 in partnership with regional and national aluminum associations to enable the industry to maintain continuous global growth as well as promoting social environmental improvements.

It is a global voluntary commitment assumed by the members of IAI, which represents more than 80% of the world’s aluminum production. The initiative created a true benchmark for the evolution of the concept of sustainability in the world’s aluminum industry. It comprises 14 major goals relating to environmental social and economic aspects, whose performance is followed through relevant indicators.

Some highlights in performance of the Brazilian industry i.e. greenhouse gas emissions and recycling rates of aluminum beverage cans which was 97.6% in 2010 – global record. Aluminum for Future Generations aims further at promoting the use of aluminum in the automotive industry as a way to mitigate greenhouse gases by cutting down the weight of vehicles and consequent reduction in the consumption of fuel.

Control methods and measuring of improved sustainability indicators are being developed and constitute a major challenge for the world industry in the next few years. Brazilian companies that produce primary aluminum are already gathering information to evaluate their performance relating to sustainable development and define means to improve it. The most recent data is from 2008 and can be found on <http://www.world-aluminum.org>.

Another important consideration is REACH (Registration, Evaluation, Authorisation and Restriction of Chemical substances). Since 2007, export of substances, mixtures and goods to the European Community has to comply with the requirements set out by REACH . It requires previous registration of a product in accordance with requirements that involve technical and bureaucratic work.

3.2 Main national normative instruments (compulsory and voluntary) in effect in the main sector's foreign markets (requirements from consumers, certificates etc.) which cause an impact on the sector

The main normative instruments applicable to the Brazilian aluminum industry are ISO Standards, of a voluntary nature, mainly 14000 series standards. Among the main standards in use are Standards 14001, Environmental Management System; 14031, Environmental Performance; 14020, Environmental Labels; 14040, Life cycle Assessment and 14064, Greenhouse Gas Accounting and Verification.

GHG Protocol for inventory of greenhouse gases is also voluntarily applied by the sector's industries.

3.3 Main regulatory aspects (legislation) and normative instruments (compulsory or voluntary) which affect the sector in Brazil

- State and Federal Climate Change Policies;
- State and Federal Solid Residue Policies;
- New Mining Code, which contains at its core the proposal for increase of rates of Financial Compensation for Exploration of Mineral Resources (CFEM);
- Electric Power used in the industry – availability and security of supply of competitive electricity
- Taxes on the aluminum production chain – need exemption;
- Need for an industrial policy that contemplates customs barriers, support for export and purchasing by the State with a minimum level of nationalization.



4 BUSINESS PRACTICES FOR SUSTAINABLE DEVELOPMENT (1992-2011)

4.1 Main technological transformations/ innovation and management incorporated by the sector in production

ENERGY SELF-GENERATION

Due to high energy costs, in order to maintain factories' competitiveness, primary aluminum producers have invested in self-generated energy, seeking to guarantee part of its consumption. Investments made so far have enabled participation in self-generated hydro-electricity in the sector's use matrix to jump from 12% in 2000 to the current 31%, with prospects to reach 50% by the end of the decade. In this scenario, Brazil's aluminum industry would be made available 3% of the total electricity generated in the country to society and other segments of the economy.

Energy efficiency

Electricity is the main raw material in the production of primary aluminum, a stage when production is power intensive. In the other stages of the production chain, consumption of electrical energy is low, comparable to any other industrial process.

In order that intensive use of this electricity can cause the lowest impact possible to society, the world aluminum industry is committed to improving continuously the energy efficiency. In 2010, in Brazil, the specific average consumption of electrical energy was 15.6 MWh/ton of primary aluminum, represented a slight increase in relation to previous years.

Brazil's primary aluminum production plants use Soderberg and Prebaked technologies, mainly the latter (58% of production in 2010) –responsible for increasing energy efficiency with a lower volume of emissions both CO₂ and PFCs.

An alternative that has been used in smelters Soderberg is the modernization of the equipment without changing the technology. The change consists of applying the feeding system point feeder to the Prebaked furnaces, changing part of the equipment but maintaining buildings, furnaces, bars and anodes as original features. However, because furnace sizes and work amperage is maintained, the gains in efficiency are very small, therefore it is a considerable investment not usually made. The Prebaked technology is justifiable only for use in new plants.

4.2 Initiatives for divulging information and transparency on social environmental performance of the sector

PUBLICATIONS

Every two years, Associação Brasileira do Alumínio – ABAL publishes the sector's Sustainability Report with a view to presenting the performance of the Brazilian aluminum industry, its investments and impact on society towards sustainable development. The fourth and most recent edition of the report was published in 2010. Concurrently to the sector's report, main companies of the industry – specifically producers of primary aluminum – publish their own reports on social responsibility.

http://www.abal.org.br/servicos/biblioteca/rel_sustentabilidade_ind_aluminio_2010.asp



ABAL also publishes technical guides on aluminum processes and applications addressing the theme "environmental responsibility", some very prominent and with content, such as the guides on recycling and generation and treatment of dross.



STUDIES

Whenever necessary, ABAL contracts studies and consultancies to measure, evaluate and correct the performance of activities that cause impact on aspects of sustainability in the aluminum industry.

In 2010, for example, to get to know better the contribution of the whole of the production chain of aluminum to emissions in our country, seeking to accelerate the steps of the industry towards a low carbon economy, ABAL, in partnership with Fundação Espaço ECO conducted a study “Evaluation of greenhouse gases in the aluminum value chain”, in order to:

- identify the comparative advantages of Brazilian aluminum;
- contribute to positioning the industry in regulatory terms;
- guide mitigating actions;
- correctly inform customers of the production chain.



http://www.abal.org.br/servicos/biblioteca/industria_brasileira_aluminio.asp

INTERNACIONAL ALUMINUM CONGRESS INTERNACIONAL ALUMINUM RECYCLING SEMINAR

Every two years, ABAL held the **V International Aluminum Congress** and the **XI International Aluminum Recycling Seminar**, the largest and most important national events of the sector, which brings together specialists from various countries to discuss themes that contribute to the continuous development of the aluminum production chain in Brazil.

RECYCLING RATE FOR ALUMINUM BEVERAGE CANS

National Aluminum Recycling Day

ABAL has continuously worked to divulge and raise awareness for aluminum recycling by promoting actions to various audiences such as lectures at schools and universities all over Brazil; it divulges the recycling rate of aluminum beverage cans, where Brazil has come top for the past ten years; and actions with society during the National Day of Aluminum Recycling (on 28 October). In 2010, for example, to commemorate the date a cycling event was held in the southern region of São Paulo and attracted more than 250 cyclists.



ALUMINUM AT SCHOOLS

The need to disseminate the advantages of aluminum and technology innovation as well as its contribution to sustainability of the planet, the industry supports the ABAL Aluminum at School Project with a view to promoting research and study of aluminum in the academic sector.

Directed mainly at engineering and architecture courses and technical schools, the Project offers courses, workshops and technical-scientific programs contributing to the qualification of skilled professionals to transform aluminum into solutions for the market. ABAL's education policy is to fill in the technical gaps in the market at the same time that it promotes social inclusion by qualifying students and professionals.

4.3 Self-regulation certification initiatives developed by the sector

ABAL, through its Technical Committee, maintains and supervises the Brazilian Aluminum Committee of ABNT (the Brazilian Technical Standards Association) (CB-35/ABNT), which produces and publishes all the standards that regulate the industry processes and products. The following Study Commissions form part of this Committee: Physical, Chemical and Metallographic Characterization; Extruded Products, Laminated Products; Surface treatment; Terminology; Structures; and Metallic Domestic Utensils.

ABAL's Technical Committee is also responsible for technical publications, currently it has nine publications addressing aluminum characteristics of several metal transformation processes such as: rolling; surface treatment; liquid aluminum handling; structures, profiles, plates and tiles; liquid metal treatment; physical-chemical characteristics; generation and treatment of dross; and recycling.

4.4 Initiatives from the sector's association

ABAL chairs the Chamber Environmental of the Metallurgical, Mechanical and Siderurgical Sectors from CETESB (SP) and supervises and maintains the CB-35 of ABNT.

Furthermore, participates in several working groups for regulation of national policies on solid residues and climate change. For example, the Packaging Working Group is preparing a proposal for a reverse logistics model for this segment, coordinated by the Ministry of the Environment. Also participates in the Business Coalition for the Governance of National Policy on Solid Waste, coordinated by the Business Council for Recycling (CEMPRE), and the Group for Business Mobilization for Climate Change led by CNI – the National Industry Confederation.

Representatives from the Commissions for the Environment and Sustainable Development and Recycling of the association have participated since the beginning of the discussions of work for regulation and implementation of National Politics – Laws no. 12,305 (Solid Waste) and no 12,187 (Climate Changes) -, so that definitions should not affect competitiveness in Brazil's aluminum industry.



5 CHALLENGES AND OPPORTUNITIES IN THE SECTOR FOR SUSTAINABILITY

5.1 Main international sustainability trends for the sector

The main international sustainability trends for the sector of aluminum towards a green economy occur mainly in five dimensions always supported by a prospect of analysis of the life cycle.

- Increase in the use of aluminum in products which may contribute to energy savings in the life cycle of the product, which will require a concentration of efforts in getting to know the use of energy and emission in the life cycle of products.
- Increase in the use of hydroelectricity, preventing the Brazilian energy matrix – which is 85% from renewable sources – lose this advantage due the increase use of fossil sources.
- Increase in recycling rates, according to item 5.2.
- Seek greater energy efficiency: either through technology retrofits or the use of best operating practices, these gains would not have a significant impact when compared with others. Because it is capital intensive and plants installed have a long life, these measures have not shown quick results unless there are incentives.
- Application and development of new technologies: according to the “Energy Technology Transitions for the Industry”, 2009, published by the International Energy Agency, the transition to a green economy will still require research, development, demonstration and use of new technologies for production.

In the current environment of low investments due to the high cost of energy and uncertainties in relation to the ability of our industry to compete, Brazil has been left on the margin of this process, which may be reversed with the adoption of the measures suggested by the Aluminum Working Group – created by Inter-ministerial Administrative Act no. 436, of 13 July 2011.

5.2 Opportunities for aluminum in sustainable development mark

Brazil's aluminum industry is prepared to use the opportunities of the new economy better – with customers more aware and attentive of the life cycle of products – contributing as part of the solution to the sustainability of important economic segments, such as the automotive industry, food and beverage, building & construction and transport to be incorporated into processes and products of these industries.

Challenges and opportunities:

- **Aluminum recycling:** increase the participation of recycled aluminum (from old scrap and industrial processes) in the matrix of domestic aluminum supply – which is currently about 36%, a higher index than the world average 28% (base 2010); in recycling of aluminum beverage cans to maintain its leading position, which it occupies for the past ten consecutive years.
- **Use of aluminum in the transport segment:** reduction of the weight of vehicles and other means of transport brings countless of advantages such as less consumption of fuel and significantly diminish atmospheric emissions. While in Brazil the use of aluminum in cars is 50 kg/vehicle, in Japan this exceeds 118 kg, in Europe, 124 kg, and in the USA it is about 148 kg/vehicle.
- **Lower carbon footprint:** substitute imported products which have high carbon footprint and increase fabrication of national items. The products made from Brazilian aluminum have competitive advantages in relation to imported products. The higher recycling indices and the use of hydro electricity for production of primary aluminum considerably reduce the carbon footprint of Brazilian aluminum.
- **Energy efficiency:** the use of Prebaked technology in the production of primary aluminum is only viable in new plants (*smelters*). However, in Brazil, due to an increase in electrical energy cost, since the 1980's new primary aluminum plants have not been built. The prospect today is a loss in installed capacity.

5.3 Challenges for the sector in relation to sustainable development

The high prices of electrical energy threaten the competitiveness of Brazil's aluminum industry and the sector runs the risk of going from exporter to importer of primary aluminum as from 2013, which will have a strong impact on the economic growth and social economic development of the country.

In a scenario of continuity, in a decade, the production of Brazilian primary aluminum will fall by half (- 57%) and, to worsen the global climate situation, the national product will tend to be replaced by imported products. In both situations, greenhouse gas emissions will increase significantly.

ABAL, together with other associations, among them Abrace (Brazilian Association of Large Industrial Consumers of Energy and Free Consumers) Associação Brasileira de Grandes Consumidores Industriais de Energia e de Consumidores Livres), accompanies the evolution of demand and offer planning of electrical energy in the medium and long terms in the country thus aiming at identifying possible risks of lack of supply and use its influence so that this may be minimized or eliminated.

Further, the industry works together with other organizations and governmental bodies in order that:

- the goals proposed by Law no. 12,187, which establishes a National Climate Change Policy are voluntary for Brazil and the Brazilian industry with the effective participation of industrial associations in establishing these goals;
- the reductions of emissions already carried out voluntarily by the industry are considered in establishing new goals;
- the mechanisms for financial incentives for a low carbon economy are available before implementation of compliance with goals;
- protection mechanisms are created against importing of products with carbon footprints higher than those manufactured by the Brazilian industry;
- incentive mechanisms are created for application of lighter materials in the transport industry which contribute for reduction of consumption of fuels and, consequently, emissions of pollutant gases;
- efforts are made to reduce emissions in all stages of the production chain, for example: implement actions that aim at improving operating practices; disseminate adoption of the IPCC methodology to quantify the emissions from all plants; incentivize recycling of all aluminum products, etc;
- investments and support for technological research for improvement of efficiency of the production process may continue;
- the use of standard methodologies should be encouraged to measure emissions and carryout inventories;
- professionals of the industry and other partners should be qualified to follow low carbon economy.

5.4 Contribution of aluminum to sustainability of major economic segments

Aluminum is associated with the most modern sustainable business policies by aligning lightness and mechanical resistance, durability, weather and corrosion resistance, as well as infinite recyclability. Aluminum contributes to the planet's sustainability being applied to a vast array of products in the following segments:

PACKAGING

Aluminum packaging is lighter, more durable and resistant to corrosion than other materials, which are ideal characteristics to guarantee the integrity of food, drinks, medications and cosmetics during transport, storage and consumption. Because it is not toxic and is an excellent barrier against light, humidity and impurities, aluminum protects and increases the useful life of packed products increasing its access to the population. Aluminum packaging is also fully recyclable infinitely, which diminishes the generation of residues and does not attack the environment.

TRANSPORTS

Aluminum significantly contributes to the production of more economic safe vehicles with a low index of gas emissions. Because it is lighter than steel and cast iron, the use of aluminum leads to main reductions in fuel consumption and diminishes wear and maintenance of parts. Only aluminum is light and resistant at the same time, which enables offering increasing more technology and safety to means of transport without significantly increasing the weight shipped.

On average, each kilo of aluminum, used in place of a heavier material may reduce emissions of up to 20 kg of CO₂ during the useful life of a car; 28 kg of CO₂ in trucks, and from 40 kg to 45 kg of CO₂ in buses.

BUILDING & CONSTRUCTION

Because aluminum products for building & construction are light, totally recyclable and require very low maintenance, use is essential in work aiming to be qualified as green enterprise. The versatility of aluminum enables the development of products and solutions that reduce the consumption of air conditioning and electrical power at the same time that they are safer and provide users thermal and acoustic comfort, factors which contribute to sustainability in construction.

Building projects, seeking LEED (Leadership in Energy and Environmental Design), certification, known as Green Building, find in aluminum an excellent alternative for implementation of the concept of sustainability. CBCS (the Brazilian Council for Sustainable Construction) is responsible for the seal in Brazil and has the participation of the aluminum industry among its founding partners. It is estimated that 200 buildings are in the process of obtaining certification in Brazil.

ELECTRICAL

Because of its high thermal and electrical conductivity, aluminum is used in cables and wires in the transmission and distribution of energy for homes, businesses and industries. The programme of rural electrification of the Federal Government, called Light for All which has already benefited about 12 million Brazilians and was for example a driver of the increase in the consumption of aluminum over recent years.

CONSUMER DURABLES

Because it is lightweight, resistant, durable and easy to maintain, aluminum takes on a prominent role in the home. It is used in a variety of products: bicycles; pots, kitchen and bathroom utensils; furniture; decoration objects; lights (blinds and roofs); aerials, air conditioning; electrical electronic equipment; stairs, tools; jewellery; musical instruments; among others.

5.5 Conclusion

Brazil has the ability to be a nation to lead the low carbon economy, whereby aluminum – because of its intrinsic properties – has much to contribute to the sustainability of the main segments of the economy.

Our aluminum is “green” in its origin because it comes from clean and renewable energy sources and because it offers absolute recyclability. As the debate on climate change and on the need for reducing greenhouse gases grows, aluminum has gained notoriety.

As well as being strategic for the Brazilian economy – because it creates jobs, participates strongly in the industrial GDP and supply all industrial segments -, its contribution to mitigate greenhouse gases becomes even more valued in a world which desires low carbon. However, Brazil’s aluminum industry has been for a while losing its competitiveness which could lead to a loss of value in its production chain.

Government, industry and society should unite in their efforts so that the expected increase in consumption of aluminum as projected for Brazil in the next few years may be supplied by companies established in the country – creating jobs, investments and wealth – and using preferably as raw material Brazilian primary aluminum, which is less polluting than world aluminum and recovered scrap to complete the national supply.

Brazilian Aluminum Association – ABAL

CNI – CONFEDERAÇÃO NACIONAL DA INDÚSTRIA

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