



Mining Industry

MINING & GREEN ECONOMY

INDUSTRY MEETING FOR SUSTAINABILITY

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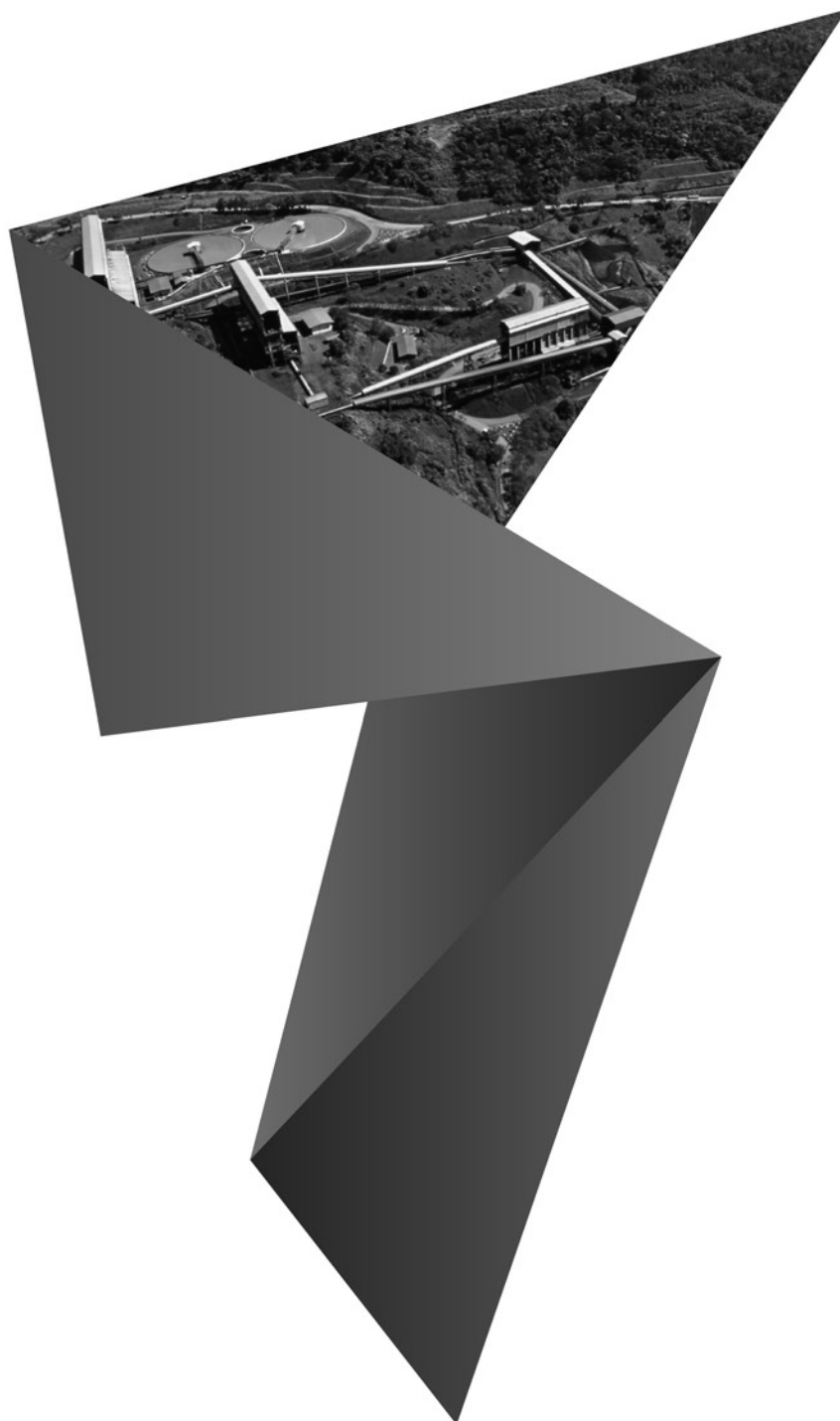
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LIST OF ACRONYMS

DNPM	National Mineral Production Department
Rio-92 or Eco-92 / Agenda 21	A set of resolutions adopted at the international Eco 92 Conference held in Rio de Janeiro in June 1992. It was organized by the UN, relied on the participation of 179 countries and culminated in measures to reconcile economic and social growth with environmental preservation. Under Agenda 21, the individual countries established the bases for environmental preservation in their territories, thereby making sustainable development possible
BEN	National Energy A
MDIC	Ministry of Development, Industry and Foreign Trade
PMB	Brazilian Mineral Production
Rio+10	United Nations Conference on Environment and Sustainable Development, held in Johannesburg
Rio+20	Conference held 20 years after Rio 92
PNM2030	National Mining Plan for 2030
WBCSD	World Business Council for Sustainable Development.



LIST OF FIGURES

Figure 1.	The relationship between land area, population density and Gross Domestic Product and the growth of countries	21
Figure 2.	The global urbanization process	22
Figure 3.	Trends in Brazil's mining production	23
Figure 4.	Mining industry as a share of Brazil's Trade Balance	24
Figure 5.	Importance of mining in terms of job creation	24
Figure 6.	Number of existing jobs and expected to be created in the mining industry by 2030 (Numbers in Thousands of Jobs)	25
Figura 7.	Foreign trade of the mineral sector amounts in millions of US\$ (Exports)	25
Figura 8.	Foreign trade of the mineral sector amounts in millions of US\$ (Imports)	26
Figure 9.	Main steps of a mining activity and their interference with water resources	31
Figure 10.	Desenho esquemático do sistema de recirculação de água em mineração de ferro	32
Figure 11.	Participation of IBRAM in the steering bodies of the National Water Resources Council (CNRH)	34
Figure 12.	Carajás NF area in the municipality of Parauapebas, Pará, in 1980	37
Figure 13.	Carajás NF area in the municipality of Parauapebas, Pará, in 2006	37
Figure 14.	Greenhouse gas inventory for the mining sector	38

Figure 15.	Distribution (in percentage terms) of the total estimated emissions for the 10 minerals covered in IBRAM's GHG Inventory, 2010	39
Figure 16.	Scope of the total emissions (in percentage terms) for the 10 minerals covered in IBRAM's GHG Inventory, 2010	40
Figure 17.	Mortality rate halved in mining sector between 1999 and 2009	43
Figure 18.	Amazon – Mining projects and active mines versus protected areas	57
Figure 19.	Boundaries of the Brazilian continental shelf (source: PNM, 2030)	58
Figure 20.	Map illustrating infrastructure in Brazil	60
Table 1.	Share of mining industry in Brazil's GDP	23
Table 2.	Relevance of Brazil in the global mining production	26
Table 3.	Energy Consumption – Mining and Pelletizing (toe)	28
Table 4.	Energy Consumption – Mining and Pelletizing (%)	28
Table 5.	Energy Consumption – Ferroalloys (toe)	29
Table 6.	Energy Consumption – Ferroalloys (%)	29
Table 7.	Energy Consumption – Non-ferrous metals and metallurgy (toe)	30
Table 8.	Energy Consumption – Non-ferrous metals and metallurgy (%)	30
Table 9.	Water consumption (m3) for some mineral varieties (2010)	31
Table 10.	Annual consumption and the rate recycling/ recirculation for different types of minerals	33
Table 11.	Biodiversity related actions regarding different mineral types in 2010 ...	35
Table 12.	Investments in environmental conservation regarding different mineral types in 2010	36
Table 13.	Total tailings generated and average percentage share of each substance in the decade 1996-2005 and during 2010-2030	41
Table 14.	Emissions of particulate matter related to the production of different mineral types	42
Table 15.	Investments in safety programs (2010)	44
Table 16.	Procedures and relevant bodies for the granting of mineral rights	49



SUMMARY

CNI presentation

Sectorial presentation

Background	15
1 Introduction	17
1.1 Ibram	17
1.2 Objectives of this Issue	17
2 Industry Profile	19
2.1 The Global Mining Industry	21
2.2 Caracterização econômica	22
2.3 Socio environmental profile	27
3 Economic and socio environmental regulations with relevance to the mining industry	45
3.1 Main international agreements and regulatory issues relevant to the sector	45
3.2 Main national regulations in force in major foreign mining markets with impacts on the industry	48
3.3 Main regulatory aspects and regulations relevant to the mining sector in Brazil	49
4 Business practices for sustainable development (1992-2011)	51

4.1	Initiatives for disclosure and transparency on the environmental performance of the mining sector	51
4.2	Best practice initiatives developed by IBRAM for the mining sector	52
5	Challenges and opportunities for the mining sector to achieve sustainability	55
5.1	Main international trends for the sector within the sustainability framework	55
5.2	Challenges facing the mining sector within the framework of sustainable development	56
5.3	Opportunities available to the mining sector within the framework of sustainable development	60
6	ANNEX – Roster of IBRAM's members	63



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

The Brazilian Mining Association (IBRAM) is the Country's entity that represents corporations and organizations in the mining industry. IBRAM was founded on December 10th, 1976 as a private, nonprofit association with the objective of bringing together, representing, promoting, and publicizing Brazil's mining industry with a view to helping raise the standards in various segments of the industry.

IBRAM focuses on fostering mainstreaming of sustainability in the mining industry, and it views mining as a driver of change for society's living standards. This change is predicated on best practices developed at corporate level, as well as on actions that generate benefits, wealth and improved lifestyles for those communities that are under the direct or indirect influence of the mining business.

The various actions supported by IBRAM towards achieving the so called Green Economy paradigm include best occupational safety and health practices in the mining sector; sensible and efficient use of living and non living resources; workforce training; and empowerment of communities residing in mining areas.

It is IBRAM's view that concerted, environment friendly actions in line with the objective of solidifying sustainable development with social inclusion will make it possible to achieve the growth levels desired by Brazil today and in the future.

José Fernando Coura
Chief Executive Officer



BACKGROUND

The United Nations Organization has held a number of conferences aimed at reconciling the debate on environmental conservation versus economic development. This process started with the Stockholm Conference in 1972 and the Rio de Janeiro Conference held in 1992 is also a part of it. This was the largest conference on the environment and development ever, and it introduced the notion of sustainable development. The industrial sector took a proactive stance at the time, which had the creation of the World Business Council for Sustainable Development (WBCSD) as a milestone.

In 2002, the UN held the World Summit on Sustainable Development in Johannesburg, also called Rio+10. This was an opportunity to review the targets set out in the Rio 92 Conference and to map achievements and areas that required further efforts. However, the event took a different turn and its discussions focused on aspects of a social nature. It's been 10 years since the Johannesburg Conference, and now the UN is organizing a Conference on the same topic, to be held in Rio de Janeiro in 2012.

The UN Resolution on the organization of the Conference reflects the need to invite the various stakeholders to take part in the debate. As a result, an opportunity is available for the industrial sector to take part in the design of planning for the Conference in a concerted fashion by providing inputs and identifying the most relevant topics for the discussion on sustainability.

Given the diverse profile of the industrial sector, it is key for proposals and themes for discussion to effectively reflect the challenges in the development promotion agenda by incorporating increased competitiveness in Brazil's industrial sector without undermining the country's comparative advantages afforded by the supply and use of natural endowments. In order to steer the various views and proposals, it is fundamental to have leadership and coordination from the production sector that is capable of reconciling the various viewpoints and interests.

Considering that the Conference is being hosted by Brazil, and in view of the Country's leading role in environmental issues internationally, it is essential to engage Brazil's business sector in this discussion. As the legitimate representative of Brazil's industrial sector, the Brazilian National Confederation of Industry (CNI) has a key role to play, thus showing the achievements made by the sector in the environmental front in the Country since 1992, as well as the perspectives and opportunities that emerged from the coming of age of sustainability in the business sector.

Against this backdrop, the viewpoint of these industries on the relevant topics and their perceptions on the trends emerging from this debate are vitally important. To this end, CNI provides trade associations with Terms of Reference for the development of a document to be added to the Brazilian industrial sector's official position at the Rio+20 Conference. This document should focus on technical contents vis à vis the topics outlined in the suggested structure below, reflecting the current state of affairs and the industry's viewpoint of the emerging trends.



1 INTRODUCTION

1.1 Ibram

The Brazilian Mining Association (IBRAM) is the country's entity that represents corporations and organizations in the mining industry. It is a private, nonprofit association with the objective of bringing together, representing, promoting, and publicizing Brazil's mining industry, thus helping enhance its competitiveness at domestic and international levels. IBRAM also intends to foster sustainable development and adoption of best occupational safety and health practices by the mining industry by encouraging research, development, innovation, and use of cutting edge technologies.

Another major task is to promote and enhance the technological and human capabilities employed in the mining sector, in addition to advocating for sustainability and respecting the environment and water resources. IBRAM has an ongoing focus on improving life standards, in particular those communities living in mining areas, especially those people that are located close to or are directly impacted by mining sites.

IBRAM currently has 206 members, including mining companies, mining machinery and services companies, trade associations, and law offices. See Annex 1 by the end of this document for a description of these.

1.2 Objectives of this Issue

The purpose of this issue is to show the importance of contributions by the mining business to Brazil's sustainable development, as well as to introduce the opportunities and challenges facing the industry to achieve a new economic and socio environmental paradigm that is now taking shape.



2 INDUSTRY PROFILE

The term 'mining' stems from the Latin word *mineralis* (i.e., related to mines), and it can be defined as the process of extracting economically valuable minerals and ores for the benefit of humankind. Mining is a primary industry, meaning that the minerals it produces are derived from the Earth's crust, including those extracted from oceans, lakes and rivers. In general, the good produced by this industry are used as raw material in secondary industries.

In view of its pioneering nature, however, mining does not stand out only because it is a primary industry, but also because of its is a driver of new and additional economic opportunities.

Minerals have an increasing impact on the lives and development of a country. As populations grow, higher amounts of minerals are required on a daily basis to meet growing needs, and as people migrate to urban areas the demand for minerals goes up. The comfort and technology provided by modern housing certainly rely on a number of minerals as the primary raw material in people's daily lives.

In terms of a classification of the mining supply chain, the industry comprises the steps of exploration, extraction and processing (metallurgy and non metallic materials)¹. The exploration step is intended to identify and study in detail those mineral deposits that are technically, economically and environmentally viable; it is followed by the steps of mine development and production. To this end, mining companies invest in research, both to diversify new sources and to enhance the knowledge of mineral reserves of active mines in order to further their activities. Mining is the step of extraction operations where mineral raw materials are produced.

The mineral processing segment is the link in the chain that interfaces with the secondary sector of the economy by adding value and generating jobs from mining. It

¹ 2030 National Mining Plan, developed by the Brazilian Ministry of Mines and Energy in 2010.

comprises metallurgy (steel, non-ferrous metals, ferroalloys, pig iron, and cast iron) and non-metallic minerals (cement, red ceramics, ceramic tiles, glass, lime, gypsum, fertilizers, etc.).

According to specialized literature, minerals may be sorted in the following order:

1. Metals

- a) Ferrous metals (elements that are used heavily in the steel industry and make up key alloys with iron):
 - Iron, manganese, chromium, cobalt, molybdenum, niobium, vanadium, etc.
- b) Non-ferrous metals:
 - Copper, zinc, lead, tin, aluminum, magnesium, titanium, beryllium, and nickel.

2. Precious metals

- Gold, silver, platinum, etc.

3. Non-metals:

- a) Industrial Minerals and Rocks (IMRs);
- b) Materials for construction;
- c) Ornamental rocks;
- d) Agro-minerals.

4. Energy materials

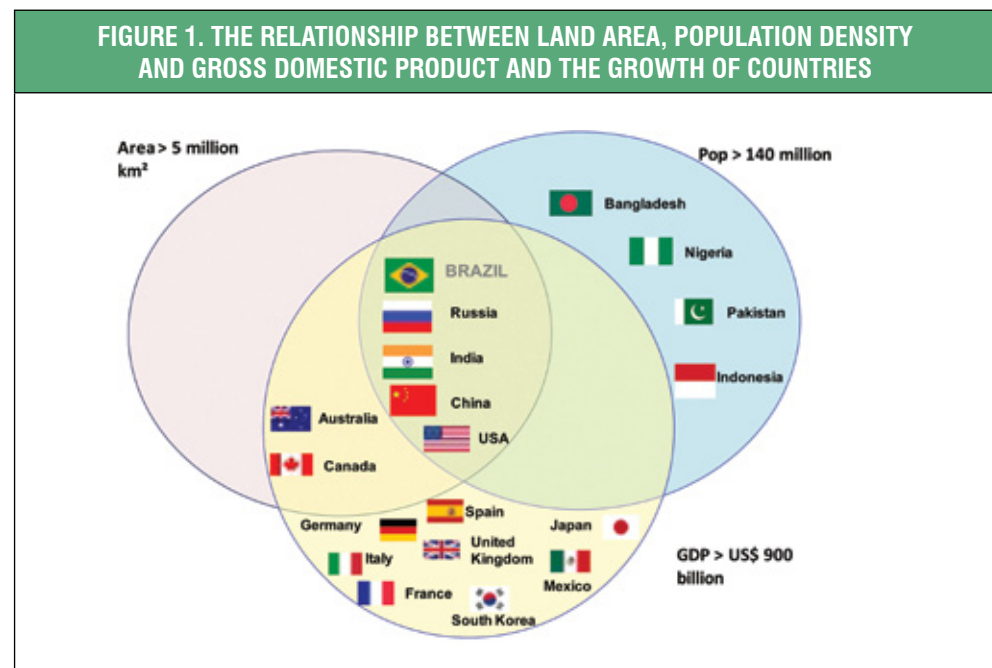
5. Gems and diamonds

6. Mineral water

2.1 The Global Mining Industry

The mining sector provides a major socio-economic contribution to the Brazil and the world. It accounts for much of GDP growth, enables investments in infrastructure, in technology development, and in improved professional qualification. When used adequately, the proceeds from mining support the socioeconomic development of the communities located around the mining areas. Moreover, if managed responsibly, the mining business minimizes the impacts on natural systems and on society by assisting them throughout the life of the mining activity and after closure.

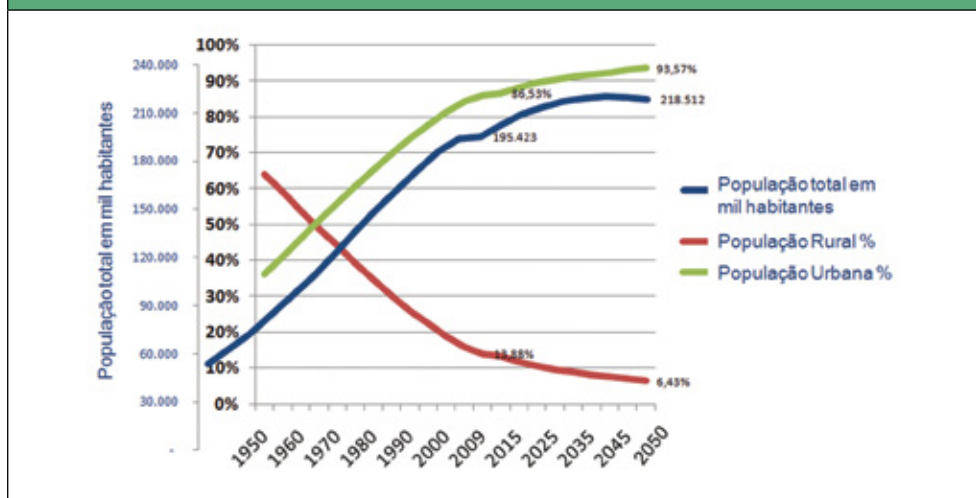
Brazil's mining industry is currently experiencing vigorous growth that is associated both to the profound structural changes that the country has been undergoing and the social and economic situation of the world. This growth is driven by the urbanization process in emerging countries endowed with vast territorial areas, high population density and large Gross Domestic Product, such as the BRICs (Brazil, Russia, India, and China), which coincidentally makes them major players in the global mining arena.



Source: World Bank (2010).

In any country, urbanization boosts consumption of mineral commodities. Cities will need to build houses, manufacturing facilities, roads, railways, hospitals, schools, and universities; they will need to upgrade the existing infrastructure for an increase in demand due to population growth, build power plants and power transmission networks, increase food production, etc. In other words, urbanization and improved quality of life increase the demand for mineral commodities, and because it needs to augment mineral production, the mining industry requires increased investment.

FIGURE 2. THE GLOBAL URBANIZATION PROCESS



Source: ONU (<http://esa.un.org>).

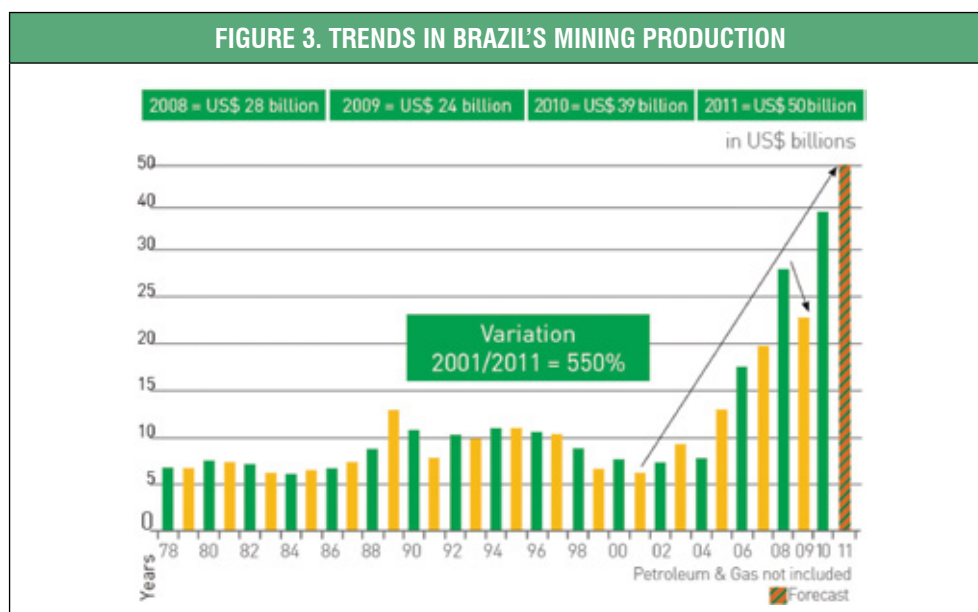
2.2 Economic Characterization

The mining industry plays a pivotal role in boosting the economy of Brazil. It accounted for 3% to 4% of the GDP and 20% of total exports, generating 175 thousand direct jobs and 2.2 million in mineral processing, i.e. 8% of industrial jobs in 2010.

Growth rate of mining production

From the year 2000, increased demand for minerals – especially due to the high rate of global growth – boosted the value of PMB (an acronym that stands for 'Brazilian Mineral Production' in Portuguese). In 2001 2011, the value of the PMB grew by 550% – jumping from \$7.7 billion to \$50 billion in 2010, according to the National Mining Plan (PNM/2030).

As global urbanization rushes ahead and emerging economies expand, it is estimated that the PMB will continue to grow between 5% and 8% per year over the next three years.



Source: Ibram, 2011.

Share of mining industry in Brazil's industrial GDP

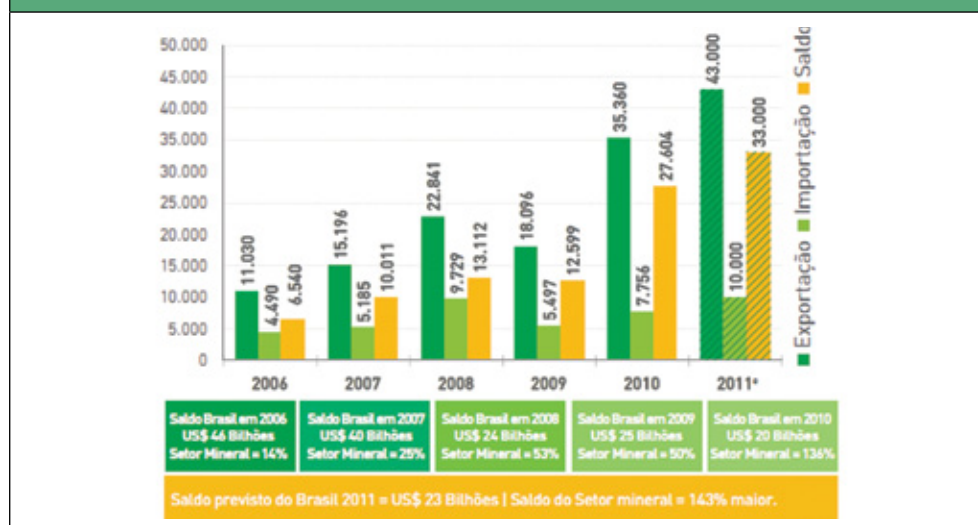
The importance of the mining industry for the Country as measured by the share of this industry in the GDP has been waning over the years. This decline is likely to be related to the economic diversification that Brazil has been experiencing over the past few decades.

TABLE 1. SHARE OF MINING INDUSTRY IN BRAZIL'S GDP										
Industry segment	Years						Average annual growth rate per decade			
	1970	1980	1990	2000	2005	2008	70	80	90	2000
Mining (1)	0.8	0.8	0.6	0.6	0.8	1.1	8%	-1%	0%	10%
Processing (2)	5.1	5.4	4.1	2.6	3.4	3.1	8%	1%	0%	2%
Non metallic	1.6	1.8	1.3	0.7	0.6	0.7	9%	-1%	-3%	3%
Metallurgy	3.5	3.6	2.8	1.9	2.8	2.4	8%	-1%	-1%	6%
Total (1 + 2)	5.9	6.4	4.7	3.2	4.2	4.2				
Brazil's GDP							7.7%	2.0%	2.1%	3.2%

Source: PNM-2030.

In 2008, GDP of the mining sector totaled \$69 billion, accounting for 4.2% of the national GDP. It should be pointed out that the mining sector has had a positive impact on the Brazilian trade balance in recent years. This is primarily due to the significant income from the export of its mineral commodities.

FIGURE 4. MINING INDUSTRY AS A SHARE OF BRAZIL'S TRADE BALANCE



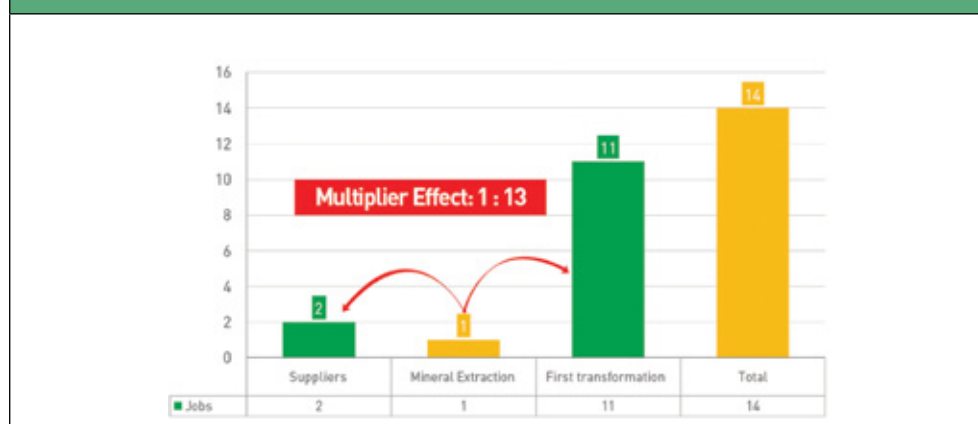
Source: Ibram, 2011.

Number of jobs in the mining industry

The total manpower directly employed in the mining sector was 175 thousand workers in 2011. Studies conducted by the Ministry of Mines and Energy's Secretariat for Geology, Mining and Mineral Processing show that the multiplier effect of job creation is 1:13 in the mining sector. This means that for every job created in the mining sector, another 13 are directly created along the supply chain. This number is even greater if the multiplier effect of indirect jobs in the mining business are taken into consideration.

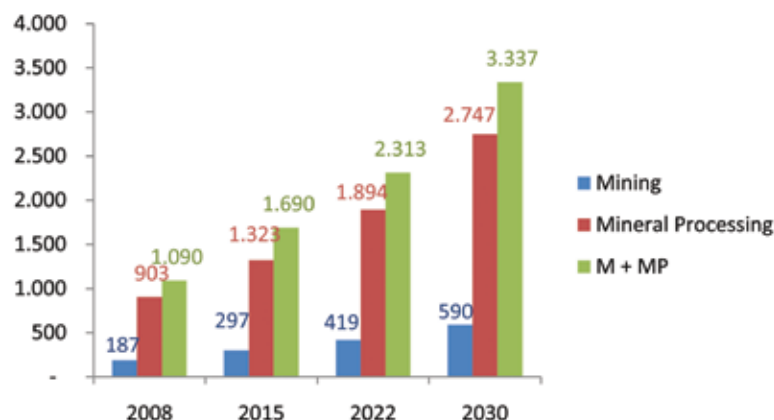
Therefore, it can be considered that the mining sector employs about 2.2 million (direct) workers, without taking into account the exploration, extraction, planning, and the workers involved in the so called artisanal mining.

FIGURE 5. IMPORTANCE OF MINING IN TERMS OF JOB CREATION



Source: National Secretary for Geology and Mineral Transformation of the MME.

FIGURE 6. NUMBER OF EXISTING JOBS AND EXPECTED TO BE CREATED IN THE MINING INDUSTRY BY 2030 (NUMBERS IN THOUSANDS OF JOBS)

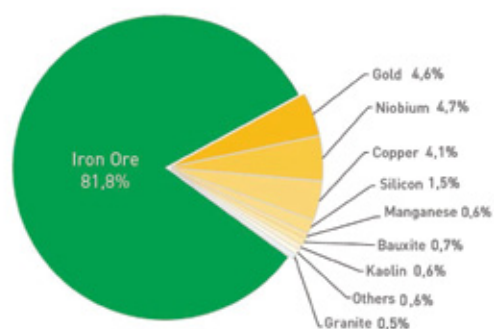


Source: PNM-2030.

Figures for mining exports and its share of Brazil's total exports

FIGURA 7. FOREIGN TRADE OF THE MINERAL SECTOR AMOUNTS IN MILLIONS OF US\$ (EXPORTS)

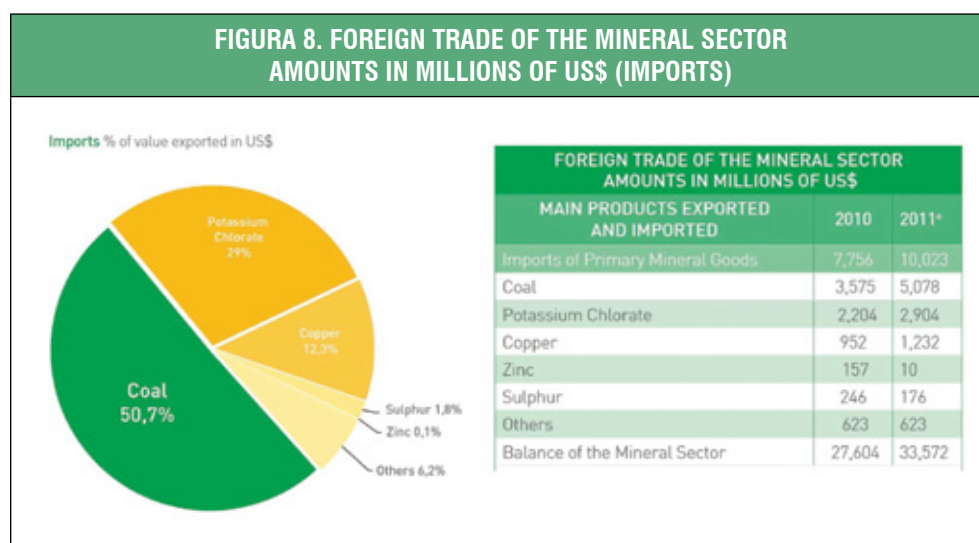
Exports % of value exported in US\$



FOREIGN TRADE OF THE MINERAL SECTOR AMOUNTS IN MILLIONS OF US\$		
MAIN PRODUCTS EXPORTED AND IMPORTED	2010	2011*
Mineral Exports Primary Goods	35,360	43,595
Iron Ore	28,912	35,745
Gold (in bars)	1,786	1,988
Niobium (iron-niobium)	1,557	2,034
Copper	1,238	1,806
Silicon	460	637
Kaolin	275	258
Manganese Ore	357	276
Bauxite	270	322
Tin	8	20
Lead	12	12
Granite	219	230
Others	268	268

Source: Ministry of Development, Industry and Trade (MDIC) – Annualized projection for 2011.

Figures for mining imports and its share of Brazil's total imports



Source: Ministry of Development, Industry and Trade (MDIC) – Annualized projection for 2011.

Brazil's share of total global mining production

Brazil plays a major role in the world production of minerals, and is the leading global producer of a number of fundamental and strategic varieties. On the other hand, the Country relies heavily on minerals that are essential to its economy and growth, as is the case of agro minerals, which are fundamental to the fertilizer industry.

TABLE 2. RELEVANCE OF BRAZIL IN THE GLOBAL MINING PRODUCTION				
Global Exporter Player	Exporter	Self-sufficient	Importer/ Producer	Reliance on Foreign Sources
Niobium (1st)	Nickel Magnesium Kaolin Tin	Limestone	Copper	Metallurgic Coal Potash
Iron Ore (2nd)		Industrial Diamonds		
Manganese (2nd)		Titanium		
Tantalite (2nd)				
Graphite (2nd)	Vermiculite Chromium Gold	Tungsten Talc	Phosphate Diatomite Zinc	Sulphur Rare Earths
Bauxite (2nd)				
Ornamental Rocks (4th)				

Strategic Items

Source: DNPM/IBRAM/MME.

Number of companies operating in the mining industry in Brazil

According to the National Mineral Production Department (DNPM), the Annual Mining Report (*Relatório Anual de Lavras*, in Portuguese), there were 7,932 active companies in 2010, broken down as follows. IBRAM has 206 members and represents 85% of the Brazilian mining industry's GDP.

REGION	COMPANIES
Mid-West	942
Northeast	1,258
North	439
Southeast	3,392
South	1,901

2.3 Socio environmental profile

Mining is an industrial activity of temporary land use that requires a natural environmental conditions change (eg change in local topography, suppression of vegetation, etc.), in order to supply modern society with minerals necessary for their welfare. Like any productive activity, the mining sector is directly tied to the use of resources, natural or not. Therefore, actions aimed at optimization and rational use these inputs are becoming more prominent, to ensure the sustainability of mining chain.

Energy

The exuberant growth of the mining sector in the past decade bears a direct relation with energy consumption, as shown in the following tables.

In the “mining and pelletizing” table, the high demand for fuel oil, coal coke and electricity are mainly related to iron ore pelletizing. It should be stressed that the data contained in the National Energy Accounts (BEN, in the Portuguese acronym) in 2010 also covers other energy-intensive activities for ore compression, such as sintering.

Pelletizing is the process of compression or molding of a given material in the form of a pellet with characteristics that are suitable for feeding processing units, such as blast furnaces. The steps involved in the pelletizing process can broadly be divided into three stages – preparation of raw materials, formation of raw pellets and thermal processing.

TABLE 3. ENERGY CONSUMPTION – MINING AND PELLETIZING (TOE)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	142	283	182	191	229	270	260	233	426	239
Mineral Coal/ Coal Coke	400	437	455	421	602	690	680	726	743	430
Firewood	0	0	0	0	0	0	0	0	0	0
Diesel Oil	158	166	159	197	215	211	221	242	249	224
Fuel Oil	812	622	756	742	529	572	650	763	502	351
Liquefied Petroleum Gas	20	27	33	23	29	32	20	21	22	17
Kerosene	3	4	4	4	2	1	1	1	1	2
Electricity	639	594	660	785	799	829	863	928	970	706
Charcoal	0	0	0	0	0	0	0	0	0	0
Petroleum Coke	138	134	108	122	236	300	319	429	437	437
TOTAL	2,312	2,268	2,356	2,495	2,642	2,905	3,013	3,342	3,349	2,407

Source: BEN, 2010.

TABLE 4. ENERGY CONSUMPTION – MINING AND PELLETIZING (%)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	6.1	12.5	7.7	7.7	8.7	9.3	8.6	7.0	12.7	9.9
Fuel Oil	35.1	27.4	32.1	29.7	20.0	19.7	21.6	22.8	15.0	14.6
Electricity	27.6	26.2	28.0	31.5	30.2	28.5	28.6	27.8	28.9	29.3
Others	31.1	33.9	32.2	31.1	41.1	42.5	41.2	42.4	43.4	46.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: BEN, 2010.

In the tables below, energy consumption for the production of ferroalloys is expressed in toe (tones of oil equivalent) and percentage (%) terms. The high levels of electricity and charcoal use in the processing of ferroalloys is related to the reduction processes for these minerals. It should be noted that charcoal used increasingly derives from planted forests, which are managed by the mining companies themselves.

TABLE 5. ENERGY CONSUMPTION – FERROALLOYS (TOE)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	0	0	0	1	1	2	2	29	2	2
Mineral Coal	36	36	43	16	0	0	0	0	0	0
Gasworks Gas	0	0	0	0	0	0	0	0	0	0
Coal Coke	6	19	7	79	106	92	93	104	119	92
Electricity	550	462	586	614	659	665	662	746	751	579
Charcoal and Firewood	490	313	399	609	648	662	668	715	730	564
Others	101	102	99	151	149	192	187	209	210	210
TOTAL	1,182	932	1,135	1,470	1,563	1,613	1,613	1,803	1,811	1,446

Source: BEN, 2010.

TABLE 6. ENERGY CONSUMPTION – FERROALLOYS (%)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	0.0	0.0	0.0	0.1	0.1	0.1	0.1	1.6	0.1	0.1
Mineral Coal	3.1	3.9	3.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Gasworks Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal Coke	0.5	2.0	0.6	5.4	6.8	5.7	5.8	5.8	6.6	6.3
Electricity	46.5	49.5	51.7	41.8	42.1	41.2	41.1	41.4	41.5	40.0
Charcoal and Firewood	41.4	33.6	35.2	41.4	41.5	41.0	41.4	39.6	40.3	39.0
Others	8.5	11.0	8.7	10.3	9.6	11.9	11.6	11.6	11.6	14.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: BEN, 2010.

In the case of non-ferrous metals and metallurgy, the primary source usually employed is electricity. This consumption focuses primarily on mineral processing, a stage that requires massive amounts of energy. Coal coke is also used to some extent in this type of processing.

TABLE 7. ENERGY CONSUMPTION – NON-FERROUS METALS AND METALLURGY (TOE)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	148	163	279	327	452	490	528	632	675	659
Firewood	0	0	0	0	0	0	0	0	0	0
Fuel Oil	976	917	871	1,136	1,136	1,147	1,091	1,124	1,062	987
Liquefied Petroleum Gas	75	70	54	54	37	18	85	91	85	79
Gasworks Gas	0	0	0	0	0	0	0	0	0	0
Coal Coke / Mineral Coal	245	210	244	221	251	255	259	270	187	173
Electricity	2,490	2,255	2,629	2,763	2,916	2,999	3,174	3,273	3,366	3,106
Charcoal	6	6	8	8	8	8	8	9	9	8
Other Petroleum Secondaries	424	381	431	505	498	513	548	583	590	590
TOTAL	4,385	4,001	4,515	5,014	5,298	5,430	5,694	5,982	5,975	5,601

Source: BEN, 2010.

TABLE 8. ENERGY CONSUMPTION – NON-FERROUS METALS AND METALLURGY (%)										
SOURCES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Gas	6.1	12.5	7.7	7.7	8.7	9.3	8.6	7.0	12.7	9.9
Fuel Oil	35.1	27.4	32.1	29.7	20.0	19.7	21.6	22.8	15.0	14.6
Electricity	27.6	26.2	28.0	31.5	30.2	28.5	28.6	27.8	28.9	29.3
Others	31.1	33.9	32.2	31.1	41.1	42.5	41.2	42.4	43.4	46.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: BEN, 2010.

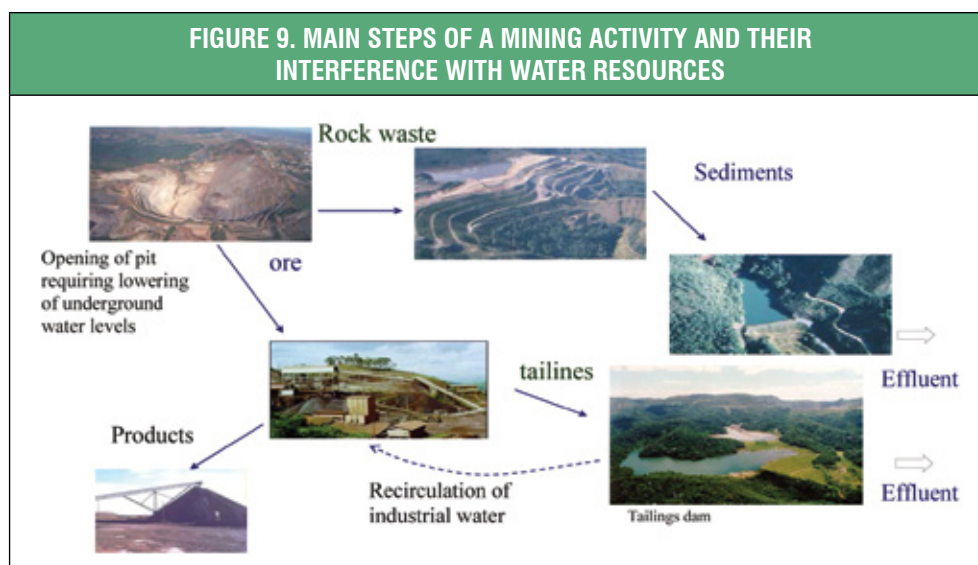
Water

WATER USE

The mining business is distinguished by its significant interaction with surface and underground water, be it for the use of water in its production processes or the fact that it operates in areas of water sources and water recharge.

Being vital for a number of mining processes and operations, water involves major additional costs as a result of both drainage requirements and interference in its quality, which is why it requires proper management and governance. For the mining industry, water is a strategic, scarce and economically valuable element. Scarcity and pollution of water is a limiting factor for mining operations, and efficient use of water resources is an important factor of competitiveness.

The water-mining relationship must be considered in every possible aspect, not only in the stages of mine exploration, operation, closure, and post closure, but also taking into account all ore processing activities, as can be seen in the following Figure:



Source: MBR.

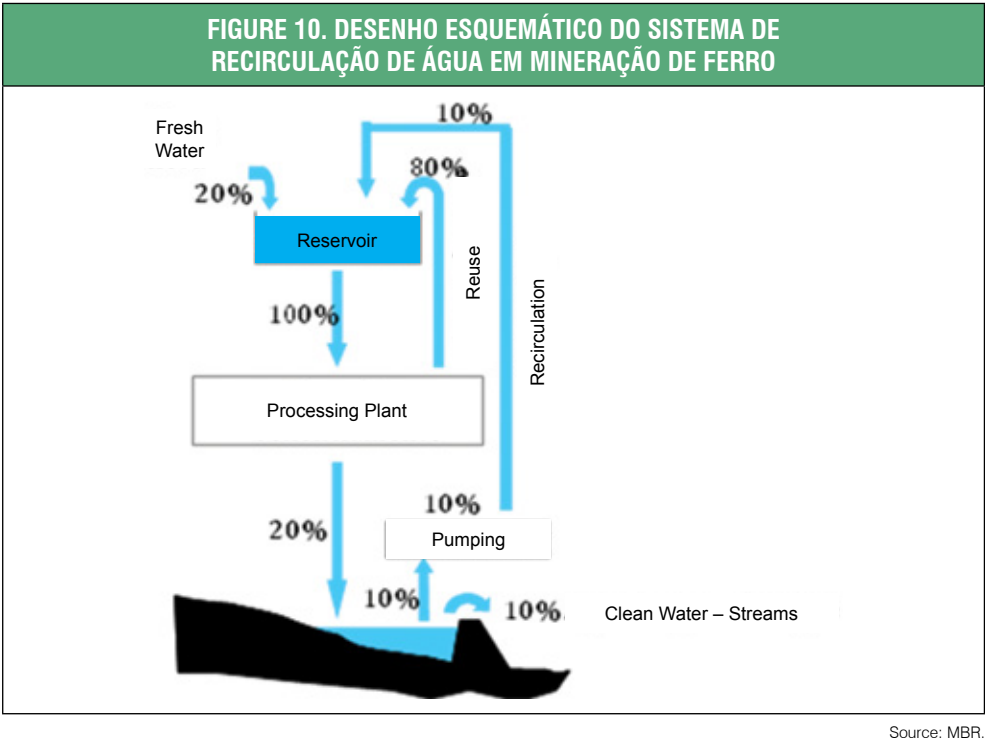
On the issue of water use performance in the mining industry, IBRAM has entered into a partnership with the Ministry of Environment's Secretariat for Water Resources and Urban Environment to conduct a study to establish technical coefficients for water use in Brazil's mining sector. The values derived from this study are shown in the following table.

TABLE 9. WATER CONSUMPTION (M3) FOR SOME MINERAL VARIETIES (2010)	
Type of Mineral	Consumed Flow/Output (m3/t)
Copper	2.03
Iron	0.18 to 1.0
Phosphate	6.6 to 13.8
Potash	0.11
Manganese	0.03 to 0.17
Gold	0.14 to 2.28
Titanium	1.58

Source: Ibram.

Water use in mining operations involves significant figures. Therefore, there is growing interest in the quantity and quality of water, which is a viable alternative to increased, lower cost production, process efficiency, among others. Additionally, water from tailings ponds, thickeners, filtering operations, etc. is recycled in concentration plants and helps reduce consumption of new water in this process.

Due to the massive volumes involved, the use of recycling processes and water recirculation is quite commonplace in the mining sector. (Figure 10). The most common sources are from the reservoirs of tailings dams or those resulting from the process of dewatering by filtration, screening, and thickening, etc.



The correlation between the amount of fresh water and recycled/recirculated water varies on a case by case basis. The ideal situation is the so-called zero discharge, i.e., optimization of the recycling process makes it possible to reuse all of the water already used.

The following table provides more details on the annual consumption and the rate of recycling/recirculation conducted by mining companies.

TABLE 10. ANNUAL CONSUMPTION AND THE RATE RECYCLING/ RECIRCULATION FOR DIFFERENT TYPES OF MINERALS			
Type of mineral	Production	Water	
		Annual consumption (million m3)	Recycling/ Recirculation (%)
Iron ore	4 Mt/year	43	90
Gold	335.5 thousand oz/year	3	54
Coal	42 Mt/year	1,3	90
Gold and silver	14.9 t/year	91,5	80
Kaolin	1.45 Mt/year	5,7	85
Industrial quartz sand, limestone and dolomite	2.9 thousand Kt/year	7	95
Bauxite	17.02 Mt/year	25	85
Iron ore pellets	23.449 Mt/year	163,3	91
Nickel	4.05 Mt/year	3,4	74,3
Phosphate	283.5 Mt/year (ROM)	22,5	50 to 83
Gold	155.1 thousand oz/year	0,39	90
Iron ore	307.8 Mt/year (iron) and 49 Mt/year (pellets)	294,3	79
Aluminum, nickel and zinc	15.6 Mt/year	24,8	62
Bauxite	2.8 Mt/year	8,4	50 to 90
Gold and copper	327.9 thousand oz/year (gold) and 149.4 thousand pounds of copper	50,1	83

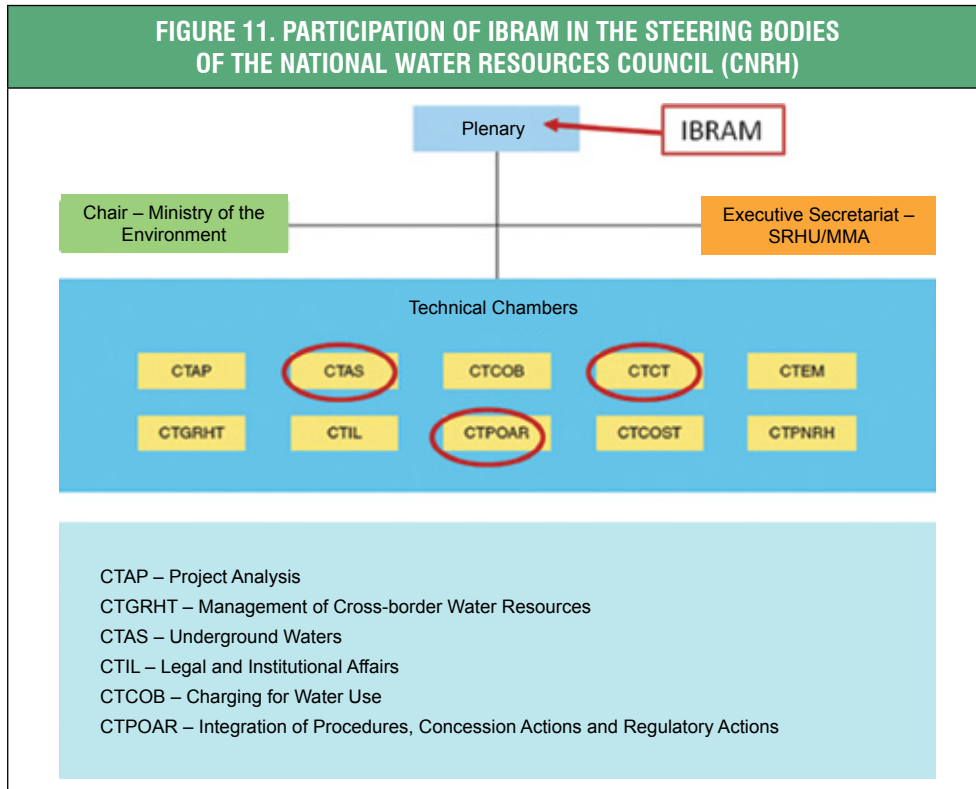
Source: IntheMine, 2011.

MANAGEMENT OF WATER RESOURCES

With regard to the management of water resources from a political and institutional perspective, enactment of the *Lei das Águas* (Water Act) (Law 9433 of 8 de January de 1997) provided a modern and innovative approach – it is quite different in form from the majority of Brazilian laws. Its main contribution was to establish the concept of water as a finite good with economic value, in contrast to the widespread perception of water as an infinite bounty of nature. In doing so, it seeks to establish mechanisms for its effective management, thus enhancing design and negotiation mechanisms.

Aware of the importance of the issue, IBRAM, through its Board of Directors, decided to implement the Special Water Resources Program – PERH/IBRAM. IBRAM plays a role in the National Water Resources Management System (SINGREH, in

the Portuguese acronym) by monitoring the System's steering bodies, as can be seen in the following figure:



Source: Ibram.

In addition to representing the industry in the National Water Resources Council (CNRH, in the Portuguese acronym), IBRAM is a full member of the State Water Resources Council for Minas Gerais (MG-CERH) and also takes part in two technical chambers in the State Council, namely:

- Technical Chamber for Management Tools (CTIG)
- Legal and Institutional Technical Chamber (CTIL)

Additionally, IBRAM takes part in the main river basin committees with a state jurisdiction – in the case in Minas Gerais – and at the federal level:

- Velhas River Basin Committee
- Paraopeba River Basin Committee
- Doce River Basin Committee
- Sao Francisco River Basin Committee
- Araguari River Basin Committee
- River Basin Committee for the Upper Paranaíba's Tributaries in Minas Gerais

BIODIVERSITY AND FORESTRY

The mining business can potentially affect biodiversity through the life cycle of a mining project both directly and indirectly. Direct or primary impacts may result from any activity that involves removal or clearance of land (such as entryways, road construction works, drilling for exploration, construction of tailings dams, etc.); and release into water bodies or into the air (particulate emissions). These can be readily identifiable and rectified. The secondary or indirect impacts may result from socio environmental changes caused by the mining operations and are often difficult to pinpoint. Cumulative impacts occur where mining projects are conducted in environments influenced by other projects, whether mining or non-mining projects.

Despite the potential for significant negative impacts on biodiversity from mining operations, much has been done by mining companies to minimize or prevent such impacts in those areas identified as suitable for mining. The commitment currently demonstrated towards biodiversity conservation is an essential part of sustainable development for the mining and metals industry, as shown in the table below.

TABLE 11. BIODIVERSITY RELATED ACTIONS REGARDING DIFFERENT MINERAL TYPES IN 2010			
Type of mineral	Biodiversity		
	Protected Area (Hectares)	Revegetation (ha/year)	Seedling nursery (seedlings)
Iron ore	2.8 thousand	350	120 thousand
Gold	3.506	12	20 thousand
Coal	0,45	23,6	
Gold	1.3 thousand	28	20 thousand
Gold and silver	4.078	126	20 thousand
Kaolin	1.3 thousand	50	50 thousand
Industrial quartz sand, limestone and dolomite	377	10	3 thousand
Bauxite	377	254	400 thousand
Chrysotile mineral fiber	2.5 thousand	9	400 thousand
Limestone and clay	407	5 thousand seedlings/year	12 thousand
Iron ore pellets	2.2 thousand	61,78	20 thousand
Nickel	1.400	51	25 thousand
Phosphate	6 thousand	78,7	25 thousand
Gold	408.5	12,6	20 thousand
Iron ore	1.1 thousand	7 thousand	5 million
Aluminum, nickel and zinc	22 thousand		
Bauxite	1.4 thousand	122	400 thousand
Gold and copper	2768	55	55 thousand
		55	55 thousand

Source: IntheMine, 2011.

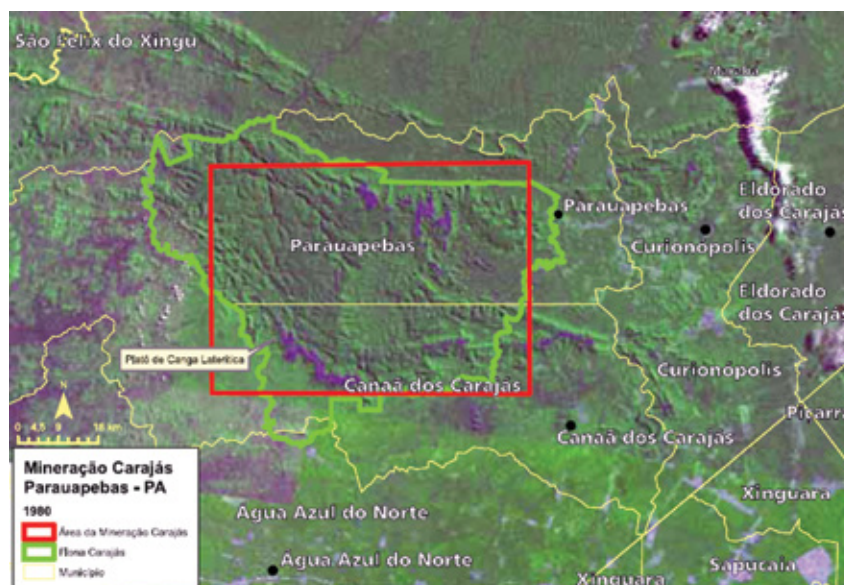
Several mining companies have pursued biodiversity management strategies as part of their commitment to establish and maintain its 'operating license.' Thus, the commitment by the mining industry to respect, preserve and restore the landscape and to conserve biodiversity in the areas where their mining operations are carried out is intended to go beyond legal environmental requirements, i.e., socio environmental responsibility is perceived as strategic for the performance of their activities and not as mere budgeted costs.

TABLE 12. INVESTMENTS IN ENVIRONMENTAL CONSERVATION REGARDING DIFFERENT MINERAL TYPES IN 2010	
Type of mineral	Investments (R\$)
Agalmatolite	500.000,00
Chrysotile Asbestos	1.600.340,50
Sand	190.530,05
Bauxite	29.836.056,00
Limestone	3.325.842,46
Coal	7.996.617,03
Cassiterite	2.126.918,48
Kaolin	10.600.000,00
Copper	8.183.080,58
Feldspar	25.400,00
Iron	429.150.832,85
Phyllite	70.000,00
Phonolite	150.000,00
Gypsum	40.000,00
Gneiss	125.000,00
Granite	1.475.000,00
Ilmenite	1.463.262,00
Nickel	10.121.684,38
Gold	37.747.862,00
Potash	5.164.891,46
Uranium	85.900.861,00

Source: Minérios e minerais, 2011.

There are several successful cases of coexistence of mining activities in Preservation Areas (EPAs) and National Forests (NF), including projects in the Carajás NF, in the state of Pará. In this case, satellite imagery from 1980 and 2006 show the intense human activity in the area surrounding the Carajás project, which virtually wiped out the entire native forest cover in the area in less than three decades. What remained were the protected areas located around the iron mine. The picture zooms in on the impact of mining activities. It should be pointed out that the forest cover was restored on 3,000 hectares and 8 million seedlings of 450 species were planted from 1979 to 2005.

FIGURE 12. CARAJÁS NF AREA IN THE MUNICIPALITY OF PARAUPEBAS, PARÁ, IN 1980

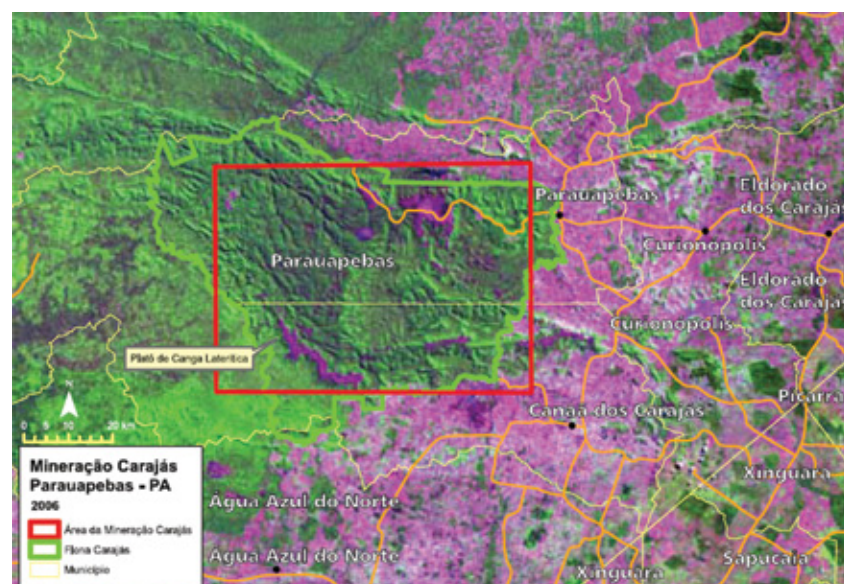


Mineração Carajás, Parauapebas, Pará – 1980

- Mineração Carajás Area
- Carajás NF
- Municipal borders

Source: PNM 2030.

FIGURE 13. CARAJÁS NF AREA IN THE MUNICIPALITY OF PARAUPEBAS, PARÁ, IN 2006



Mineração Carajás, Parauapebas, Pará – 2006

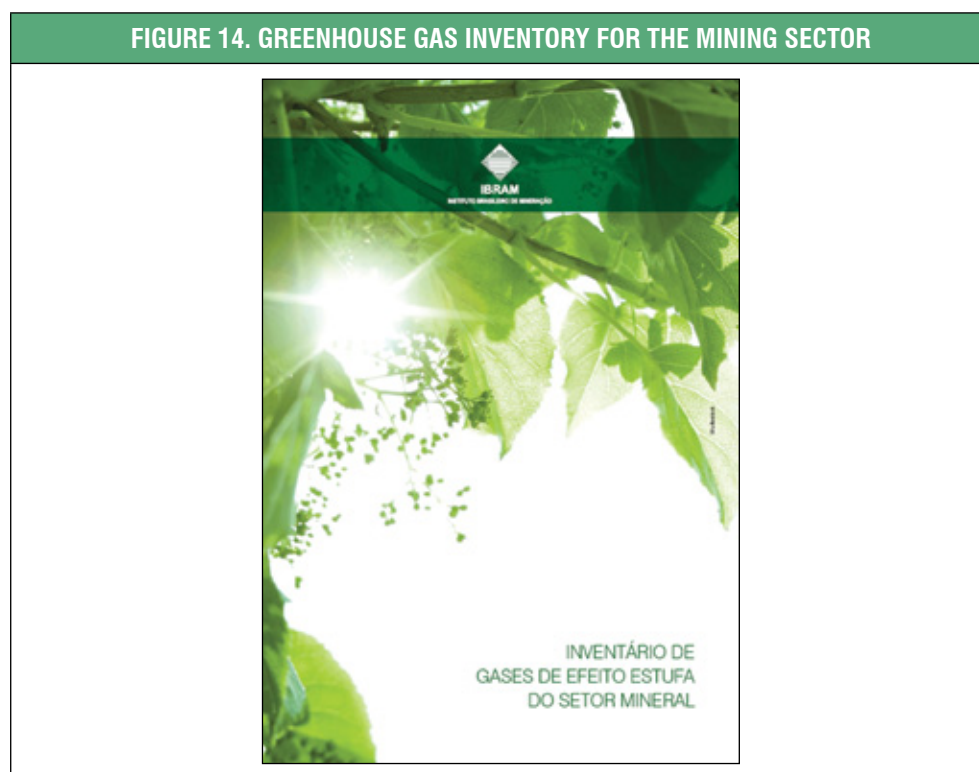
- Mineração Carajás Area
- Carajás NF
- Municipal borders

Source: PNM 2030.

CLIMATE CHANGE

Climate Change is increasingly becoming a defining element of human activities, whether production activities or not. Indeed, the Federal Government enacted the National Policy on Climate Change – Law No. 12187/2009, which established the National Policy on Climate Change (PNMC, in the Portuguese acronym), among other provisions, including development of Industry Specific GHG Emission Plans, including a plan for the mining sector, which was due to be completed by December 15th, 2011. Therefore, understanding the behavior of the mining industry vis à vis a low carbon economy is obviously paramount.

Given this new paradigm, IBRAM has undertaken to develop the “*Inventário de Emissões de GEE do Setor Mineral*” (Inventory of GHG Emissions in the Mining Sector), discussed below. The purpose of this report was to provide an understanding of the current status of IBRAM’s members regarding Climate Change and Greenhouse Gases (GHGs), and it is the first step for the development of a GHG inventory for Brazil’s mining sector.

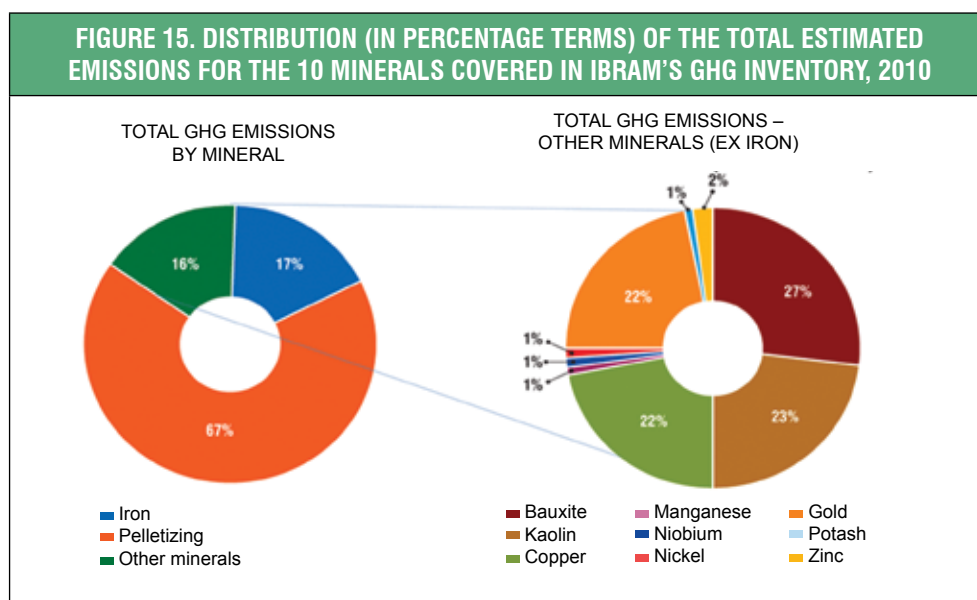


Source: IBRAM, 2011.

The starting point for this GHG inventory was the existing business inventories for the 10 most relevant minerals in terms of value. For each of these, the most relevant companies were selected; their production total accounts for at least 80% of the industry’s output. Then a projection of total GHG emissions related to the individual minerals was conducted. The year 2008 was chosen as the base year for mining production, with no deviations arising from the global economic crisis in 2009.

Emissions of greenhouse gases for the ten minerals covered in the inventory, as expressed in metric tons of carbon dioxide equivalent (CO₂e), totaled **8,855,655 tons of CO₂e** for the year 2008.

The graphs below represent the distribution (in percentage terms) of the total estimated emissions for the 10 minerals:

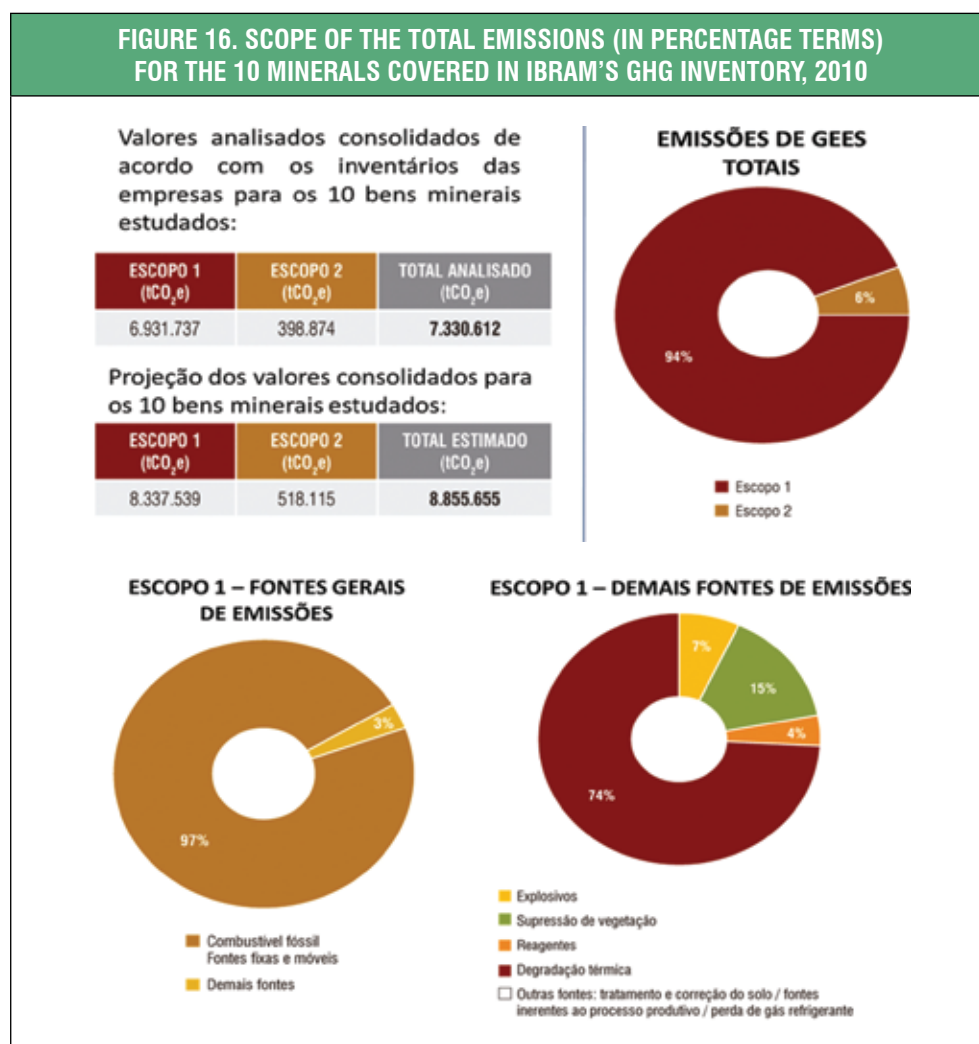


Source: Ibram.

Out of these 8,855,655 tCO₂e, 7,473,800 tCO₂e are related to iron, which includes its extraction, inland transport and pelletizing. Hence, iron accounts for 84% of total emissions. However, pelletizing alone accounts for 67% of mining related emissions (5,957,420 tCO₂e). Without the pelletizing component, total emissions would be **2,898,235 tCO₂e**. The relative share of iron emissions without pelletizing then becomes 52% (1,516,380 tCO₂e).

The first finding to emerge from this study is the low relative contribution of the mining sector to GHG emissions at national level. Considering the latest official data available for Brazil (2005), total emissions for CO₂ alone (top GHG emissions) were 1,637,950,000 tCO₂. A strict analysis of mining in this study revealed 8,855,655 tCO₂e (tCO₂e represents the sum of CO₂, methane and nitrous oxide). This warrants the conclusion that the contribution of mining is of little significance to the limit of the production process used in extraction, processing and transportation. Considering that limit, however, the use of heavy equipment and vehicles with high consumption of fossil fuels is a significant source of GHG emissions.

Over 90% of the corporate emissions covered in the study arise from the burning of fuel in stationary and mobile sources. Therefore, direct emissions (Scope 1) are the most significant in absolute terms. As for indirect emissions (Scope 2), the majority of companies surveyed uses electricity from the National Integrated National, thus resulting in extremely low emissions.



Fonte: Ibram.

Thus, a contribution of mining companies to the abatement of GHG emissions is related to the efficient use of fossil fuels, as well as the use of renewable fuels. The massive concentration of mining sites in far off areas and in the North region of Brazil, which has areas formerly covered by crop and pasture lands, provides an opportunity for the production of biofuels in this area to supply mining companies. This provides numerous benefits, including the following: (i) reduction of direct GHG emissions from fossil fuel burning by mining companies; (ii) rehabilitation of vegetation in degraded areas; and (iii) economic and social development of impoverished areas.

WASTE GENERATION

The National Policy on Solid Waste (PNRS, in the Portuguese acronym) provides principles, objectives, guidelines, goals and actions, in addition to important tools for the various types of waste. As far as mining waste is concerned, the PNRS has a specific definition due to the distinct features of the waste generated by this industry.

Large volumes and masses of materials are extracted and handled in mining operations, where two types of solid waste are generated in larger quantities – rock waste and tailings. Rock waste refers to excavated materials generated by the extraction or mining activities during mine stripping, have no economic value and are usually arranged in dumps. Tailings are the waste from mineral processing activities. These processes are intended to standardize the size of fragments, remove related minerals with no economic value and enhance the quality, purity or content of the final product. There are other wastes consisting of a wide range of materials, such as sewage treatment effluents and tire and battery casings from the operation of mineral extraction and processing plants. The following is information on the production and total quantity of tailings generated and the average percentage share of each substance in the decade 1996-2005 and during 2010-2030.

TABLE 13. TOTAL TAILINGS GENERATED AND AVERAGE PERCENTAGE SHARE OF EACH SUBSTANCE IN THE DECADE 1996-2005 AND DURING 2010-2030				
Item	Total amount of waste (1,000 t)		Average share of individual ores in total waste (%)	
	1996-2005	2010-2030	1996-2005	2010-2030
Iron	765,977	4,721,301	35.08	41.38
Gold	295,295	1,111,320	13.82	9.74
Titanium	276,224	1,018,668	12.55	8.93
Phosphate/Phosphate rock	244,456	1,128,198	11.33	9.89
Tin	149,369	357,952	6.79	3.14
Zirconium	116,236	490,183	5.39	4.30
Limestone	89,398	341,045	4.29	2.99
Aluminum (bauxite)	69,783	493,925	3.16	4.33
Copper	53,498	819,636	2.25	7.18
Niobium	35,690	119,372	1.53	1.05
Nickel	35,076	637,380	1.61	5.59
Kaolin	24,346	90,729	1.09	0.80
Manganese	12,064	36,071	0.54	0.32
Zinc	12,562	44,097	0.57	0.39
Total	2,179,975	11,409,877	100.00	100.00

Source: Research data. Developed by IPEA/DIRUR.

The disposal of mining tailings in dams is the most commonly used method in the Brazil. These dams or dikes may involve natural soil (conventional dams) or they can be built with the tailings themselves (retention dams with raised tailings embankments). The three most common methods to build embankments for tailings dams are the upstream, downstream centerline methods. Tailings dams pose a serious risk if they are not properly designed, operated and serviced. The importance of this issue is such that in 2010 Law No. 12334 was enacted, establishing the National Policy on Dam Safety.

ATMOSPHERIC EMISSIONS

Atmospheric emissions from mining activities are found throughout all stages of a mining project. Depending on its size, a mining project may process millions of tons of ore during its lifetime, and this ultimately generates a massive amount of materials suspended in the atmosphere, especially particulates. It should be stressed that these emissions have harmful effects on the environment and human health, so their control and management are paramount.

TABLE 14. EMISSIONS OF PARTICULATE MATTER RELATED TO THE PRODUCTION OF DIFFERENT MINERAL TYPES		
Type of mineral	Production	Emissions of particulates
Gold and silver	14.9 t/year	0.00103 kg/t
Bauxite	17.02 Mt/year	352.4 mg/Nm ³
Chrysotile mineral fiber	302 Mt/year	0.96 kg/h
Iron ore pellets	23.449 Mt/year	1.2 thousand t
Nickel	4.05 Mt/year	24.9 µg/m ³
Phosphate	283.5 Mt/year (ROM)	8.82 lb/t
Gold	155.1 thousand oz/year	0.1 tpa
Iron ore	307.8 Mt/year (iron) and 49 Mt/year (pellets)	6.6 thousand t
Aluminum, nickel and zinc	15.6 Mt/year	1.1 thousand t

Source: IntheMine, 2011.

SAFETY AND HEALTH

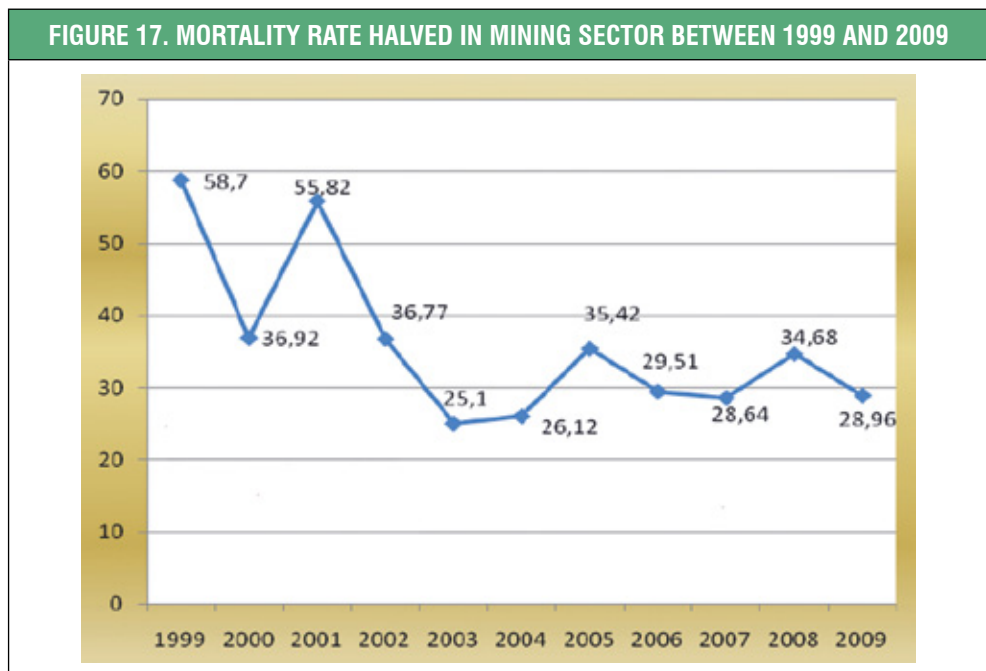
Mining is considered to be a high risk sector and mining workers operate under challenging conditions. Workers in mines are among those who still suffer due to inadequate and insufficient occupational safety health and hygiene standards.

The exact nature of mining related hazards depends on the profile of the mine – whether it is an open pit or underground mine – and whether it is a large or small mine. However, the hazards to mine workers can be generalized as follows:

- Environmental hazards: underground difficulties due to darkness, heat, humidity, insufficient space, radiation, exposure to gases (e.g. methane), and atmospheric pressure.
- Occupational hazards: explosives, physical work, noise, vibration, dust.
- Poisoning due to: fumes from explosives, diesel engines, resins, PVC conveyor belts, non flammable adhesives and liquids based on polychlorinated biphenyls, phosphate, and glycol esters.
- Biological hazards in mines with wood props for wells or where draft animals are used. In some cases, the work sites can be infested with animals.

Although it is not possible to eliminate all possible hazards, it is possible to control the causes of most risks through a combination of national regulations; use of safety inspectors and safety and occupational health committees in the work sites; education and training and other solutions at the regional, national and local level in order to mitigate problems.

The industry has been currently working on an ongoing basis to manage these risks, learn from previous incidents and deploy processes, technologies and behavioral standards that would mitigate such undesirable situations. In this sense, Brazil's mining industry has been showing substantial changes with respect to fatal accidents, as can be seen in the chart below.



Source: MPS – Anuários Estatísticos de Acidentes de Trabalho – 2000 a 2009 e MTE – Relação Anual de informações Sociais – 1999 a 2009.

This new paradigm is reflected in the investments made in safety programs in a very wide range of supply chains in the mining industry, as shown in the following table.

TABLE 15 – INVESTMENTS IN SAFETY PROGRAMS (2010)	
Type of mineral	Investments (R\$)
Agalmatolite	95.000,00
Chrysotile Asbestos	1.794.246,49
Industrial sand	46.000,00
Bauxite	2.124.739,00
Limestone	1.340.990,00
Coal	322.000,00
Cassiterite	250.000,00
Kaolin	1.830.392,63
Copper	4.087.393,47
Feldspar	25.400,00
Iron	22.093.497,46
Phyllite	30.000,00
Phonolite	50.000,00
Gypsum	140.450,00
Gneiss	459.333,00
Granite	120.000,00
Ornamental granite	150.000,00
Magnesite	460.000,00
Manganese	2.400.000,00
Nickel	5.627.830,00
Gold	14.727.846,00
Potash	7.622.558,00
Quartz	17.100,00
Scheelite	30.000,00
Talc	231.500,00
Uranium	1.103.945,00
Zinc	2.245.729,92

Source: Minérios e Minerais, 2011.



3 ECONOMIC AND SOCIO ENVIRONMENTAL REGULATIONS WITH RELEVANCE TO THE MINING INDUSTRY

3.1 Main international agreements and regulatory issues relevant to the sector

Brazil is now a major player in the market for mineral commodities. Since mining is a business that has impacts at global level and is a primary industry for various supply chains, it has been the subject of various international agreements that try somehow to standardize its trade, as shown in the following list:

Reach

This stands for Registration, Evaluation (restriction) and Authorization of Chemicals, and it is a European Union regulation enacted on December 2nd, 2008 that states that all chemicals exported to the Union, marketed as such or as components of preparations and products must comply with its rules. A basic concept in the REACH regulation is that the mining industry becomes responsible for providing safety information on chemicals and the level of risk resulting from their use.

Although the goal of REACH is to ensure a high level of protection for human health and the environment, the regulation is so strict and demanding that it makes the compliance process expensive and laborious, thus posing a challenge particularly to small and medium exporting companies.

Raw Materials Initiative

In 2011, the European Union issued a trade and development policy defined as “Raw Materials Initiative.”

This new policy is based on the relevance for international markets of raw materials to operate freely and transparently. Many countries, however, are increasingly adopting measures such as export taxes, import subsidies, price setting and restrictive investment rules that distort markets. The net effect of these distortions is that the processing industry in developed, emerging and developing countries suffers the blow when access is subject to this sort of bias.

Rotterdam Convention – Inclusion of chrysotile asbestos

Asbestos is a naturally silky mineral fiber extracted essentially from rocks, which can be divided into two groups – amphiboles (tremolite, actinolite, anthophyllite, amosite, and crocidolite) and serpentines (chrysotile or white asbestos). Asbestos is known for both its applications and the hazards it poses to health.

The primary concern across the board in the mining industry is to control the dust likely to be released during the breaking, crushing and screening of mineral rocks. The fine particles suspended in the air are invisible to the naked eye, and they can cause pulmonary impairment. Today, however, thanks to technical and scientific knowledge, the hazards of chrysotile do not amount to a public health issue, instead they are an occupational health hazard requiring controlled use. Standards for iron ore exposure are covered by legislation and the Brazilian Federal Government is responsible for overseeing the compliance of controlled use rules.

Discussion is ongoing regarding greater control of international trade and use of chrysotile asbestos. The issues surrounding asbestos at international level are primarily related to international trade, worker protection and environmental protection.

European Union – Exporting mineral commodities

The European Union is increasingly placing restrictions on the export of products that could harm human health and the environment. An illustration is the ban on the export of metallic mercury and certain mercury compounds and mixtures in 2011, according to a regulation negotiated between the European Parliament and Council. This is based on the fact that mercury and its compounds are highly toxic to humans, in particular to the development of children's nervous systems, and they are also harmful to ecosystems and wildlife.

The Kimberley Process

Established in 2003, the Kimberley Process is designed to certify the origin of diamonds in order to curb trade on stones originating from conflict areas, with a view to preventing the financing of weapons in African countries racked by civil war.

The process began in 2000 and was an initiative by the main producing countries and by diamond trading countries in order to put in place a global certification system for rough diamonds extracted and sold legally. This process of informal negotiations is known as the “Kimberley Process Certification System (KP).” The system envisaged by the Kimberley group recommends that no diamond trade should be conducted without an appropriate certificate of origin. All imports and exports of batches of rough diamonds must be accompanied by a legitimate Kimberley certificate.

Brazil attended most meetings held under the KP from the beginning. However, it was not until November 2002, at the meeting in Interlaken, Switzerland, that Brazil officially declared its adherence to the Process as a Participant, pledging to comply with all necessary requirements to become a full member.

Equator Principles

The Equator Principles were created in October 2002, when the International Finance Corporation (IFC) – the financial arm of the World Bank – and ABN Amro – a Dutch bank – held a meeting of senior executives in London to discuss experiences with investments in projects involving social and environmental issues in emerging markets, where strict legislation to protect the environment is not always in place. The objective is to ensure sustainability, environmental balance, social significance and prevention of unexpected accidents that might affect the progress of projects while reducing the risk of default.

3.2 Main national regulations in force in major foreign mining markets with impacts on the industry

National and international self regulatory programs include technical standards such as those laid out by the **Brazilian Association of Technical Standards (ABNT)** and **the International Organization for Standardization (ISO)**.

IBRAM works in this domain through its Committee for International Mining Standardization (IBRAM-CONIM), whose primary purpose is to bring together the mining community and coordinate its participation in relevant national and international standardization fora.

On the topic of environment, standardization can be divided into three distinct and complementary levels of action:

- Guidelines for **environmental management and certification, widely implemented** by mining companies, whose development efforts (by ABNT and ISO) and dissemination efforts had the participation of IBRAM CONIM since their inception, with participation in standardization fora and corporate outreach events and visits.
- Guidelines for **environmental engineering**, in which many technological innovations that are beneficial to the environment in the mining business are addressed directly. Although not as close in this regard, the involvement of IBRAM-CONIM was extremely important, for example in the revision of standards for the preparation and submission of projects for dams for tailings disposal, retention of sediments and/or reservation of water and development and submission of projects for the disposal of waste dumps.
- Rules of **procedure** – these are basically the rules for sampling, chemical analysis, physical and metallurgical testing of ores; IBRAM-CONIM actively participates in the their development at both the international and national level, where environmental issues are carefully monitored in order to replace inadequate technology and materials while maintaining the quality and accuracy of these procedures. It should be emphasized that these procedures are widely used in commercial applications, and are also the basis for corporate procedures in line with the requirements of environmental management systems.

3.3 Main regulatory aspects and regulations relevant to the mining sector in Brazil

In Brazil, mining is generally subject to an array of regulations, where the three levels of state power – federal, state and municipal – have competences with respect to mining and the environment. At the federal level, government bodies are the ones with the duty to lay out guidelines and regulations as well as to perform the granting, monitoring and enforcement of mining and environmental legislation as regards the use of mineral resources. As these resources belong to the State, the exploration and use thereof – which are at the heart of mining activities – are subject to mining concession regimes according to various legal systems.

TABLE 16 – PROCEDURES AND RELEVANT BODIES FOR THE GRANTING OF MINERAL RIGHTS			
Legal Regime	Objective	Mining Title	Relevant Body/ Authority
Authorization for Exploration	Refers to exploration of all minerals, except for those under a monopoly regime	Exploration Permit	Director General of DNPM
Mining Concession	Mineral deposits already under the Authorization for Exploration regime	Mining Concession Directive	Minister of Mines and Energy and environmental licensing
Mineral Licensing	Use of mineral substances directly employed in construction in a maximum area of 50 ha	Specific Municipal License	Prefeitura do município
Alluvial Mining License	This covers immediate extraction of mineral deposits which, due to their nature, size, location and economic use, can be extracted regardless of any previous exploration work	Alluvial Mining Concession Directive	Director General of DNPM
Mineral Extraction License	This covers extraction of mineral substances for immediate and exclusive use in public construction works	Extraction Registration Certificate	Director General of DNPM and environmental licensing
Monopoly or Monopolization	When, due to special legislation, it is subject to direct or indirect action by the Federal Government	Special regimes	Federal Government

Source: Silva, 2001 (with adaptations).



4 BUSINESS PRACTICES FOR SUSTAINABLE DEVELOPMENT (1992-2011)

'Sustainable development' means a process of sustained economic growth with globally competitive production structures, with improvements in income and wealth distribution, and with preservation and conservation of local and micro regional eco-systems. Reconciling these three major interdependent objectives of sustainable development requires the design and implementation of public policies that involve the need for shared action with private production organizations.

4.1 Initiatives for disclosure and transparency on the environmental performance of the mining sector

The mining industry is now being guided by several international organizations devoted to measuring, reporting and verifying both the management and performance of its operations. Some of these are directly related to the mining industry, while others cover the entire production sector more broadly. These are:

- Global Reporting Initiative (GRI) – Sustainability Reporting Guidelines and Mining and Metals Sector Supplement
- World Economic Forum, with the document World Scenario Series – Mining and Metals
- International standards for Social and Environmental Performance by the International Finance Corporation (IFC) – the private arm of the World Bank that finances and supports sustainable projects conducted by the private sector around the world
- Principles for Sustainable Development by the International Council on Mining and Metals (ICMM)
- Towards Sustainable Mining – TSM/Mining Association of Canada
- Extractive Industries Transparency Initiative – EITI Principles
- Convention on Biological Diversity (CBD)

4.2 Best practice initiatives developed by IBRAM for the mining sector

Safety program in tailings dams

The purpose of the Special Program for Safety in Tailings Dams is to train professionals in the mining industry, governments and civil society on best practices for safety management in tailings dams by providing modern tools and management strategies in order to minimize accidents and incidents in tailings dams.

The Education and Training programs will be divided into the following modules:

- Training for Directors and Managers;
- Training for Operations Engineers;
- Training for Operations Supervisors.

The Special Safety in Tailings Dams Program also has a focus on a survey of prevailing practices in the safety management of dams in the state of Minas Gerais. In this regard, IBRAM conducted visits with specialists in order to inspect the Class III tailings dams as per the classification system of the Minas Gerais Environmental Foundation (FEAM).

Water Resources Program

The Special Water Resources Program (PERH, in the Portuguese acronym) is targeted at companies in the mining sector with at least one plant or office in Brazil. Its main objective is to strengthen IBRAM's political and technical capabilities for the development of regulations under the National Policy on Water Resources with a view to establishing rights and undertaking duties for the mining sector regarding surveillance and protection of aquatic ecosystems, as well as the development and dissemination of methods and techniques to improve water resources management in the mining supply chain. It is also intended to strengthen the National Water Resources Management System (SINGREH), which is considered by the business community – particularly through the establishment of river basin committees – as an important forum to impart credibility into industrial investments and for necessary establishment of social pacts with the government and civil society around the goal of sustainability.

The MINERAÇÃO Program

The MINERAÇÃO Program was established in 2007 and is intended to foster an improved culture and management of occupational health and safety among mining companies operating in Brazil. The idea is to contribute to sustainable development in pursuit of continuous improvement through proactive participation of the various stakeholders.

This program has a OHS self-assessment system for member organizations, and also provides for the creation of IBRAM's OHS Certification with a view to encouraging positive competition.

Inventory of GHG emissions

Studies conducted by the Brazilian Mining Association reveal that 52% of the total balance of Brazilian foreign trade is associated to the mining industry. According to the National Mineral Production Department (DNPM), 55 different minerals are marketed in Brazil. For this reason, putting together an up to date inventory of greenhouse gas (GHG) emissions in the industry is an inescapable necessity. Thus IBRAM, aware of the need to provide a contribution to the climate balance, decided to launch a program for an inventory of greenhouse gas emissions in the mining sector in 2010.

The first product to come out of this initiative showed that mining, in strict terms, accounts for 0.5% of total GHG emissions in Brazil.

Inventory of sustainability practices

The year 2012 is an momentous one for Brazil and, as a contribution to the Rio+20 Conference, the Brazilian Mining Association is conducting a research study to identify sustainability related management practices in the mining industry, in partnership with ERM as part of an assessment of how things have evolved since 1992, considering that sustainability management and practices are being increasingly mainstreaming into production processes in the mining sector.

This publication will draw on information from IBRAM's members organizations, as well as major industry practices identified through an analysis of public data with the aim of identifying how the relationship of mining companies with sustainability has evolved in practical terms.

The publication is due to be launched at the Rio +20 Conference, and it will provide an opportunity to see how corporate management structures have been making progress in terms of the inclusion and integration of sustainability and of understanding that it is possible to show how mining contributes to sustainable development.

Standardization

IBRAM plays a key educational role in the mining sector through its Committee for International Mining Standardization (CONIM). IBRAM has been delivering courses on International and National Standards, and has been participating in the development of projects and ISO Standards.



5 CHALLENGES AND OPPORTUNITIES FOR THE MINING SECTOR TO ACHIEVE SUSTAINABILITY

5.1 Main international trends for the sector within the sustainability framework

In Brazil and worldwide, the mining business has achieved a position of prestige and prominence due to increasing demands for minerals and the latent potential to boost economic and social development. In this regard, the industry has sought to be in line with the major international trends related to sustainability, namely:

- Implementing and maintaining ethical business practices and sound corporate governance systems;
- Integrating sustainable development considerations into corporate decision making;
- Contributing to the conservation of biodiversity and integrated approaches to land use planning;
- Supporting and encouraging the development, use, reuse, recycling, and disposal of our products in a responsible manner;
- Contributing to the social, economic and institutional development of those communities that live in the areas where mining operations are carried out;
- Establishing effective and transparent agreements with the stakeholders for commitment, disclosure and independent verification of information;
- Upholding fundamental human rights and respecting the culture, customs and beliefs of employees and other parties affected by mining activities;
- Implementing risk management strategies based on valid data and sound science;
- Pursuing ongoing improvement of its health and safety performance;
- Pursuing ongoing improvement of its environmental performance.

5.2 Challenges facing the mining sector within the framework of sustainable development

The challenges for the mining industry derive from structuring issues for current and future trends for this business. This view assumes that mining provides minerals to contemporary society, in line with the core principles of environmental responsibility, social justice and economic viability without neglecting the needs of future generations.

Thus, the challenges facing the mining sector can be listed as follows:

1. Occupational Health and Safety

Mining is a business that, by its very nature, exposes its workers to various risks. While a legal framework and regulations on the health and safety of mining workers are in place, accidents rates remain high.

2. Mining in protected areas

The demand for minerals and mineral products in Brazil and internationally is expected to grow substantially over the coming decades, which means that the pressure to increase mineral production will go up.

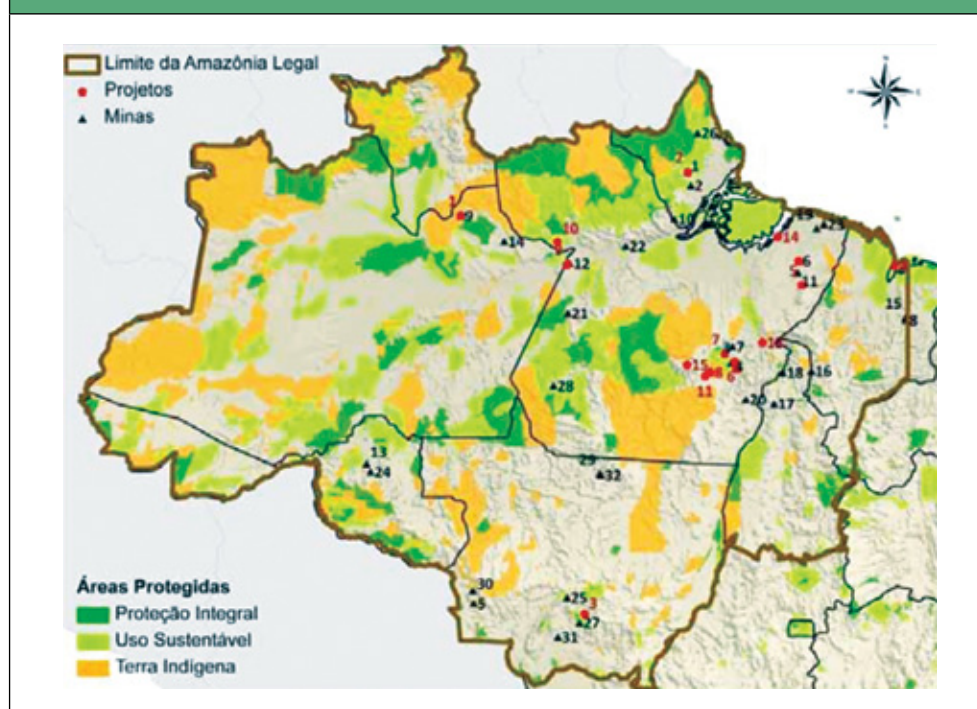
This translates into increased pressure on the use and occupation of land. New environmental preservation areas, the demarcation of indigenous and quilombola lands, legal reserve requirements in the case of rural properties, as well as increased demand for additional areas for agrarian reform, among other factors, tend to restrict or limit the expansion of the mining business. Mining along borders, which cover 10% of the Country's territory, is also a limiting factor.

The production sector believes that efforts should be undertaken to set up a shared agenda regarding creation of new protected areas, environmental licenses and other matters involving mining and the environment. Environmental preservation should be considered an integral part of sustainable development since this development can only be achieved by integrating and promoting synergies of environmental, economic and social development.

3. Mining in the Amazon

The Amazon is the currently the frontier for the expansion of mining in Brazil. However, there are several complex issues related to conflicts over the use and occupation of land. For its geological, environmental and territorial uniqueness and its historical condition, the Amazon requires a differentiated approach. This poses an additional challenge to mineral policies for the region because, in addition to targeting competitiveness of the mining sector as a whole, it should strongly consider the regional socioeconomic context.

FIGURE 18. AMAZON – MINING PROJECTS AND ACTIVE MINES VERSUS PROTECTED AREAS

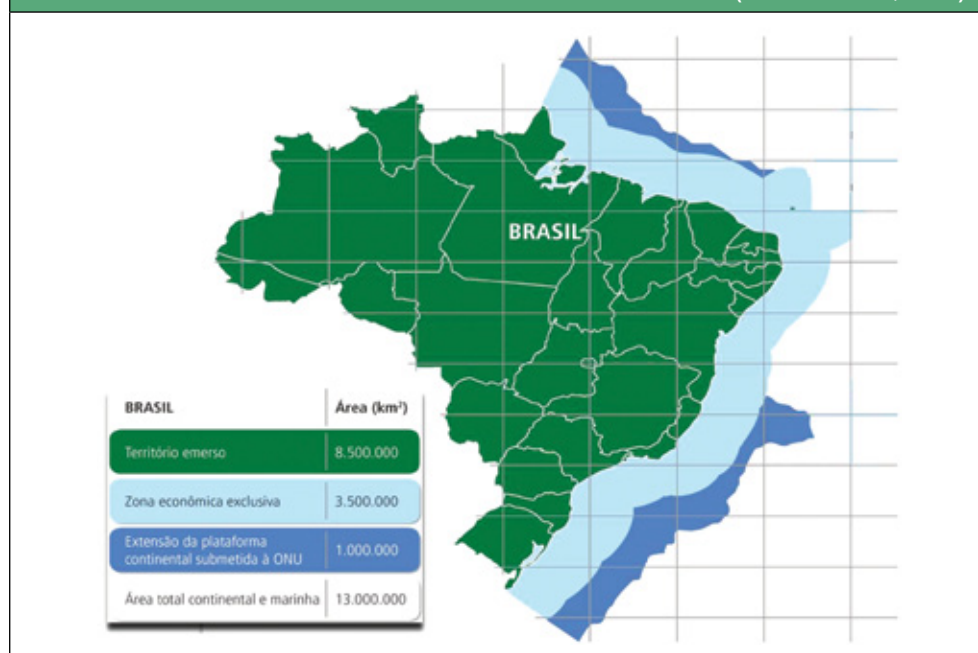


Source: PNM 2030.

4. Blue Amazon

Brazil is now discovering the mining opportunities in the area. The Brazilian Amazon – also called *Legal Amazon* – covers an area of about 5,217,423 square kilometers, which corresponds to 61% of Brazil's total area (8,553,152 square kilometers). At sea, Brazil's Exclusive Economic Zone (EEZ), with an outer limit of 200 nautical miles, has an ocean area of about 3,539,919 square kilometers, which, in addition to the 950,000 square kilometers of continental shelf claimed with the United Nations Commission on the Limits of the Continental Shelf, make up a total of 4,489,919 square kilometers, thus outlining the so called Blue Amazon, a vast ocean area adjacent to the Brazilian continent, and which corresponds to approximately 52% of the Country's continental area.

FIGURE 19. BOUNDARIES OF THE BRAZILIAN CONTINENTAL SHELF (SOURCE: PNM, 2030)



Source: PNM, 2003.

Brazil has important and diverse interests in this extensive strip of the ocean. Specifically in the mining sector, studies conducted by the Ministry of Navy and by the Geological Survey of Brazil show various mineral resources such as sand, aggregates, potash, coal, diamonds, gold and also oil and gas, which are already explored.

5. Mine closure

Over the past few decades, there has been growing awareness of the severity, risks and magnitude of the costs associated with social and environmental liabilities inherited from past generations, especially those related to production activities. As far as the mining industry is concerned, this understanding has been taking shape especially in relation to mine closure plans and the need to minimize the risks that the end of a mine's life poses to the local community where the mining project is located.

Planning for closure of a mine is a complex process. In many ways, it is as complex as the feasibility study for a project that results in the deployment of an operation. The planning horizon is measured in decades – not months or years –, and planners should deal with social, economic and environmental factors that are likely to change across generations.

A mine closure plan requires an ample range of skills, and it can be designed for projects, active mines, and abandoned mines or mines nearing exhaustion. Its scope addresses the methods, procedures and actions to rehabilitate the former mining area so as to ensure that mine closure does not compromise future environmental conditions and minimizes the extent of any economic, social and environmental liabilities for the mining company or society.

To ensure successful mine closure and subsequent rehabilitation and use of the former mining area, it is fundamental that the process takes place from inception of mineral exploration through to exhaustion of the mineral deposits. This process should rely on the participation of the community and local authorities for the development of all actions. The need to also consider mine closure as an essential part of the mining business is key for this approach.

6. Strategic minerals

The concept of “strategic mineral” has always been associated with political objectives of hegemonic countries. The concept became prevalent during the Cold War and referred to the scarcity of minerals for the manufacture of defense materials, including the build up of ‘strategic’ stocks. Today the term is used broadly as a synonym of a scarce, essential or critical mineral resource to a country.

Against this backdrop, Brazil’s heavy reliance on minerals that are vital to its economy is noteworthy. For example, mineral resources used to produce fertilizers since Brazil’s soil needs nutrients in large quantities to sustain the agricultural sector’s output.

Another case in point refers to minerals that will grow in importance in the next few decades for their application in high tech products. This includes rare earths, lithium, cobalt, tantalum, and other materials that are dubbed “bearers of the future.”

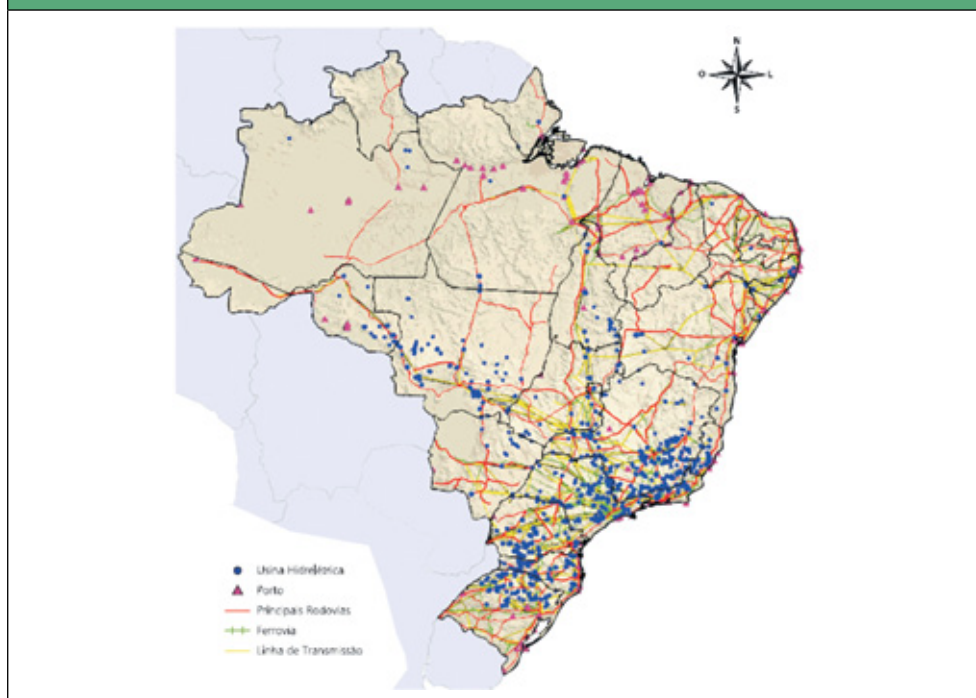
Thirdly, Brazil has comparative advantages regarding certain mineral resources, which are essential to its economy due to the foreign currency they generate. A key example is niobium – Brazil’s reserves and production account for over 90% of global reserves and production. In addition to the potential of Brazil’s reserves, the technological and commercial development promoted by CBMM for use of this metal deserves special mention.

7. Infrastructure and logistics

Mining and mineral processing require provision of infrastructure and logistics that is quantitatively and qualitatively adequate for mining projects to be viable. The availability of competitively priced energy, transport infrastructure (road, rail, waterways and ports) and logistics are fundamental to maximize the best use of mineral resources and their integration in supply chains.

Insufficient infrastructure has been an obstacle that has a negative impact on the attractiveness of Brazil for the development of new mining and mineral processing projects, especially when considering the unevenness of their distribution across the Country, with the aggravating factor that the mineral frontier is expanding to areas with poor infrastructure coverage.

FIGURE 20. MAP ILLUSTRATING INFRASTRUCTURE IN BRAZIL



Source: PNM, 2030.

5.3 Opportunities available to the mining sector within the framework of sustainable development

Mining and metals form the basis of society, today and tomorrow. Its use is pervasive in all walks of life, and they are essential to modern life. As a result, it is fair to say that mining, minerals and metals are relevant to the economic and social development of many countries.

Just like any human activity, every stage of the mining supply chain involves significant social, environmental and economic nature implications – both positive and negative implications. These implications can be managed effectively and efficiently to serve as the foundation of economically, socially and environmentally responsible and sustainable development.

A great deal of green economy as a concept is predicated on the pursuit of enhanced efficiency in the use of resources. Hence mining plays a critical role since metals and minerals have proven ability to be continually recycled, thereby increasing the life cycle of a mineral good and alleviating the pressure on the use of primary resources. This is further supported by the energy savings that this recyclability provides.

Another key role towards a green economy is related to the search for alternative sources of energy. A number of metals are crucial for the development of new technologies, and most innovations in these domains are only possible thanks to the use of metals.

Technological innovation – especially that related to the use of new types of minerals – has been a new paradigm vis à vis the present reality. It is worth mentioning, for example, the current position enjoyed by the so called “Rare Earths.” This group is comprised of 17 chemical elements – 15 of which are known as lanthanides – and it is essential for the development of ‘high tech’ green technologies, such as those in electric vehicles, hybrid batteries, energy efficient light bulbs, flat screens, computer hardware, high performance magnets, and advanced defense systems.

Furthermore, the alternative use of minerals in innovative technologies, such as use of platinum in automotive catalytic converters; metallurgical coal in wind turbines; or copper for electric motors with enhanced efficiency greatly contributes to boost efficiency and lower energy consumption.

An important contribution to sustainable development by the mining industry is that it acts both as a foundation and as a catalyst for local economic and social development. Mining is globally recognized for its robust ability to transform social and economic relations due to its long term profile, thus enabling the economic development of the communities located around it.

When a mining development project is deployed in a particular municipality, it generates a series of positive impacts for the local and regional economy, including:

- Increased employment levels and salary bill;
- A significant increase in average real wages and overall employment conditions;
- Increased tax base, which makes it possible to fund more and better core social services for healthcare, education, infrastructure, etc.;
- Establishment of an environment for local and regional development which provides a wide range of entrepreneurship opportunities and options for the local community;
- Matching of the demand for labor in mining projects with an educational policy that qualifies the local workforce for the new jobs to be created

Due to the massive investments that are usually made, the deployment and operation of a mining project will have major impacts on the economy of the area under their influence. These impacts can be on the supply chain to which it belongs (knock on effects on both directions), on the increase of income (the payroll and incomes generated by direct, indirect and induced purchases), and on local employment and on the tax base. The entrepreneurial action of the local community, businesspeople and leaders is determinant of the extent of the positive impact of investments.



6 ANNEX – ROSTER OF IBRAM'S MEMBERS

As of 20th March 2012

1. Abirochas – Associação Brasileira de Rochas Ornamentais
2. Acoplast Brasil Ltda.
3. Aggreko Energia Locação de Geradores Ltda.
4. Akaflex Indústria e Comércio Ltda.
5. Alcoa World Alumina Brasil Ltda.
6. AMC Reflex do Brasil Serviços para Mineração Ltda.
7. AMEC Minproc Engenharia e Consultoria Ltda.
8. Anglo American Brasil Ltda.
9. Anglo Ferrous Rio Minas Mineração S.A.
10. AngloGold Ashanti Brasil Mineração Ltda.
11. Arcelor Mittal Mineração Serra Azul S.A.
12. Associação Brasileira de Grandes Consumidores Industriais de Energia – Abrace
13. Associação Brasileira de Produtores de Ferroligas e de Silício Metálico – Abrafe
14. Associação Brasileira de Metalurgia e Materiais – ABM
15. Associação Brasileira do Amianto Crisotila – ABRA
16. Associação Brasileira dos Produtores de Calcário Agrícola – Abracal
17. Associação Nac. Entid. de Prod. Agregados para Const. Civil – Anepac
18. Associação Nacional da Indústria Cerâmica – Anicer
19. Associação Nacional do Ouro – Anoro
20. Atlas Copco Brasil Ltda. – Divisão CMT

21. Ausenco do Brasil Engenharia Ltda.
22. Azevedo Sette Advogados
23. Bahia Mineração Ltda.
24. Bahmex – Bahia Mineral Exploration Ltda.
25. Banco de Desenvolvimento de Minas Gerais S.A. – BDMG
26. Barbosa, Müssnich & Aragão Advogados
27. Beadell Brasil Ltda.
28. Bemisa – Brasil Exploração Mineral S.A. (Ex-GME4)
29. BHP Billiton Metais S.A.
30. Bichara, Barata, Costa & Rocha Advogados
31. Borpac Comércio, Importação e Exportação Ltda.
32. Brandt Meio Ambiente, Indústria, Comércio e Serviços Ltda.
33. Brass do Brasil Projetos e Consultoria Técnica Ltda.
34. Brazpot Mineração Ltda.
35. Britex Minerações Ltda. – Programa Mineração
36. Bucyrus Brasil Ltda.
37. Cadam S.A.
38. CAE Mining Brasil Soluções em Tecnologia Ltda. (Ex-Datamine)
39. Camargo Correa Construções Industriais S.A.
40. Carbonífera do Cambuí Ltda.
41. Carneiro & Souza Advogados
42. Casadei Engenharia Mineral S/C Ltda.
43. Caterpillar Brasil Serviços Ltda
44. Centro de Tecnologia Mineral – Cetem/CNPQ
45. Cestari Industrial e Comercial S.A.
46. Cia. Baiana de Pesquisa Mineral – CBPM
47. Cia. Brasileira de Equipamento – CBE
48. Cia. Brasileira de Metalurgia e Mineração – CBMM
49. Cia. de Desenvolvimento Econômico de Minas Gerais – Codemig
50. Cia. de Pesquisa de Recursos Minerais – CPRM
51. Cia. Geral de Minas
52. Cia. Mineradora do Pirocloro de Araxá – Comipa
53. Cia. Siderúrgica Nacional – CSN
54. Ciber Equipamentos Rodoviários Ltda.

55. Cimento Tupi S.A.
56. Cliffs International Mineração Brasil Ltda.
57. Codelco do Brasil Mineração Ltda.
58. Coffey Consultoria e Serviços Ltda. (Ex-Geoexplore)
59. Colossus Geologia e Participações Ltda. – Programa Mineração
60. Colossus Mineração Ltda.
61. Comercial e Industrial Petropasy Ltda.
62. Comércio de Equipamentos Norte Sul Ltda.
63. Consultores e representantes autônomos diversos
64. Contecmina Consultoria em Mineração Ltda.
65. Copelmi Mineração S.A.
66. Corumbá Mineração Ltda.
67. CPE Equipamentos Topográficos Ltda.
68. Crusader do Brasil Mineração Ltda.
69. Devex Tecnologia e Sistemas Ltda.
70. Dow Corning Metais do Pará Indústria e Comércio S.A.
71. Electrum Capital Pesquisa de Recursos Minerais Ltda.
72. Embu S.A. Engenharia e Comércio
73. Energold Perfurações Ltda. (Ex-Kluane Sondagens)
74. Eutectic do Brasil Ltda.
75. Ferramentas Gedore do Brasil S.A.
76. Ferro+Mineração – Programa Mineração
77. Ferrous Resources do Brasil Ltda.
78. Figueiredo e Werkema Advogados Associados
79. Fornac Ltda.
80. GE Betz do Brasil Ltda.
81. Gemcom do Brasil Ltda.
82. Geo-Rom Informação Sistematizada Ltda.
83. Geosol – Geologia e Sondagens Ltda.
84. Gerdau Açominas S.A.
85. Gonçalves, Arruda e Assis Brasil Sociedade de Advogados
86. Graneísa Equipamentos Ltda.
87. Haver & Boecker Latinoamericana Máquinas Ltda.
88. Henfel Indústria Metalúrgica Ltda.

89. Holcim (Brasil) S.A.
90. IBQ Indústrias Químicas Ltda.
91. IDS Brasil Engenharia de Sistemas Ltda.
92. Imerys Rio Capim Caulim S.A.
93. Instituto Brasileiro de Siderurgia – IBS
94. Instituto de Metais Não Ferrosos – ICZ
95. InterCement Brasil S.A.
96. Interfusão Distribuidor Comercial Importação e Exportação Ltda.
97. Itaoeste Serviços e Participações Ltda.
98. Ius Natura Ltda.
99. J. Mendo Consultoria Empresarial Ltda.
100. Lavrita Engenharia Consultoria e Equipamentos Industriais Ltda.
101. Liebherr Brasil – Guindastes e Máquinas Operatrizes Ltda.
102. Lobo e Ibeas Advogados
103. Luna Gold Mineração Ltda.
104. Maccaferri do Brasil Ltda.
105. Magnesita Refratários S.A.
106. Martin Engineering Ltda.
107. Mattos Filho, Veiga Filho, Marrey Jr. e Quiroga Advogados
108. Metroval Controle de Fluidos Ltda.
109. Metso Brasil Indústria e Comércio Ltda.
110. Millennium Inorganic Chemicals Mineração Ltda.
111. Mincom International Serviços de Informática Ltda.
112. Mineração Amaparí Ltda.
113. Mineração Caraíba S.A.
114. Mineração Corumbaense Reunida S.A. (Ex-Urucum Mineração S.A.)
115. Mineração Curimbaba Ltda.
116. Mineração Iamgold Brasil Ltda.
117. Mineração Jundu Ltda.
118. Mineração Lapa Vermelha Ltda.
119. Mineração Paragominas S.A.
120. Mineração Rio do Norte S.A.
121. Mineração Rio Pomba Cataguases Ltda.
122. Mineração Santa Elina Indústria e Comércio S.A.

123. Mineração Serras do Oeste Ltda.
124. Mineração Taboca S.A.
125. Mineração Usiminas S.A. – Matriz
126. Mineração Vale Verde Ltda.
127. Minerações Brasileiras Reunidas S.A. – MBR
128. Minérios Itaúna Ltda. – Minerita
129. Mirabela Mineração do Brasil Ltda.
130. MMD Mineral Sizing (South America) Ltda.
131. MMX Mineração e Metálicos S.A.
132. Modular Mining Systems do Brasil Ltda.
133. Moreira Pinto Advogados
134. Nacional Minérios S.A. – Namisa
135. Nalco Brasil Ltda.
136. Netzsch AKW Equipamentos e Processos Ltda.
137. Nogueira Curvo & Arruda Advogados Associados
138. Nord Drivesystems Brasil Ltda.
139. Novelis do Brasil Ltda.
140. Outotec Tecnologia Brasil Ltda.
141. Oyamota do Brasil S.A.
142. P & H MinePro do Brasil Comércio e Indústria Ltda.
143. Pará Pigmentos S.A.
144. Pedra Branca do Brasil Mineração S.A.
145. Pedras Congonhas Extração Arte Indústria Ltda.
146. Pedreira Santa Isabel Ltda.
147. Pedreiras Valéria S.A.
148. Petrobras – Petróleo Brasileiro S.A.
149. Petróleo Brasileiro S.A. – Petrobras (SIX)
150. Pinheiro Neto Advogados
151. Pipe Sistemas Tubulares Ltda.
152. Prominas Projetos e Serviços de Mineração Ltda.
153. PTI – Power Transmission Industries do Brasil S.A.
154. RDF Comercial Ltda (K2on)
155. Reinarda Mineração Ltda.
156. Rhio's Rec. Humanos, Intercâmbio e Orient. Profissional Ltda.

157. Rio Paracatu Mineração S.A. – RPM/Kinross
158. Rolim, Godoi, Viotti & Leite Campos Advogados
159. Rydian Mineração Indústria e Comércio Ltda.
160. Sama S.A. Minerações Associadas
161. Samarco Mineração S.A.
162. Scania Latin America Ltda.
163. Schmidt, Valois, Miranda, Ferreira & Agel Advogados
164. SEI Consultoria de Projetos Ltda.
165. Seival Sul Mineração Ltda.
166. Sete Soluções e Tecnologia Ambiental Ltda.
167. Sew Eurodrive Brasil Ltda.
168. Silveira Athias Soriano de Mello Guimarães Pinheiro & Scaff Advogados
169. Sind da Ind. Rochas Ornam. Cal e Calcário do Est. do ES – Sindirochas
170. Sindicato da Ind. de Ext. de Areia do Estado de SP – Sindareia
171. Sindicato da Ind. Extração de Carvão do Estado de SC – Siecesc
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