

## **“Vale Brasil”: the largest ore carrier in the world**

*Valemax is a class of 32 vessels being built to operate exclusively to take Vale’s iron ore from Brazil to Asia. Valemax vessels are the biggest bulk carriers ever built, capable of transporting 400.000 tons of iron ore per trip. These vessels have 360 meters long, 65 meters wide and 56 meters high up to the mast. Valemax vessels will enable a significant reduction in the cost of freight, making our ore even more competitive in Asia. In addition, they will cut carbon emissions by 35% per ton transported, representing a major environmental improvement. The Valemax is a great innovation, bringing Brazil even closer to the world’s faster growing market, Asia. This is yet another demonstration of the pioneering approach taken by Vale, a company that has always strived for excellence in everything it does.*

- Jose Carlos Martins, Executive Director of Marketing, Sales and Strategy of Vale<sup>1</sup>

Vale do Rio Doce is a global company that operates in the mining sector with an extensive portfolio of products, including iron ore and pellets, nickel, copper, coal, bauxite, alumina, aluminum, potassium, kaolin, manganese, ferroalloys, cobalt, platinum group metals and precious metals; also active in logistics, energy, steel making and fertilizers, which are strategic sectors and complementary products to the mining business.

Their products and services can be found in all areas of modern society and have an essential function in ensuring life quality. Three of the main products are iron ore, coal, and manganese, fundamental components in the production of steel, which is used in basic industries, transportation, construction, and thousands of everyday activities.

Others like Nickel are used in stainless steel production and in electronic and medical equipment. Copper is an essential part of telecommunications. Bauxite is the raw material for producing aluminum, widely used in industries ranging from packaging to aircraft manufacturing.

The agricultural sector uses potassium and phosphate to increase yielding, while kaolin is used especially in paper manufacturing in the pharmaceutical industry and in ceramics.

Its stated mission "To transform mineral resources into prosperity and sustainable development"<sup>2</sup> has been fulfilled, since the company has been developing international projects in different places of the world. A representative sample was the opening of a railway in Guinea, where the company is part of the largest iron ore project in Africa. Besides, the growing interest in Africa was opened by the diplomatic and commercial governmental strategies of the former president Lula Da Silva, especially in countries like Mozambique and Angola.

Vale is the leader of the privatization process in the late nineties (1997). Brazil achieved earnings of R\$ 30 billion in 2010 and today it is the second world's largest mining company, and it has begun to expand presence in Asia markets with an aggressive strategy specially designed in China. The recent announcement of Vale about the new investments for more than USD \$9 billion over the next four years, together with the strategic position of regional resources warns about the interest in advancing with firm steps toward the leadership of the worldwide extraction and mining industries.

This case begins with a brief explanation of the iron ore industry, the supply, demands and international competition. The international expansion of Vale, the future and the strategy of having the world's largest ships to transport ore, will be described later on.

## Iron Ore Industry

To understand in general what iron ore is, we must say that according with the Primary Industries and Resources S.A. of South Australia (PIRSA), the elemental Iron (Fe) is ranked fourth in abundance in the earth's crust and it is the major constituent of the Earth's core. It rarely occurs in nature as the native metal. The pure metal is silvery white, very malleable, strongly magnetic. It can be melted at 1528°C. Iron accounts for approximately 95% of all metals used by modern industrial society<sup>3</sup>.

Metallic iron is most commonly produced from the smelting of iron ore to produce pig iron. Steel is a processed form of pig iron with impurities such as silicon, phosphorus and sulfur with a reduction in the carbon content. Globally, steel's versatility is unsurpassed. Iron metal may be produced from the smelting of certain iron compounds. Their concentration in economic proportions is referred to as 'iron ore'

According with Primary Industries and Resources S.A. of South Australia (PIRSA), the following table describes the main components that are present in this vital raw material<sup>3</sup>.

Name	Formula	% Fe
Hematite	Fe <sub>2</sub> O <sub>3</sub>	69.9
Magnetite	Fe <sub>3</sub> O <sub>4</sub>	74.2
Goethite/Limonite	HFeO <sub>2</sub>	~ 63
Siderite	FeCO <sub>3</sub>	48.2
Chamosite	(Mg,Fe,Al) <sub>6</sub> (Si,Al) <sub>414</sub> (OH) <sub>8</sub>	29.61
Pyrite	FeS	46.6
Ilmenite	FeTiO <sub>3</sub>	36.81

## Current Situation

The iron ore production declined in 2009 for the first time in seven years, but trade in this commodity, driven by demand from China, grew last year; The Iron Ore Market 2009–2011 UNCTAD Report shows that global production of iron ore fell 6.2% to 1588 million tons in 2009. Production declined in most countries, with some notable exceptions such as Australia and South Africa<sup>4</sup>.

UNCTAD says China is the largest producer of iron ore with about 370 million tons in 2009 but it was mainly in use for domestic consumption. As major producing / exporting countries are Australia, Brazil and India (see Annex 1 - Million Metric Tons Iron Ore 2009 UNCTAD).

Another important aspect is to know that sometimes the power exercised by the three major exporting companies in the world; BHP Billiton, Vale and Rio Tinto Group are able to push for the market to increase the price of iron ore. A clear example occurred last year when the China Iron and Steel Association presented the report on April 28<sup>th</sup>, 2010 where it was stated that while some countries sought to revive their economy and to recover the international trade, they were threatened with a suspension of supply of this raw material by those big three companies unless the steel makers agreed to their prices. According to this association there was a price increase of 90%<sup>5</sup>.

## Supply and Demand

Production figures in China reviewed and reduced in the latter study reached 234 million tons in 2009 by a factor of "comparable quality". A "comparable quality" shows that the iron content of the ore is of the same magnitude than the world average of 63% to 64%. China used to be the largest producer of iron ore, but now it ranks fourth behind Australia (394 million tons), Brazil (300 million tons) and India (257 million tons) in terms of quality level.

Despite the global recession, the iron ore trade reached a record level of 955 million tons in 2009, representing an increase of 7.4% over the previous year. This increase was due to the growth of Chinese imports because of the growing demand in that country and the decline in the national production<sup>4</sup>.

According to the international market for iron ore in 2009 the largest exporters in terms of volume, Australia was first with 363 million tons, an increase of 17% over the previous year; Brazil was second with 266 million tons and a decrease of 3% over the previous year and a third place was occupied by India with 116 million tons.

In 2009, seaborne trade of iron ore was of 890 million tons showing a growth of 11% compared to 2008. China was the largest importer of iron ore with 628 million

tons: two thirds of the world imports. Despite the recession, consumption of iron ore increased by 41% in 2009 compared to the previous year<sup>4</sup>.

Due to the widespread closures of mines, it is possible that domestic production in China declines as it has in recent years. It is noted that, for sure, the country will pay more for iron ore imports, since the new pricing system empowers the main producers even more.

The international steel industry, the main customer for iron ore, is a fragmented industry and lacks coherence, thus enabling the three largest iron ore producers to exert considerable control in today's market that favors sellers (See Annex 2 - Global Demand Drivers Drewry).

The new operations of iron ore mining, started in 2009, and reached almost 75 million tons worldwide. In addition, between 2010 and 2012, the new production capacity could exceed 685 million tons. Steel producers are increasingly investing in both, iron ore and coal mines.

## **Vale's Competition**

### **BHP Billiton**

Two large companies that did have experience and expertise in the management of commodities, merged, forming the BHP and Billiton.

The first BHP, that is Australian, has experience in managing natural resources like oil, gas, steel, copper, silver, lead and zinc and has been recognized for his research and discovery of rich areas in natural products their logistics and operational progress worldwide. The company developed an ability to adapt to market changes and to focus efforts on new opportunities and challenges.

The second Billiton that is from UK is one of the largest mining companies in the world. It has gone into the production of alloys, aluminum, coal, chromium, nickel, titanium, among others, and it has mines in Australia, Canada, Colombia, Mozambique and South Africa.

The merger of these two companies in 2001 created the largest diversified resources company in 20 countries. It is currently the leader in almost all markets in which it operates. The company's operations are segmented into seven major divisions: petroleum, aluminum, base metals, carbon steel materials, diamonds and specialty products, energy coal and stainless steel materials. Today both companies continue to operate as separate entities in the BHP Billiton PLC in UK and BHP Billiton Ltd in Australia.

## **Rio Tinto**

Rio Tinto is the combination of 2 companies: Río Tinto Ltd in Australia and Río Tinto PLC in United Kingdom. It has been in operation since the end of the nineteenth century with a copper mine in South Spain. It currently develops its market in five principal product groups: Aluminum, Copper, Diamonds & Minerals, Energy and Iron Ore, and two support groups: Technology & Innovation and Exploration.

As for iron ore, it is the second largest producer supplying maritime trade. They have supported their growth in countries like Australia and Canada. Pilbara region of North West Australia is the center of iron ore operations with 13 mines, 1350 Km of railroads and two maritime ports. Its position is solid in terms of operational efficiency and iron ore exports specially to meet the demand growth in Chinese and Asian markets.

## **Competition**

The iron ore trade has generated a lot of competition at the level of 3 large companies that control the production, transportation and marketing thereof. Vale remains the largest producer of this product with Rio Tinto and BHP second and third.

According to the ACCC (Australian Competition and Consumer Commission) competition with iron ore concentrates in maritime transport, the availability of large supply centers to meet the current market demand, and price management. This fact has generated comments from associations such as Eurofer about an unfair system of competitiveness with a market concentration in only 3 producers.

The competition is marked by the need to cover not only the offer to have distribution centers closer to consumers but also the shipping to destinations with more cargo capacity in the shortest possible time. Demand projections show the growth of iron ore over the next three years which suggests that companies will need to make great efforts to grow and stay on the market. Then prices will be expected to stabilize, so, buyers and steelmaker producers are not affected.

## **Vale – Iron Ore**

If we do the simple exercise of reviewing the steel or iron materials needed in all constructions, cars, ovens, washing machines, kitchens, air conditioners and a number of objects that can be found around and are part of our daily lives, we will find that the raw material iron ore is fundamental and important in the development and growth of the human race.

"Iron ore is the core of our product line". Its superior quality is the result of a series of investments, both in mineral exploration and state of the art processing technology. To sustain their growth strategy, Vale is actively engaged in mineral exploration in 21 countries. Iron Ore represents a major part of the company's operating revenue with 53.8% from the first quarter of 2011<sup>7</sup>.

Vale is committed to fully satisfy its customers' needs and to guarantee the high quality of its products and services. This commitment begins with world class assets including several mining sites, railways and strategically positioned ports, cutting edge laboratories for quality control and strong research and development infrastructure<sup>7</sup>.

Integrated systems: In Brazil Vale produces iron ore and pellets with an integrated production system including mines, railway and port facilities<sup>8</sup>.

1. Northern system, iron ore comes from Carajás mines and, after transportation through railway, finally shipped onto vessels at Ponta da Madeira port.
2. Southern system, iron ore comes from Minas Gerais and, after transportation through railway, finally shipped onto vessels at Itaguaí or Guaíba ports.
3. Southeastern system, iron ore comes from Minas Gerais and Urucum province and, after transportation through railway, finally shipped onto vessels at Port of Tubarão.

Export Routes: It is important to understand where the centers of production and consumption around the world, which generate international trade in iron ore, are located. (See Appendix 3 - Areas of production and consumption).

Over the recent years some major shipping routes have been successfully identified.(See Annex 4 - Global Iron Ore Trade 2009)

Australia – China (4800 nautical miles)

These countries mobilized 183 million tons in 2009 which represents the route with the largest iron ore carrier in the world. Its proximity to China makes the ton-mile cost most competitive, but low productivity, delays, port congestion, the strength of unions in the retention of vessels and, ultimately the floods, have affected not only the value of cargo, but the production level in a way that it could not be accomplished in 2010 and so far in 2011.

Brazil – China (12000 nautical miles)

These other two countries mobilized 96 million tons in 2009 and this represents the most important trade for Vale. In order to compete with Australia, it is necessary to apply new technologies seeking to reduce costs and to route large volumes per trip. This would achieve maximum economies of the scale equation.

**Brazil – Europe (5000 nautical miles)**

They mobilized 82 million tons in 2009. Compared with exports from Australia in the same period, it was less than 8% to 6 million tons. It is the natural route from Brazil and has reached a level of expertise not only by standards of productivity, but in the logistics that was set from Rotterdam, Netherlands to the rest of Europe

**Brazil – Other Asia (Range between 9000 and 13500 nautical miles)**

Here, 87 million tons were mobilized in 2009 to countries like Japan, South Korea and others. They are currently carrying out a project to establish a collection center in Qingdao China, which will serve to supply the needs in Northern Asia and to receive ships of 400,000 DWT.

**Brazil – Middle East (9000 nautical miles)**

This new route represents one of the most ambitious plans and is part of the strategy to compete with Australia in terms of availability and quality. The government of Oman is committed to creating the cluster of steel that may participate in the 30 million tons between demand / supply in the region, as well as the advantage of ensuring Operations Framework for the Asian region just-in-time. Reducing costs of land and the possibilities to automate their production will provide excellent business opportunities and improvement in time. Sohar Industrial Port Company will build a 1.5 kilometer jetty to be exclusively used and operated by Vale. It is scheduled to be operational in June this year with a capacity of 9 million tons per year.

**Future Africa – China (7000 nautical miles)**

African shipments have small quantities if compared to Brazil and Australia but the continent contains a huge number of reserves and new projects of Vale and Rio Tinto to mine iron ore in Guinea. Meantime, infrastructure and political risks in the area are still a problem. In the Republic of Cameroon, an Australian based company named Sundance Resources is developing the Mbalam project which includes mines on the borders between Cameroon and Congo. Operations on this iron ore mines are planned to start in 2012.

Expansion Projects: During the period from 2004 to 2009, Vale invested over 55 billion dollars in about 23 projects and has established a master plan with the ambitious goal of increasing its production capacity in iron ore to 450 million tons per year in 2014 (See Annex 5 - Increasing Investment Vale and Annex 6 - 29 Projects Delivered Vale between 2002 and 2009).

Carajás is an excellent example of this increased capacity, where the evolution in production in 1985 was 0.6 million tons per year and in 2009 it increased to 89.4 million tons per year. As main customers countries in this mine are China as the largest consumer with 59.3%, followed by Japan with 9.5% and South Korea to 7.3%, compared with only 2.3% for Brazil (See Annex 7 - Carajás iron ore supply distribution, 2009).

The Oman project includes an industrial complex consisting of two pelletizing units with a nominal capacity of 9 million tons of direct reduction pellets per year, and a distribution center with an annual capacity of 40 million tons. The Government of Oman has a 30% stake in the company of pelletizing and it is expected to increase production capacity to 18 million tons per year in the near future and all the iron ore will come from Brazil.

*"Sohar's strategic location outside the Strait of Hormuz, with the advantage of deep water seas, and the heavy infrastructure investments to provide leading logistics networks, advanced energy and power supply technologies and world-class facilities at Sohar Industrial Port, were key to our decision to establish our operations in the Sultanate,"* said Roger Agnelli, Vale CEO<sup>9</sup>.

To Vale, being able to establish a logistics center in Asia, named in China as "virtual mine", has become part of its competition strategy and price control. This suggests the implementation of a new pricing strategy, giving possibilities of reducing the distance effect for Brazil and helping to meet different kinds of ore products. By the way, the installation requires approximately 2 years under construction. In May, 2011 it was given the green light to begin the phase of 300.000 DWT wharf capacity in Shandong Province, Qingdao Port.

### **Vale's Strategy largest "Ore Carrier" of the world**

To meet growing global demand and to maximize the quality of its operations, Vale has taken the initiative to achieve greater economies of scale. A highly efficient logistical infrastructure is a key element for competitiveness in the iron ore market.

The initiative taken by the Vale Company is an important step for the maritime sector. It becomes the protagonist and leader in the segment of Capesize ships. The possibility of providing a model transport in the range of economy of scale ensures greater efficiency, productivity and differentiation. On the other hand, the iron ore market is volatile and even more so after the crisis of 2009. It has ordered 35 ships with 400,000 DWT capacity, they will be delivered between 2011 and 2013, when 60 of these new leviathans are projected to be in operation.

The first of seven ships ordered by Vale to Daewoo Shipbuilding & Marine Engineering Co., South Korea, was received last May 2011 and called "Vale Brasil". It has a length of 362 meters and a capacity of 400,000 DWT. The estimated investment per ship represents more than 105 million dollars. According to the orderbook program and in long-term agreements with Vale 35 ships of the same features will have been delivered by 2013 (See Annex 8 – Ship's Particulars MV Vale Brasil).

"Vale Brasil" arrived to Brazilian lands last 5<sup>th</sup> of May, 2011 and in her first trip she was loaded 391.000 tons of iron ore, and the operation finished 24<sup>th</sup> of May at the



Ponta do Madeira terminal in São Luis, Maranhão with destination to Port of Dalian in China.

### **Energy efficiency and productivity**

"Vale Brasil," the largest ore vessel in the world, is also considered the cleanest among the ships of her type. On May 24<sup>th</sup>, 2011, in Oslo, Norway, the ship received the Clean Ship Award by the Nor-Shipping, in recognition of the 35% reduction in carbon emissions per transported ton compared with a traditional ship of around 200,000 DWT.

The implementations of advanced technologies in equipment and her efficient design in relation between energy and power have made possible the level of emissions reductions. This event is one of the most important and every day and there is great strength in the fact that companies are responsible with the environment. Organized by Norges Varemese every two years and sponsored by Det Norske Veritas (DNV) has become one of the most recognized classification societies in the world.

*"We believe that combining the presentations of the Clean Ship and Next Generation Ship Awards with an Opening Conference focused on next generation topics creates a strong platform for highlighting the issues, challenges and opportunities the industry faces going forward."*

Tollef Schiander, Director of Nor-Shipping<sup>10</sup>.

### **Fleet Age and Orderbook Capesize**

We will consider below the current composition of the different types of vessels in relation with age, orderbook schedule at shipyards, and also the performance of the available supply in each segment. Such as Capesize vessels where it is found that 37% of the fleet is aged between 0 to 4 years, followed by 16% from 5 to 9 years. This means that 50% of the current fleet is represented by relatively new ships with an average of 15 years of operational life (see Annex 9 Capesize Orderbook)<sup>11</sup>.

According to the orderbook, in 2011 this segment is estimated to grow by 27% of the existing fleet, followed by approximately 20% in 2012. The total Capesize fleet is 1182 vessels with a capacity of 212 million DWT and 604 vessels are sorted with a capacity of 118 million DWT, which means that the supply in this segment reached more than the 330 million DWT per annum. This can generate oversupply of capesize fleet (idle and/or layup).

The fleet is over 25 years old. Vessels shall enter in the process of scrapping or recycling. It is estimated that by 2011 there are about 70 ships with less than 8% of the current fleet. The relatively young fleet minimizes the number of ships to be scrapped (See Annex 10 – Dry bulk Fleet Over 25yrs of Age)<sup>12</sup>.

According to the National Bank of Greece in 2009 the new buildings cancellations reached 40% of dry bulk orderbook, resulting from the global crisis and the drastic drop in charter rates. And also one of the normal consequences to avoid costs for layouts is ship recycling. Over the same period there was around 70 million DWT of scrapping<sup>13</sup>.

It is estimated that there are over 16.000 billion tons miles for different products of the dry bulk seaborne trade, a figure that should be increased and it is estimated that 2015 will exceed the 23.000 billion tons miles for all bulk carriers in general (Annex 11 - Seaborne Trade Development Billion tonne miles)

### Charter Rates – Capesize

The current arrangements for charter parties by time charter, bareboat charter or voyage charter are constantly changing cyclically because of the strength of markets and the dynamics of supply and demand. Some carriers prefer to control these variations with long term contracts to obtain control of the cost and over the fleet. Others also prefer to negotiate on the spot market where the variation of freights offers opportunities and risks.

The Baltic Exchange Dry Index (BDI), developed by "The Baltic Exchange" in London, measures the price of the dry cargo freight rates, through a selection of 26 main routes in this type of freight movements and it is constructed as a synthesis of other three indices, which control the assessment of loads as many types of vessels Capesize, Panamax and Supramax Handy. The Capesize market is at 1.735 units in 2011 that can be compared to the same levels of 2002 and 2003, including the 1.506 points reaching its lowest level since January 2001. In 2008 it came to contract carriers by about 230.000 U\$/day, while in January 2011 it was 11.900 U\$/day. (See Annex 12 - Baltic Exchange Capesize Dry Index - BDI).



Source: <http://new.arrowresearch.com/view/capesize>

Analyzing the chart, for the last 4 years regarding the behavior of the indicator time charter rate per day in dollars, it is possible to determine the Capesize segment volatility and cyclical shipping business. Before the economic crisis in late 2007 the cost of a day charter reached U\$190.668 and by the end of 2008 it reached U\$225.186, an astronomical figure that involves many participants to take different decisions.

During 2007 it was decided to initiate processes of shipbuilding, and to establish long term contracts. Some investors took the risk of buying used vessels, but after the economic crisis and in particular in November 14<sup>th</sup>, 2008, the time charter rate reached its lowest price: U\$3.793 per day. It seemed that it was not possible. The price fell below the minimum required operating and cover costs, interest, depreciation, loans, etc. generating some participants go bankrupt. Others decided to recycle part of their fleet and others began to sell at very low prices.

In 2009 and 2010 the level of time charter behaved with some stability starting with levels above U\$80.000, but going downward gradually and, at the beginning of 2011 it reached U\$11.900 per day. This was because the ships ordered in 2007 with the boom in freights are expected by the second half of 2010 and in greater volume in the current year. This fact creates an oversupply situation for the Capesize segment, with benefits for the cargo operators who can seize the moment to achieve very low freight costs and optimal conditions in the long term contracts.

## **Opportunities**

Vale was characterized by an aggressive and strong growth in a relatively short period since privatization. In the last decade, in terms of market share, the company came from being the fifth with revenues of 9.2 billion dollars per year to become the second with more than \$ 170 billion in 2010. However BHPB (Billiton) continues its leadership. (See Annex 13 - The Company's market cap Multiplied by 18 in the last 9 years)

Similarly the process of development and growth in the exploitation of iron ore has increased from 162 million tons per year in 2000 and it is estimated that based on the master plan for 2014 it will be 450 million tons per year (See annex 14 – Master Plan and Vale Iron Ore production Evolution 2000 -2014). In the following years representative projects came into operation and production with an increase of iron ore to 166 million tons per year only in the Brazilian territory (see Annex 15 - Iron Ore Projects in Brazil).

## Scenario

While Vale continues its growth process in Brazil, Latin America and Africa exploit millions of tons of iron ore. They also strive to maintain a good level of price with reference to their other major rivals in Australia, which, by their geographical position in relation to Asian countries, can offer a more competitive price due to low transportation costs and short delivery time.

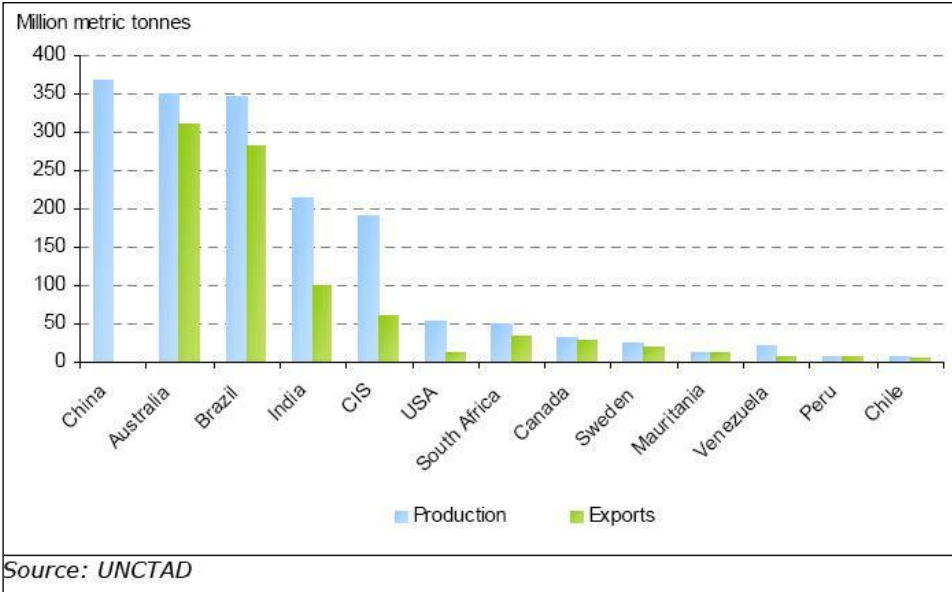
With this acquisition, Vale is becoming the leader in the Capesize segment to be the world's largest iron ore carrier without being a specialist in this segment. Perhaps this decision was necessary to take control of transport cost levels of economy of scale. Another strategy has been to establish logistics centers as the case of pellets processing in Oman and distribution in Qingdao to reduce delivery times to the customers in Asia, which is an improvement compared to Australia.

Many experts believe that to have a fleet represents for Vale to lose the opportunity to take advantage of current rates for the Capesize market. It is estimated that there will be an increase above \$ 30,000 in 4 or 5 years. This can be interpreted as though using its own fleet will be less competitive than if it were done today with third parties in terms of time charter. Another consideration would be to establish a long term contract at very good rates and periods of not less than 10 years.

Among the emerging trades, Africa seems to be the most promising due to the still unexplored Iron Ore mines and the developing projects in the area plus the attempt from China in changing Iron Ore supply. Iron Ore demand is not elastic, the huge demand for the raw material will continue, but, new projects in which existing ports cannot cope with a Capesize vessel will demand smaller vessels for their shipments.

### Annexes

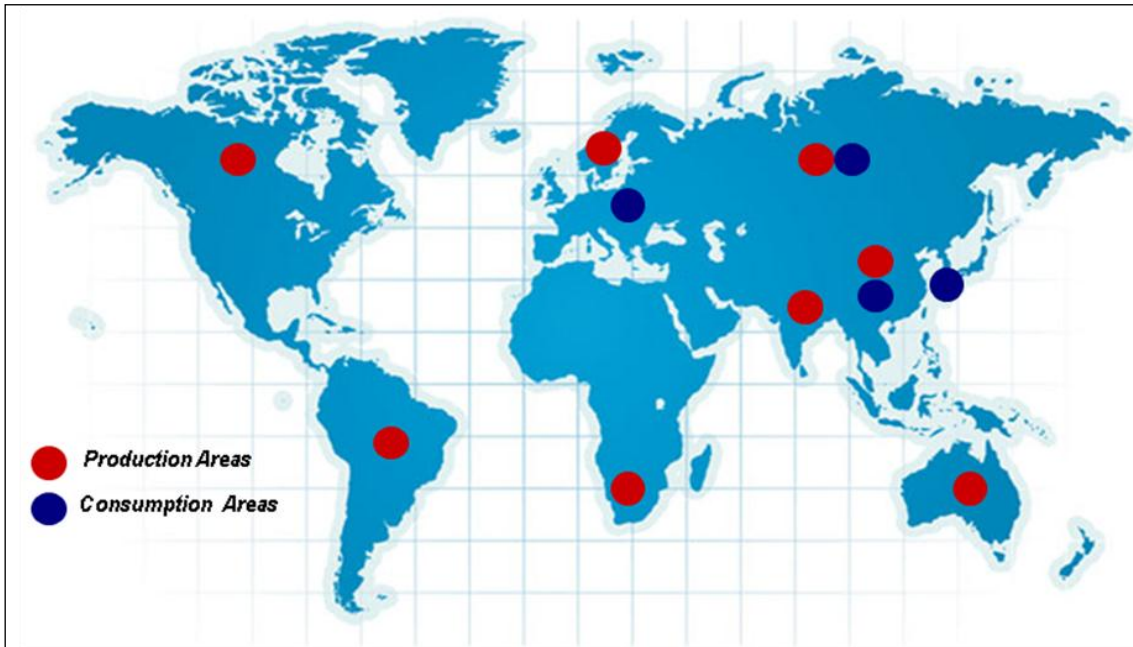
#### Annex 1 – Million metric tonnes Iron Ore 2009 UNCTAD



#### Annex 2 – Global Demand Drivers



Annex 3 – Production and Consumption Areas



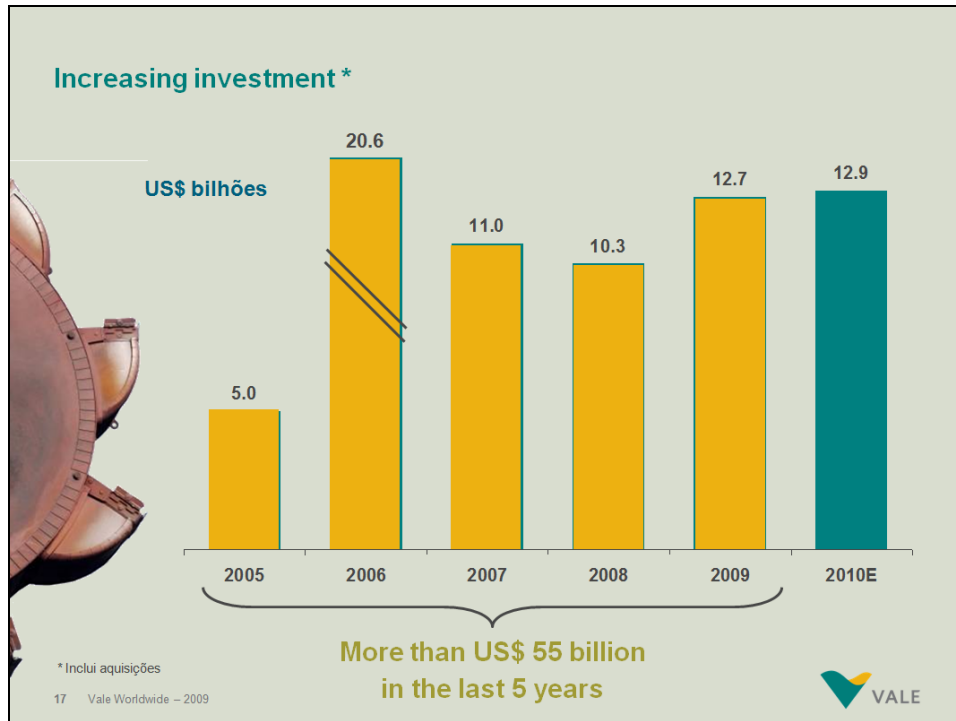
Source: <http://new.arrowresearch.com>  
[www.rba.gov.au/publications/bulletin/2009/jan/1.html](http://www.rba.gov.au/publications/bulletin/2009/jan/1.html)

Annex 4 – Global Iron Ore Trade 2009

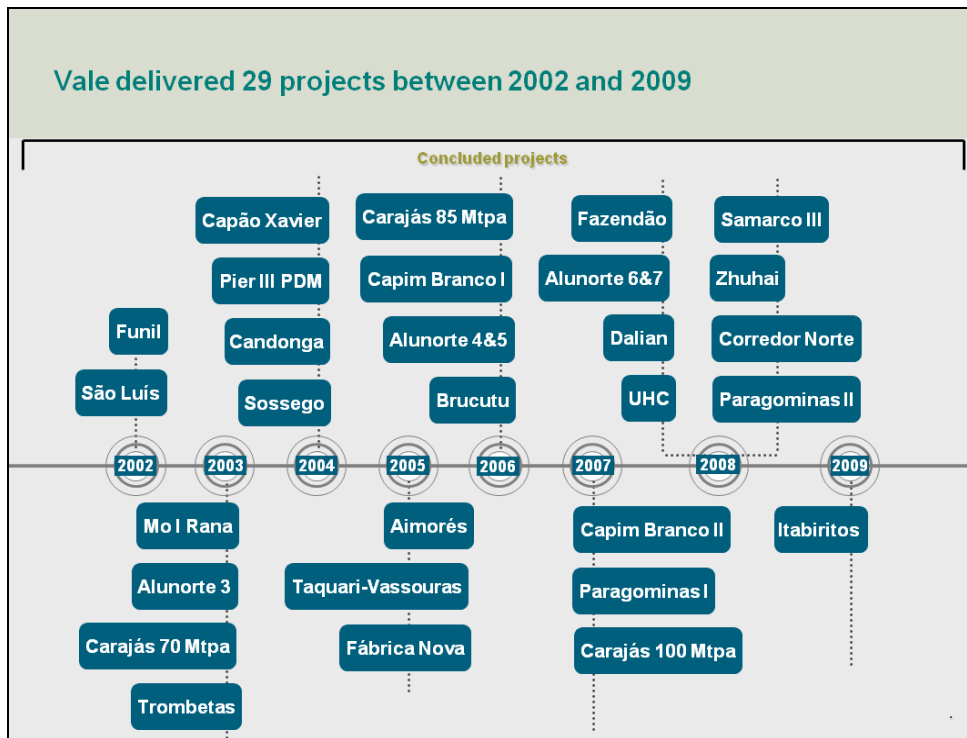
Global Iron Ore trade 2009 ( Million metric tonnes)							
From \ To	North America	West Europe	East Europe	China	Japan	Other Asia	Rest of world
Australia		6		183	77	43	
Brazil	3	79	3	96	40	47	14
India		1	1	91	7	2	
CIS		6	41	14			
Canada	6	14		3	1	1	7
South Africa		7		14	7	2	3
Sweden		11				4	2
Mauritania		8		3			
Other Latin America		2		11	3	2	1

Source: UNCTAD

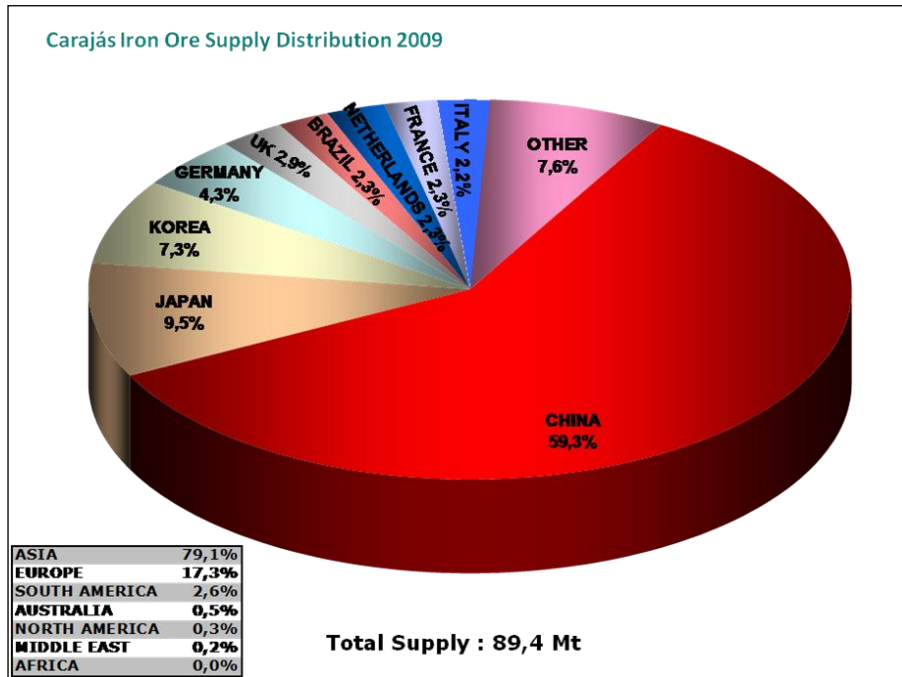
Annex 5 – Vale Increasing Investment



Annex 6 – Vale Delivered 29 Projects between 2002 and 2009



Annex 7 - Carajás Iron Ore Supply Distribution 2009



Annex 8 – Ship’s Particulars MV Vale Brasil

**Capacity:**  
400,000 tons of ore per voyage .

**Operation:**  
Terminal Ponta da Madeira (MA)  
and Porto de Tubarão (ES).

**Length:**  
362 meters.


**Width:**  
65 meters.


**Height:**  
56 meters to mast.

**Speed:**  
Around 15 knots.

**Main Engine:**  
Around 25,000 KW .

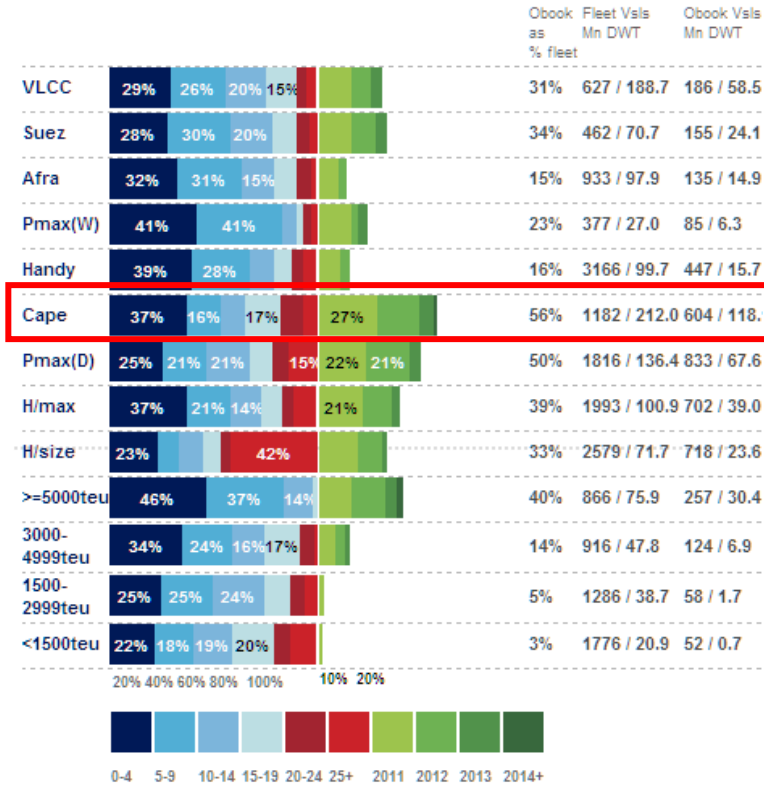
**Number of holds:**  
7 holds / 7 hatches .



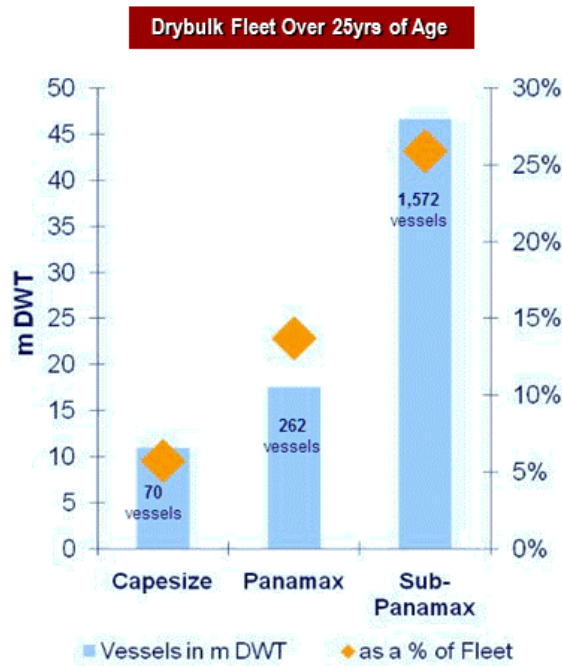




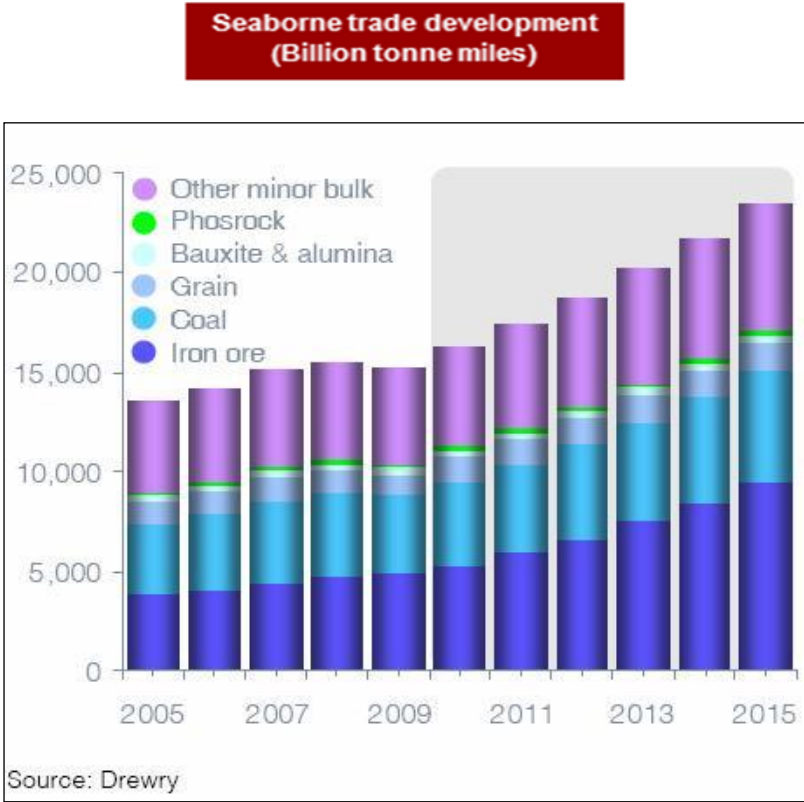
Annex 9 – Order book Capesize



Annex 10 – Dry bulk Fleet Over 25yrs of Age



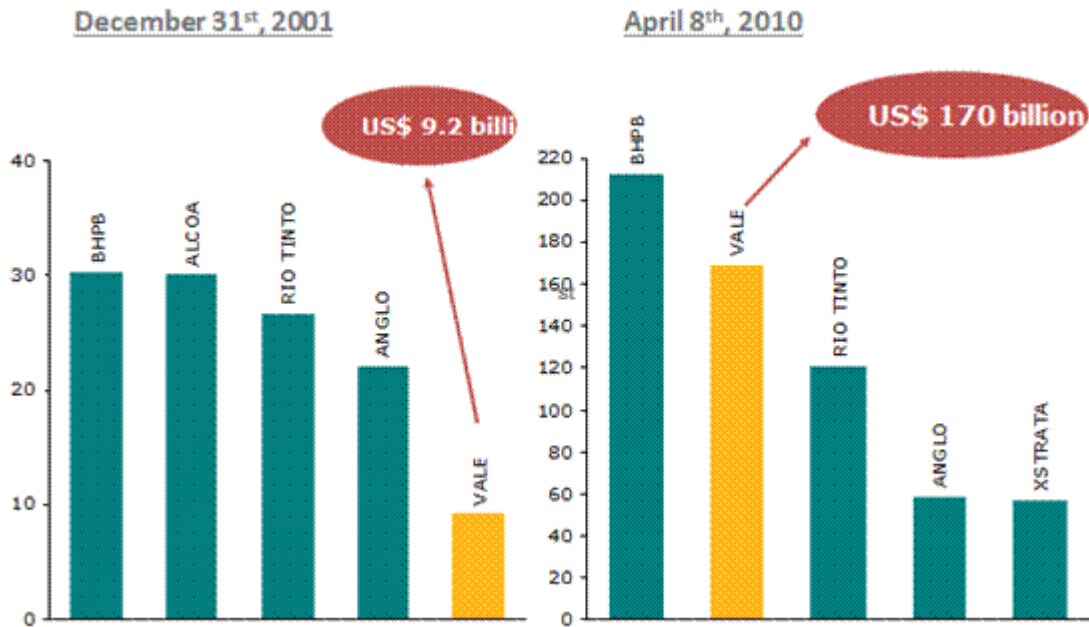
Annex 11 – Seaborne Trade Development (Billion ton miles)



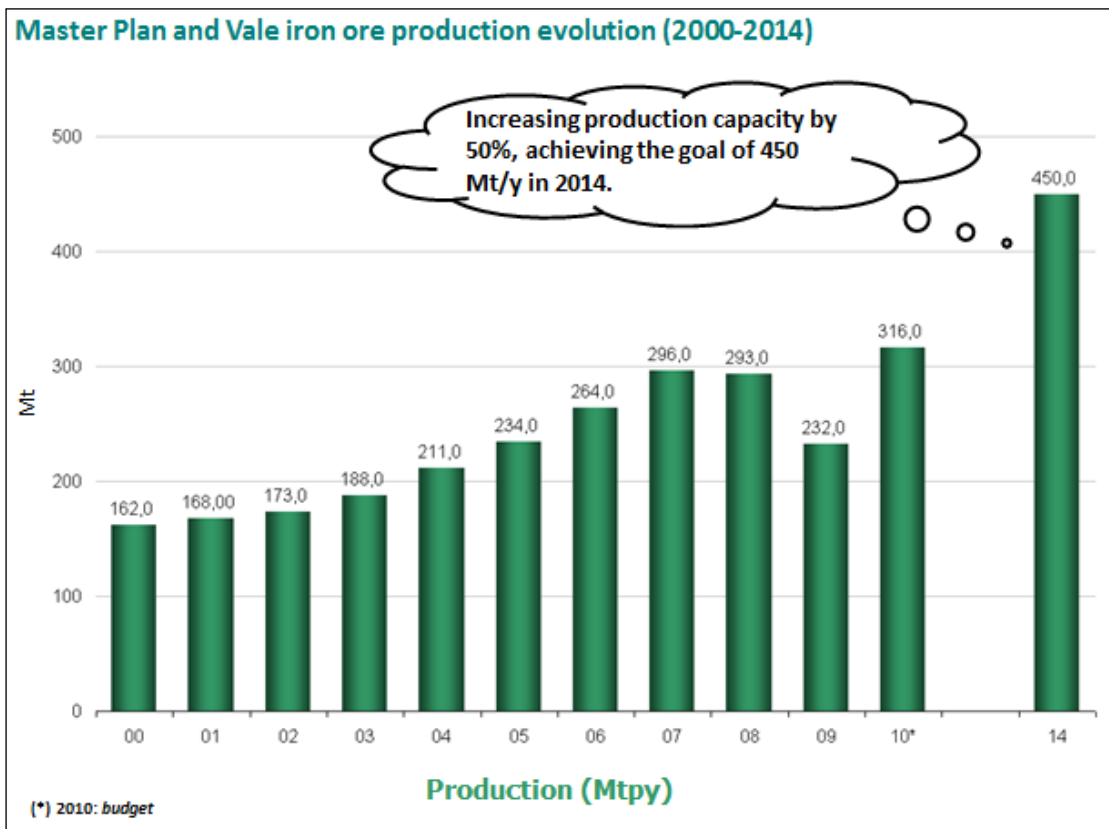
Annex 12 – Capesize Baltic Exchange Dry Index – BDI



Annex 13 – The Company’s market cap multiplied by 18 in the last 9 years



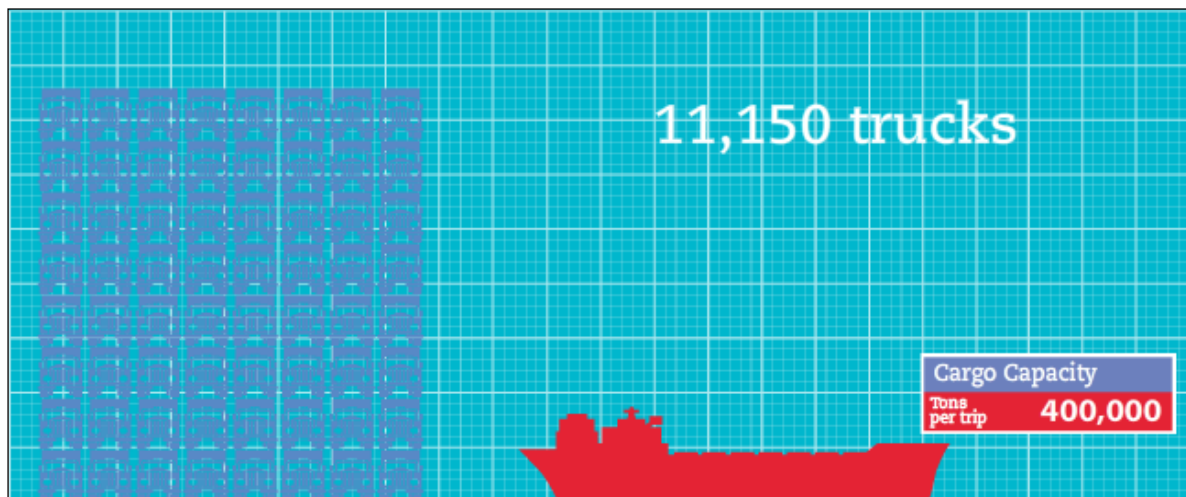
Annex 14 – Master Plan and Vale Iron Ore production Evolution (2000 -2014)



Annex 15 – Iron Ore Projects Brazil

Iron Ore Projects in Brazil				
	Capacity (Mtpy)	State	Start up	Investments (US\$ million)
Carajás - Additional 30Mtpy	30	PA	2012	2,478
Carajás Serra Sul (mine S11D)	90	PA	2013	11,297
Apolo	24	MG	2014	2,509
Conceição Itabiritos	12	MG	2012	1,174
Vargem Grande Itabiritos	10	MG	2013	1,259

Annex 16 – Comparison of Transportation Capacity between Vale Brazil and Truck Model



## Final Notes

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