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# Shipping

# Dry Bulk Outlook: Iron ore and coal

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**This report contains detailed forecasts on global seaborne iron ore and coal exports, including more than 65 of the world's largest commodity ports and new port projects. These are further used to analyse the effect on dry bulk shipping rates.**

- **Iron ore -** After subdued volumes in 2009, we believe that iron ore exports will increase substantially during the next five years. It is our opinion that Australia will remain the largest iron ore exporter in the world, followed by Brazil. From 2009 to 2015, we believe that iron ore port capacity will increase by 86.3%, or an annual average growth of 10.9%. During the same period, we believe that iron ore exports will increase by 81.1%, representing an annual average growth of 10.4%

- **Coal -** Also in coal, we believe that Australia will remain as the top exporting country, followed by Indonesia. We expect to see large capacity increases in the ports of Newcastle, Hay Point, Abbot Point and Gladstone. In the period 2009 to 2015, the capacity of coal terminals is expected to grow by 35.5%, equal to an average annual growth of 5.2%. In the same period, we believe that actual coal exports will grow by 59.5%, representing an annual average growth of 8.1%

- **Rates** - Although volumes are expected to rise, the dry bulk carrier fleet is set to continue its rapid expansion as the order books remains at historically high levels. Taking slippage and cancellations into consideration, we still believe that the fleet growth will keep rates at subdued levels for the next few years. Volatility will however persist, but at lower average rates than what we have been used to in recent years

**Please see the last page for important information.**

DnB NOR Markets

# Table of contents

# Table of figures

# Appendix

# Preface

### The purpose of the study

The purpose of this study is to examine the capacity and export volumes for iron ore and coal ports, globally. In addition to presenting current numbers, this report also includes estimates for the next 5 years, both in terms of capacity and exports.

Although the transportation and production of these goods are very closely related, the focus of this report is the former. Hence, while certain mining projects are mentioned, it is not the objective of this report to give a detailed analysis of these.

### Coverage

This study covers more than 65 ports worldwide. While this includes all the largest coal and iron ore ports in the world, the aggregate volumes exported through many small ports will cause the real global export to deviate somewhat from the aggregated volumes in this study. However, this deviation is limited, since the majority of the volumes come from the largest ports. For 2009, the volumes from the ports included in this study represented 93.2% and 94.8% of iron ore and coal, respectively.

### Scale of measurement

While some companies, primarily in North America, report productions volumes in short tons, the vast majority of businesses use the metric system. Consequently, in our report we use metric tonnes. Furthermore, the abbreviation “Mt” is used to express a million metric tonnes. The term “Mtpa” is used to express “million metric tonnes per year”.

### Estimates

In the following report, we use the terms “capacity” as a measure of what a port can export if the demand and supply is high. The estimated port capacities are given in two different formats: year-end and weighted. The year-end capacities are the export capacities as of the end of the calendar year, December 31$^{st}$. In contrast, the weighted estimates are adjusted to represent the export capacities of the ports *during* the year. Hence, if a port has a capacity of 10 million tonnes per annum (Mtpa) and becomes operational on the 1$^{st}$ of October 2010, its weighted 2010 capacity will be calculated as [3 months/12]*10 Mtpa = 2.5 Mtpa. In comparison, the capacity at year-end is 10 Mtpa.

Forecasted port capacities and export volumes are based on communication with representatives from the ports and/or mining companies, as well as published material. While this forms the basis for the base case estimates, we have also included “High” and “Low” forecasts, to incorporate the underlying uncertainty. Unless otherwise noted, the forecasts presented are the base case estimates.

Predicting future capacities and export volumes is a difficult task and deviations will occur due to events such as cancellations and delays, but also to new projects being approved. When there is high uncertainty about when (or if) projects will be built, these projects are not included in the aggregated forecasts, although they are described in the report.

Estimates are based on the current market conditions, which are also reflected in generally positive outlooks from representatives from the ports and mining companies. Macroeconomic events, such as a new economic downturn, can potentially have a large impact on the realized export volumes (capacities would in such a case be less affected and mainly consist of the cancellation or delays of early-stage projects. Due to uncertainty, these are in many cases not included in the aggregated numbers in the first place).

# Iron ore

Few metals have affected the way our society looks and works more than iron. While its areas of use spans from cars to painting to medicine, approximately 98% of iron ore is used to produce steel. Iron (Fe) constitutes approximately 5% of the Earth's crust. Yet, it is virtually impossible to find it naturally in its metallic form. Instead, iron is extracted from iron oxides (molecules of iron and oxygen), the most common being Hematite ($Fe_2O_3$) and Magnetite ($Fe_3O_4$), with iron content of 70% and 72%, respectively.

Iron ores are rocks and minerals that contain a high level of iron oxides. However, the ores also consist of other rocks and minerals and their overall levels of iron are therefore lower than those of the oxides separately. On average, the iron content for ores is between 60-65%. Taconite is a term used to describe a low-grade iron ore that contains up to 30% Hematite and Magnetite.

### Processing

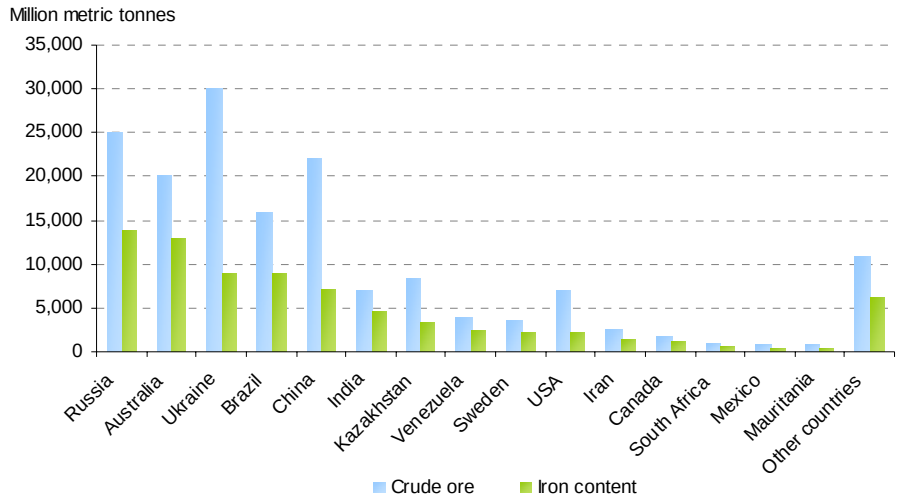
Although Magnetite oxides have a higher iron content (72%) than Hematite oxides, Magnetite ores have lower iron content than Hematite ores, due to a higher content of other minerals. It must therefore go through a process called "beneficiation" to become suitable for steelmaking. This process crushes the ore and separates the Magnetite from the other minerals. Since iron is one of the 3 magnetic metals found in nature, magnetic separation is used in this process. After processing the ore and removing other minerals, the iron content usually increases to above 65%. Hence, although the beneficiation process has a cost, magnetite concentrate gets a premium due to its high iron content. Likewise, taconite also requires a relatively comprehensive beneficiation process in order to increase its iron level to shipping grade. Hematite ores normally contain higher levels of iron than those of Magnetite. Consequently, this ore requires a shorter beneficiation process (simple crushing and screening) and is therefore often referred to as "Direct Shipping Ore".

The iron ore is either sold as fines, lump or pellets. Fines are particles up to about 5mm, while lump are particles larger than that. Pellets are made from fines at pelletizing plants, in a process where moist ore is tumbled, mixed with a binder and in some cases limestone, and hardened by heating and subsequent cooling. This process is often used for processed magnetite and taconite. Lump and pelletized iron ore are normally better suited for being fed into the blast furnace for steel production. Due to their size, air is allowed to flow through, which is important for the process. In contrast, fines are more compact, allowing less air to flow in between. To solve this process, iron ore fines must go through a process called "sintering", in which it is solidified and broken into appropriate sized pieces.

### Iron ore deposits

Iron ore is found on all continents and the deposits are large. In 2008, global iron ore production exceeded 1,700 Mt, but these volumes are still low compared to the available reserves. Due to the high amount of raw material, production is not only a function of availability of iron ore. Transportation can be just as expensive as the material. Hence, factors such as infrastructure and proximity to steel plants affect the development of the industry.

**Figure 1: Global iron ore reserves**

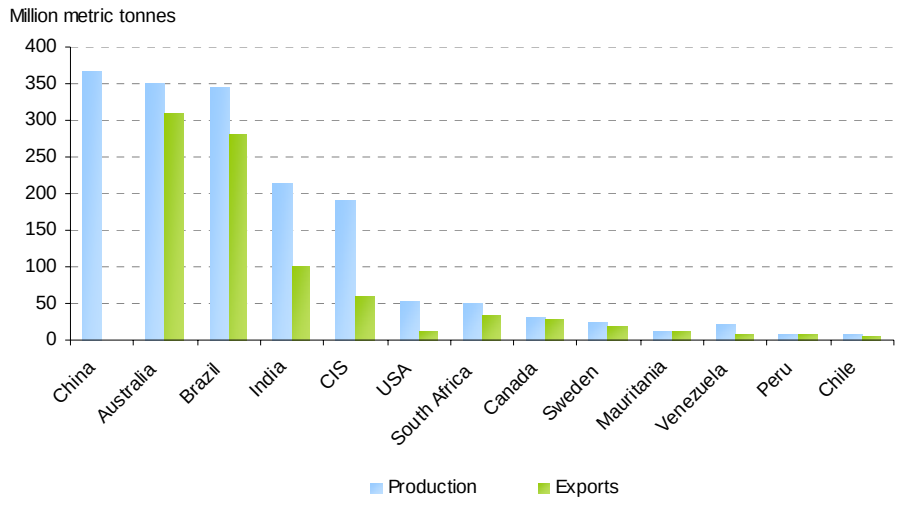



*Source: U.S. Geological Survey*

### Production and exports

The largest producers of iron ore are China, Australia, Brazil, India and the CIS (Commonwealth of Independent States). Due to China using virtually all its iron ore for domestic steel production, Australia and Brazil are by far the largest iron ore exporters. India and CIS also export significant volumes, although substantial shares of their productions are used for domestic steel production. Several countries, including the U.S., South Africa, Canada, Sweden, Mauritania, Venezuela, Peru and Chile also produce and export iron ore. Although these volumes are relatively low compared those of Australia and Brazil, they are covered in this report.

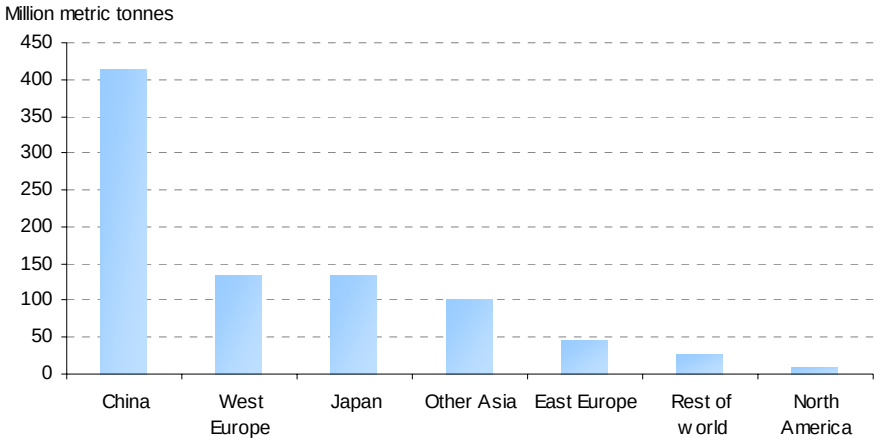
**Figure 2: Iron ore production and exports, 2008**




*Source: UNCTAD*

**Imports**

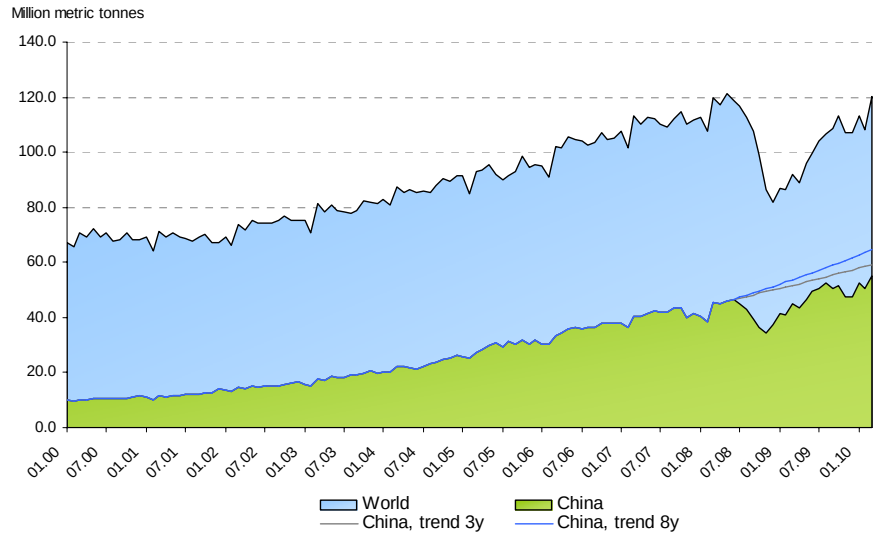
**Figure 3: Iron ore imports**




*Source: UNCTAD*

In contrast, China does not only use its entire domestic supply, but is also the world's largest importer of iron ore. According to UNCTAD, China imported 415 Mt of iron ore in 2008. This equals approximately 49% of worldwide iron ore exports. As the world economies plunged in 2009, steel production and iron ore exports were reduced. However, for China the decrease was lower than that for the world as a whole: The Chinese production decreased by 26.2% from its peak in June 2008 to its lowest levels in November 2008 while world production decreased by 32.5% from the highest levels in May 2008 to the bottom in December 2008. However, the production has picked up again, and iron ore producers are currently experiencing a soaring demand.

**Figure 4: Steel production, China and total world production**




*Source: Worldsteel*

In March 2010, global steel production was back at the peak levels before the economic downturn. Chinese production, however, has reached volumes above its pre-crash level. In fact, the Chinese steel production is almost back at the levels it would have been at, had it continued to grow at its three-year average monthly growth rate, rather than declining in 2008.

## Trade flows

**Figure 5: Global iron ore trade, 2008 (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*

From the table above, we can see where the iron ore from different countries was exported in 2008. Notice from this table that the CIS countries mainly export their iron to China and Europe, with East Europe constituting the majority of this. The transportation of this iron ore is mainly done by train while volumes transported by sea are low. Hence, these volumes are not included in this report.

The export destinations for the CIS countries reflect the importance of transportation costs. Steel producers tend to buy the iron ore from (relatively) nearby producers. In other words, the majority of Swedish iron ore is exported to Europe and, likewise, Australian and Indian iron ore is mainly exported to Asia.

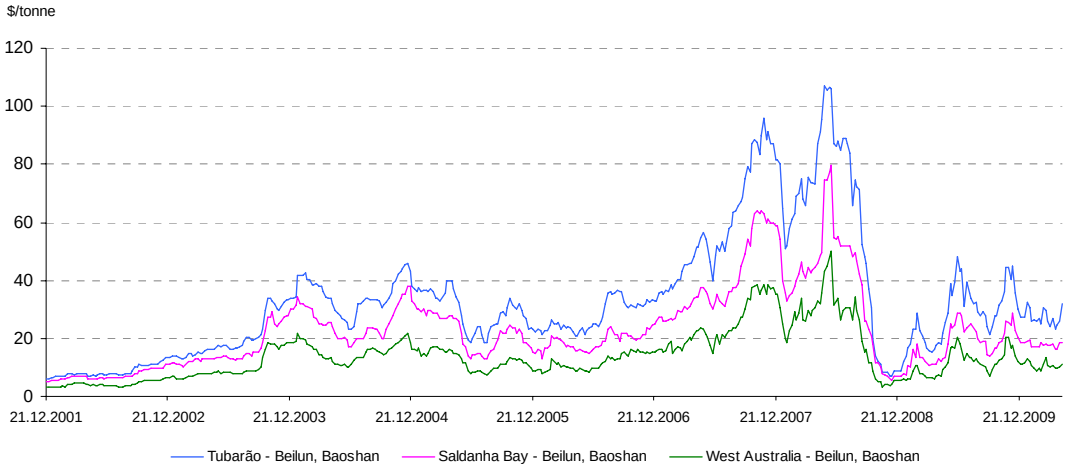
**Figure 6: Largest steel producing countries (Thousand metric tonnes)**

| Country | 2007 | 2008 | 2009 |
|---|---|---|---|
| China | 489,899 | 500,312 | 567,842 |
| Japan | 120,203 | 118,739 | 87,534 |
| Russia | 72,387 | 68,510 | 59,940 |
| United States | 98,102 | 91,350 | 58,142 |
| India | 53,080 | 57,791 | 56,608 |
| South Korea | 51,517 | 53,625 | 48,598 |
| Germany | 48,550 | 45,833 | 32,671 |
| Ukraine | 42,830 | 37,279 | 29,757 |

*Source: Worldsteel*

However, from the table above we see that a large part of the global steel production takes place in Asia, resulting in a high demand for iron ore from these countries. Consequently, these importers must also seek to get this demand covered from more distant exporters. This long distance transportation, from countries such as Brazil, creates a need for a large amount of bulk vessels, and increases the transportation costs for the involved steel producers.

**Figure 7: Capesize rates, ore voyage - 165,000 dwt**




*Source: Clarksons*

The figure above shows voyage rates to Beilun/Baoshan in China for 165,000 dwt Capesize vessels. We can here see the higher costs related to shipping iron ore from Tubarão (Brazil) and from Saldanha Bay (South Africa), compared to West Australia. Australian miners have benefited from this geographical advantage. Due to the lower cost of shipping, they demand a price premium on the iron ore, since the delivered product is (quite) similar to that from Brazil.

It is interesting to note, however, that Vale is trying to meet the competition, and the challenges caused by distance to their customers, in new ways: The company is planning to open a distribution centre (including a pellet plant) in Oman this year and is also planning to construct a distribution centre in Teluk Rubiah, Malaysia. The capacities of these centres will be 40 Mtpa and 30 Mtpa, respectively, with the latter having the possibility to expand to 90 Mtpa. Vale has also recently started to acquire very large ore carriers (VLOCs), in order to reduce the volatility of their shipping costs: According to Clarksons, Vale has ordered 19 VLOCs, with a capacity of 400,000 dwt each.

### Major players

In terms of companies, there are three dominant players in the industry: Vale, Rio Tinto and BHP Billiton. Vale produces its iron ore in Brazil, but also owns a share of an iron ore pellet plant in China, and is planning to expand its operations to Simandou in Guinea. Rio Tinto and BHP Billiton operate primarily in the Pilbara region in West Australia. However, BHP Billiton is also represented in Brazil through Samarco, a 50-50 joint venture with Vale. Rio Tinto had until recently iron ore operations in Brazil, through its Corumbá iron ore mine, but this was sold in September 2009. The company also owns the Iron Ore Company of Canada, has a project in Orissa, India, and is planning a project in Guinea.

**Figure 8: Largest iron ore producers, early 2010**

| Company | Country | Capacity (Mtpa) |
|---|---|---|
| Vale Group | Brazil | 417.1 |
| Rio Tinto Group | UK | 273.7 |
| BHP Billiton Group | Australia | 188.5 |
| ArcelorMittal Group | UK | 78.9 |
| Fortescue Metals Group | Australia | 55.0 |
| Evrazholding Group | Russia | 50.4 |
| Metalloinvest Group | Russia | 44.7 |
| AnBen Group | China | 44.7 |
| Metinvest Holding Group | Ukraine | 42.8 |
| Anglo American Group | South Africa | 41.1 |
| LKAB Group | Sweden | 38.5 |
| CVG Group | Venezuela | 37.9 |
| Cliffs Natural Resources | USA | 34.6 |
| NMDC Group | India | 32.6 |
| Imidro Group | Iran | 29.8 |
| CSN Group | Brazil | 28.0 |
| Shougang Beijing Group | China | 26.5 |
| US Steel Group | USA | 23.5 |
| ENRC - Eurasian Natural Resources | Kazakhstan | 19.7 |
| Wuhan Iron & Steel Group | China | 18.6 |

*Source: James F. King*

In June 2009, Rio Tinto and BHP Billiton announced that they will pool their Australian Pilbara assets in a 50-50 joint venture. Rio Tinto informed in their 2009 Annual Report that the long-term synergies that can be captured by doing this, is at least USD 10 billion. However, the plans have met strong opposition, especially from steelmakers, who claim that such an action will effectively result in a duopoly in seaborne iron ore trade. The plans are currently under review by the Australian Competition and Consumer Commission.

The current situation, with a few large companies dominating is a result of the large barriers of entry: Iron ore mining is an industry that requires substantial investment in equipment and infrastructure, and the economies of scale are large. However, new companies are starting up, such as the Australian Fortescue Metals Group and Brazilian MMX.

In recent years, Chinese companies have increased their investments in iron ore projects abroad. This is done to diversify their supply, to avoid getting too dependent on the largest mining companies. Hence, Chinese companies are currently involved in large iron ore mining projects at multiple locations, including South America, Australia and Africa.

### Pricing

For the last four decades, most iron ore trades have followed the “benchmark system”, although a spot market exists as well. Under this system, the first price reached through negotiations between miners and steelmakers in a given year serves as a benchmark. The remaining trades use this price and hence, it is negotiated only once a year. When spot prices are higher than the benchmark price, mining companies will lose potential income by following the benchmark system. In the same way, they gain by following the system if the spot prices are lower than the benchmark price.

However, a problem with this system has been examplified in recent years. When the spot prices plunged in 2008, Japanese steel mills demanded price reductions, while China rejected the benchmark deal. However, when prices are increasing and the spot prices are higher than the benchmark prices, as seen recently, the same steelmakers embrace the benchmark system.

After signalling for a while that they would move away from this system, Vale and BHP Billiton announced in March 2010 that they change to a quarterly pricing system instead. Vale informed that the new prices will be based on a three-month average of price indexes ending one month before

the start of the new quarter. Hence, the new prices are more in line with the movements in the spot market.

At the time of the announcement, the current benchmark price for the Japanese and Korean customers was USD 62 per tonne, while the new price was set at USD 105 per tonne. Rio Tinto is also following, and reported that, in the second quarter of 2010, the company signed agreements with about 50% of its Asian customers for pricing on a quarterly basis.

### Iron ore ports

The iron ore ports covered are listed below. In addition to these, some projects under development are mentioned, but not included in the aggregated capacity and export volumes. This is due to uncertainty in the planning process, such as receiving the necessary permits, political risk, or difficulties in getting accurate information.

**Figure 9: Iron ore ports covered in this study**

| Country | Port | Status * |
|---|---|---|
| Australia | Port Hedland | Will increase capacity |
| Australia | Port of Dampier | Will increase capacity |
| Australia | Cape Lambert | Will increase capacity ** |
| Australia | Esperance Ports | Possible expansion |
| Australia | Port of Geraldton | |
| Australia | Port of Darwin | Will increase capacity |
| Australia | Cape Preston | Under construction |
| Australia | Oakajee Port | Planning stage |
| Brazil | Ponta da Madeira | Will increase capacity |
| Brazil | Tubarão | |
| Brazil | Guaíba | |
| Brazil | Itaguaí (Vale) | |
| Brazil | Itaguaí (CSN) | Will increase capacity |
| Brazil | Ponta da Ubu | Possible expansion |
| Brazil | Açu Superport | Under construction |
| Brazil | Sudeste Port | Under construction |
| Brazil | Ferrous port | Planning stage |
| Peru | San Juan de Marcona (Shougang Hierro Peru) | Will increase capacity |
| Peru | San Juan de Marcona (Strike Resources) | Planning stage |
| Chile | Puerta Punto Cachos | Planning stage |
| India | Mormugao Port | Will increase capacity |
| India | Paradip Port | Will increase capacity |
| India | Port of Visakhapatnam | Possible expansion |
| India | Port of Chennai | |
| India | Ennore Port | Will increase capacity |
| India | Haldia Dock Complex | |
| India | New Mangalore Port | Will increase capacity |
| South Africa | Saldanha Bay | Will increase capacity |
| Mauritania | Port of Nouhadibou | Will increase capacity |
| Guinea/Liberia | Vale Simandou project/Port in Liberia | Planning stage |
| Sierra Leone | Pepel Port / Tagrin | Under construction |
| Canada | Port de Sept-Îles | Will increase capacity |
| Canada | Port-Cartier | |
| Norway | Port of Narvik | Will increase capacity ** |
| Sweden | Port of Luleå | |
| Ukraine | Ferrexpo Yuzhny terminal | |
| Latvia | Free Port of Ventspils | |
| Finland | Port of Kemi / Port of Narvik expansion | Planning stage |

* Plans as of the 1st of August 2010
** Debottlenecking

*Source: DnB NOR Markets*

**Figure 10: Port projects not included in aggregate volumes**

| Country | Company | Project | Planned capacity |
|---|---|---|---|
| Australia | Atlas Iron, Brockman Resources, FerrAus (NWIOA* ) | Port Hedland terminal | 50 Mtpa (probably 2014/2015) |
| Australia | Fortescue Metals Group | Further expansion of the Herb Elliot Port (Port Hedland) + new terminal in the South West Creek (Port Hedland) | Total capacity of 120 Mtpa in 2013 and 155 Mtpa in 2014 (We have estimated 95 Mtpa in 2013 going forward) |
| Australia | Fortescue Metals Group, Aquila Resources, Metallurgical Corporation of China | Port at Anketell Point | Potentially 130 Mtpa in first phase (2014/2015) |
| Brazil | Adriana Resources / Brazore | New port | 20 Mtpa (2013/2014), 45 Mtpa (2015/2016) |
| Brazil | Usiminas | Sepetiba bay port | 25 Mt (2015-2016 |
| Guinea | Rio Tinto | Simandou project | 70 Mtpa (possibly around 2015) |
| Guinea | Bellzone | New port (Kalia mining project) | 20 Mtpa (2014), 30 Mtpa (2015) 40 Mtpa (2017), 50 Mtpa (2018) |
| Republic of Congo / Republic of Gabon | Core Mining | Port of Owendo / New port (Avima and Kango projects) | 1 Mtpa (2011), 30 Mtpa (2015), 40 Mtpa (Longer term) |
| Cameroon | Sundance Resources | Lolabè (Mbalam project) | 35 Mtpa (commence operations in 2012. Ramp-up unknown) |

* North West Iron Ore Alliance

**Possible additional capacity by the end of 2015 (best case)** **475 Mtpa**

*Source: DnB NOR Markets*

Again, the projects in the table above are not included in the aggregate numbers due to uncertainty. This can be uncertainty regarding receiving the necessary permits, political risk and general uncertainty about the progress and schedule of the projects.

## Port capacities and exports

The demand for iron ore has been soaring recently, and in most cases, the capacities of mines and transportation are the current bottlenecks. Hence, many projects are under planning and construction, and the result is a substantial expected increase in capacity and export within the next five years.

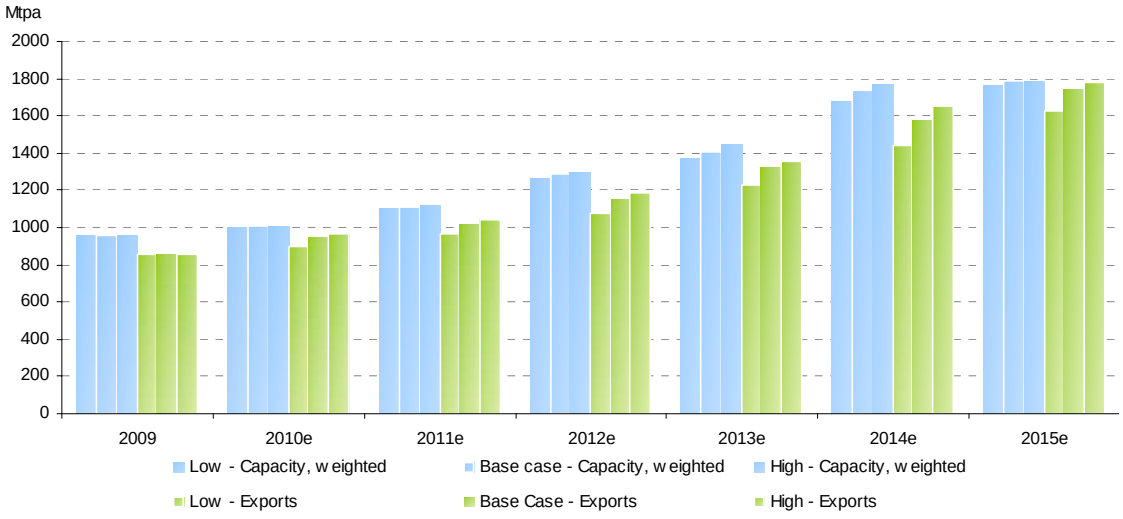
The aggregated expected port capacities and export volumes for iron ore terminals are shown in the table and figure below. With a few exceptions on export volumes, all numbers for 2009 are either as reported, or volumes that we have been informed about through conversations with exporters and/or port authorities.

**Figure 11: Global capacities and export volumes – Iron ore (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | | | | | | | |
| Low | 958 | 1001 | 1099 | 1263 | 1369 | 1674 | 1764 |
| Base case | 958 | 1005 | 1110 | 1288 | 1404 | 1741 | 1785 |
| High | 958 | 1009 | 1123 | 1298 | 1451 | 1774 | 1789 |
| **Capacity, year-end** | | | | | | | |
| Low | 980 | 1022 | 1165 | 1299 | 1416 | 1764 | 1764 |
| Base case | 980 | 1027 | 1167 | 1314 | 1470 | 1775 | 1775 |
| High | 980 | 1041 | 1218 | 1317 | 1563 | 1779 | 1779 |
| **Exports** | | | | | | | |
| Low | 854 | 901 | 962 | 1074 | 1230 | 1437 | 1627 |
| Base case | 854 | 948 | 1021 | 1153 | 1319 | 1574 | 1742 |
| High | 854 | 968 | 1045 | 1183 | 1358 | 1651 | 1782 |
| **Growth rates, base case** | | | | | | | |
| Capacity | | 4.9 % | 10.5 % | 16.0 % | 9.0 % | 24.0 % | 2.5 % |
| Capacity, year-end | | 4.9 % | 13.6 % | 12.6 % | 11.9 % | 20.8 % | 0.0 % |
| Exports | | 11.0 % | 7.7 % | 12.9 % | 14.4 % | 19.4 % | 10.7 % |

*Source: DnB NOR Markets*

**Figure 12: Global capacities and export volumes – Iron ore**




*Source: DnB NOR Markets*

We expect to see approximately doubled iron ore exports by the end of 2015, with the largest scheduled volume increases coming from Vale, Rio Tinto and BHP Billiton. However, several younger companies are establishing themselves in the market and new ports and terminals are being built to accommodate their iron ore exports. In Australia, examples of

these are Fortescue Metals Group (exporting through its “Herb Elliot Port” in Port Hedland and exploring the possibility of a new port at Anketell Point), Atlas Iron (Currently exporting through “Herb Elliot Port” and will start exporting through “Utah Point” in Port Hedland), a consortium consisting of Murchison Metals, Crossland Resources and Mitsubishi (planning the construction of a new deepwater port at Oakajee) and CITIC Pacific (constructing a new mine, railroad and port at Cape Preston). In Brazil, the infrastructure company LLX is constructing two major ports: Sudeste Port and Açu Superport. These projects are described in further detail later in this report.

**Figure 13: Iron ore export capacities and volumes (base case) (Mtpa)**

| Country | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Australia** | | | | | | | |
| - Capacity, weighted | 413 | 438 | 491 | 575 | 606 | 772 | 789 |
| - Capacity, year-end | 435 | 449 | 542 | 586 | 639 | 789 | 789 |
| - Exports | 381 | 423 | 474 | 540 | 594 | 688 | 779 |
| **Brazil** | | | | | | | |
| - Capacity, weighted | 306 | 314 | 321 | 389 | 422 | 557 | 563 |
| - Capacity, year-end | 306 | 321 | 321 | 398 | 447 | 563 | 563 |
| - Exports | 269 | 295 | 300 | 324 | 383 | 502 | 561 |
| **India** | | | | | | | |
| - Capacity, weighted | 105 | 107 | 116 | 118 | 126 | 128 | 128 |
| - Capacity, year-end | 105 | 107 | 118 | 118 | 128 | 128 | 128 |
| - Exports | 95 | 98 | 104 | 110 | 116 | 118 | 118 |
| **South Africa** | | | | | | | |
| - Capacity, weighted | 45 | 49 | 56 | 58 | 58 | 58 | 58 |
| - Capacity, year-end | 45 | 50 | 58 | 58 | 58 | 58 | 58 |
| - Exports | 44 | 47 | 50 | 54 | 56 | 56 | 56 |
| **Canada** | | | | | | | |
| - Capacity, weighted | 40 | 42 | 60 | 60 | 60 | 60 | 60 |
| - Capacity, year-end | 40 | 42 | 60 | 60 | 60 | 60 | 60 |
| - Exports | 30 | 33 | 39 | 46 | 52 | 55 | 55 |
| **Sweden / Norway** | | | | | | | |
| - Capacity, weighted | 26 | 26 | 26 | 32 | 32 | 32 | 32 |
| - Capacity, year-end | 26 | 26 | 26 | 32 | 32 | 32 | 32 |
| - Exports | 14 | 25 | 25 | 27 | 29 | 31 | 31 |
| **Mauritania** | | | | | | | |
| - Capacity, weighted | 12 | 12 | 12 | 13 | 20 | 20 | 20 |
| - Capacity, year-end | 12 | 12 | 12 | 20 | 20 | 20 | 20 |
| - Exports | 10 | 11 | 11 | 11 | 17 | 20 | 20 |
| **Peru & Chile** | | | | | | | |
| - Capacity, weighted | 5 | 8 | 10 | 10 | 15 | 30 | 50 |
| - Capacity, year-end | 5 | 10 | 10 | 10 | 20 | 40 | 40 |
| - Exports | 4 | 6 | 9 | 10 | 11 | 18 | 37 |
| **Guinea/Liberia** | | | | | | | |
| - Capacity, weighted | 0 | 0 | 0 | 13 | 31 | 50 | 50 |
| - Capacity, year-end | 0 | 0 | 0 | 13 | 31 | 50 | 50 |
| - Exports | 0 | 0 | 0 | 13 | 31 | 50 | 50 |
| **Sierra Leone** | | | | | | | |
| - Capacity, weighted | 0 | 0 | 8 | 10 | 24 | 25 | 25 |
| - Capacity, year-end | 0 | 0 | 10 | 10 | 25 | 25 | 25 |
| - Exports | 0 | 0 | 0 | 9 | 20 | 25 | 25 |
| **Ukraine** | | | | | | | |
| - Capacity, weighted | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| - Capacity, year-end | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| - Exports | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| **Latvia** | | | | | | | |
| - Capacity, weighted | 0 | 5 | 5 | 5 | 5 | 5 | 5 |
| - Capacity, year-end | 0 | 5 | 5 | 5 | 5 | 5 | 5 |
| - Exports | 0 | 3 | 4 | 5 | 5 | 5 | 5 |
| **Capacity, weighted** | **958** | **1,005** | **1,110** | **1,288** | **1,404** | **1,741** | **1,785** |
| - Growth | | 4.9 % | 10.5 % | 16.0 % | 9.0 % | 24.0 % | 2.5 % |
| **Capacity, year-end** | **980** | **1,027** | **1,167** | **1,314** | **1,470** | **1,775** | **1,775** |
| - Growth | | 4.9 % | 13.6 % | 12.6 % | 11.9 % | 20.8 % | 0.0 % |
| **Exports** | **854** | **948** | **1,021** | **1,153** | **1,319** | **1,574** | **1,742** |
| - Growth | | 11.0 % | 7.7 % | 12.9 % | 14.4 % | 19.4 % | 10.7 % |

*Source: DnB NOR Markets*

The figure on the previous page shows that we expect Australia to remain as the number one iron ore exporter in the world (in addition to the capacity increase in the figure above, we may see an additional increase of 110 Mtpa at Port Hedland and 130 Mtpa at Anketell Point, Australia, within the next five years). Notice that this figure reflects aggregate export volumes through the ports of a given country. This can deviate greatly from actual production, as some of the countries, such as India, use a substantial part of their iron ore for domestic steel production.

As mentioned earlier, the iron ore ports covered in this study represented approximately 93.2% of global iron ore exports in 2009. If we assume that this proportion remains constant, we can find an estimate of the real seaborne iron ore volumes, including those not covered by the ports in this study.

**Figure 14: Adjusted expected export volumes**

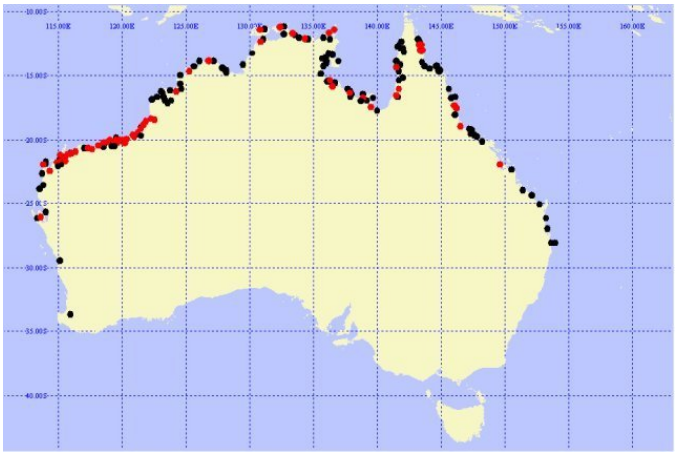
| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Exports** | | | | | | | |
| Low | 854 | 901 | 962 | 1074 | 1230 | 1437 | 1627 |
| Base case | 854 | 948 | 1021 | 1153 | 1319 | 1574 | 1742 |
| High | 854 | 968 | 1045 | 1183 | 1358 | 1651 | 1782 |
| **Adjusted exports** | | | | | | | |
| Low | 916 | 967 | 1,033 | 1,153 | 1,320 | 1,543 | 1,747 |
| Base case | 916 | 1,017 | 1,096 | 1,238 | 1,415 | 1,689 | 1,870 |
| High | 916 | 1,039 | 1,122 | 1,270 | 1,458 | 1,772 | 1,913 |

*Source: DnB NOR Markets*

### Port congestion

Port congestion (ships waiting to load) is a factor that affects supply of tonnage in the market and thereby the shipping rates. In recent years, this has been a problem in Australia, with for example up to 80 vessels waiting to load at the coal port of Newcastle. However, the iron ore ports in the west of Australia are generally less affected, although severe delays have been observed here as well. In Australia, the Pilbara region is the most exposed area to cyclones. Since 1970, 75% of all severe Australian cyclones have crossed here, with an average of one severe and one non-severe every year. This affects loading and unloading of vessels.

**Figure 15: Coastal crossing points, cyclones in Australia**



*Source: The Australian Government, Bureau of Meteorology*
*(red dots represent severe tropical cyclones (category three or higher) and black dots represent non-severe)*

As of the end of May 2010, the average waiting time for vessels to load at the west coast of Australia was about 3 days. However, this varies from port to port as well as it fluctuates over time. In Port Hedland, they plan with an average maximum “in port time” of 120 hours, including time for

entry and departure, as well as time for loading. Hence, with its current number of berths, the port should ideally have 12 vessels waiting offshore at all times, to keep up the loading rate. Due to expansions at the port, the Port Authorities have informed us that this number will increase to 50-60 in the future.

Congestion is normally a smaller problem in Brazil than in Australia, although there are sometimes large delays here as well. As of the end of May 2010, Vale reports that the waiting time at their ports is “a few days”.

# Australia

The vast majority of the Australian iron ore mining industry is located in the Pilbara region in West Australia, with a large amount of mines located around the towns Newman and Tom Price. The major players in the industry here are Rio Tinto (through Hamersley Iron) and BHP Billiton. Fortescue Metals Group is also well-established and has planned to increase output substantially in the next years.

### Rail access

In contrast to the infrastructure on the east-coast of Australia, where its coal industry is located, railroads to the major ports in Pilbara are privately owned, and Rio Tinto, BHP Billiton and Fortescue all own railroads for transportation of iron ore. While the railways of Rio Tinto and BHP Billiton have been closed to third-party access, the Fortescue railway has been open to other producers.

There have been several battles in court about third parties wanting access to the Rio Tinto and BHP Billiton railways. While the junior miners can gain a lot by not having to construct their own railways, the large owners argue that allowing these junior mining companies access to their railways will decrease their capacity and cause large economic losses. In a recent ruling, the Goldsworthy and Robe River lines, owned by BHP Billiton and Rio Tinto respectively, were declared open for third party access. However, the Mount Newman and Hamersley rail lines were not declared open, and Fortescue Metals Group has announced that it will most likely appeal this verdict.

### Tax

The Australian government announced in May 2010 that it planned to impose a new 40% Resource Super Profits Tax (RSPT), starting in July 2012. The proposal received massive criticism from the mining industry, who claimed that profitability and investments in the industry would decrease substantially and projects would be cancelled.

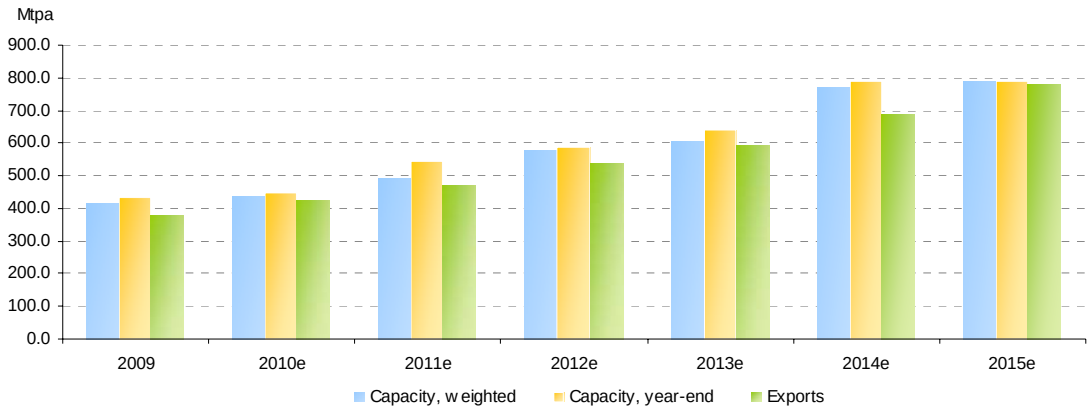
However, with a new prime minister, the RSPT has been replaced with a proposal of a Minerals Resource Rent Tax (MRRT). The new MRRT is suggested to apply from the first of July 2012, and will have a tax rate of 30%, applied to the taxable profit of the resource. Additionally, the law gives the miners the opportunity to carry forward tax losses and deduct capital costs. However, since the new law only taxes iron ore and coal, it has been argued that it is unfair and favours the large companies with more influence on the government, and who earns its profits from the sale of several commodities. Additionally, although the mining industry is more positive to the new MRRT proposal, there is still scepticism and uncertainty regarding the tax.

**Figure 16: Iron ore export capacity and volumes – Australia (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 413.3 | 437.6 | 491.0 | 575.5 | 606.1 | 771.9 | 789.0 |
| - growth | | 5.9 % | 12.2 % | 17.2 % | 5.3 % | 27.4 % | 2.2 % |
| **Capacity, year-end** | 435.0 | 448.7 | 542.0 | 585.7 | 639.0 | 789.0 | 789.0 |
| - growth | | 3.1 % | 20.8 % | 8.1 % | 9.1 % | 23.5 % | 0.0 % |
| **Exports** | 381.4 | 423.5 | 473.8 | 539.9 | 594.2 | 688.2 | 779.3 |
| - growth | | 11.0 % | 11.9 % | 14.0 % | 10.0 % | 15.8 % | 13.2 % |

*Source: DnB NOR Markets*

**Figure 17: Iron ore export capacity and volumes – Australia**




*Source: DnB NOR Markets*

We expect the port capacity and exports of Australian iron ore to grow substantially in the next five years. Average annual growth rates for weighted capacity, year-end capacity and expected export volumes, between 2009 and 2015, are 11.4%, 10.4% and 12.6%, respectively. Percentage wise, the year-end capacity increase will be highest in 2011 and 2014, with new capacity coming online at Port Hedland and Cape Lambert.

There are three major iron ore ports in Australia. These are:

- Port Hedland
- Port of Dampier
- Cape Lambert

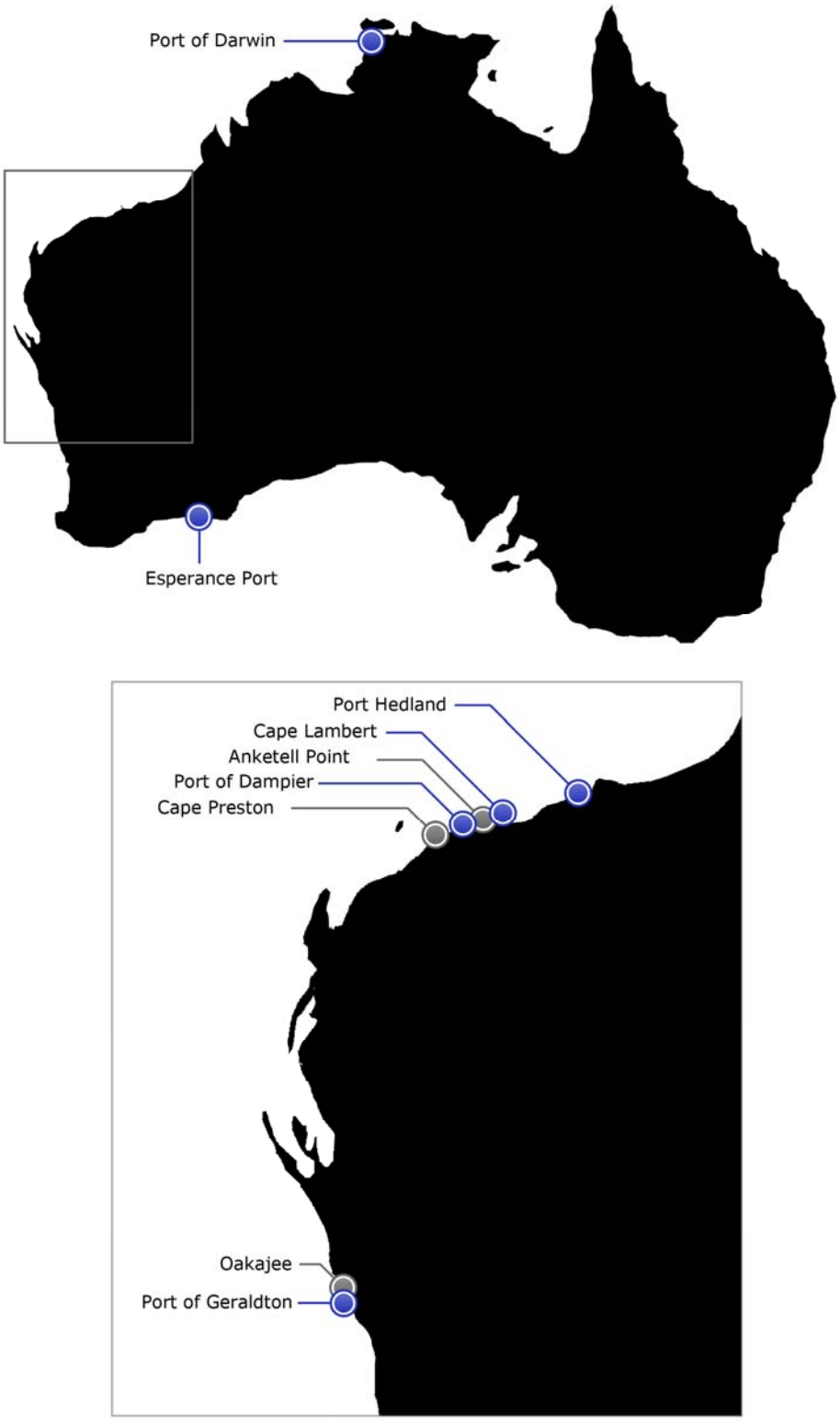
In addition, this report also covers three smaller ports, in terms of iron ore exports.

- Esperance Ports
- Port of Geraldton
- Port of Darwin

Finally, 3 ports under construction/planning are covered in this report:

- Cape Preston
- Oakajee
- Anketell Point (not included in aggregate numbers)

**Figure 18: Australian iron ore ports**




*Source: DnB NOR Markets*

### Port Hedland

In terms of export volumes, Port Hedland is the largest iron ore port in the world. In the calendar year 2009, approximately 162.9 Mt of iron ore was exported through this port, the most of which came from BHP Billiton. Other than BHP Billiton, Fortescue Metals Group and Atlas Iron also export iron ore through this port.

**Figure 19: Statistics - Port Hedland (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports | 110.3 | 143.9 | 162.9 | 184.5 |

*Source: Port Hedland Port Authority*

The table above shows iron ore export volumes for the last three years. Due to increasing utilization of current capacity, and new capacity becoming operational, we expect the growth to continue in 2010.

### Current terminals

#### BHP Billiton terminals (Nelson Point and Finucane Island)

BHP Billiton has shipping facilities at Nelson Point and Finucane Island. In the recent years, the company has expanded rapidly through investments in its Rapid Growth Projects (RGP). RGP 4 recently increased the company's capacity to 155 Mtpa. When RGP 5 is completed, scheduled for the second half of 2011, its capacity is expected to increase to 205 Mtpa. RGP 6 is scheduled to be completed in the second half of 2013 and should increase the BHP Billiton capacity to 240 Mtpa.

#### Herb Elliot Port

Fortescue Metals Group also export iron ore from Port Hedland, through its "Herb Elliot Port". This is located at Anderson Point, in the southern part of the inner harbour. As a younger company, shipments of iron ore commenced from these facilities in May 2008, and the company reported that they had shipped approximately 27 Mt in the fiscal year 2008/2009. However, the capacity of the port is 55 Mtpa, and the company is planning to reach this export rate in June 2011. Until then, Fortescue is aiming to export at a rate of 40 Mtpa. In the first half of 2010, Fortescue exported 21.5 Mt of iron ore, equal to an annualized rate of 43 Mtpa.

The junior iron ore company Atlas Iron also ships its iron ore from "Herb Elliot Port". At the moment, they are only exporting about 1 Mtpa, but hope to increase its iron ore exports to 6 Mtpa in 2011, when the new terminal at Utah Point is ready.

The iron ore is transported to Herb Elliot Port through the Fortescue Metals Group railway.

### Expansion projects:

In addition to the previously mentioned BHP Billiton projects RGP 5 and RGP 6, there are several projects under planning and development at Port Hedland:

#### Utah Point

This terminal is located south of the BHP Billiton facilities at Finucane Island, and is expected to commence operations in October 2010. While its initial capacity is 9 Mtpa, it is possible to expand this to 17.1 Mtpa, although representatives for companies involved have told us that its real capacity may reach 20 Mtpa. Atlas Iron aims at exporting up to 15 Mtpa from Utah Point by 2015

and, hence, an expansion of these facilities seems likely. In terms of transportation, Atlas Iron has obtained approval from the government to construct a road to transport their iron ore. Options exist, as the company could try to gain access to the BHP Billiton or Fortescue Metals Group railways. Atlas Iron was therefore pleased with the recent court verdict that opens up the BHP Billiton Goldsworthy rail line for third party access. This rail line is close to some of the company's main deposits and would enable it to substantially increase its iron ore production.

**Fortescue expansion**

After increasing export volumes to 55 Mtpa in March 2011, Fortescue Metals Group plans to construct a third berth at the Herb Elliot Port, increasing its capacity to 95 Mtpa. They have also included a fourth and a fifth berth in their strategy, which is planned to take their capacity at Port Hedland to 155 Mtpa by June 2014. However, these last two berths are not included in our forecast, due to higher uncertainty.

To facilitate exports of up to 95 Mtpa, the company will have to expand its railway, which was built with an initial capacity of 70 Mtpa. This is relatively easy, and requires the construction of 4-5 passing sides. The company has planned a larger upgrade if it should go ahead with its plans to reach a capacity of 155 Mtpa.

**Hancock Prospecting**

Hancock Prospecting is planning to construct a terminal at Port Hedland, from which it will export the iron ore from its Roy Hill iron ore project. The terminal will be constructed in the south-western part of the inner harbour, and construction is planned to start in the second quarter of 2011. Furthermore, Hancock Prospecting, together with Posco, recently got the approvals to build a 303 km rail line from its Roy Hill mining project to its proposed terminal. The company has scheduled to complete the 55 Mtpa terminal and railway by the end of 2013 and to start shipping iron ore in 2014.

**North West Iron Ore Alliance (NWIOA):**

NWIOA is a consortium, consisting of junior miners Atlas Iron, Brockman Resources and FerrAus. These companies are planning to build a 50 Mtpa terminal at the South West Creek, in the inner harbour of Port Hedland, and are currently waiting for government approvals. Port representatives have informed us that they are confident that the approvals will be given by the end of the first quarter of 2011. The companies plan to finish the feasibility studies for the port and the mines by 2012. However, there has not yet been published any specific timeline for this project. The companies in the NWIOA are trying to jointly negotiate with the larger companies to gain access to the railways in the region

**Outer harbour expansion**

Should the projects discussed above be constructed, the inner harbour of Port Hedland will facilitate iron exports of approximately 460 Mtpa. In order to further increase this, the construction of an outer harbour has been discussed, with a preliminary estimated potential for iron ore exports of 400 Mtpa.

This will facilitate further growth, once the space in the inner harbour runs out. Although this is a project that could potentially meet competition from Anketell Point, should that port become fully expanded, representatives from Port Hedland have informed us that they are confident that the outer harbour will be built. There are two reasons for this. First, the majority of the Australian iron ore is located in the eastern Pilbara. Hence, Port Hedland is the closest port to these resources and can therefore become the cheapest option for mining companies, trying to minimize costs related to infrastructure. Second, the outer harbour will be close to Port Hedland.

This results in further cost savings, since much of the infrastructure is already in place.

The table below shows the expected iron ore export capacity and volumes at Port Hedland. This estimate includes Utah Point, stages 1 and 2, as well as the BHP Billiton Rapid Growth Project, stages 5 and 6, Fortescue Metal Group's expansion to 95 Mtpa and the planned Hancock Prospecting terminal. Due to the higher uncertainty surrounding the timelines of the NWIOA terminal, this is not included in the overall forecasts. However, we believe that it is likely that this will be constructed and commence operations in 2014-2015. In that case, Port Hedland total capacity will increase by an additional 50 Mtpa, bringing it to a total of 460 Mtpa.

**Figure 20: Forecasts – Port Hedland (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 173.3 | 197.3 | 227.8 | 296.0 | 322.1 | 400.8 | 410.0 |
| Capacity, year-end | 195.0 | 204.0 | 269.0 | 305.0 | 355.0 | 410.0 | 410.0 |
| Exports | 162.9 | 186.5 | 214.7 | 263.8 | 313.3 | 353.7 | 407.4 |

*Source: BHP Billiton, Fortescue Metals Group, Atlas Iron, Port Hedland Port Authority, DnB NOR Markets*

### Port of Dampier and Cape Lambert

The Port of Dampier and Cape Lambert are the second and third largest Australian iron ore ports, respectively. Through these ports, Rio Tinto exports the iron ore from its Australian subsidiaries: the wholly-owned Hamersley Iron and the Robe River Iron Associates joint venture. While the Port of Dampier has a capacity of 140 Mtpa, an upgrade of Cape Lambert was completed in the end of 2008, bringing its capacity from 55 Mtpa to 80 Mtpa. Hence, Rio Tinto currently has a total iron ore export capacity from these two ports of 220 Mtpa.

The table below shows historical iron ore export volumes from the two ports. For the 12 months ending on the 30th of June 2010, the Port of Dampier and Cape Lambert exported at full capacity of about 140 Mtpa and 80 Mtpa, respectively (total export volumes exceeded 219 Mt). We believe to see the same levels for the calendar year 2010.

**Figure 21: Statistics – Port of Dampier and Cape Lambert (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports - Dampier | 105.0 | 114.2 | 131.3 | 140.0 |
| Exports - Cape Lambert | | | 72.3 | 80.0 |

*Source: Dampier Port Authority, Rio Tinto*

For the next five years, Rio Tinto has big expansion plans for its iron ore export capacity, with the majority of the new capacity expected to come through Cape Lambert. The capacity at the Port of Dampier is planned to increase by 5 Mtpa in both 2011 and 2012, through debottlenecking, bringing the port's total capacity to 150 Mtpa, and the Rio Tinto Australian iron ore export capacity to 230 Mtpa.

At Cape Lambert, however, Rio Tinto plans to increase the capacity by 100 Mtpa, 50 Mtpa within the first half of 2014 and another 50 Mtpa within the first half of 2016. These upgrades were until recently scheduled to be completed in the fourth quarter of 2013 and 2015, respectively. Rio Tinto has informed us that there has only been a "slight delay", and we therefore believe that the upgrades will be completed by the first quarters of 2014 and 2016, respectively.

A new 1.8 km four-berth jetty will be constructed in order to facilitate these export volumes. This will eventually bring the capacity at Cape Lambert to

180 Mtpa and the total Rio Tinto Australian iron ore export capacity to 330 Mtpa. Rio Tinto representatives have informed us that the company is confident that the mines will be able to deliver these volumes, and that ramp-up of the capacity will happen quite suddenly, once the capacity is increased.

**Figure 22: Forecasts – Port of Dampier (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 140.0 | 140.0 | 145.0 | 148.8 | 150.0 | 150.0 | 150.0 |
| Capacity, year-end | 140.0 | 140.0 | 145.0 | 150.0 | 150.0 | 150.0 | 150.0 |
| Exports | 131.3 | 140.0 | 145.0 | 148.8 | 150.0 | 150.0 | 150.0 |

*Source: Rio Tinto, DnB NOR Markets*

**Figure 23: Forecasts – Cape Lambert (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 125.8 | 130.0 |
| Capacity, year-end | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 130.0 | 130.0 |
| Exports | 72.3 | 80.0 | 80.0 | 80.0 | 80.0 | 119.6 | 130.0 |

*Source: Rio Tinto, DnB NOR Markets*

The iron ore is transported to these two ports by the Rio Tinto-owned railway. This is built to facilitate the same export volumes as the port.

### Esperance Port

Esperance Port is located in Esperance, on the south-west coast of Australia. While the previous 3 ports focus on iron ore exports, Esperance Port also exports cargoes such as grain and nickel. However, the majority of the 10.7 Mt throughput the port expects to handle in 2009/2010 is iron ore.

In the 2008/2009 financial year, Esperance Port exported approximately 7.4 Mt of iron ore. The port currently has a license to export 8.8 Mtpa, and expect to reach this volume in 2010. Looking ahead, the port might increase its iron ore exports to 11.5 Mtpa by 2012. However, this depends on the market conditions.

**Figure 24: Forecasts – Esperance Ports (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 8.8 | 8.8 | 8.8 | 11.5 | 11.5 | 11.5 | 11.5 |
| Capacity, year-end | 8.8 | 8.8 | 8.8 | 11.5 | 11.5 | 11.5 | 11.5 |
| Exports | 8.1 | 8.6 | 8.6 | 11.2 | 11.4 | 11.4 | 11.4 |

*Source: Esperance Ports, DnB NOR Markets*

### Port of Geraldton

The Port of Geraldton is located approximately 420 km north of Perth, on the west coast of Australia. After increasing iron ore exports in recent years, the port transformed one of its berths to a dedicated iron ore export facility in 2008. According to annual reports, this increased the port's iron ore exports capacity of 10-12 Mtpa. However, a port representative informed us that the maximum capacity of iron ore exports is approximately 9 Mtpa.

Furthermore, we have been informed that the port authorities expect to export approximately 6 Mt in the financial year 2009/2010, compared to 4.2 Mt in the financial year 2008/2009.

The port is currently serving 3 customers, while another 2 potential customers are considering it for exporting their iron ore. However, there are plans to construct a new iron ore port at Oakajee, and the new customers may choose that port instead. It remains to be seen whether this port will capture a part of Geraldton's market share, or whether it will bring synergies that both ports can benefit from.

**Figure 25: Forecasts – Port of Geraldton (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Capacity, year-end | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Exports | 4.7 | 6.0 | 6.0 | 6.0 | 6.5 | 7.0 | 7.5 |

*Source: Geraldton Port Authority, DnB NOR Markets*

### Port of Darwin

In September 2007, the Port of Darwin, located in the northern part of Australia's Northern Territory, exported its first shipment of iron ore in 33 years. At the moment, the port export iron ore at an annualized rate of 2.2 Mtpa. Volumes are expected to remain stable at this level until early 2013, when the port will start handling three mines, compared to one mine today. This will increase annual export volumes to 5-6 Mtpa.

**Figure 26: Forecasts – Port of Darwin (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 2.2 | 2.2 | 2.2 | 2.2 | 5.5 | 5.5 | 5.5 |
| Capacity, year-end | 2.2 | 2.2 | 2.2 | 2.2 | 5.5 | 5.5 | 5.5 |
| Exports | 2.2 | 2.2 | 2.2 | 2.2 | 5.0 | 5.5 | 5.5 |

*Source: Darwin Port Authority, DnB NOR Markets*

### Cape Preston

Cape Preston is located on the north-western part of Australia, approximately 55 km from the Port of Dampier. Here, a new port is being built to accommodate the iron ore exports from the Sino Iron Project. The project is managed by CITIC Pacific Mining; a wholly-owned subsidiary of the Hong Kong based company CITIC Pacific, and will comprise an integrated system with mine, processing plant, road, pipeline and port. The company will ship a part of the iron ore to its own steel mills in China, as well as serving other customers.

Once the project is completed, it will have a production rate of approximately 28 Mtpa. The company expects to start production before the end of 2010, and company representatives have informed us that they expect a production rate of 28 Mtpa to be reached before the end of 2011. The company has the rights to expand the project, but has not yet announced any plans about doing so.

### Oakajee Port and Rail

Oakajee Port and Rail is a project that will link mines in the western part of Australia to a new deepwater port, which is planned to be built approximately 25km north of Geraldton. This will be done through a new open access rail network. Due to strong interest from miners, the initial capacity of the project was recently increased from 35 Mtpa to 45 Mtpa.

The project is aiming to start construction in early 2011, and commence operations in early 2014.

**Anketell Point**

Three companies are involved in planning a new port at Anketell Point: Fortescue Metals Group, Aquila Resources and Metallurgical Corporation of China. The port will be under the authority of Dampier Port Authority.

While the project is currently in the planning phase, the involved parties hope to start construction in the first quarter of 2012, subject to approvals. The first shipments of iron ore are expected to take place in 2014 or 2015.

In terms of capacity, Fortescue Metals Group is interested in approximately 80 Mtpa in initial capacity to support further exports, once its capacity at Port Hedland is filled. Aquila Resources is looking for approximately 30 Mtpa and Metallurgical Corporation of China is interested in around 20 Mtpa. Hence, approximately 130 Mtpa could be a reality in its initial phase. In the longer term, Fortescue has announced that its volumes from Anketell Point may reach 150 Mtpa by 2016 and 200 Mtpa by 2017.

Nevertheless, there are many uncertainties surrounding the project as of today. Besides the timeframe, the project is also rather expensive. Much dredging is needed in order to facilitate the docking of Capesizes. Furthermore, unless Rio Tinto allows third parties access to their railway, new ones will have to be constructed. Aquila Resources has estimated that a new 282 km railway will cost the company AUD 1.7 billion.

Yet, studies have shown that there is a potential to increase the capacity at Anketell Point to up to 350 Mtpa. Hence, this could become one of Australia's largest ports over time.

# Brazil

The Brazilian iron ore industry has for a long time been dominated by Vale (formerly known as Companhia Vale do Rio Doce, or CVRD). This company has three mining systems: the northern, south-eastern and southern systems.

The northern system is connected to Ponta da Madeira, in the state of Maranhão. Iron ore from the south-eastern system is exported through Tubarão, in the state of Espírito Santo. These two ports are the two largest iron ore ports in Brazil. Furthermore, Vale exports the iron ore from its southern system from its Guíba Island and Itaguaí terminals, both in the state of Rio de Janeiro. While new ports are often built privately by companies, most of Vale's ports are public ports operated on a concession.

Although the market share of Vale is expected to remain high and export will increase from some of the terminals mentioned above, a growing amount of younger mining companies will further contribute to increased Brazilian iron ore export volumes. The majority of these new projects will be constructed either by the Sepetiba Bay in the state of Rio de Janeiro, close to the Guíba Island and Itaguaí terminals, or in the state of Espírito Santo. These projects include Sudeste Port and Açu Superport, both being constructed by LLX, the Brazore project by Adriana Resources and new ports under planning by Usiminas and Ferrous Resources.

Brazilian law previously demanded that a company had to ship its own cargo in order to get permission to build a port. However, this law is now changed, and companies, such as the infrastructure company LLX can therefore build terminals with the purpose of not only exporting its own, but also the iron ore of other companies. There is a large demand for such capacity from mining companies, whose current infrastructure does not support selling their products abroad.

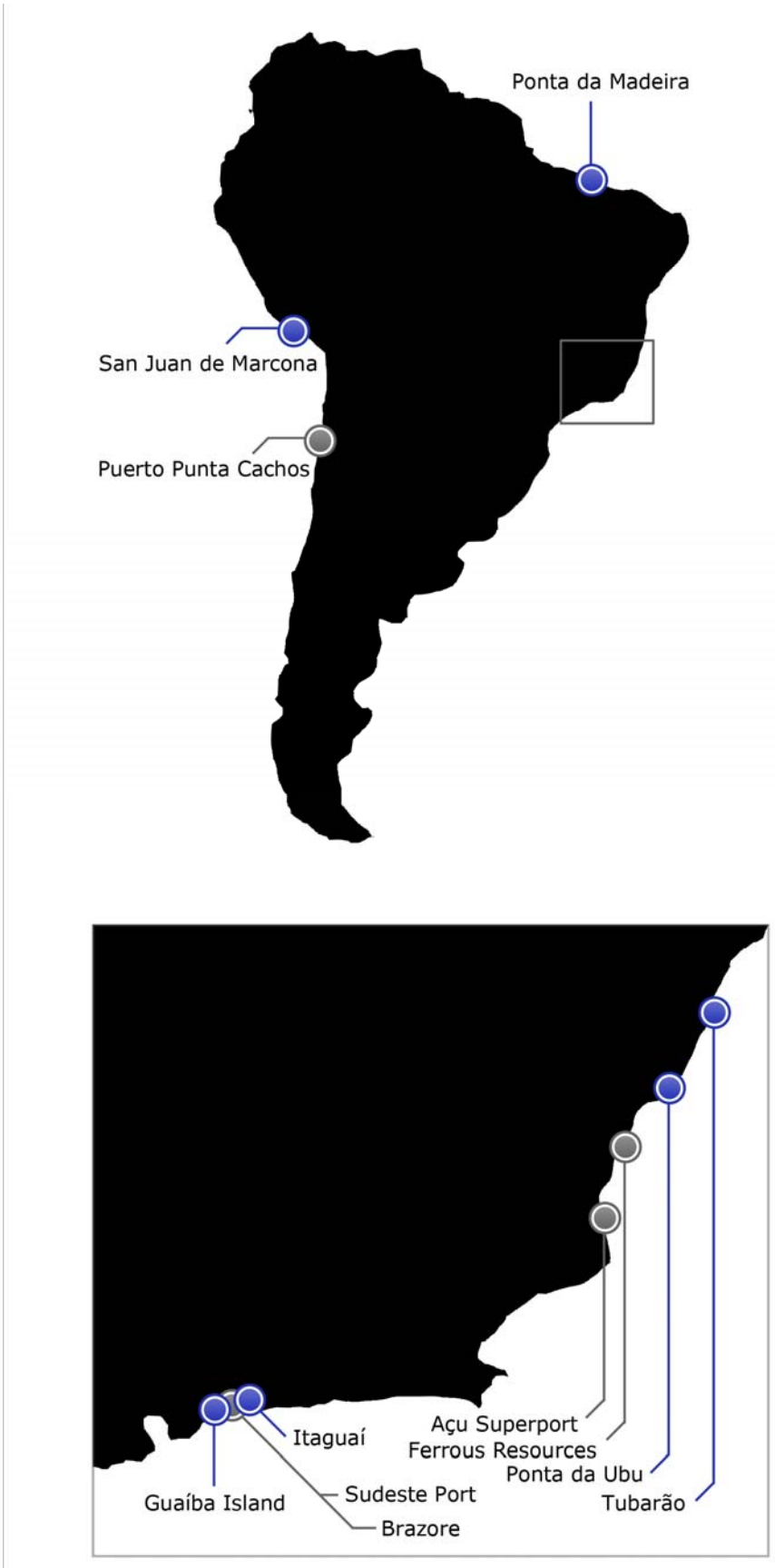
The Brazilian ports included in this report are:

- Ponta da Madeira
- Tubarão
- Guíba Island
- Itaguaí (Vale)
- Itaguaí (Tecar terminal, CSN)
- Ponta da Ubu

These ports accounted for approximately 97.5% of the Brazilian iron ore exports in 2008. In addition, there are several new ports under planning and construction:

- Açu Superport
- Sudeste Port
- Ferrous Resources Espírito Santos port
- Brazore Sepetiba Bay port (not included in aggregate numbers)
- Itaguaí (Usiminas) (not included in aggregate numbers)

**Figure 27: South American iron ore ports**



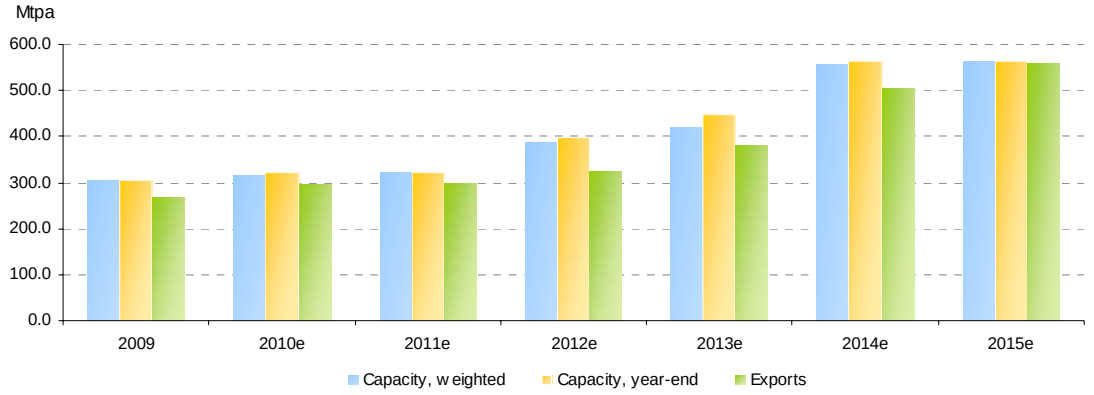

*Source: DnB NOR Markets*

**Figure 28: Iron ore export capacity and volumes – Brazil (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 306.0 | 313.5 | 321.0 | 388.7 | 421.9 | 556.6 | 563.2 |
| - growth | | 2.5 % | 2.4 % | 21.1 % | 8.5 % | 31.9 % | 1.2 % |
| **Capacity, year-end** | 306.0 | 321.0 | 321.0 | 397.6 | 446.6 | 563.2 | 563.2 |
| - growth | | 4.9 % | 0.0 % | 23.9 % | 12.3 % | 26.1 % | 0.0 % |
| **Exports** | 269.3 | 295.0 | 299.7 | 324.2 | 382.6 | 502.5 | 560.5 |
| - growth | | 9.5 % | 1.6 % | 8.2 % | 18.0 % | 31.3 % | 11.5 % |

*Source: DnB NOR Markets*

**Figure 29: Iron ore export capacity and volumes – Brazil**




*Source: DnB NOR Markets*

We see from the figure above that while export volumes will increase from the subdued levels of 2009, capacity will be the restricting factor for 2010 and 2011. Vale representatives have confirmed that they currently expect 2010 export volumes to converge towards the levels of 2008, but not to increase much further, due to the infrastructure being a bottleneck. 2010 volumes may also be somewhat affected by the heavy rain Brazil experienced in the first quarter.

The numbers in the table above represent a somewhat prudent outlook. There are several projects not included due to their uncertain schedules. However, it is likely that some of these will be completed before 2015.

### Ponta da Madeira

Ponta da Madeira is the port from which Vale exports the iron ore from its Northern system. The port is located in the north of Brazil, near the city of São Luís. Although 2009 was a year in which Vale and rest of the iron ore industry experienced reduced demand, the export volumes from Ponta da Madeira were less affected. 91.8 Mt of iron ore was exported from the port, compared to 91.7 Mt in 2008. Although export volumes have been higher than the 2008 volumes (101 Mt in 2007), Vale informed us that the volumes of 2008 is what the infrastructure currently supports.

**Figure 30: Statistics – Ponta da Madeira (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports | 101.0 | 91.7 | 91.8 | 87.8 |

*Source: Vale*

For 2010, we expect somewhat lower volumes than in recent years. Although the demand for iron ore is higher than ever, the port capacity in the first half of the year has been somewhat reduced due to an accident that required maintenance of the car dumpers and discharging equipment. For the second half, Vale expects to return to normal capacity.

However, the export volumes at Ponta da Madeira are set to increase beyond the historical volumes. Vale is currently in the middle of developing the Carajás Serra Sul, its largest greenfield project ever. Once this project is completed, it will add approximately 90 Mtpa to Vale's iron ore production volumes. The project also includes a duplication of the railroad and an expansion of the port to expand the increased volumes.

The Carajás Serra Sul project was initially scheduled to commence operations in 2013, and reach full capacity in 2014. However, Vale has informed that problems with getting the environmental licences might delay the project.

**Figure 31: Forecasts – Ponta da Madeira (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 92.0 | 92.0 | 92.0 | 92.0 | 92.0 | 182.0 | 182.0 |
| Capacity, year-end | 92.0 | 92.0 | 92.0 | 92.0 | 92.0 | 182.0 | 182.0 |
| Exports | 91.8 | 87.8 | 92.0 | 92.0 | 92.0 | 137.0 | 182.0 |

*Source: Vale, DnB NOR Markets*

### Tubarão

The port of Tubarão is located in the city of Vitória, in the state of Espírito Santo, and is used by Vale to export the iron ore from its south-eastern system. In 2008, the port operated at close to full capacity, and exported 93.9 Mt of iron ore. As the economic crisis resulted in lower demand for Brazilian iron ore, mines reduced capacity or were temporarily closed. This resulted in reduced volumes in 2009, and Tubarão exports decreased to 77.4 Mt. However, Vale representatives have informed that all mines have now resumed production and they expect Tubarão export volumes for 2010 to be close to those for 2008.

**Figure 32: Statistics – Tubarão (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports | 85.9 | 93.9 | 77.4 | 94.0 |

*Source: Vale*

The 2008 export volumes for Vale were close to the maximum export capacity for their different systems. Although the ports could possibly export more, the infrastructure to the ports is a bottleneck. For Tubarão, the company expects export volumes to remain stable around 2008 volumes until 2013. In 2013, the Apolo mine project will become operational, and increase exports by approximately 24 Mtpa. The infrastructure will be expanded in order to handle these additional volumes.

**Figure 33: Forecasts – Tubarão (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 94.0 | 94.0 | 94.0 | 94.0 | 112.0 | 118.0 | 118.0 |
| Capacity, year-end | 94.0 | 94.0 | 94.0 | 94.0 | 118.0 | 118.0 | 118.0 |
| Exports | 77.4 | 94.0 | 94.0 | 94.0 | 100.9 | 117.1 | 118.0 |

*Source: Vale, DnB NOR Markets*

### Guaíba and Itaguaí (Vale)

Besides Tubarão and Ponta da Madeira, Vale also exports iron ore from its Guaíba Island and Itaguaí terminals, both located in the Sepetiba Bay in the state of Rio de Janeiro. The capacity of the terminal at Guaíba Island is approximately 44 Mtpa, while the capacity of the Itaguaí terminal is approximately 25 Mtpa.

There are currently no official plans to undertake new projects that will result in substantially increased exports through these two terminals. Hence, these volumes are expected to remain more or less close to the current capacity.

**Figure 34: Statistics – Guaíba and Itaguaí (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports - Guaíba | 43.9 | 40.6 | 36.8 | 41.0 |
| Exports - Itaguaí | 25.2 | 22.8 | 19.6 | 24.5 |

*Source: Vale*

### Itaguaí - TECAR terminal (CSN)

The Brazilian company CSN owns two terminals at Itaguaí, of which one is used for exporting iron ore from the company's mines: Casa de Pedra and Namisa (the other terminal is 60% owned by CSN and 40% owned by a consortium of Asian steel mill companies and is used for steel products). The junior mining company MMX, a part of the EBX group, also use this terminal, awaiting the completion of the Sudeste Port.

While the terminal currently has a capacity of 30 Mtpa, this will be increased to 45 Mtpa during the summer of 2010. Furthermore, the company is planning to increase the capacity to 130 Mtpa by 2016, which would make the TECAR terminal one of the largest in Brazil. In 2008, 14.7 Mt of iron ore were exported from the terminal and this increased to 21.7 Mt in 2009.

CSN is planning to separate its mining assets in a new company and publicly list this through an IPO. Company representatives have informed us that if this is done, it is likely that the capacity targets set forth will be increased.

**Figure 35: Forecasts – Itaguaí (TECAR terminal, CSN) (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 30.0 | 37.5 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| Capacity, year-end | 30.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| Exports | 21.7 | 25.7 | 25.7 | 25.7 | 32.0 | 44.3 | 44.3 |

*Source: CSN, DnB NOR Markets*

### Ponta da Ubu

Ponta da Ubu is located in the state of Espírito Santo. The port is wholly-owned by Samarco, a joint venture between Vale and BHP Billiton. Iron ore pellets from its three pellets plants, with a nominal production capacity of 21.6 Mtpa, are exported through the Ponta da Ubu. According to a company representative, they have the capacity to ship 24 Mtpa, but expect to export 22 Mt in 2010. Iron ore is transported to the plant through a slurry pipeline, with a capacity of 24 Mtpa.

There are no official expansion plans with certain timelines for this port. Nevertheless, Samarco is analyzing the possibility to construct a fourth pelletizing plant, which would increase capacity by approximately 8 Mtpa. If such plans are realized, the port would be expanded to facilitate higher export volumes. However, such a project is not included in our forecasts due to its uncertainty.

**Figure 36: Forecasts – Ponta da Ubu (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Capacity, year-end | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Exports | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 |

*Source: Samarco, DnB NOR Markets*

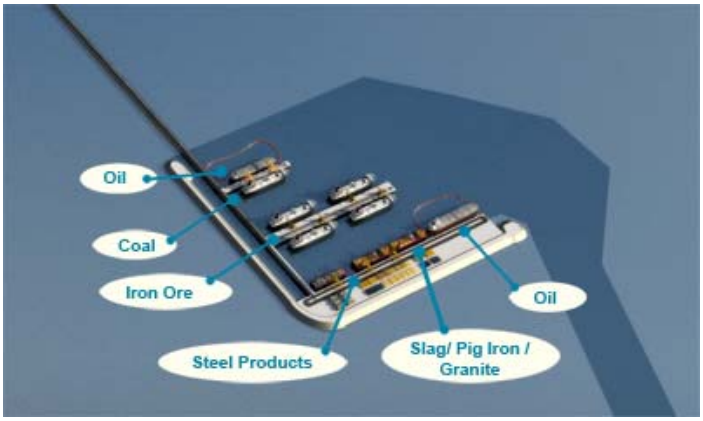
### Açu Superport

Açu Superport is one of two new ports under construction by LLX, an infrastructure company and part of the Brazilian EBX Group. The site of this new port is located in the state of Espírito Santo, approximately 65 km to the south-west of Vitória. In addition to exporting iron ore, Açu Superport will be used for the shipment of various other cargoes.

Açu Superport is planned to have four iron ore berths, each with a theoretical capacity of 30 Mtpa. However, we have been informed that the real capacity will probably be closer to 26 Mtpa for each of the berths.

The first berth is expected to commence operations within the 1st half of 2012 and the second to become operational in the 1st half of 2014. The remaining two berths will be completed at a later time, and are therefore not included in this report.

**Figure 37: Plan – Açu Superport**




*Source: LLX*

**Sudeste Port**

LLX is also the company behind the construction of the Sudeste Port. This port will be located in the Sepetiba Bay, in the state of Rio de Janeiro. In the first stage, Sudeste Port will have two berths, with an annual capacity of 50 Mtpa. The iron ore for the port will be supplied by MMX, another company in the EBX group, as well as other mining companies who currently do not have an alternative way to export their iron ore. A company representative has informed us that even with 50 Mtpa, they are short of shipping capacity.

The first shipment of iron ore from Sudeste Port is scheduled to take place by the end of 2011. As with most new ports, a certain ramp-up time is expected, and LLX expects to be shipping approximately 40 Mt of iron ore from the port in 2013.

Sudeste Port can be expanded by an additional 50 Mtpa. However, the date for such an expansion is not yet known, and we have therefore not included this in the study.

**Figure 38: Plan – Sudeste Port**

*Source: LLX*

**Ferrous Resources Espírito Santos port**

Ferrous Resources is a relatively young company, who is developing several mining projects in the Minas Gerais region in Brazil. To export the output from these projects, the company has purchased land close to town Presidente Kennedy in the south of Espírito Santo, on which it plans to build a port.

The port is scheduled to commence operations in October 2013. Although the first stage of the project has a target production rate of 25 Mtpa, the port will be constructed to support an export rate of 50 Mtpa. However, only a certain part of the port area will be dredged in the first stage, and the usable capacity of the port will therefore be 25 Mtpa. Ferrous Resources has informed us that the ramp-up is expected to be quite smooth, with export volumes of approximately 20 Mt in 2014 and 25 Mt in 2015.

In the second stage, the iron ore output from the mines will be increased to 50 Mtpa, and areas of the port will undergo additional dredging to increase its real capacity to 50 Mtpa. However, this is not scheduled to happen until 2016.

**Figure 39: Plan – Ferrous Resources port**

*Source: Ferrous Resources*

### Brazore

Brazore is a subsidiary of the Canadian mining company Adriana Resources, and is planning to construct an iron ore port by the Sepetiba Bay, in the state of Rio de Janeiro. In the initial phase of the project, the port is planned to have a capacity of 20 Mtpa. At stage 2, the company aims at reaching an export rate of 45 Mtpa.

The Brazore project is not included in the estimated numbers presented in this report. Although the probability of the port being constructed is high, the timeline is too uncertain. Construction was initially planned to commence in 2009 and take 18-24 months. However, the company did not get the government approvals needed, and the project was delayed. Brazore expects to have the permissions by the end of 2011, and start construction in the beginning of 2012. Construction time is estimated to be 18-24 months.

Once the first phase is completed and the port has a capacity of 20 Mtpa, the company expects to start the second stage quite quickly. This stage, which brings the capacity of the port to 45 Mtpa, is expected to take a maximum of 2 years. Hence, Brazore could potentially have a capacity of 20 Mtpa by mid-2013 and a capacity of 45 Mtpa by mid-2015. Again, this timeline is somewhat uncertain, and we have not included these numbers in the aggregate forecasts.

### Itaguaí (Usiminas)

Although Usiminas is primarily a steel production company, it is planning to increase its iron ore exports in the future. In 2009, the company produced 5.5 Mt of iron ore, of which 93% was used in its two steel making facilities. For 2010, the company hopes to produce 7 Mt, with approximately 90% expected to be used for own steel production. Usiminas plans to increase its iron ore production, with expected volumes of 12 Mt in 2013 and 27-29 Mt in 2015. The majority of this planned increase will be exported, as the need for iron ore for own steel production is expected to remain between 6-7 Mtpa.

As iron ore production increases, the company is considering building its own port at Itaguaí, in the Sepetiba Bay. A company representative has informed us that, if built, this port will have a capacity of 25 Mtpa and will be completed around 2015-2016. However, as the company is still in the process of getting environmental licenses and much planning is yet to be done, we have not included these volumes in this report.

# South America (excluding Brazil)

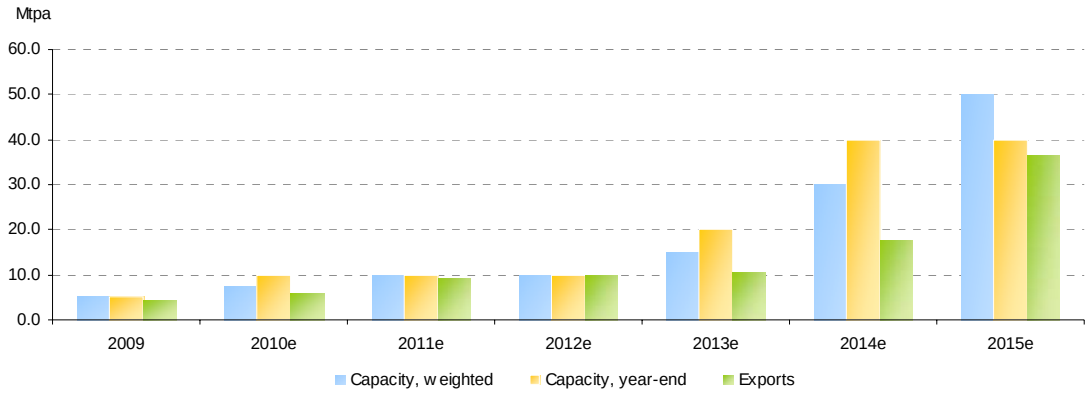
If we do not include Brazil, South American iron ore production and export volumes are relatively low. According to the United Nations Conference on Trade and Development (UNCTAD), Chile, Venezuela and Peru exported 5, 6 and 7 Mt of iron ore in 2008, respectively. The low volumes, combined with the difficulty to obtain accurate information have led us not to include the current ports of Chile and Venezuela in this report. However, Peru is included, as well as one project in Chile. In Peru, the dominating producer is Shougang Hierro Peru, while the Australian company Strike Resources has carried out feasibility studies and is planning to start operations within the next years.

**Figure 40: Iron ore export capacity and volumes – South America (excluding Brazil)**
**(Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 5.0 | 7.5 | 10.0 | 10.0 | 15.0 | 30.0 | 50.0 |
| - growth | | 50.0 % | 33.3 % | 0.0 % | 50.0 % | 100.0 % | 66.7 % |
| **Capacity, year-end** | 5.0 | 10.0 | 10.0 | 10.0 | 20.0 | 40.0 | 40.0 |
| - growth | | 100.0 % | 0.0 % | 0.0 % | 100.0 % | 100.0 % | 0.0 % |
| **Exports** | 4.4 | 5.7 | 9.3 | 10.0 | 10.7 | 17.7 | 36.6 |
| - growth | | 28.4 % | 64.4 % | 7.2 % | 7.0 % | 65.3 % | 106.9 % |

*Source: DnB NOR Markets*

**Figure 41: Iron ore export capacity and volumes – South America (excluding Brazil)**




*Source: DnB NOR Markets*

The estimated capacity increases are relatively large compared to the current capacity. In the period 2009 to 2015, we forecast average annual port capacity increase to be approximately 46.8%. This is mainly caused by the large expected increase, planned by Strike Resources and MMX, becoming operational at the end of the period.

### San Juan de Marcoma

San Juan de Marcoma is the port from which the Chinese company Shougang Hierro Peru exports its iron ore. Although the company has not published exports statistics, the Peruvian Mining Ministry has statistics on domestic production. Being the single, large producer, the domestic statistics are close to the production volumes for Shougang Hierro Peru.

**Figure 42: Statistics – Peru (Mtpa)**

| | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|
| Exports | 5.1 | 5.2 | 4.4 | 5.7 |

*Source: The Peruvian Mining Ministry*

For the first quarter of 2010, the company produced iron ore at a rate of approximately 6 Mtpa. Such an increase is not surprising, given the improving economy and company's expansion project. This project is expected to be completed this year, and is planned to double output, from approximately 5 Mtpa to 10 Mtpa. Assuming 12 months ramp up, we expect volumes to increase substantially next year, before stabilizing at around 10 Mtpa.

**Figure 43: Forecasts – Shougang Hierro Peru (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 5.0 | 7.5 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Capacity, year-end | 5.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Exports | 4.4 | 5.7 | 9.3 | 10.0 | 10.0 | 10.0 | 10.0 |

*Source: DnB NOR Markets*

### Strike Resources

The Australian company Strike Resources have been carrying out pre-feasibility studies to explore the possibilities to mine iron ore in two projects: Apurimac and Cuzco. Although there have been delays in the process, the company expects the Apurimac mine to commence operations in 2014, and ramp up time to be 12-15 months. The iron ore from this mine is planned to be transported through a slurry pipeline to the port of San Juan de Marcoma. The company plans to develop this port, which will give Strike Resources an export capacity of 20 Mtpa. This will be done at the same schedule as the rest of the project.

The Cuzco project is somewhat more uncertain, and we have not included it in our projections. However, it has a potential to produce 10-15 Mtpa. The choice of port for this project is not yet clear, and will depend on how the company chooses to transport the iron (railway or pipeline).

**Figure 44: Forecasts – Strike Resources (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 20.0 |
| Capacity, year-end | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 | 20.0 |
| Exports | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 17.3 |

*Source: Strike Resources, DnB NOR Markets*

### Puerto Punto Cachos

The Brazilian conglomerate EBX Group is in the process of developing a new port, Puerto Punta Cachos in the region of Punta Cachos in Chile. From this port, the mining company MMX will export the iron ore from its Chilean mining project. The port is targeted to export at full capacity of 10 Mtpa by 2015, and we believe that ramp-up will start in 2013.

**Figure 45: Forecasts – Puerta Punto Cachos**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 10.0 | 20.0 |
| Capacity, year-end | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 10.0 | 10.0 |
| Exports | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 5.0 | 9.3 |

*Source: DnB NOR Markets*

# India

In the fiscal year 2008/2009, India exported approximately 106 Mt of iron ore, with volumes expected to be somewhat similar or slightly lower for the fiscal year 2009/2010. Due to its location, the majority of its exports, more than 90% in 2008, is shipped to China.

However, the Indian Steel Ministry is currently looking for ways to curb these exports. Although a complete export ban, as suggested by some officials, is not regarded as very likely, taxes are being used to limit the amount of iron ore being shipped out of the country. In December, India imposed a 5% export tax on iron ore fines and the export tax on iron ore lumps was raised from 5% to 10%. The latter was further increased in April, from 10% to 15% percent. As iron ore prices have been soaring and companies are experiencing high profits, the Indian Ministry of Mines has also proposed to impose a windfall tax on these. This could affect export volumes, with a larger part of the production being redistributed to domestic steel mills. Hence, although our export forecasts here incorporate the expectations of Indian port representatives, these could be affected by changes in taxes and trade restrictions.

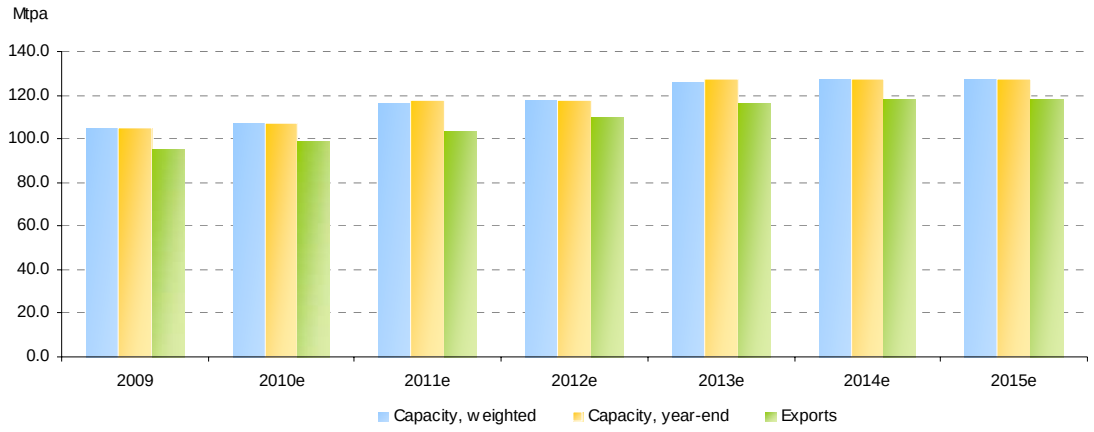
The Indian state of Karnataka, in which the New Mangalore port is located, recently imposed a temporary ban on iron ore export. State officials have expressed that a permanent ban is the goal. If this happens, it will affect iron ore exports from the ports of Chennai, Ennore and New Mangalore, as well as the Port of Krishnapatnam (not included in this study).

**Figure 46: Iron ore export capacity and volumes – India**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 105.0 | 107.0 | 116.3 | 117.5 | 125.8 | 127.5 | 127.5 |
| - growth | | 1.9 % | 8.6 % | 1.1 % | 7.1 % | 1.3 % | 0.0 % |
| **Capacity, year-end** | 105.0 | 107.0 | 117.5 | 117.5 | 127.5 | 127.5 | 127.5 |
| - growth | | 1.9 % | 9.8 % | 0.0 % | 8.5 % | 0.0 % | 0.0 % |
| **Exports** | 94.9 | 98.4 | 103.7 | 109.6 | 116.3 | 118.1 | 118.1 |
| - growth | | 3.7 % | 5.4 % | 5.7 % | 6.1 % | 1.6 % | 0.0 % |

*Source: DnB NOR Markets*

**Figure 47: Iron ore export capacity and volumes – India (Mtpa)**




*Source: DnB NOR Markets*

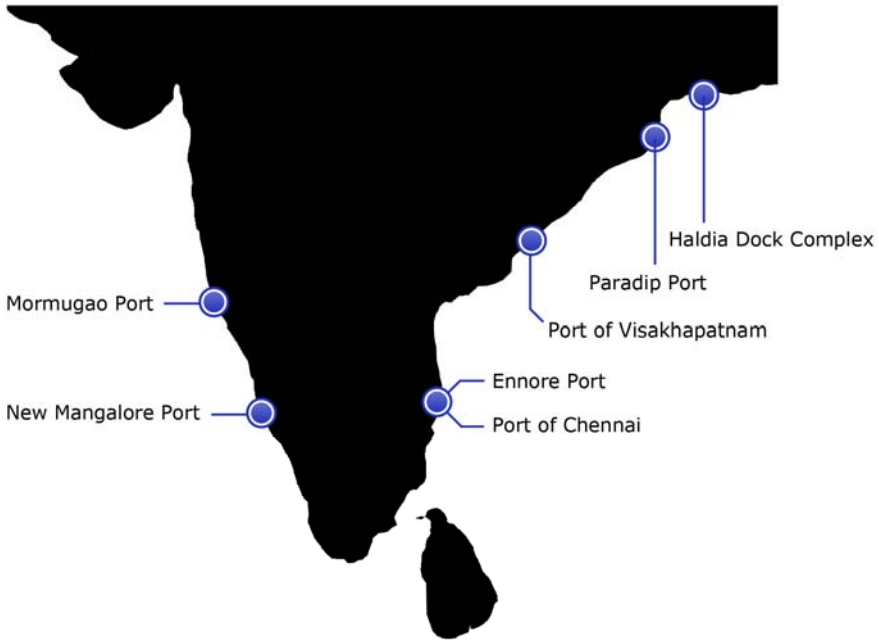
We expect to see Indian capacity and exports increase over the next five years, mainly driven by the ports of Paradip and Ennore. Other ports also contribute to the growth, but their individual capacity increases are relatively low (in the range of 1-4 Mtpa).

The seven Indian ports included in this report are:

- Mormugao Port
- Paradip Port
- Port of Visakhapatnam
- Port of Chennai
- Ennore Port
- Haldia Dock Complex (Part of Kolkata Port)
- New Mangalore Port

In terms of location, five of the ports are located on the east coast of the country, while the remaining two are located on the west coast.

**Figure 48: Indian iron ore ports**




*Source: DnB NOR Markets*

### Mormugao Port

Mormugao Port is currently the largest Indian iron ore port and is located in the city of Mormugao in the state of Goa. In the Indian fiscal year 2008/2009, it exported 33.8 Mt of iron ore, and the volumes increased to approximately 37 Mt for 2009/2010. The port is currently expanding its capacity somewhat, but expects to limit exports to about 40 Mtpa. A port representative informed us that when these volumes are reached, they will not prioritize iron ore exports by further expanding. 40 Mtpa is expected to be reached within the fiscal year 2012/2013.

**Figure 49: Forecasts – Mormugao Port (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 37.0 | 39.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Capacity, year-end | 37.0 | 39.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Exports | 36.2 | 37.8 | 38.8 | 39.8 | 40.0 | 40.0 | 40.0 |

*Source: Mormugao Port Trust, DnB NOR Markets*

### Paradip Port

The second largest Indian iron ore port is located in the town of Paradip, in the state of Orissa, on the east coast of India. In the fiscal year 2008/2009, 16.16 Mt of iron ore was exported through Paradip Port. This was close to full capacity, which is about 17 Mtpa. There is a big expansion project under development at the port, and this is expected to be completed in three years. The project involves constructing a mechanized berth, and will increase capacity by 10 Mtpa.

However, although the capacity increases, exported volumes will not increase accordingly. When the new mechanized plant is commissioned, traffic will be diverted from the old terminal and annual export volumes are expected to increase to 20 Mtpa and remain at those levels.

**Figure 50: Forecasts – Paradip Port (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 17.0 | 17.0 | 17.0 | 17.0 | 25.3 | 27.0 | 27.0 |
| Capacity, year-end | 17.0 | 17.0 | 17.0 | 17.0 | 27.0 | 27.0 | 27.0 |
| Exports | 16.2 | 16.8 | 17.0 | 17.0 | 19.3 | 20.0 | 20.0 |

*Source: Paradip Port Trust, DnB NOR Markets*

### Port of Visakhapatnam

The Port of Visakhapatnam exported a total of 17.5 Mt and 18.4 Mt of iron ore and pellets for the financial years ending in March 2009 and 2008, respectively. However, it has been difficult to get accurate information about the port and we therefore assume that its capacity is about 18.5 Mtpa. We do not believe that its export volumes will decrease in the next years. The port is planning an expansion, and this could take its export volumes up to 25 Mtpa within the next five years. However, due to little information about this expansion, we have chosen not to include this in our aggregated results.

**Figure 51: Forecasts – Port of Visakhapatnam (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 |
| Capacity, year-end | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 | 18.5 |
| Exports | 17.9 | 17.9 | 17.9 | 17.9 | 17.9 | 17.9 | 17.9 |

*Source: DnB NOR Markets*

### Port of Chennai

Located on the east coast of India, the Port of Chennai (formerly Madras) exported 8.6 Mtpa of iron ore in the fiscal year 2009/2010. However, the port has a capacity of 12 Mtpa, and iron ore throughput is expected to increase, to 9 Mt this fiscal year (2010/2011) and 11.5 Mt in the next (2011/2012). There are no plans to expand the iron ore handling facilities at the port, and exports are likely to be limited by capacity in a few years. There is also a possibility that some of these exports could be diverted to Ennore Port, located approximately 24 km to the north.

**Figure 52: Forecasts – Port of Chennai (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Capacity, year-end | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Exports | 8.1 | 8.9 | 10.9 | 11.7 | 11.9 | 12.0 | 12.0 |

*Source: Port of Chennai, DnB NOR Markets*

### Ennore Port

Ennore Port is located outside the city of Chennai. Due to its location, in a less populated area, the port is better suited than the Port of Chennai to handle certain cargoes. Iron ore is one of these cargoes, and while the export volumes have been low until now, an increase is expected in the next years. In the fiscal year 2009/2010, approximately 1.1 Mt was exported. A small increase, to about 1.5 Mt is expected for the fiscal year 2010/2011. However, in the end of 2010, the capacity of the port will increase, from its current capacity of 4 Mtpa, to approximately 12 Mtpa. According to sources at the port, volumes are expected to gradually increase and reach 12 Mtpa within 3-4 years.

**Figure 53: Forecasts – Ennore Port (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 4.0 | 4.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Capacity, year-end | 4.0 | 4.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Exports | 1.1 | 1.4 | 4.1 | 7.3 | 11.0 | 12.0 | 12.0 |

*Source: Ennore Port, DnB NOR Markets*

### Haldia Dock Complex

The Haldia Dock Complex is a part of the Kolkata Port, and is located in West Bengal, in the north east of India. The port has dedicated iron ore handling facilities with a capacity of 6 Mtpa. However, they have recently also exported iron ore through other of the port facilities, and reached 8.6 Mt of iron ore exports in 2008/2009. Approximately the same amount, between 8 and 9 Mt, is expected for the fiscal year 2009/2010.

There are no expansion plans for the iron ore handling facilities at Haldia. In 2012, they are planning to change some equipment, but this will not affect the capacity of the port. In fact, a port representative informed us that they expect somewhat lower volumes in the future, starting around autumn 2011. This decrease will be around 1 Mtpa and is due to increased capacity becoming operational at facilities closer to the mines.

**Figure 54: Forecasts – Haldia Dock Complex (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Capacity, year-end | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Exports | 8.6 | 8.3 | 7.5 | 7.2 | 7.2 | 7.2 | 7.2 |

*Source: Kolkata Port Trust, DnB NOR Markets*

### New Mangalore Port

The New Mangalore Port is located on the west coast of the country, in the city of Mangalore. In the fiscal year 2009/2010, the port expects to export 5.2 Mt of iron ore pellets and 1.6 Mt of iron ore fines: A total of 6.8 Mt. This is close to the full capacity, which is somewhere between 7 and 7.5 Mtpa.

The port is currently under expansion, which will increase its export capacity to 9 Mtpa by the end of 2011. Port representatives have informed us that the mines will be able to supply the additional 2-3 Mt of iron ore, and they expect a sudden jump in export volumes, once this capacity becomes operational.

**Figure 55: Forecasts – New Mangalore Port (Mtpa)**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 7.5 | 7.5 | 7.8 | 9.0 | 9.0 | 9.0 | 9.0 |
| Capacity, year-end | 7.5 | 7.5 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| Exports | 6.8 | 7.3 | 7.6 | 8.8 | 9.0 | 9.0 | 9.0 |

*Source: New Mangalore Port Trust, DnB NOR Markets*

# Africa

Iron ore volumes exported from Africa are currently rather small compared to those exported from Brazil and Australia. As of today, there are two ports from which substantial amounts of iron ore are shipped. These two ports are the Port of Saldanha, in South Africa, and the Port of Nouadhibou, in Mauritania.

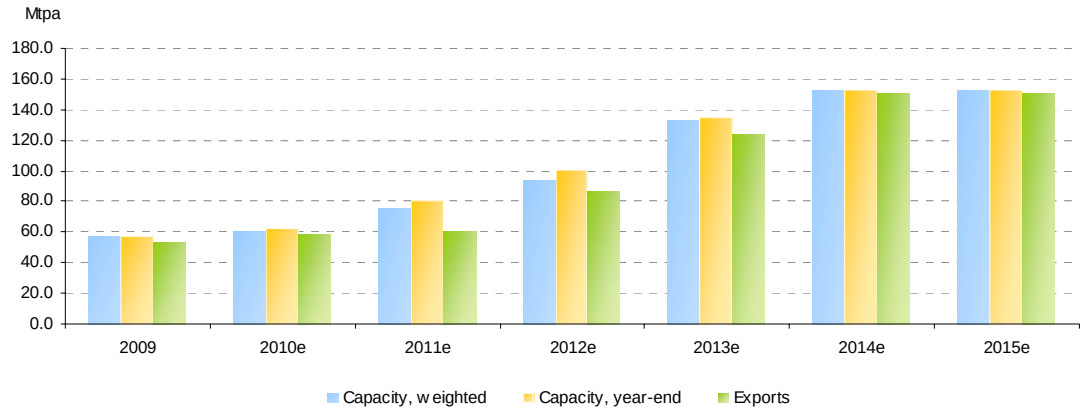
However, the continent contains large, unmined reserves. Several large mining companies, including Vale and Rio Tinto are planning projects to mine iron ore in Simandou in Guinea. Although substantial political risk is present in the country, these projects could pave the way for major infrastructure investments and iron ore production in the region. Several companies are also exploring the possibilities for starting mining operations in other countries in West Africa.

**Figure 56: Iron ore export capacity and volumes – Africa**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 57.0 | 60.8 | 75.5 | 93.8 | 133.0 | 153.0 | 153.0 |
| - growth | | 6.6 % | 24.3 % | 24.3 % | 41.7 % | 15.0 % | 0.0 % |
| **Capacity, year-end** | 57.0 | 62.0 | 80.0 | 100.5 | 134.3 | 153.0 | 153.0 |
| - growth | | 8.8 % | 29.0 % | 25.6 % | 33.6 % | 14.0 % | 0.0 % |
| **Exports** | 53.6 | 58.3 | 60.7 | 86.8 | 123.7 | 151.0 | 151.0 |
| - growth | | 8.6 % | 4.2 % | 42.9 % | 42.5 % | 22.1 % | 0.0 % |

*Source: DnB NOR Markets*

**Figure 57: Iron ore export capacity and volumes – Africa**

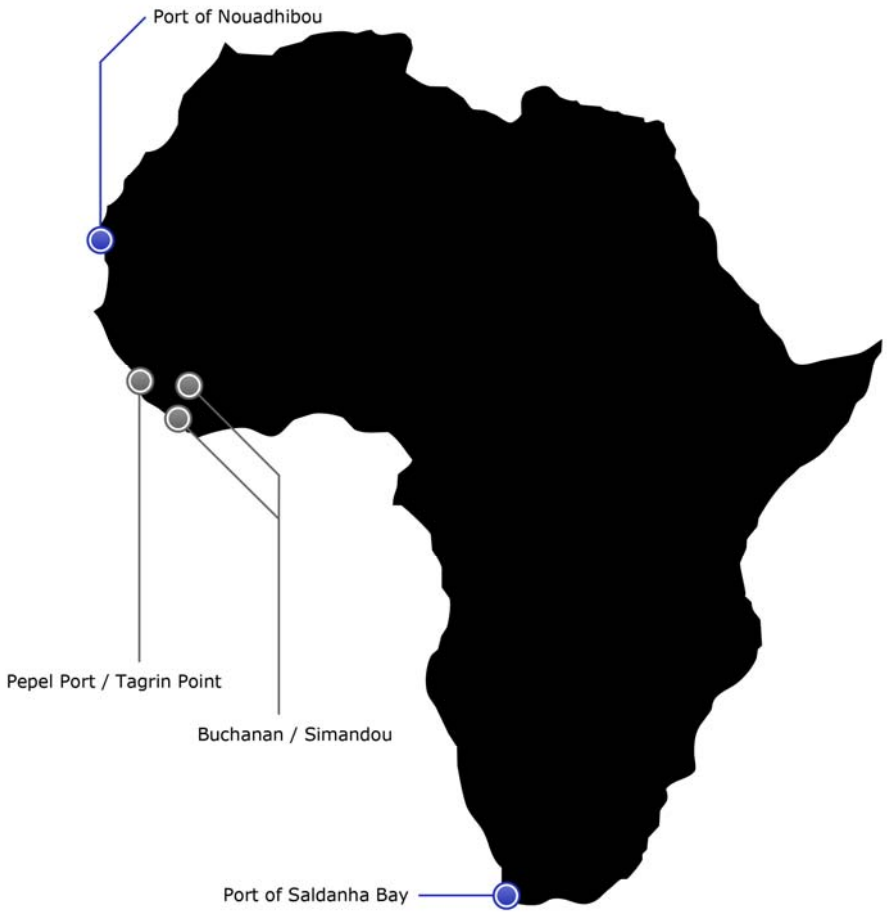



*Source: DnB NOR Markets*

The numbers in the table above include the exports of the ports of Saldanha and Nouadhibou, and Vale's Simandou project. The forecasts for the Simandou project is naturally somewhat more uncertain than those for the other two ports, and aggregated numbers for the continent without this project can be derived from the more detailed analysis below.

Until 2012, the growth in volumes will be a result of expansion at the Port of Saldanha. Thereafter, volumes will increase due to expansion of the Nouadhibou port, as well as the ramp up of Vale's Simandou project.

**Figure 58: African iron ore ports**




*Source: DnB NOR Markets*

### Port of Saldanha

The Port of Saldanha is located in the west of South Africa, approximately 100 km north of Cape Town. The port is operated by Transnet National Port Authority, and is the only iron ore handling port in South Africa. However, it also handles other cargoes, including oil and break-bulk.

**Figure 59: Statistics – Port of Saldanha**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|---|---|---|
| Exports | 26.5 | 28.2 | 28.2 | 30.9 | 32.1 | 43.6 | 47.3 |

*Source: Transnet*

The Port of Saldanha has experienced a growth in volumes in the recent years. In contrast to many other ports, this growth continued in 2009, when it exported 43.6 Mt of iron ore.

The port is connected to the Sishen-Saldanha railway line, an 861 kilometre long railway run by Transnet Freight Rail. The company with the highest export volumes from the port, Kumba Iron Ore, transported 34.2 Mt of iron ore through this channel in 2009. Transnet will develop this railway as they are expanding the port, and it will facilitate exports from the new 9 Mtpa Sishen South project, under development by Kumba Iron Ore.

From the current level of 45 Mtpa, Transnet expects to increase the port capacity to 50 Mtpa for the financial year 2010/2011, and to reach 58 Mtpa in 2011/2012. Export volumes are expected to rise along with this. With the new expansion of the Port of Saldanha, it will be able to accommodate vessels up to 350,000 dwt.

**Figure 60: Forecasts – Port of Saldanha**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 45.0 | 48.8 | 56.0 | 58.0 | 58.0 | 58.0 | 58.0 |
| Capacity, year-end | 45.0 | 50.0 | 58.0 | 58.0 | 58.0 | 58.0 | 58.0 |
| Exports | 43.6 | 47.3 | 49.5 | 53.8 | 55.8 | 56.0 | 56.0 |

*Source: Transnet, DnB NOR Markets*

### Port of Nouadhibou

The Port of Nouadhibou is located in the city with the same name (formerly Port-Étienne), on the coast of Mauritania. The port is owned and operated by Societe Nationale Industrielle et Miniere (SNIM), a mining company in which the Mauritanian government is the majority owner.

**Figure 61: Statistics – Port of Nouadhibou**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010e |
|---|---|---|---|---|---|---|---|
| Exports | 11.0 | 10.6 | 10.7 | 11.8 | 11.0 | 10.0 | 11.0 |

*Source: SNIM, DnB NOR Markets*

The exports from Mauritania have historically been stable at around 11 Mtpa, close to the current maximum capacity of 12 Mtpa. However, SNIM is currently expanding the mine and constructing a new port, with the goal to increase capacity to 20 Mtpa within 2012/2013. The new port will facilitate the loading of vessels up to 250,000 dwt. The 700 km railway will also be upgraded to support these increased volumes.

**Figure 62: Forecasts – Port of Nouadhibou**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 12.0 | 12.0 | 12.0 | 13.3 | 20.0 | 20.0 | 20.0 |
| Capacity, year-end | 12.0 | 12.0 | 12.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Exports | 10.0 | 11.0 | 11.0 | 11.2 | 16.7 | 20.0 | 20.0 |

*Source: SNIM, DnB NOR Markets*

We expect the export volumes at the Port of Nouadhibou to increase somewhat in 2012 and to increase further, as production is ramped up in 2013, before reaching the new capacity in 2014.

### Pepel Port / Tagrin Point

Pepel Port, located to the north-east of Freetown, in Sierra Leone, is the port from which the Guernsey-based African Minerals plans to export the iron ore from its Tonkolili project. The company is aiming to produce 10 Mtpa in the first stage of the project, and plans to deliver the first iron ore in the fourth quarter of 2011. In the fourth quarter of 2012, it is planning to implement the second stage of the project, which will increase exports to 25 Mtpa. This is, however, subject to a feasibility study, scheduled to be completed in the fourth quarter of 2010.

While Pepel Port will have a capacity of 10 Mtpa, the company plans to construct a new port at Tagrin Point for the second stage of the project. With an initial capacity of about 15 Mtpa, the port will get a capacity of 25 Mtpa, and in the long-run all exports from African Minerals will be shipped through Tagrin Point. In the third stage of the project, the company is aiming at increasing its exports by 45 Mtpa, bringing the volumes to a total of 70 Mtpa. However, a timeline for the third stage has not yet been announced.

### Simandou

Several companies are exploring the possibilities for iron ore mining in Simandou, in the southern part of Guinea. Rio Tinto, who started exploring the potential for iron ore projects in the area as early as 1997, had claimed 95% of all 4 blocks in Simandou. However, after the military coup in 2008, Rio Tinto was ordered by the Guinean government to hand over 2 of its 4 blocks to BSG Resources. While Rio Tinto still maintains that it is the owner of all the rights in Simandou, the Guinean government has threatened to also strip the company of its remaining rights.

In addition, Guinea is currently in the process of electing a new president, and the second round of the election will take place on the 19th of September, 2010. It is expected that several mining concessions will be reviewed after this election, including that of Rio Tinto. The company may also try to get a more fair treatment of its rights with a new administration. This could potentially be a problem for the Brazilian mining giant Vale.

Vale recently announced that they had acquired 51% of BSG Resources (Guinea) Ltd., giving them access to the iron resources in the area. By making large investments in infrastructure, Vale plans to start exports of iron ore from the area as soon as 2012. According to their plan, these volumes will be transported through the “Liberia corridor”, to a port close to the Liberian town of Buchanan. The company has the rights to use the existing railway, but also the rights to construct a new railway, and a port. Vale expects to be shipping 10-15 Mt of iron ore from Simandou in 2012, and to reach 50 Mtpa in 2014 (this can be exceeded if additional reserves are found).

Rio Tinto and Chinalco are also planning a project in Simandou, through a joint venture. Their current plans propose a capacity of approximately 70 Mtpa and, like Vale, the companies will have to make large investments in infrastructure. However, company representatives have informed us that they currently regard the political risk in the area as quite high, and do not expect the project to be operational until 2015.

Due to the political risk regarding the rights in this area, we have not included the Rio Tinto/Chinalco project in Simandou in our overall numbers. We have, however, included Vale’s project, as they are confident that they will commence operations in time.

### Sundance Resources port

The Australian-based company Sundance Resources are in the process of developing the Mbalam project in the Republic of Cameroon. The project is includes mines on the border between Cameroon and Congo, a new railway and deep water port at Lolabè, which is planned to be able to accommodate vessels of up to 400,000 dwt. Sundance Resources is aiming at completing a definitive feasibility study by the end of 2010. Furthermore, construction is planned to start in the second quarter of 2011 and operations to start in 2012.

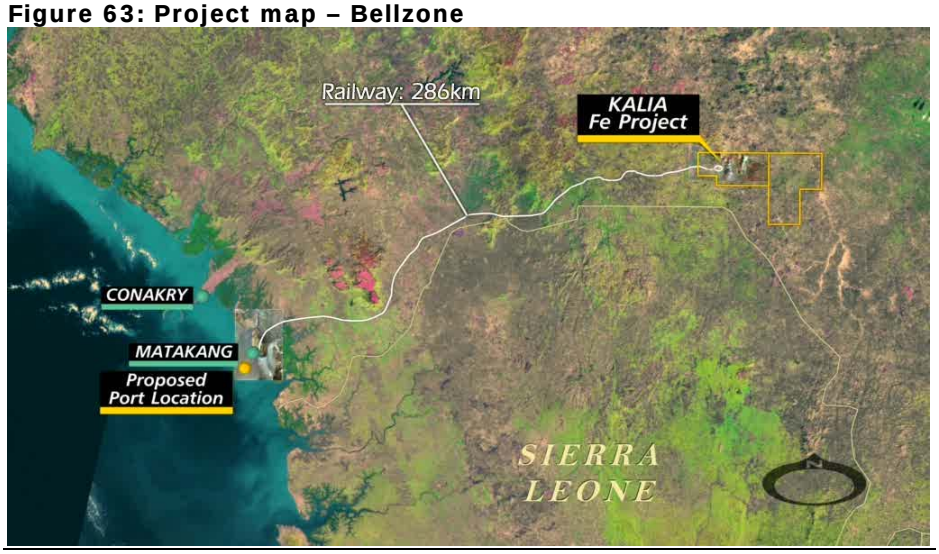
In June 2010, a plane crash claimed the lives of 11 people in Congo, including the entire board and executive manager of Sundance Resources. After a trading halt lasting for about one month, the company has now elected a new board and management, and recently reported that operations are progressing as scheduled. However, we have not included this project in our report, due to lack of accurate information.

### Other African projects under development

In addition to the projects mentioned above, there are several other iron ore projects under development in the western part of Africa. However, we have not included these volumes in our overall summaries, due to difficulties in getting accurate information and uncertainty surrounding the projects.

In Guinea, the Australia-based company Bellzone is developing the Kalia iron ore project in Guinea. In the first stage of the project, the goal is to produce iron ore at a rate of 20 Mtpa in 2014 and 30 Mtpa in 2015. In the second stage of the project, the production is planned to increase to 40 Mtpa in 2017 and 50 Mtpa in 2018. The project involves constructing a 286 km rail line, as well as a new deepwater port with an initial capacity of 50 Mtpa and expansion potential. All infrastructure will be funded by the China International Fund Limited, who will in return receive land areas and a mining permit from Bellzone.

**Figure 63: Project map – Bellzone**




*Source: Bellzone*

The Isle of Man-based company Core Mining are in the process of developing their Avima and Kango projects, located in Congo and Gabon, respectively. While the short-term goal is to produce 1 Mt of iron ore in 2011, the company aims at increasing production to a total of 30 Mtpa by 2015 and 40 Mtpa in the longer term. The Kango project is located relatively close to existing infrastructure, such as the Trans-Gabon railway, leading to the port of Owendo. The Avima project will need a new railway to handle the expected volumes, but no specific plans are announced yet.

Another project in Gabon is the Belinga iron ore project, which is under planning by the China National Machinery and Equipment Import and Export Corp. The project includes mining facilities, railway and a new deepwater port in Santa Clara. Although the mine was planned to produce at a rate of 30 Mtpa, the project is still in the feasibility study stage, and the authorities in Gabon recently said that they will review the deal, signed in 2006. The project has been heavily criticized by environmental groups.

# North America

Between 2005 and 2008, U.S. iron ore production exceeded 50 Mtpa (this was reduced by approximately 50% in 2009, due to the economic downturn). However, the majority of the U.S. production is used for the domestic steel industry and export volumes were fluctuating around 10 Mtpa in the period mentioned above.

**Figure 64: Iron ore export capacity and volumes – USA**

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009e |
|---|---|---|---|---|---|---|---|
| Production | 48.6 | 54.7 | 54.3 | 52.7 | 52.5 | 53.6 | 26.0 |
| Exports | 6.8 | 8.4 | 11.8 | 8.3 | 9.3 | 11.1 | 5.0 |

*Source: U.S. Geological Survey*

According to the U.S. Geological Survey, 99% of the U.S. iron ore is produced in the states of Michigan and Minnesota, and there are three companies involved: Cliffs Natural Resources, U.S. Steel and ArcelorMittal. Due to the location of the mines (close to the great lakes), the majority of the exported iron ore are exported to steel mills in Canada. Hence, these export volumes do not create large trade flows in the global shipping industry, and we have not covered them in this report.

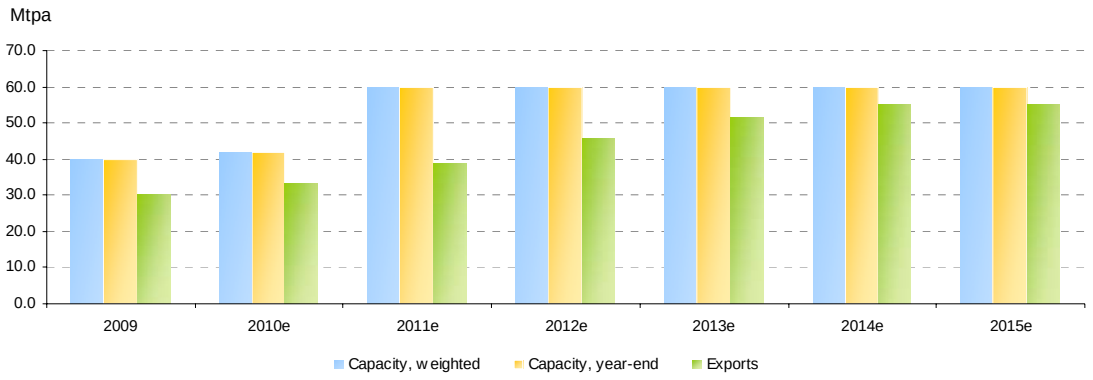
In Canada, there are two large iron ore ports, both located in the north-west of the country, in the province of Québec. These ports are Port-Cartier and Port de Sept-Îles.

**Figure 65: Iron ore export capacity and volumes – North America (Canada)**
**(Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Sum, Capacity** | 40.0 | 42.0 | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 |
| | | 5.0 % | 42.9 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Sum, Capacity YE** | 40.0 | 42.0 | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 |
| | | 5.0 % | 42.9 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Sum, Exports** | 30.2 | 33.3 | 38.8 | 45.8 | 51.8 | 55.0 | 55.0 |
| | | 10.0 % | 16.5 % | 18.1 % | 13.1 % | 6.3 % | 0.0 % |

*Source: DnB NOR Markets*

**Figure 66: Iron ore export capacity and volumes – North America (Canada)**




*Source: DnB NOR Markets*

The export volumes and capacities for Canada are expected to increase until 2012. The increase will be driven by the expansion at the Port de Sept-Îles. The port serves five customers, including the Rio Tinto-owned

Iron Ore Company of Canada. This company recently restarted its iron ore expansion programme, through which it aims at increasing mining capacity from 18 to 22 Mtpa.

**Figure 67: North American iron ore ports**


*Source: DnB NOR Markets*

### Port-Cartier

Port-Cartier is owned and operated by ArcelorMittal. The company transports iron ore from Mont-Wright to the port using its own 420 km long railway. At the port complex, ArcelorMittal owns a pelletizing plant with a capacity of about 9 Mtpa. The capacity of the port, however, is approximately 20 Mtpa.

In 2009, 13.1 Mt of iron ore was exported through the port. Although the capacity is about 20 Mtpa, company representatives have informed us that they expect to export 15 Mt in 2010. The reason for not exporting at the maximum capacity is that the port also handles 4 Mtpa of grain, using capacity that could otherwise have been used for iron ore.

There are currently no plans to expand the port. Hence, we expect volumes to remain somewhat stable at the volumes expected for this year.

**Figure 68: Forecasts – Port-Cartier**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Capacity, year-end | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Exports | 13.1 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |

*Source: ArcelorMittal, DnB NOR Markets*

### Port de Sept-Îles

The Port de Sept-Îles is located approximately 35 kilometres to the north east of Port-Cartier. In contrast to Port-Cartier, the Port de Sept-Îles also handles other types of cargoes, and a cruise ship dock is also currently under construction.

Last year, the Port de Sept-Îles exported 17.1 Mt of iron ore through its facilities in the Pointe-Noire area. Hence, with a capacity of 20 Mtpa, it was less affected by the economic downturn than many other ports. For 2010, port representatives have informed us that they expect to export 18 Mt.

There are three expansion projects under development at the port. When these are completed, in 2011, the capacity will increase to 40 Mtpa. There are five mining companies exporting their cargoes through the port, and the port authorities are confident that the new capacity will be utilized. However, since this is a substantial increase in capacity (100% compared to previous capacity at the port), we have used an assumption of a gradual ramp up over 3 years in our estimates. This may be conservative, but we expect that some time will be needed for the mining companies to ramp up their production to this relatively large capacity increase.

**Figure 69: Forecasts – Port de Sept-Îles**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 20.0 | 22.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Capacity, year-end | 20.0 | 22.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Exports | 17.1 | 18.3 | 23.8 | 30.8 | 36.8 | 40.0 | 40.0 |

*Source: Port de Sept-Îles, DnB NOR Markets*

# Europe and CIS

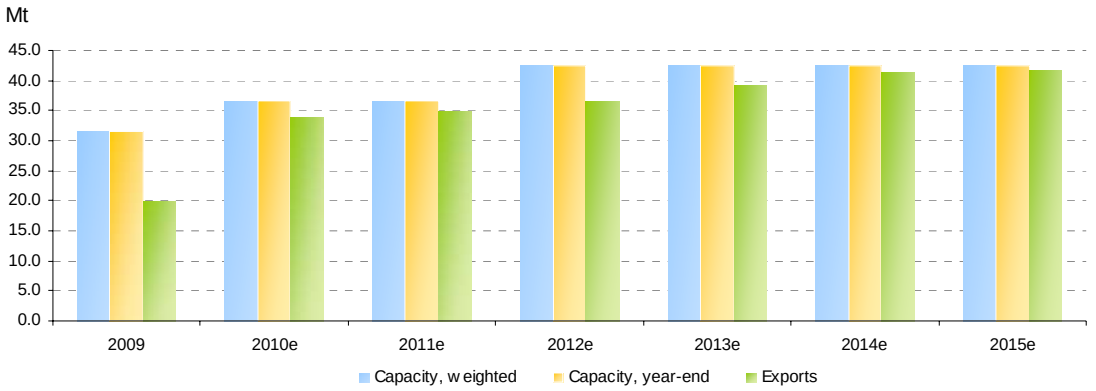
Seaborne iron ore exports from Europe are relatively low. One of the dominating companies is LKAB, who runs mining operations in Sweden and exports its products through the ports of Luleå and Narvik. There are also ports in Eastern Europe and by the Black Sea, exporting iron ore produced by the CIS countries. However, the volumes at these ports are relatively low and therefore not included in this report.

**Figure 70: Iron ore export capacity and volumes – Europe and CIS (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 31.5 | 36.5 | 36.5 | 42.5 | 42.5 | 42.5 | 42.5 |
| - growth | | 15.9 % | 0.0 % | 16.4 % | 0.0 % | 0.0 % | 0.0 % |
| **Capacity, year-end** | 31.5 | 36.5 | 36.5 | 42.5 | 42.5 | 42.5 | 42.5 |
| - growth | | 15.9 % | 0.0 % | 16.4 % | 0.0 % | 0.0 % | 0.0 % |
| **Exports** | 19.9 | 33.8 | 34.8 | 36.6 | 39.3 | 41.4 | 41.8 |
| - growth | | 69.5 % | 3.0 % | 5.3 % | 7.2 % | 5.5 % | 0.8 % |

*Source: DnB NOR Markets*

**Figure 71: Iron ore export capacity and volumes – Europe and CIS**




*Source: DnB NOR Markets*

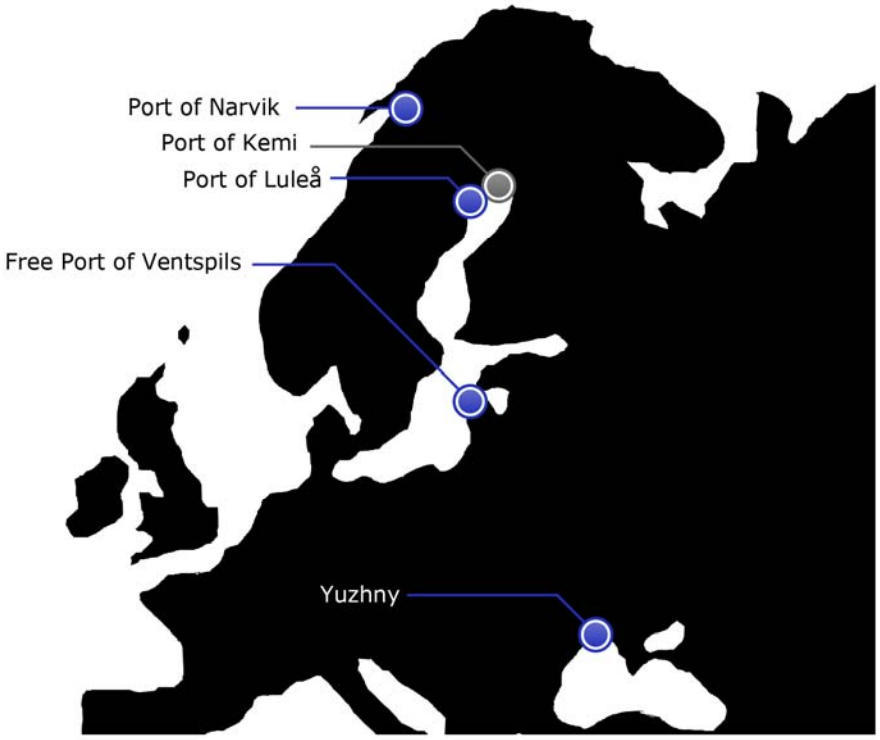
Capacity increases in Europe occurs in 2010 and 2012. In 2010, a terminal at the Free Port of Ventspils becomes operational. In 2012, Northland Resources plans to start exports, either from the Port of Narvik, in Norway, or the Port of Kemi, in Finland. However, export volumes are expected to grow more gradually, as exports from these terminals are converging towards the potential capacities.

We believe that there will be a strong increase in European iron ore exports this year. In addition to the new terminal at the Free port of Ventspils, we believe that the Port of Luleå will increase its exports.

The European iron ore ports included in this report are:

- Port of Narvik
- Port of Luleå
- Ferrexpo Yuzhny terminal
- Free port of Ventspils
- Port of Kemi / Port of Narvik (Northland Resources)

**Figure 72: European iron ore ports**




*Source: DnB NOR Markets*

### Port of Luleå and Port of Narvik

The Swedish mining company LKAB ships its iron ore through the ports of Luleå (Sweden) and Narvik (Norway). From its mines at Kiruna and Malmberget, the iron ore is transported by train to the ports.

In 2009, the ports of Narvik and Luleå exported approximately 12.1 Mt and 2.3 Mt of iron ore, respectively. The volumes were affected by the adverse economic conditions, and are expected to increase again for 2010. The port of Narvik expects to export 16 Mt this year, where the restricting factor is the train capacity. There is a project to upgrade this and around 2012, longer trains will lead to increased capacity, of about 17 Mtpa. Volumes are expected to stay around the full capacity during the next years.

**Figure 73: Forecasts – Port of Narvik**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 16.0 | 16.0 | 16.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| Capacity, year-end | 16.0 | 16.0 | 16.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| Exports | 12.1 | 16.0 | 16.0 | 17.0 | 17.0 | 17.0 | 17.0 |

*Source: LKAB, DnB NOR Markets*

The Port of Luleå is expected to increase output again this year. The full capacity of the port is 10 Mtpa, but company representatives have informed us that it is more realistic to expect export volumes in the range of 9.0-9.5 Mtpa for the next years.

**Figure 74: Forecasts – Port of Luleå**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Capacity, year-end | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Exports | 2.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 |

*Source: LKAB, DnB NOR Markets*

### Port of Kemi / Port of Narvik (Northland Resources)

Northland Resources is a Luxembourg-registered mining company with mining projects in Sweden and Finland. The company had planned to export the iron ore from its Kaunisvaara project through the Port of Kemi, in Finland, but recently announced that it is also studying the possibility of using the Port of Narvik. The Port of Narvik has the advantage of being a deepwater port, whereas exporting through Kemi would involve transhipment expenses, as the ore would have to be transferred from Handymaxes to Capesizes.

Independent of port choice, the company plans to commence operations on the project in mid-2012, and we believe that the 5 Mtpa production rate will be reached in sometime in 2014-2015.

**Figure 75: Forecasts –Northland Resources port (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 0.0 | 0.0 | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Capacity, year-end | 0.0 | 0.0 | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Exports | 0.0 | 0.0 | 0.0 | 0.4 | 2.5 | 4.7 | 5.0 |

*Source: DnB NOR Markets*

### Ferrexpo Yuzhny terminal

The mining company Ferrexpo owns a terminal in Yuzhny, Ukraine, from which it ships iron ore pellets. The port has a capacity of between 5-6 Mtpa, and it is currently exporting at this capacity. Although upgrades have been discussed, no specific plans have been published yet. Hence, the company expects export volumes to remain at the current levels.

**Figure 76: Forecasts – Ferrexpo Yuzhny terminal**

| | 2009e | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| Capacity, year-end | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| Exports | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |

*Source: Ferrexpo, DnB NOR Markets*

### Free port of Ventspils

In March, an iron ore terminal started operations at the Free Port of Ventspils, Located in the west of Latvia. While the terminal exported 0.3 Mt per month for the first few months, the port representative told us that they hope this will increase. The majority of the iron ore exported at this terminal comes from Russia. We assume that the port will export about 3 Mt this year, 4 Mt next year and then to stabilize at around 5 Mtpa.

**Figure 77: Forecasts – Free port of Ventspils**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Capacity, year-end | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Exports | 0.0 | 3.0 | 4.0 | 4.5 | 5.0 | 5.0 | 5.0 |

*Source: Free port of Ventspils Authority, DnB NOR Markets*

# Coal

Coal is a combustible sedimentary rock and fossil fuel, especially rich in carbon. It is derived from large amounts of dead plant matter trapped at the bottom of swamps, which, after millions of years with high pressures and temperatures, has been transformed to coal. Due to this long process, coal is classified as a non-renewable energy source.

While coal has several uses, including transforming metallurgical coal into coke for the production of steel, the rock is primarily used to generate electricity in coal power plants. According to the World Coal Institute, 41.5% of the world's electricity is generated from coal. Coal also provides 26.5% of the global primary energy needs.

### Coal types

The U.S. classification scheme recognizes four different ranks of coal, with the ranking factors including heating value and fixed carbon and volatile matter content. Heating value is the energy released as heat when the coal undergoes complete combustion with oxygen, and is often measured in British Thermal Units (1 BTU ~ 1.06 kilojoules). The terms "thermal coal" and "steam coal" are often used to describe coal used for heating (e.g. for power plants). In contrast, "metallurgical coal" or "coking coal", is coal used to produce coke.

***Anthracite*** is the highest rank of coal. It is black and has a carbon content between 86% and 97%. However, it has lower energy content than bituminous coal, with heating values between 26 and 33 MJ/kg. China produces substantial amounts of anthracite. However, this type of coal constitutes a very small part of seaborne coal trade.

***Bituminous*** coal is the second highest ranked coal. It is normally black, has heating values between 24 and 35 MJ/kg and has a carbon content of approximately 45%-86%. Bituminous coal is also primarily used for power generation. However, due to its characteristics, it is also used to make coke: through a process in which the coal is baked in a furnace, without any contact with air and with temperatures as high as 2,000 degrees Celsius, the majority of the volatile matter in the coal is driven off. The result, coke, has a carbon content of about 98%. It is used as a fuel, and also as a reducing agent when smelting iron ore in a blast furnace.

***Sub-bituminous*** coal is ranked above lignite and below bituminous coal. It is normally dark brown or black and its primary use is for steam-electric power plants. The carbon content in sub-bituminous coal is normally between 35%-45% and its heating values are in the range of 19.3 to 26.7 MJ/kg. An advantage with sub-bituminous coal is that it contains relatively low amounts of sulphur, which leads to less pollution and is attractive for companies who have to comply with pollution regulations.

***Lignite*** is the lowest rank of coal. It is relatively soft and brown or brownish-black, and is often referred to as brown coal. The primary, and almost only, use of lignite is as fuel for steam-electric power plants. However, it has a relatively low energy density and it is not very efficient to transport over long distances. The lignite mining areas and power stations are therefore often located close to each other. Lignite normally contains 25%-35% carbon and has a heating value between 10 and 20 MJ/kg.

### Processing

Before being burned, coal normally goes through a preparation process. This can include removing unwanted material, crushing, screening for size and washing. Coal from different mines might be blended to create a certain quality.

### Coal deposits

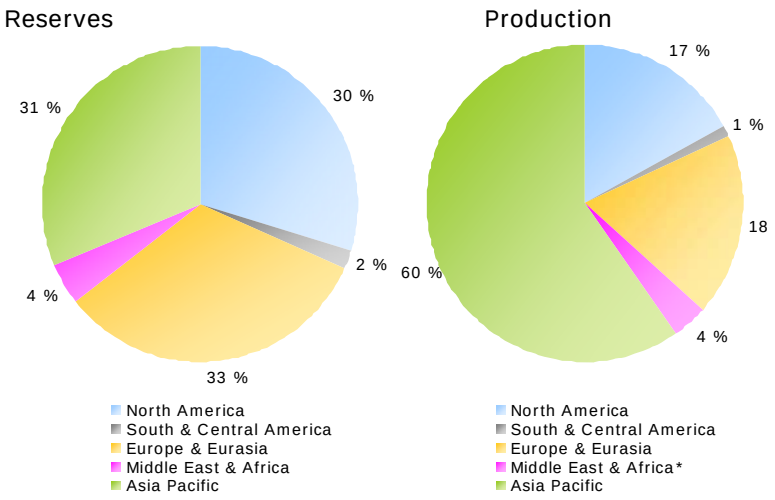
According to the World Energy Council, proven coal reserves comprise approximately 411 billion tonnes of higher rank coal (anthracite and bituminous) and 415 billion tonnes of lower rank coal (sub-bituminous and lignite). The United States have the largest coal reserves in the world, followed by Russia and China. These countries control 28.9%, 19.0% and 13.9% of the world's total reserves, respectively. Other countries with large deposits of coal include Australia, India, Ukraine and Kazakhstan. These top seven countries control more than 85% of the world's proven coal reserves.

If annual consumption of coal stays at the same level as today, it is believed that the resource will last for 130 years.

### Production, consumption, imports and exports

China is by far the world's largest producer of coal. In 2008, the country produced 68.7% of the total world production, measured in tonnes. By this scale, the country was followed by the United States, India, Australia and Russia.

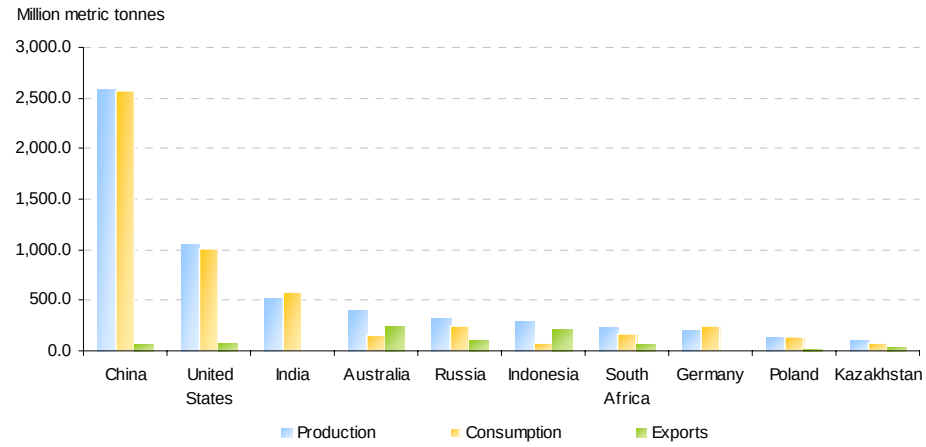
**Figure 78: Reserves and production by area, 2008 (Mtpa)**




** Coal production in the Middle East is close to zero*

*Source: BP*

**Figure 79: Volumes for top 10 coal producing countries, 2008**

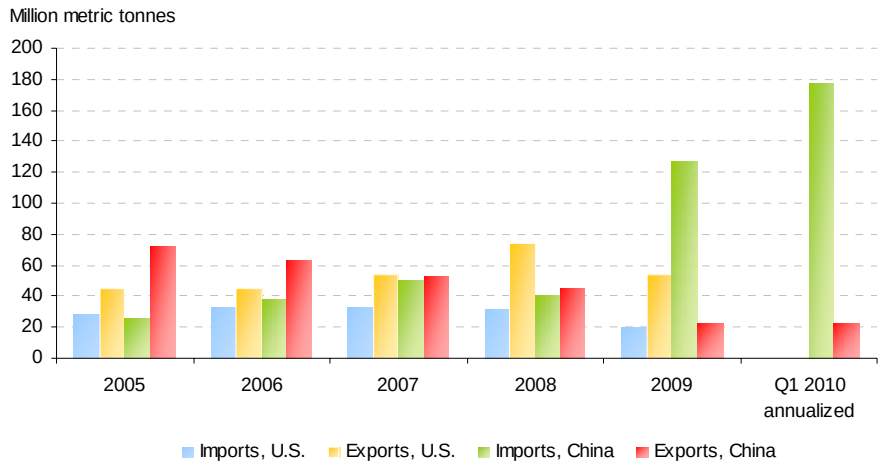



*Source: U.S. Energy Information Administration*

We see from the figure above that, while China and the United States are the world's largest producers of coal, they are also the largest consumers. It is also interesting to note that these countries are both exporting and importing coal. However, Chinese coal exports have decreased in recent years and in 2007, the country became a net importer of coal. In contrast, the U.S. is still a net exporter.

Whether a country imports and exports coal at the same time, depends on what is advantageous to the mining companies or their customers. An example of this is the U.S. imports of Colombian coal. Certain power plants located by the Gulf of Mexico find Colombian coal to be the best option, although domestic providers exist.

**Figure 80: Coal exports and imports, U.S. and China**




*Source: Bloomberg*

For the last years, we can see a trend in declining Chinese exports and increasing imports. This seems to continue this year: For Q1 2010 China exported coal at an annualized rate of 22.8 Mtpa while it imported at a rate of 177.7 Mtpa. However, Chinese coal imports are still low, compared to its total consumption. This results in a situation where changes in domestic demand can have a large effect on the import volumes and cause volatility in these. Still, even if Chinese imports decrease, there is also a growing demand from India. Consequently, we believe that the demand from coal will still be strong going forward, resulting in a high demand for transportation and port capacity.

Due to the relatively low export volumes from China, combined with difficulties in getting accurate information, we have not included Chinese coal export ports in this study. We do not believe that China will increase its coal exports significantly within the next years.

### Market

The market for coal can be divided into the Atlantic Basin and the Pacific Basin. The Atlantic Basin is dominated by the U.S., Colombia and South Africa. The largest importer is Europe, although the U.S. is also importing substantial amounts from Colombia.

In the Pacific Basin, the largest exporters are Australia and Indonesia. These two countries are by far the largest coal exporters in the world. Australian exports amounted to 263.4 Mt in the fiscal year (July to June) 2008/2009. According to statistics from the Indonesian Coal Mining Association, Indonesia exported about 230 Mt of coal in 2009. The largest importers of coal in the Pacific Basin are Japan, China, India, South Korea and Taiwan.

The world's third largest coal exporter, Russia, has several coal ports, but also exports coal by train. Due to its location, it supplies coal both to Europe and Asia. Likewise, South Africa also exports coal to both markets.

### Pricing

The majority of coal is priced using OTC contracts with negotiations between the involved parties. There is also a spot market, as well as derivatives traded on exchanges, such as the Chicago Mercantile Exchange. It is important to remember that there is not *one* type of coal. Different types of coal have different qualities (heating value, moist, ash etc.) and these characteristics affect price.

**Figure 81: API2 index**


*Source: McCloskey, Argus Media*

During the economic crisis in 2008, coal prices decreased substantially. Since then, prices have been increasing again. In early April 2010, it was reported that Xstrata and PT Bumi Resource had settled with Japanese utilities to deliver coal at contract prices 40% above those for last year's contracts.

Coking coal has traditionally followed the same pricing system as iron ore: the benchmark pricing system with an annual price. However, as with iron ore, the metallurgical coal pricing system has started to move towards shorter-term price agreements. In March, BHP Billiton settled a coking coal price on a quarterly basis, and other companies have signalled that they will consider doing the same.

### Coal ports covered in this study

31 individual coal ports are covered in this report. While many of the largest iron ore companies export their cargoes through privately owned ports, the situation is somewhat different in the coal market. Several companies, in countries such as Indonesia, Russia and Colombia, own their own ports or terminals. However, many of the largest coal ports, serve several mining companies.

**Figure 82: Coal ports covered in this study**

| Country | Port | Status * |
|---|---|---|
| Australia | Port of Newcastle | Will increase capacity |
| Australia | Port of Hay Point | Will increase capacity |
| Australia | Port of Gladstone | Will increase capacity |
| Australia | Abbot Point | Will increase capacity |
| Australia | Port Kembla | Possible expansion |
| Australia | Port of Brisbane | Will increase capacity |
| Australia | Waratah coal terminal | Planning stage |
| Canada | Port Metro Vancouver | |
| Canada | Port of Prince Rupert | |
| Poland | Port of Szczecin | |
| Poland | Port of Swinoujscie | |
| Poland | Port of Gdansk | |
| Latvia | Free Port of Ventspils | |
| Estonia | Port of Tallin | |
| Norway | Store Norske / Svea | |
| Russia | Port of Ust-Luga | Will increase capacity |
| Russia | Port Temryuk | |
| Russia | Murmansk port | Will increase capacity |
| Russia | Vostochny Port | Possible expansion |
| Russia | Nakhodka Commercial Sea Port | |
| Russia | Maly Port | |
| Russia | Vanino Commercial Sea Port | Will increase capacity / Under construction |
| Russia | Port Posiet | Will increase capacity |
| Colombia | Puerto Bolívar | Possible expansion |
| Colombia | Puerto Drummond | Will increase capacity |
| Colombia | Puerto Prodeco | Will increase capacity ** |
| Colombia | Sociedad Portuaria Rio Cordoba | |
| Colombia | MPX Port | Under construction |
| South Africa | Richard's Bay Coal Terminal | Will increase capacity *** |
| Mozambique | Port of Maputo | Will increase capacity |
| Mozambique | Port of Beira | Under construction |

* Plans as of the 1st of August 2010
** Construction of new port: Puerto Nuevo
*** By increasing capacity in railroad

*Source: DnB NOR Markets*

# Port capacities and exports – Coal

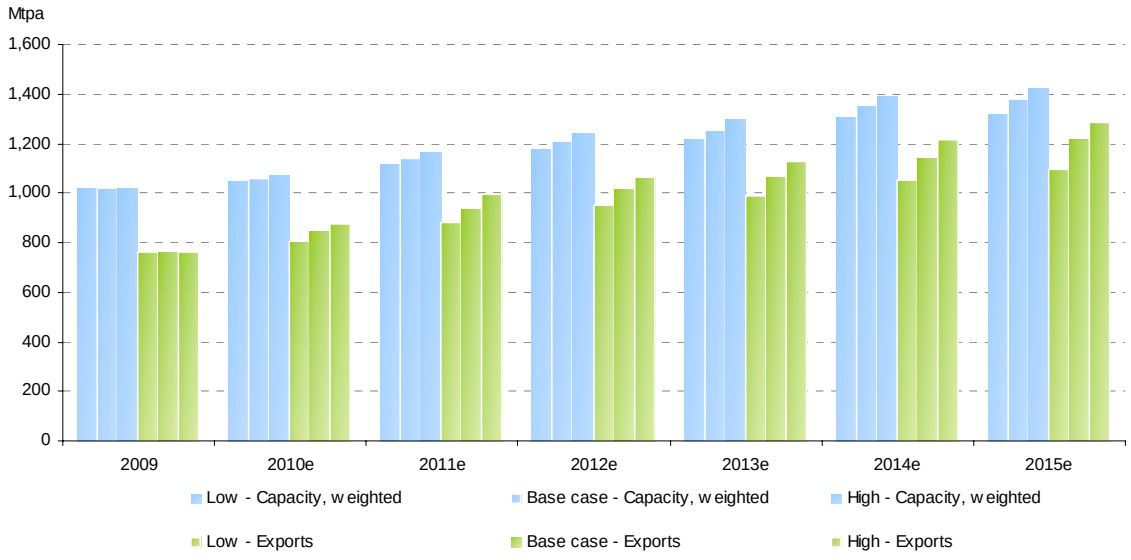
The ports we cover in this paper exported 761 Mt in 2009 and had a total capacity of 1021 Mtpa at year-end. Although there are fewer new coal ports under construction, relatively to iron ore ports, we still believe that we will see a substantial increase in total coal export capacity. We forecast a 36% capacity increase (base case), to 1389 Mtpa, by the end of 2015. This represents an average year-on-year increase of 5.3%.

**Figure 83: Global capacities and export volumes – Coal (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | | | | | | | |
| Low | 1,020 | 1,047 | 1,118 | 1,178 | 1,216 | 1,301 | 1,313 |
| Base case | 1,020 | 1,059 | 1,143 | 1,212 | 1,254 | 1,355 | 1,382 |
| High | 1,020 | 1,072 | 1,168 | 1,242 | 1,295 | 1,391 | 1,421 |
| **Capacity, year-end** | | | | | | | |
| Low | 1,021 | 1,070 | 1,140 | 1,184 | 1,236 | 1,332 | 1,313 |
| Base case | 1,021 | 1,083 | 1,157 | 1,215 | 1,267 | 1,361 | 1,382 |
| High | 1,021 | 1,095 | 1,193 | 1,245 | 1,324 | 1,391 | 1,421 |
| **Exports** | | | | | | | |
| Low | 761 | 807 | 882 | 950 | 988 | 1,052 | 1,096 |
| Base case | 761 | 842 | 934 | 1,014 | 1,063 | 1,140 | 1,214 |
| High | 761 | 876 | 998 | 1,065 | 1,125 | 1,213 | 1,283 |
| **Growth rates, base case** | | | | | | | |
| Capacity | | 3.8 % | 7.9 % | 6.0 % | 3.5 % | 8.1 % | 2.0 % |
| Capacity, year-end | | 6.0 % | 6.9 % | 5.0 % | 4.2 % | 7.5 % | 1.5 % |
| Exports | | 10.7 % | 10.9 % | 8.6 % | 4.8 % | 7.2 % | 6.5 % |

*Source: DnB NOR Markets*

**Figure 84: Global capacities and export volumes – Coal**




*Source: DnB NOR Markets*

In terms of export volumes, we believe that these will rise from 761 Mt in 2009, to 1,214 Mt in 2015. This represents an increase of 59.5%, or an average of 8.1% year-on-year. Exports growth is quite a lot higher than capacity growth. This is explained by the fact that there is currently relatively high unused capacity. Hence, in addition to increased exports as new capacity becomes operational, exports will also increase as e.g. railways are improved, resulting in higher utilization of current port capacity.

**Figure 85: Coal export capacities and volumes (base case) (Mtpa)**

| Country | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Australia** | | | | | | | |
| - Capacity, weighted | 351 | 369 | 408 | 442 | 454 | 517 | 524 |
| - Capacity, year-end | 351 | 389 | 423 | 442 | 465 | 524 | 524 |
| - Exports | 275 | 309 | 354 | 391 | 414 | 458 | 500 |
| **Indonesia** | | | | | | | |
| - Capacity, weighted | 230 | 243 | 266 | 287 | 299 | 316 | 336 |
| - Capacity, year-end | 230 | 243 | 266 | 287 | 299 | 316 | 336 |
| - Exports | 230 | 243 | 266 | 287 | 299 | 316 | 336 |
| **United States *** | | | | | | | |
| - Capacity, weighted | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| - Capacity, year-end | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| - Exports | 44 | 45 | 44 | 45 | 46 | 46 | 47 |
| **Russia** | | | | | | | |
| - Capacity, weighted | 74 | 74 | 80 | 83 | 87 | 87 | 87 |
| - Capacity, year-end | 74 | 74 | 80 | 87 | 87 | 87 | 87 |
| - Exports | 46 | 58 | 64 | 69 | 73 | 74 | 74 |
| **Colombia** | | | | | | | |
| - Capacity, weighted | 69 | 71 | 73 | 75 | 82 | 92 | 92 |
| - Capacity, year-end | 69 | 71 | 73 | 75 | 83 | 92 | 92 |
| - Exports | 62 | 68 | 71 | 75 | 79 | 84 | 88 |
| **South Africa** | | | | | | | |
| - Capacity, weighted | 65 | 65 | 65 | 73 | 81 | 81 | 81 |
| - Capacity, year-end | 65 | 65 | 65 | 73 | 81 | 81 | 81 |
| - Exports | 61 | 64 | 67 | 70 | 73 | 76 | 79 |
| **Canada** | | | | | | | |
| - Capacity, weighted | 35 | 39 | 41 | 41 | 41 | 41 | 41 |
| - Capacity, year-end | 35 | 41 | 41 | 41 | 41 | 41 | 41 |
| - Exports | 23 | 32 | 35 | 38 | 40 | 41 | 41 |
| **Mozambique** | | | | | | | |
| - Capacity, weighted | 3 | 5 | 17 | 17 | 17 | 27 | 27 |
| - Capacity, year-end | 4 | 6 | 17 | 17 | 17 | 27 | 27 |
| - Exports | 2 | 4 | 10 | 17 | 17 | 22 | 27 |
| **Latvia** | | | | | | | |
| - Capacity, weighted | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| - Capacity, year-end | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| - Exports | 7 | 8 | 11 | 11 | 11 | 11 | 11 |
| **Estonia** | | | | | | | |
| - Capacity, weighted | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| - Capacity, year-end | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| - Exports | 5 | 6 | 6 | 6 | 7 | 7 | 7 |
| **Poland** | | | | | | | |
| - Capacity, weighted | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| - Capacity, year-end | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| - Exports | 4 | 6 | 5 | 4 | 4 | 3 | 3 |
| **Norway** | | | | | | | |
| - Capacity, weighted | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| - Capacity, year-end | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| - Exports | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| **Capacity, weighted** | **1,020** | **1,059** | **1,143** | **1,212** | **1,254** | **1,355** | **1,382** |
| - growth | | 3.8 % | 7.9 % | 6.0 % | 3.5 % | 8.1 % | 2.0 % |
| **Capacity, year-end** | **1,021** | **1,083** | **1,157** | **1,215** | **1,267** | **1,361** | **1,382** |
| - growth | | 6.0 % | 6.9 % | 5.0 % | 4.2 % | 7.5 % | 1.5 % |
| **Exports** | **761** | **842** | **934** | **1,014** | **1,063** | **1,140** | **1,214** |
| - growth | | 10.7 % | 10.9 % | 8.6 % | 4.8 % | 7.2 % | 6.5 % |

**Excluding exports to Canada*

*Source: DnB NOR Markets*

While we believe that countries such as Colombia, South Africa and Russia will experience high growth, Indonesia and Australia will be the main drivers of capacity and export volumes. As with iron ore, we believe that Australia will keep its position as the number one coal exporter in the world.

For 2009, the coal ports covered in this study represented 94.8% of worldwide seaborne coal trade. Hence, by assuming that this proportion remains constant, we can make an adjusted estimate for seaborne coal volumes, including ports not covered in this report.

**Figure 86: Adjusted expected export volumes**

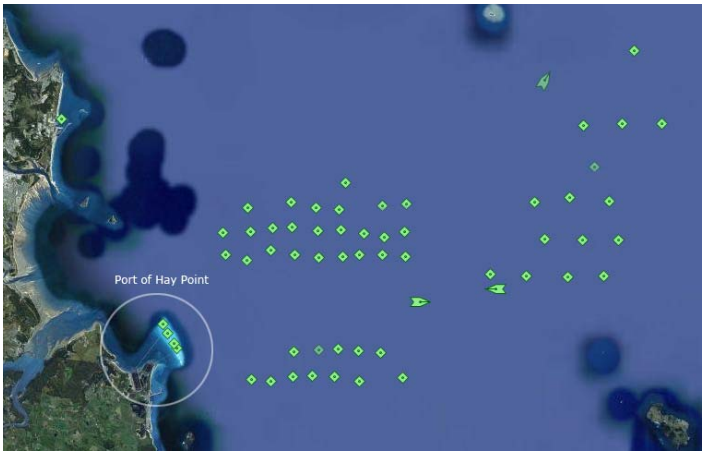
| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Exports** | | | | | | | |
| Low | 761 | 807 | 882 | 950 | 988 | 1,052 | 1,096 |
| Base case | 761 | 842 | 934 | 1,014 | 1,063 | 1,140 | 1,214 |
| High | 761 | 876 | 998 | 1,065 | 1,125 | 1,213 | 1,283 |
| **Adjusted exports** | | | | | | | |
| Low | 803 | 852 | 931 | 1,003 | 1,042 | 1,111 | 1,157 |
| Base case | 803 | 889 | 986 | 1,070 | 1,122 | 1,203 | 1,281 |
| High | 803 | 924 | 1,053 | 1,124 | 1,187 | 1,280 | 1,354 |

*Source: DnB NOR Markets*

### Port congestions

Especially at Australian coal ports, port congestion has been significantly high. As of August 2010, 32 vessels were waiting to load coal at the Port of Newcastle. The same problem exists elsewhere. In the beginning of April 2010, 221 vessels were waiting at Australian coal ports. Due to the repair works on a berth at the Port of Hay Point, more than 100 vessels were waiting there. However, this number has later been reduced, as the port has continued regular operations. By mid-May 2010, the number of vessels waiting at Australian coal ports had fallen to 160, but still keeping a large amount of tonnage out of the market.

**Figure 87: Vessels waiting to load at the Port of Hay Point**



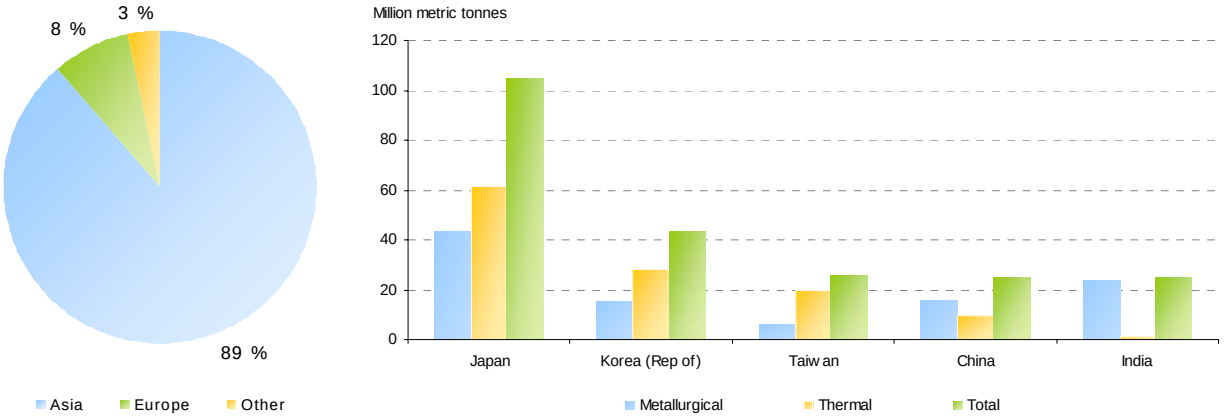

*(Green squares represent anchored vessels)*

*Source: www.marinetraffic.com, 27th of May, 2010*

# Australia

According to the World Energy Council, Australia had 76.2 billion tonnes of proven coal reserves at the end of 2008. This is split approximately 50-50 between higher rank and lower rank coal. In the fiscal year ended 30th of June 2009, Australian coal exports amounted to 263.4 Mt. 233.5 Mt (88.6%) were exported to Asia. Japan was the largest customer, followed by South Korea, Taiwan, China and India. 20.9 Mt (7.9%) were shipped to Europe, while 9.1 Mt (3.5%) were shipped to other countries, including Brazil and Mexico.

**Figure 88: Importers of Australian coal, fiscal year 2008/2009**




*Source: Australian Coal Association*

The volumes exported in 2008/2009 makes Australia the world's largest coal exporter. While the majority of the Australian coal exports are thermal coal, the country also exports a substantial amount of metallurgical coal.

Most Australian coal resources are located in the eastern part of the country, in the states of Queensland and New South Wales. Many large companies are present here, including Peabody Energy, Anglo American, BHP Billiton, Rio Tinto, Vale and Xstrata. The vast majority of the coal mined in Australia is transported to the ports by train. In contrast to the Australian iron ore industry, the railroad used by the coal industry is not owned by the mining companies.

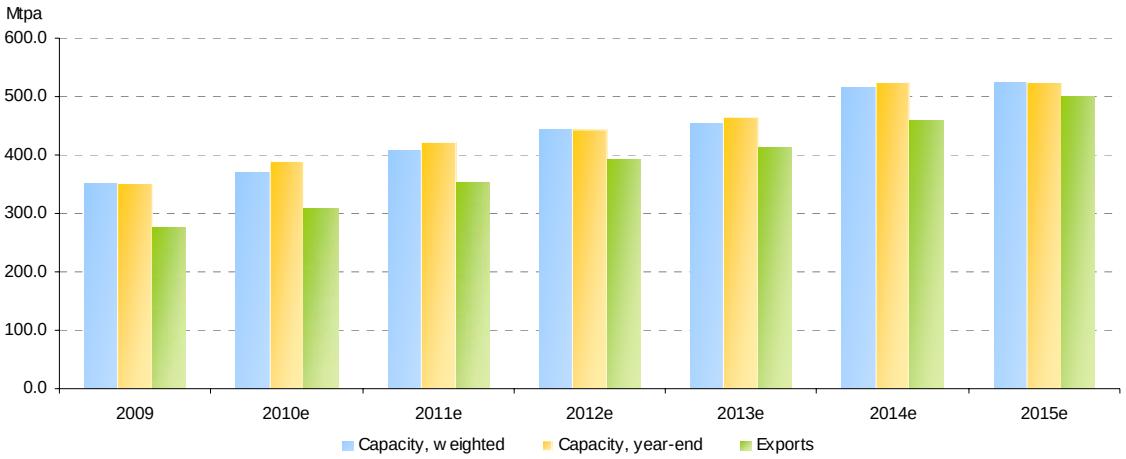
Certain port representatives have informed us that the railroad is a bottleneck preventing them from increasing production. However, the largest coal railroad operator, QRNational, which transported more than 184 Mt of coal in 2007/2008, claim that they currently have a capacity of 240 Mtpa. This should be sufficient to supply the ports in question. Furthermore, the railroad operator informed us that they could quite easily increase capacity by adding more locomotives and rail cars. However, it remains to be seen if they are able to deliver the volumes demanded.

**Figure 89: Coal export capacity and volumes – Australia (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 351.5 | 369.0 | 408.1 | 442.2 | 453.7 | 517.4 | 524.1 |
| - growth | | 5.0 % | 10.6 % | 8.4 % | 2.6 % | 14.1 % | 1.3 % |
| **Capacity, year-end** | 351.5 | 389.1 | 422.6 | 442.2 | 465.1 | 524.1 | 524.1 |
| - growth | | 10.7 % | 8.6 % | 4.6 % | 5.2 % | 12.7 % | 0.0 % |
| **Exports** | 275.1 | 308.7 | 353.6 | 390.6 | 413.8 | 458.5 | 500.3 |
| - growth | | 12.2 % | 14.5 % | 10.5 % | 5.9 % | 10.8 % | 9.1 % |

*Source: DnB NOR Markets*

**Figure 90: Coal export capacity and volumes – Australia**




*Source: DnB NOR Markets*

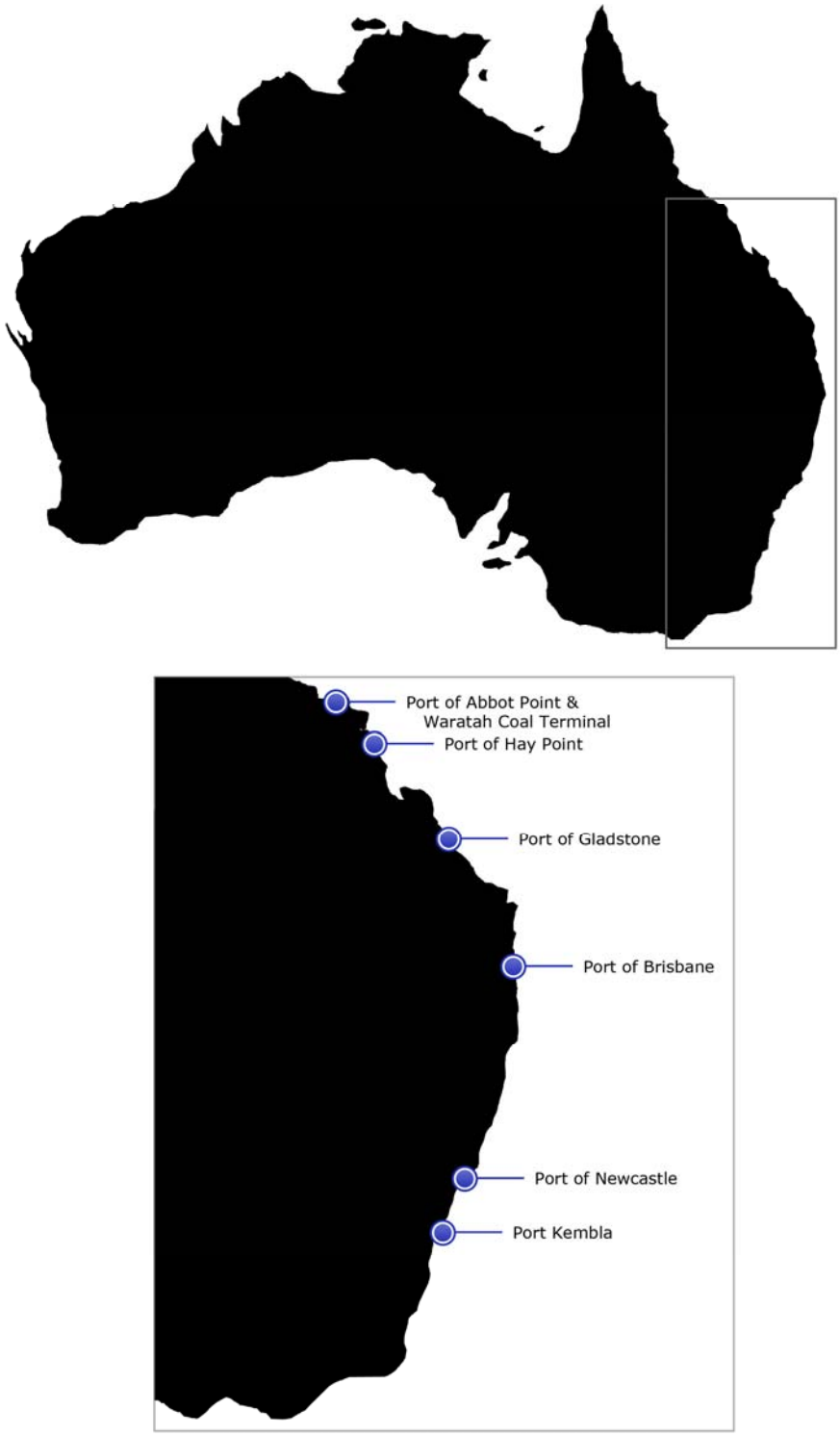
We expect to se a substantial increase in both export capacities and volumes for Australia in the next years. This is driven by capacity increases at the Port of Newcastle, the Port of Gladstone and the Port of Abbot Point, as well as better utilization of current capacity at the Port of Hay Point.

There are six main coal ports in Australia. These are

- Port of Newcastle (Carrington Coal Terminal and Kooragang Coal Terminal)
- Port of Hay Point (Dalrymple Bay Coal Terminal and Hay Point Coal Terminal)
- Port of Gladstone (Barney Point and RG Tanna terminals)
- Port of Abbot Point
- Port Kembla
- Port of Brisbane

Several new coal terminals are under planning and construction: One (potentially two) at the Port of Newcastle, one at Dudgeon Point (close to the Port of Hay Point), one at the Port of Gladstone and potentially three close to the Port of Abbot Point. One of these, under planning by Waratah Coal, is included in this report.

**Figure 91: Australian coal ports**




*Source: DnB NOR Markets*

### Port of Newcastle

The Port of Newcastle is the largest coal export port in the world, in terms of volumes. Located in the city of Newcastle in New South Wales, the port shipped 92.8 Mt of coal in 2009.

The coal shipped from the Port of Newcastle comes from the Hunter Valley Coal Chain, a complex network in which coal from 35 different mines is transported up to 450 kilometres to Newcastle. At any time, there is only two weeks visibility on who will deliver coal and which vessels will transport it.

The Port of Newcastle currently has two terminals with a combined capacity of 113 Mtpa. However, based on the current infrastructure, the independent incorporated body Hunter Valley Coal Chain Coordinator, whose purpose is to manage the coal chain, assume that the real capacity is about 106.2 Mtpa. At this level, the vessel queue is estimated to consist of around 15 vessels on average.

The two terminals are operated by Port Waratah Coal Services (PWCS). A third terminal is under construction, and this will be operated by the Newcastle Coal Infrastructure Group (NCIG), whose member companies include producers such as BHP Billiton and Peabody Energy. Furthermore, PWCS has been awarded the rights to construct a fourth terminal, but this is still at an early stage.

The oldest terminal, the Carrington Coal Terminal, has a capacity of 25 Mtpa. It has berth space for two vessels of up to 180,000 dwt. The second terminal is the Kooragang Coal Terminal. After investing more than 1 billion dollars in this terminal over the last 15 years, it currently has a capacity of 88 Mtpa. It has berth space for three vessels of up to 232,000 dwt.

PWCS has approvals to develop its capacity to 145 Mtpa, compared to the current capacity of 113 Mtpa. In February 2010, the company announced that they would invest AUD 670 million to expand the Kooragang Coal terminal. This will increase its capacity by 20 Mtpa and the total capacity of the Port of Newcastle from 113 to 133 Mtpa. In addition, the NCIG terminal is currently under commissioning, and is scheduled to commence full operations in the first quarter of 2011. This will have a capacity of 30 Mtpa, increasing the total port capacity (disregarding bottlenecks in the surrounding infrastructure) to 163 Mtpa. As large investments have been made in the railway system, NCIG representatives have expressed that they are confident that export levels will be close to full capacity.

NCIG recently announced that it would expand its terminal to 53 Mtpa. The expansion is planned to take 2.5-3 years. In the long run, an additional PWCS expansion, to 145 Mtpa, has also been mentioned. This will involve constructing a fourth terminal, which could potentially be completed around 2013/2014. However, no official announcements have been made about this and we have therefore not included this expansion in our forecasts. However, if this is constructed, the total port capacity will most likely exceed 200 Mtpa within 2015.

**Figure 92: Forecasts – Port of Newcastle (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 106.2 | 118.7 | 140.6 | 160.2 | 171.7 | 183.1 | 183.1 |
| Capacity, year-end | 106.2 | 136.1 | 140.6 | 160.2 | 183.1 | 183.1 | 183.1 |
| Exports | 92.8 | 103.1 | 130.8 | 150.6 | 155.7 | 172.3 | 175.8 |

*Source: DnB NOR Markets*

Although we expect volumes to increase somewhat this year, we believe that they will increase more in 2011 and 2012. In 2012, PWCS alone is contractually obligated to handle 123.6 Mt. Additionally, the expansion of the NCIG terminal will lead to increased capacity by 2013/2014. We also believe that improvements in infrastructure will result in higher utilization of current capacity.

### Port of Hay Point

The Port of Hay Point is located in Queensland, approximately 800 km to the north west of Brisbane. The port has two terminals: the Hay Point Coal Terminal (HPCT), wholly-owned by BHP Billiton, and the Dalrymple Bay Coal Terminal (DBCT). In 2008/2009 the total coal export from the port was 82.45 Mt, of which 47.13 Mt were shipped through DBCT and 35.32 Mt were shipped through HPCT.

In terms of capacity, the Port of Hay Point is larger than the Port of Newcastle. HPCT has a capacity of 44 Mtpa while DBCT has a capacity of 85 Mtpa. However, port representatives have informed us that the railroad is a bottleneck and is currently preventing the terminals from reaching their potential capacities.

BHP Billiton is considering expanding the HPCT by 10 Mtpa. However, there has not been announced any timeline for such a project and we have therefore not included it in our forecasts. DBCT recently (in 2009) expanded its capacity from 68 Mtpa to the current level of 85 Mtpa. The terminal is, however, planning another expansion, which will take the capacity to 150 Mtpa. According to sources in the operating company, it is possible to increase the capacity as far as up to 180 Mtpa. Hence, combined with the current capacity of HPCT, the total capacity of the Port of Hay Point could therefore increase to 224 Mtpa. Such an expansion would take five years to complete, and depends on the feedback DBCT gets from the mining companies. Due to an uncertain timeline and our scope of time for this report (five years), we have not included this project in our forecasts.

In July 2010, it was announced that Dalrymple Bay Coal Terminal and the Indian company Adani Group will develop a plan for the development of a new coal terminal at Dudgeon Point. This is located about four kilometers to the north of current terminals at the Port of Hay Point. The development is still at a very early stage and details regarding capacity are not yet available.

**Figure 93: Forecasts – Dalrymple Bay Coal Terminal (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 80.8 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| Capacity, year-end | 80.8 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| Exports | 54.2 | 66.6 | 72.5 | 77.5 | 81.0 | 83.0 | 84.5 |

*Source: Dalrymple Bay Coal Terminal, DnB NOR Markets*

**Figure 94: Forecasts – Hay Point Coal Terminal (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 |
| Capacity, year-end | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 |
| Exports | 34.7 | 37.5 | 41.0 | 42.5 | 43.5 | 44.0 | 44.0 |

*Source: BHP Billiton, DnB NOR Markets*

For the fiscal year of 2009/2010, DBCT is expected to be exporting 62-64 Mt. We further believe that its export volumes will gradually increase towards its full capacity. BHP Billiton has informed us that their terminal, the HPCT, is expected to operate at full capacity. However, the terminal is a bit older than DBCT and was damaged in a cyclone earlier this year. Hence, two months were lost while repair works were taking place. We believe that HPCT will converge towards its potential capacity within the next years.

However, the infrastructure is a risk factor here. Whether the railway manages to deliver the expected volumes remains to be seen.

### Port of Gladstone

Located in the city of Gladstone, about 400 km to the north-west of Brisbane, the port of Gladstone is the third largest Australian coal port, in terms of volumes. The port has two terminals: RG Tanna, with a capacity of 70 Mtpa, and Barney Point, with a capacity of about 6 Mtpa.

In 2008, the port of Gladstone exported 58 Mt of coal, and the exports are expected to increase this year. For 2009/2010, the port has a production target of 63 Mt. However, it will probably not reach this target, due to

storms and weather events, as well as bottlenecks in the logistics, and we expect exports of about 60 Mt.

There will be no further expansions of the RG Tanna terminal. Instead, the next expansion project at the Port of Gladstone will take place at the Wiggins Island, a few hundred meters to the west of RG Tanna. The first stage of this project is scheduled to be completed by 2013-2014, with an initial capacity of 25 Mtpa. A port representative informed us that they expect export volumes from this terminal in the range of 15-25 Mtpa for the first two to three years after its completion. In the long term, the port corporation plans to reach 70-75 Mtpa in capacity at this terminal. This is, however, many years in the future, and is not within the scope of time of this study.

However, as the new Wiggins Island project commences operations, the port authority plans to stop shipping coal from the Barney Point terminal. Hence, as the port capacity increases by 25 Mtpa, it will also experience a capacity decrease of 6 Mtpa, resulting in a net increase of 19 Mtpa.

**Figure 95: Forecasts – Port of Gladstone (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 76.0 | 76.0 | 76.0 | 76.0 | 76.0 | 95.0 | 95.0 |
| Capacity, year-end | 76.0 | 76.0 | 76.0 | 76.0 | 76.0 | 95.0 | 95.0 |
| Exports | 58.0 | 61.5 | 64.5 | 67.5 | 73.3 | 82.5 | 90.0 |

*Source: Gladstone Ports Corporation, DnB NOR Markets*

For the next years, we expect a continuously improved utilization of the current capacity. With the new capacity commencing operations in 2014, we believe that exports will reach 90 Mt in 2015.

### Port of Abbot Point

The Port of Abbot Point is located approximately 1,000 kilometres to the north-west of Brisbane and is the northernmost Australian coal port covered in this study. With export volumes of 13.8 Mt in 2009, the Port of Abbot Point is a not a very large port, compared to the three described above. However, the port is expanding and with most of the equipment in place, it is expected to start commissioning soon. The new capacity is planned to commence full operations in 2011, which will increase its capacity to 50 Mtpa, from the current level of 20 Mtpa.

Additionally, there are big development plans for the Port of Abbot Point. BHP Billiton and Hancock Prospecting have received approvals for constructing new coal loading facilities within the port and their facilities could potentially export at a rate of 30 Mtpa each. Furthermore, the chief executive of the North Queensland Bulk Port Corporation was recently quoted saying that the port is planning extra capacity of up to 200 Mtpa. Another mining company, Waratah Coal, has announced that it is planning to construct a 40 Mt terminal next to the Port of Abbot Point. However, as these projects are in the early stages, not many details have been announced and this project is not included in the aggregate volumes.

**Figure 96: Forecasts – Port of Abbot Point (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 21.0 | 21.0 | 35.5 | 50.0 | 50.0 | 50.0 | 50.0 |
| Capacity, year-end | 21.0 | 21.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| Exports | 15.2 | 19.0 | 21.9 | 27.5 | 33.8 | 40.0 | 45.3 |

*Source: North Queensland Bulk Ports, DnB NOR Markets*

The Port of Abbot Point is expected to export 18-19 Mt for the fiscal year ending in June 2010. For the next years, we believe that the volumes will increase gradually, and exceed 30 Mtpa for the first time in 2014.

### Port Kembla

In 2009, Port Kembla exported approximately the same amount of coal as the Port of Abbot Point. The 13.7 Mt was lower than its capacity of 17 Mtpa, and we expect export volumes to increase somewhat this year, to 14.5 Mt. We further believe that this increase will continue until 2013, in which we expect the export volumes to reach 17 Mt.

**Figure 97: Forecasts – Port Kembla (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| Capacity, year-end | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| Exports | 13.7 | 14.5 | 15.5 | 16.5 | 17.0 | 17.0 | 17.0 |

*Source: Port Kembla Port Corporation, DnB NOR Markets*

There are no specific expansion plans for Port Kembla as of today. The port is currently doing a pre-feasibility study to explore the opportunity of expanding, and this study is scheduled to be completed by the end of 2010. If the project is undertaken, it will take 3-5 years to construct and will result in a capacity increase of about 20-30 Mtpa. Hence, there is a possibility that the port will have a capacity in the range of 37-47 Mtpa within the next five years. However, due to the uncertainty, this is not included in the forecasts.

### Port of Brisbane

The Port of Brisbane is the smallest coal port covered in this report. In 2008/2009, the port shipped 6.3 Mt of coal, and was then operating at full capacity. For 2009/2010, the volumes are expected to be in the range of 6.4 to 6.8 Mt.

**Figure 98: Forecasts – Port of Brisbane (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 6.5 | 7.4 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Capacity, year-end | 6.5 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Exports | 6.5 | 6.5 | 7.4 | 8.5 | 9.6 | 10.0 | 10.0 |

*Source: Queensland Bulk Handling, DnB NOR Markets*

The port has an ongoing expansion project to increase its stockpiles, which will make it able to export more than 10 Mtpa. The project is expected to be completed by October 2010. How soon we can expect to see increased volumes depends on the mining companies as well as the railroad operator, Queensland Rail. In our forecasts, we assume a gradual ramp up over three years, which will result in the port reaching its new capacity in 2014.

### Waratah Coal Terminal

Waratah Coal is planning to construct a coal terminal close to the Port of Abbot Point, in order to export coal from its Galilee Coal project. The terminal will most likely have a capacity of 40 Mtpa, and is planned to commence operations in 2014.

# Indonesia

Indonesia is the world's largest producer of thermal coal. In 2009, the country exported about 230 Mt, 81% of its total production of 283 Mt. This constituted a year-on-year export growth of 43.8%. However, there are different statistics, and the data are not as accurate as those for several other countries. In May 2010, the chairman of the Indonesian Coal Mining Association said that they expect total Indonesian output to reach 320 Mt this year, a number which includes 40 Mt produced by illegal mining.

According to McCloskey, the largest importers of Indonesian coal are China, India, Korea, Japan and Taiwan, with these five countries importing more than 70% of the Indonesian international coal sales. Hence, Indonesia has a very strong position in international thermal coal sales in the Pacific Basin. The country also has an advantage due to the proximity to its customers.

**Figure 99: Importers of Indonesian coal**

| Country | % of exports |
|---|---|
| China | 16.6 % |
| India | 16.0 % |
| Korea | 14.7 % |
| Japan | 14.6 % |
| Taiwan | 10.6 % |

*Source: McCloskey*

### Infrastructure and logistics

Compared to countries such as Australia, Indonesia has many more, but smaller ports. This is logical, since the country consists of many islands, with large parts of the land covered by jungle, and with an infrastructure that is less developed than in many other coal-exporting countries. However, it complicates the work of forecasting capacity and exports on a port-by-port basis. Instead, we will in this case forecasts export volumes for the country as a whole, and describe some of the largest ports and projects. However, the largest ports, and their 2009 coal export volumes (statistics may be somewhat unreliable) are listed below.

**Figure 100: Largest Indonesian coal ports with approximate export volumes for 2009**
**(Million metric tonnes)**

| Name of port | Volumes |
|---|---|
| Samarinda | 46.1 |
| Banjarmasin | 37.2 |
| Tanjung Bara Coal | 34.6 |
| Adang Bay | 19.2 |
| North Pulau Laut Coal Terminal | 12.9 |
| Balikpapan Coal Terminal | 9.8 |
| Muara Pantai | 8.6 |
| Satui Anchorage | 8.1 |
| Bontang | 6.3 |
| TG Pemancingan | 4.7 |
| Indonesia Bulk Terminal | 4.7 |
| Tarahan Coal Terminal | 3.7 |
| Sebuku Anchorage | 2.0 |
| Jorong Anchorage | 1.9 |

*Source: McCloskey*

### Domestic demand

Although production is expected to increase in the next years, there is some uncertainty regarding domestic production and how the country will handle the increasing domestic demand. In order to reduce power shortages, the Indonesian government are currently developing the "10,000 MW Acceleration Program". As the name indicates, the project is aiming to increase the Indonesian power supply by 10,000 MW, which will result in an increased domestic demand for coal. It is expected that the first stage of this project will demand about 32 Mt of coal per year. With the second stage, the number is expected to increase to 65-70 Mtpa. However, there have been delays in the project, and some of the demand from the first stage of the project will not come until 2011.

In order to secure coal supply for domestic use, a law related to Domestic Market Obligation was launched in 2009 (Ministry Regulation of Energy and Mineral Resources No. 34, 2009). This regulation describes how mining companies must supply a given amount of coal domestically during a year. Every year, in June, a minimum percentage of domestic coal sales will be set and the quota to be filled is split proportionally between the different mining companies. The individual mining companies must fill their share of the domestic supply within the next four quarters, or risk being penalized. However, we have been informed that there is high uncertainty about how this will be enforced and many of the companies are not following the law at the moment.

The largest coal producers in Indonesia are Bumi Resources and Adaro. The coal mining operations of Bumi Resources is conducted through its two business units, Arutmin Indonesia and Kaltim Prima Coal.

### Arutmin

Arutmin Indonesia is located in the South Kalimantan. Here, both higher rank bituminous and lower rank sub-bituminous coal is mined and hauled by trucks to the company's four barge ports: Sembilang, Air Tawar 2, Muara Satui and Batulicin. The coal is loaded onto self-discharging or flat top barges. The coal is thereafter transported either to domestic customers, to the North Pulau Laut Coal Terminal or to a transhipment point. According to Bumi Resources, this port, which is located in the north of Laut Island, has a capacity of 14 Mtpa. In 2008, Arutmin mined 15.7 Mt, of which it exported 14.1 Mt. In 2009, the company produced 22.42 Mt.

**Figure 101: Arutmin barge port**

*Source: Arutmin*

**Kaltim Prima Coal**

Kaltim Prima Coal was acquired from BHP Billiton and Rio Tinto in 2003. It is located at Sengata, on the east coast of Kalimantan. The coal from Kaltim Prima Coal is transported by an overland conveyor of 13.2 kilometres to the Tanjung Bara Coal Terminal. The port has a stockyard of 1.2 Mt and can accommodate vessels of up to 220,000 dwt. In 2008, the total Kaltim Prima Coal production amounted to 37.5 Mt, of which 36 Mt (96%) were exported.

**Figure 102: Tanjung Bara Coal Terminal**

*Source: Kaltim Prima Coal*

Bumi Resource has planned to expand the total production capacity of Arutmin and Kaltim Prima Coal to 100 Mtpa by 2012. Compared to the 2008 production volumes of 53.2 Mt, this will result in a substantial increase in production. In addition, the company expect to increase its total capacity by a further 11 Mtpa, through the recent acquisitions of Fajar Bumi Sakti and Pendopo Energi Batubara.

**Adaro**

Adaro is the second largest Indonesian coal producer. The company is located in the Tanjung district, in South Kalimantan, and operates the largest coal mine in Indonesia. In 2009, the company sold 40.6 Mt of coal, of which 75-80% were for international customers. In the first quarter of 2010, Adaro produced at a rate of 45.4 Mt. About 75% of the production in 2010 will be exported, which implies exports of about 34 Mt. While the current capacity is 48 Mtpa, the company is aiming to reach 80 Mtpa by 2014. The company is the largest supplier to domestic customers, and might increase its domestic sales to 30% by the time it reaches these production levels.

The coal from Adaro is being shipped on barges to the Taboneo anchorage. From Taboneo, it is barged to domestic customers, loaded onto bulk carriers with self loading cranes or by floating cranes, or barged to the PT Indonesia Bulk Terminal in the south of Laut Island and exported from there.

A company representative from Adaro informed us that they currently have the infrastructure needed to reach 80 Mt. Whether or not this target will be reached depends on the customers. It is also a trend that many Capesizes in the market are occupied in the transportation of iron ore. Hence, there are not enough vessels to transport the coal, as it becomes unprofitable to transport it using smaller vessels.

### Export forecasts

According to statistics from McCloskey, Indonesian coal exports experienced an average monthly growth of 1.1% between January 2007 and March 2010. However, the fluctuations have been rather large, with standard deviation of growth of 9.82%

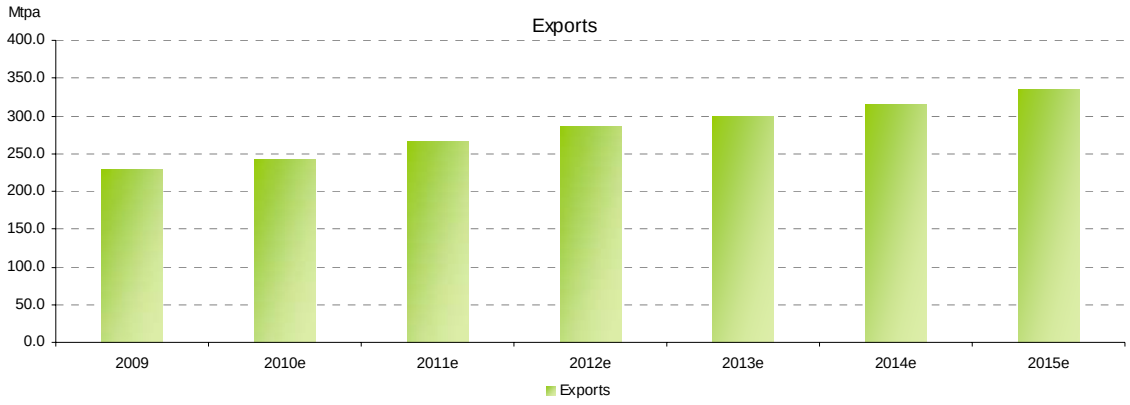
We assume that the growth rate will decrease in the future. Also including information about the expansion programs for the largest companies, we expect the following export volumes for Indonesia in the next five years.

**Figure 103: Coal exports – Indonesia (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Exports** | 230.0 | 242.7 | 265.7 | 287.0 | 298.9 | 315.6 | 335.9 |
| - growth | | 5.5 % | 9.5 % | 8.0 % | 4.1 % | 5.6 % | 6.4 % |

*Source: DnB NOR Markets*

**Figure 104: Coal export capacity and volumes – Indonesia (Mtpa)**



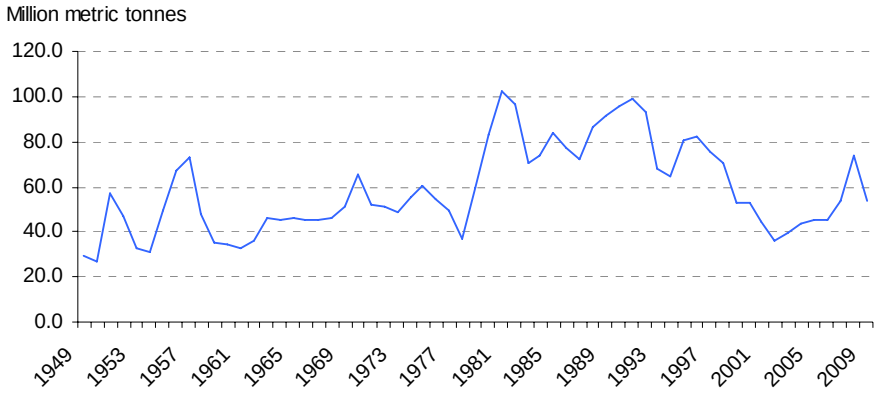

*Source: DnB NOR Markets*

These numbers are more uncertain than the majority of the other forecasts made in this report. In the aggregate numbers for global coal export capacity we use the same numbers for weighted and year-end capacity, as for exports.

## The U.S.

With the world's largest proven reserves, of 238.3 billion tonnes (as at the end of 2008), the U.S. controls about 29% of the world's coal. As described earlier, the U.S. is also a major producer and consumer of coal. Measured in million tonnes of oil equivalent, the country produced and consumed 18.0% and 17.1% of the world total (in 2008), respectively. About 90% of the coal mined in the U.S. is used for domestic power generation, and these power plants supplied the country with about 45% of its energy need in 2009.

**Figure 105: U.S. historical coal exports**




*Source: U.S. Energy Information Administration*

Compared to its total production and reserves, the coal volumes exported from the U.S. are rather low. In terms of absolute volumes, they are worth including. After exporting high volumes in the 1980s and 1990s, the export decreased in the late 90s. However, export volumes have grown again in recent years, and reached 74 Mt in 2008. Due to the economic crash, a strong decrease was experienced in 2009, when the U.S. exported approximately 53.6 Mt of coal. About 30-45% of the coal is shipped to Europe and 25-40% is shipped to Canada. Brazil also imports U.S. coal.

The majority of U.S. coal ports are located on the east coast, and by the Gulf of Mexico. Several coal terminals are found by the cities of Norfolk and Newport News in Virginia. These include Lamberts Point, Pier IX and the Dominion Terminal. In Maryland, the CNX Marine Terminal is the major coal terminal. In the south, important coal exporting terminals include the U.S. United Bulk Terminal in Davant, Louisiana and the McDuffie terminal in Mobile, Alabama. The largest U.S. Coal Ports are listed below.

**Figure 106: U.S. coal terminals**

| Port | Location | Capacity (million metric tonnes/year) |
|---|---|---|
| Lamberts Point | Norfolk, Virginia | 43.5 |
| U.S. United Bulk Terminal * | Davant, Louisiana | 22.7 |
| Dominion Terminal Associates | Newport News, Virginia | 20.0 |
| McDuffie Terminal | Mobile, Alabama | 20.0 |
| CNX Marine Terminal | Baltimore, Maryland | 10.9 |
| Pier IX | Newport News, Virginia | 10.9 |
| International Marine Terminal * | Myrtle grove, Louisiana | 5.4 |
| Chesapeake Bay Piers * | Baltimore, Maryland | 3.6 |
| IC Railmarine Terminal | Convent, Louisiana | 3.6 |
| *Capacity has not been confirmed by operating company | | 140.6 |

*Source: Reuters, DnB NOR Markets*

Compared to many other ports and companies, U.S. companies are generally reluctant to share information about their forecasted coal export volumes and projects that will increase capacity. Hence, like with

Indonesia, we have chosen to forecast the export volumes for the country as a whole, rather than on a port-by-port basis.

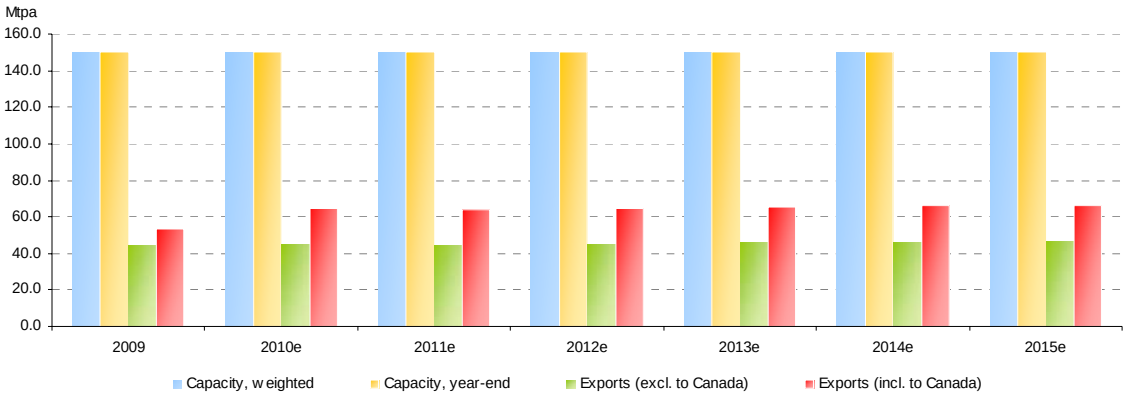
Based on the capacities from figure 106, we expect the export capacity of the country to be roughly 150 Mtpa. There are currently no large ongoing expansion projects to increase port capacity, and we therefore expect the capacity to remain at today's levels. There has been much talk about constructing coal exports facilities on the West coast of the U.S., in order to facilitate exports to the Asian markets. However, this is a long process and if a project is started, it will take many years to get the approvals needed and to construct the port. Hence, this is out of the time scope of this study. Currently, the export to the Asian market goes through the Westshore and Ridley terminals in Canada. The statistics are therefore somewhat biased, as this is reported as export to Canada.

**Figure 107: Coal export capacity and volumes – The U.S. (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 |
| - growth | | 0.0 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Capacity, year-end** | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 |
| - growth | | 0.0 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Exports (excl. to Canada)** | 44.0 | 45.2 | 44.5 | 45.1 | 45.7 | 46.2 | 46.5 |
| - growth | | 2.6 % | -1.6 % | 1.6 % | 1.3 % | 1.0 % | 0.7 % |
| **Exports (incl. to Canada)** | 53.6 | 64.5 | 63.5 | 64.5 | 65.3 | 66.0 | 66.4 |
| - growth | | 20.3 % | -1.6 % | 1.6 % | 1.3 % | 1.0 % | 0.7 % |

*Source: U.S. Energy Information Administration, DnB NOR Markets*

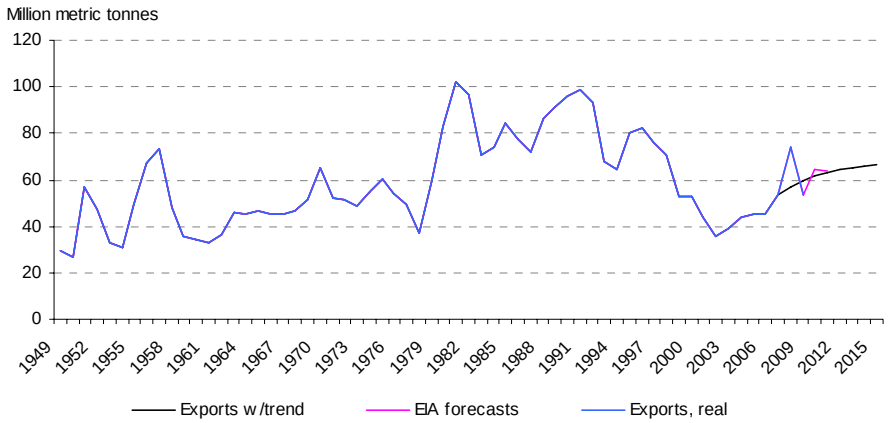
**Figure 108: Coal export capacity and volumes – The U.S. (Mtpa)**




*Source: U.S. Energy Information Administration, DnB NOR Markets*

According to sources in the U.S. Energy Information Administration, it is extremely hard to forecast future U.S. export volumes for the next years. However, an increase compared to 2009 is quite obvious this year, and we follow their guidance of 64.5 Mt and 63.5 Mt for 2010 and 2011, respectively. For the next years, we expect to see a continuation of the trend seen in recent years, but we expect the growth rate to decrease.

**Figure 109: U.S. historical coal exports plus forecasts**



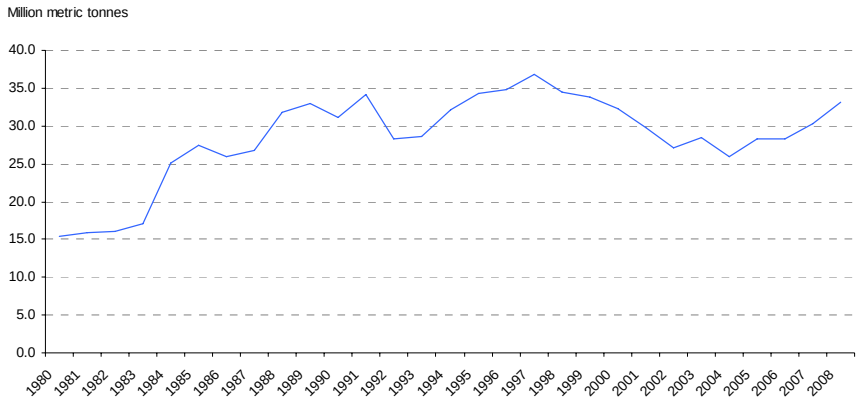

*Source: U.S. Energy Information Administration, DnB NOR Markets*

In the aggregate export volumes, we have excluded 30%, which we assume will be exported to Canada. The reason for doing so is that these exports generate little tonnage demand in the international shipping market.

# Canada

At the end of 2008, Canada had known coal reserves of 6,578 Mt. According to the U.S. Energy Information Administration, the country exported about 33.1 of coal Mt the same year. From the figure below, we see that export volumes have fluctuated around 30 Mtpa during the last two decades.

**Figure 110: Historical Canadian coal exports**




*Source: U.S. Energy Information Administration*

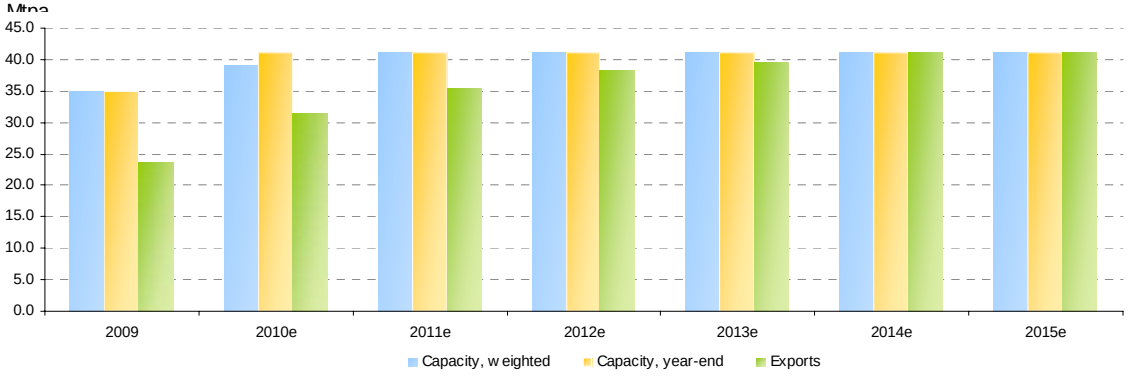
For the next years, we expect to see an increase in exported volumes, driven by an expansion at the Westshore Terminals, as well as better utilization of the current facilities at the Ridley Terminal.

**Figure 111: Coal export capacity and volumes – Canada (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 35.0 | 39.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| - growth | | 11.4 % | 5.1 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Capacity, year-end** | 35.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| - growth | | 17.1 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % | 0.0 % |
| **Exports** | 23.5 | 31.5 | 35.4 | 38.3 | 39.6 | 41.0 | 41.0 |
| - growth | | 34.1 % | 12.3 % | 8.1 % | 3.6 % | 3.5 % | 0.0 % |

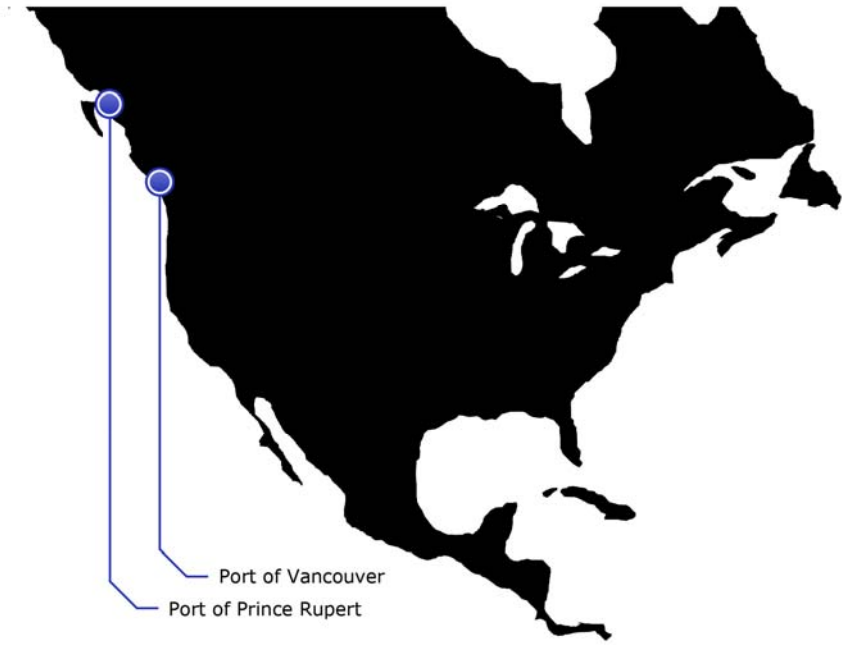
*Source: DnB NOR Markets*

**Figure 112: Coal export capacity and volumes – Canada (Mtpa)**




*Source: DnB NOR Markets*

**Figure 113: Canadian coal ports**




*Source: DnB NOR Markets*

### Westshore Terminals – Port Metro Vancouver

The Westshore Terminals is located at Roberts Bank, 32 kilometres south of Vancouver. It is the largest coal terminal in Canada, and exported about 20 Mt in 2009. The terminal recently expanded, from the previous capacity of 23 Mtpa to 29 Mtpa. The Westshore Terminals have expressed a target throughput of 22 Mt this year. However, in the first quarter, they exported at a rate of 25 Mtpa, which they hope will continue.

Sources at the port have informed us that they expect the upper limits of the new capacity to be tested. Hence, we believe that volumes will approach 30 Mtpa during the next years.

**Figure 114: Forecasts – Westshore Terminals**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 23.0 | 27.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| Capacity, year-end | 23.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| Exports | 20.0 | 25.0 | 27.5 | 29.0 | 29.0 | 29.0 | 29.0 |

*Source: Westshore Terminals, DnB NOR Markets*

### Ridley Terminals – Port of Prince Rupert

The Port of Prince Rupert is located close to the city of Prince Rupert on the west coast of Canada, approximately 750 kilometres to the north-west of Vancouver. Although its capacity is 12 Mtpa, it exported only 4.2 Mt of coal in 2009. However, for 2010 we believe exports to be in the range of 6.5-7 Mt. Furthermore, the port expects to reach 12 Mtpa of coal exports within the next 3-5 years. We forecast a gradual increase up to this point.

**Figure 115: Forecasts – Ridley Terminals**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Capacity, year-end | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Exports | 3.5 | 6.5 | 7.9 | 9.3 | 10.6 | 12.0 | 12.0 |

*Source: Ridley Terminals, DnB NOR Markets*

When the terminal was constructed, the port laid the foundation for infrastructure to support a 12 Mt expansion. Hence, the port could eventually double its capacity. Such an expansion will take 3-5 years, and will require the construction of new berth. However, there are currently no specific plans about doing this, and such a project is therefore not included in our forecasts.

# Europe (including Russia)

Except for Russia, there are no countries in Europe whose coal production is highly in excess of consumption. The result is lower coal exports. Furthermore, due to the geography of the continent, the cargoes between countries can also be transported using land-based transportation, which further decreases the demand for tonnage.

**Figure 116: Top 10 European coal producing countries, 2008 (Million metric tonnes)**

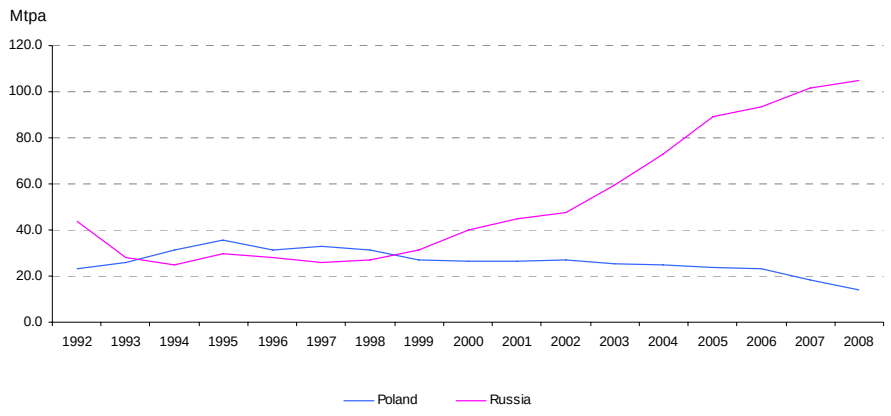
| Country | Production | Consumption | Exports |
|---|---|---|---|
| Russian Federation | 323.1 | 244.7 | 104.7 |
| Germany | 194.5 | 244.8 | 0.7 |
| Poland | 143.2 | 135.5 | 13.8 |
| Turkey | 75.8 | 95.5 | 0.0 |
| Greece | 65.7 | 66.2 | 0.0 |
| Czech Republic | 60.2 | 55.7 | 8.4 |
| Ukraine | 59.6 | 66.6 | 4.8 |
| Serbia | 36.0 | 37.2 | 0.1 |
| Romania | 34.7 | 40.8 | 0.0 |
| Bulgaria | 28.8 | 33.9 | 0.0 |

*Source: U.S. Energy Information Administration*

There are two main areas for Europe and Russia in which coal exporting ports are located. This is in the East Europe, including ports in Latvia, Estonia, Russia, and in the eastern Russia. The ports in East Europe mainly export coal from Russia to other European countries. On the Russian east coast, coal is transported to the other Asian countries, such as Japan, Korea and China. Certain ports by the black sea also export coal. However, we have not included these in this report, due to the relatively low volumes and difficulties in getting accurate information.

Finally, there are also coal ports in Poland. The country has traditionally exported coal, but export volumes have decreased in recent years.

**Figure 117: Historical coal exports: Poland and Russia**




*Source: U.S. Energy Information Administration*

Russia has the second largest coal reserves in the world, after the United States. At the end of 2008, the country had 157 billion tonnes of proven resource, which constitute 19% of the world total. Approximately two thirds of the coal is sub-bituminous or lignite, while about one third is anthracite and bituminous. In terms of production, the country produced about 323 Mt in 2008, according to the U.S. Energy Information Agency. The majority of the Russian coal comes from seven basins; three are located to the west of

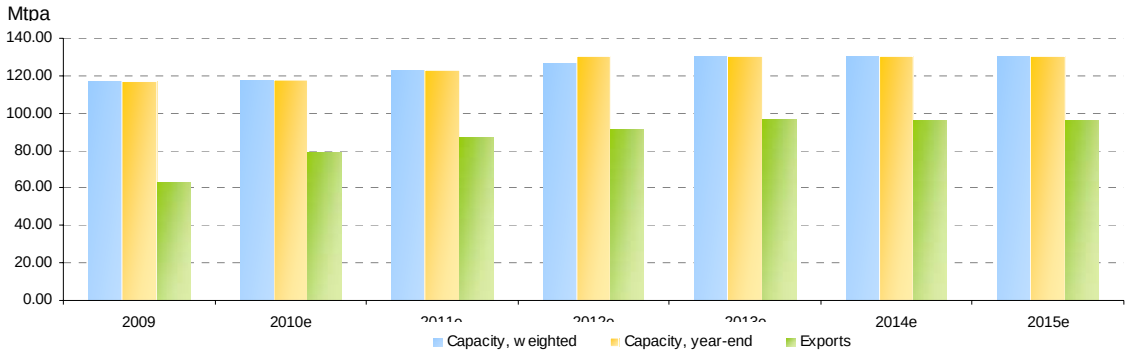
the Ural Mountains, in the European part of the country. The remaining four are located in the eastern part of the country, in the Siberian Region.

**Figure 118: Coal export capacity and volumes – Europe (including Russia)**
**(Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 117.0 | 117.9 | 123.0 | 126.8 | 130.5 | 130.5 | 130.5 |
| - growth | | 0.8 % | 4.3 % | 3.0 % | 3.0 % | 0.0 % | 0.0 % |
| **Capacity, year-end** | 117.0 | 117.9 | 123.0 | 130.5 | 130.5 | 130.5 | 130.5 |
| - growth | | 0.8 % | 4.3 % | 6.1 % | 0.0 % | 0.0 % | 0.0 % |
| **Exports** | 63.4 | 79.1 | 87.0 | 91.4 | 96.2 | 96.2 | 96.4 |
| - growth | | 24.7 % | 10.0 % | 5.1 % | 5.2 % | 0.0 % | 0.2 % |

*Source: DnB NOR Markets*

**Figure 119: Coal export capacity and volumes – Europe (including Russia)**




*Source: DnB NOR Markets*

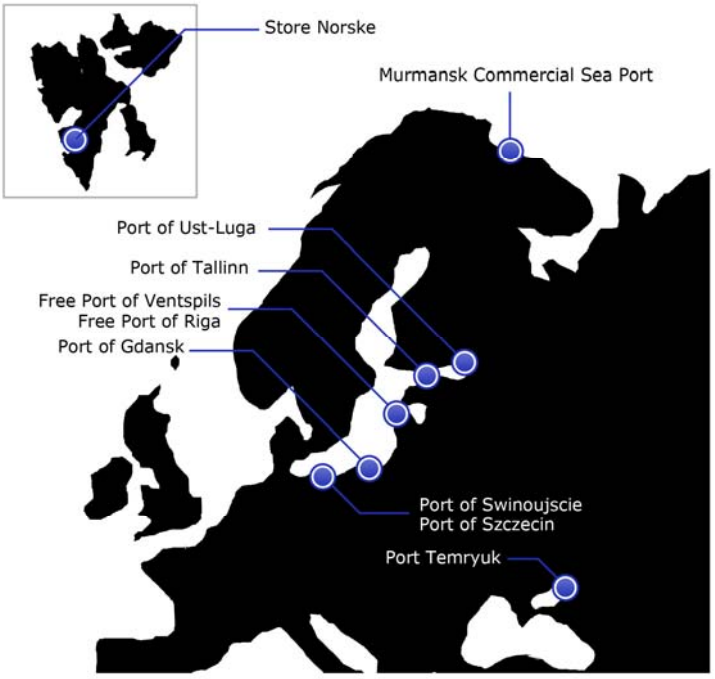
For the next five years, we do not expect to see a very large increase in capacity. At many of the ports included in this study, there is excess capacity. In contrast, we expect export volumes to increase by 52% within the next five years, which will lead to a higher utilization of the current capacity. About two thirds of the volume increase is expected to come at the ports by the pacific coast of Russia.

Compared to the coal ports in Australia, South Africa and some in Indonesia, the majority of the terminals in the Europe and Russia are small, with the majority having capacities between 5-15 Mtpa. The ports covered in this report are:

**Europe**

- Port of Szczecin
- Port of Swinoujscie
- Port of Gdansk
- Free Port of Ventspils
- Free Port of Riga
- Port of Tallinn
- Port of Ust-Luga
- Port Temryuk
- Store Norske, Svalbard
- Murmansk Commercial Seaport

**Figure 120: European coal ports**

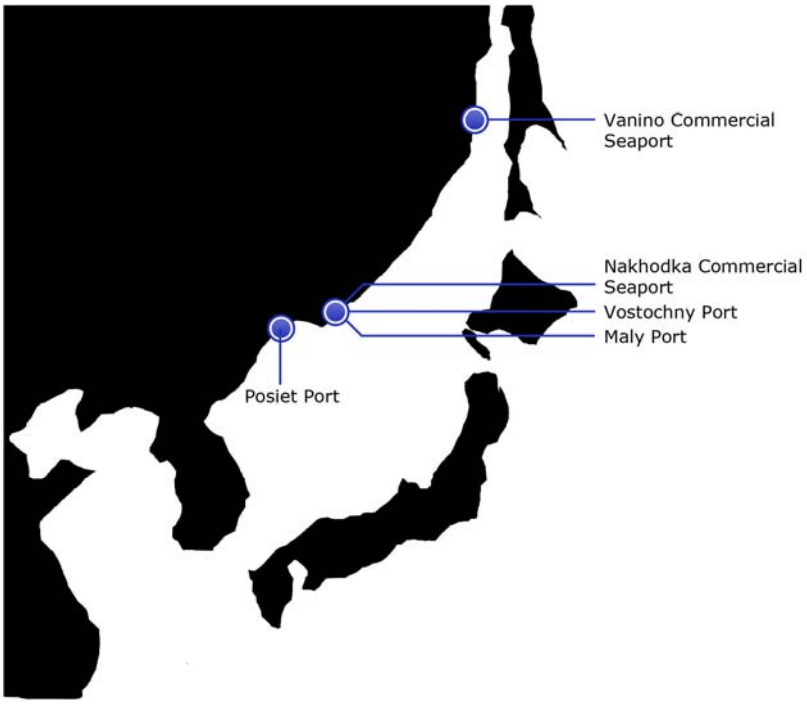



*Source: DnB NOR Markets*

**Asia (the Pacific coast of Russia)**

- Nakhodka Commercial Sea Port
- Vostochny Port
- Maly Port
- Vanino Commercial Sea Port
- Port Posiet

**Figure 121: East Russian coal port**




*Source: DnB NOR Markets*

### Port of Szczecin and Port of Swinoujscie

The ports of Szczecin and Swinoujscie are two of three Polish ports covered in this report. Both ports are located rather close to each other in the west of Poland, only a few kilometres from the border of Germany. The terminals at the ports have a total capacity of 10 Mtpa. However, while they used to only export coal, the ports of Szczecin and Swinoujscie now handle both imports and exports, and it is currently hard to predict the volumes from year to year. Two years ago, the ports were net importers of coal. Last year, they were net exporters, and this is expected to continue this year.

We believe that the port will export approximately 2.5 Mt of coal this year, somewhat higher than in 2009. Port authorities have informed us that they expect imports to take over for exports within the next years. Hence, this is reflected in our predictions.

**Figure 122: Forecasts – Port of Szczecin and Port of Swinoujscie (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Capacity, year-end | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Exports | 2.0 | 2.5 | 1.8 | 1.3 | 0.5 | 0.0 | 0.0 |

*Source: Szczecin and Swinoujscie Port Authority, DnB NOR Markets*

### Port of Gdansk

The Port of Gdansk also has a capacity of about 10 Mtpa. In 2009, the port exported 1.5 Mt of coal, but the exports are expected to increase to about 3 Mt this year. We believe that they will remain around those levels.

The Belgium company SEA-invest will develop a new coal terminal at the port. However, we do not have much information about the planned specifications at this time.

**Figure 123: Forecasts – Port of Gdansk**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Capacity, year-end | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Exports | 1.5 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

*Source: Gdansk Port Authority, DnB NOR Markets*

### Free Port of Ventspils

The Free Port of Ventspils is located in Latvia. The port has two coal terminals. The Ventspils Commercial Port terminal has a potential capacity of 5.5 Mtpa. Due to the adverse economic conditions, they exported 4 Mt last year. The port authorities hope to reach the full capacity within the next year.

The second terminal is the Baltic Coal Terminal, which has a capacity of 6 Mtpa. It commenced operations in 2009 and exported 2.7 Mt of coal during the year. The operating company expects to export 4.2 Mt in 2010 and to stay at a rate of 6 Mtpa for the next years.

**Figure 124: Forecasts – Free Port of Ventspils**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| Capacity, year-end | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| Exports | 6.7 | 8.5 | 10.5 | 10.8 | 11.0 | 11.0 | 11.0 |

*Source: Free Port of Ventspils Authority*

The vast majority of the coal exported from Ventspils comes from Russian coal mines.

### Free Port of Riga

The Free Port of Riga is located in the capital of Latvia. In 2008 and 2009, the port handled 13.8 and 13.9 Mt of coal, respectively. It recently announced that it will move the coal terminal from downtown Riga to the peninsula Krievu Sala, and that the new terminal will get a capacity of 12 Mtpa. However, as we do not have accurate information about the port capacity, or its proportion of exports versus imports, we have excluded it from our aggregated numbers.

### Port of Tallinn

The port of Tallinn, located in the capital of Estonia, has several terminals. The largest of these is the Muuga Harbour. This opened in 2005, and has a capacity of 5 Mtpa. It can potentially be expanded to 8 Mtpa, but no specific expansion plans have been announced. In its first year of operations, 4 Mt were exported through Muuga Harbour. However, coal exports were reduced to close to zero, and the terminal was almost empty for a few years. Currently, exports have picked up again and 3 Mt were shipped from the terminal last year.

The other terminals have a combined capacity of about 3 Mtpa. These are run by Russian companies, and we believe that about 1.5-2 Mt were exported through these in 2009.

**Figure 125: Forecasts – Port of Tallinn (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Capacity, year-end | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Exports | 4.8 | 5.5 | 5.7 | 6.0 | 6.5 | 6.6 | 6.8 |

*Source: Port of Tallinn*

For the next years, we believe to see somewhat increased exports at the Port of Tallinn. However, we do not believe that the terminals will export at full capacity.

### Store Norske

Store Norske is a Norwegian mining company with mining operations at Svalbard. After producing at rates of up to 4 Mtpa in previous years, its output was at 2.6 Mt in 2009. However, the mine has limited reserves and this will be reflected in the future production volumes. For 2010, we expect an output of 2.1 Mt, with annual production of 1.8 Mtpa for the subsequent 4 years.

**Figure 126: Forecasts – Store Norske (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted * | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Capacity, year-end * | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Exports | 2.6 | 2.1 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |

** The capacity of 4 Mtpa is not confirmed by the company, but reflects approximately the highest volumes that have been shipped from the operations previously*

*Source: Store Norske, DnB NOR Markets*

### Port of Ust-Luga

The Port of Ust-Luga is a relatively young port, inaugurated by the former Russian President Vladimir Putin in 2001. Yet, the port is growing rapidly and will be highly important for Russia in the years to come. Not only do its facilities include a coal terminal: it recently completed a terminal for car imports, and will within the next years also handle containers, fertilizer and grain, as well as up to one fifth of Russia's oil products exports.

The coal terminal currently has a capacity of 8 Mtpa. In 2009, coal exports amounted to 7.1 Mt, and we expect volumes to reach 8 Mt this year. The owner of the terminal, Kuzbassrazrezugol, is expanding the terminal and its second stage is nearly completed. This will increase the capacity to 12 Mtpa. The company also have enough land to construct a second terminal, but no such plans have been announced

**Figure 127: Forecasts – Port of Ust-Luga**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 8.0 | 8.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Capacity, year-end | 8.0 | 8.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| Exports | 7.1 | 8.0 | 11.0 | 12.0 | 12.0 | 12.0 | 12.0 |

*Source: DnB NOR Markets*

### Port Temryuk

Port Temryuk is owned by Mechel, and is located by Azov, in the eastern end of the Black Sea. The company has informed us that its capacity is 2.5 Mtpa and that it is currently exporting close to this rate. Expansion plans have been discussed but nothing has been decided yet. We therefore believe that exports will continue at the same rate. This notion is based on Mechel informing us that they currently have more coal than they manage to export.

**Figure 128: Forecasts – Port Temryuk (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Capacity, year-end | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Exports | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |

*Source: Mechel, DnB NOR Market*

### Murmansk Commercial Seaport

The Murmansk Commercial Seaport is located in the north-western part of Russia. The port exported 12.1 Mt of coal in 2009, and the volumes are expected to be in the range of 12-12.5 Mt for 2010. However, the railroad is the bottleneck and with the current high demand from miners, the port could have exported another 6 Mtpa if the railroad had supported it.

There are plans to expand the port by constructing a new terminal. This would increase the capacity of the port by 12-18 Mtpa and the terminal could be completed by the 2015. Hence, the total port capacity could potentially increase to 30 Mtpa. However, we do not have enough information to include this project in our forecasts.

**Figure 129: Forecasts – Murmansk Commercial Seaport (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Capacity, year-end | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Exports | 12.1 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |

*Source: DnB NOR Markets*

### Vostochny Port

The Vostochny Port is located on the east coast of Russia, approximately 100 km to the south-west of Vladivostok. In 2009, 12.3 Mt of coal was exported through the port. There are two terminals: one multi-purpose terminal with capacity to export up to 3.5 Mtpa of bulk cargoes and a dedicated coal terminal, with a capacity of 12.5 Mtpa. The volumes for the first five months have been 5% higher than those for the same period last year, and we believe that its total coal exports will increase by more than this, YoY.

Although the port authorities informed us that there are expansion projects plans under development, they have not given any details about these. Hence, we have not included any expansion plans in our forecasts. However, we have been informed that the port authorities believe that they will reach 17 Mtpa. We believe that the increase will come somewhat gradual and that this target will be reached in 2012.

**Figure 130: Forecasts – Vostochny Port (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| Capacity, year-end | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| Exports | 12.3 | 16.5 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |

*Source: Vostochny Port, DnB NOR Markets*

### Nakhodka Commercial Seaport

Nakhodka Commercial Seaport is located next close to Vostochny Port, on the Russian east coast. The port is owned by the company Evraz, who use it to export coal to the Asian market. The maximum capacity of the port is 10.5 Mtpa, but we have been informed that the company expect to ship about 2 Mt from the port in 2010. We believe that Russian coal exports will increase, but we do not have accurate information about the port. We therefore take a prudent view and expect volumes to remain at the current levels.

### Maly Port

Maly Port is also located close to Vostochny, and has a capacity of 1.5 Mtpa. It is privately owned by the Siberian Coal Energy Company (SUEK), who ships about 1 Mt of coal from the port each year.

### Vanino Commercial Sea Port

Vanino Commercial Sea Port is the second largest Russian coal port, in terms of volumes, and is located in the Khabarovsk region, approximately 925 km to the north-east of Vladivostok.

#### JSC Port Vanino

There are currently two coal terminals at the Vanino port. One is operated by the stevedoring company JSC "Port Vanino". The current capacity of the terminal is 1.5 Mtpa, but as for many other terminals, export volumes were subdued in 2009. There are no ongoing projects to expand the terminal, but they plan to increase exports towards the full capacity.

#### SUEK

The second terminal is owned by the Siberian Coal Energy Company (SUEK), which is the largest thermal coal producer in Russia. The capacity of the terminal is 12 Mtpa, and we believe that export volumes will gradually increase towards this level over the next few years.

#### Mechel

A third terminal is under construction close to the Vanino port, from which the Russian mining company Mechel will export its coal. The terminal will have an initial capacity of 5 Mtpa, and is scheduled to commence operations in the end of 2012. The company has mentioned that it will expand this further over time, and is aiming to reach a capacity of 20 Mtpa within 2020. However, there are no specific plans published for this subsequent expansion, and it is therefore not included in the aggregated forecasts. Our aggregated forecasts for all terminals at the port are shown in the table below.

#### Problems with unloading

Due to low winter temperatures, exports at Vanino were severely delayed in November 2009. In the winter, coal with high moisture levels freezes on the way to the port. As coal producers were economising on techniques to defrost coal, the defrosting took extra time. Hence, the terminal operators unloaded less than 70% of their planned volumes, and more than 700 rail cars were at one point backed up at the port.

**Figure 131: Forecasts – Vanino Commercial Sea Port (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 13.5 | 13.5 | 13.5 | 14.8 | 18.5 | 18.5 | 18.5 |
| Capacity, year-end | 13.5 | 13.5 | 13.5 | 18.5 | 18.5 | 18.5 | 18.5 |
| Exports | 6.4 | 10.4 | 12.5 | 13.4 | 18.1 | 18.5 | 18.5 |

*Source: Vanino Commercial Sea Port, SUEK AG, Mechel, DnB NOR Markets*

### Port Posiet

Port Posiet is located in the southern part of the Russian pacific coastline, approximately 100 kilometres to the south-west of Vladivostok, and close to the North Korean border. The port is owned by Mechel, who use it to export coal to its Asian customers. In 2009, about 2.5 Mt of coal was exported here. This is below the port capacity, which is 3 Mtpa.

The company expects the capacity to increase to about 3.5 Mtpa this year, 4.5 Mtpa next year. When the capacity increase is completed, by the end of 2011, the port capacity will be about 7-9 Mtpa. We regard it as likely that the export volumes will follow the capacity increase quite closely. A

company representative informed us that the company currently has more coal than it manages to export and that there will be almost no ramp up time for the new capacity.

**Figure 132: Forecasts – Port Posiet (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 3.5 | 4.4 | 5.5 | 8.0 | 8.0 | 8.0 | 8.0 |
| Capacity, year-end | 3.5 | 4.4 | 5.5 | 8.0 | 8.0 | 8.0 | 8.0 |
| Exports | 2.5 | 4.4 | 5.5 | 8.0 | 8.0 | 8.0 | 8.0 |

*Source: Mechel, DnB NOR Markets*

# Colombia

Colombia is the world's fifth largest coal exporter. The country is mainly powered by hydro-electric power plants and it therefore sells a large amount of its coal abroad. In 2008, the country exported 65.8 Mt of coal, which represents 89.5% of its total coal production of 73.5 Mt. The same year, coal constituted 58% of the cargo that was shipped through Colombian ports and the income from coal trade represented about 25% of the country's export earnings. Hence, coal is a very important resource for the country.

According to the World Energy Council, Colombian coal reserves (end of 2008) are 6.8 billion tonnes. About 94% of this is higher rank coal (anthracite and bituminous), while 6% is of lower rank (sub-bituminous and lignite). However, due to low investments in explorations of resources, it is believed that substantial undiscovered volumes exist.

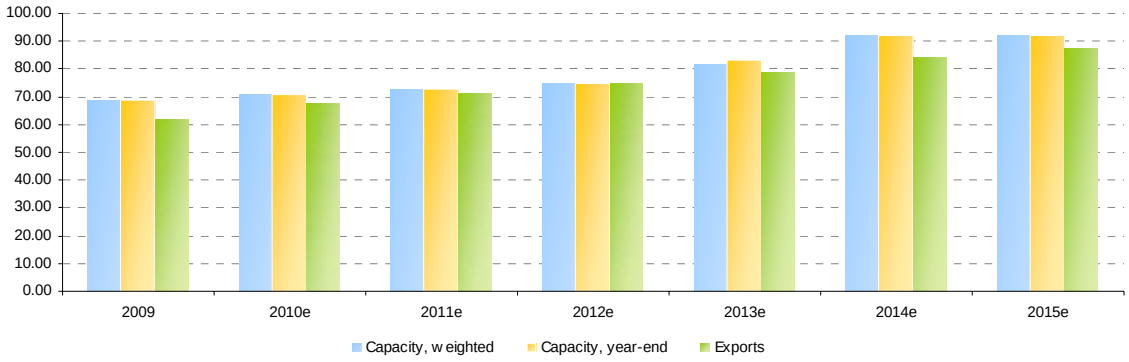
With all its major ports located at the Caribbean coast, the majority of Colombian coal is exported to North America or Europe. According to the U.S. Energy Information Administration, the U.S. imported 17.8 Mt of Colombian coal in 2009, constituting 78.6% of total U.S. coal imports. Many large international companies are involved in the Colombian coal industry, and several of the large ports are owned by these companies. These companies include BHP Billiton, Xstrata, Glencore and Drummond.

**Figure 133: Coal export capacity and volumes – Colombia (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 69.0 | 71.0 | 73.0 | 75.0 | 81.7 | 92.2 | 92.2 |
| - growth | | 2.9 % | 2.8 % | 2.7 % | 8.9 % | 12.9 % | 0.0 % |
| **Capacity, year-end** | 69.0 | 71.0 | 73.0 | 75.0 | 83.2 | 92.2 | 92.2 |
| - growth | | 2.9 % | 2.8 % | 2.7 % | 10.9 % | 10.8 % | 0.0 % |
| **Exports** | 61.9 | 67.6 | 71.4 | 74.6 | 78.7 | 84.3 | 87.9 |
| - growth | | 9.3 % | 5.5 % | 4.6 % | 5.5 % | 7.1 % | 4.3 % |

*Source: DnB NOR Markets*

**Figure 134: Coal export capacity and volumes – Colombia**



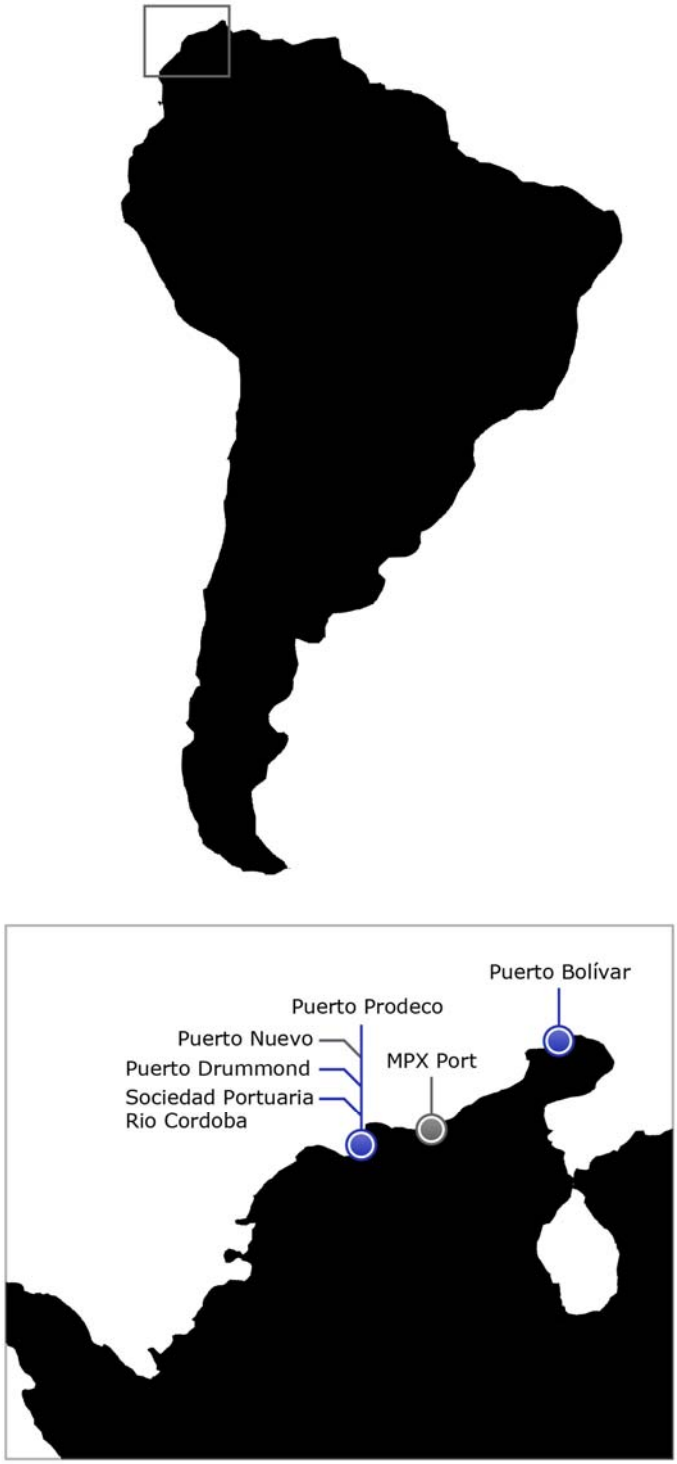

*Source: DnB NOR Markets*

Within the next five years, we expect the capacity and exports of the Colombian coal export ports to increase by an annual average of 4.9% and 6.0%, respectively. This comes from an expansion at Puerto Drummond in 2013, the new MPX port, as well as expanded volumes when Glencore starts operations at Puerto Nuevo.

The ports included in this report are:

- Puerto Bolívar
- Puerto Drummond
- Puerto Prodeco & Puerto Nuevo
- Sociedad Portuaria Rio Cordoba
- MPX Port

**Figure 135: Colombian coal ports**




*Source: DnB NOR Markets*

### Puerto Bolívar

Puerto Bolívar is the largest Colombian coal port. It belongs to Cerrejón Coal (owned by BHP Billiton, Xstrata and Anglo American), who runs an integrated operation, with mine, railroad and port.

From the Cerrejón open cut mines, which is the largest open pit mining operation in the world, about 30 Mt of coal is transported by the 150 kilometre private railroad to Puerto Bolívar annually. Both the coal deposits and the port is located the La Guajira region, in the north east of Colombia.

In 2009, 30.3 Mt of coal were exported through Puerto Bolívar. We expect to see a small increase this year, to about 31 Mt. Within the next few years, the export volumes are expected to reach the port capacity, which was recently upgraded to 32 Mtpa. A feasibility study to expand the operations to 40 Mtpa was completed in January 2010, but no specific timeline for such an expansion has been released.

### Puerto Drummond

Puerto Drummond is a deep-water port located near the city of Santa Marta in the Magdalena region in north Colombia. The port is wholly-owned by the American mining company Drummond. From producing about 1 Mt in 1995, they have grown their operations and in 2009, the company exported about 20 Mt coal through the port.

The coal is mined from the Drummond mine, near La Loma. It is thereafter transported approximately 190 km by the Colombian National Railroad System (Fenoco railroad concession held with Glencore, Drummond, Coalcorp and Vale) and the National Highway, to the port.

Puerto Drummond currently has a capacity of 21 Mtpa. Hence, we expect the export volumes to remain between 20-21 Mt for the next years. However, an increase is expected after 2013, when the port is expanded to 27 Mtpa. Although the export will lag somewhat behind, we believe that they will increase by 2 Mtpa in both 2014 and 2015.

Drummond recently announced that it is considering finding a partner to develop one of its mining projects, the El Descanso mine, from 3 Mtpa to 25 Mtpa. There are also speculations on whether or not the company will sell its entire Colombian division to another mining company. Developing the mine will involve increasing capacity on infrastructure, including the construction of a new shiploader in the town of Ciénaga. However, this project is not included in our forecasts, due to lack of accurate information.

### Puerto Prodeco

After selling its Prodeco operations to Xstrata in 2009, the Swiss-based commodities trader Glencore announced in March 2010 that it would exercise an option to buy it back. The operations include the wholly-owned port Puerto Prodeco. This is located in the city of Santa Marta, and 10.5 Mt of coal were exported through the port last year.

Prodeco is currently involved in the Puerto Nuevo project: A project to construct a new multi-user port facility at Ciénaga, which is located to the south of Santa Marta. Hence, we expect to see an increase in Prodeco production and exports. In the 2009 annual report, Xstrata informed that permits had been secured for an expansion of the coal mining operations from 10 to 17 Mtpa by 2013. It also informed that the first phase of Puerto Nuevo, which would give a capacity of 23 Mtpa, was expected to be completed by 2013. Hence, we believe that we will see approximately doubled exports from Prodeco within the next five years.

### Sociedad Portuaria Rio Cordoba

Sociedad Portuaria Rio Cordoba is a private port, owned by the Brazilian mining company Vale. The port is located in Ciénaga, in the Magdalena region. From this location, Vale exports the coal from its El Hatillo operation, located 210 km to the southeast of Santa Marta.

Compared to the other Colombian ports, Sociedad Portuaria Rio Cordoba is a relatively small one, with an annual capacity of 4 Mtpa. While 1.14 Mt were exported last year, we expect the volumes to increase to 3 Mt for 2010 and to further reach the full capacity next year.

The coal to Puerto Drummond, Puerto Prodeco and Sociedad Portuaria Rio Cordoba is transported by the Fenoco railroad, for which Drummond, Glencore, Vale and Coalcorp hold a concession.

### MPX Port

The Brazilian mining company MPX is in the process of developing a new port at the northern coast of Colombia, close to the town of Dibulla. From this port, it will export coal from the mining area in the La Guajira region, where it has concession for coal exploration in 29 areas.

MPX hopes to start construction of the port in the first quarter of 2011, and to start operations of the first phase, with a capacity of 10 Mtpa, in the last quarter of 2013. For this phase, MPX plans to transport the coal by trucks. For the second phase of the project, which has a capacity of 15 Mtpa for the port, the company will consider constructing a railroad that can transport these volumes. However, if constructed, it will not be ready until 2016. In the third phase of the project, MPX plans to expand the infrastructure to 20 Mtpa, which is what the company aims at producing by 2021.

### Other ports

In addition to the ports described above, there are several other coal ports in Colombia. Due to low volumes and difficulties in getting accurate information, these ports have not been included in this report or in the aggregate numbers.

**Figure 136: Smaller Colombian coal ports**

| Port name | Region | Volumes 2008 |
|---|---|---|
| Carbosan | Santa Marta | 4,346,367 |
| Barranquilla | Barranquilla | 503,550 |
| Sociedade Portuaria del Norte | Barranquilla | 412,012 |
| Colclinker | Cartagena | 660,541 |
| Mamonal | Cartagena | 498,640 |
| Muelles el Bosque | Cartagena | 45,231 |
| Muelle 13 | Buenaventura | 47,025 |
| Buenaventura | Buenaventura | 405,161 |

*Source: MMX*

# Africa

According to the World Energy Council, the proven coal reserves of Africa were 32 billion tonnes at the end of 2008, which is equal to 3.9% of the world total. The vast majority of this, 99.5%, is located in South Africa, in the Mpumalanga province. The South African reserves are all higher rank coal (bituminous and anthracite).

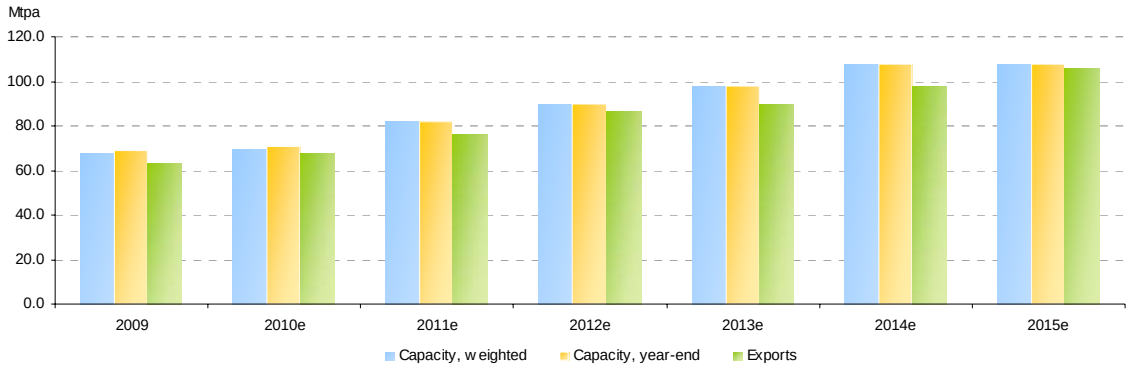
In terms of exports, the vast majority of African coal is transported through the Richards Bay Coal Terminal. Some volumes are also transported to, and shipped from, Maputo in Mozambique. Furthermore, the Brazilian mining company Vale is currently planning a coal mining project in Moatize in Mozambique. If the plan is followed, this project will lead to coal exports through the Port of Beira, and potentially through a new port in Nacala.

**Figure 137: Coal export capacity and volumes – Africa (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| **Capacity, weighted** | 68.0 | 69.7 | 82.0 | 89.8 | 98.0 | 108.0 | 108.0 |
| - growth | | 2.5 % | 17.7 % | 9.5 % | 9.2 % | 10.2 % | 0.0 % |
| **Capacity, year-end** | 69.0 | 71.0 | 82.0 | 89.8 | 98.0 | 108.0 | 108.0 |
| - growth | | 2.9 % | 15.5 % | 9.5 % | 9.2 % | 10.2 % | 0.0 % |
| **Exports** | 63.1 | 67.6 | 76.6 | 87.0 | 90.0 | 98.1 | 106.0 |
| - growth | | 7.2 % | 13.3 % | 13.6 % | 3.4 % | 9.1 % | 8.0 % |

*Source: DnB NOR Market*

**Figure 138: Coal export capacity and volumes – Africa**



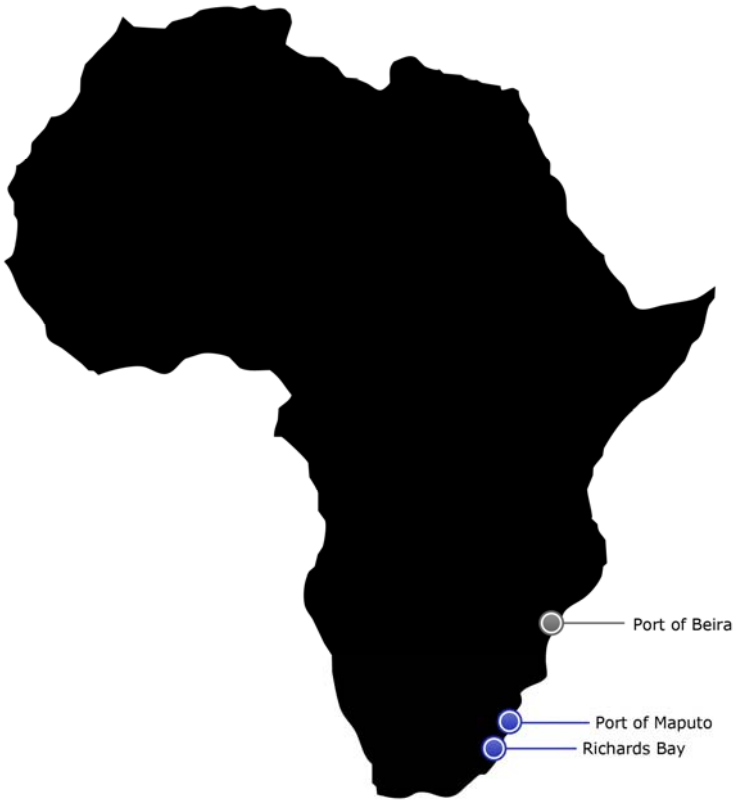

*Source: DnB NOR Markets*

We expect to see substantial increases in both capacity and coal export volumes for Africa for the next five years. This is based on our expectations of higher efficiency in the rail system connected to Richards Bay, increased capacity at the Matola Coal Terminal, as well as the ramp up of the Vale Moatize project.

There are three African coal ports included covered in this report:

- Richards Bay Coal Terminal
- Matola Coal Terminal
- Port of Beira

**Figure 139: African coal ports**




*Source: DnB NOR Markets*

### Richards Bay Coal Terminal

Richards Bay is located in the eastern part of South Africa, approximately 150 kilometres to the north-east of Durban. In terms of capacity, Richards Bay Coal Terminal comprises the world's third largest coal export facilities. When the "Phase V" expansion was completed in April 2010, its nameplate capacity increased from 76 Mtpa to 91 Mtpa.

However, export volumes are lagging behind. In 2009, 61.1 Mt of coal was exported through the terminal. The bottleneck is in this case the railway, which is not able to deliver at the capacity levels of the terminal. Additionally, there have been two strikes at the port this year, of which one affected export volumes somewhat.

With a current capacity of 65 Mtpa, we expect the railway to limit exports also in the next 2 years. However, there is an ongoing project to expand the rail capacity to the terminal. Sources at Richards Bay have informed us that within 2-3 years, the railroad capacity will increase to 81 Mtpa. Within further 4-5 years, its capacity is expected to be increased to 91 Mtpa.

Hence, as mentioned above, we expect limited export volumes for the next 2 years. Due to stockpiles, we do believe that there will be a high enough supply to increase export volumes above 65 Mtpa in 2011. As additional capacity is added to the railway, we believe that export volumes from the port will increase gradually over the next years.

**Figure 140: Forecasts – Richards Bay Coal Terminal**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 65.0 | 65.0 | 65.0 | 72.8 | 81.0 | 81.0 | 81.0 |
| Capacity, year-end | 65.0 | 65.0 | 65.0 | 72.8 | 81.0 | 81.0 | 81.0 |
| Exports | 61.1 | 65.0 | 67.0 | 70.0 | 73.0 | 76.0 | 79.0 |

*Source: Richards Bay Coal Terminal, DnB NOR Markets*

### Matola Coal Terminal

The Matola Coal Terminal is a part of the Port of Maputo, which is located in the capital of Mozambique. While current exported volumes are rather low, the port will most likely expand within the next five years.

In 2009, the capacity of the terminal was upgraded, from 2 Mtpa to 4 Mtpa. According to the terminal operator, Grindrod, 1.98 Mt of coal was exported from the terminal during the year.

Grindrod is planning to further increase the capacity of the terminal. In August 2010, it expects to complete a project that will take its capacity to 6 Mtpa. As some ramp-up is needed, a company representative has informed us that they expect to export 6 Mt of coal annually from 2012 onwards. The railway system has, however, been mentioned as a potential risk factor in the supply chain. There is also a feasibility study to expand the capacity further, from 6 Mtpa to 16 Mtpa. The study is scheduled to be done in November 2010. Grindrod hopes to be able to go ahead with this project. If so, construction is likely to start in the beginning of 2011, and is scheduled to take three years.

We believe to see export volumes gradually increasing, towards 6 Mt in 2012. Furthermore, we think it is likely that the additional 10 Mtpa will be constructed and commence operations in the first half of 2014. Hence, in our forecasts, we expect export volumes to approach 16 Mtpa in 2015. The infrastructure could be a risk factor in reaching these volumes.

**Figure 141: Forecasts – Matola Coal Terminal (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 3.0 | 4.7 | 6.0 | 6.0 | 6.0 | 16.0 | 16.0 |
| Capacity, year-end | 4.0 | 6.0 | 6.0 | 6.0 | 6.0 | 16.0 | 16.0 |
| Exports | 2.0 | 3.6 | 5.6 | 6.0 | 6.0 | 11.1 | 16.0 |

*Source: Grindrod, DnB NOR Markets*

### Port of Beira

The Brazilian mining company Vale have obtained licenses to construct a coal mine in Moatize in Mozambique. The start-up for the mine is scheduled for the first half of 2011, and it is planned to have a capacity of 11 Mtpa.

The coal from Moatize will be transported to Beira, in which the government is constructing a new maritime terminal. This is scheduled to be ready by 2012. In 2011, Vale is ramping up production at the mine and will only need capacity to export 4 Mtpa. This will be shipped from another port in the area. As the mine is planned to produce at full capacity in 2012, the new port will be ready to export these volumes.

Vale is also in the process of getting approvals and doing performance studies for a possible expansion of the project. If expanded, the company will consider building its own railroad to the city of Nacala, in the north of Mozambique, in which it will also construct a port to ship the coal.

However, due to the uncertainty regarding the second stage of the project, we have not included it in our forecasts.

**Figure 142: Forecasts – Port of Beira (Mtpa)**

| | 2009 | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|---|
| Capacity, weighted | 0.0 | 0.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| Capacity, year-end | 0.0 | 0.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| Exports | 0.0 | 0.0 | 4.0 | 11.0 | 11.0 | 11.0 | 11.0 |

*Source: Vale, DnB NOR Markets*

# Dry bulk shipping

As we have seen in the previous sections, worldwide iron ore and coal trade flows are set to increase substantially within the next five years. In this section, we analyse how this will affect the dry bulk shipping market.

### The fleets

The two fleets central here are the Capesize and Panamax bulker fleets, with Capesizes being the vessels with a capacity of more than 100,000 dwt and Panamaxes having capacities between 60,000 and 100,000 dwt. Traditionally, approximately 75%-80% of the Capesize fleet have been transporting iron ore, while the remaining 20-25% have been transporting coal. According to Clarksons, the vessels in the fleet have an average size of 179,000 dwt and an average age of 10.3 years.

In contrast, the Panamax fleet is used to transport a larger variety of commodities, with grains taking up a substantial part of the fleet capacity. We estimate that the 50-55% of the current fleet is transporting coal, while about 5% is transporting iron ore. However, the distribution is expected to change as coal volumes are growing rapidly while the volumes of other commodities, such as grains, grow at a lower pace. The Panamax fleet has an average size of about 75,000 dwt and an average age of 12.2 years.

**Figure 143: Fleet data – Capesize and Panamax**

| Current fleet | Capesize | Panamax |
|---|---|---|
| # of vessels | 1,067 | 1,692 |
| Tonnage (M Dwt) | 191.0 | 126.7 |
| Average size (Dwt) | 179,006 | 74,887 |
| Average age | 10.3 | 12.2 |

*Source: Clarksons*

### Adjustment of expected volumes

In the previous sections, expected iron ore and coal export volumes were presented. While these included the majority of large ports and port projects, the existence of many low-volume ports virtually makes it impossible to cover all volumes. For 2009, the ports included in this study accounted for about 94.8% of global seaborne iron ore trade, while the corresponding proportion for coal was 93.2%. We have expected these proportions to be constant in the next five-year period: Hence, we adjust our volumes, assuming that the real seaborne trade flows are somewhat higher than what we have found.

**Figure 144: Base case estimates – Additional iron ore exports (Mt)**

| Port capacity and volumes | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Additional exports | 94.0 | 73.0 | 132.1 | 165.6 | 255.4 | 168.3 |
| Adjusted additional exports | 100.9 | 78.3 | 141.8 | 177.8 | 274.2 | 180.7 |

*Source: DnB NOR Markets*

**Figure 145: Base case estimates – Additional coal exports (Mt)**

| Port capacity and volumes | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Additional exports | 81.4 | 91.6 | 80.1 | 48.9 | 76.8 | 74.1 |
| Adjusted additional exports | 85.9 | 96.7 | 84.5 | 51.6 | 81.1 | 78.2 |

*Source: DnB NOR Markets*

### The orderbook

Whether rates in the shipping industry increase or decrease is a question of supply and demand. The volumes in the tables on the previous page represent additional demand of fleet capacity, while fleet growth represents additional supply. In calculating the additional supply for vessels, we have used the Clarksons orderbook. As of August 2010, this counted 718 Capesize vessels with a total capacity of 139 million dwt, and 875 Panamax vessels with a total capacity of 70 million dwt.

However, several adjustments are made to the orderbook. As a measure of prudency, we remove 25% of the capacity in the orderbooks for both Capesizes and Panamaxes. This proportion represents vessels that we believe will be cancelled, as well as vessels that have already been delivered or cancelled, but are still registered in the orderbook. Furthermore, the volumes are adjusted for slippage. We assume that slippage will be 15% for Capesizes and 20% for Panamaxes. For comparison, slippage and cancellations for the overall dry bulk shipping orderbook was 42-43% in the first half of 2010. Capacity affected by slippage is assumed to be delayed by one year. Finally, we adjust the volumes in the orderbook by a proportion representing the percentage of the vessel capacity that can be utilized. For Capesizes, we believe that 90% of the capacity can be used to transport iron ore and coal. For Panamaxes, we believe that 93% of the vessel capacity can be utilized.

**Figure 146: Orderbook - Capesize**

| New capacity and scrapping - Capesize | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Tonnage remaining in Clarksons orderbook (M Dwt) | 30.5 | 54.8 | 38.1 | 13.4 | 2.3 | 0.0 |
| Cancellations and error in orderbook | 25 % | 25 % | 25 % | 25 % | 25 % | 25 % |
| "Real" orderbook (M Dwt) | 22.8 | 41.1 | 28.6 | 10.1 | 1.7 | 0.0 |
| Slippage percentage | 15 % | 15 % | 15 % | 15 % | 15 % | 15 % |
| Slippage (M Dwt) | 3.4 | 6.2 | 4.3 | 1.5 | 0.3 | 0.0 |
| Expected for delivery (M Dwt) | 19.4 | 38.4 | 30.5 | 12.8 | 3.0 | 0.3 |
| Tonnage already delivered in 2010 (M Dwt) | 20.8 | | | | | |
| Expected for delivery, including all 2010 volumes (M Dwt) | 40.2 | 38.4 | 30.5 | 12.8 | 3.0 | 0.3 |
| Fill percentage | 90 % | 90 % | 90 % | 90 % | 90 % | 90 % |
| **Net expected delivery (M Dwt)** | **36.2** | **34.5** | **27.4** | **11.6** | **2.7** | **0.2** |

*Source: Clarksons, DnB NOR Markets*

**Figure 147: Orderbook - Panamax**

| New capacity and scrapping - Panamax | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Tonnage remaining in Clarksons orderbook (M Dwt) | 13.9 | 27.8 | 22.7 | 5.6 | 0.4 | 0.0 |
| Cancellations and error in orderbook | 25 % | 25 % | 25 % | 25 % | 25 % | 25 % |
| "Real" orderbook (M Dwt) | 10.4 | 20.9 | 17.0 | 4.2 | 0.3 | 0.0 |
| Slippage percentage | 20 % | 20 % | 20 % | 20 % | 20 % | 20 % |
| Slippage (M Dwt) | 2.1 | 4.2 | 3.4 | 0.8 | 0.1 | 0.0 |
| Expected for delivery (M Dwt) | 8.3 | 18.8 | 17.8 | 6.8 | 1.1 | 0.1 |
| Tonnage already delivered in 2010 (M Dwt) | 7.2 | | | | | |
| Expected for delivery, including all 2010 volumes (M Dwt) | 15.6 | 18.8 | 17.8 | 6.8 | 1.1 | 0.1 |
| Fill percentage | 93 % | 93 % | 93 % | 93 % | 93 % | 93 % |
| **Net expected delivery (M Dwt)** | **14.5** | **17.5** | **16.5** | **6.3** | **1.0** | **0.1** |

*Source: Clarksons, DnB NOR Markets*

We see that the volumes in the orderbook stay high until 2013, at which they start declining. Most newbuilding contracts are however not settled more than two years ahead, and these numbers will change as time goes.

### Calculating trips per year

In order to compare the demand for transportation to the new capacity being built, we need to estimate how many trips the vessels sail every year. To do so, we split the iron ore market into 52 trade routes, and the coal market into 65 trade routes. Assuming that each exporter will export the same proportion to each importer as in 2009, we forecast future volumes being transported at the different routes. We thereafter split these routes between Capesizes and Panamaxes. This is maybe a somewhat rough

assumption, but in the aggregate picture, it gives a fairly good estimate. We calculate the time a round-trip takes. This includes not only the sailing time, but we also include time for loading and offloading, congestion and bunkering[1], and thereafter the amount of vessels needed to serve each route. When we know how many Capesizes or Panamaxes that will be needed to serve the different routes, and how long time each of them use for a round trip, we can make a weighted estimate of how many trips an average Capesize and Panamax sail in one year. Hence, our estimate is adjusted for distances, as well as volumes. The results are shown in the table below.

**Figure 148: Trips/year – Capesize and Panamax**

| Trips / year | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Capesize - Iron ore | 7.4 | 7.5 | 7.5 | 7.4 | 7.3 | 7.3 |
| Capesize - Coal | 5.9 | 5.8 | 5.8 | 5.8 | 5.7 | 5.7 |
| Panamax - Iron ore | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 |
| Panamax - Coal | 10.2 | 10.2 | 10.1 | 10.1 | 10.1 | 10.0 |

*Source: DnB NOR Markets*

As mentioned earlier, the vast majority of coal is being transported by Panamaxes. Capesizes operate mainly on the longest routes, resulting in fewer trips per year. In contrast, Capesizes transporting iron ore also operate on somewhat shorter routes. The weighted average trips per year numbers in the table can change slightly from year to year, as the distribution of volumes changes between the trade routes.

### Iron ore

**Figure 149: Expected export volumes – Iron ore**

| Port capacity and volumes | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Adjusted additional exports | 100.9 | 78.3 | 141.8 | 177.8 | 274.2 | 180.7 |
| Capesize routes | 97.1 | 72.6 | 135.5 | 170.6 | 272.2 | 180.7 |
| Panamax routes | 3.8 | 5.7 | 6.3 | 7.2 | 1.9 | 0.0 |

*Source: DnB NOR Markets*

The table above shows the expected annual increase in export volumes, for iron ore as a total and as divided between Capesize and Panamax routes. It is important to note that Panamax demand here is somewhat overstated. This includes exports from India, which is mainly transported by Supramaxes, as much of the infrastructure in the country does not support larger vessels.

By dividing the additional export volumes from the table above, by the corresponding average trips per vessel, we get a measure of how much tonnage will be needed in order to transport the additional volumes. In the following tables, we call this “tonnage required”.

Assuming that 75% of new Capesize tonnage and 5% of new Panamax tonnage is directed to the iron ore market, we compare this demand and supply in the table on the next page.

[1] Details on this can be found in the appendix

**Figure 150: Tonnage supply and demand – Iron ore**

| Supply vs. Demand - Iron ore | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| **Ship capacity supplied - Iron ore (M Dwt)** | | | | | | |
| New capacity - Capesize ( 75% of new tonnage ) | 27.1 | 25.9 | 20.6 | 8.7 | 2.0 | 0.2 |
| New capacity - Panamax ( 5 % of new tonnage ) | 0.7 | 0.9 | 0.8 | 0.3 | 0.1 | 0.0 |
| **New tonnage required - Iron ore (M Dwt)** | | | | | | |
| Capesize | 13.0 | 9.6 | 18.0 | 23.0 | 37.4 | 24.9 |
| Panamax | 0.4 | 0.6 | 0.6 | 0.7 | 0.2 | 0.0 |
| **Excess additional ship supply - Iron ore (M Dwt)** | | | | | | |
| Capesize | 14.1 | 16.3 | 2.6 | -14.3 | -35.4 | -24.7 |
| Panamax | 0.3 | 0.3 | 0.2 | -0.4 | -0.1 | 0.0 |

*Source: Clarksons, DnB NOR Markets*

We see that if 75% of new Capesize tonnage and 5% of new Panamax tonnage enters the iron ore market, we can expect to see a substantial overcapacity of Capesizes, while the picture looks more promising for Panamax vessels. It is, however, important that these proportions are not fixed. The calculations tell us that the demand from the iron ore market will not absorb the same proportion of fleet growth as in the past. To get a better look at the market, it is important to analyze the effect from coal and to look at the effect from the two commodities combined.

## Coal

**Figure 151: Expected export volumes - Coal**

| Port capacity and volumes | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| Adjusted additional exports | 85.9 | 96.7 | 84.5 | 51.6 | 81.1 | 78.2 |
| Capesize routes | 13.5 | 10.2 | 8.3 | 5.9 | 9.0 | 6.6 |
| Panamax routes | 72.4 | 86.5 | 76.2 | 45.7 | 72.0 | 71.6 |

*Source: DnB NOR Markets*

As with iron ore, the table above shows expected demand for transportation of iron ore for Capesize and Panamax routes. Again, we divide these volumes on the average trips sailed each year by Capesizes and Panamaxes in coal trade. This tonnage required is then compared to the capacity supplied to the coal market, which we assume is 25% of new Capesize tonnage and 55% of new Panamax tonnage.

**Figure 152: Tonnage supply and demand – Coal**

| Supply vs. Demand - Coal | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| **Ship capacity supplied - Coal (M Dwt)** | | | | | | |
| New capacity - Capesize ( 25% of new tonnage ) | 9.0 | 8.6 | 6.9 | 2.9 | 0.7 | 0.1 |
| New capacity - Panamax ( 55 % of new tonnage ) | 8.0 | 9.6 | 9.1 | 3.5 | 0.6 | 0.0 |
| **New tonnage required - Coal (M Dwt)** | | | | | | |
| Capesize | 2.3 | 1.7 | 1.4 | 1.0 | 1.6 | 1.2 |
| Panamax | 7.1 | 8.5 | 7.5 | 4.5 | 7.2 | 7.2 |
| **Excess additional ship supply - Coal (M Dwt)** | | | | | | |
| Capesize | 6.7 | 6.9 | 5.4 | 1.9 | -0.9 | -1.1 |
| Panamax | 0.9 | 1.1 | 1.6 | -1.0 | -6.6 | -7.1 |

*Source: Clarksons, DnB NOR Markets*

We see that allocating 25% of new Capesize tonnage to the coal market results in serious overcapacity. Likewise, there is also excess supply of Panamax tonnage, if it receives a proportion of 55%. Again, the table tells us what the excess supply would be if the coal market had been allocated approximately the same proportion as in the past. As with iron ore, the numbers are flexible. Overcapacity of tonnage in the coal market can be absorbed by other markets, and we therefore analyse the two commodities combined to get a better picture of the situation.

## Iron ore and coal

**Figure 153: Expected export volumes – Iron ore and Coal**

| New tonnage required | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| New tonnage required - Capesize (M Dwt) | 15.3 | 11.4 | 19.4 | 24.0 | 39.0 | 26.0 |
| New tonnage required - Panamax (M Dwt) | 7.5 | 9.1 | 8.2 | 5.2 | 7.4 | 7.2 |

*Source: DnB NOR Markets*

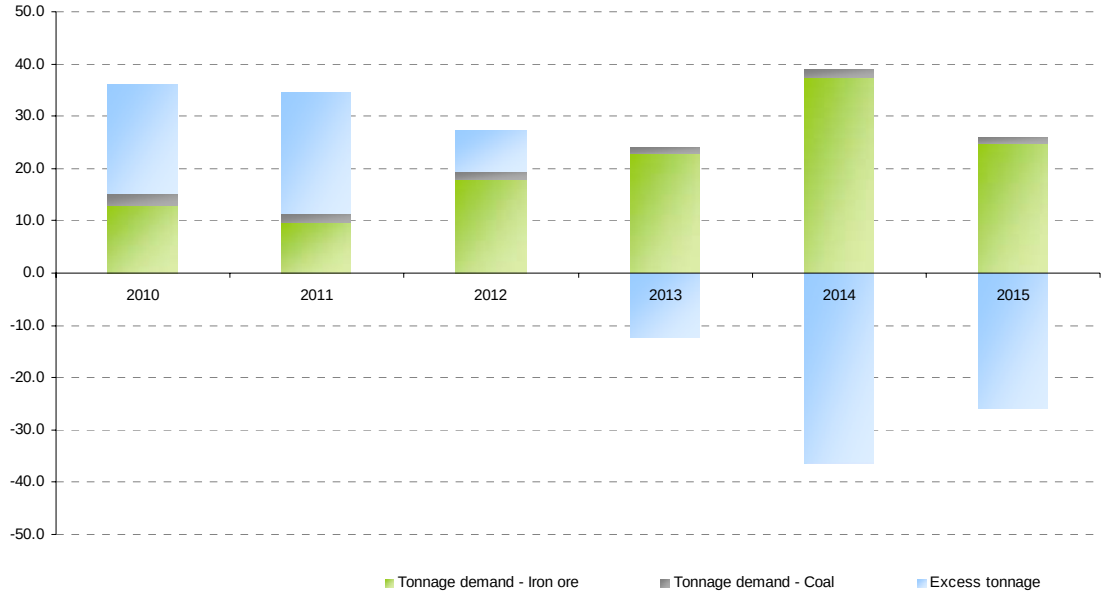
The figure above shows the combined demand for tonnage created by increasing iron ore and coal volumes. This demand can then be compared to the Capesize and Panamax orderbooks. We see that while cargo volumes are set to increase substantially, new tonnage expected to be delivered seems to be too large to be absorbed by these volumes. Have in mind that this situation incorporates 25% cancellations, as well as 15% slippage for Capesize and 20% slippage for Panamax vessels.

**Figure 154: Tonnage supply and demand – Iron ore and Coal**

| Supply vs. Demand - Iron ore and coal | 2010e | 2011e | 2012e | 2013e | 2014e | 2015e |
|---|---|---|---|---|---|---|
| **Capesize** | | | | | | |
| Capesize orderbook (M Dwt) | 36.2 | 34.5 | 27.4 | 11.6 | 2.7 | 0.2 |
| New tonnage required - Capesize (M Dwt) | 15.3 | 11.4 | 19.4 | 24.0 | 39.0 | 26.0 |
| Excess supply - Capesize (M Dwt) | 20.8 | 23.2 | 8.0 | -12.4 | -36.3 | -25.8 |
| Approximate number of vessels (165,000 dwt) | 126 | 140 | 49 | -75 | -220 | -156 |
| **Panamax** | | | | | | |
| Panamax orderbook (M Dwt) | 14.5 | 17.5 | 16.5 | 6.3 | 1.0 | 0.1 |
| New tonnage required - Panamax (M Dwt) | 7.5 | 9.1 | 8.2 | 5.2 | 7.4 | 7.2 |
| Excess supply - Panamax (M Dwt) | 7.0 | 8.4 | 8.4 | 1.1 | -6.3 | -7.1 |
| Approximate number of vessels ( 70,000 dwt ) | 100 | 120 | 120 | 15 | -91 | -101 |

*Source: Clarksons, DnB NOR Markets*

**Figure 155: Supply vs. Demand – Capesize**



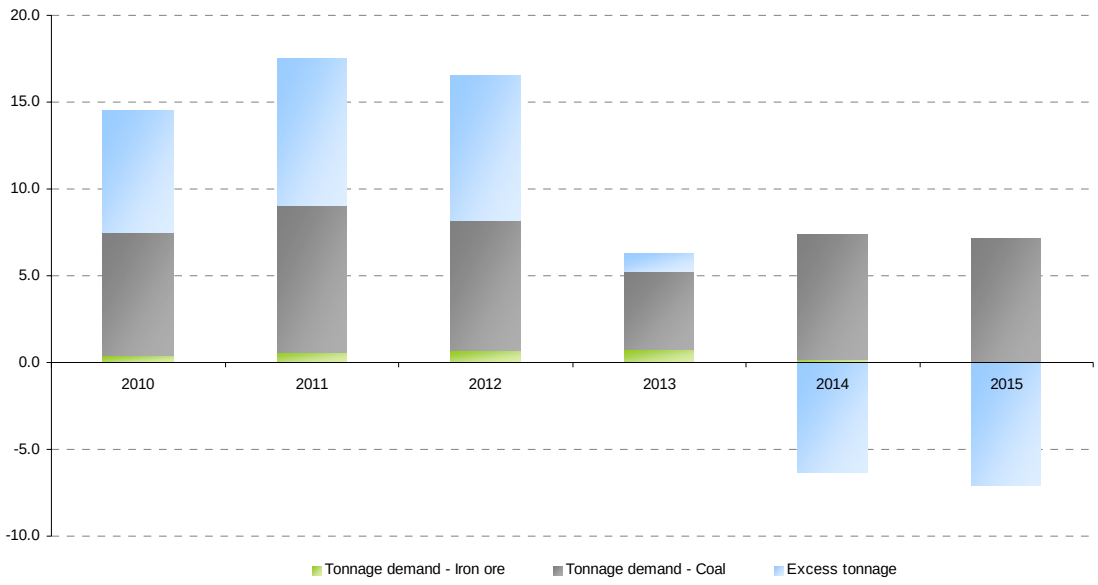

*Source: Clarksons, DnB NOR Markets*

The charts show how much of the new tonnage that is expected to be absorbed by increasing iron ore and coal volumes. While we estimate that there will be excess supply of capacity in both fleets, we believe that this will affect the rates for Capesizes more than those for Panamaxes. Not only is the expected overcapacity higher here; Additional supply of Panamaxes can be absorbed by other cargoes, such as grains and steel products.

According to estimates from Clarksons, global seaborne grain volumes amounted to 315 Mt in 2009, which is about 39% of total coal volumes in the same year. However, as coal volumes are expected to increase extensively in the next years, grain trade is quite stable from year to year and grows at a lower pace.

In contrast, Capesizes are mainly used for transportation of iron ore and coal and there are not many opportunities to use excess capacity to transport other cargoes.

**Figure 156: Supply vs. Demand - Panamax**




*Source: Clarksons, DnB NOR Markets*

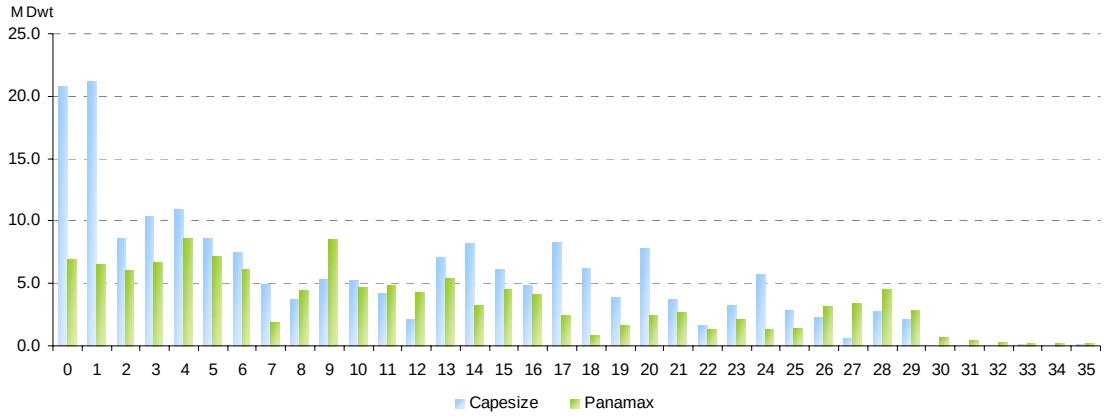
As construction of new vessels slows down, it will still take some time for rates to gain more support. The overcapacity works as a pool from which vessels can be employed, and it is thereby effectively a buffer between increased demand and rates. Basically, the over-capacity needs to be absorbed before rates can again gain momentum.

We are coming from a situation in which fleet utilization has been very high (in 2009 and 1H 2010). Due to the projected over-capacity of tonnage developing, average rates should soften (in our view) relative to the earnings obtained in recent years. Volatility in rates should however persist due to rapid short-term changes in demand, congestion, psychology etc. This volatility should on the other hand be on lower rate levels than what we have been used to in recent years, as the weight of vessel supply takes its toll.

### Scrapping

However, as overcapacity starts to materialize in the market, we can expect to see a higher degree of scrapping, and possibly an increasing number of cancellations of new vessels. If enough additional capacity enters the market, we believe that we may see vessels being scrapped before they reach the average scrapping ages (which have been 26.7 years for Capesizes and 28.3 years for Panamaxes).

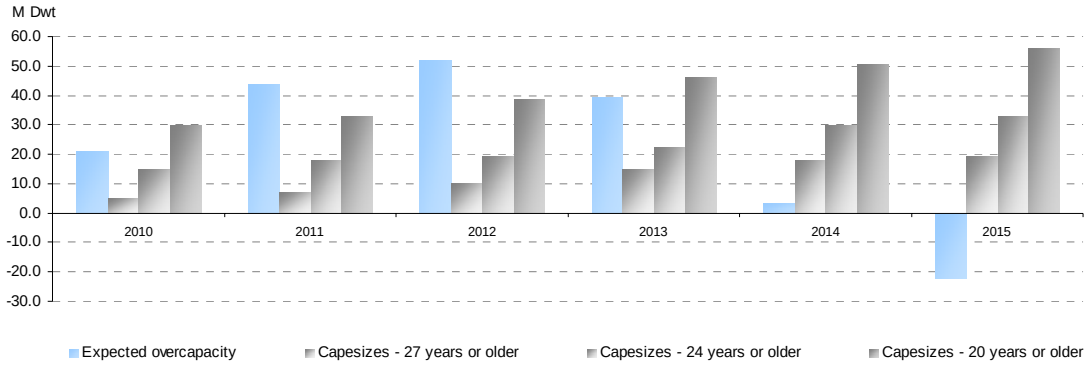
**Figure 157: Age profile – Capesize and Panamax fleets**




*Source: Clarksons*

From the figure above, we see that the majority of the fleets are rather young. Still, substantial tonnage can be scrapped, depending on how low companies are willing to go on vessel age. The figure below shows cumulative overcapacity along with cumulative tonnage on vessels older than 20, 24 and 27 years. Scrapping in dry bulk shipping is only a matter of economics, as there are no regulations that impact the demolition decision.

**Figure 158: Cumulative overcapacity and tonnage by age - Capesize**




*Source: Clarksons, DnB NOR Markets*

**Figure 159: Cumulative overcapacity and tonnage by age - Capesize**

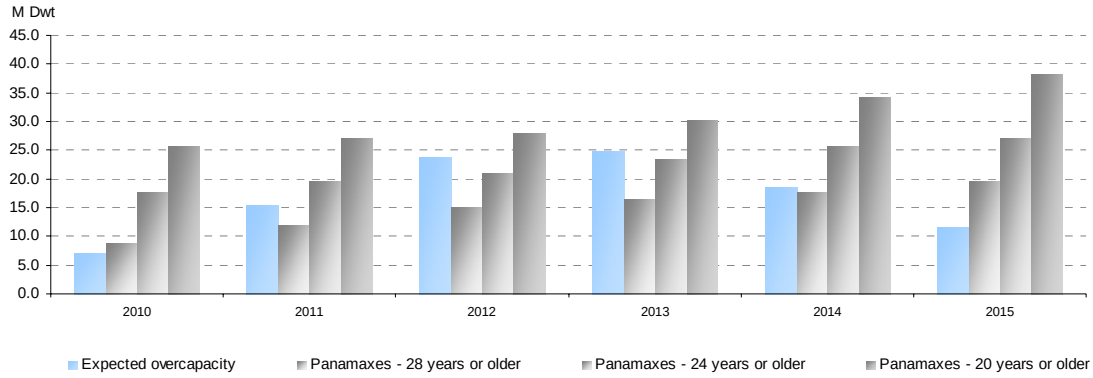
| Scrapping potential - Capesize | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| **Cumulative overcapacity (M Dwt)** | 20.8 | 44.0 | 52.0 | 39.6 | 3.3 | -22.5 |
| **Capesizes - 27 years or older** | | | | | | |
| Vessels | 49 | 63 | 79 | 110 | 127 | 135 |
| Tonnage (M Dwt) | 5.8 | 8.1 | 10.9 | 16.6 | 19.8 | 21.4 |
| Capacity (M Dwt) * | 5.2 | 7.3 | 9.8 | 14.9 | 17.8 | 19.3 |
| **Capesizes - 24 years or older** | | | | | | |
| Vessels | 110 | 127 | 135 | 154 | 199 | 222 |
| Tonnage (M Dwt) | 16.6 | 19.8 | 21.4 | 25.1 | 32.9 | 36.8 |
| Capacity (M Dwt) * | 14.9 | 17.8 | 19.3 | 22.6 | 29.6 | 33.1 |
| **Capesizes - 20 years or older** | | | | | | |
| Vessels | 199 | 222 | 252 | 296 | 326 | 363 |
| Tonnage (M Dwt) | 32.9 | 36.8 | 43.1 | 51.4 | 56.2 | 62.3 |
| Capacity (M Dwt) * | 29.6 | 33.1 | 38.8 | 46.2 | 50.6 | 56.1 |

** Capacity utilized*

*Source: Clarksons, DnB NOR Markets*

We see from the figure that although scrapping can potentially remove a lot of overcapacity from the market, we believe that we will see too many vessels in the next few years. Even if all vessels with an age of 20 years or older were scrapped, there would still be overcapacity in 2011 and 2012, all other factors constant. In contrast, the outlook is better for Panamax. As the age profile shows, the youngest vessels constitute a lower proportion of this fleet. Hence, the older vessels constitute a relatively larger part and much of the overcapacity can be eliminated by scrapping vessels. Also taking into consideration that other cargoes may absorb some capacity strengthen our notion that overcapacity will be a smaller problem in the Panamax fleet.

**Figure 160: Expected overcapacity and tonnage by age - Panamax**




*Source: Clarksons, DnB NOR Markets*

**Figure 161: Expected overcapacity and tonnage by age - Panamax**

| Scrapping potential - Panamax | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| **Cumulative overcapacity (M Dwt)** | 7.0 | 15.4 | 23.8 | 24.9 | 18.5 | 11.4 |
| **Panamaxes - 28 years or older** | | | | | | |
| Vessels | 146.0 | 196 | 244 | 265 | 285 | 316 |
| Tonnage (M Dwt) | 9.5 | 12.9 | 16.1 | 17.6 | 18.9 | 21.1 |
| Capacity (M Dwt) * | 8.9 | 12.0 | 15.0 | 16.4 | 17.6 | 19.6 |
| **Panamaxes - 24 years or older** | | | | | | |
| Vessels | 285.0 | 316.0 | 335.0 | 373.0 | 407.0 | 428.0 |
| Tonnage (M Dwt) | 18.9 | 21.1 | 22.5 | 25.2 | 27.6 | 29.2 |
| Capacity (M Dwt) * | 17.6 | 19.6 | 20.9 | 23.4 | 25.7 | 27.2 |
| **Panamaxes - 20 years or older** | | | | | | |
| Vessels | 407.0 | 428.0 | 438.0 | 473.0 | 531.0 | 593.0 |
| Tonnage (M Dwt) | 27.6 | 29.2 | 30.0 | 32.5 | 36.6 | 41.1 |
| Capacity (M Dwt) * | 25.7 | 27.2 | 27.9 | 30.2 | 34.0 | 38.2 |

**Capacity utilized*

*Source: Clarksons, DnB NOR Markets*

To summarize, we believe that rates in the Capesize markets will remain subdued for the next few years, and that substantial scrapping must occur. Although a large orderbook is also present in the Panamax market, it has a larger potential for scrapping, as well as a potential for other cargoes to absorb parts of the new tonnage. Hence, while we believe that Panamax rates will remain subdued, we believe that they will do better than those for Capesizes. Cannibalization of Panamax cargoes from the Capesize fleet should however not be underestimated, although logistical issues could mitigate some of the effect. We also believe that volatility in rates will persist, but on lower rate levels than what we have been used to.

### Sensitivity analysis

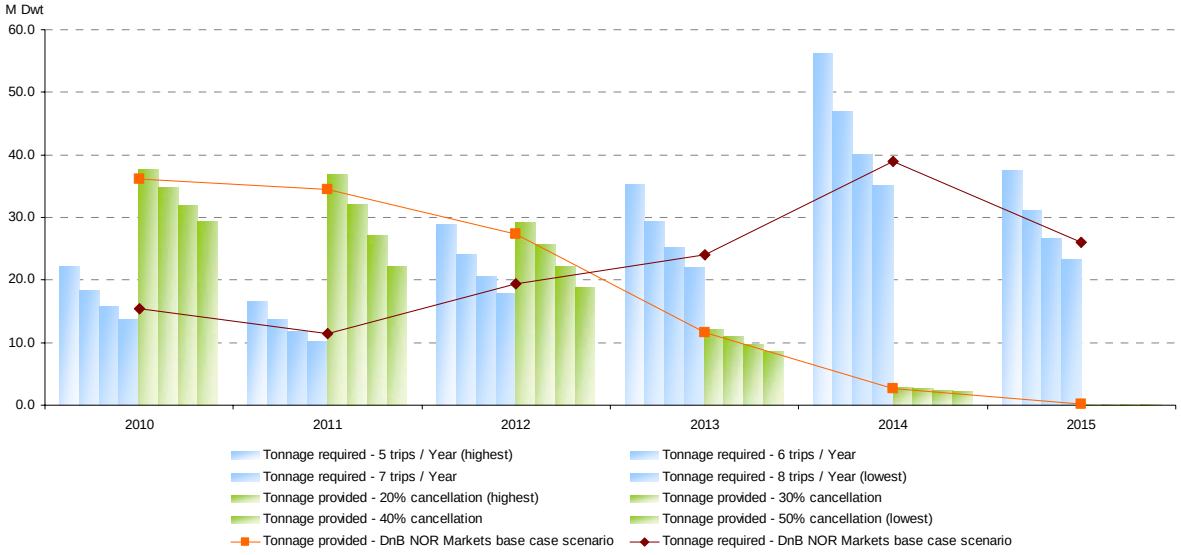
There are several factors of uncertainty to the described scenario. On the tonnage demand side, we have two primary components: Export volumes and trips per vessel per year. In this study, expected volumes are based on conversations with port and mine representatives. It is our experience that

these have had a generally positive market outlook and most of them expect to reach their full capacity within a few years. Consequently, we perceive these estimates to be somewhat bullish, and the potential downside may be larger than the upside. In our sensitivity analysis, we keep these volumes unchanged, and look instead at how many trips a vessel can sail each year.

This variable has been calculated using a variety of input factors, including factors such as trip distances, vessel speed and congestion. While we believe that these have been measured quite exactly, we look at how different number of trips per year affects the amount of new tonnage required. For Capesizes, we estimate 7.3-7.5 trips/year for iron ore trade, and 5.7-5.9 trips/year for coal trade. In the sensitivity analysis, we use values between 5 and 8 trips/year for the entire fleet, and see how the supply of vessels changes. For the Panamax fleet, we estimate that the vessels employed in iron ore trade sail 9.8 trips/year, while those used in coal trade sail between 10.0 and 10.2 trips/year. In the sensitivity analysis, we look at the range between 8 to 11 trips/year.

On the supply side, cancellation, including error correction of the orderbook, is the most important factor affecting the addition of new capacity. For both the Capesize and the Panamax fleets, we use 25% as our base case estimate. However, in the sensitivity analysis, we analyse the effects on tonnage supply by changing this percentage between 20% and 50%. The different supply and demand values are represented in the figures below.

**Figure 162: Sensitivity analysis – Capesize fleet**

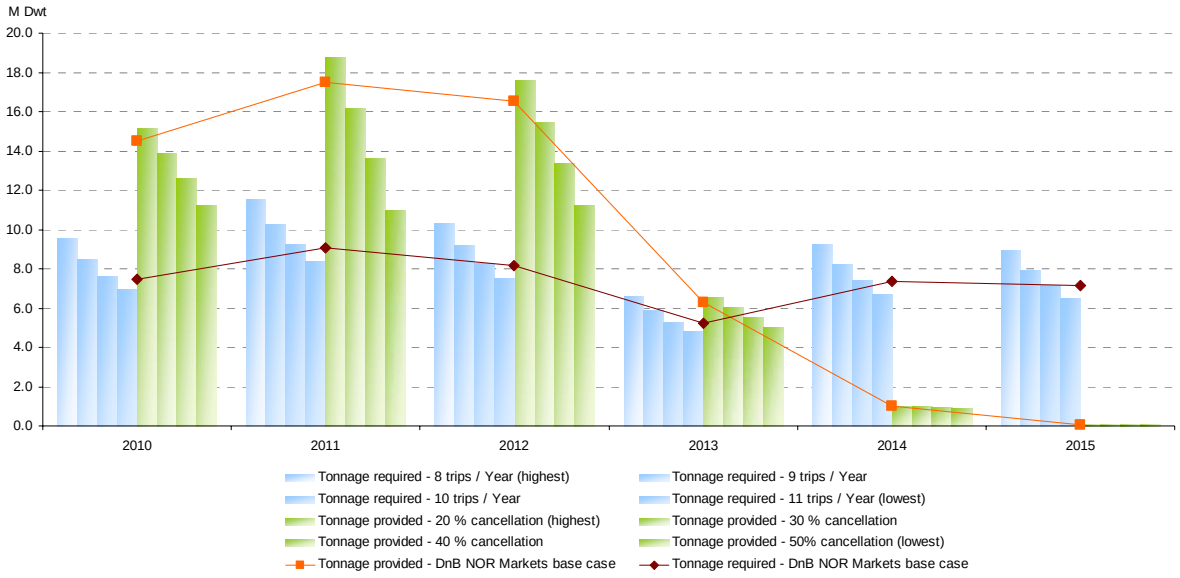



*Source: DnB NOR Markets*

For the Capesize fleet, we see that even with a cancellation rate of 50%, and a with the average Capesize delivering 5 cargoes each year, we still have overcapacity in 2010 and 2011. However, with high scrapping, the gap could be closed. However, we do not believe that such a scenario is possible as a result of the extremely low demolition volumes seen so far in 2010 (9 Capesizes/1.33 M Dwt and 3 Panamaxes/0.22 M Dwt). Instead, we use the figure as an illustration of the sensitivity of the supply-demand balance to our assumptions.

Like earlier, we see that it is easier to close the gap between tonnage demand and supply for the Panamax fleet. If cancellation should rise to 50% while utilization drops to 8 trips/year, we would see that iron ore and coal trade would absorb close to all the new Panamaxes entering the market. Again, we do not regard this scenario as likely to happen, but simply include this figure to show the sensitivity in supply and demand.

**Figure 163: Sensitivity analysis - Panamax**




*Source: DnB NOR Markets*

# Appendix

## Appendix 1: Vessel assumptions – Iron ore and Coal

| | Average usable capacity (dwt) | Average speed (knots) | Loading + unloading, excl. congestion (days) |
|---|---|---|---|
| Capesize | 165,000 | 14.0 | 4 |
| Panamax | 70,000 | 14.3 | 3 |

*Source: DnB NOR Markets*

## Appendix 2: Distances of trade routes – Capesize – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| **Australia** | | | 21,740 | 5,856 | 6,236 | 6,829 | |
| **Brazil** | 7,213 | 10,484 | 8,833 | 21,280 | 21,595 | 22,734 | 8,240 |
| **India** | | | 20,901 | 6,994 | 7,277 | 8,526 | |
| **Canada** | | | 5,257 | 27,243 | 27,549 | 28,705 | 8,240 |
| **South Africa** | | | 11,602 | 14,307 | 14,767 | 15,924 | 8,240 |
| **Sweden** | | | 2,310 | 28,230 | | | 8,240 |
| **Mauritania** | | | 4,168 | | 22,240 | | |
| **Ukraine** | | | 6,638 | 28,091 | 28,398 | 29,554 | |
| **Peru** | | | 19,138 | 17,905 | 18,085 | 16,418 | 8,240 |
| **Guinea** | | | 6,240 | 19,867 | 20,149 | 21,330 | 8,240 |
| **Sierra Leone** | | | 5,852 | 20,321 | 20,505 | 21,782 | 8,240 |
| **Latvia** | | | 1,738 | 27,727 | | | 8,240 |

*Source: DnB NOR Markets*

## Appendix 3: Distances of trade routes – Panamax – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| **Australia** | | | 18,061 | 5,856 | 6,236 | 6,829 | |
| **Brazil** | 7,213 | 10,484 | 8,833 | 20,597 | 20,886 | 20,646 | 8,240 |
| **India** | | | 13,906 | 6,994 | 7,277 | 8,526 | |
| **Canada** | | | 5,257 | 21,276 | 21,626 | 19,987 | 8,240 |
| **South Africa** | | | 11,602 | 14,307 | 14,767 | 15,924 | 8,240 |
| **Sweden** | | | 2,310 | 21,949 | | | 8,240 |
| **Mauritania** | | | 4,168 | | 19,614 | | |
| **Ukraine** | | | 6,638 | 15,703 | 15,987 | 17,235 | |
| **Peru** | | | 12,180 | 17,905 | 18,085 | 16,418 | 8,240 |
| **Guinea** | | | 6,240 | 19,867 | 20,149 | 21,330 | 8,240 |
| **Sierra Leone** | | | 5,852 | 20,321 | 20,505 | 21,782 | 8,240 |
| **Latvia** | | | 1,738 | 21,414 | | | 8,240 |

*Source: DnB NOR Markets*

## Appendix 4: Congestion and bunkering (days) – Iron ore

| Exporters | | | | Importers | |
|---|---|---|---|---|---|
| **From** | **Congestion** | **Bunkring** | **Congestion + bunkring** | **To** | **Congestion** |
| Australia | 4 | 1 | 5 | North America | 1 |
| Brazil | 4 | 1 | 5 | East Europe | 1 |
| India | 3 | 2 | 5 | West Europe | 1 |
| Canada | 1 | 2 | 3 | Other Asia | 5 |
| South Africa | 2 | 2 | 4 | China | 5 |
| Sweden | 0 | 2 | 2 | Japan | 5 |
| Mauritania | 0 | 2 | 2 | Rest of world | 1 |
| Ukraine | 0 | 2 | 2 | | |
| Peru | 0 | 2 | 2 | | |
| Guinea | 0 | 2 | 2 | | |
| Sierra Leone | 0 | 2 | 2 | | |
| Latvia | 0 | 2 | 2 | | |

*Source: DnB NOR Markets*

## Appendix 5: Round trip (days), including congestion and bunkering – Capesize – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| Australia | | | 79.9 | 32.8 | 34.0 | 35.9 | |
| Brazil | 33.2 | 43.7 | 38.4 | 82.4 | 83.4 | 87.1 | 36.5 |
| India | | | 77.2 | 36.5 | 37.4 | 41.4 | |
| Canada | | | 24.9 | 99.6 | 100.5 | 104.3 | 34.5 |
| South Africa | | | 46.3 | 59.0 | 60.5 | 64.2 | 35.5 |
| Sweden | | | 14.4 | 101.7 | | | 33.5 |
| Mauritania | | | 20.4 | | 82.5 | | |
| Ukraine | | | 28.3 | 101.3 | 102.3 | 106.0 | |
| Peru | | | 68.5 | 68.5 | 69.1 | 63.8 | 33.5 |
| Guinea | | | 27.1 | 74.9 | 75.8 | 79.6 | 33.5 |
| Sierra Leone | | | 25.8 | 76.3 | 76.9 | 81.0 | 33.5 |
| Latvia | | | 12.6 | 100.1 | | | 33.5 |

*Source: DnB NOR Markets*

## Appendix 6: Round trip (days), including congestion and bunkering – Panamax – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| Australia | | | 65.8 | 31.4 | 32.6 | 34.5 | |
| Brazil | 31.7 | 42.0 | 36.8 | 77.8 | 78.7 | 78.0 | 34.9 |
| India | | | 52.3 | 34.5 | 35.4 | 39.3 | |
| Canada | | | 23.0 | 77.4 | 78.5 | 73.4 | 32.4 |
| South Africa | | | 44.0 | 56.5 | 58.0 | 61.6 | 33.4 |
| Sweden | | | 12.8 | 78.6 | | | 31.4 |
| Mauritania | | | 18.6 | | 71.2 | | |
| Ukraine | | | 26.4 | 58.9 | 59.8 | 63.7 | |
| Peru | | | 43.8 | 65.8 | 66.4 | 61.2 | 31.4 |
| Guinea | | | 25.1 | 72.0 | 72.9 | 76.6 | 31.4 |
| Sierra Leone | | | 23.9 | 73.4 | 74.0 | 78.0 | 31.4 |
| Latvia | | | 11.0 | 76.9 | | | 31.4 |

*Source: DnB NOR Markets*

## Appendix 7: Trips/year (assuming 360 days) – Capesize – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| Australia | | | 4.5 | 11.0 | 10.6 | 10.0 | |
| Brazil | 10.8 | 8.2 | 9.4 | 4.4 | 4.3 | 4.1 | 9.9 |
| India | | | 4.7 | 9.9 | 9.6 | 8.7 | |
| Canada | | | 14.5 | 3.6 | 3.6 | 3.5 | 10.4 |
| South Africa | | | 7.8 | 6.1 | 6.0 | 5.6 | 10.1 |
| Sweden | | | 25.0 | 3.5 | | | 10.8 |
| Mauritania | | | 17.6 | | 4.4 | | |
| Ukraine | | | 12.7 | 3.6 | 3.5 | 3.4 | |
| Peru | | | 5.3 | 5.3 | 5.2 | 5.6 | 10.8 |
| Guinea | | | 13.3 | 4.8 | 4.8 | 4.5 | 10.8 |
| Sierra Leone | | | 13.9 | 4.7 | 4.7 | 4.4 | 10.8 |
| Latvia | | | 28.6 | 3.6 | | | 10.8 |

*Source: DnB NOR Markets*

## Appendix 8: Trips/year (assuming 360 days) – Panamax – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| Australia | | | 5.5 | 11.5 | 11.0 | 10.4 | |
| Brazil | 11.4 | 8.6 | 9.8 | 4.6 | 4.6 | 4.6 | 10.3 |
| India | | | 6.9 | 10.4 | 10.2 | 9.2 | |
| Canada | | | 15.6 | 4.6 | 4.6 | 4.9 | 11.1 |
| South Africa | | | 8.2 | 6.4 | 6.2 | 5.8 | 10.8 |
| Sweden | | | 28.2 | 4.6 | | | 11.5 |
| Mauritania | | | 19.3 | | 5.1 | | |
| Ukraine | | | 13.6 | 6.1 | 6.0 | 5.6 | |
| Peru | | | 8.2 | 5.5 | 5.4 | 5.9 | 11.5 |
| Guinea | | | 14.3 | 5.0 | 4.9 | 4.7 | 11.5 |
| Sierra Leone | | | 15.1 | 4.9 | 4.9 | 4.6 | 11.5 |
| Latvia | | | 32.8 | 4.7 | | | 11.5 |

*Source: DnB NOR Markets*

## Appendix 9: Annual capacity provided by each 165k dwt Capesize – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| **Australia** | | | 743,674 | 1,809,877 | 1,744,931 | 1,652,374 | |
| **Brazil** | 1,790,069 | 1,359,411 | 1,547,328 | 720,935 | 712,179 | 682,236 | 1,628,129 |
| **India** | | | 769,673 | 1,628,381 | 1,588,731 | 1,434,647 | |
| **Canada** | | | 2,385,874 | 596,627 | 590,783 | 569,735 | 1,722,558 |
| **South Africa** | | | 1,283,245 | 1,007,084 | 982,437 | 925,528 | 1,674,013 |
| **Sweden** | | | 4,118,227 | 583,878 | | | 1,774,003 |
| **Mauritania** | | | 2,912,137 | | 720,181 | | |
| **Guinea** | | | 2,096,285 | 586,468 | 580,802 | 560,448 | |
| **Peru** | | | 867,008 | 866,556 | 859,294 | 931,493 | 1,774,003 |
| **Ukraine** | | | 2,195,552 | 793,549 | 784,065 | 746,643 | 1,774,003 |
| **Latvia** | | | 2,301,436 | 778,368 | 772,387 | 733,248 | 1,774,003 |
| **Finland** | | | 4,720,007 | 593,324 | | | 1,774,003 |

*Source: DnB NOR Markets*

## Appendix 10: Annual capacity provided by each 70k dwt Panamax – Iron ore

| From \ To | North America | East Europe | West Europe | Other Asia | China | Japan | Rest of world |
|---|---|---|---|---|---|---|---|
| **Australia** | 0 | 0 | 382,799 | 801,907 | 772,508 | 730,693 | 0 |
| **Brazil** | 795,035 | 600,164 | 684,909 | 323,858 | 320,118 | 323,225 | 721,484 |
| **India** | 0 | 0 | 482,235 | 730,300 | 711,911 | 640,749 | 0 |
| **Canada** | 0 | 0 | 1,093,652 | 325,388 | 320,823 | 343,364 | 777,106 |
| **South Africa** | 0 | 0 | 572,641 | 445,880 | 434,736 | 409,052 | 753,859 |
| **Sweden** | 0 | 0 | 1,973,693 | 320,761 | 0 | 0 | 801,833 |
| **Mauritania** | 0 | 0 | 1,353,651 | 0 | 353,841 | 0 | 0 |
| **Guinea** | 0 | 0 | 954,971 | 427,755 | 421,380 | 395,408 | 0 |
| **Peru** | 0 | 0 | 575,017 | 382,747 | 379,478 | 412,024 | 801,833 |
| **Ukraine** | 0 | 0 | 1,002,627 | 349,932 | 345,677 | 328,905 | 801,833 |
| **Latvia** | 0 | 0 | 1,053,716 | 343,122 | 340,440 | 322,909 | 801,833 |
| **Finland** | 0 | 0 | 2,297,684 | 327,775 | 0 | 0 | 801,833 |

*Source: DnB NOR Markets*

## Appendix 11: Distances of trade routes – Capesize – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 14,150 | 14,126 | 25,050 | 14,640 | 15,049 | 9,486 | 7,274 | 7,033 | 7,292 | 4,635 |
| Indonesia | 14,526 | 18,301 | 17,139 | 22,290 | 9,428 | 11,191 | 4,408 | 4,588 | 5,780 | 5,331 | 2,266 |
| Colombia | 3,113 | 1,048 | 10,776 | 8,647 | 20,999 | 13,168 | | | | | |
| South Africa | 14,597 | 14,262 | 9,468 | 13,346 | 7,709 | 3,982 | 7,680 | 12,891 | 14,430 | 13,720 | |
| Russia | | | | 3,041 | | | | 2,177 | 1,603 | 948 | |
| United States* | | 3,289 | 8,889 | 6,669 | 22,305 | 14,144 | 22,152 | 27,227 | 28,766 | 28,054 | |
| Canada | | 6,295 | 14,637 | 27,667 | 21,720 | 21,753 | 16,501 | 9,983 | 8,123 | 8,756 | |
| Mozambique | | 14,620 | 9,823 | 13,702 | 7,442 | 4,131 | 7,469 | 12,830 | 14,370 | 13,658 | |
| Latvia | | | | 1,738 | | | | | | | |
| Estonia | | | | 2,030 | | | | | | | |
| Poland | | | | 1,543 | | | | | | | |
| Norway | | | | 2,873 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 12: Distances of trade routes – Panamax – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 14,150 | 14,126 | 22,185 | 14,640 | 15,049 | 9,486 | 7,274 | 7,033 | 7,292 | 4,635 |
| Indonesia | 14,526 | 18,301 | 17,139 | 16,971 | 9,428 | 11,191 | 4,408 | 4,588 | 5,780 | 5,331 | 2,266 |
| Colombia | 3,113 | 1,048 | 6,710 | 8,647 | 12,701 | 13,168 | | | | | |
| South Africa | 14,597 | 14,262 | 9,468 | 13,346 | 7,709 | 3,982 | 7,680 | 12,891 | 14,430 | 13,720 | |
| Russia | | | | 3,041 | | | | 2,177 | 1,603 | 948 | |
| United States* | | 3,289 | 8,889 | 6,669 | 11,413 | 13,394 | 17,777 | 20,088 | 18,126 | 18,894 | |
| Canada | | 6,295 | 13,587 | 16,846 | 20,952 | 19,718 | 16,501 | 9,983 | 8,123 | 8,756 | |
| Mozambique | | 14,620 | 9,823 | 13,702 | 7,442 | 4,131 | 7,469 | 12,830 | 14,370 | 13,658 | |
| Latvia | | | | 1,738 | | | | | | | |
| Estonia | | | | 2,030 | | | | | | | |
| Poland | | | | 1,543 | | | | | | | |
| Norway | | | | 2,873 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 13: Congestion and bunkering (days) – Coal

| Exporters | | | | Importers | |
|---|---|---|---|---|---|
| From | Congestion | Bunkring | Congestion + bunkring | To | Congestion |
| Australia | 9 | 1 | 10 | North America | 2 |
| Indonesia | 3 | 2 | 5 | Central America | 2 |
| Colombia | 3 | 2 | 5 | South America | 2 |
| South Africa | 5 | 1 | 6 | Europe | 6 |
| Russia | 2 | 2 | 4 | Middle East | 2 |
| United States | 2 | 2 | 4 | Africa | 2 |
| Canada | 1 | 2 | 3 | India | 5 |
| Mozambique | 1 | 2 | 3 | China (incl. TW + HK) | 6 |
| Latvia | 1 | 2 | 3 | Japan | 6 |
| Estonia | 1 | 2 | 3 | Korea | 6 |
| Poland | 1 | 2 | 3 | Other Asia (+ Oceania) | 2 |
| Norway | 1 | 2 | 3 | | |

*Source: DnB NOR Markets*

## Appendix 14: Round trip (days), including congestion and bunkering – Capesize – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 61 | 61 | 101 | 63 | 64 | 49 | 43 | 43 | 43 | 31 |
| Indonesia | 58 | 70 | 66 | 87 | 41 | 47 | 28 | 30 | 34 | 32 | 18 |
| Colombia | 21 | 14 | 46 | 43 | 78 | 53 | | | | | |
| South Africa | 59 | 58 | 42 | 59 | 37 | 25 | 40 | 57 | 62 | 60 | |
| Russia | | | | 24 | | | | 21 | 19 | 17 | |
| United States* | | 21 | 39 | 35 | 82 | 55 | 84 | 102 | 106 | 104 | |
| Canada | | 29 | 56 | 102 | 79 | 79 | 65 | 45 | 39 | 41 | |
| Mozambique | | 56 | 41 | 57 | 33 | 22 | 36 | 54 | 59 | 57 | |
| Latvia | | | | 18 | | | | | | | |
| Estonia | | | | 19 | | | | | | | |
| Poland | | | | 17 | | | | | | | |
| Norway | | | | 22 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 15: Round trip (days), including congestion and bunkering – Panamax – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 60 | 59 | 89 | 61 | 62 | 48 | 42 | 41 | 42 | 30 |
| Indonesia | 55 | 67 | 63 | 67 | 39 | 45 | 26 | 28 | 32 | 30 | 17 |
| Colombia | 19 | 13 | 31 | 41 | 49 | 51 | | | | | |
| South Africa | 57 | 56 | 41 | 57 | 35 | 24 | 38 | 56 | 60 | 58 | |
| Russia | | | | 22 | | | | 19 | 18 | 15 | |
| United States* | | 19 | 36 | 33 | 44 | 51 | 67 | 76 | 70 | 72 | |
| Canada | | 27 | 50 | 65 | 73 | 70 | 62 | 43 | 37 | 39 | |
| Mozambique | | 54 | 38 | 55 | 31 | 20 | 34 | 52 | 57 | 54 | |
| Latvia | | | | 16 | | | | | | | |
| Estonia | | | | 17 | | | | | | | |
| Poland | | | | 16 | | | | | | | |
| Norway | | | | 20 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 16: Trips/year (assuming 360 days) – Capesize – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 5.9 | 5.9 | 3.6 | 5.7 | 5.6 | 7.3 | 8.3 | 8.4 | 8.3 | 11.7 |
| Indonesia | 6.2 | 5.2 | 5.4 | 4.2 | 8.7 | 7.7 | 12.8 | 12.1 | 10.7 | 11.2 | 19.7 |
| Colombia | 17.1 | 25.1 | 7.9 | 8.4 | 4.6 | 6.8 | | | | | |
| South Africa | 6.1 | 6.2 | 8.5 | 6.1 | 9.8 | 14.5 | 9.1 | 6.3 | 5.8 | 6.0 | |
| Russia | | | | 15.1 | | | | 17.1 | 18.8 | 21.1 | |
| United States* | | 17.5 | 9.3 | 10.2 | 4.4 | 6.5 | 4.3 | 3.5 | 3.4 | 3.5 | |
| Canada | | 12.3 | 6.4 | 3.5 | 4.6 | 4.6 | 5.5 | 8.0 | 9.2 | 8.8 | |
| Mozambique | | 6.4 | 8.9 | 6.3 | 10.9 | 16.2 | 10.0 | 6.6 | 6.1 | 6.3 | |
| Latvia | | | | 19.9 | | | | | | | |
| Estonia | | | | 18.9 | | | | | | | |
| Poland | | | | 20.6 | | | | | | | |
| Norway | | | | 16.6 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 17: Trips/year (assuming 360 days) – Panamax – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 6.0 | 6.1 | 4.1 | 5.9 | 5.8 | 7.5 | 8.6 | 8.8 | 8.6 | 12.2 |
| Indonesia | 6.5 | 5.4 | 5.7 | 5.4 | 9.2 | 8.1 | 13.7 | 12.9 | 11.4 | 11.9 | 21.6 |
| Colombia | 18.7 | 28.1 | 11.8 | 8.8 | 7.3 | 7.1 | | | | | |
| South Africa | 6.3 | 6.4 | 8.8 | 6.3 | 10.2 | 15.3 | 9.4 | 6.5 | 6.0 | 6.2 | |
| Russia | | | | 16.3 | | | | 18.6 | 20.5 | 23.3 | |
| United States* | | 19.1 | 9.9 | 10.8 | 8.1 | 7.1 | 5.3 | 4.8 | 5.2 | 5.0 | |
| Canada | | 13.2 | 7.2 | 5.6 | 4.9 | 5.2 | 5.8 | 8.4 | 9.7 | 9.2 | |
| Mozambique | | 6.7 | 9.4 | 6.6 | 11.6 | 17.6 | 10.6 | 6.9 | 6.3 | 6.6 | |
| Latvia | | | | 21.9 | | | | | | | |
| Estonia | | | | 20.7 | | | | | | | |
| Poland | | | | 22.7 | | | | | | | |
| Norway | | | | 18.0 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 18: Annual capacity provided by each 165k dwt Capesize – Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 966,184 | 967,382 | 590,985 | 942,039 | 922,805 | 1,200,261 | 1,369,345 | 1,394,244 | 1,367,467 | 1,922,515 |
| Indonesia | 1,029,690 | 850,758 | 898,830 | 685,584 | 1,438,238 | 1,264,645 | 2,108,722 | 1,996,992 | 1,769,003 | 1,848,458 | 3,248,922 |
| Colombia | 2,828,009 | 4,134,553 | 1,301,663 | 1,388,135 | 756,783 | 1,113,978 | | | | | |
| South Africa | 1,008,220 | 1,026,975 | 1,399,964 | 1,008,600 | 1,615,210 | 2,395,335 | 1,496,874 | 1,034,268 | 952,237 | 988,432 | |
| Russia | | | | 2,498,691 | | | | 2,828,802 | 3,101,656 | 3,484,768 | |
| United States* | | 2,887,663 | 1,540,090 | 1,676,301 | 727,159 | 1,071,028 | 705,481 | 585,183 | 557,986 | 570,240 | |
| Canada | | 2,031,918 | 1,059,898 | 582,799 | 753,736 | 752,724 | 913,377 | 1,317,467 | 1,518,941 | 1,443,775 | |
| Mozambique | | 1,060,932 | 1,464,073 | 1,041,394 | 1,804,484 | 2,666,480 | 1,649,814 | 1,095,201 | 1,003,648 | 1,044,000 | |
| Latvia | | | | 3,284,539 | | | | | | | |
| Estonia | | | | 3,122,225 | | | | | | | |
| Poland | | | | 3,402,246 | | | | | | | |
| Norway | | | | 2,733,190 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*

## Appendix 19: Annual capacity provided by each 70k dwt Panamax– Coal

| From \ To | North America | Central America | South America | Europe | Middle East | Africa | India | China (incl TW + HK) | Japan | Korea | Other Asia (+ Oceania) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | | 423,353 | 423,883 | 283,759 | 412,658 | 404,143 | 526,650 | 601,605 | 612,698 | 600,768 | 851,797 |
| Indonesia | 456,457 | 375,637 | 397,287 | 376,671 | 643,434 | 563,568 | 955,578 | 902,081 | 795,241 | 832,359 | 1,515,316 |
| Colombia | 1,306,085 | 1,969,351 | 823,123 | 619,040 | 509,454 | 494,753 | | | | | |
| South Africa | 442,638 | 450,982 | 617,779 | 442,155 | 714,779 | 1,070,987 | 660,293 | 453,541 | 417,174 | 433,212 | |
| Russia | | | | 1,141,954 | | | | 1,302,226 | 1,436,471 | 1,627,726 | |
| United States* | | 1,336,976 | 690,982 | 752,565 | 567,395 | 497,572 | 373,685 | 332,860 | 362,407 | 350,229 | |
| Canada | | 922,773 | 501,472 | 390,658 | 343,191 | 362,352 | 403,712 | 587,229 | 680,006 | 645,298 | |
| Mozambique | | 471,004 | 656,089 | 461,412 | 815,106 | 1,229,387 | 741,166 | 485,816 | 444,325 | 462,592 | |
| Latvia | | | | 1,530,281 | | | | | | | |
| Estonia | | | | 1,449,275 | | | | | | | |
| Poland | | | | 1,589,402 | | | | | | | |
| Norway | | | | 1,257,539 | | | | | | | |

** Exports to Canada are not included*

*Source: DnB NOR Markets*