CIAB

# COAL INDUSTRY ADVISORY BOARD

# International Coal Market & Policy Developments in 2004/05

**JANUARY 2006**

# Contents

## Author's Note:

The report has been compiled on behalf of the CIAB by Brian Heath, CIAB Executive Co-ordinator, and thanks are due to the following CIAB Associates, on whose contributions it is substantially based:

| | | |
|---|---|---|
| Andy Lloyd | Rio Tinto | Australia |
| Colin Whyte | Xstrata Coal | Australia |
| Bob Bell | Luscar | Canada |
| Roland Lübke | GVSt (German Hard Coal Assn.) | Germany |
| Hans-Wilhelm Schiffer | RWE Power | Germany |
| Kyohei Nakamura | EPDC | Japan |
| Shu Sakamoto | Tokyo Electric Power Co. Inc. | Japan |
| Kasuhisa Kawamura | Mitsui Coal Holdings Pty Ltd. | Japan |
| Harry Inoue | Idemitsu Kosan Co. Ltd. | Japan |
| Stan Pillay | Anglo American | Rep. of South Africa |
| Wendy Poulton | Eskom | Rep. of South Africa |
| Mücella Ersoy | TKI | Turkey |
| Allan Jones | E.ON UK plc | UK |
| Chris M$^{c}$Glen | UK Coal plc | UK |
| Connie Holmes | National Mining Association | USA |

The sections of this report reviewing world coal supply and demand draw on a consistent coal data set provided by the IEA. At the time of writing, the latest such data available refer to 2004 and are based on preliminary estimates made by IEA Member governments. Where firmer or more recent data are available from CIAB Members or other sources, any significant differences between these and IEA data are highlighted. Thanks are also due to *The McCloskey Group* for permission to use their coal price data.

# FORWARD FROM CIAB CHAIR PRESTON CHIARO

The *Coal Industry Advisory Board* (CIAB) is a group of high level executives from coal-related industrial enterprises, established by the International Energy Agency Governing Board in July 1979 to provide advice to the IEA from an industry perspective on matters relating to coal. There are currently 40 CIAB Members from 16 countries, typically Chief Executives or senior executives from coal mining, transportation and machinery companies, or from major power generation or other coal consuming companies.

The original task of the CIAB was to assist the IEA in the practical implementation of the "Principles for IEA Action on Coal" – measures aimed at ensuring a ready supply and trade of coal to underpin energy security. In recent years the CIAB has focused additionally on developments in the technology of coal use required to enable coal to contribute to energy security in this era of climate change concern; and on issues arising from increasingly liberalised energy markets, such as the restructuring and privatisation of coal and electricity industries in many countries.

The CIAB produces this report annually for the Governing Board, Standing Committees and Secretariat of the International Energy Agency and the opinions expressed in it are entirely those of CIAB Members and Associates.

It draws on contributions from Associates of CIAB Members to briefly describe developments in international coal markets over the last year and to highlight policy and other issues that CIAB Members regard as pertinent to the development of coal as a secure, clean and competitive energy source. We hope that it will also be of interest to a wider audience.

***Preston Chiaro***
***CIAB Chairman***

*January 2006*

# 1 HIGH LEVEL MESSAGES

## 1.1 Synopsis of Coal Market Developments

1. 2004 again saw strong growth in world primary energy demand (4.3 percent) and greater growth in world hard coal demand (6.3 percent), reinforcing the continuing role of coal in world energy markets. Although coal demand growth continues to be driven substantially by Chinese economic development and its need for electricity and steel, growth in coal demand is also apparent in many other developing countries, e.g., India, Indonesia, and South Africa, as well as developed economies, e.g., USA.

2. International and domestic coal markets are tight as growing demand meets constraints in the existing production and transportation capacity. Investment in coal production and port capacity in exporting countries has typically been made in response to identified increases in demand, rather than in anticipation of such increases, so there have been time lags in bringing new capacity to market. Nevertheless, international coal markets remain fundamentally competitive, thereby continuing to contribute to world energy security.

3. Both Asian and European seaborne delivered steam coal market prices peaked in the $75-80 range in mid year 2004, compared to the $60/tonne seen at the end of 2003 for prices delivered to Europe – itself then the highest price for the last 20 years. Prices declined during the second half of 2004 and 2005. Prices for coking coal have also risen as demand for iron and steel has increased with world economic growth. Although prices remain high by historical standards, coal is still far lower cost than competing fossil energy sources.

4. Demand growth in Asian markets reflects commitments to coal in China (including Taiwan), Japan, Korea, Indonesia, India and other Asian markets, and these commitments are likely to continue. The future of coal use in Europe is less predictable, with market volatility resulting from competition with gas for power generation and longer term uncertainty regarding EU energy-environment policy, including concerns over energy security.

5. Perhaps the most fundamental change in the international coal market, after growth in Chinese demand, has been the withdrawal of the USA from the export market. Previously the USA has been able to utilise marginal steam coal production and port capacity to act as a price-stabilising “swing producer” on the world market. However, coal prices have increased in line with other energy prices driven by increased domestic demand. This has lead to a reduction in exports of US coal production, itself shifting from eastern sources, close to the Atlantic ports, to lower-sulphur and low BTU western sources. As a result, movements in international coal prices now correspond more closely to movements in prices of competing fuels.

6. Australia remains by the largest coal exporting country, followed by Indonesia and China. Because the focus of growing demand is Asia, the transport cost advantage of Chinese producers is possibly the critical influence on the outlook for the pattern of future coal trade. Russia’s proximity to Asian and European markets may become important if producers can overcome the disadvantage of domestic transport costs. The lower sulphur content of Russian coals is increasingly valued by European buyers.

7. Significant rationalisation of international steam coal supply has occurred during the past five years, particularly in Australia and Indonesia. Despite this, the share of production

that is controlled by individual companies remains relatively low. No producer controls more than 10 percent of supply; the top ten producers control less that 50 percent of supply. The geographical diversity and substitutability of steam coal, low levels of ownership concentration, and low barriers to entry will ensure the steam coal market continues to operate competitively and efficiently.

8. High-quality coking coal is less widely available than steam coal and concentration of supply is far greater than in the steam coal market. Commercial relations are generally closer and of longer standing than is the case with steam coal.

## 1.2 The Challenge of Coal's Environmental Performance

9. The evidence supporting the imperative to reduce greenhouse gas emissions continues to grow[1]. Along with other fossil fuels, coal is a carbon-intensive primary fuel and therefore is affected by uncertainties surrounding the implementation of measures to reduce emissions of greenhouse gases through the Kyoto protocol and other national and regional initiatives in countries around the world, including Australia and the USA.

10. Future energy market and environmental security depends on demonstrating the ability to produce and use coal with reduced emissions of greenhouse gases. The former may be achieved by the capture of fugitive methane when coal is mined; and the latter by improved energy efficiency or by carbon capture and storage. During the year, the IPCC published a Special Report for policy makers from its chapter on carbon capture and storage techniques. One key conclusion of the report is that using these technologies in a portfolio of mitigation options would reduce the costs of stabilisation of atmospheric $CO_2$ by 30 percent or more.

11. Although developed countries are responsible for the vast bulk of historical $CO_2$ emissions, developing countries will be the main source of growth in greenhouse gas emissions from energy use over the coming decades. Most of these developing countries do not have Kyoto Protocol commitments. Thus it is in the best interests of the OECD countries to assist developing countries in using coal sustainably by facilitating the application of current best commercial technologies and by encouraging participation in international research and development of new coal technologies relevant to their needs.

12. There are encouraging signs of initial progress on technology development in some countries. For example, the US energy policy legislation enacted in August 2005 included a nine year, $1.8 billion, programme to demonstrate advanced coal technologies and a Low Emissions Technology Development Fund has been set up by the Australian Federal government, with funding of AUS$500m to be matched 2:1 by industry.

13. In Europe, the EC Directorate for Research has established a Technology Platform for Zero Emission Fossil Fuel Power Plants (see Section 4.1.1). In line with the proposed priority for "Near Zero Emission Power Generation" within the 7th Framework R&D Programme (FP7) covering the years 2007-2013, the Technology Platform aims to develop research goals and remove obstacles to the creation of these power plants, which will drastically reduce the environmental impact of fossil fuel use, particularly coal.

[1] The Scientific Consensus on Climate Change – N Oreskes, "Science", Volume 301, December 2004

14. International collaborative initiatives to encourage the Research, Development and Demonstration of clean coal technologies continue to gain momentum. The Carbon Sequestration Leadership Forum (CSLF) identified 7 additional projects to bring its total nominated collaborative projects to 17. During 2005, the G8 recognised the importance of the low emission technology development efforts and the new partnership, the Asia Pacific Partnership for Clean Development and Climate, was announced between the US, Australia, Japan, South Korea, China and India, who between them account for over half the world's GDP and over half of global $CO_2$emissions.

15. The commercial adoption of Integrated Gasification Combined Cycle (IGCC) plant is dependent on manufacturers providing performance guarantees for all the main component parts of the integrated plant. This has so far been an obstacle, but appears to have come a stage closer with the agreement signed between AEP and GE Energy/Bechtel in the USA.

## 1.3 CIAB Policy Messages to the IEA

16. Despite some temporary infrastructure bottlenecks international coal markets continue to operate well in a period of strong energy demand. Coal suppliers are responding quickly to the increase in demand and, given the wide distribution and abundance of coal resources, the energy security benefits of coal are more apparent than ever.

17. In some countries government electricity market reform, environment and climate policies can have the effect of encouraging a shift in energy use away from coal. These policies might be expected to slow growth in coal demand and eventually lead to a decline in its use. However, the medium/long-term growth in coal demand forecast by organisations such as the IEA together with the continuing demand for coal to support current economic growth, particularly in developing economies, are at variance with longer-term expectations held by some governments.

18. This uncertainty means that coal producers continue to be wary of investing in advance of a demonstrated demand for coal. This is particularly an issue for European markets where prospects for coal in the longer-term are particularly uncertain. Investment has increased as coal prices have risen, but to date it has been mainly operational and transportation investment rather than capacity investment in long term coal production and use.

19. On the other hand, many countries, including Australia, Indonesia, South Africa, and the USA recognise that supply chain investment is needed to maintain the necessary role of coal in the future energy mix, and a large number of investments were initiated or foreshadowed during the year.

20. Future energy market security depends on demonstrating the ability to use coal in a more climate-friendly manner and to rapidly spread technology to developing countries. A number of projects to demonstrate large scale carbon capture and storage in the power sector have been announced. While policy priorities vary between world regions, joint industry/government co-operation to demonstrate new low $CO_2$ emission technologies and to formulate policy frameworks that encourage investment in efficient coal-fired electricity generation technologies is essential if the goal of cleaner use of fossil energy is to be achieved in the necessary timescale

21. The efficient transfer of new technologies will be important to secure continued use of

coal. In this regard improvement of the Clean Development Mechanism (CDM) is necessary. In particular the scope of CDM must be widened to include abatement achieved through carbon capture and storage.

22. The CIAB also stresses the need to address $CO_2$ emissions from the current build of conventional PF coal fired power plant, including in developing countries, and requests that the IEA examine the potential for post combustion capture to be retrofitted to these plants as well as existing gas-fired generating units.

23. A new focus on clean fossil energy has emerged from the IEA Governing Board meeting at Ministerial level and from the G8 meeting at Gleneagles. CIAB work published during 2005 has sought to highlight technologies for reducing $CO_2$ emissions from coal use, explain the industry's perspective on investment and identify policy options. The CIAB will continue to work with the IEA to progress the clean coal agenda in support of a clean, clever, and secure energy future.

# 2 CIAB WORK PROGRAMME

24. In conjunction with the CIAB Plenary meeting held on 10th November 2005 a workshop, organised with the valuable assistance of CIAB Associates and IEA staff, was held on 9th November. This workshop, entitled *"Meeting our Energy Needs - driving forward coal's role in a clean, clever and competitive energy future"* proved to be a very valuable discussion of the key issues for coal, with views from CIAB Members, government representatives and other relevant organisations. A comprehensive note of the proceedings has been prepared and is available on the CIAB website.

25. Many of the 2005 CIAB work projects have been completed or are nearing completion and the following publications have been issued during 2005:

    - "Roadmapping Coal's Future - Zero Emissions Technologies for Fossil Fuels" (March 2005)
    - "Reducing Greenhouse Gas Emissions – the Potential of Coal" (April 2005)
    - "Investment in Coal Supply and Use – an industry perspective on the IEA World Energy Investment Outlook" (November 2005)

26. In addition to these reports, compilation of the sustainable development case studies has progressed well and a draft report was made available to the 2005 CIAB Plenary meeting. It is planned to publish this work early in 2006. These reports, together with the current edition of *"International Coal Market and Policy Developments"* can all be downloaded free of charge from the CIAB website http://www.iea.org/ciab.

27. A new focus on clean fossil energy has emerged from the IEA Governing Board meeting at Ministerial level. The Ministerial communiqué, dated 3 May 2005, put strong emphasis on ***"leadership and co-operation"*** for a ***"clean, clever, and competitive energy future"***. Ministers highlighted that **technology** and **efficient markets** would be key factors in reducing the environmental impacts of energy production and its use. **International co-operation** and sharing of **best practices**, in conjunction with industry, would be pivotal to accelerating progress towards this goal (**"the power of the market and promise of technology"**).

28. In practical terms, the message on the need for R&D on ***"cleaner combustion technologies and carbon capture and storage"*** is an acknowledgement that coal has an important role in the future, but that a high level of international and industry co-operation is needed to develop environmentally-friendly technologies, given their cost, complexity and lead times.

29. Further, during the G8 summit, held at Gleneagles on 6-8 July 2005, world leaders drew attention to why reliable and affordable energy supplies are essential for **strong economic growth** and **poverty alleviation**. In response to the accepted environmental challenge, the G8 communiqué focuses on energy efficiency and technological development through co-operation. In the case of coal, some specific actions are proposed:

    - Review, assess and disseminate information on the **energy efficiency** of coal-fired power plants with the aim of promoting the most cost-effective **best practices** in all countries, including **developing countries**.

- Demonstrate the potential of **advanced clean coal technologies** through national and international research programmes and partnerships with industry.
- Develop and commercialise **carbon capture and storage technology**, including a study of the "capture ready" plant concept and the role of economic incentives.

30. During 2006 and subsequent years, the CIAB has an important opportunity to support and facilitate the clean coal initiatives and organisational development mandated by G8 and the Asia Pacific Partnership, noting the key role that the IEA will play in these initiatives.

31. The CIAB is most effective when engaged in activities that are of genuine interest to Members, drawing on their practical, technical and commercial experience to complement the work of more specialised technical, financial and policy organisations. Following discussions at the 2005 CIAB Plenary meeting, it is proposed that CIAB working groups and agendas for 2006 should comprise:

**Zero Emissions Technologies *(Chair - Bill Koppe)***

32. The focus of this group will centre on contributing industry perspectives to coal RD&D in areas including:

- Potential for CCS
- How to commercialise ZETs?
- How to transfer ZETs to developing countries?
- Increased collaboration with IEA WPFF
- Increased support of IEA / CSLF programs
- Examine potential of Technology partnerships and engage with a view to support G8 and the Asia Pacific Partnership activities.

33. The group's current primary project is the compilation of a global atlas of geological storage opportunity - to provide a key reference to the evaluation of geological storage sites around the world in relation to current CO2 sources, to coal resources and to other fossil fuel resources - including CCS compatible oil and gas developments and infrastructure. A prime purpose of the Atlas is the identification of regions and sites with the potential to support commercial scale CCS developments – meeting a pre-requisite for attracting the substantial funding required for preliminary demonstration-scale developments. It will also identify regions where additional evaluation work is required to reliably define potential, as well as those regions reliably defined as having limited CCS potential.

34. Related projects that the ZETs group could also consider supporting are the compilation of a global register of clean coal technology projects, and a framework for geological storage collaboration between the coal and petroleum industries. There is no shortage of useful projects that could be undertaken subject to the availability of supporting resources.

**Creating Commercial Drivers for CCT Investment *(Chair - Deck Slone)***

35. The focus of this group will include:

- Impediments to investment in new technology
- Impediments to investment in developing countries
- Options for World Financial institutions support, and increasing their understanding of coal related investment issues

36. There is a pressing need to understand the potential mechanisms to drive the deployment of emerging clean coal technologies. The Group will work actively with the IEA to:

- Understand the lessons from experience with emissions trading in Europe
- Look to apply this thinking where it is relevant in other jurisdictions
- Consider how to get traction for CDM process for creating technology exchange
- Look at the nature of the investment challenges in developing countries, and
- Consider all possible other drivers for securing investment in CCTs, including tax incentives, other government incentives, etc.

37. The work might draw on experience in other industries, and in programs such as the US Clean Coal Technology Program as a way of introducing hard proposals such as tax incentives into IEA thinking. A workshop with IEA staff would better define a scope and work plan.

38. The ZETS and CCTs working groups will interact with each other as required and will provide key input into the G8 and APP work which seeks the international effort to accelerate deployment of low emission technologies internationally.

**Best Practice *(Chair - Andy Lloyd)***

39. The purpose of this group will be to:

- Examine efficiency aspects of the coal-electricity chain and recommend opportunities for improvement.
- Work with the WCI on a joint IEA/WCI workshop on CCTs at New Delhi in May 2006
- Possibly in conjunction with this workshop, support an IEA-led mission to China and India to follow-up and update the IEA on issues raised by the CIAB reports on China and India. An important sub-goal would be to gain CIAB Members from these countries.

40. Careful preparation, with the IEA Secretariat, will be necessary to agree objectives and strategies, leaders and participants for these missions. The IEA needs to understand the potential for improved coal use in these countries, including the Chinese work on gasification and liquefaction. In both countries there is sound expertise, and the task is to assess the size of the gap between common practice and best practice.

**Enhancing Energy Security *(Chair - Milton Catelin, WCI)***

41. The focus of this joint CIAB/WCI working group will include:

    - How to define and measure the contribution of coal to energy security
    - How can this contribution be increased?
    - What institutions are active in this area, and how best might they be encouraged to understand and promote coal's contribution?

42. The IEA work on this area, and in particular the finding that coal will only marginally be impacted by a switch to gas, will be reviewed. The WCI has recently completed a document on coal's role in energy security, and this is a key area for the IEA as well. It is recommended that any work in this area should focus upon building support for efforts of both these organisations in this area.

**Specific Ad-hoc Assistance and Advice to IEA**

43. There are several issues that might give rise to the need for ad-hoc and occasional advice to the IEA, which may or may not require work groups from time to time:

    - A group to co-ordinate the CIAB contribution to the WEO.
    - An offer to assist coal-related projects conducted in the IEA Secretariat (so that the CIAB has a better window on what the IEA is doing on coal in the environment office, for example.)
    - Follow-up the CIAB coal statement to collaborate on development of the WEO alternative scenario.
    - A group to review the role the CIAB could play in Coal Information

44. This is a challenging work programme for CIAB Members and their Associates. However, we believe that progress towards these work goals will usefully aid the IEA as it undertakes its own work to address the priorities emerging from the IEA Ministerial meeting and the G8 summit.

# 3 OVERVIEW OF WORLD COAL SUPPLY AND DEMAND

45. According to BP statistics, world consumption of **primary energy** grew very strongly by 4.3 percent in 2004 (2.9 percent in 2003). Within this total, EU15 countries' consumption grew by 1.3 percent, North America grew by 1.6 percent and the Asia Pacific region increased its energy consumption by 8.9 percent. Notable within the EU15 countries was a stagnation of energy demand in Germany, which accounts for nearly 20 percent of the EU15 total.

46. Asia Pacific energy growth was again dominated by Chinese growth in total primary energy and coal demand of about 15 percent. China's primary energy consumption now accounts for 13.5 percent of the world total.

47. Thirty years ago, coal accounted for roughly one quarter of world primary energy demand and it now accounts for over 27 percent. Coal use again grew strongly during 2004, by 6.3 percent compared with total energy growth of 4.3 percent. Nearly 70 percent of energy requirements in China, whose economy has been growing at about 8 percent annually since the mid 1990s, are met by coal.

## 3.1 Company Developments

### *United States of America*

48. Although unlikely to affect the global coal markets, the competitive nature of US coal markets meant that industry sales, acquisitions, and reorganizations remained very active in 2004 and early 2005. Details of significant company developments are shown in Appendix 1.

### *Japan*

49. Japanese companies' investment in overseas coal production continued during 2004 and 2005.

50. Itochu announced in December 2004 the purchase of a 1.5 percent share of the Heilongjiang Longmei Group Co. Ltd., Heilongjiang Province, China. The Heilongjiang Longmei Group produces 55 million tons of coking and thermal coals per annum and plans to expand production to 100 million tons per annum by 2010.

51. In July 2005, Japan Coal Development Co., Ltd. acquired a 3.5 percent interest in the Clermont Coal Project in Queensland, Australia, in which Mitsubishi and J-Power have 31.4 percent and 15 percent interests respectively. The Clermont Project is expected to start thermal coal production in 2009 at 12 million tons per annum.

52. Idemitsu announced in July 2005 the development of the Boggabri Project in New South Wales, Australia. The Boggabri Project is expected to start production in JFY2006 at a rate of 1.5 million tons per annum of thermal and semi-soft coking coals.

53. In August 2005, Nippon Steel announced the acquisition of a 2.5 percent interest in the Elkview Coking Coal Mine in Canada. The Elkview Mine produces 5.6 million tons per annum of hard coking coal and is planned to expand to 7 million tons per annum in 2007.

## 3.2 Coal Demand Developments

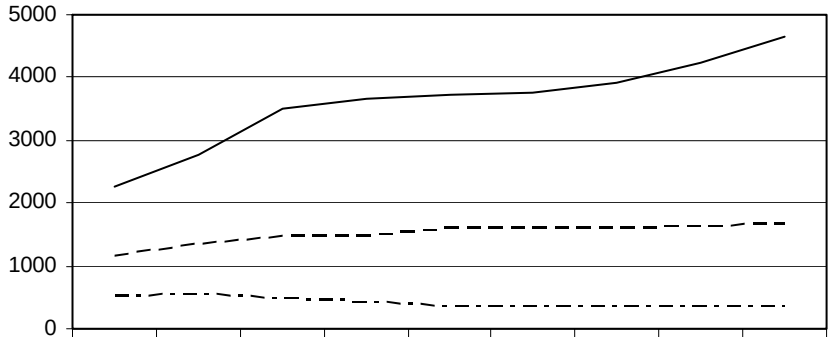
### 3.2.1 Total Hard Coal Demand

54. During 2004, IEA statistics show that **World** consumption of hard coal grew by over 9 percent or 395 million tonnes, continuing to grow at a rate very similar to 2003. Within that total, OECD consumption increased at a lower rate of 3.1 percent while consumption within EU(19) countries remained static. World hard coal consumption has increased by nearly 25 percent since the year 2000.

**Chart 1 - Hard Coal Demand**

***(million tonnes)***

***Source: IEA Statistics***




| | 1973 | 1980 | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004e |
|---|---|---|---|---|---|---|---|---|---|
| EU (19) | 497 | 543 | 480 | 408 | 353 | 353 | 345 | 360 | 361 |
| OECD | 1143 | 1334 | 1463 | 1455 | 1579 | 1584 | 1590 | 1621 | 1671 |
| World | 2248 | 2781 | 3513 | 3669 | 3735 | 3752 | 3902 | 4251 | 4646 |

55. **China** was again largely responsible for the increase in world hard coal demand during 2004, with its 20.4 percent increase accounting for over 300 m. tonnes of the 395 m. tonnes growth in world demand. The China Coal Industry Association estimates that growth in 2005 will be lower as macro-economic policy reins in growth, water power increases following heavy rains in south China and demand from cement producers, one third of which ceased operating in 2004, reduces.

56. According to China's National Bureau of Statistics, the country's GDP grew by 9.5 percent in 2004, while coal production and power generation both increased by about 15 percent, iron and steel production was up by nearly 24 percent and investment in fixed assets grew by nearly 25 percent. Experience in the first half of 2005 indicated that GDP will continue to grow at this rate, with official estimates for 2005 having recently been revised from 8.8 percent to 9.2 percent.

57. For the **USA**, the IEA estimates growth of 3.1 percent in hard coal demand and a decline of 2.3 percent in brown coal demand during 2004. Brown coal accounts for less than 8 percent of total coal demand. According to the US Energy Information Administration, total coal demand for use in the United States was 1,104 million short tons in 2004 (metric: 1,001 million tonnes). Exports were 43.5 million tonnes, bringing total demand for United States coals to 1,045 million tonnes. In 2005, the US is on track to use 1,040 million tonnes domestically and to export approximately 44 million tonnes, of which 30

million tonnes will go to overseas destinations and 14.5 million tonnes to Canada.

58. It should be noted that most brown coal (lignite) produced in the United States is used for power generation, although some is used for gasification purposes. Thus, brown coal use in 2004 approximated 83.5 million short tons (metric: 75.8 million tonnes) and is expected to be the same in 2005.

59. In **Japan**, total metallurgical coal, thermal coal and anthracite imports in FY2004 were 184 million tonnes, a 16 million tonne increase on the previous year. The increased import volume comprised two-thirds thermal coal and one-third coking coal. The largest share of imports (56 percent) was from Australia, while China accounted for 16 percent and Indonesia 15 percent.

60. **United Kingdom** coal demand declined by 2.8 percent in 2004, with reductions in power station and coke oven demand being balanced by an increase in other uses. Demand for power station coal declined by 2.7 million tonnes (nearly 5 percent).

**Table 1 - UK Hard Coal Demand 2003, 2004 and 2005 (1st Quarter)**

| ***million tonnes*** | **2003** | **2004** | **% Change** | **2004 Q1** | **2005 Q1** | **% Change** |
|---|---|---|---|---|---|---|
| Power Generation | 53.1 | 50.4 | -4.9 | 15.7 | 16.3 | 3.8 |
| Coke Ovens | 6.6 | 6.4 | -3.5 | 1.6 | 1.5 | -6.2 |
| Other | 2.7 | 3.8 | 40.1 | 0.9 | 0.9 | - |
| **TOTAL** | **62.4** | **60.6** | **-2.8** | **18.2** | **18.7** | **2.7** |

*Source:* UK Department of Trade and Industry Statistics

61. In **Germany**, a total of 66.2 million tce of hard coal was traded in 2004, 3.6 percent less than the previous year (IEA estimated figures suggest a 1.8 percent increase in tonnes demanded). This downturn can be attributed almost exclusively to the fall in demand from the electricity industry and has continued into the first half of 2005. The contribution made by imported fuel to the German coal market again exceeded that of the domestic mining industry, whose output of nearly 27Mtce was in line with the 2003 figure.

62. In 2004, Germany was the main importer of hard coal in the EU, and of coke worldwide. Around 40 million tonnes of hard coal and coke were imported and the biggest supplier was South Africa (25 percent), closely followed by Poland (almost 22 percent) and Russia (16 percent). Most of Germany's coke imports originated from Poland, with an increasing trend towards imports from the People's Republic of China

63. Sales of coal and coke by the German coal industry totalled some 28.2Mtce in 2004, which almost matched the previous year's result.

64. **Canada** consumed 46.4 million tonnes of hard coal, of which 19 million tonnes was imported. Hard coal exports amounted to 27.1 million tonnes[2].

### 3.2.2 Steam Coal Demand

65. **World** consumption of steam coal increased by 9.3 percent (345 million tonnes) in 2004

[2] Includes trade with USA

according to IEA provisional estimates. IEA estimates made last year showed a 3.8 percent increase for 2003, but revisions of +190 million tonnes to the 2003 figure now show that growth in 2003 had been similar to that now estimated for 2004. The last two years have therefore both seen substantial growth in steam coal use, driven by its continued use in developed economies including Europe, as well as very rapid growth in developing economies including China and India. Growth in non-OECD countries was close to 15 percent.

**Table 2 - Steam Coal Demand (million tonnes)**

| | 2002 | 2003 | | 2004e | |
|---|---|---|---|---|---|
| | m.tonnes | m.tonnes | %change | m.tonnes | %change |
| EU(19) | 267 | 280 | 4.9 | 280 | 0.0 |
| OECD | 1386 | 1415 | 2.1 | 1443 | 2.0 |
| World | 3407 | 3730 | 9.5 | 4075 | 9.3 |

*Source:* IEA Statistics

66. In **China**, rapid economic growth is continuing to drive electricity demand, which has grown at an annual average of 8 percent over the last 20 years. The 10th Five-Year Plan (2001-05) planned to meet electricity demand growth of 4.8 percent p.a. to 1,730TWh by 2005, and generation capacity growth of 3 percent p.a. to 370GW. However, rapid growth has resulted in accelerated capacity installation, and the construction of 30 new power stations with a combined generation capacity of 23GW was approved in 2003. Over 70 percent of China's electricity generation is fuelled by coal, 25 percent is hydro and 2 percent nuclear. More than 60 percent of Chinese coal is used for power generation.

67. Steam coal demand in **South Africa** increased by over 6 percent to 178 million tonnes in 2004 (IEA estimates a 2.5 percent increase to 170 million tonnes). Local market consumption is 73 percent of the total output (bituminous coal 99 percent and anthracite 1 percent). The rest is exported mainly through Richards Bay Coal Terminal (97 percent), Durban (1.4 percent) and Maputo (1.3). Final approval for the expansion of RBCT from 72 million tonnes capacity per annum to 82 million tonnes will only be signed by RBCT and the National Port Authority later in the year. This agreement will make it possible for Black Economic Empowerment (BEE) in the coal industry to participate in the coal exporting market. The 10 Mt capacity expansion, referred to as Phase V, will cost R750 million.

68. For **Japan,** the IEA estimates a 3.6 percent decline in steam coal demand to 97.1 million tonnes in 2004. However, demand for steam coal from power utilities grew by 5 million tonnes to 80 million tonnes in FY2004. The increase resulted from a revival in electricity demand because of a hot summer and economic recovery during 2004. About 62 percent of these purchases were made from Australian suppliers, with China's share reduced to about 19 percent due to their increased domestic consumption and Indonesian coal increasing its share to about 12 percent.

69. In the **United States**, according to preliminary data from the Energy Information Agency (EIA), the electric power sector used 1,015 million short tons of coal (metric: 921 million tonnes) in 2004 for electricity generation and for useful thermal output. Just over 51.5 percent of all electricity produced during the year was coal-fired. Total electricity generation increased by 1.95 percent in 2004 but generation from coal was essentially flat. Due in part to lower than desired coal inventories, utilities had use more expensive natural gas as generation from natural gas increased by 9.0 percent in 2004. Nuclear generation increased by 3.3 percent in 2004.

*70.* The outlook for coal use by electricity generators in the United States remains strong in 2005 and EIA expects 1,060 billion short tons (962 million tonnes) to be burned to generate nearly 51 percent of electricity produced. Coal-fired generation continues to be by far the lowest marginal cost source of fossil-fired electricity.

*71.* The demand for electricity during the first eight months of 2005 increased by 2.0 percent. A cooler than normal US spring was followed by a hotter than normal summer, thus increasing coal burn. Coal-fired power generation through the first eight months of the year increased by 1.5 percent over 2004 levels. In many places electric generators continued to use coal in preference to more expensive natural gas, although summer restrictions on NOx in the eastern part of the country inhibited coal burn slightly. Coal also replaced base load nuclear power which declined by 2.5 percent over 2004 levels. Since May, the weather throughout the United States has been very warm and data available from the Edison Electric Institute shows that electricity generation from early June to mid August was up by 7.6 percent. As much of the increase has been in traditional coal burning areas, coal use should end the year on a very strong note.

72. Industrial use of coal for steam generation and other purposes totalled 65.5 million short tons in 2004 (59 million tonnes), showing little change from 2003. The EIA expects that industrial use of coal will increase by approximately 5 percent in 2005, partially in response to high natural gas prices.

73. In **Germany** in 2004 approximately 47 million tce was used for power and heat generation at power stations, almost 3 million tce less than in 2003. Deliveries of indigenously produced steam coal to power stations remained unchanged from the 2003 figure of 21.1 million tce.

74. **Italy** has a power generation capacity of 60 GW, producing 276.4 TWh in 2004. The country consumed 322 TWh, including electricity imports. Generation is 80 percent thermal (oil, gas, and coal), with the mix shifting away from oil towards natural gas, which is expected to become the dominant fuel source for power generation by the end of the decade.

75. Most of the coal consumed in Italy is used for power generation and approximately 24 million tonnes of hard coal were imported in 2004. The main suppliers of steam coal were South Africa (7 million tonnes), Indonesia (3.8 million tonnes), Columbia (3.1 million tonnes), and Russia (1.9 million tonnes). Higher imports will be required in future years as ENEL decreases its reliance on imported oil, although coal will not play as important a role as natural gas.

76. Despite many predictions, coal burn in the **United Kingdom** has remained strong as rising gas prices make coal the fuel of choice, especially in the UK winter months. This has led to an increase in coal imports to meet demand, rising by over 13 percent in 2004 to 36.1 million tonnes and continuing this trend in the first quarter of 2005.

77. Total UK power generation in 2004 was 393TWh (gross[3]), a slight decrease on 2003, with electricity imports nearly doubling from 5.1TWh to 9.8TWh. Of this total, 132TWh was generated from coal (33.5 percent), a marginally lower proportion than in 2003.

78. Wholesale electricity prices have risen, driven by increasing gas (and therefore carbon) prices. Despite the onset of the EU Emissions Trading System, the cost of coal (plus carbon credits) is currently lower than that of gas (plus carbon credits) during the UK

[3] i.e. including power subsequently used within the power industry itself (aux power, T&D losses…)

winter, with the two fuels being more or less evenly matched during the summer.

79. Several power stations have changed hands, with the general trend being for the larger generating companies to expand their portfolio through the acquisition of Combined Cycle Gas Turbine (CCGT) power stations. However, there is little activity in the field of power station construction, other than for renewable energy.

80. Over the next decade, the closure of a significant portion of the UK's nuclear fleet, and of coal- and oil-fired plant opted out of the European Large Combustion Plant Directive, will result in the need for a substantial programme of new build. There are a few developers interested in new coal-fired power stations and it is expected that most new plant will be CCGTs. Approval has been granted for a 430 MW IGCC in Yorkshire (although construction has not started) and an application for a 480 MW IGCC to be built in South Wales is currently being considered.

81. Tightening $SO_2$ emission limits at power stations within the UK have resulted in higher-sulphur indigenous coals being limited to stations fitted with flue gas de-sulphurisation (FGD) equipment and lower sulphur imports being used at non-FGD stations. This has led to a strong demand for low-sulphur Russian coals which have now overtaken South African coal as the number one supplier into the UK.

### 3.2.3 Coking Coal Demand

82. Table 3 shows IEA statistics for coking coal demand in the major world regions.

**Table 3 - Coking Coal Demand (million tonnes)**

| | 2002 m.tonnes | 2003 m.tonnes | %change | 2004e m.tonnes | %change |
|---|---|---|---|---|---|
| EU(19) | 78 | 80 | 2. | 81 | 1.6 |
| OECD | 204 | 206 | 1.1 | 228 | 10.7 |
| World | 495 | 522 | 5.4 | 571 | 9.5 |

*Source:* IEA Statistics

83. **World** and **OECD** demand for coking coal increased by approximately 10 percent in 2004, driven by strong growth in iron and steel output from the largest world producers. World pig iron production grew by 7 percent, with 80 percent of the world growth being accounted for by China. Equivalent numbers for world crude steel production are 9 percent and 57 percent. China now accounts for close to one third of world coking coal demand. As the table below shows, strong world growth in iron and steel production continued through 2005 although production continued to decline in OECD countries.

**Table 4 - Primary Iron & Steel Production (11 months to November)**

| | Blast Furnace Iron (m. tonnes) | | | Direct Reduced Iron (m. tonnes) | | | Crude Steel (m. tonnes) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2005 | % change | 2004 | 2005 | % change | 2004 | 2005 | % change |
| EU (25) total | 101 | 98 | -3.5 | 0 | 0 | 0.0 | 178 | 172 | -3.8 |
| OECD | 262 | 255 | -2.5 | 6 | 7 | -12.1 | 473 | 461 | -2.5 |
| World | 652 | 711 | 9.0 | 39 | 42 | 7.1 | 953 | 1012 | 6.1 |

*Source:* International Iron & Steel Institute

84. In **Japan**, total metallurgical coal (coking coal plus PCI coal) imported by steel mills and coke manufacturing companies in FY2004 was 69 million tonnes, slightly above the previous year's total. Crude steel production increased from the previous year, supported by strong demand in steel products. In order to maintain higher productivity in blast furnace iron making, Japanese steel mills increased their consumption of coke and reduced PCI, by replacing High Volatile PCI coal with Low Volatile PCI coal. Approximately 60 percent of imports were from Australia. Coal imports from the USA increased significantly, while those from China and Canada decreased.

85. Coking coal use in the **United States** declined in 2004 to 23.7 million short tons (metric: 21.5 million tonnes). Steel production was 109.9 million short tons (99.7 million tonnes), sharply up by 6.4 percent on 2003 levels. The industry operated at an average 95 percent capacity utilisation throughout the year in response to the increased demand. Just over 52 percent was produced in electrical furnaces. Tariffs on foreign steel imports were lifted in November 2003 and as a result imports of finished steel increased by 55 percent in 2004. Steel imports remained at high levels in 2005 and, as demand appears to be levelling, production of raw steel through the first seven months of 2005 has declined year-on-year.

86. Through the first half of 2005 consumption of coking coal was 1.7 percent below 2004 levels, which makes the EIA forecast of a 1 million short ton increase in coking coal use in 2005 seem optimistic. Although new coke oven capacity is coming on line in 2005, demand has fallen off. Imports of coke through August 2005 are down by almost 46 percent, another indication of falling demand.

### 3.2.4 Total Brown Coal Demand

**Table 5 - Brown Coal Demand (million tonnes)**

| | 2002 | 2003 | | 2004e | |
|---|---|---|---|---|---|
| | m.tonnes | m.tonnes | %change | m.tonnes | %change |
| EU(19) | 389 | 391 | 0.5 | 390 | -0.2 |
| OECD Total | 630 | 630 | 0.0 | 625 | -0.7 |
| World | 892 | 909 | 1.8 | 889 | -2.2 |

*Source:* IEA Statistics

87. World growth in demand for brown coal declined by 2.2 percent in 2004, reversing the 2003 growth and falling to a level below any seen since the mid 1970s. Most countries and regions of the world experienced declines, notable exceptions being Germany, Spain, Turkey, India, Australia and Korea.

88. In **Germany,** Lignite is mainly used for power generation, followed by utilisation in processing plants. Between 1990 and 1999, demand more than halved to 163 million tonnes, but has been growing at an average rate of over 2 percent per year since then. In 2004, some 11.2 million tonnes were used for product processing at lignite industry-owned facilities and 1.7 million tonnes were used for power generation in coal industry power plants. 169.1 million tonnes of lignite were used by the electricity industry for power generation, equivalent to 26.1 percent of total power generation in Germany and 93 percent of total lignite production in 2004. Germany has a lignite-based power plant capacity of some 20GW, one third of which went on stream in the second half of the last decade or in the first years of the current decade.

89. In **Turkey**, lignite use increased by almost 35 percent between 1990 (45 million tonnes) and 2001 (61 million tonnes), but declined sharply to 51 million tonnes in 2002 as a consequence of natural gas volume commitments in supply agreements. Lignite use in 2004 was 46.2 million tonnes, most of it (65 percent) supplied to lignite-fired power plants and the remainder divided equally between industrial users (17 percent) and residendial heating (16 percent).

90. 6,440MW of the total 36,822MW installed electricity generating capacity is lignite-fired plant. The 320MW Can lignite-fired power plant uses Fluidized-Bed Combustion technology. In 2004, the country's gross electricity production reached 149.6 TWh, of which 22.4 TWh (15 percent) was produced from lignite.

91. The state-owned electricity generation company (EUAS) produces lignite entirely for its own power stations. The price of lignite is set by the state-owned Turkish Coal Enterprises (TKI) with lower prices charged to its guaranteed lignite-fired power plant market. Lignite production will increase in future years to meet Turkey's growing power requirements.

## 3.3 Coal Supply Developments

92. A common feature to the **Australian** supply landscape has been increasing costs and shortages of equipment, skilled people and secondary inputs. Equipment manufacturers' order books are full and there are global shortages of heavy equipment, tyres and explosives. On the cost side, the rising costs of steel, and fuel and wage inflation, have increased at a rate far greater than offsetting efficiency improvements. High coal prices have also seen a growth in sustaining capital investment, the deferral of which had kept costs artificially low in previous years.

### 3.3.1 Hard Coal

93. World production has continued to grow strongly over the last four years, driven to a significant extent by China. OECD countries' production has remained broadly stable since 1990, while the steady decline in EU (19) countries' production continued through 2004.

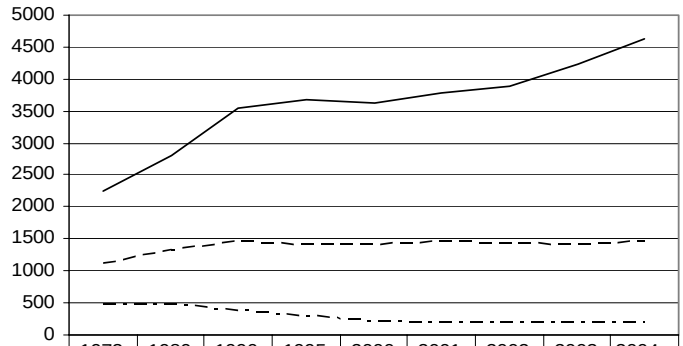
94. According to IEA estimates, **China** produced 1,956 million tonnes of hard coal in 2004, 19.5 percent more than in 2003, accounting for 42 percent of the world total. Exports were 87 million tonnes in 2004, of which 80 million tonnes were steam coal. According to the China Coal Industry Association, production in the first quarter of 2005 was 45.07 million tonnes, an increase of 11.9 million tonnes year-on-year.

95. In August 2005, China's State Administration of Coal Mine Safety ordered over one fifth of China's mines to close until they can meet required safety standards, and anticipated that the total number of suspensions would reach 7,000. The total number of mines in China is about 26,000 and, as most of the suspended mines are very small, there will be only a marginal effect on total production.

## Chart 2 - Hard Coal Production

***(million tonnes)***

***Source: IEA Statistics***




| | 1973 | 1980 | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004e |
|---|---|---|---|---|---|---|---|---|---|
| EU(19) | 467 | 488 | 368 | 289 | 202 | 195 | 189 | 186 | 180 |
| OECD | 1117 | 1336 | 1456 | 1405 | 1395 | 1468 | 1433 | 1404 | 1449 |
| World | 2237 | 2805 | 3535 | 3674 | 3628 | 3794 | 3902 | 4231 | 4629 |

96. **South African** hard coal production increased by over 6 percent in 2004, reaching 243 million tonnes (IEA estimate 238 million tonnes). South Africa's 2005 total coal production is estimated at 248 Mt. Approximately 70 Mt will be exported and 178 Mt sold domestically to: Eskom (115 Mt), Sasol (45 Mt) and others (18 Mt). There are 29 billion tonnes of mineable reserves in-situ, although infrastructure weaknesses, especially rail and port, and the distance of reserves from ports constrain competitiveness.

97. **Columbian** hard coal exports (the vast majority of production) increased 12 percent to 51 million tonnes in 2004. These exports are increasingly finding customers in the USA and several southern utilities are using or trialling the coal.

98. 2004 saw **Indonesian** coal production again increasing strongly to 129 million tonnes, repeating the 12 percent growth seen in 2003. Indonesia now accounts for almost 15 percent of world hard coal exports.

99. In response to the historically high price, especially for coking coals, a number of projects in which **Japan**ese companies have interests have announced production expansions and a number of new projects have been given the go-ahead or are at the final feasibility stage. New projects include Carborough Downs, Poitrel, Millenium and Lake Lindsay, Vermont and Rolleston. Subject to infrastructure availability, exports from Australia could increase by as much as 40 million tonnes over the next three years and some coal buyers have already committed to a portion of the increased capacity.

100. The Minerva Project in Queensland, Australia, in which Sojitz has a 30 percent interest, is starting production of thermal and semi-soft coking coals in the second half of 2005 and is expected to increase its production to 2.5 million tonnes per annum in 2007.

101. The Rolleston Thermal Coal Project in Queensland, Australia, in which Sumitomo and Itochu have an equal 12.5 percent interest, is starting its coal production in the second half of 2005 and is expected to expand its production to 8 million tons per annum in 2007.

102. In December 2004, Mitsui announced the expansion of the Dawson Complex (Moura/Theodore), held by a joint venture between Mitsui (49 percent) and Anglo (51 percent). The Dawson Complex produces 7 million tons per annum of coking and

thermal coals and will increase production to 12.7 million tonnes per annum in 2007.

103. Mitsui has announced that it will take a 30 percent interest in the Russian Denisovskaya coking coal project. Full production of 3.6 million tonnes, of which two thirds will be export coking coal, is expected by 2008.

104. In the **United States of America**, **total coal production** in 2004 was 1,111.5 million short tons (metric: 1,008.3 million tonnes), 3.7 percent above the 2003 figure. Hard coal (bituminous and sub-bituminous) production totalled 1,027.9 million short tons (932.5 million tonnes) tons and brown coal (lignite) production was 83.6 million short tons (75.8 million tonnes).

105. Production increased in almost all coal producing states in 2004 as demand continued to outstrip supply. However, despite record demand for coal domestically and an increase in demand for US coal for export, coal production was constrained for several reasons: continued problems on the nation's major waterways due to flooding and major lock and dam repair work; rail transport problems related to weather events (heavy rains and hurricanes); and temporary technical or weather related production problems at mines in all regions of the country.

106. The resulting production shortfall was made up from imports and inventories. Coal imports increased in 2004 to 27.3 million short tons (24.8 million tonnes) and inventories fell by approximately 18.2 million short tons (16.5 million tonnes) to the lowest overall level since 1999.

107. Production in 2005 is expected to increase to 1,140.5 million short tons (1,034.4 million tonnes) an increase of 2.6 percent. This is somewhat less than the industry's capacity to produce coal and has again been affected by weather, especially with regard to the transportation network. A Midwestern drought continued to affect coal transportation on the waterways and unseasonably heavy rain in the west caused rail derailments on the line from the Powder River Basin early in 2005. While this problem is being addressed, coal shipments from the PRB (the source of almost one-third of US production) have been constrained, although they are expected to be at more normal levels for the rest of the year.

108. As demand for coal continues to increase and production does not keep pace for the third consecutive year, imports are expect to increase once again, to approximately 33 million short tons (30 million tonnes), and inventories will decline again. Low inventories could be problematic in some regions of the country over the US winter season, especially if it is particularly cold.

109. In 2004, **Canada** produced 54.4 million tonnes of hard coal, including 25.1 million tonnes of sub-bituminous coal. The strong demand for metallurgical coal in international markets has resulted in significant activity in Canada's metallurgical coal mining sector. Four mines commenced or re-commenced operations in Alberta and British Columbia and more projects have been announced for future start-up.

110. In **Germany**, Deutsche Steinkohle's nine remaining working collieries in the Ruhr (seven pits), Saar (one pit) and Ibbenbüren (one pit), produced a total of 26.6 million tce (25.7 million tonnes saleable output) in 2004, similar to the 2003 figure. Germany's only operating colliery-owned coking plant (*Prosper/DSK*) produced 2.1 million tonnes of coke in 2004. Steel industry coking plants produced some 6.4 million tonnes of coke.

111. German coal policy is still governed by the Coal Agreement of 13 March 1997, which will remain in force until the end of 2005. The number of employees in the hard coal mining

sector decreased by 7.8 percent from 45,581 on 31 December 2003 to 42,005 on 31 December 2004. Underground operations employ 22,333 mineworkers, or 53.2 percent of the workforce (as at 31 December 2004).

112. Decisions taken in 2003 on a follow-up regime for the period 2006 – 2012 involve reducing hard coal output from 26 million tonnes in 2005 to 16 million tonnes in 2012. A plan for colliery closures to meet this decline in production has been drawn up by Deutsche Steinkohle AG. Warndt/Luisenthal will close on 1 January 2006 and Lohberg/Osterfeld on 31 March 2006, reducing mining capacity by 4 million tonnes. Further closures will be Walsum, on 1 January 2009, Lippe on 1 January 2010 and other capacity yet to be determined.

113. In **France**, the last mine, La Houve, closed in April 2004 and it is expected that the state-owned coal company CdF will be wound up some time in 2007. Hard coal production more than halved, to less than 1 million tonnes, in 2004.

114. In the **United Kingdom**, indigenous coal production continues to decline as deep mine collieries reach the end of their economic lives and surface mines find difficulty in obtaining planning permission. In 2004 UK production fell to its lowest recorded level of 25.1 million tonnes and imports are now running at record levels, accounting for 55 percent of UK demand in Q1 2005.

115. UK COAL Mining, the UK's largest producer announced the closure of the Ellington Colliery in February 2005 after it suffered a substantial and continual inflow of water on its working coalface. As a result of this closure, and the closure of the Selby coalfield in 2004, surface mine production overtook deep mined output for the first time in the first quarter of 2005.

116. In July 2005 UK COAL Mining also announced that Harworth Colliery is to abandon its current seam after working the current face due to adverse geology. It is hoped to mothball the colliery to allow plans to be drawn up to access alternative seams.

117. ATH Resources, a surface mine operator in Scotland and third largest coal producer in the UK, listed on the UK stock market in the August 2004. The company has a since acquired additional surface operations in Scotland as part of its policy of expanding output.

**Table 6 - UK Coal Supply 2003, 2004 and 2005 (1st Quarter)**

| ***million tonnes*** | **2003** | **2004** | **% Change** | **2004 Q1** | **2005 Q1** | **% Change** |
|---|---|---|---|---|---|---|
| UK Production | 28.3 | 25.1 | -11.2 | 6.4 | 5.2 | -18.8 |
| Imports | 31.9 | 36.1 | 13.4 | 8.9 | 10.3 | 15.7 |
| Exports | 0.5 | 0.6 | +14.2 | 0.1 | 0.1 | - |
| From Stocks | 2.7 | - | -100.0 | 3.0 | 3.3 | 10.0 |
| **TOTAL** | **62.4** | **60.6** | **-2.8** | **18.2** | **18.7** | **2.7** |

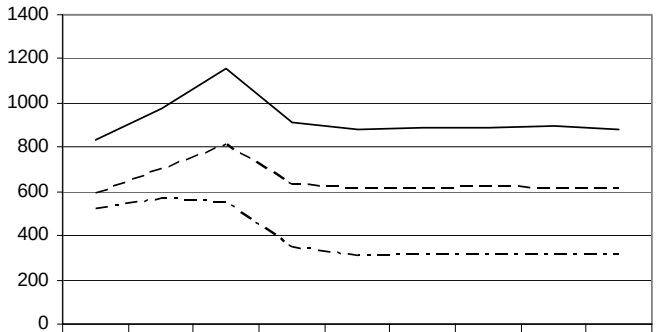
*Source:* UK Department of Trade and Industry Statistics

### 3.3.2 Brown Coal

**Chart 3 - Brown Coal Production**

***(million tonnes)***

***Source: IEA Statistics***




| | 1973 | 1980 | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004e |
|---|---|---|---|---|---|---|---|---|---|
| EU(19) | 520 | 566 | 551 | 348 | 308 | 316 | 318 | 318 | 317 |
| OECD | 590 | 699 | 807 | 626 | 614 | 617 | 622 | 615 | 616 |
| World | 835 | 979 | 1153 | 909 | 884 | 888 | 885 | 893 | 879 |

118. **Germany** remains the world's largest producer of brown coal, with 2004 production recovering the 1.5 percent decline in 2003 to again reach nearly 182 million tonnes, or 20 percent of world production. Production, from opencast mines, was divided between four regions: Rhineland (100.3 million tonnes), the Lusatian region (59 million tonnes), Central Germany (20.3 million tonnes) and Helmstedt (2.4 million tonnes).

119. Coal has the biggest share of **Turkey**'s primary energy production (42 percent of the 24 Mtoe in 2004). Turkey produces both hard coal and lignite, but lignite is the most important domestic energy source and production is spread throughout almost all regions of the country. Total reserves amounted to 9.3 billion tonnes in 2004.

120. Lignite is produced by two state-owned companies, Turkish Coal Enterprises (TKI) and the Electricity Generation Company (EUAS), and by the private sector. Of the total 9,3 billion tonnes reserves, EUAS owns 4.8 billion tonnes, TKI owns 2.5 billion tonnes and private sector owns the rest. TKI, the biggest lignite producer, has production capacity of 45.8 million tonnes and produced 55 percent of the 47.3 million tonnes of lignite produced in 2004, supplting power station, industrial and heating markets. The private sector produces almost 10 percent of the total, supplying heating and industrial markets, and EUAS produces lignite for its own power stations.

121. **Canada** produced 25.1 of sub-bituminous coal and 11.6 million tonnes of lignite in 2004. The lignite was all consumed within Canada.

## 3.4 Trade and Prices

### 3.4.1 Trade Volume

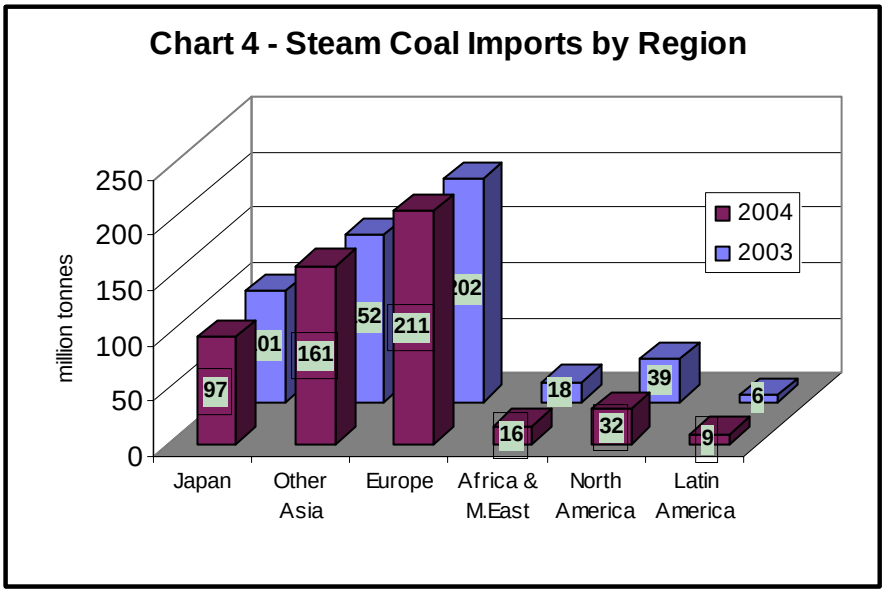
122. According to IEA statistics, world hard coal trade increased by about 4.5 percent (33 million tonnes) in 2004 after growth of more than 10 percent in 2003, with similar rates of

increase in coking coal and steam coal trade.

123. World **steam coal** trade grew to 540 million tonnes during 2004. Global demand for **seaborne** traded steam coal grew by approximately 36 million tonnes (8.4 percent) to about 465 million tonnes in 2004 (IEA estimate 31 m.tonnes, 7 percent, growth to 480 million tonnes). Of this growth, about 31 million tonnes was in the Asia-Pacific Basin while 5 million tonnes of the demand growth came from Atlantic markets. Chart 4[4] illustrates the changes in 2004 steam coal trade by import region (IEA estimates).

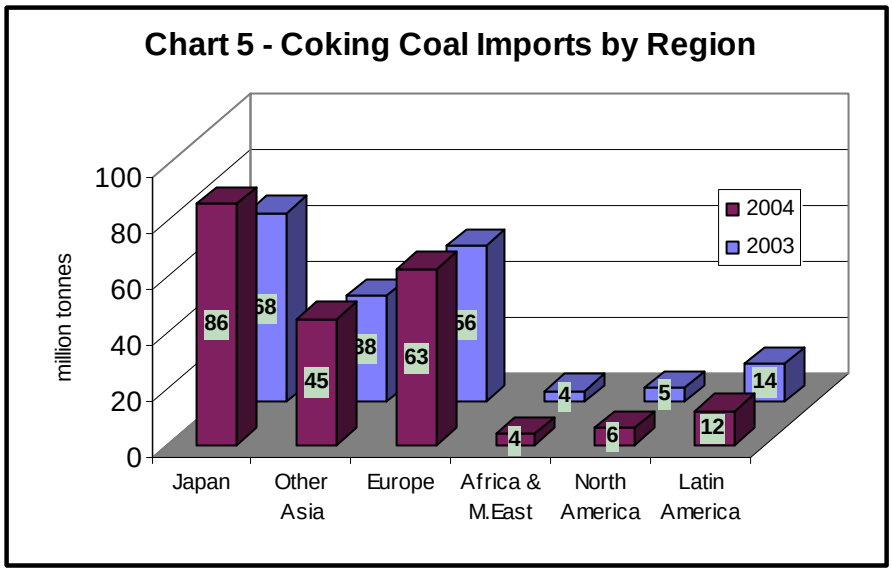
124. Seaborne traded thermal coal demand is expected to grow by 15 Mt (3.2 percent) in 2005. The EU Emissions Trading System will limit coal burn in Europe and there are no new coal-fired stations planned for Japan, the world's largest consumer of imported thermal coal. It is expected that the emerging markets of India, Mexico and Southern China will provide pockets of growth in the Asian region and that the USA will continue to be a growing destination for Colombian and Venezuelan exports.

125. Despite this relatively low rate of growth in 2005, the Pacific and Atlantic markets have remained finely balanced, with strong pricing.




126. World **coking coal** trade grew by 8 million tonnes to 214 million tonnes during 2004. World **seaborne** coking coal trade grew by 5 million tonnes to 196 million tonnes. (IEA statistics, including Australian exports of soft and semi-soft coking coal used for PCI). Chart 5 illustrates the changes in 2004 coking coal trade by import region (IEA estimates and definitions).

[4] The changes in imports by region shown in Chart 4 & Chart 5 do not equate to changes in total imports due to differences in the balancing item in the IEA trade matrices for 2003 and 2004, not shown in the charts.




127. All of the growth was accounted for by increases in demand for hard coking coals, while demand for weak and semi-soft coking coals remained flat at approximately 33 million tonnes p.a. Demand for seaborne export PCI coals increased by about 10 percent to 27 million tonnes in 2004.

128. The bulk of the increase in demand came from the fast-growing markets of China, and to a lesser extent India and Brazil. On the supply-side, China reduced their coking coal exports by about 3million tonnes in 2004 in order to satisfy their own booming demand. The USA emerged as the vital swing supplier in 2004, increasing its exports from 15 million tonnes (IEA: 20 million tonnes) to about 24 million tonnes in just one year. Additional supply increases were provided by Australia and Canada. Australia increased coking coal exports from 96 million tonnes in 2003 to 101 million tonnes in 2004 and remains by far the largest supplier of export coking coal to the world market.

129. It is expected that the global market will once again increase by approximately 5 percent in 2005 and that large increases in Australian, and to a lesser extent Canadian, export capacity will meet the bulk of this growth in demand. The strength of the global steel market should lead to maximisation of blast furnace output and a resultant increase in demand for prime hard coking coals.

130. In the **Pacific markets**, strong growth was observed in the major coal markets of Japan, South Korea and Taiwan. Growth was also seen in the emerging markets of India, Southern China and Southeast Asia. India imported 16 million tonnes of steam coal in the financial year ending March 2005 and this could almost double over the next two years on the back of increasing demand from electricity producers, which indigenous producers are not well placed to meet.

131. On the supply-side, Indonesia accounted for the majority of the growth in Pacific region coal trade as its exports lifted by about 15 million tonnes (or 17 percent) in 2004. Australian thermal exports grew by about 5 million tonnes to 106 million tonnes while the Chinese exporters pulled back slightly to around 70 million tonnes, down from 73 million tonnes in 2003 in accordance with their export license restrictions designed to ensure adequate thermal coal supply to their booming domestic market. In the Atlantic market, South African exports declined to 66 million tonnes in 2004 due to poor railing performance to the key Richards Bay export terminal.

132. In 2005, coal demand growth in Japan has been stronger than forecast, driven by stronger GDP and continuing low utilisation of the nuclear fleet and re-stocking. Korean imports are in line or slightly below those of 2004, offering some correction to the over-buying and stocking seen in 2004. Taiwan's imports have continued their steady growth, which will be further bolstered by new electricity plant commissioning in late 2005. Elsewhere in Asia, India looks set to live up to expectations and see import growth in excess of 5 million tonnes.

133. China's thermal coal exports continue to moderate, falling an estimated 4 million tonnes to 64 million tonnes for 2005, and there is a small increase in import volume as China struggles to meet growing demand for electricity. In 2005, 23 of China's 32 provinces have experienced power shortages. Indonesian expansions have been important in meeting Chinese demand during 2005. A recent report[5] has suggested that, despite announced plans to build up to twelve new LNG import terminals, the contribution of LNG to meeting power generation requirements may be limited by its high cost relative to coal and pipeline gas.

134. Indonesian continues to be largest source of supply growth to the seaborne market in 2005 adding an estimated 12-15 million tonnes for the calendar year and overtaking Australia as the world's largest exporter of steam coal.

135. Australian steam coal growth has been moderate in 2005, adding only 2-4 million tonnes to exports due to continuing port and rail capacity constraints. Further, metallurgical coals have squeezed thermal exports, with producers, where possible, diverting port capacities to higher margin metallurgical coals.

136. In order to diversify supply, Japanese and other Asian steam coal buyers have favoured Chinese and Indonesian coals, with their short-distance supply routes, in the last couple of years. In FY 2004, however, due to supply disruptions in China and Indonesia, some Asian buyers have sought to shift their sources back to Australian coal terminals other than Newcastle.

137. Supply growth to the **Atlantic markets** in 2005 has come from Columbia, with Russia flat and South Africa struggling to maintain volumes. Columbia's growth has been constrained by heavy rains and equipment shortages. Drummond Coal has recently announced plans to significantly expand production from its Pribbenow mine in Columbia. This will be backed by new US supply contracts, supported by import infrastructure developments, and reinforces the recent trend of southern and eastern US power utilities taking low sulphur South American coals. US consultants Hill & Associates have estimated that Gulf and East coast import capacity could increase by 24 million tonnes by the end of 2007. In the first half of 2005, US imports from Colombia rose by 3.2 million tonnes to 9.6 million tonnes.

138. Russian exports have started to hit port and cost limitations, halting the large growth seen in 2004. However, exports in the first half of 2005 are still estimated to have risen by 3 million tonnes (10 percent) from their H1 2004 level. South Africa continues to battle against poor delivery performance on the rail system and an appreciating Rand and will maintain exports at similar levels to 2004.

139. In 2004, South African exports declined by 5 percent (IEA estimate 9 percent), mainly due to rail infrastructure problems. With the decrease of the US$/Rand exchange rate by

[5] "Pricing and Demand for LNG in China: Consistency between LNG and Pipeline Gas in a Fast Growing Market" by Akira Miyamoto and Chikako Ishiguro, Oxford Institute for Energy Studies, UK, January 2006.

45 percent from January 2002 to October 2004, most of the potential profits for the local industry were lost. From 2003 to 2004, export prices increased by 7 percent and the coal industry revenue gain amounted to approximately R6.6 billion.

140. The following table shows **United States** coal exports in 2003, 2004 and for the first eight months of 2005 (million short tons):

**Table 7 – US Coal Exports (million short tons)**

| | 2003 | 2004 | Jan-Aug '04 | Jan-Aug '05 | % change '05/'04 |
|---|---|---|---|---|---|
| **to Canada** | | | | | |
| Metallurgical | 3.597 | 3.781 | 2.263 | 2.600 | +14.9 |
| Steam | 17.106 | 13.548 | 8.157 | 9.705 | + 19.0 |
| TOTAL | **20.705** | **17.329** | **10.419** | **12.306** | **+ 7.0** |
| **to Overseas** | | | | | |
| Metallurgical | 18.493 | 23.059 | 17.487 | 16.815 | - 3.8 |
| Steam | 3.680 | 6.978 | 4.921 | 3.889 | -21.0 |
| TOTAL | **22.173** | **30.037** | **22.409** | **20.704** | **-7.6** |
| **Total Exports** | **42.877** | **47.367** | **32.828** | **33.010** | **+0.1** |

Note: 2005 export data for overseas steam coal are under-reported due to closure of facilities affected by hurricanes in New Orleans and Mobile.

141. In 2004, US exports increased by over 10 percent to 47.367 million short tons thanks to a sharp increase in metallurgical coal shipments to Japan and Turkey. Steam coal exports to non-Canadian destinations nearly doubled, with increases in shipments to Brazil, Japan and S. Korea accounting for nearly 80 percent of the increase. Global increases in steel production coupled with unavailability of met coal from other producing countries, a weaker dollar and higher shipping rates, all combined to make US coal attractive to overseas buyers.

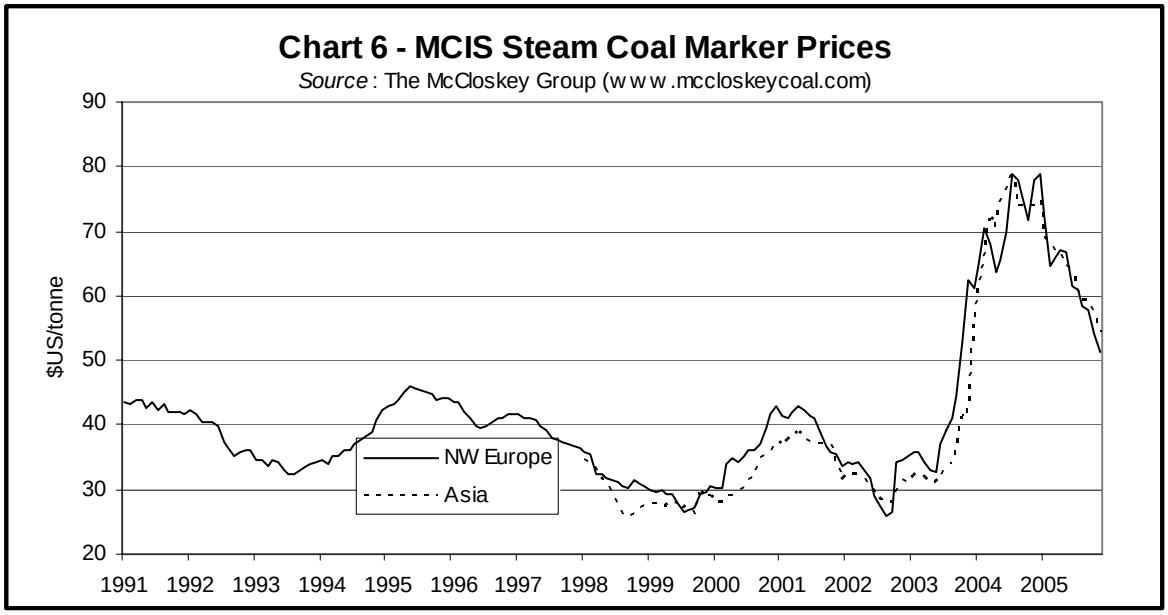
142. Although US shipments of coal to Canada have increased in 2005, seaborne exports declined during the first eight months of 2005 due mainly to a decline in shipments of steam coal to Japan and to the European Union. Metallurgical coal exports also showed a decline in the eight months to August. It must be noted that 2005 data may be affected due to difficulty in operations of reporting offices in Mobile, Alabama and New Orleans caused by Hurricane Katrina.

143. Although US shipments of coal to Canada have increased in 2005, seaborne exports declined during the first six months of 2005 due mainly to a decline in shipments of steam coal to Japan and to the European Union. Metallurgical coal exports were essentially flat for the first six months or 2005.

### 3.4.2 Market Prices

144. **World steam coal trade** has developed rapidly over the last 20 years. In general terms, the period 1996-2003 was one of rapid volume growth averaging nearly 25million tonnes/year. Many new mines were developed specifically for the export market and the emphasis was on volume growth, with consequent downward pressure on prices. As this growth in production capacity has slowed and the market has become more transparent with the introduction of electronic trading systems and price indices, price cycles have

become more frequent, as illustrated by Chart 6 below.




145. International steam coal prices peaked in June 2004 with the ARA CIF delivered price reaching over US$79/t and the FOB price ex Richards Bay peaking at almost $71/t. Prices delivered to European and Asian distribution ports have been on a declining trend since then although, for example, FOB prices ex Richards Bay have remained above $45/tonne, still high compared to pre-2004 levels.

146. Freight rates have made a significant contribution to the fall in delivered steam coal prices. By early December 2005, sea freight rates were generally about half the level of those seen in the same period the previous year. Capesize rates into Europe from Hay point had declined by US$23/t to US$17/t, rates from Richards Bay by about US$20/t to US$13/t and rates from Puerto Bolivar by US$15/t to US$13/t. Panamax rates and rates on other sea routes had also broadly halved during this period.

147. In the **Pacific Steam Coal** market, prices remained relatively high during 2004 due to strong demand, China's export reduction pursuant to its increased domestic consumption, heavy rains in Indonesia and infrastructure constraints in some key exporting countries. There have been rail constraints to Richards Bay in South Africa, lack of rail/port capacity in the key ports of Newcastle and Dalrymple Bay in Australia and constraints on port capacity on Russia's East Coast.

148. The FOB Newcastle spot price peaked at around US$63/t in July 2004, up from US$39/t in early January, and subsequently fell back to the mid/low US$50's for most of the second half of 2004 and the first half of 2005. By late 2005 it was trading in the range US$37-39.

149. Australian contract prices for Japanese term supply were settled at approximately US$41-45/t in early 2004, for supply during the April 2004 to March 2005 financial year. Contract prices have been settled for the 2005/06 financial year at levels around US$53/t. These are the highest nominal price settlements seen for over a decade, reflecting the continuing market tightness and concern over security of supply.

150. In the **Atlantic Steam Coal** market (predominantly a spot market) prices followed a similar pattern, with the spot price for South African coal rising from about US$40/t at the

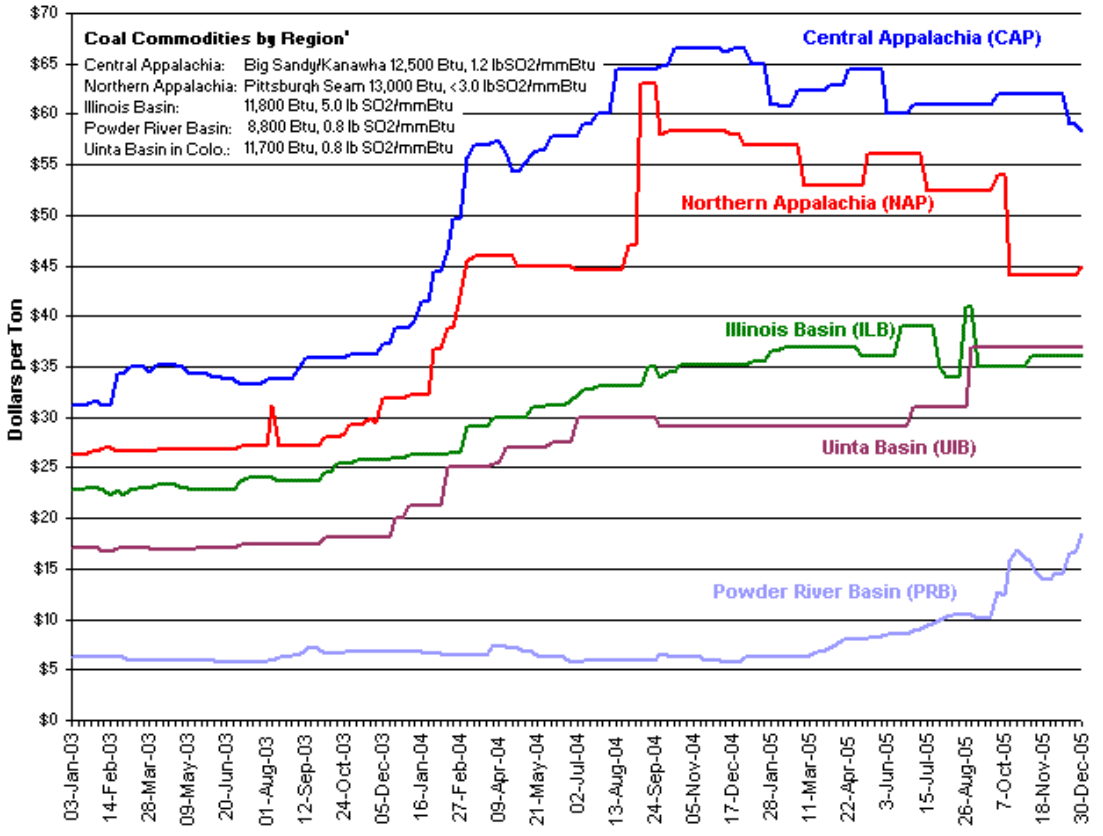
start of 2004 to a peak of around US$70/t in June before relaxing back to a level around US$50/t by year-end. In the first six months of 2005, prices have been less volatile, ranging between US$45/t to US$53/t FOB Richards Bay Coal Terminal and declining to about US$40/t by the end of 2005.

151. The majority of the contract prices for prime Australian **hard coking coal** were settled at approximately US$58/t in early 2004 in a rising market. Prices for lower grade and semi-soft coking coals and PCI coals were settled around the same time at levels of US$40-45/t.

152. During the year, it became obvious that the lack of Chinese supply, as well as Australian infrastructure constraints, meant that there was a severe shortage of coking coal on the market to meet the increasing demand. In addition, the booming global steel market saw record steel prices and maximisation of output. The only option, for Asian steelmakers in particular, was to import very expensive swing supply metallurgical coals from the USA in order to cover supply shortfalls. This meant that the spot market for coking coal soared during the year. Supplies of prime Australian hard coking coal for the 2005-06 financial year were settled at a record level (in nominal terms) of around US$125/t in early 2005.

153. In the **United States**, limited information is available on spot prices for selected coal types in Central Appalachia, Northern Appalachia, the Illinois Basin, Power River Basin and the Colorado Unita Basin. The information is prepared by "Platts Coal Outlook" and is available graphically on the US Energy Information Administration (EIA) web site (www.eia.doe.gov). Information for the two years to the end of 2005 is reproduced below.

**Chart 7 – Spot Prices for US Coal 2003- 2005**




*Source*: US Energy Information Administration

154. As can be seen, spot prices for all coals remain at or above early 2004 levels. Spot prices for coal from Northern and Central Appalachia have been on a declining trend through 2005, with a $10/ton decline in the Northern Appalachian spot price occurring at the end of the third quarter 2005. Conversely, the price of Powder River Basin coal has risen steadily during 2005, tripling from $5.75 for the week ended 24th December 2004 to reach $18.48 for the week ended 30th December 2005, with the most rapid increases during the fourth quarter. Fundamental factors driving the increase include months of diminished PRB coal shipments due to rail problems, entrenched coal inventory shortages in the consuming sectors, capacity constraints for Appalachian low-sulphur coal, sustained high oil and natural gas prices, and high $SO_2$ allowance prices that reached a new record high of $1,630 per ton on 9th December 2005.

# 4 ISSUES RELATED TO COAL

## 4.1 Sustaining the Role of Coal

155. The IEA has forecast that total energy demand over the next thirty years will almost double. In order to maintain a stable and affordable energy supply whilst keeping economic, social and environmental objectives in balance, it is important that energy be obtained from a wide variety of sources.

156. A compelling economic and social case can be made for sustaining the role of coal in the future energy mix, given that it is an affordable, reliable and secure source of energy. All fossil fuels must address the challenge of climate change – most important for coal because it is the most carbon intensive fossil fuel. The following paragraphs highlight recent developments that reflect the challenge which has been accepted by the industry to reduce the emissions from the use of coal in fulfilling its role in the future energy mix.

### 4.1.1 Policy and the Role of Coal

***International Collaboration***

***Asia-Pacific Clean Development and Climate Partnership***

157. The Asia-Pacific Clean Development and Climate Partnership was announced on 28th July 2005. The six countries involved, Australia, China, India, Japan, Korea and the United States, have produced a Vision Statement stating that they will work together to:

- develop, deploy and transfer existing and emerging clean technology;
- meet our increased energy needs and explore ways to reduce the greenhouse intensity of our economies;
- build human and institutional capacity to strengthen cooperative efforts; and
- seek ways to engage the private sector.

158. A charter and terms of reference for the partnership were issued at the Inaugural Ministerial meeting held in Sydney on 11/12 January 2006. Details are available at http://www.dfat.gov.au/environment/climate/ap6/.

159. In relation to climate change aspects of the partnership, participating countries have indicated they do not intend establishing Kyoto-style emission reduction targets. Rather, the new partnership will focus on technology development and transfer, and capacity building. Technologies of interest include both renewable and fossil fuel based systems, and energy efficiency.

160. The Partnership received strong support from business including the coal industry, which has been invited to participate in numerous taskforces to address clean development and climate issues on a sectoral basis.

### *Carbon Sequestration Leadership Forum*

161. The Policy and Technical Groups of the Carbon Sequestration Leadership Forum (CSLF) met separately and then in a joint session in Berlin in late September. These meetings were preceded by a day-long CSLF stakeholder forum which urged the Forum to better engage with stakeholders and to integrate them into appropriate CSLF fora and processes and for the forum to develop a clear vision and strategic plan to enable the goals of the forum to be realised.

162. A highlight of the CSLF meetings was a presentation by the IPCC and broad discussion on its review of carbon capture and storage technologies. Other key outcomes of the meetings were:

- Australia and the European Commission will work with a small team of member countries to refine a draft CSLF work plan;
- a moratorium on new CLSF members until the next Policy Group meeting in April 2006;
- draft letter from the policy chair of CSLF to Executive Director IEA regarding invitation to collaborate;
- establishment of a web-based Stakeholder Registry;
- endorsement of a public outreach paper and proposals to implement the measures outlined in the paper;
- establishment of a working group to focus on capacity building for developing countries (Australia has elected to be a member of this working group);
- CSLF endorsement of seven new projects;
- endorsement of three technical taskforce reports, i.e. gaps in capture, gaps in capture and transport, gaps in monitoring and verification of storage and storage capacity measurement.; and
- a decision to hold the next CSLF meetings in India in mid April 2006.

### *Methane to Markets Partnership*

163. The 2nd meeting of the Methane to Markets Partnership will be held in Buenos Aires, Argentina on 2-4 November. M2M is an international initiative designed to promote cost-effective, near-term methane recovery internationally. The Partnership will focus on methane emissions from coal mines, oil and gas activities and landfills.

164. The Partnership now comprises 16 members: Australia, Argentina, Brazil, Canada, China, Colombia, India, Italy, Japan, Mexico, Nigeria, Russia, Republic of Korea, Ukraine, United Kingdom and the United States. A recent application by Ecuador to join the Partnership is under consideration by the Steering Committee.

165. The focus of the M2M Partnership is on resource ownership and market development, which will in turn lead to energy technology collaboration; in particular regarding methane capture. Action Plans have been developed, which will identify opportunities and key collaborative projects to be undertaken under each of the three main sources of methane emissions: coal, oil and gas and landfills.

166. The first Methane to Markets Regional Workshop will be held in Beijing, China on 2 December 2005 and will be co-hosted by the Australian Department of Environment and

Heritage, the US Environmental Protection Agency and Japan's New Energy and Industrial Technology Development Organization (NEDO).

167. More information and minutes from the meetings can be found at www.methanetomarkets.org.

***United States of America***

168. Comprehensive Energy Policy legislation that includes a number of provisions that will assist in expanding the role of coal fuelled generation in the United States was signed into law on 8th August 2005. The coal related provisions include:

***The Clean Coal Power Initiative*** - a nine year, $1.8 billion, program to demonstrate advanced coal technologies.

***Basic Coal Research and Development*** - authorization for a three year, $1,137 billion, basic coal and coal combustion R&D program.

***Carbon capture and sequestration research*** - a ten year, $90 million, carbon capture R&D program to develop carbon capture technologies for existing and new coal fired electric generating units.

***Coal Mining Research*** - authorization for a three year, $75 million, program to focus on coal mining R&D.

***Clean Air Coal Program*** - an authorization for loan guarantees and grants so that power plants can install advanced pollution control technologies or re-power or replace capacity with advanced clean coal technologies.

***Tax incentives*** in the form of investment tax credits for both integrated gasification combined cycle plants and advanced coal combustion plants. There are also investment tax credits for IGCC used by industry. In each instance, the amount of tax credit available is capped to limit the number of plants eligible.

***Climate Change in the Energy Bill***

169. In addition to the wide range of provisions that encourage investments in R&D and conservation, efficiency and new advanced technologies, that will serve to lower greenhouse gas intensity in the United States, the Comprehensive Energy Bill includes a climate change title that will result in development and use of specific technologies that will reduce greenhouse gas emissions intensity and help meet the Administration's goal of reducing GHG emissions intensity by 18 percent by 2012 (as compared with 2000 levels). The title also calls for development and implementation of a strategy to deploy these same technologies in developing countries in part by identifying barriers to export of US technology and finding ways to remove those barriers. The provisions of the Conference report support a strong voluntary and technology based program to address the issue of climate change on an international basis.

***Climate in the future***:

170. In the Congress: During the debate on the energy bill, the Senate defeated by a wide margin a proposal to require mandatory greenhouse gas reductions in the United States. However, a proposal to require a mandatory intensity based cap with a safety valve or cap on the price of emissions was introduced and withdrawn without a vote. This proposal is the subject of several workshops and hearings and is expected to be reintroduced late in 2005 and be considered by the Senate in 2006.

171. The Administration continues to advance policies and programs to support technology-based voluntary emissions intensity reductions towards the goal of achieving an 18 percent reduction in emissions per unit of GDP by 2012. The Administration and industry are working to expand voluntary partnerships that will contribute to that goal. Additionally, the US has launched a number of international initiatives including the Carbon Sequestration Leadership Forum, the Methane to Markets Partnership and the International Hydrogen Initiative, to promote technology collaboration and information sharing that will result in cost effective reductions of emissions over the longer term. The new Asia Pacific Partnership on Clean Development and Climate was announced in late July. This agreement, involving the US, Japan, Australia, China, India and South Korea, highlights the need "to develop, deploy and transfer" cleaner, more efficient technologies. It is believed that clean coal technologies will be a major part of this program and the coal and coal fuelled electric generating industry in the United States will be involved in this effort as the program moves forward.

***Canada***

172. The Government of Canada announced in its 2005 budget that it would share the cost of clean coal technology investments through a Partnership Fund of C$230 million.

***Australia***

173. Australia has been very active on international collaborative initiatives (see above).

174. The potential benefits of the Asia-Pacific Clean Development and Climate Partnership are significant. However the coal industry in Australia has argued that these benefits are only likely to be realised if some shared goals are established for achieving measurable progress in clean coal technology development and deployment, and resources are made available to underpin efforts to reach those goals.

175. The industry has put the case that these goals should relate to technology demonstration and pre-commercial deployment rather than specific emissions outcomes. The Partnership provides an opportunity to ensure that important technology demonstrations and supporting R&D takes place, with each country in the partnership undertaking projects that most suit their particular needs and circumstances as a contribution to achieving shared goals. Those goals should be established through the process of developing regional technology roadmaps for key technologies.

176. The question of stakeholder engagement/involvement was debated at length during the meetings of the CSLF Policy and Technical Groups, and at the preceding day's CSLF stakeholder forum meeting. Australia took a high profile in arguing that stakeholders would ultimately deliver the CCS technologies and that, without their genuine engagement in CSLF deliberations, the Forum would be significantly less effective in achieving its goals. The CSLF Policy Group has agreed to host a regular stakeholder forum at each CSLF meeting, to acknowledge stakeholders during policy and technical group meetings and to include stakeholders in working groups.

177. The Terms of Reference for the Methane to Market Partnership are consistent with Australia's objectives to support positive measures to reduce greenhouse gas emissions and encourage the development of methane as an energy source.

178. Although much remains to be done, significant progress is being made in Australia and in partnership with other nations, on progressing the technology pathways to reduce greenhouse gas emissions from the production and consumption of coal.

179. Australian industry is continuing to work with Governments in undertaking this work, and seeking policy directions which accelerate the development and strengthen implementation wherever possible whilst also balancing the need for energy security and a sound economy.

***Greenhouse Challenge Plus and Energy Efficiency***

180. The Australian government is requiring larger Australian businesses to undertake Energy Efficiency Opportunities Assessments and be subjected to mandatory energy audits every five years. This measure is designed to encourage the business sector to become more energy efficient by increasing senior management attention to energy usage and energy management practices. Large energy users will be required to complete an energy efficiency opportunities assessment and report publicly on the outcomes of the assessment and their business response.

181. The Government in New South Wales has also introduced an energy efficiency programme, again focussed on large energy users and has established a fund from which grants will be made to companies for projects to be undertaken to reduce the use of power.

***IEA Country Review 2005***

182. On 9th August, IEA Executive Director Claude Mandil visited Australia to present the findings of the IEA's latest country review of Australia's energy policies. Some of the key findings of the review are:

- Australia has been one of the leaders in energy sector reform and should be commended for its vision and implementation of a liberalised market.
- The country has one of the most transparent and competitive electricity markets in the world and could well serve as a model for other countries.
- The efficiency of the market, combined with low-priced domestic coal, give Australia some of the lowest electricity prices in the IEA and the world.
- Australian energy security is sound, bolstered by abundant domestic fuels, an extensive energy infrastructure and good access to world markets, although one area that may warrant further attention is oil stocks.
- Australian energy production enhances not only domestic energy security but also global energy security.
- Environmental sustainability represents Australia's greatest energy challenge.
- Although Australia has chosen not to ratify the Kyoto Protocol, it is still on track to meet its Kyoto target of 8 percent emission growth from 1990 to 2008-2012.
- Australia is taking a technological approach to reducing emissions from its energy sector. The government has announced a number of programs to promote cleaner energy technologies.
- Initiatives such as the A$500 million Low Emissions Technology demonstration Fund and COAL21 demonstrate effective collaboration between government and industry.
- While new technologies will be a key component in tackling the long-term problem of climate change, there is no certainty about when and to what extent the necessary technologies will be developed.

- Such technologies would most likely require a carbon price signal to facilitate their implementation.
- An emissions trading system can be an effective means of introducing a price signal and the government is encouraged to re-appraise as required the costs and benefits of a national emissions trading scheme, particularly in light of developments regarding further international and domestic climate change frameworks and technology advancements.
- The government is encouraged to strengthen policies to encourage greater energy efficiency in all sectors of the economy.

***State Policy Processes***

183. In Queensland, the Government is reviewing State energy policy with the Government apparently keen to facilitate the development of additional coal fired generation to underpin the State's energy intensive industries.

184. In addition to its energy efficiency program already mentioned, the NSW Government is also in the process of finalising a new energy policy. Growing electricity demand will see the need for new power capacity in NSW by 2012. The Government is under pressure to adopt a more pragmatic position in relation to both future electricity supply and climate change. Consequently the new energy policy due to be released by the end of the year is expected to allow new coal fired power plants, subject to emissions intensity targets that reflect best available technology (BAT), measured in terms of thermal efficiency, with minor carbon saving offsets. It is also anticipated that NSW Government-owned utilities will need to take a far greater interest in clean coal technologies including CO2 capture and storage which has not been hitherto been a priority at the political level.

***Japan***

185. Coal has been fulfilling an important role in the primary energy mix and the power generation in Japan. In JFY 2004, coal accounted for 22.4 percent in the primary energy supply and 24.2 percent in the power generation. Those percentages were 21.1 percent and 24.0 percent, respectively, in JFY2003.

186. The amount of the "Coal Tax", introduced in JFY2003, was increased from 230 yen/tonne to 460 yen/tonne in April 2005. Exemption from the Coal Tax for coking coals for steel making and thermal coals for cement making has been extended for another two years, until the end of March 2007.

187. With the Kyoto Protocol having come into effect in February 2005, early introduction of the so-called "Environmental Tax" has been widely discussed in Japan within and between the government and various industries, and the discussion is continuing.

188. The Japanese government released the Kyoto Protocol Target Attainment Plan in April 2005. According to this plan, carbon dioxide emissions from energy consumption have to be restrained to a 0.6 percent increase from their 1990 level in 2010. One of the main pillars of the plan is "Carbon Saving" by the energy supply sector through:

- steady use of nuclear power plant;
- faster introduction of renewable energy;
- fuel switching to natural gas;

- lowering carbon intensity in the power sector;
- more efficient use of oil and petroleum fuel; and
- realisation of a hydrogen economy.

Cap and trade type emissions trading could play a significant role in GHG reduction, but the view of some major Japanese energy companies is that further discussions are needed to ensure the equitable distribution of CO2 emission caps between various entities.

***South Africa***

189. The main issues for coal in South Africa are:

- the new Mineral and Petroleum Resources Development Act, which is changing the face of the coal industry and providing an opportunity for Black Economic Empowerment (BEE) firms;
- access to potentially economically viable reserves;
- export infrastructure (port and rail) for the BEE producers;
- the implementation of clean coal technologies; and
- the Voluntary Energy Efficiency Accord.

190. With government and industry co-operation, the problems caused by the re-shaping of the industry will be overcome and coal will remain the country's cheapest and main energy source for the foreseeable future. The industry's local market sales are closely linked to the export market, which provides the extra revenue that is an important underpinning for affordable power prices.

191. At present, the outlook for the coal industry during the next two to three years is very optimistic. With the implementation of some, or all outstanding coal projects, including the RBCT Phase V expansion by 2005-6, coal production and exports should increase by 10 to 15 percent. The re-assessment of the remaining coal potential in the Central Basin will give many BEE companies the reserves they need to enter the industry. Some of these companies have already opted for partnerships or joint ventures with some of the existing coal companies - a quicker way to enter the coal industry, but one that will not bring the desired increase in production and exports.

192. Given the right technology, coal is expected to remain South Africa's major energy source. Displacement by hydro, gas and alternative energy sources is not currently a major threat, but it may become one if coal reserves become less accessible, more difficult to mine and/or when quality decreases further.

193. Future investments in the coal industry will go hand-in-hand with the implementation of the Mineral and Petroleum Resources Development Act. New mines must now comply with the Act and Charter. Goals such as SHE standards and environmental obligations and growing HDSA mining inputs and procurement rank with facilitation of broader access to exports and maintenance of global market share.

***Europe***

194. In Europe, in line with the proposed priority for "Near Zero Emission Power Generation"

within the Energy thematic area of its 7th Framework R&D Programme (FP7), which covers the period 2007-2013, the EC Directorate for Research announced on 1st December 2005 a Technology Platform for Zero Emission Fossil Fuel Power Plants. The body will bring together energy companies, equipment suppliers, users, consumers, financial institutions, regulators, public authorities, researchers and civil society to develop common research goals, and identify and remove obstacles to the creation of highly efficient power plants with near-zero emissions.

195. These power plants will drastically reduce the environmental impact of fossil fuel use, particularly coal, and will include $CO_2$ capture and storage as well as clean conversion technologies leading to substantial improvements in plant efficiency, reliability and costs. The entire budget for the Energy thematic area over the 7 years covered by FP7 is €2.9bn, although the split between the various priorities has yet to be established,

***Germany***

196. On 13th July 2005 the (second) amendment of the Energy Industry Act came into effect. The basis for this amendment can be found in the EU Directives for an accelerated deregulation of the European gas and electricity markets dated 26th June 2003, which member states were required to transpose into national law by 1st July 2004. Among other items it contains rules about reporting requirements of the public utilities.

197. As a first direct consequence of the change in the North Rhine-Westphalian state government the *Walsum mine* (Duisburg) will be closed half a year earlier at the end of June 2008. Initially the closure was planned for beginning of 2009. After the federal parliamentary election on 18th September 2005 the future orientation of Germany's coal and energy policy remains unclear. In general it is still difficult to predict the impact on the coal-policy decisions taken for period 2006 to 2012, which provide for German coal production to be scaled down from 26 million tonnes to a base output level of 16 million tonnes. There are also some uncertainties about the future of nuclear power in Germany. The possible revocation of phasing out nuclear power has again been the subject of discussion.

***Spain***

*198.* Spanish energy policy continues to favour renewables and the minimisation of coal use. The Government is negotiating a new production agreement with unions and industry in light of the 4 percent p.a. reduction in coal subsidies. No new coal-fired power plants are planned. Combined Cycle Gas Turbine capacity will increase from 5GW to 20GW in the next few years and wind power will also grow substantially.

***United Kingdom***

199. The UK Government published its "Energy White Paper" in February 2003. There are four stated policy goals:

- to place the UK on a path to cut its carbon dioxide emissions by some 60 percent by 2050, as recommended by the RCEP, with real progress by 2020;
- to maintain the reliability of energy supplies;
- to promote competitive markets in the UK and beyond…; and
- to ensure every home is adequately and affordably heated.

200. The majority of the White Paper is concerned with the first of these four goals. It states that the Government will intervene in the market only in extreme circumstances – believing that the best guarantee of security is that firms believe that the Government will allow markets to work. Generation capacity margin and fuel mix are merely to be 'kept under review'.

201. The UK Government during 2005 has undertaken an enquiry into carbon capture and storage with a view to determining its role in future UK energy policy.

### 4.1.2 Industry Actions to Sustain the Role of Coal

***Australia***

202. COAL21 was initiated by the Australian Coal Association and is a collaborative program involving Australian federal and state governments, the coal and electricity industries, key research organisations and labour unions. Its primary objective is to reduce greenhouse gas emissions from coal-based electricity generation in Australia.

203. Launched in 2003, the first phase of COAL21 involved the development of the COAL21 National Action Plan which was released in March 2004. The Plan identifies the emerging low emission technologies considered most applicable in the Australian context, and details actions that Australia should take to accelerate the development and deployment of those technologies. These include measures to:

- facilitate the demonstration, commercialisation and early uptake of technologies identified in the plan;
- promote relevant Australian R,D&D so that it can be both built upon and make a unique contribution to international R,D&D in the area;
- provide a mechanism for effective interaction and integration with other international zero-emissions coal initiatives.

Participants in COAL21 (38 organisations) are now focused on implementing the recommendations in the Plan.

204. Key activities related to COAL21 in 2005 have included the inaugural COAL21 Annual Conference held in Sydney in April, which attracted a range of prominent Australian and international speakers, and preparations by a number of groups for bringing forward demonstration project proposals for funding under the Federal Government's A$500 million Low Emission Technologies Demonstration Fund (see further details under the section Developments in Clean Coal/Near Zero Emissions Technology).

***Japan***

205. In April 2005, the two main coal industry organizations, the "Japan Coal Energy Center" (JCOAL) and the "Centre for Coal Utilization, Japan" (CCUJ) were merged into a single coal industry organization called "Japan Coal Energy Centre (JCOAL)" covering both upstream and downstream areas of the coal chain. One of the main objectives of the merger is to improve the management, under one organization, of projects such as the extraction and utilization of coal mine methane, in light of global environmental issues.

206. Various energy-related industries jointly held the 14$^{th}$ "Clean Coal Day" events during August and September under the sponsorship of METI and the relevant embassies. This

industry activity promotes understanding of the sustainable role of coal by the general public and those involved in various sectors of the coal industry. During this year's CCD, JCOAL and the Japanese Committee for Pacific Coal Flow (JAPAC) each held an international conference on coal in early September, and coal-related facilities such as coal-fired power stations, steel mills and coal museums throughout Japan were opened for the general public.

***United Kingdom***

207. The presumption against surface mine development in England and Wales has now been extended to Scotland with the adoption of new planning guidelines in June 2005. No other mineral carries such a presumption. Surface mines are the only way to increase production in the short term and the UK coal industry has started a major campaign to have coal planning policy treated the same as other minerals.

208. Due to the difficulty in raising finance for long-term projects in the energy sector, UK producers have approached the Government to extend the Coal Investment Aid scheme, which provides assistance for capital projects at viable mines.

### 4.1.3 Emissions Trading

***United States of America***

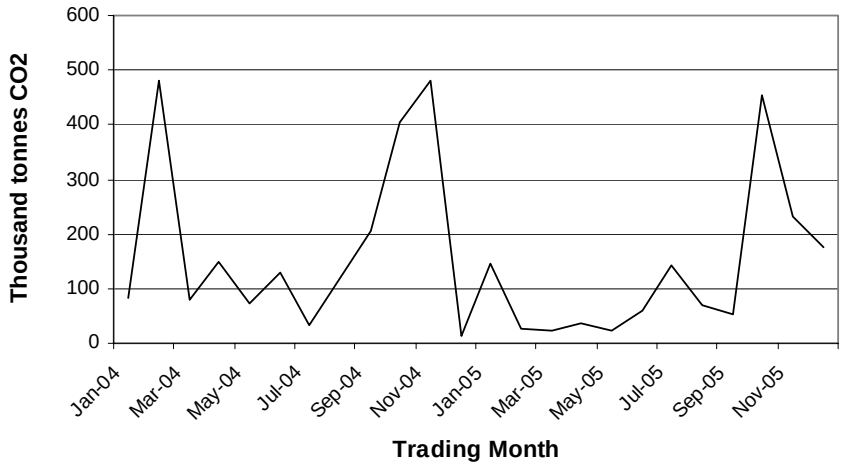
209. The United States has not, and is not likely to, embark on an official carbon emissions trading program developed by the government although a number of companies are engaged in informal carbon trading programs. Additionally, some states and regions have proposed and/or are in the early stages of developing greenhouse gas emissions programs.

210. As a private industry example, the Chicago Climate Exchange has been established as a self-regulatory, voluntary, organization that manages a market for trading greenhouse gas emissions. It began continuous electronic trading of greenhouse gas emission allowances in December 2003. Although located in the US, Chicago Climate Exchange participation is multi-national.

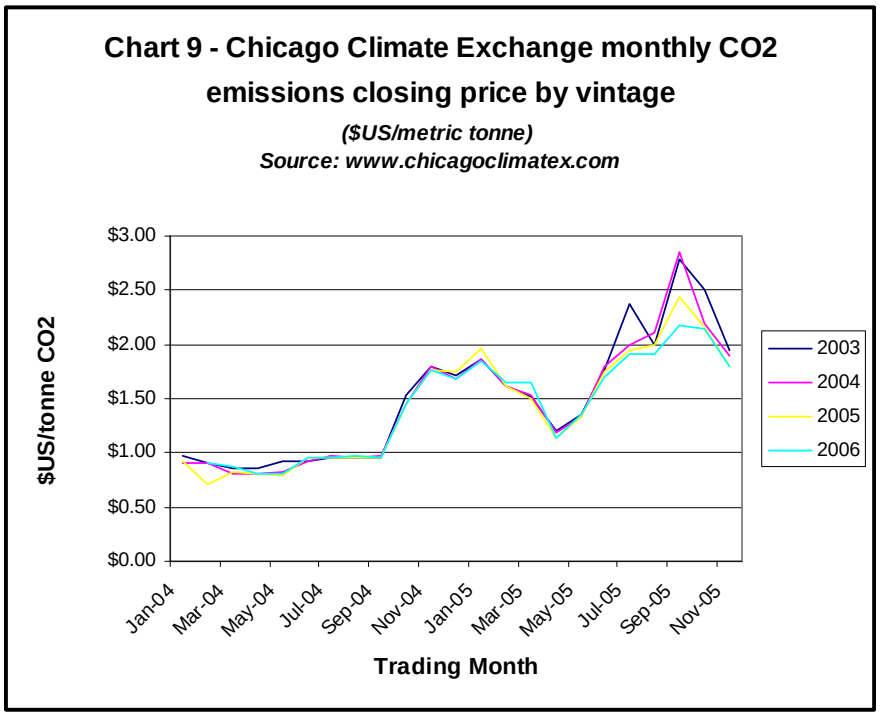
**Chart 8 - Chicago Climate Exchange monthly CO2 emissions trading volume, all vintages**

***(thousand tonnes)***

***Source: www.chicagoclimatex.com***



211. Trading volumes have been very volatile, as shown in Chart 8, and they averaged less in the early months of 2005 than in 2004. The prices for allowances however have been on an increasing trend since late 2004 with increased volatility, particularly for 2003 and 2004 allowances, in 2005 (Chart 9).




212. A number of US-based corporations, including major coal-burning power generators, buy and sell $CO_2$ emissions credits on the exchange for purposes that include achievement of voluntary reductions pledged under the Climate Change Initiative, which has been established in the US as an alternative to participation in the Kyoto Protocol. Experience gained by US firms in trading of $SO_x$ and $NO_x$ emission allowances under the nation's clean air protection programs aid participation in the exchange's $CO_2$ emission trading programs.

213. The $NO_x$ and $SO_x$ emissions trading programs that have been in effect in the USA since the mid-1990s, as an integral component of the national strategy to achieve mandated emission reductions, continue to operate effectively.

***Australia***

214. The Australian Government has ruled out introducing a national emissions trading regime until such time as a truly international scheme is in place. However in late 2003 state and territory governments, all of which are Labour, established an inter-jurisdictional working group to develop a multi-jurisdictional emissions trading scheme for consideration by state and territory governments. The working group reported on progress to First Ministers of state and territory governments in December 2004.

215. The working group developed ten key principles as a basis for further investigation and analysis. These are:

- A cap and trade approach be used as the basis for scheme design;
- The scheme be national and sector based;

- In setting the cap, consideration be given to the overall national emissions abatement target, and how the abatement responsibility is allocated between sectors covered by the scheme and those outside the scheme.
- The scheme initially cover the stationery energy sector (including electricity, gas and coal);
- The scheme cover all six greenhouse gases under the Kyoto Protocol;
- Permit allocation be made on the basis of a mix of administratively allocated and auctioned permits, with both long and short term (annual) permits;
- A penalty should be set to encourage compliance and to establish a price ceiling for the permit market;
- Offsets be allowed;
- Mechanisms be included to address any adverse effects and structural adjustments; and
- Mechanisms be included to allow a transition for participants who have taken early abatement action and new entrants.

216. In March 2005, First Ministers released a joint communiqué endorsing a program of further work building on these ten design principles. The working group released a discussion paper in September 2005, which explores each of the ten principles in depth and is intended as a basis for consultation with stakeholders on the issues surrounding the design and implementation of a trading scheme. Those consultations are continuing.

217. It is anticipated that the working group will provide advice to First Ministers some time during 2006.

***Japan***

218. In April 2005, the Japanese government released the Kyoto Protocol Target Attainment Plan, which contained various specific measures to reduce GHG emissions from all kinds of activities nationwide. The plan advocates that policy instruments, such as carbon taxes and emissions trading, should be optimised so as to achieve maximum GHG emissions at least cost. Based on the plan, the Japanese Ministry of Environment (MoE) has started an internal voluntary emissions trading scheme. In return for setting their own GHG-reduction targets, participants in the scheme can receive government subsidies to install facilities for reducing GHG emissions or saving energy. Surpluses and deficits to their targets can be traded in the domestic market. This voluntary trading scheme is the first of its kind in Japan, but the market will be fairly small due to the limited volume of available subsidy (approx. US$30M).

219. Potential carbon taxes and the possibility of a wide-ranging mandatory emissions trading scheme have been controversial issues in Japan. Industry in general opposes such coercive measures and prefers to achieve GHG emissions reductions through its own voluntary initiatives.

***South Africa***

220. The Designated National Authority (DNA), required to approve proposed Clean Development Mechanism (CDM) projects in South Africa, has been established in the South African Department of Minerals and Energy. Sustainable Development criteria have been approved and are being implemented. A number of projects have been

submitted to the DNA for approval. As coal plays a dominant role in South Africa's energy mix, it is possible that potential CDM projects related to coal will be submitted.

221. The Kuyasa Low-income Housing Energy Upgrade project was registered by the CDM Executive Board on 27 August 2005. This is the first CDM project that has gone through South Africa's Designated National Authority approval procedures, and the first African CDM project to be registered by the UNFCCC CDM Executive Board.

***Europe***

222. While the EU ETS can be seen as a deterrent to future growth in overall coal consumption in the expanded EU, the effect is likely to be marginal. There is potential for growth of coal imports into the expanded EU, as higher quality imports are substituted for declining production of more expensive/subsidized and less environmentally friendly domestic coal production in countries such as UK, Spain, Germany and Poland.

223. Notwithstanding the increase in the cost of $CO_2$ emission permits, from about €6-8/t to a peak of €29/t, coal imports appear to be stable or growing into most regions of the EU, other than Scandinavia where hydro availability has recovered. This is because, despite the increased costs of $CO_2$ emission permits, coal remains one of the lowest cost options for power generation in the EU when compared to current alternatives including oil and gas.

224. A number of uncertainties remain in regulating the EU ETS system which can affect liquidity and prices. These include the limited number of currently operating country registries, as well as the non-participation of countries with large $CO_2$ surpluses such as Poland and Russia. Furthermore, potential reviews of the EU ETS rules on matters such as increasing $CO_2$ allowances, including non-EU countries into the traded market, and easing the process of injecting additional allowances into the market via the CDM or JI schemes, may change the status quo.

225. Coal is expected to maintain its strategic position in the EU's energy mix as a cost-effective, widely available fuel of choice. This will be coupled with an ongoing focus on cleaner coal technology.

***Germany***

226. The German Office for Emissions Trading (DEHSt / http://www.dehst.de/ ), which is responsible for emission rights trading in Germany, approved the allocations required under the National Allocation Plan at the end of 2004, with the result that some 1,850 installations in Germany are now subject to the emissions trading scheme. However, about 800 plant operators have lodged a protest against the allocation decision and this matter is currently being dealt with by the DEHSt. Regardless of this, the European Commission has gone ahead with its approval of a national allocation table, which lists all plant operators along with their allotted emission quotas.

227. While real trading in emission rights on an EU-wide basis is still only possible to a limited extent, the Leipzig Electricity Stock Exchange (EEX / http://www.eex.de/index_e.asp ) actually began dealing in European emission rights in early March 2005. Here the price of $CO_2$ allowances has risen sharply, starting the year at €7-8/t $CO_2$ and currently standing at more than €22/t $CO_2$. This movement can be attributed to the high prices now being paid for oil, gas and coal.

228. On 4th May 2005 the Federal Government adopted the ProMech Act, a new law whose purpose is to implement the European Linking Directive that is designed to create a link

between the European emission rights trading system and the flexible instruments of the Kyoto Protocol (CDM and JI). The Act was adopted by the "*Bundestag*" (*Lower House of German Parliament*) on 8th July 2005.

***United Kingdom***

229. Since 1st January 2005, the EU Emissions Trading Scheme has been operational, with carbon prices reaching €29/t $CO_2$ in June 2005. The UK is currently in dispute with the EU over the overall size of the UK National Allocation Plan (NAP). The UK originally submitted a NAP in April 2004, which was approved, and then submitted in November a revised NAP with a higher overall cap, resulting from an upward revision of predicted emissions under 'business as usual'. The EU rejected this revised NAP and has required that the total UK allocation be restricted to the original NAP. This is being legally challenged by the UK Government. If the higher NAP total is allowed, it would mean an additional 20MTe of allowances for the electricity supply industry over 2005-7.

230. Without the effect of carbon, coal is the preferred fuel of the UK market. However, during the summer months the carbon price has reflected the coal-gas price differential and has pushed coal down the merit order.

231. In Phase I, UK coal power stations have been given an annual allowance equivalent to a coal burn of 37mt, 24 percent lower than their 2004 consumption. Phase II of the EUETS will run from 2008-2012, with subsequent phases to follow. The uncertainty over the allocation policy post-2007 is deterring investment in new power station projects.

### 4.1.4 Power Station Emissions Control/Mining Regulations

***Japan***

232. Conventional air and water pollutants emission standards relating to thermal power stations have not been changed over the last year. Discussion of a possible future ambient standard for mercury emissions is continuing at government level, but no specific guidelines have yet been proposed.

***South Africa***

233. The South African Department of Environmental Affairs and Tourism, has drafted a new National Environmental Management: Air Quality Bill, which will replace the outdated Atmospheric Pollution Prevention Act (no. 45 of 1965) (APPA). The new legislation has been heralded as a watershed for Air Quality Management in South Africa and will address the protection of the environment against air pollution, as well as the cumulative impact of pollutants on the environment. The Bill proposes the development of a national framework.

234. One area where coal has a significant impact on ambient air quality in South Africa is where it is utilised in domestic applications. Efforts to reduce these impacts have been undertaken through the Department of Minerals and Energy, who have developed a strategy for addressing this issue. The Bill is in its final stages of approval and will be implemented shortly.

235. 32 companies and industry associations signed the Energy Efficiency Accord on 4th May 2005. The accord responds to the Department of Minerals and Energy's Energy

Efficiency Strategy, enabling business to come together to support government in its energy reduction objectives. The voluntary Energy Efficiency Accord is aimed at reducing national energy intensity. It requires broad commitment to energy efficiency by industrial energy users and enables collaboration to develop more detailed commitments within one year for individual sectors. The Accord targets a 15 percent reduction in 'final energy demand' for the industrial sector by 2015, and a 12 percent improvement in energy-efficiency for the nation as a whole by the same date.

***United Kingdom***

236. The longer term future of coal-fired plant in the UK is affected by the transposition of the Large Combustion Plant Directive into UK Law. There is still considerable uncertainty over how the LCPD will be interpreted. The UK Government is believed to favour implementation through Emission Limit Values for large plant, including all coal-fired power stations, with a National Emissions Reduction Plan for smaller combustion plant, although approval for this hybrid scheme needs to be obtained from the Commission. The UK Government has also to decide whether the LCPD will be applied on a unit or station basis, and whether the 20000 hr lifetime of opted out plant is to be parcelled into 2500 hrs a year.

237. FGD is currently fitted or being fitted to 11GW of the UK's 29GW of coal-fired capacity. RWE Npower has announced plans to fit FGD to Aberthaw (1.5 GW) and Scottish & Southern Energy are considering FGD for part of their Fiddler's Ferry and Ferrybridge plants.

238. In addition to the Large Combustion Plants Directive, all generating plant must be authorised under EU Integrated Pollution Prevention and Control legislation in order to operate from 2007 onwards, requiring the use of Best Available Techniques to reduce plant emissions.

239. These uncertainties are reflected in the perceived value of coal-fired generating plant in the UK, which has been traded actively since privatisation. Fiddlers Ferry and Ferrybridge, both 2000MW coal-fired power stations with no FGD fitted, were sold to Edison Mission Energy in 1999 for a reputed £650 million each. They have since been sold to AEP and, in July 2004, to Scottish and Southern Energy for a reputed £125 million each. Conversely, the FGD-equipped 4000MW Drax coal-fired power station sold in 1999 for about £1,900 million to AES. It is currently owned by a consortium of banks, which have rejected an offer to purchase it at that price.

## 4.2 Investment in Coal Supply, Transportation and Use

***United States of America***

240. There is considerable investment being made by the U.S. rail industry in coal transportation capacity. Demand for coal in U.S. has increased while sourcing has become more complex due to environmental regulations and coal availability.

241. A significant proportion of planned investment by the BNSF Railway Company is devoted to its coal service. Over the past 10 years, BNSF has spent more than $2.2 billion on investments specifically aimed at increasing coal-carrying capacity. Likewise, Union Pacific has spent enormous sums on its coal service, including more than $1 billion over the past eight years on locomotives and another $1 billion on track capacity enhancements for coal. Total coal investment for 2004 and 2005 will reach $300 million. UP and BNSF have also developed plans to increase the "nameplate capacity" on the Powder River Basin joint line from its current 350+ million tons to 400+ million tons.

242. Norfolk Southern plans 2005 capital expenditures of $1,030 million, including 102 new locomotives and extensive spending on refurbishing the existing locomotive fleet, much of which will benefit coal.

243. With these capital investments to upgrade the rail infrastructure and increase productivity, delivered fuel costs to electric generators have declined, in contrast to delivered prices for oil and natural gas.

***Canada***

244. The investment climate has been very positive in supporting the development of new coal supply in western Canada. Expansion of thermal coal mine capacity has been undertaken to meet expanded power generation capacity in Alberta and to meet increased international demand for hard coal. Four metallurgical coal mines commenced operations in late 2004 and further new projects have been announced or are under construction. Rail carriers have increased coal rolling stock capacity and have announced system enhancements that will increase total capacity.

245. Canadian power generator EPCOR Utilities Inc. commenced commercial operations of Canada's only supercritical coal-fired generation unit on March 1, 2005. The 450 MW unit emits 18 percent less $CO_2$ per unit of generation compared to average plants. The associated sub-bituminous coal mine, owned jointly with Luscar Ltd., is being expanded to meet the increased demand. Luscar is also adding 2 million tonnes per year of bituminous coal production capacity at its Coal Valley mining operation in west-central Alberta. Most of this coal is destined for the Pacific Rim export market.

***Australia***

246. Demand for infrastructure services by the export coal industry continued to grow strongly in 2005 and placed increased pressure on already stressed systems. A capacity allocation system introduced in 2004 for the Hunter Valley coal chain has continued in operation and been largely effective in reducing the queue of ships at Newcastle port. However during 2005 capacity shortfalls in the rail/port systems servicing the Queensland coalfields have also become apparent. As a result, opportunities for short-term increases in coal exports were not fully realised, and infrastructure capacity has become the main constraint on medium-longer term growth of the industry.

247. The issue gained national prominence during the year, with long vessel queues at the Dalrymple Bay Coal Terminal in Queensland assuming iconic status amidst concerns about an economy-wide deficiency in infrastructure capacity. A resulting inquiry by a special taskforce appointed by the Australian Prime Minister concluded there was no general infrastructure crisis, but in the interest of facilitating timely investment in new capacity, recommended a lighter handed, better coordinated, approach to the regulation of monopoly infrastructure providers by the federal and state governments.

248. Due to the lead times involved in regulatory approvals and construction of major offshore works, planning for expansion of export coal infrastructure capacity has focussed on the ports. That said, the lead times involved in new rail track and rolling stock capacity also are significant. Looking at each of the major rail/port corridors:

***Blackwater to Gladstone Port***

249. Current throughput is 44mtpa. The port's next three phases of growth (to 53mtpa by the end of 2005, 61mtpa by mid 06 and 72mtpa by mid 07) are all committed, based on anticipated demand. Further, planning is underway for a third loading terminal at Wiggins Island adjacent to the existing RG Tanna facility at Gladstone, the first stage of which would increase capacity by another 20mtpa by 2010. Further, an initial feasibility study is underway for a third loading terminal at Wiggins Island adjacent to the existing RG Tanna facility at Gladstone, the first stage of which would increase capacity by another 20mtpa by 2010 with the potential to further expand in due course by another 60Mtpa.

250. The main requirement for expanding and new mines in the Southern of the Bowen Basin coalfields is to ensure that rail capacity on the Blackwater and Moura corridors is developed in line with this growth of the port.

***Goonyella to Hay Point Port (Dalrymple Bay and Hay Point Terminals)***

251. A substantial and growing gap emerged between rail/port capacity and industry demand in the northern Bowen Basin coalfields during 2005. BHP Billiton Mitsubishi Alliance is expanding the capacity of its Hay Point Coal Terminal from 34mtpa to 40mtpa by the second half of 2006 and then to 44mtpa by first quarter 2007, and is assessing options for further growth of the facility to 55-57mtpa.

252. Dalrymple Bay Coal Terminal Owners, Babcock & Brown Infrastructure, are undertaking a 'short gain' expansion of that facility, which is expected to increase the terminal's capacity from 56 to 60mtpa by early 2006. Expansion beyond this level will be undertaken in three phases, with the "phase 1" expansion now underway to increase capacity to 68mtpa by July 2007. Completion of phases 2 and 3 will take capacity to 85mtpa by August 2008, subject to DBCT customer demand to that level.

253. A major issue for northern Bowen Basin coal producers is whether the Goonyella to Hay Point/DBCT rail system can be cost effectively expanded to the full extent required to accommodate all of this proposed port growth. This is being evaluated by Queensland Rail.

***Newlands to Abbot Point Port***

254. An option to expand the Abbot Point Port and associated rail line from 13 to 20mtpa is being assessed. More significantly, a proposal to upgrade and join the Newlands rail line to the Goonyella line (the "Missing Link") and substantially expand the port to as much as 50mtpa by the end of the decade is the subject of a major feasibility study by Queensland Rail and the Ports Corporation of Queensland. This study will complete the

picture in terms of the options available for expanding coal export capacity from the northern part of the Bowen Basin, from where much of the growth of Queensland coal production is expected to emanate over the next five to ten years.

***Hunter Valley to Newcastle Port***

255. Following its establishment in 2004, the Hunter Valley Coal Chain (HVCC) team, which brings together all coal chain operators, has been formalised and has developed a 10 year capacity master plan. Based on this plan, every component of the coal chain is required to deliver new infrastructure if capacity is to increase. Investment is conditional upon coal demand emerging, and upon commercial commitments to underwrite the expenditure:

    - Australian Rail Track Corporation (ARTC) – additional track capacity to manage increased coal demand and support the geographical diversification of mines;
    - Newcastle Coal Infrastructure Group (NCIG) – a new coal terminal including additional dump stations, stockpile capacity, reclaimers, ship berths and loaders;
    - Pacific National Rail (PN) – more rolling stock and more efficient train configurations;
    - Port Waratah Coal Services (PWCS) – more stockpiling and reclaiming capacity; and
    - Newcastle Port Corporation (NPC) - enhance the Newcastle coal port capacity through increased channel width and depth.

256. Expansion is underway at PWCS to increase capacity to 102 million tonnes by December 2007. Planning to further expand capacity to 120Mtpa is underway. The development by NCIG of a new port facility adjacent to PWCS has been announced. This facility is expected to add 30Mtpa capacity by January 2009, although no formal plans have been confirmed.

257. Growth of the Australian coal industry is also placing additional demands on other forms of infrastructure, the development of which is struggling to keep pace with requirements. This includes water supply infrastructure, particularly in drought affected areas, housing for increased mine and contractor workforces in regional locations, and skills (engineers, tradespeople and equipment operators) for which coal companies are competing with other mineral producers and a generally buoyant Australian business sector.

***Japan***

258. Investment by Japanese companies into the overseas coal industry continued in FY2004. The Sumitomo Corporation and the Itochu Corporation purchased Xstrata's interest in the Rolleston coal mine (Queensland, Australia) for 42.6 billion yen, each obtaining a 12.5 percent interest in the mine.

259. Sumitomo and Itochu are confident about the future prospects of the Rolleston project, which will produce low ash coal and have top-class export competitiveness. It will produce mainly thermal power station coal and is expected to commence production and trial shipping of its coal in 2005 (1 million tons), reaching its full 8 million ton production capacity by 2008.

260. No investment in transportation was made by Japanese companies in 2005.

261. In FY 2004, Japanese power utilities started 1,500 MW of new coal-fired generating plant. From FY 2005 onwards they will construct 4,100 MW of new coal-fired plant, expanding coal-fired generating capacity to 41GW (16 percent of the total) by 2014.

262. While the “Allocation System” introduced for some Australian coal terminals in 2004 and 2005 has improved demurrage, quarterly allocations reduce delivery flexibility. Further investment in coal production and transportation infrastructure is needed to stabilise coal flows.

***South Africa***

263. As a result of the changes brought about by the new Mineral and Petroleum Resources Development Act, the large coal mining companies are still testing the new investor’s environment and although some large coal projects have been announced, the full implementation of such projects is still awaiting the final go ahead of those companies.

264. On the other hand, a number of Black Economic Empowerment (BEE) companies have acquired reserve blocks and have opened a number of small collieries. As a result of the allocation of some export tonnage by RBCT to BEE companies, there will be more mines opening in 2005 and probably during 2006.

265. The only large infrastructure investment will be the approval of the construction of the new coal terminal, SDCT, and the related rail capacity increment. The new port will probably be fully operational by 2007.

266. Eskom is likely to build a next new station in 2010/2012 and is assessing a number of coal technologies.

***Germany***

267. RWE has plans to build two new lignite power stations with a total capacity of 2,100 MW and 43 percent efficiency at Neurath. However, the power stations will not go ahead until the position on $CO_2$ emissions certificates beyond 2008 is clearer and the economics of these substantial long term investments can be reliably estimated.

***France***

268. France has plans to increase electricity peaking capacity and the need for maintaining a level of coal capacity is now starting to be considered in light of the recent increases in gas prices and high (€30/tonne) $CO_2$ emissions permit prices.

***United Kingdom***

269. Despite the predictions of many analysts, coal continues to provide a third of the UK’s electricity requirements and the announcement of Government funding for the Carbon Abatement Technology strategy is a major step forward in acknowledging the role coal can continue to play in a low carbon economy.

270. However, the energy market structure in the UK is not conducive to long term investment in either the mining or power sector. The lack of certainty in how the LCPD will be implemented or what targets will be adopted in Phase II and how the allowances will be allocated is resulting deferral, for as long as possible, of investment in power projects. This is to the detriment of coal, where higher capital costs and a longer period of

construction means that going forward gas may become the default fuel of choice.

271. There is now a perceived shortage of coal import capacity in the UK and utilities are having to contract for this capacity before committing to imported coal. Associated British Ports (ABP) is building a new dedicated coal import terminal (HIT2) at Immingham on the UK East coast. The terminal will be able to handle 7.5 million tonnes a year and will commence operations in mid 2006. Immingham is geographically well placed to supply a number of power stations in the UK Midlands. Further investment in the local rail infrastructure will be required to handle the increased volumes but as yet no announcement from the track operator Network Rail has been made.

## 4.3 Developments in Clean Coal/Near Zero Emissions Technology

***United States of America***

272. One of the nation's largest electric power generators, American Electric Power Co., announced on 31st August 2004 its intent to build approximately 1,200-megawatts of commercial-scale, baseload IGCC generation. Although two government-subsidized 250 MW IGCC demonstration plants are currently operating in the US, this would be the nation's first commercial-scale IGCC plant. AEP company statements mentioned the following factors in its decision to invest in a commercial-scale IGCC application:

    - the capability to reduce $SO_2$, NOx and mercury emissions, relative to conventional pulverized coal;
    - the expected capability of IGCC to accommodate $CO_2$ capture technologies;
    - an expectation that future years will bring tighter air-emission control requirements; and
    - a desire to gain operating experience with low-emission coal generation technologies.

273. AEP announced on 29th September 2005 that it had signed an agreement with GE Energy and Bechtel Corporation to begin the front-end engineering design process for a commercial-scale, Integrated Gasification Combined Cycle (IGCC) clean-coal plant in the 600-megawatt range. This will be the first such engineering and design agreement undertaken for an IGCC plant of this scale and the first large-scale, baseload IGCC plant in the country. Following this 10-12 month process, and depending on the status of regulatory proceedings and engineering and cost targets, AEP would hope to move forward with awarding contracts for final engineering, procurement and construction and complete the plant in 2010. The company intends to build at least another 600 megawatts of IGCC generation by 2013.

274. Several coal companies and utilities have agreed to participate in FUTUREGEN, a Department of Energy/industry partnership to build a zero emission coal fired plant consisting of an integrated gasification combined cycle plant that produces both hydrogen and electricity and geological carbon sequestration. The private sector consortium and the DOE are currently in the final stages of negotiation on project details. This project will contribute to the research and technology development that must occur to reach the Administration's long term objective of a hydrogen-based economy.

***Canada***

275. Recent initiatives include research and development work to support both mercury removal and carbon dioxide emission reductions. An international consortium of government and research agencies and electric power sector companies constructed a mercury removal test facility at the Poplar River Power Station of Saskatchewan Power Corporation. A number of sorbents have been tested since September 2004 and results indicate that high rates of mercury reduction are feasible.

276. The Canadian Clean Power Coalition is comprised of Canadian and American power companies, coal producers, research institutions and government agencies that are working towards a commercial scale plant to demonstrate power generation from low rank coals with carbon capture and storage. The second phase of this project, to

determine the initial design of the IGCC facility for low rank coals, is near completion.

***Australia***

277. The Coal21 Action Plan identified an urgent need to bring forward pilot and/or major demonstration projects for a number of clean coal and ZETs-related concepts. Several candidate projects are now being planned or considered, each of them meeting at least one of three basic assessment criteria, namely its potential to facilitate near-zero emissions, increase coal use efficiency, or facilitate hydrogen production. Project proponents include public and private sector organisations.

278. Potential Australian demonstration projects include:

***Potential black coal demonstration projects:***

- Stanwell IGCC (190MW with CO2 capture and storage) (Stanwell)
- Callide A Oxy-fuel retrofit (30MW) (CS Energy)
- Post Combustion Capture (PCC) demonstration (CSIRO)
- Ultra Clean Coal scale-up plant (UCC Energy)

***Potential brown coal (lignite) demonstration projects:***

- Monash Energy project (160MW demonstration) (Anglo American)
- GTL Energy coal gas-to-liquids project (IGCC + CCS) (GTL Energy; International Power; Rentech)
- CLP Power gasification project (500 MWe IGCC (CLP and Yallourn Energy)
- HRL IDGCC demonstration (125MW)
- MTE step-up pilot and other possible lignite drying demonstrations.

***Potential CO2 Storage Projects:***

- Otway basin CO2 storage research project (CO2CRC)
- Gorgon Project (a large gas project aiming to sequester up to 5MT p.a. of CO2 generated during the gas production project.

279. A number of these potential projects are expected to apply for funding through the Federal Government's A$500 million Low Emission Technologies Demonstration Fund (LETDF). Final guidelines for applicants to the LETDF were released in early October and applications close at the end of March 2006.

280. In addition to planned pilot and demonstration projects, Australia has a range of relevant R&D programmes, with others actively planned. These programmes are spread over a number of research organisations that include CSIRO, CCSD, CO2CRC, CRC for Clean Power from Lignite and the new Queensland Centre for Low Emissions Technology (CLET). Most of these programmes are supported by public and industry funding.

***Japan***

281. Clean Coal Technology (CCT) development has been strongly pursued in Japan, primarily focusing on high-efficiency coal use technologies. 10 Japanese electric power companies are collaborating in an IGCC demonstration program, including construction and operational testing of a 250MW demonstration plant from FY2004 through FY2009.

282. Another project on integrated coal gasification fuel cells (IGFC), the “EAGLE Project”, has been conducted at a pilot-scale (150ton/d coal plant) by the New Energy and Industrial Technology Development Organization (NEDO) and Electric Power Development Co. (EPDC) since FY1998 and will continue until FY2006.

283. R&D programs for 700°C class advanced ultra-supercritical plant, lead by the Japan Society of Mechanical Engineers (JSME), will be started from 2006. This initiative is targeted at commercial operations after the 2020s.

284. The following R&D programs on carbon capture and sequestration (CCS) technologies have been started in Japan:

- Demonstration test for $CO_2$ capture from coal flue gas using an MEA-based solvent, (Mitsubishi Heavy Industries, 2005 ~ 2006)
- Japan-Australia joint program on Oxy-fuel combustion and the CCS project in Australia, (Japan Coal Energy Centre et al, 2004 ~)
- $CO_2$ geological sequestration into a saline aquifer, (Research Institute of Innovative Technology for the Earth (RITE), 2000 ~)
- $CO_2$ storage and Enhanced coal mine methane recovery project, (Japan Coal Energy Centre, 2002 ~ 2006)

***South Africa***

285. South Africa joined the Carbon Sequestration Leadership Forum and the Department of Minerals and Energy commissioned a study to assess sources and suitable sites for carbon sequestration in South Africa. Further work needs to be carried out in this area.

286. Eskom is studying the potential application of Underground Coal Gasification (UCG) with former-Soviet Union experts, represented by Ergo Exergy Inc., Canada. UCG is a process whereby coal is converted in situ into a combustible gas that can be used for power or chemical production. A conceptual and scoping study was completed in November 2002, which showed significant potential. A pre-feasibility study into applying the technology in Majuba colliery was completed in December 2003, and was again positive. Subsequently, a phased investment in the RD&D of this technology was approved in March 2004. In July 2005 the site was characterised in detail to prove the suitability of the coal seam, and the results were positive. The engineering of the pilot plant has therefore commenced (for initially 6MWe, expanding to 28 MWe), with first gas planned for production in March 2006. Pending the outcome of this pilot, a demonstration plant of 112 MWe is planned for 2007. Commercial implementation will follow if positive results are achieved in the RD&D phases, with the intention being to supplement coal for Majuba power station (4,110 MWe capacity) with up to 30 percent thermal input from UCG gas.

***Germany***

287. On 1st June 2005 the German Cabinet voted to adopt the fifth Energy Research Programme – the first of its kind to be initiated in the last ten years. The programme is aimed at supporting the Federal Government's energy policy and is designed especially to contribute towards achieving a balanced energy mix. It should also help to create an effective framework for the power-station replacement programme due to be launched in Germany in 2010. As well as promoting energy efficiency and renewable energies, the programme will also give broad support for coal utilisation. In this respect the Energy Research Programme will be based on preliminary work carried out under the COORETEC Project, an initiative launched by the Federal Ministry of Economics and Labour to develop techniques for improving energy efficiency and to demonstrate the viability of a $CO_2$-free power station.

288. Another significant project in this context is the *Component Test Facility for a 700°C Power Plant* (*COMTES 700)* project. With financial support from the EU Commission, *COMTES 700* will demonstrate how advanced, mainly nickel based, materials and power plant components can pave the way towards more efficient coal-fired power plant in the future. Such technology allows power plants to operate at steam temperatures of 700°C and pressures of 350bar. The Component Test Facility has been installed at E.ON's coal-fired *Scholven* power plant and operation started in mid-2005 with the aim of evaluating results in 2009, before construction of new power plants. The project is financed by the EU Research Fund for Coal and Steel and jointly sponsored by major European power plant operators. The total investment amounts to more than €15 M.

***United Kingdom***

289. The UK is keen to show global leadership in the area of climate change and in June 2005 the UK Department of Trade and Industry launched its long awaited "Strategy for Developing Carbon Abatement Technologies for Fossil Fuel Use" document. It recognises that fossil fuels will have a major role to play in power generation and other energy-related activities for decades to come and identifies ten action areas for delivering the Strategy. A central theme of the document is the continuation of R&D into clean fossil options, but extended to include the demonstration of CAT options at meaningful scale. A budget of £25M has been allocated to stimulate demonstration projects.

290. A number of large UK-based companies (BP, E.ON UK, Progressive Energy, Air Products, Alstom Power UK, AMEC, ConocoPhillips, Mitsui Babcock, Schlumberger Oilfield UK, Scottish & Southern Energy and Shell) have formed the Carbon Capture and Storage (CCS) Association to promote technology for storing greenhouse gases underground.

291. The Carbon Capture and Storage (CCS) Association believes this technology can help the UK meet its emission reduction goals and may also extend the life of North Sea oil fields by improving recovery of residual oil deposits. The estimated total storage capacity in the UK sector of the North Sea is more than 15 billion tonnes of $CO_2$, compared with the country's total emissions in 1990 of around 760 million tonnes of $CO_2$ equivalent.

292. The U.K. 2005 Budget Statement also included a commitment to look at market incentives for carbon capture and storage technologies.

293. BP has announced a $600m CCS project at Peterhead power station in collaboration with Scottish & Southern Energy. $CO_2$ will be injected into the North Sea Miller oil field, which had been due to close by 2007, extending its life by 15 years.

# 5 CONCLUDING REMARKS

294. The information given in the body of this paper has been compiled with the help of CIAB Associates and using other published sources. It describes developments over the last year in international coal markets and in environmental/energy policy in various countries from the perspective of individuals active in the coal, electricity and transport industries. Section 1 of the paper summarises the high level messages derived from this work and from other work published by the CIAB during the last year.

295. Three CIAB publications during 2005: *"Roadmapping Coal's Future - Zero Emissions Technologies for Fossil Fuels"*, *"Reducing Greenhouse Gas Emissions – the Potential of Coal"* and *"Investment in Coal Supply and Use - an industry perspective on the IEA World Energy Investment Outlook"*; have sought to highlight technologies for reducing $CO_2$ emissions from coal use, explain the industry's perspective on investment and identify policy options.

296. The CIAB has given considerable thought to how it can support the IEA Secretariat in delivering responses to the G8 Summit action plan and the particular challenges for coal. The organisation is most effective when engaged in activities that are of genuine interest to Members, drawing on their practical, technical and commercial experience to complement the work of more specialised technical, financial and policy organisations. Following discussions at the CIAB Plenary meeting on 10th November 2005, Members endorsed a direction for future work that has culminated in the work programme proposed in Section 2 of this paper.

297. We believe that progress towards these work goals will usefully aid the IEA as it undertakes its own work to address the priorities emerging from the IEA Ministerial meeting and the G8 summit.

***CIAB, January 2006***

# APPENDIX 1 – RECENT USA COAL OWNERSHIP DEVELOPMENTS

**Alpha Natural Resources LLC** acquired the assets of Moravian Run Reclamation Co., Inc. in April 2004, and a coal prep plant and railroad loading facility from Cooney Brothers Coal Company in May 2004. Alpha became a publicly traded company in February 2005, and in April 2005 sold its Colorado mining subsidiary, National King Coal LLC, and Gallup Transportation and Transloading assets to NKC Acquisition. NKC Acquisition is owned by GCC America. (Alpha had originally purchased National King Coal in March 2003 from AMCI).

**Arch Coal, Inc.** signed an agreement with Vulcan Coal Holdings LLC in 2003 for the purchase of its two Triton Coal Company mines in the Powder River Basin (North Rochelle and Buckskin). In January 2004, contingent on Federal Trade Commission (FTC) approval of the Triton mines acquisition, Arch agreed to re-sell the Triton Buckskin mine to Kiewit Mining Group. In April, the FTC filed a lawsuit to block the proposed purchase of the Triton Mines. Finally, in August, after the D.C. Circuit Court of Appeals turned down the FTC's block of the purchase, Arch completed its acquisition of Triton and concurrently sold the Buckskin Mine to Kiewit Mining Co. as agreed to in January. Arch purchased the remaining 35 percent interest in Canyon Fuels in July 2004 from ITOCHU Corporation, giving it the full 100 percent interest.

In July 2004, RAG Coal Holding Company became **Foundation Coal Corp.**, formed by a private equity consortium consisting of First Reserve Corporation, The Blackstone Group, and American Metals & Coal International (AMCI). Foundation then began trading publicly in December 2004.

**International Coal Group (ICG)** was formed in October 2004 to acquire the primary assets of former Horizon Natural Resources. ICG announced in April 2005 its intent to become a publicly traded company by second quarter 2005. Also in April, ICG announced plans to merge with Anker Coal Group and CoalQuest by the second quarter of 2005.

**James River Coal Co.**, which emerged from bankruptcy in May 2004, became a publicly traded company in November. The company announced in March 2005 its intent to acquire Triad Mining Inc.

In August 2004, **Massey Energy Co.** bought Horizon Natural Resources' Cannelton and Starfire operations, and in April 2005 sold the Starfire Mining assets (now called Big Elk Mining) to Trinity Coal Holdings LLC;

**Lexington Coal** is in the process of selling the remainder of the Horizon Natural Resources mines it acquired in 2004. The company sold its Marrowbone Development assets in April 2005 to a newly formed partnership called Southern West Virginia Resources LLC.

**Peabody Energy Corp.** purchased RAG Coal International's Twentymile Mine in Colorado, along with RAG's mining assets in Australia and Venezuela (April 2004). In March 2005, Peabody Energy acquired several Lexington Coal Illinois and Indiana coal properties (formerly Horizon mines).

**Wexford Capital LLC** purchased power producer American Electric Power's (AEP) Ohio and Eastern Kentucky mines to in April 2004. (Wexford holds most of these coal assets under CAM Holdings LLC.)

**Cook & Sons Mining**, which filed for bankruptcy protection in August 2003, received approval for its reorganization plan in August 2004, and the assets were put up for final auction in June 2004.

**White Mountain Mining**, which filed for Chapter 11 bankruptcy protection in June 2002,

received bankruptcy plan approval in April 2004.