

COAL INDUSTRY ADVISORY BOARD
Meeting with IEA Governing Board, Wednesday 10 December 2003
Background Paper

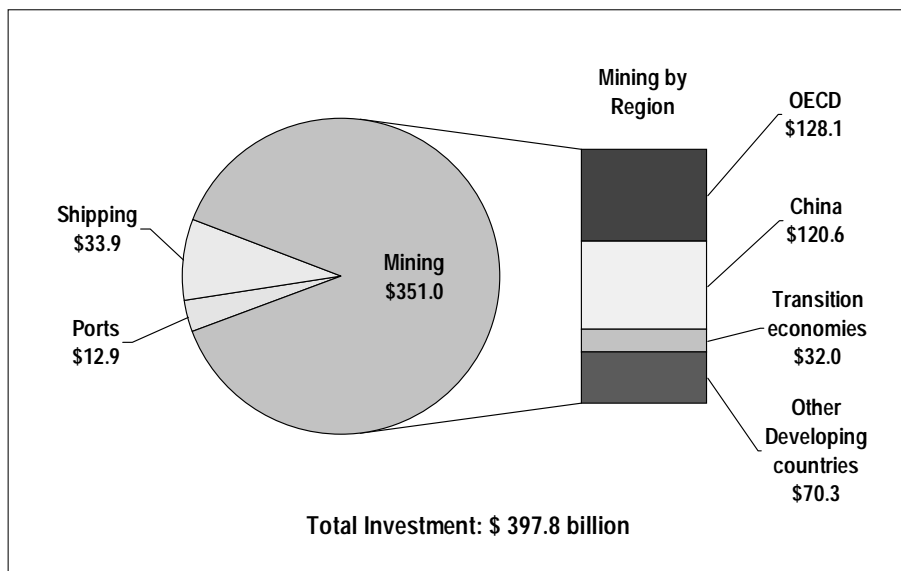
Investment in the Coal Industry

- On the basis of the IEA World Energy Outlook Reference Scenario, cumulative global investment needs in the coal industry are expected to be just under \$400 billion over the period 2001-2030, including mining, shipping and ports. This investment is needed to replace production capacity that will close during the projection period and to meet rising demand and trade.
- World coal demand grows from 4,595 Mt in 2000 to 6,954 Mt in 2030 representing one quarter of world energy demand but the coal industry requires only 2 % of global energy investment. Supply of one unit of energy from coal is only about one-sixth as capital-intensive as producing and transporting the same unit from gas. Coal is the least capital-intensive of the fuels with a significant share in world energy supply. Investment in coal rises to \$1.9 trillion if coal-fired power stations are included.
- Investment in the coal industry is split relatively evenly between developing countries and the rest of the world. In developing and developed countries alike, investment in the coal industry will be crucial to continued economic growth (and poverty alleviation in developing countries), given that most investment in coal is needed to supply coal-fired electricity generation.
- Financing the required energy investments in developing countries will be a big challenge; and not only for public budgets. More of the capital needed for energy projects will have to come from private and foreign sources than in the past. It is especially pressing for non-OECD countries to create an investment framework and climate that will enable them to mobilise the necessary capital.
- Currently, gas-fired power plants are smaller and quicker to build than coal-fired power plants, making it easier to attract private financing in liberalised markets. However, advances in coal technology will increase the thermal efficiency of coal-fired power plants, and reduce their capital cost.
- The longer term potential of advanced coal-fired power generation and carbon sequestration technologies is significant. Clean coal technologies in conjunction with carbon capture and sequestration could allow coal to continue to provide low cost electricity in a carbon constrained environment.
- A substantive barrier to investment in coal mining and coal-fired power plants is the concern that investments will become “stranded” due to carbon emissions penalties that may be imposed in the future. Uncertainty about future environmental policies is already pushing up required rates of return for new projects. However, continued research into clean coal technologies and carbon sequestration offers the potential for further improvements in the environmental performance of coal-fired power plants. The barriers to investment in coal mining and coal fired power plants may (1) discourage new

investment and (2) curtail research and development into carbon capture and sequestration. Policy makers will need to consider a bridge to maintain the economic and social benefits of coal, while allowing the time for the new technologies to develop.

Mining investment over the period 2001-2030, at around \$351 billion, represents close to 90% of the projected \$400 billion investment in the coal industry (Figure 1). Cumulative coal-related global investment required in the bulk-dry cargo fleet is \$34 billion (9%) and \$13 billion (3%) in ports. OECD countries will account for 36% of the global investment in mining and ports. Around 8% of the investment in non-OECD countries is needed to supply the exports of coal from non-OECD countries to OECD countries.

Figure 4: Cumulative World Coal Investment, 2001-2030



China is expected to account for 34%¹ (around \$123 billion) of the total global investment required in the coal industry through to 2030. This is driven by significant growth in coal-fired power generation to help meet strong electricity demand growth and also by China's relatively high new mine development costs. Significant investment will be required in port facilities in China to handle increased coal exports, growth in internal trade and imports.

The North American domestic coal market is expected to remain the second largest coal market in the world during the next three decades, although the influence and share of the United States and Canadian coal producers in export markets will continue to decline. Investment in the United States and Canadian coal industry is projected to account for 19% of the global total (around \$70 billion). Most investment

¹ All regional shares of the world total are calculated using only investment in mining and ports (\$364 billion) and exclude shipping, as shipping investment is not attributed to individual regions.

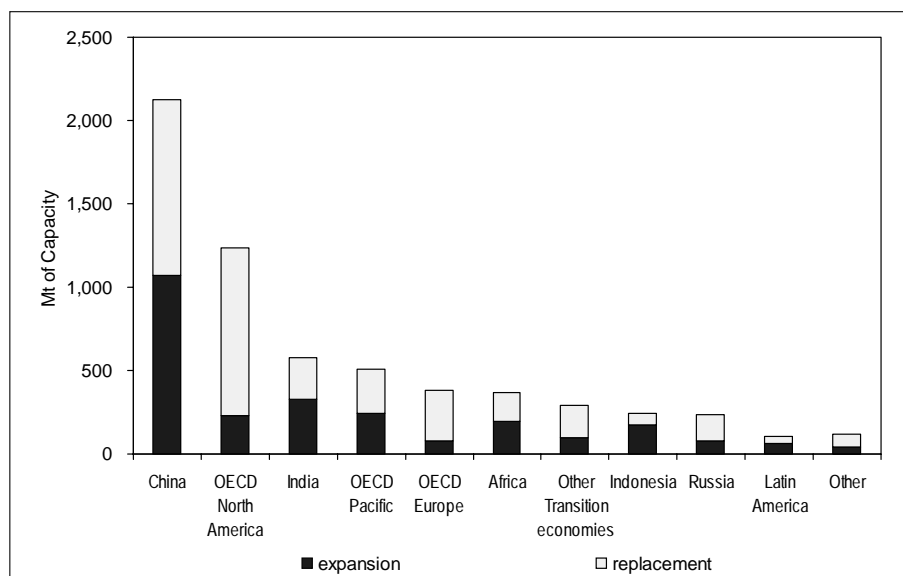
will be needed in order to maintain production, with a relatively small amount required to expand production to meet demand growth. Investment in the eastern United States will remain significant, despite an anticipated decline in production, as virtually all mines currently in production in this area will close within the next 20 to 25 years.

India is expected to account for 7% (around \$25 billion) of global investment in coal mining and ports over the period 2001-2030. Despite its large coal reserve base, India faces many challenges in meeting future demand growth from domestic sources. These include low productivity, poor coal quality and the poor financial state of the coal industry and power sector. Growth in imports and in the internal shipment of coal is modest, requiring an additional \$0.8 billion over the next three decades.

The need for new production capacity over the *Outlook* period will greatly exceed projected demand growth, because the closure of existing productive capacity will require new mines to replace this capacity. In some producing regions, such as the eastern United States and Indonesia, a large proportion of the existing mine capacity will close over the *Outlook* period and if production is to be maintained this capacity will have to be replaced. This high rate of mine closure is driven by a number of factors, including reserves, geology, regulations and the faster rate at which today's high-productivity mines can exhaust their economic reserves.

To maintain existing production levels and add capacity to meet projected demand growth between 2000 and 2030 will require 6,191 Mt of additional production capacity (Figure 2). This is equivalent to more than three times the current production of OECD countries combined. Capacity additions will have to average around 206 Mt per annum. It is expected that around 58% of the new mine capacity required will be needed to replace mine capacity that will be retired over the *Outlook* period. The balance will be required to meet demand growth.

Figure 2: Cumulative Additional Coal Mining Capacity



China alone will need to add around 2,130 Mt of production capacity, around half of which will be to meet demand growth. This is equal to around 34% of the global new

mine capacity additions and is some 70% more than the next largest region, the United States and Canada, where around 1,230 Mt of new capacity will be needed.

Total cumulative investment in the bulk-dry cargo fleet required for coal trade is expected to be around \$34 billion. This will be driven by growth in the world's international sea-borne coal trade of 419 Mt between 2000 and 2030 and by the internal shipping requirements of India, China and Indonesia of 105 Mt. World sea-borne coal trade is projected to reach 977 Mt² in 2030. The combined internal trade of India, Indonesia and China will reach 246 Mt in 2030. Global port investment needs will be modest at around only \$13 billion over the *Outlook* period.

² World coal trade covers all coal trade, including secondary products such as coke oven coke.