Zambia

What Would it Take for Zambia’s Copper Mining Industry to achieve its Potential?

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ACRONYMS, ABBREVIATIONS & CURRENCY

AFTFP  Africa Finance and Private Sector Development Unit of the World Bank
BOZ  Bank of Zambia
CAGR  Compound annual growth rate
CNMC  China Non-Ferrous Metal Mining Group
CSSDP  Copperbelt Small and Medium Enterprise Suppliers Development Program
DFID  United Kingdom Department for International Development
DRC  Democratic Republic of the Congo
FDI  Foreign direct investment
GDP  Gross domestic product
ICMM  International Council on Mining and Minerals
JPC  Jobs and Prosperity: Building Zambia’s Competitiveness Program
KCM  Konkola Copper Mines
LME  London Metal Exchange
PPI  Policy Potential Index
SXEW  Solvent extraction and electro-winning
UNCTAD  United Nations Conference on Trade and Development
VAT  Value Added Tax
ZRA  Zambia Revenue Authority

All dollar amounts are U.S. dollars unless otherwise indicated.
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This report is a window into a larger initiative, the Jobs and Prosperity: Building Zambia’s Competitiveness (JPC) Program. The JPC Program is a “joint venture” between the Government of the Republic of Zambia, the Zambian private sector, the United Kingdom’s Department for International Development (DFID), the African Development Bank Group and the World Bank Group. As such, the report represents the collective efforts of many people who engaged in this work at different stages in the process.

As this report is being published, the Program is being implemented by teams of stakeholders from Government, industry and civil society. While these teams are driving the work forward in an effort to achieve results, a smaller group of people was involved in preparing this report.

This report is part of a series produced by the World Bank’s Africa Finance and Private Sector Development Unit (AFTFP).1 The team is led by Marie Sheppard (Senior Private Sector Development Specialist), and includes Anna Morris (Private Sector Development Specialist), Michael Engman (Economist) and Sipiwe Chihame (Team Assistant). The report is based on a draft prepared by Sunil Sinha and Frank Russell (Consultants, Nathan EME, Ltd.)

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1 For a list of reports in the series, see Annex.
EXECUTIVE SUMMARY

This report explores the potential contribution that the copper mining industry could make to jobs and prosperity in Zambia, and what it would take to achieve this potential. Copper has for many years played an important role in Zambia’s economy, and the performance of the economy has followed the fortunes of copper mining closely. This report investigates the role copper mining could play in achieving the government’s objectives of increasing economic growth and jobs in the future.

Global prospects for copper are favorable. Driven by increased consumption in emerging economies, especially China and India, demand for copper is expected to grow at around 3 percent annually, reaching 25 million tonnes by 2020. Supply of copper from known sources is expected to peak at 20 million tonnes and decline thereafter, resulting in a shortfall in supply. Copper prices are expected to remain high in real terms, though they will be subject to cyclical fluctuations and periodic, short term, volatility.

To meet the shortfall in supply and take advantage of high prices, the global mining industry is looking to increase investment in copper mining. Where it chooses to invest depends upon three factors: (1) good mineral potential, (2) a sound policy environment, and (3) a competitive industry able to generate good returns to investment.

Although 40 percent of the country has not been geologically surveyed, Zambia is recognized by the international mining industry as having good mineral potential. Zambia possesses 6 percent of known world copper reserves. The resources available to existing mines in Zambia are estimated at 2.8 billion tonnes of ore ranging between 0.6 percent and 4 percent copper. This, together with recent successful exploration, should be sufficient to sustain the industry well into the middle of the twenty-first century.

According to the highly-respected Fraser Institute survey of mining and exploration companies, Zambia ranks 26th out of 79 jurisdictions worldwide for mineral potential. In Africa, only the Democratic Republic of Congo (DRC) and Burkina Faso have appreciably higher mineral potential scores.¹

However, the country’s policy environment is not considered favorable. Zambia ranks 57th out of 79 jurisdictions on the Fraser Institute’s Policy Potential Index.² This is confirmed by the influential mining consultancy Behre Dolbear, whose 2011 ranking of countries for mining investment placed Zambia 19th out of 25. The main factors that detract from the policy environment in Zambia are: (1) social issues with respect to community services, (2) currency instability, (3) corruption, (4) the tax regime and (5) the political system.

The Zambian mining industry has a high cost base, with most of the major mines in the top two quartiles of the international cost curve. In the mining industry, with prices determined by international markets, the sole determinant of competitiveness is cost of production. The older mines, which account for the majority of output, produce at a cost well above the international benchmark for new investment of $4,400 per tonne ($2 per lb). The newer mines are able to meet the benchmark but the high cost base means that even they are in the middle of the international cost curve.
The major factors that undermine competitiveness are:

1. **Resources at the older, large, mines have largely been depleted**, creating a need to mine at considerable depth and distance from the mine head and hence leading to high costs. Mines that have passed their useful economic life are kept open due to government pressure.

2. **Input costs are high**, having risen rapidly, and productivity is low, and this undermines the cost competitiveness of all the mines. The major input of concern is labor, the cost of which has risen dramatically in recent years and the productivity of which is well below international standards. The cost of other inputs, such as equipment, spares, fuel and other consumables is also high. Most items need to be imported because the supply base in Zambia is weak.

3. **Infrastructure is poor**. Power shortages limit output. The rail system is costly and unreliable. The time and cost of clearing borders is high and this adds to road transport costs.

**Zambia has failed to maximize the industry’s potential to contribute to national prosperity.** The nationalization of the mines during the 1970s proved to be a disaster - resulting in under-investment, falling output, and the industry becoming a major drain on the exchequer. After privatization, in the 2000s, investment and output have revived, but the country is yet to benefit fully.

The world over, the major contribution that the mining industry makes to national prosperity is through paying taxes that governments can then reinvest in infrastructure and human development. Despite the revival of the industry since privatization, the mining industry’s contribution to government revenues has remained low, peaking at just 1.4 percent of GDP in 2008. Mining taxes amount to just 8 percent of total tax revenue. This is a low figure given the industry’s share of GDP (15–18 percent) and the value of copper exports (over $3 billion). Worldwide, taxes represent between 25–40 percent of export revenues. In Zambia, they represent 3–5 percent.

The reason for the low tax take lies in the Development Agreements signed by government at the time of privatization and which gave away generous tax concessions. In 2008, a new tax regime was introduced which was considered draconian by the industry and had to be replaced, prompted by the sharp fall in copper prices during the global downturn.

In 2009, the government instituted a new tax regime that follows good international practice. The effective tax rate of 47 percent is within the international range of 40–50 percent. Under this regime, the tax take should increase dramatically. However, the regime faced challenges from the mining industry because of invariability clauses contained in their Development Agreements. The industry also complains that it should be compensated for the government’s failure to provide adequate infrastructure and social services, which undermine mines’ cost competitiveness.

At the root of the matter lies the failure of the government and the industry to agree on an operating regime that strikes an acceptable balance between the interests of the industry and its contribution to national prosperity. Such a regime needs to cover taxation as well as government’s obligations to provide the macro-economic stability, good governance, infrastructure and social services that the industry needs to prosper. Unless such a regime is agreed, it is likely that industry players will continue to dispute at least some aspects of the
new tax regime and that government revenues will not rise as quickly as they ought to. Moreover, the tax regime will remain unstable, undermining investor confidence.

This report examines two scenarios for Zambia’s mining industry: “business as usual” and “realizing its potential”. Under the “business as usual” scenario:

- Due to favorable global prospects, Zambia will continue to benefit from the high price of copper and so export earnings will rise to $4.8–$6.8 billion a year.
- Output, however, will remain at 800,000–850,000 tonnes a year, constrained by power shortages.
- Investment is likely to fall from current high levels as the limits to output choke off first investment in operations and then exploration.
- The tax take will increase but remain below $1 billion a year as parts of the industry continue to challenge the new tax regime.
- Zambia will continue to suffer limited linkages between the mining industry and the rest of the economy.
- During inevitable downturns in the price of copper, an uncompetitive Zambian industry will respond by suspending operations and laying off workers - as it did in 2008/2009.

Under the “realizing its potential” scenario:

- Zambia should be able to sustain the increase in investment experienced recently.
- Output should increase to 1.3–1.5 million tonnes a year by 2020, making it the world’s second largest copper producer after Chile.
- Export revenues should rise to $9–$12 billion a year.\textsuperscript{3}
- The tax take should increase to $2.25–$4 billion a year.
- Although there is limited scope for additional job creation, the industry would be able to provide more skilled and better-remunerated employment.
- It should be possible to increase the industry’s local supply base, spurring the growth of other industries such as manufacturing and creating more employment in those industries.
- A more competitive industry should be more resilient to downturns.

Achieving the more desirable outcomes set out under the “realizing its potential” scenario requires that a number of results be achieved to improve the investment climate and improve cost competitiveness:

1. The government, the mining industry and the representatives of labor and civil society arrive at a consensual and transparent agreement on what is needed to develop the copper mining industry in ways that balance the interests of the industry and the development needs of the country. The agreement should cover taxation,
infrastructure, social provision, corruption and currency stability, helping to improve Zambia’s ranking in both the Behre Dolbear and Fraser Institute indices.

2. A much stronger Geological Survey Department at the Ministry of Mines plays a more active role in the identification of the country’s resources, enabling the government to attract more investors and sign clearer exploration and development agreements.

3. The mines currently in the upper quartile of the international cost curve move to the third quartile, providing greater resilience against price dips. Mines that have reached the end of their productive lives are closed. The newer mines improve their competitiveness further.

4. All new mines are able to meet investment criteria at the production cost benchmark of $4,400 per tonne comfortably.

5. Labor costs are kept in check in dollar terms through less adversarial collective bargaining made possible by greater transparency on both sides and through the government’s intermediation.

6. Zambia reduces the gap in productivity with Chile and other comparators as a result of more effective training.

7. Power outages no longer take place and the grid extends to new mining areas.

8. Investment in road infrastructure targets the needs of the mining industry in terms of easing transport bottlenecks for existing mines and linking new mines to the road network.

9. The cost of fuel falls to South African levels for the mines and haulers.

10. The cost of road transport falls to South African levels as a result of lower fuel costs, reduced duty on spares, a better-trained workforce and better-maintained, less congested roads.

11. The railways are improved, through greater investment and better management, reducing the reliance on road transport.

12. Better trade facilitation reduces the time to cross borders, with the mines reporting that the time to port falls by half. This contributes to an improvement in Zambia’s ranking on the World Bank’s Doing Business Index.4

13. A larger, faster growing industry and an improved operating environment for manufacturing attract international original equipment manufacturers to locate in Zambia. The mines are incentivized to undertake vendor development programs.

14. A stable, competitive exchange rate helps to improve the competitiveness of the mines and manufacturing.

15. Repair and maintenance and consumable costs fall as a result of better trained Zambian technicians and a lower cost, domestic supply of spares and consumables.
Ensuring that Zambia is able to use the proceeds from copper to deliver prosperity for its people requires that the following be achieved:

1. The potential resource “curse” of natural resources is addressed through effective management of foreign exchange and government revenues generated by copper;

2. The government uses its tax revenues from copper mining to improve the competitiveness of the economy by investing in human development, infrastructure and social services. Longer term, it uses copper revenues to transform the economy’s basis of growth from factor-driven to efficiency-driven.

3. The government and the private sector work together to develop the competitiveness of industries with the potential for diversifying the export base.

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1 Many of the best-scoring jurisdictions are states or provinces of the United States, Canada and Australia.
2 Intended to serve as a report card for governments on how attractive their policies are from the point of view of an exploration manager.
3 Assuming an output of 1.5 million tonnes per year at a price of $6,000-$8,000 per tonne.
4 [http://www.doingbusiness.org](http://www.doingbusiness.org)
1 INTRODUCTION

- Why are industries in which Zambia has an apparent comparative advantage, such as commercial agriculture and tourism, not generating more jobs and income?
- What can be done differently - by Government, businesses, civil society and donors - to change this situation and make these industries more productive?
- Can innovative approaches such as crowd sourcing, often adopted by the private sector, be used to generate results and facilitate accountability for achieving them?

These questions continue to preoccupy policy makers, businesses and civil society – especially in light of Government’s strategy to embrace private sector-led growth and facilitate competitiveness and diversification.

While Zambia’s economy performs well, in macroeconomic terms, low levels of productivity plague industry, and this constrains growth, diversification and prosperity. In recent years, economic growth has averaged 5-6% a year, business reforms are being implemented (Zambia was one of the top ten reformers in the Doing Business Index of 20111), and investment levels are at an all time high. However, according to the World Economic Forum’s Global Competitiveness Index 2010-2011, Zambia is not a competitive place in which to do business (ranking 115th out of 139 countries). Not surprisingly, business productivity tends to be low, and few Zambian industries are internationally competitive. Formal employment is shrinking (estimated at 10% of the labor force) and rural poverty is increasing. In summary, there is an urgent need to increase productivity, growth and employment.

In 2008, when discussing Zambia’s progress relative to its Fifth National Development Plan, government and the World Bank agreed to try a different approach to building business productivity and industry competitiveness. Collectively, we wanted to know: is there a better way to design/implement policies and programs so that they are more effective? The World Bank discussed this question with other donors supporting private sector development in Zambia, some of whom then became partners in a new initiative, the Jobs and Prosperity: Building Zambia’s Competitiveness (JPC) Program.2

The JPC Program has two phases. Phase I encourages demand for results that, if achieved, could increase the productivity of Zambian businesses. Phase II facilitates the supply of these results.

During Phase I, stakeholders identified copper, beef, dairy and tourism as industries with large but unexploited potential that could benefit from the JPC approach. A collaborative process was used to analyze the competitiveness of these industries and identify opportunities and challenges to realizing them. The analytical work was structured so as to maximize the accuracy and ownership of results. This participatory approach helped to mobilize stakeholders and catalyze demand for achieving the target results. While the industries had been studied before and many of their challenges were known, they remained largely uncompetitive within the region and the world. The JPC Program leveraged off this previous work and adjusted the process of performing analytical work so as to avoid similar pitfalls. Specifically, the JPC sought to generate strong consensus around the analytical findings, which included the explicit consideration of political, social and institutional issues. This approach distinguishes the JPC from previous analytical work and is expected to
increase the likelihood of tangible results being achieved. Following the analytical work, industry stakeholders used agreed criteria to select three to four priority target results that – if achieved – could assist in unlocking the industries’ potential. These target results became the focus of the program’s Phase II (implementation).

**Phase II has two goals.** First, to supply some concrete results by experimenting with a range of tools, including challenge competitions and crowd-sourcing, both of which have been used successfully by the private sector. Tapping into the “wisdom of crowds” (both local and global) can identify cost-effective ways to achieve the target results – which can then be implemented on a pilot basis. Second, to facilitate advocacy and accountability for achieving the target results. The JPC provides information, analysis and resources to enable advocacy, and, equally important, a means by which stakeholders can hold each other accountable for delivering results.

**What happens next?** The JPC Program is a pilot, operating with limited time and resources, seeking to deliver concrete results within 2-3 years. It is too early to know whether the program is successful – in terms of outcomes. What is clear, however, is that the approach of mobilizing demand and supply for clearly defined results can be an effective way to improve the caliber of analysis and to build consensus around priorities. The ownership generated by this process increases the likelihood of outcomes being achieved, as key stakeholders advocate for outcomes and monitor progress towards attaining them.

**The JPC approach is an experiment, and while the risk/return ratio is not yet known, the experience is useful.** Whether or not the Program is successful, the experiences gained will be captured for future work in Zambia as well as for other countries with similar challenges. It is hoped that the return on investment will be positive – both for Zambia, which needs more productive industries to drive prosperity, and for the development community, which needs more effective ways of supporting competiveness and diversification.

This report is one in a series of documents produced under Phase I of the JPC Program. It explores the potential contribution that the copper mining industry could make to jobs and prosperity in Zambia, and what it would take to achieve this potential. It aims to facilitate the development of a common vision of the industry and of what it would take to bring about this vision. In line with the Program’s approach, the report does not contain recommendations on what should be done or plans for their implementation. It is organized as follows:

Chapter 1 (this chapter) introduces the background to the program and to this report.

Chapter 2: What are the Prospects for Copper Globally? takes stock of conditions likely to prevail in the global copper industry, analyzing the factors that are causing a shortfall in world copper supply and driving investors to invest in new mines. This sets the scene for what Zambia could hope to achieve from improving the growth and competitiveness of its copper mining industry.

Chapter 3: The Status of Copper Mining in Zambia considers the contribution copper makes to the Zambian economy and sets out what it could deliver in the future.

Chapter 4: How Attractive is Zambia for Copper Mining Investment? examines where Zambia ranks in international comparisons of the attractiveness of countries for investment and identifies the main strengths and weaknesses.
Chapter 5: **How Competitive is Zambia’s Copper Mining Industry?** compares the competitiveness of copper mines in Zambia against their international counterparts.

Chapter 6: **What Could the Industry Deliver?** sets out what is likely to happen to Zambia’s copper industry under a “business as usual” scenario or, conversely, if measures are taken to improve the environment for investment and the competitiveness of the industry.

Chapter 7: **What Would it Take to Achieve the Potential?** highlights a number of results that – if achieved – would help Zambia’s copper mining industry to achieve its potential.

Note: The majority of the research and consultations on which this report is based were conducted during the first half of 2010.

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1 See [www.doingbusiness.org](http://www.doingbusiness.org)
3 For a list of reports in the series, see Annex.
4 The Program is experimenting with tools such as challenge competitions and crowd-sourcing in order to identify recommendations for action.
2 WHAT ARE THE PROSPECTS FOR COPPER GLOBALLY?

To determine the extent to which Zambia will be able to benefit from increasing the growth and competitiveness of its mining industry, it is necessary to take stock of the global prospects for copper. This Chapter starts by analyzing demand and supply and concludes with how global demand and supply balances are likely to affect prices and hence investment.

2.1 Trends in Demand

There is substantial evidence from a variety of different sources that demand for copper is likely to continue to increase steadily. The evidence comes from several major mining companies as well as respected industry analysts.

Figure 1 is taken from a presentation by Xstrata, one of the world’s leading mining companies. Rapid economic growth and urbanization in the emerging countries of Asia and Latin America are driving up currently low levels of per capita copper consumption in these countries. As per capita consumption in these countries approaches developed country levels, demand in these countries, with their large populations, will increase dramatically, signaling a positive outlook for world demand. This trend is projected to continue to 2020 at the very least.

Figure 1: Xstrata View of Urbanization Trends and Copper Consumption Intensity

Source: Xstrata presentation based on data from UN Population Division, Deutsche Bank research, Global Insight and JP Morgan research.

Rio Tinto, another major mining company, holds a similar view. In a presentation made in November 2009, the company forecast strong metal demand for the next 20 years, as shown in Figure 2. Of particular relevance is the statement that “in order to meet demand, the copper industry will need to bring on stream the equivalent to one Escondida” (the world’s largest
copper mine) every year”, in other words about one million tonnes of copper. Putting it in perspective, this is same output as currently targeted by the whole of the Zambian mining industry.

**Figure 2: Rio Tinto’s View of Metals Demand for the Next 20 Years**

![Graph showing metals demand over the next 20 years with projections for various commodities like Iron Ore, Aluminium, and Copper.](image)

*Source: Presentation made by RioTinto at the Macquarie Global Metals and Mining Conference, November 30, 2009.*

Analysis carried out by respected industry analysts such as Brook Hunt³ reinforces these large international mining companies’ views (see Figure 3).

**Figure 3: Brook Hunt’s View of Refined Copper Consumption up to 2020**

![Graph showing refined copper consumption with projections for China, Asia excl. China, Europe, and Rest of World.](image)

*Source: copyright Brook Hunt, via Anglo Base Metals 2009.*
The analysis shows that growth in global consumption of refined copper is likely to accelerate marginally from the 2.8 percent compound annual growth rate (CAGR) achieved over the 2003–8 period to a CAGR of 2.9 percent between 2008 and 2020. The driver of growth is likely to be very fast growth of copper consumption in China, the world’s largest copper consumer. Not only is copper consumption likely to increase to meet China’s own needs, but the country will also strengthen its position as the world’s largest exporter of copper-containing products. It is forecast that China will account for 50 percent of world refined copper consumption by 2035 compared to 38 percent today (Brook Hunt 2010).

Consumption growth in India will also be strong, with the country doubling its share of refined copper consumption to around 8 percent by 2035. Demand is being driven up by large investments in the power, telecommunications, housing, appliances and automobile sectors.

The very rapid growth in consumption from these countries, however, will come partly at the expense of consumption in the developed world. The manufacture of copper-using products is expected to transfer to lower cost countries. Nevertheless, world demand is set to continue to grow at around 3 percent a year. This positive outlook assumes that the global economy recovers its pre-financial crisis growth trajectory in the next few years and that the fundamentals of demand for copper, especially investment in power and housing and expenditure on consumer durables, remain sound.

Driven by China and India, world demand for copper is likely to grow at around 3 percent a year to 2020, approaching 25 million tonnes by that year.

2.2 Trends in Supply

Counter to this continued increase in demand, world copper production from known sources is set to decline. Most analysts believe that, as mines come to the ends of their useful lives and close, supply from existing sources will peak in 2012 and start to fall from 2013 onwards.

With demand continuing to grow, this will prompt efforts to revive output by investing in sites that have been mothballed or closed in the past (brown field investment) and in developing new mines (green field). Taking into account what is known about probable brown field and green field projects, supply should continue to increase up to 2014 or shortly thereafter. Beyond that period, supply is expected to start to fall.

Brook Hunt’s analysis of likely copper production is shown below (Figure 4). The key message is that, with the current known investment plans, copper production is likely to peak at just less than 20 million tonnes. There are also a number of possible projects that could, if they prove feasible, increase supply further. However, the extent to which they will be able to increase supply is still unknown.
2.3 Global Balances

With demand for copper continuing to increase and supply challenged to keep pace, balancing demand with supply will be extremely difficult from 2015 onwards. The commonly-held view is that, by 2020, in order to meet demand, the world will need to increase copper mine output by nearly 8 million tonnes per year over current production of 15 million tonnes, the equivalent of eight times the Zambian government’s target for annual copper output. Figure 5 summarizes the view of one source, ABM Analysis, which is one of many sources forecasting similar shortfalls.

Figure 5: ABM Analysis’ View of Copper Supply Demand

Source: Anglo Base Metals 2009.
2.4 Prices

Clearly, the industry expects that demand for copper will continue to increase and that demand will not be met by currently known sources of supply. How prices will behave, however, is a matter for speculation.

At the time of research for this report (early 2010), there was some concern that copper prices might fall. The main source of this concern was likely dampening of the double-digit growth of consumption in China that did so much to revive prices in 2009. The reasons for the rate of Chinese consumption growth slackening are:

- The $4 trillion stimulus package that China unveiled in 2008 is coming to an end. It is possible that the effect of the stimulus package ending will be a dampening of demand for copper to meet domestic consumption needs.

- The very fast rate of expansion of the Chinese economy is causing inflationary pressures. As a result, the Chinese government is attempting to curb bank lending and that may well dampen investment and demand for copper.

- The rising price of copper has caused speculators to build up stocks. If demand does not continue to rise as fast as speculators had estimated, this may cause them to sell copper, bringing down prices.

While these factors are a cause for concern, they may not result in a price fall in practice. The very reasons for the overheating of the economy that have prompted the Chinese government to curb bank lending suggest that demand for copper in China may continue to grow strongly. And, speculators, knowing that a shortage of copper is likely to develop at some stage in the near future, may choose to continue to hold stocks.

Whatever the outcome of copper prices in the short term, observers believe that prices are set to remain high in the medium to long term, reflecting the shortfall in supply. Since 2002, copper prices have been rising in real terms (Figure 6). After the sharp correction in late 2008 and early 2009, they have resumed that trend. Some analysts are projecting a price in excess of $8,000 a tonne by 2011 and likely to remain at this high level in real terms thereafter.
However, given that copper usage is influenced strongly by investment (Figure 7 shows the main end-uses of copper), demand will respond to cyclical forces. Periodic downturns are likely to cause prices to fall. Further, with a tight demand–supply balance, speculative activity could also have a major impact on the market. The combined effect of economic cycles and speculation will be price volatility.

**Figure 7: End Uses for Copper**

*Copper prices are expected to remain high over the medium to long term but price volatility is likely to continue.*
2.5 The Effect on Investment

Mining companies are currently looking and will continue to look for copper to satisfy the projected supply shortfall. Investment in exploration is increasing and this has benefited Zambia already, with one of the world’s largest mining companies, BHP Billiton, investing in exploration in the Mumbwa area. New technologies are being introduced to develop mines with low grade deposits and to revive old mines.

Where mining companies invest depends mainly on the following factors:

- The nature of deposits and the level of investment needed to develop them.
- The investment environment forged by factors such as mining policies, the tax regime and the wider climate for investment in the country. The environment for mining affects the required hurdle rate of return\(^5\) that mining companies and their financial backers seek: the more risky the environment, the higher the required hurdle rate.
- The cost competitiveness of the industry itself, the availability and cost of power and the time and cost of transportation to markets. These factors affect the profitability of the investment: the more competitive the country, the higher returns are likely to be.

The above correspond to the top ten ranked criteria listed in a United Nations survey of 45 companies, which range from geological potential to the stability of the investment climate (policies, exchange rates, terms and conditions, tax and fiscal regime).\(^5\)

It is important to note that, despite the projected deficit in supply and the likelihood that prices will be high (though volatile), the consensus of the mining industry, as well as the financial and banking community, is that investment will only be made in copper projects that are *profitable at a copper price of no more than $4,400 per tonne or $2 per pound*. This is a comparatively low figure given current and projected copper prices.

The use of such a low price benchmark reflects the need to cover the various types of risks involved: country risk, project risk as well as price risk. It also ensures that the risk-adjusted rate of return to the large sums needed to open new mines or resuscitate old ones is likely to be attractive.

What this benchmark means is that investors will not rush into investing in exploration and mining across the board. They will continue to subject each country and investment to a high degree of scrutiny.

There are many places where companies can look to invest in copper mining: some are well-established destinations for investment, such as Chile and Peru; some where there is a resurgence in copper mining, such as the US; and others, such as Kazakhstan and Mongolia, that were not major players on the world scene until recently. To attract the additional investment it needs to increase the growth of copper mining beyond current target levels, Zambia will need to compete against these destinations.

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**Zambia will need to compete for investment with established copper producers, countries where mining is reviving, and newly emerged destinations. The benchmark used for investment by the industry and the banks is profitability at $4,400 a tonne.**
3. THE STATUS OF COPPER MINING IN ZAMBIA

This chapter considers the performance of Zambia’s copper mining industry, the contribution it makes to Zambia’s economy and the potential benefit Zambia could enjoy by using one of its key natural resources more effectively. For a century now, copper mining has featured prominently in the life of the Zambian polity and economy, and this chapter takes stock of the copper mining industry’s recent contribution to Zambia and what more could it offer.

3.1 The Revival of Zambian Copper Mining

The history of Zambia’s copper mining is one of decline followed by revival. From around 700,000 tonnes in the 1970s, copper production fell to just 255,000 tonnes in 1998. Nationalization of the mines proved counter-productive. Investment and then production collapsed.

Starting in 1997, with a few false starts along the way, the privatization of the industry has led to a revival in production. Driven by rising copper prices, investment in the existing mines increased, new mines were opened up in the north-west and new processing capacity established. The increased investment in mining led to a sharp increase in foreign direct investment (FDI) flows into Zambia (Figure 8).

Figure 8: Copper Prices and FDI Flows to Zambia6

![Figure 8: Copper Prices and FDI Flows to Zambia](image)

Source: Copper prices – London Metal Exchange; FDI flows – UNCTAD.

The global downturn and the sharp fall in copper prices that it caused led to a fall in investment in Zambia in late 2008 and early 2009. However, the rebound of prices from mid to late 2009 caused an upturn in investment. In the first three months of 2010, investors pledged $500 million of new mining investment to the country (Box 1). While there is always a significant variation between pledges and realization, the re-emergence of a strong appetite to invest in Zambia is undoubted.
Box 1: Mining FDI Inflows 2010

According to the Zambia Development Agency, in the first three months of 2010:

- Inward investment (all industries) increased more than sixfold compared to 2009, up from $195 million to $1.3 billion.
- Investment in mining was $500 million, spurred by higher copper prices. (ZDA 2010)

Several new mining licenses have been granted in 2009/2010 with the target of achieving 1 million tonnes of copper output by 2012 from a base of approximately 700,000 tonnes in 2009.

The rebound in investment that took place after 2004 and is continuing now has caused the revival of output. Zambia’s mining industry grew at an average of 8 percent a year between 2000 and 2008 before suffering a temporary setback in early 2009. Zambia is regaining world market share (Figure 9). And the industry has now surpassed its 1970s levels, with an output of over 800,000 tonnes in 2010.

Figure 9: Zambia’s Share of World Refined Copper Production: 1980–2010

The country is re-establishing itself as a source of some significance in the context of global copper mine production. Zambia was once the 4th largest producer of copper worldwide. Its position in the world industry had fallen to 11th as output declined, but it has now recovered to 8th (Figure 10).
With the investment that has taken place already and is likely to take place as a result of new commitments, Zambia is on course to achieve the government’s target of 1 million tonnes of copper output per year, though it is likely to take longer than the target date of 2011. If Zambia achieved the government’s target, it could very well become the 3rd or 4th largest producer in the world. It may even be possible for Zambia to overtake Peru to become the 2nd largest producer after Chile, the dominant world producer which accounts for one-third of world output.

The majority of firms investing in the industry are the subsidiaries of, what are by international mining company standards, small- to medium-sized firms (including Metorex, Equinox and First Quantum). However, there are notable exceptions such as Vedanta, Glencore and the China Non-Ferrous Metal Mining Group (CNMC), which are major global players. They are likely to be joined by BHP Billiton, the world’s largest miner. The Zambian industry will be stronger as a result.

Though Zambian copper mining is essentially a private industry, the government has retained a sizeable share holding (ranging from 4.4 percent to 20 percent of the shares of the privatized mines) through Zambia Consolidated Copper Mines Investment Holdings. Such an arrangement is not unprecedented in the copper mining industry. Codelco, Chile’s national copper company, owns shares in a number of privately owned mines.

### 3.2 The Economic Contribution of Zambian Copper Mining

Over the long term, the performance of the Zambian economy has followed the fortunes of copper mining closely. The decline of copper output after the 1970s set the stage for a period of low economic growth with falling per capita GDP. The revival of copper output has helped the economy to grow more rapidly, averaging growth of over 6 percent a year during the 2000s (Figure 11).
Figure 11: Growth of Zambia’s GDP and Basic Metals Output 2001–9

Although the economy is diversifying, especially into services, copper mining continues to account for a sizeable part of GDP (15–18 percent)\textsuperscript{7} and it is one of the lead industries for economic growth (figure 12). Mining and quarrying grew at almost 9 percent a year during the 2001–9 period, faster than GDP overall. Agriculture, once the backbone of the economy, failed to grow for much of the 2000s, though it performed significantly better in 2009.

Figure 12: Real Growth Rates of Selected Industries, 2001-9

Source: Central Statistical Office
The potential economic footprint of copper goes deeper than the contribution to growth:

1. Copper is the major export and its importance has increased with the revival of the industry, accounting for over 80 percent of export earnings in recent years. It is also a major source of FDI inflows. As a result, a decline in copper prices hits the balance of payments hard, causing the exchange rate to fall. Precipitous declines in copper prices therefore mean a sharp, external shock to the economy.

2. Copper is a source of government revenue and the transaction balances of the copper mines are an important source of liquidity for the banking system. Hence a sharp decline in copper prices compounds the external shock with a fiscal and monetary contraction at home, the extent of which depends upon the ability of government to build up reserves and borrow externally and the ability of the banking system to mobilize savings, neither of which has been satisfactory in the past.

3. The wages paid to miners, the dependents they support and the wider economic footprint of the mines in terms of buying inputs and paying local taxes means that, when the mining industry goes into reverse, consumption, which accounts for the majority of expenditure in the economy, is subdued or falls. This is what took place during the recent global downturn with demand for many products slowing down or falling.

4. The communities of the Copperbelt Province and other areas in which mines are located, are often heavily reliant on the social infrastructure built and run by the industry, either directly or enabled through the contribution that it makes to local government revenues.

This wide footprint is the cause of the historic correlation between copper prices and growth. It also explains why, despite the emergence of more dynamic, modern industries such as telecommunications, the mining industry has remained the focus of economic and political attention in Zambia.

Observers have questioned whether the copper mining industry’s contribution to the Zambian economy is, in reality, as high in relation to the attention it merits from policy makers. They point to some of the factors listed in the next section that limit the contribution that copper mining makes. However, over the long term, the fortunes of the Zambian economy have proven to be strongly correlated with the performance of copper mining, suggesting that the industry does have a strong influence on economic activity in the country.

3.2.1 Is Zambia Maximizing the Potential Contribution from Copper?

The economic importance of copper begs the question of whether the country has benefitted fully from the exploitation of one of its key natural resources. Doubts over the extent to which the country has benefitted arise out of the following:

- **Low tax contributions.** Estimates by the IMF and others suggest that, despite the recovery of the industry, its contribution to government revenues has remained low: peaking at just 1.4 percent of GDP in 2008 (IMF 2010). Mining taxes amount to just 8 percent of total tax revenue, a low figure given the contribution of the industry to GDP and the more than $3 billion of copper exports. It is a very low figure given that that this is the return to exchequer for the depletion of one of the country’s main natural assets.
- **Lack of local linkages.** The industry has limited linkages with the rest of economy and continues to rely on foreign sources of finance and inputs. Initiatives to redress this have made limited inroads and the industry continues to buy only low value items locally such as food and clothing. This reflects, in large part, the fact that a substantial proportion of the mining industry’s expenditure on investment and operations is on high integrity items that Zambia’s manufacturing industry is unable to supply competitively, but there are other factors at play as well.

- **Small contribution to job creation, poor quality jobs.** Despite the substantial investment that it has attracted, and with output expected to exceed over $5 billion in value, the industry only employs just over 47,000 people. The copper mining industry is not a labor-intensive industry worldwide and, as discussed in Chapter 5, below, Zambia has low labor productivity. As a result, the prospects for creating more jobs are low. There are also concerns over the quality of jobs provided, in particular: the growing use of casual labor, which undermines job security; the reduced level of social provision for workers and their dependents since privatization; and the lack of investment in the skills of the workforce.

- **Environmental costs** are an important consideration. Sedimentation in waterways from the mines creates a significant cost downstream for the water filtration system. Not only is the government not receiving significant tax revenue, but the country is having to pay for environmental costs incurred by mining activities.

Concern has also been expressed that there is a lack of value addition to copper in Zambia. The potential for greater copper value-addition and fabrication of copper products in Zambia is analyzed in a separate report prepared under the JPC program.9

The critical issue for all countries dependent on natural resources is taxation. Mining depletes a valuable natural asset and taxing the mining companies is a way to generate savings that can be redeployed to increase the productive capacity of the rest of the economy. Before turning to the effects on the Zambian economy of low taxes raised from copper mining, the following section considers how the tax regime has evolved in Zambia and how the current regime compares with that of Chile.

### 3.2.2 The Evolving Tax Regime

The privatization process was carried out by the government signing separate Development Agreements with each of the new owners. In general, cognizant of the poor state of the industry, caused by years of under-investment under public ownership, and the huge drain of the industry on the exchequer under public ownership, the then government provided generous concessions on tax in these Development Agreements.10

By early 2007, concerns over the low tax take were causing a public outcry over “resource robbery”, the lack of transparency of the Development Agreements, the effect on miners’ pay and conditions under the new ownership, the negative consequences on the communities of the Copperbelt and the environmental impacts of mining (Fraser and Lungu 2006). The Development Agreements allowed the government to negotiate tax regimes individually with investors - often granting them low royalty payments (0.6 percent), low corporate taxes, duty exemptions and generous capital allowances (100 percent write-off in the year incurred) and carry forward of losses.
Even when companies were making healthy operating profits, net taxable profits were consistently in negative territory, reflecting the generous capital allowances and carry forward of losses. The tax regime provided little to enable the Treasury to benefit from the growing profitability of the industry (figure 13).

**Figure 13: Accounting and Net Taxable Profit Zambia 2006–8**

![Aggregate Profit Ratio](image)

*Source: World Bank analysis based on data provided by companies*

These concerns led to the government imposing a new tax regime in 2008 that consisted of a revenue-based windfall tax, higher royalties, increased company tax and a variable profit tax. The industry considered the new regime too draconian: for high cost mines and at high prices, it amounted to a marginal tax rate in excess of 100 percent. Some of these anomalies were removed through administrative measures and, in April 2009, some of the key elements of the new regime were reversed in response to the fall in copper prices. The windfall tax was scrapped.

The evolution of the tax regime is set out in Table 1.
Table 1: The Evolution of Mining Taxation in Zambia

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>• Royalty on gross value: 0.6%</td>
<td>• Royalty on gross value: 3% (↑)</td>
<td>• Royalty on gross value: 3%</td>
</tr>
<tr>
<td>• Corporate income tax: 25%</td>
<td>• Corporate income tax: 30% (↑)</td>
<td>• Corporate income tax: 30%</td>
</tr>
<tr>
<td>• Depreciation of capital equipment for tax purposes: 100%</td>
<td>• Depreciation of capital equipment for tax purposes: 25% (↓)</td>
<td>• Depreciation of capital equipment for tax purposes: 100% (↑)</td>
</tr>
<tr>
<td>• Withholding taxes: 0%11</td>
<td>• Withholding taxes: 15% on payment of dividends, interest, royalties, management fees and payments to affiliates (↑)</td>
<td>• Withholding taxes: 15% on payment of dividends, interest, royalties, management fees and payments to affiliates</td>
</tr>
<tr>
<td>• Customs duty exemptions for capital-equipment imports</td>
<td>• Variable profit tax for profits &gt; 8% (new)</td>
<td>• Variable profit tax for profits &gt; 8%</td>
</tr>
<tr>
<td>• Limits on duties payables for consumables</td>
<td>• Windfall tax on the production value when world copper prices &gt; $5,516/tonne12 (new)</td>
<td>• Hedging income allowed to be part of mining income for tax purposes (new)</td>
</tr>
<tr>
<td></td>
<td>• Hedging income not allowed to be part of mining income for tax purposes (new)</td>
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</tbody>
</table>

Source: WTO 2009.

Under the new regime instituted in 2009, the government should expect to see a substantial increase in the tax take from mining. The new regime comprises a royalty payment of 3 percent, a company tax levied at the 30 percent rate, a withholding tax levied at 15 percent and a variable profits tax at 8 percent, making the stated effective tax rate 47 percent.

The new tax regime will coincide with the mines that have been rehabilitated since privatization starting to enter a phase when they are generating strong, positive cash flows before tax. The typical profile of cash flows of mines (figure 14) shows that they should start to generate strong cash flows and start to pay significant levels of taxes 7–9 years after major investment and that is the position that most of the privatized mines will now have reached.
The combination of the new tax regime and the maturation of past investment in mines could lead to a major increase in the revenue from mining taxes. It is likely that, at current prices, if the industry achieved the government target of 1 million tonnes of copper, exports could amount to $6–8 billion. Under the new tax regime, government revenue could amount to between $1.5 billion and $2 billion (Lundstol 2009), representing 25–35 percent of export revenue, which will constitute a huge improvement over the 3–5 percent of export revenue achieved up to 2008.¹³

There are doubts over whether the government target of 1 million tonnes will be achieved, at least not under current conditions, despite the high levels of investment in the recent past. This is discussed in Chapter 6. There are also concerns that the new regime may not generate as high a tax take as predicted. These concerns are based on the following:

- The new tax regime introduced in 2009 was challenged by the mining companies, which argued that the invariability clauses in the original Development Agreements preclude such changes. Some mines seemed prepared to contest the matter in court. However, in late 2010 government reached an agreement with a number of mines, and these mines have already started paying in accordance with the new regime. Negotiations continue with a few remaining mines in order to bring them into the fold of the new regime. The outcome of what could become a legal dispute, to be adjudicated by an arbitrator¹⁴ or a court of law, is difficult to predict at this time. However, if the arbitrator or court finds in favor of the mines, the new tax regime may come to apply mainly to new investment, thereby undermining the tax take.

- The provision for 100 percent capital allowances in the year incurred will result in taxable revenue remaining low as the industry is investing large sums of money.
• The carry forward of losses by some of the major mines that have been unprofitable in the past will undermine the actual tax take.

• It appears that the Zambia Revenue Authority (ZRA) has not been able to enforce fully the collection of taxes that were due. Therefore, the expected increase in tax take from the mines under the new tax regime will also depend on the extent that the ZRA increases its capability to enforce the new tax regime.

Concerns over the level of tax paid by Zambian copper mines prompt the question of how attractive the new mining tax regime is by international standards. Around the world, mining taxation regimes vary tremendously. Some countries (i.e. Mexico) rely entirely on taxing company profits, imposing no royalties at all, while others combine royalty and company taxes with a tax on dividends or remittances.

Notwithstanding these variations, it is reasonable to say that Zambia’s new regime is broadly in line with international practice. The norm for the mining industry is (Otto n.d.):

• Income tax: 30 percent
• Dividend withholding tax: 15 percent
• Royalties (sales value based): 2–4 percent
• Import duty on equipment: zero
• Export duty on minerals: zero
• VAT: negated
• Depreciation: accelerated depreciation over 5 years
• Depletion tax: zero
• Ring fencing: zero
• Exploration expenses: amortized over 5 years
• Environmental costs: may be expensed
• Tax holidays: zero
• Loss carry forward: 5 year limit

Across the world, the effective tax rate, defined as the total amount paid to government as a percent of the value of pre-tax profits, is usually 40–50 percent. Countries such as Chile (box 2) are at the low end of this range at around 42 percent. The new regime in Zambia, which does not have a windfall tax, would suggest an effective tax rate of 47 percent. This is within the normal range and not dissimilar to neighboring countries such as Tanzania and South Africa.
Box 2: The Chilean Tax Regime

Chile, the world’s largest copper producer, levies the following:

- A flat rate mining tax (royalty) of 4-5 percent, though the tax is calculated on operating income, not net back revenues as in Zambia.
- Corporate tax payable at a rate of 17 percent.
- An Additional Tax on dividends at a rate of 35 percent for foreign investors.
- Losses can be carried forward indefinitely but only after they have more than offset retained earnings.
- Depreciation is calculated on a straight line basis. There is a provision for firms to opt for accelerated depreciation over three years but once opted for, the treatment of the asset cannot be changed.
- Establishment and start up expenses can be amortized over a period up to 6 years.

However, a rate of tax cannot be taken in isolation: investors will accept a higher rate of tax in a country that they consider offers a more conducive, stable environment for investment and vice versa. As set out in Chapter 4, Chile has a number of advantages over Zambia and others as a destination for mining investment, thereby making its lower tax burden even more attractive.

There are three main reasons why Chile has an advantage over Zambia in terms of having established a reputation for fair, investor-friendly taxation:

- **Stability of taxation.** The Foreign Investment Statute of 1974 (known as Decree Law 600) provides for a tax invariability clause that guarantees the investor against changes in the tax regulations and the decisions of the Internal Revenue Service for 20 years if the investment exceeds $50 million. This invariability guarantee is credited with the surge in FDI that took place after the law was passed. It influenced the mining companies to negotiate similar tax stability clauses in their Development Agreements with the Zambian government.

- **Balancing the interests of taxpayers and the exchequer.** This is exemplified by the recent decision to increase the mining tax to up to 9 percent to pay for rebuilding after the earthquake. Paying the higher rate is voluntary. Firms paying it are able to extend their original tax invariability clause by 8 years. Hence, the country’s need for revenue has been balanced by a decision to give something back to the industry.

- **Providing a rule-based system for managing copper revenues.** Chile’s copper stabilization fund operates on a rule-based system with inflows and outflows determined by a reference price set by independent experts. The Public Investment Management system subjects all capital projects to a transparent cost-benefit analysis. This has resulted in the country having good infrastructure from which the mines benefit. Such provisions assure the mining companies that the revenues they contribute will be put to good use.
Chile’s experience shows that developing an investor-friendly mining tax regime is crucial in reconciling the interests of the tax payer and the exchequer and enabling stability of the tax regime.

While the new mining tax regime now prevailing in Zambia is an attempt at ensuring that the country benefits more from copper mining, the process by which it was arrived at did much to undermine investor confidence. The process of first promulgating a tax regime perceived by the industry as draconian and then rescinding it introduced the element of uncertainty that causes investors to factor in higher risk in locating in a country. Chapter 4 shows how that uncertainty has affected Zambia’s rank as a location for mining investment. In addition, the process followed was not transparent and failed to provide an enduring consensus between government and industry on an equitable tax regime.

Zambia is poised for a rapid increase in the tax take from mining. However, it still needs to reach consensus with the industry to establish a stable, equitable tax regime.

3.2.3 Undermining Stability and Public Investment

Substantial and stable mining taxes are potentially a huge asset for governments in ensuring macro stability and enabling investment in infrastructure and social services. The extent to which governments have actually taken advantage of this potential has varied. Some have chosen to husband their natural resources to ensure that they are conserved to provide a stable source of revenue and have used the income from mining taxes to invest in physical and human capital. Others, however, have failed to take advantage. Box 3 contrasts the experience of Zambia and Botswana, as told by their presidents.

Box 3: Tales of Two Presidents

“We are in part to blame, but this is the curse of being born with a copper spoon in our mouths.”

Kenneth Kaunda, Former President of Zambia

“...we intend to conserve our resources wisely and not destroy them. Those of us who happen to live in the 20th century are no more important than our descendants in centuries to come.”

Sir QKI Masire, Former President of Botswana

Zambia has experienced a number of difficulties:

- **Counter-cyclical fiscal expenditure.** By saving windfalls, reserves can be built up in stabilization funds that can be used to cushion the effect of negative shocks to the economy caused by fluctuations in commodity prices. Most natural resource exporters have now established stabilization funds. In contrast, the lack of tax revenue from mining has prevented Zambia from following suit. The lack of headroom for counter cyclical expenditure was highlighted during the recent global downturn.

- **Maintaining a stable, competitive exchange rate.** Holding savings abroad provides a buffer against sudden increases or decreases in foreign exchange earnings from copper. Currency volatility is a source of risk that reduces investment in other (non-resource)
sectors of the economy. The major long-term threat to growth that the resource curse poses is through the appreciation of the currency (Dutch disease) because it makes it difficult to achieve competitiveness in non-resource, tradable sectors of the economy. This too can be managed by “sterilizing” revenues from mining taxes abroad. Botswana proves that it is possible to maintain a stable, competitive exchange rate despite reliance on natural resource exports. However, Zambia has not been able to establish a stable, competitive exchange rate.15

- **Investing in public services and infrastructure.** Mining revenues can be used by governments to invest in education and health and infrastructure, thus helping to boost the productivity and competitiveness of the private sector in non-resource sectors, countering the effect of Dutch disease and helping to diversify the economy and sustain it over the longer-term. Low mining revenues have prevented the government from making adequate investments in these areas. It is estimated that the country has been dissaving, by exhausting its natural resources without investing sufficiently in building human and physical capital.

Zambia’s low tax take from mining in the past has prevented the government from implementing the policies that are needed for macro-economic stability and to contain and redress the effects of the resource curse.

| In the past, Development Agreements may have been needed to attract investment to revive a declining industry but the Zambian people have paid a high price in terms of foregone public revenues that could have been invested in public services and infrastructure. |

### 3.3 Looking to the Future

Since independence, the country has not been able to develop a regime for copper mining that adequately balances the interests of the industry and the development needs of the country. Each of its three attempts has fallen short of this objective:

- After independence, the government felt that the mining industry was not contributing sufficiently to development and ended up nationalizing the industry.

- In the period of public ownership, the major beneficiaries were the miners and their dependents. The industry was neglected with the result that the government ended up subsidizing the mines.

- Since privatization, many of the gains from the revival of copper mining have accrued to the industry, with the exchequer gaining little.

The current regime is an attempt to remedy the situation, but there are concerns over its outcome on both sides:

1. Most mines have agreed to a settlement accepting the new tax regime and have started to pay tax under this regime. However, Government revenues may fall short of expectations as a result of capital allowances; carry forward of losses; the inability of the ZRA to adequately enforce the new regime; and some mines insisting that their Development Agreements prevent change to the tax regime.
2. The industry is concerned with the stability of the tax regime and the process by which the new regime was arrived at. It also has concerns over the way that royalty payments are calculated. In effect, the royalty payment is based on the LME price that the industry does not receive, as it receives only the LME price minus the transport costs. Industry pays the royalty even when it is not making money. It would prefer a flat payment per tonne which it believes is the right way to tax for resource depletion.\textsuperscript{16} This argument has some merit, though most countries levy royalty payments on sales revenue. The industry is also concerned that it is disadvantaged by high labor costs, the need to provide social infrastructure, heavy taxes on its inputs, delays in recovering VAT, high transport costs, poor roads, power outages, long delays and cumbersome procedures in clearing customs, and the poor business environment in Zambia generally.

Both sets of perceptions have some validity. The key to a more favorable outcome is to find an arrangement that represents a better balance of the interests of government and the industry and is recognized as such by both sides. The favorable prospects for copper worldwide provide a new opportunity for Zambia to put the right conditions in place for the mining industry and ensure that it does contribute to the development of the country. Such an arrangement needs to go beyond taxation alone to also address the conditions under which the mines operate, especially with regard to infrastructure.

Crucially, revenues provided by copper are the means to combat the resource curse by ensuring macro stability and transforming the economy. Getting the regime right offers the prospect of a larger, more competitive industry that will generate the resources needed. What is needed to achieve this is dealt with in Chapter 6.

\textsuperscript{1} Xstrata is a global diversified mining group with headquarters in Zug, Switzerland.
\textsuperscript{2} The mine consists of two open pits in the Atacama desert in Northern Chile.
\textsuperscript{3} Brook Hunt is an internationally respected firm specializing in providing forecasting and cost analysis data to the world metal mining industry.
\textsuperscript{4} The minimum rate of return on a project that an investor is willing to accept before starting a project, given the project’s expected risk and the opportunity cost of foregoing other projects.
\textsuperscript{5} Survey referred to in Otto, James. n.d. ‘Mining Taxation’. Undated presentation.
\textsuperscript{6} Real copper price is annual average adjusted by US GDP Deflator (2005=100).
\textsuperscript{7} According to the official data from the Central Statistical Office, the contribution of mining and quarrying overall is around 8%. However, this is widely accepted to be an underestimate.
\textsuperscript{8} Although at present the industry’s contribution to government revenue is relatively small, this is expected to increase significantly as tax holidays expire and mines start to pay more tax.
\textsuperscript{9} World Bank. Forthcoming, 2011. \textit{What is the Potential for More Copper Fabrication in Zambia?}
\textsuperscript{10} It is estimated that the mines were losing about $1 million per day, causing government to spend over 4 percent of GDP to keep them operational. This prompted the IMF and the World Bank to urge government to privatize quickly in the interest of restoring macro stability and freeing resources for social investment.
\textsuperscript{11} Except on construction and technical services supplied by non-residents.
\textsuperscript{12} The windfall tax rate was designed to vary depending on the price level above the minimum threshold.
\textsuperscript{13} At the time of writing, a new Mines and Minerals Act is being prepared for Parliament.
\textsuperscript{14} Some of the Development Agreements contain clauses which require disputes to be settled by arbitrators appointed by the international court of arbitration. They are governed by the laws of Zambia and so, in the event that the matter goes to court, disputes will be adjudged by a Zambian court.
\textsuperscript{15} The World Bank’s latest (December 2009) Investment Climate Assessment for Zambia noted that currency instability is an important constraint on investment.
\textsuperscript{16} The most common rate in other countries is 2-4% of the value (tonnes of ore basis).
Chapter 1 established that appetite for investing in copper mining will remain high but that the mines will continue to be discerning over where they invest. The decision on where to invest is a function of two factors: the geological potential of the country and the environment for investment provided by government policies and social factors.

This chapter addresses how attractive Zambia is as a destination for copper mining. It starts by considering the potential for investment in new and old deposits. It then examines how the international mining industry perceives Zambia as a destination and the policies that need to change if Zambia is to improve its standing as a destination for copper mining investment.

4.1 The Geological Potential

Copper resources in Zambia form part of the African Copperbelt, which stretches from the DRC across much of Zambia and is one of the great copper resources of the world. Zambia itself contains the largest known reserves of copper in Africa, holding 6 percent of known world copper reserves. The resources available to existing mines in Zambia are estimated at 2.8 billion tonnes of ore ranging between 0.6 percent and 4 percent copper. From its traditional base in the Copperbelt, the industry is expanding to other parts of the country where geological surveys suggest a significant opportunity to find viable deposits of copper.

As the most significant deposits in the Zambian Copperbelt have been worked in the past, the major opportunities for investment in this area have taken the form of:

- Reviving production at existing mines, as CNMC did after acquiring the mines in Luanshya
- Investing in deeper mines, as Vedanta is doing with the Konkola Deep Mining Project
- Reworking old tailings and slag heaps using the efficiencies of solvent extraction and electro-winning (SXEW), as Chambishi Metals is doing at Chambishi and Nkana and as practiced at Mufulira and Nchanga
- Investing in smelting capacity—as several companies have done using concentrate produced in Zambia and the DRC—in order to increase the production of copper cathodes through smelting and to produce sulfuric acid.

In recent years, the mining industry has been successfully developing mines in North-Western Province through investment at Lumwana and explorations by the Zhonghui Mining Group of China. For example, Equinox reported that its Lumwana Project, which covers the Malundwe and Chimwiwango deposits, has measured and indicated resources of 342.5 million tonnes of ore grading 0.74 percent copper, plus inferred resources of 563.1 million tonnes at 0.63 percent copper.

Exploration is also taking place in other parts of the country, such as Luwishi, Mufapanda and Mumbwa. It is not possible to state with any precision the size of additional resources that are likely to be discovered and what their economic potential is likely to be. For one, it is
reported that 40 percent of Zambia has not been explored. This handicaps the Ministry of Mines and Minerals Development in setting appropriate terms and conditions for exploration licenses. Equally, potential investors are missing data they need to make their investments less speculative. That uncertainty is reflected in the price they are willing to pay for a license.

Moreover, economic viability is contingent on the price assumptions for copper, the risk premium required by financial investors and the likely cost of mining new deposits. The latter can only be determined after exploration. There is also uncertainty as to the extent to which technological advances will make it cheaper to develop deeper and less copper-rich deposits.

Box 4 shows the basic phases of mining investment.

<table>
<thead>
<tr>
<th>Box 4: The Phases of Mining Investment</th>
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<tbody>
<tr>
<td>Mining embraces a number of distinct processes or phases, each one having a cost and a risk associated with it. Completion of any phase does not necessarily mean the next one follows. The economics of supply and demand, cost and tax structure, environmental issues as well as the skill and financial resources of the mining company all have a part to play to achieve a successful outcome.</td>
</tr>
<tr>
<td>1. Exploration phase</td>
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<td>2. Evaluation phase</td>
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<td>3. Feasibility study and mine design phase</td>
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<td>4. Construction and commissioning</td>
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<td>5. Operation</td>
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<td>6. Closure</td>
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<tr>
<td>The outlay for each phase varies enormously and is a function of commodity, location and size in addition to the previous features mentioned. Hartman estimated that exploration costs could be five to six percent of the cost to build a mine and that this cost could be two to five times the yearly operating costs (Hartman 1987). Payback varies from three to ten years (figure 14 above).</td>
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</table>

Nevertheless, Zambia’s geological potential is recognized by the international mining industry. This is reflected in international surveys of the mining industry by respected organizations.

Since 1997, the Fraser Institute^2 has conducted an annual survey of metal mining and exploration companies in order to assess how mineral endowments and public policy factors, such as taxation and regulation, affect new exploration investment. Survey results represent the opinions of executives and exploration managers in mining and mining consulting companies operating around the world. The survey includes data on 79 jurisdictions, including sub-national jurisdictions in Canada, Australia, and the United States. More than two thirds of these jurisdictions produce copper.

According to the Fraser Institute’s 2010/11 survey (McMahon and Cervantes 2011) assuming that the policies are uniformly set at best practice across all countries, metal mining and
exploration companies rank the mineral potential of Zambia 26th out of 79 jurisdictions (figure 15). Of the 13 African countries covered, only DRC (0.90) and Burkina Faso (0.81) have appreciably higher mineral potential index scores than Zambia’s (0.78). Many of the jurisdictions that ranked higher are, in fact, individual states of the United States, Canada and Australia.

Figure 15: Fraser Institute Policy/Mineral Potential Rankings 2010/11

![Fraser Institute Policy/Mineral Potential Rankings 2010/11](image)

Source: McMahon and Cervantes 2011:18
Given the likelihood of prices remaining high, the substantial known resources identified already and the fact that new, economically viable deposits have recently been found, it can reasonably be assumed that Zambia should continue to be a substantial producer of copper up to the middle decades of the twenty-first century at least. Indeed, there is potential for Zambia to exceed the government’s target and increase production to beyond 1 million tonnes if the investment climate can be improved and the industry made more competitive.

Known resources are sizable and new exploration is taking place, providing significant opportunities for investment. Enabling the Ministry of Mines and Minerals Development to improve the quality of geological information would be useful in attracting new investment in exploration and ensuring that Zambia gets value for money from exploration licenses.

4.2 How Do Investors Rate Zambia as an Environment for Mining?

Recent exploration activity and mining investment has proved the appetite of investors to invest in Zambia’s copper mining industry. With current high prices and a shortfall likely to develop in the supply of copper worldwide, there is no doubt that the large copper resources of the African Copperbelt are attractive to investors.

If the opportunity is attractive enough it is likely to outweigh the risks posed by the environment, as proved by recent investment in copper mines in the DRC. Despite ongoing conflict, the DRC has been able to attract large-scale investment, for example, the recent $2 billion investment by McMoRan in the Tenke Fungurume mine near the Zambian border. This is a result of its geological potential.

However, there are two reasons why it is important to assess how investors perceive the environment Zambia provides for mining investment:

- Investors have a choice as to where to invest. If the commercial opportunity is the same, they will always prefer a destination that they perceive as less risky and more conducive for business.

- As a result of perceiving the environment to be less attractive, they are likely to wring concessions out of the government with respect to taxation, subsidies or terms of the lease. Conversely, a country such as Chile, which is considered to be a favorable environment for mining investment, will be able to levy a comparatively high rate of taxation and offer fewer subsidies.

The assessment of what is perceived by a mining company as a good place to invest is somewhat subjective and, in an attempt to put this on a rational and comparative basis, reference is made to two independent sources of information, Behre Dolbear and the Fraser Institute.

4.2.1 Behre Dolbear

The Behre Dolbear Group of companies is a well-established minerals industry consultancy that for over 10 years has published a ranking of countries based on their attractiveness for mining investment. The rankings are based on opinions gathered from professionals and research from various public and confidential sources. The ranking is qualitative, not
quantitative, and is based on responses to the question, “where would you not want to invest?”

The survey uses seven criteria to rank twenty-five countries (twenty of which are copper producers) that are host to major exploration, and/or mining operations:

- The country’s economic system
- The country’s political system
- The degree of social issues affecting mining in the country
- Delays in receiving permits due to bureaucratic and other delays
- The degree of corruption prevalent in the country
- The stability of the country’s currency
- The country’s tax regime.

Each category under consideration is rated from 1 to 10, with the highest ranking being 10. Accordingly, the maximum score attainable for a country is 70 points.

Figure 16 summarizes the 2011 ranking. Zambia is found bordering the lowest quartile, ranked 19th out of 25.

**Figure 16: Behre Dolbear Country Ranking, 2011**

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<td>16</td>
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</table>

*Source: Behre Dolbear 2011*

Zambia scored poorly on corruption (2), currency stability (2), social issues (3), tax regime (3) and political system (4) and average on the other two aspects.
4.2.2 Fraser Institute

The Fraser Institute’s Policy Potential Index (PPI), derived from its survey of metal mining and exploration companies, is intended to serve as a report card for governments on how attractive their policies are from the point of view of an exploration manager. This differs from the Behre Dolbear ranking in that Behre Dolbear takes the view of someone currently investing in the country. The PPI is a composite index that measures the effects on exploration of government policies including uncertainty concerning the administration, interpretation, and enforcement of existing regulations; environmental regulations; regulatory duplication and inconsistencies; taxation; uncertainty concerning native land claims and protected areas; infrastructure; socioeconomic agreements; political stability; labor issues; geological database; and security.

The PPI measures the overall policy attractiveness of the 79 countries and sub-national jurisdictions in the survey. It is normalized to a maximum score of 100. That means that a jurisdiction that ranked first under the “Encourages Investment” response in every policy area would have a score of 100; one that scored last in every category would have a score of 0.

Figure 17 shows the summary of the results from the 2010/11 survey published in March 2011, in which Zambia was ranked 57th out of 79 jurisdictions. Table 2 shows how Zambia’s ranking has changed over time. Zambia has consistently been ranked in the bottom half of jurisdictions.

<table>
<thead>
<tr>
<th></th>
<th>Zambia’s rank</th>
<th>Jurisdictions included</th>
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<tbody>
<tr>
<td>2010/11</td>
<td>57</td>
<td>79</td>
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<tr>
<td>2009/10</td>
<td>52</td>
<td>72</td>
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<td>2008/09</td>
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<td>2007/08</td>
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<td>2005/06</td>
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<td>64</td>
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<tr>
<td>2004/05</td>
<td>46</td>
<td>64</td>
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</table>

Source: McMahon and Cervantes 2009, 2011; McMahon and Melhem 2007

In the 2010/11 survey, no individual factor emerged as a particularly adverse issue in Zambia. Most got a rating of “not a deterrent to investment” or “mild deterrent. It could be said that Zambia’s Fraser Institute ranking of “lower than average” was a scorecard saying it “could do better”.

Figure 17: Fraser Institute Policy Potential Index, 2010/11

Source: McMahon and Cervantes 2011: 10
4.2.3 Summary of Attractiveness to Investment

Zambia’s geological potential for supporting continued investment is undoubted, even though the full extent of resources is yet to be established. The country’s mineral potential score is much higher than its rating as an environment for mining investment.

Both the Behre Dolbear Index and the Fraser Institute’s Policy Potential Index place Zambia in the third or fourth quartile of mining jurisdictions. Four main policy issues drag down Zambia’s rating as a destination for mining investment.

Firstly, social issues are the highest risk facing the development of mineral projects in every country. Factors considered part of the social issue category include the level of poverty, HIV/AIDS, and the need for firms to invest in and operate schools and hospitals due to poor government provision. In order to attract more investment, Zambia needs better social infrastructure and basic social sector delivery, as well as clarity for workers with regard to the government’s and the mines’ respective responsibilities.

Secondly, the lack of currency stability, shown by the volatile exchange rate over the past few years, has increased the risk of investing in Zambia. In comparison, Ghana and Botswana score much higher than Zambia in this area.

Thirdly, corruption is a major concern since it creates delays in starting business operations and results in high country risk, thereby increasing the risk-adjusted return that investors and their financial backers seek. Zambia’s score on the corruption component of the Behre Dolbear index is poor (only 2 out of 10). While Zambia’s ranking in the Transparency International Corruption Perceptions Index has improved slightly in recent years (115th of 180 countries in 2008, 99th of 180 in 2009, and 101st of 178 in 2010), Zambia remains in the lower half of the ranking.

Fourthly, tax—both the rate and the stability of the regime—affects investment. Frequent changes in tax rate create an air of uncertainty for investors. Stable and predictable tax policies are essential in evaluating a mining project’s perceived risks and viability.

One of the effects of a poor rating, or even the perception that might follow the rating, is that mining companies will be looking for a higher rate of profit after tax and the banks that finance their projects will demand a higher return to capital. No doubt, the availability of resources and favorable prospects for copper will result in continued investment in Zambia. Nevertheless, the poor policy environment may undermine the extent to which the government can ensure that the country benefits from that investment.

The perception of Zambia as a poor place to invest will affect its ability to reach exploration and development agreements that ensure the country benefits more from the exploitation of one of its major natural assets.

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1 Presentation made by Mukuba Resources Limited. Includes resources at Lumwana. It is also reported that 40 percent of the reserves have not been surveyed.
2 The Fraser Institute is an independent research and educational organization based in Vancouver, Canada. It is financed by tax-deductible contributions from individuals, organizations, and foundations. In order to protect its
independence, the Institute does not accept grants from government or contracts for research. Its stated mission is to measure, study, and communicate the impact of competitive markets and government interventions on the welfare of individuals.

3 Assuming no land use restrictions in place and assuming industry “best practices”.

4 Based on industry consultations, it seems that most investment in the DRC takes place near the Zambian border so the mines can take advantage of the smelting facilities in Zambia.
5 HOW COMPETITIVE IS ZAMBIA’S COPPER MINING INDUSTRY?

Zambia’s ability to attract investment will depend also on the ability of mining companies to generate profits in Zambia. Profitability is, in turn, determined by the competitiveness of the industry. In copper mining, prices for the product (cathodes, concentrates and blisters) are determined in international commodity markets. In the mining industry, therefore, competitiveness is entirely a matter of the cost of production and of transporting the product to market.

The cost of production is a function firstly of the nature of the resource (the quality of the ore, the depth it is found at, and so forth) and the extent to which the most accessible resources have been exploited. Older mines tend to have a higher cost of mining. Younger mines can save on operating costs, but they have to bear the upfront investment in capital and equipment, which can be significant. Location relative to processing and refining facilities also plays an important role. In addition, the cost of inputs and their productivity influence the cost of production at all mines, irrespective of the nature of the resource. If prices are reasonably attractive and the cost of inputs and their productivity is high, even older mines can earn profits. Finally, the overall business environment in which the mine operates also affects costs.

This chapter starts with an assessment of the overall cost competitiveness of Zambia’s mining industry, then looks at the cost of inputs and their productivity and then the key business environment factors that matter for the mining industry. Finally, it concludes with the main factors that would improve efficiency and hence competitiveness.

5.1 Uncompetitive Zambian Mines

To put the costs of production faced by mines in Zambia into a global context, this section refers to data provided by World Mine Cost Data Exchange, a cooperative internet resource for mining industry analysts that uses verifiable engineering and production data and peer review. The two approaches to comparing costs with those of international operators are to compare operating costs or to compare mining and milling costs. Figure 18 shows the 2009 operating costs for some 150 copper mining operations worldwide that represent about 87 percent of world production. There are no data for Chibuluma and Chambeshi mines. Costs quoted are cash operating costs (C1) and exclude any credits for by-product metals.
With the exception of Lumwana (and the small tonnage from the Mufulira SXEW) all operations in Zambia are in the upper half of the cost curve and many of the older operations are in the upper quartile of costs. In general, Zambian mines are not competitive against those of their international counterparts. The Mufulira SXEW is not representative of the Zambian mining industry as a whole as it exploits previously mined ores.

Another way of comparing costs in Zambia with international operations is to examine the mining and milling (concentrator) costs derived from the same source. These are shown in Figure 19.
Again, with the exception of Lumwana and the SXEW at Nchanga Tailing Leach, all Zambian operations are in the upper half of the curve and most are in the upper quartile. This is because of the age and depth of Zambian mines. Lumwana is a new, green field mine that uses trolley assistance technology that saves operating costs. This technology uses electric power, which costs less than diesel fuel. The Lumwana example confirms that younger mines could save on operating costs, especially by using new technology.

The generally high operating costs in Zambia seem to be rising rapidly. Figure 20 shows estimated copper production costs from two mining companies over the 2006–9 period. These two companies are responsible for over half of Zambia’s copper production and hence are representative of developments in the industry as a whole. The data obtained from the companies were reported as “Cost of sales”. Production data are from the Ministry of Mines. Also plotted is the average yearly realized copper price, as reported by the Bank of Zambia (BOZ).
While the estimated operating cost does not include credit for the mining of cobalt at Nkana and small amounts at Konkola, in 2009, neither company reported a profit. From 2006 to 2009, costs increased by 176 percent while the realized copper price decreased. Note that the “cost of sales” includes finance charges and therefore the number corresponds to C3 cost. The C3 cost has been going up consistently since 2000.

In this example, the mining operations of Mopani (Mufulira and Nkana) and KCM (Nchanga and Konkola) are high cost because of a combination of being old (with outdated infrastructure); operating at greater than originally designed depth (extended hoisting system for underground or long haul routes in open pits); mining lower grades (high grade ore having been depleted); and greater waste and ore stripping ratios in open pits (see Box 5 below). The cost of these operations has also increased considerably in the last three years.
Box 5: The High Cost of Zambia’s Old Mines

Mufulira, Nkana, Chingola, Konkola, Luanshya and Chambeshi traditionally make up the Copperbelt of Zambia. Most have been in production since the 1930s, except Konkola (1958) and Chambeshi (1965). As such, they have old infrastructure that is expensive to operate (with the exception of relatively new smelters at Mufulira, Nchanga and Chambeshi). Much of the infrastructure should have been replaced in the 1970s and 1980s but was not because the nationalized mines did not receive funds for capital investment. With privatization the situation did not improve significantly as, by the time it occurred, the mines themselves were becoming depleted and did not warrant high capital expenditure.

These operations are large integrated units with mine, concentrator, smelter and refinery.

Because of their history, these mines also carry the cost of services such as hospitals, and although the responsibility is on local government, the mining companies often have to step in to provide additional local services.

This trend of rising costs is confirmed by data provided to ZRA by Mopani (figure 21).

Figure 21: Mopani Costs and Copper Price

![Graph showing Mopani Costs and Copper Price](image)

Source: Based on data provided in Mopani Copper Mines 2009

Mopani cited the following reasons for the high and rising costs (MCM 2009):

- The age and depth of mines and age of infrastructure
- Increasing distance from production face to shafts
- Low grades
- Depleting ore bodies
- Low skills levels for maintenance
- Dewatering (need for removal of water)
- Inflation
- Inadequate rail transport system, requiring the use of road transport instead
- High usage of electricity and unreliable supply
- An inadequate local manufacturing base.

While some factors are outside the control of the government and other market players, several other factors such as transport and electricity can be improved.

Mining industry costs have been rising worldwide, driven by the cost of oil, which feeds through into other cost elements. After the 2008/9 dip, price escalation is expected to continue in the international copper industry. However, the very sharp increase in cost (as shown above, Mopani’s costs increased fourfold from 2000 to 2008) recorded in Zambia is above the international trend.

The picture of a high cost base due to depleted resources does not hold across the whole industry. The older, larger mines have depleted their high grade deposits but the new mines are competitive.

New operations such as Kansanshi and Lumwana are either operating at, or targeting, operating costs less than $3,000 a tonne (about $1.4 a pound). This makes them attractive for international investors. They are new operations using high capacity trucks and a modern, efficient plant. However, they do have very high capital investment costs to repay, making the C3 costs (which include amortization) high by international standards. Box 6 shows details of the new mines and their cost structure.

**Box 6: The Cost Base of Zambia’s New Mines**

In the category of “new mines” are Kansanshi, Lumwana and Chibuluma South, which represent new investment following privatization of the mining industry and the introduction of Development Agreements that enabled the companies to negotiate tax breaks to achieve early payback (if successful) on their investment.

Being new, they utilize the latest mining technology to achieve low operating costs. To do this requires a large capital investment in equipment and plant, and hence their total costs of operation (including amortization) may still be high by international standards.

Both Kansanshi and Lumwana are located in Northwestern Province and could be said to represent the “new Copperbelt” as there is recognized potential for further mining operations in the area.

Chibuluma South is a small high-grade mine located in the Copperbelt and represents what could be done with similar deposits in Zambia.

One common feature of the new mines is that they only produce concentrate and transport this to smelters and refineries. The capital cost of smelters and refineries worldwide is now very high, especially with sulphur capture, and the Zambian mining industry is fortunate that it now has three modern smelters to treat concentrates.
There are three smelters in Zambia for processing copper concentrate, located at Mufulira, Nchanga and Chambeshi. They are relatively new plants. In the past, these plants were taking concentrate from the DRC, but in recent years the DRC has periodically imposed bans on exporting concentrate, which has affected the amount received. The plants are now at capacity and plans are in place for their expansion.

No cost information for smelters is available, but based on consultations they do appear to be competitive and earning good profits. It can be assumed, however, that their operating costs are affected by input costs in the same way as the mines’, and these issues are discussed more fully in the following sections.

5.2 High Input Costs Undermine Zambia’s Competitiveness

While depleted resources have no doubt contributed, high input costs remain an important factor in determining the positions of Zambian mines on the international cost curve. All Zambian mines, irrespective of their age and resource depletion, are high cost. The rise in costs shown earlier is due mainly to increases in the cost of inputs.

Both capital and operating costs can be reduced to three basic elements: labor, energy and steel (where steel can be taken to represent manufactured goods). The proportion of cost elements in mining countries differs and depends on a variety of factors. Labor costs in North America can make up 40 percent of costs whereas in less developed countries this can be as low as 20 percent. Similarly, manufactured goods in North America could account for 20 to 40 percent of costs whereas in less developed countries this could be 30 to 65 percent.

The cost structure of Zambian mines differs from those of mines in other developing countries. The cost structure in Zambia is more like that of a developed country (Figure 22). While energy and steel costs remain stable, labor costs have accounted for a significant part of the costs.

Figure 22: Cost Structures in Zambia (left) and Indonesia (right)

<table>
<thead>
<tr>
<th></th>
<th>Mopani</th>
<th>Grasberg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>41%</td>
<td>22%</td>
</tr>
<tr>
<td>Power</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Fuel</td>
<td>7%</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>43%</td>
<td>53%</td>
</tr>
</tbody>
</table>

(2008 for Mopani in Zambia and 2009 for Grasberg in Indonesia)

This is a result of recent cost inflation. In the past, the cost structure of Zambian mines was not dissimilar to that of a developing country such as Indonesia, as shown by changes in Mopani’s cost structure between 2004 and 2008.
The main change has been the very large increase in the cost of labor, partly due to the appreciation of the kwacha. Table 3 shows cost escalation for Mopani over the period 2003–8. The cost of fuel increased fastest and the cost of labor increased almost fourfold.

### Table 3: Cost Escalation at Mopani, 2003–8

<table>
<thead>
<tr>
<th>Item</th>
<th>Escalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>396%</td>
</tr>
<tr>
<td>Fuel, Coke and Coal</td>
<td>453%</td>
</tr>
<tr>
<td>Lime</td>
<td>303%</td>
</tr>
<tr>
<td>Energy</td>
<td>81%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>332%</td>
</tr>
<tr>
<td>Inflation</td>
<td>221%</td>
</tr>
</tbody>
</table>

**Source:** MCM 2009

#### 5.2.1 Rising Labor Costs, Low Labor Productivity

The fact that labor costs account for a high proportion of total costs in Zambia in relation to other developing countries is due to a combination of two factors: (1) labor costs have risen faster than inflation; and (2) labor productivity is very low.

Figure 24 shows the evolution of labor costs.
By international standards, labor productivity in Zambia is low. Figure 25 shows two sets of indicators for labor productivity in Zambia compared to Chile:

- Productivity data (2009) for KCM compared to a similar size (in terms of output) operation in Chile – an open pit, Los Pelambres, located in the Andes.

- Output of the Chilean mining industry in 2008 (when a total of 50,000 workers produced over 5 million tonnes of copper) compared to Zambia’s output in 2009, when a similar number of workers (47,400) produced only 700 thousand tonnes of copper.

There is almost a 7:1 ratio in productivity between the two countries – a ratio that cannot all be explained by factors such as scale, nature of resources or use of better equipment. The cost of labor per unit of output is much higher in Zambia than in other developing countries.
Several reports have expressed concern about the growing use of contract labor and contractors in the Zambian mining industry. However, the rate of the increase in labor costs and the low productivity of employees strongly influence the mines’ use of contract labor (see Box 7).

**Box 7: The Incentive to Use Contract Labor in Zambia**

Unlike their more fortunate counterparts that are employed by the mines, miners working for contractors supplying services to the mines do not receive housing or vocational allowances or social services provided by the mines, and are not eligible for the same level of retrenchment benefits. They are also likely to receive a lower basic rate of pay. As labor costs in Zambian mines have risen sharply, it has provided a greater incentive for the mines to use more contract labor.

Besides general inefficiency, one of the reasons for low productivity is a shortage of skills in the country. Companies have to train people, incurring additional costs, and even that does not make up for certain skill deficiencies or the lack of basic work skills of employees. Mines tend to be overmanned as the political pressure that results from firing workers can be uncomfortable.

Skills that are not available within the country are mainly technical and managerial. The country’s technical and vocational education and training system is weak. Such skills usually have to be brought in to the country at high cost with added costs such as air fares and travel time for specialists.

Although the number of expatriate employees is generally low, it is still an expensive labor component that is not part of most of Zambia’s competitors’ cost structures. Most expatriate labor is in managerial positions and specialist technical areas.
5.2.2 Power Outages

The cost of grid power in Zambia is price competitive and has been rising below the rate of inflation. The recent increase in the cost of power to $0.04–0.06 per kilowatt hour\(^7\) still leaves Zambia competitive against most other countries.

What the mining industry complains about is the periodic outages that occurred in 2008 and are occurring again. This forced them to acquire costly standby generators. Even the most efficient standby generator does not produce power at a cost less than $0.32 per kilowatt hour. In Chile, the average industrial tariff for grid power is $0.0805 per kilowatt hour. Generators are generally used for emergency outages and are short-term. Outages in Zambia are usually less than 8 hours, so the cost of running a generator may not be as much of an issue as the disruption caused by outage.

Should the power outages such as occurred in 2008 return, then a combination of power from the grid and self-generation would make power costs uncompetitive against countries where reliable supply from the grid is available without interruption.

Unless the supply of power from the grid is increased, power could also be a major limiting factor for the growth of the industry. In addition, as the industry expands to new areas, there is a need to extend the grid, building new power lines to the mines and local communities.

5.2.3 Expensive Manufactured Goods and Consumables

A range of manufactured goods form part of both the cost of investment and the costs of repair and maintenance and consumables. The mines complain that the cost of these items is very high. Combined with the need to import labor for some of the work involved, it results in the high proportion of repair and maintenance costs shown in the Mopani cost structure above.

The reasons for high costs include:

- Zambia does not have the capability to manufacture the range of industrial products that the mining industry needs, for example, steel and roof balls for mine support. The mines import most of these goods through agents and importers in South Africa. The cost of logistics, trade facilitation and mark ups for the agent/importer adds to international prices. The end result is an item of equipment or spare part that can cost more than twice what it would in other countries.

- The mines require high integrity products. The limited range of industrial products manufactured in Zambia is generally not of sufficient quality. The mines mainly buy low value-added items in Zambia such as food and clothing, a few industrial products and contracted out non-critical services such as security and construction.

- The suppliers of high integrity products have not chosen to locate in Zambia because of the country’s lack of attractiveness as a manufacturing destination. Also, until recently, the level of demand from the mines was not sufficient.

Many mines are keen to see the domestic manufacturing base expand – in order to reduce their input costs. However, according to mining companies, while the price of goods produced in Zambia may not be uncompetitive, the limited range of products available locally and the poor quality of what is available discourage local purchases. On the other hand, some
mines still prefer to source products through their corporate headquarters or from companies in their home countries.

Now that the mining industry is growing rapidly, it may be an opportune time to attract to Zambia international original equipment manufacturers with a track record in supplying equipment for mines in other countries. An inventory of the mining industries’ purchasing needs should be developed and assessed against the economic scale of manufacture to establish what could feasibly be produced in Zambia. Certainly, manufacturers of high integrity, fabricated (as against mass manufactured) items could be a possibility.

At the same time, it should be possible to incentivize the mining industry to undertake vendor development programs to increase the skills of their existing suppliers and potential new suppliers that they select. Demand-led efforts, initiated and managed by the mining companies, are far more likely to succeed than supply-driven programs. Examples of the types of incentives that have been offered in other countries are grants to cover the cost of the scheme, tax write-offs at more than 100 percent of the cost, or simply recognition by the Ministry of Mines. Such schemes have been used in Malaysia and other countries sometimes with the threat of imposing a minimum content requirement if the industry does not respond to the incentive on offer.

Such efforts could be supported by improving the environment for manufacturing in general. Developing Zambia’s current manufacturing base to meet the needs of the mines will take time, but in the long-term it will reduce input costs for the mines.

5.2.4 Fuel Costs

Fuel is an important cost component throughout the global mining industry. It powers much of the machinery used by the mines and the transport they use to move ore to processing plants. Mopani reports that 7 percent of its total cost is fuel (MCM 2009). Until about mid-2008 fuel prices in Zambia were among the highest in Africa and in the world, although prices were reduced considerably in late-2008. Yet Zambia’s fuel prices have remained quite high relative to other countries. A recent study based on research undertaken in 2009 showed diesel prices to be 72 percent lower in South Africa, 37 percent lower in Botswana, 35 percent lower in Zimbabwe, and 19 percent lower in Tanzania (Engman 2010).

5.2.5 Transport

The rail system, built to accommodate the export of copper, performs poorly. The system is unreliable, inflexible and expensive and does not extend to the new areas in which the mines are now operating. Privatization has not brought in the investment and skills needed to revive a system that fell into disrepair under public ownership. The vital importance of the rail system to the mines can be gauged by the fact that the Chamber of Mines organized a bid for the railways when they were privatized.

As a result of the problems with rail, road transport is the main form of transport used by mining companies. Fortunately, the market for road transportation is competitive and relatively efficient given its challenging context of high fuel costs, stretches of poor roads and inefficient customs. The cost of road transport in Zambia – at $0.042–0.046 per tonne per kilometer (tonne-kilometers or tkm) – compares favorably with that of many other African transport corridors and even with countries such as China and France ($0.05 tkm). The prices compare less favorably with Pakistan (2.0 cents/tkm), Brazil (3.5 cents/tkm) and the United States (4.0 cents/tkm) (Engman 2010).
Figure 26 below shows the approximate cost of transport in dollars per tonne for the journey between the Zambian Copperbelt and the port of Durban, compared to the cost from a copper mine in South Africa.

Figure 26: The Cost of Transport to and from Ports

![Cost of Transport to and from Ports chart]

Source: Data obtained during interviews with mining and manufacturing companies

There are several factors that – if addressed – could reduce transport costs and thereby improve the mining industry's competitiveness.

1. *The high cost of diesel* (see above).

   This makes up some 30–40 percent of the total costs of transport companies. Since fuel prices in Zambia tend to be higher than those in neighboring countries, international haulers have an incentive fill up their trucks outside Zambia (Engman 2010).

2. *The time taken to transport copper to the nearest ports.*

   Transporting cargo from the Copperbelt to Dar es Salaam usually takes an average of 7-8 days, but the journey could be delayed to 10–12 days due to road conditions, border congestions or corruption. It takes around 4-6 days\textsuperscript{10} to truck copper from the Copperbelt to Johannesburg if the cargo is pre-cleared, all documents are in order, and there are no incidents along the way, but the journey often takes longer. From Johannesburg to Durban is an additional 2.5 days. In contrast, the journey from Palabora mine to Durban takes just 3 days.\textsuperscript{11}

3. *Trade transactions costs.*

   A World Bank study on transport in Africa highlighted the two prominent constraints in cross-border trucking: custom duties and trade procedures (Teravaninthorn and Raballand 2008). It has since been estimated that the trade transactions costs equal 0.7-1.1 cents/tkm from the Copperbelt to Durban and 1.1-1.6 cents/tkm from the Copperbelt to Dar es Salaam.\textsuperscript{12} There is potential to significantly cut these trade
transactions costs by streamlining administrative requirements and procedures (Engman 2010).


Spare, like other manufactured goods, are expensive (see above). Haulers have to pay duty on spares. There is also a lack of skilled labor, which hampers the ability of haulers to maintain their vehicle fleets cost-effectively.

5. The age of trucks.

Because capital is expensive in Zambia, trucks are older than they should be.

6. Road quality and capacity.

In many parts of Zambia where mines are located, roads are congested and/or in poor condition. In some cases, road capacity is not sufficient to cope with the growth of mining output. For example, road access to Lumwana and Kansanshi is at maximum capacity now and expansion of these operations as well as development of the Northwestern Province (e.g. Kiwara) would be hindered without improved road or rail access. The road between Ndola and Chingola is also congested and slow.

The above inefficiencies have an adverse impact on the cost of moving from the mines to processor. Although not included in cost breakdowns explicitly, they certainly reduce the competitiveness of the Zambian mining industry. Transporting long distances by truck over poor roads is not a cost that many of Zambia’ competitors have to bear. Chile, for instance, uses pipelines that transport concentrate by gravity to the smelter or port.

The time and cost of crossing borders is a major impediment for the mines that affects both the cost of importing and the time required to ship to customers. It also affects the price realized for copper. The distance to port is long and would be best undertaken by rail. Road, transport and other logistics costs can account for a significant proportion of the price realized, especially when prices are low. “The mining industry is sensitive to changes in transport prices since it relies on imports of almost every input in the supply chain, including chemicals, machinery, filtration, mechanical parts, and transport equipment.” (Engman 2010).

5.2.6. Social Costs

At privatization, mining companies took on the running of schools, hospitals and clinics that accompanied the mines. This results in Zambia-based mining companies bearing relatively high social costs that are not borne by companies in many other parts of the world. Mopani reports that it spent nearly $80 million between 2002 and 2008 on social costs, and that costs are rising. In 2002, it spent nearly $6 million, while in 2008 it spent $21.5 million, representing 2.7 percent of revenue (MCM 2009). Lumwana also followed the social agreements but expects to have tax holidays and that it will not have to pay any windfall tax.

Mining companies practice Corporate Social Responsibility and sign up to the International Council on Mining and Minerals (ICMM) sustainable development framework. But even those that sign up will seek reduced taxation in recompense for this cost.

According to the ICMM, mining companies are expected to contribute to community development. And the proportion spent by companies such as Mopani does seem excessive.
Palabora spends on average 1.5 percent of its revenue on the Palabora Foundation (PMC 2009), which is a common practice among mining companies. What makes this spend particularly irksome to Zambian companies is that they need to incur high social costs even when they are making losses, not philanthropically as part of corporate social responsibility when they can afford it.

5.3 Business Environment Could Be Better

The lack of a sound business environment in Zambia is well-documented in the World Bank’s Doing Business Report and Investment Climate Assessment. Zambia is currently ranked at 76th out of 183 countries on the World Bank’s Doing Business Index, reflecting steady progress from a poor starting point. However, the World Economic Forum’s Global Competitiveness Report 2010 ranks Zambia 112th out of 133 countries, which reflects some of the difficulties the mines (as well as firms in other industries) face.

The World Bank’s recent Investment Climate Assessment (World Bank 2009) reported an improved investment climate in Zambia. However, it highlighted five major constraints:

- Unstable macro-economic conditions, combined with limited access to finance for small firms
- Uncertainty in the tax regime and inconsistent regulation
- Weak law enforcement and corruption
- Poor quality infrastructure
- Labor inflexibility.

A critical issue for Zambia’s mining industry is the instability of the exchange rate. While Zambian firms in general have pointed to the lack of stability of the exchange rate as a key weakness of the investment climate, for the mining industry, the exchange rate plays a crucial role in determining competitiveness.

The kwacha/dollar exchange rate has been volatile, with the kwacha falling in value to nearly ZMK 5,000 to the dollar in 2004, only to appreciate to around ZMK 3,500 in early 2008. The Kwacha swung wildly in 2008/2009. In real terms, the rate of around ZMK 4,500 or more that it has occupied in 2010 and the first quarter of 2011 represents a strong appreciation from levels reached in 2004, as Zambian inflation has consistently been higher than US inflation.

For exporters, such as the mines, stability is important in making investment and operational decisions. The volatility of the exchange rate also creates uncertainty for investors. Longer term, what really matters for competitiveness is maintaining a competitive exchange rate in real terms. The appreciation of the kwacha hurts the export industries. The rise in the proportion of costs made up of labor between 2004 and 2008 was due in part to the appreciation of the kwacha.

5.4 Attitudes to Mine Closure

In developing a competitive industry in a country with as long a history of copper mining as Zambia, it is inevitable that old, depleted mines will close. Currently, the mines are put under huge pressure by the government to remain open, despite making losses. The pressing social need to maintain employment is understandable but, in the long-term, such a policy stance is
likely to be counterproductive. Investors will take note of such policies and factor them into their (unfavorable) assessment of Zambia as a place to locate.

Moreover, keeping such mines open will mean that resources that could be put to use in developing competitive mines will remain locked into uncompetitive uses and detract from Zambia developing a competitive mining industry.

With the new, more favorable climate for attractive mining investment, and the shortage of skills in the country, it would be far more effective, in terms of economic and social outcomes, to incentivize new investors to redeploy labor from mines that are no longer economic. If that could occur in the vicinity of the old mine, then so much the better. However, even if the new mines are located elsewhere, attractive relocation packages for miners, provided by the old mines, could help mitigate the costs of social dislocation.

For example, the mine at Mufulira is likely to close soon due to depletion of reserves and high cost of production. It has only remained open in recent years due to government pressure. Such pressure can only result in a waste of resources that could be better deployed elsewhere. Planning needs to start now to develop Mufulira into a smelter town rather than a mining town. Investors looking to build new smelter capacity could be incentivized to locate in Mufulira.

### 5.5 Key Competitiveness Issues

In summary, the international competitiveness of Zambia’s copper mines is low, with the major mines all in the bottom quartile of cost competitiveness worldwide. The major issues are as follows:

1. The age of the large mines and their depletion, leading to high costs. There is a need to ensure that uneconomic mines are closed.

2. The newer mines, such as Lumwana and Kansanshi, are at the middle of the international cost curve because of high input costs.

3. Input costs are high, having risen rapidly, and productivity low, and this undermines the cost competitiveness of all the mines. New mines can achieve benchmark but are disadvantaged by high costs.

4. The major input cost of concern is labor, the cost of which has risen dramatically while productivity remains well below international standards.

5. Providing an efficient system of transport is vital for improving competitiveness. A functioning rail system, that extends to the new areas of mining, is hugely important for the mining industry and for manufacturing generally, enabling the country to import the raw materials it needs and to export efficiently. Further improvements in the efficiency of the road transport industry would be hugely beneficial for the competitiveness of all industries.

6. Better power infrastructure—capable of delivering uninterrupted power—is essential.

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1 Brook Hunt defines C1 costs as cash operating costs, including mining, processing, site administration, net of by product credits.
2 Solvent extraction and electrowinning (SXEW) is a two-stage process that first extracts and upgrades copper ions from low-grade leach solutions into a concentrated electrolyte, and then deposits pure copper onto cathodes using an electrolytic procedure.

3 On a “no credits” basis.

4 C3 costs are total production costs, including mining, processing, site administration and refining; depreciation and amortization charges; royalties, related head office and interest costs, net of by-product credits.

5 It is not clear why the figures for costs at Mopani Copper Mines differ in the sources used for Figure 20 and Figure 21. Nevertheless, in both cases the trend in costs is upwards.

6 Vocational allowance includes training or trade experience.

7 ZESCO, costs in effect from April 2009.

8 For more details of the issues discussed in this section, see Engman 2010.

9 According to consultations with trucking companies in the Copperbelt, only approximately one-sixth of Zambia’s copper exports travel by rail (almost all of which to Dar es Salaam), with the rest by road.

10 Along the Chirundu-Beit Bridge route.

11 Data obtained during interviews with mining and manufacturing companies.

12 For a truck with a 30 tonne copper load.

13 See http://www.doingbusiness.org
6 WHAT COULD THE INDUSTRY DELIVER?

Thanks to the expected global shortage of copper, prospects for Zambia copper mining industry are positive. In examining the industry’s competitiveness and what could be done it is useful to consider two scenarios: a “business as usual” scenario and a scenario in which the issues outlined above with respect to investment, competitiveness and maximizing the development impact of the industry are addressed.

6.1 Scenario 1: Business as Usual

The Zambian copper mining industry is set for continued growth on the back of recent investment. There is no doubt that exploration and subsequent investment is likely to continue. BHP Billiton has already bought into exploration in Central Province and the Kiwara deposit has been acquired by First Quantum for further exploration and potential development. A number of other explorations are underway that could lead to sizeable new investments.

Figure 27 shows what the companies are projecting for growth until 2012, showing potential total output. In the absence of data for some companies, 2009 output has been used (i.e. assuming no increase in output after 2009). Total output projections come to 1 million tonnes in 2012. The main increases come from KCM, Lumwana and Kasanshi. Most of the increase in production is coming from Konkola Deep, where most of the capital investment needed has already taken place. The figure shows mined output and does not include treatment of DRC concentrates.

Figure 27: Projected Copper Production by Mine, 2008–12

Source: World Bank calculations based on data provided by mining companies
The production forecast in the above figure is based on the mines’ own projections produced for the benefit of their shareholders. These projections are based on assumptions that power will be available and that transport links will keep pace with output. However, under the scenario of “business as usual”, these assumptions are unlikely to hold. There are also major caveats to the planned increase in output projected by the mines:

1. A sharp price fall would derail output.

2. Achieving a 40 percent increase in output will require major improvements in road infrastructure—for instance, easing the road access to Lumwana and Kansanshi (which is reported to be breaking up and needs to handle a million tonnes of concentrates each year). Even the mines in Copperbelt Province are experiencing problems with the quality of roads and their ability to carry more tonnage. The transport constraints will also hinder output growth unless road conditions are improved.

3. The mines have been assured that they will receive additional power and that power lines will be built to reach new areas. However, there are some doubts as to whether these will actually be delivered on time. For example, a 40 percent increase in output will require an increase of 40 percent in power supply (assuming there is no change in the intensity of electricity demand). If no additional power is available, the industry’s output will be constrained and output of 1 million tonnes will be unlikely. Projects announced to increase power generation are yet to deliver, prompting some of the mines to consider offering funding to get them moving. The likelihood is that the first project to actually begin to deliver power will be Kariba North Bank - which is expected to generate extra 300 MW in 2013. Assuming a constant intensity of power demand, the target of 1 million tonnes is likely to be achieved only when the 700-800 MW Kafue Gorge Lower project comes onstream in 2016. In fact, the assumption of constant intensity is also unlikely to prove realistic as the older mines such as Konkola will need more electricity to pump water.

Under current conditions and rate of progress the target of 1 million tonnes will not be achieved. For all the investment taking place now in exploration, the lack of infrastructure would remain a bottleneck constraining output. Further, there are likely to be some mine closures, for example Mufulira, as a result of mines coming to the end of their productive lives. Continuing with a high cost industry, with major mines nearing depletion, will expose the country to disastrous closures whenever a price dip similar to that experienced in 2008–9 occurs.

With global prices likely to remain high, though with periodic dips, the export revenue generated by copper will rise. The current tax regime is beginning to raise the tax take, but there are concerns over how much the tax take will be. For example, some major companies claim that, because of high capital investment and the carry forward of losses, the tax paid in cash to the government will not increase even under the new regime.

In addition, as noted in Chapter 3, some mines have still not reached an agreement with government on the tax regime. When new mines are opened, they may need to provide their own infrastructure and this may result in the government having to make some of the same types of tax concessions as were incorporated in the Development Agreements of the past.

Even with these objections, the tax take should increase. Some of the tax breaks from Development Agreements are expiring and the mines are now entering a stage of their life when they should be generating large operating profits and not having to invest large sums. It
appears that most of the mines are reconciled to pay the 3 percent royalty. Thus, revenue from taxation should increase in the foreseeable future.

In summary, if nothing is done, the consequences will be as follows:

1. Limited additional output and contribution to economic growth: The best that can be expected is 800-850,000 tonnes of copper output per year. And, despite higher prices, the contribution to economic growth will be limited by rising input costs.

2. An increase in exports to $4.8–6.8 billion per year earned from the export of 800-850,000 tonnes of copper.

3. Higher government revenues approaching $1 billion per year (though it could be lower). Nevertheless, government revenue from mining will rise appreciably. This will provide the government with the greater fiscal space it needs to invest in development.

4. Modest increases in employment, periodic lay-offs. Though the scale of investment coming into the country will be large, the impact on employment will be relatively small because mining is capital-intensive and, as shown above, there is much headroom for productivity gains. There are also likely to be periodic lay-offs of workers as and when the price of copper falls.

5. Continued low linkages with the rest of the economy. The lack of competitiveness of Zambian manufacturing is likely to continue and the mines will continue to rely on imports.

6. Continued currency instability. Because of the reliance on copper for exports and foreign investment, the exchange rate will continue to be volatile.

7. The country could experience resource curse effects. The inflows of foreign exchange could cause the real exchange rate to continue to appreciate. This, combined with greater government expenditure, could cause Dutch Disease. Under this scenario, it could lead to a decline in all traded sectors of the economy, including agriculture on which much of the workforce depends. Resources (labor and capital) would flow into the public sector where they would be less productive.

Such a scenario cannot be sustained. If infrastructure constraints are allowed to continue to limit output, sooner or later investment and exploration will stop. This serves only to highlight the urgency of improving the operating environment for the mining industry.

6.2 Scenario 2: Improved Investment Attractiveness and Competitiveness

Global prospects for copper and the country’s resource base have established the appetite of the industry to invest. However, steps need to be taken to translate that appetite into output, exports and government revenues. These steps can be grouped under two headings:

- *Improving the attractiveness of investing in Zambia*. Arriving at a better compact with the mines and exploration companies that not only looks at taxation, but sets in place obligations of the government to invest in infrastructure and the public services in mining communities, would do much to make Zambia more attractive to investors. If that compact could be enshrined in law, it would do even more. Addressing corruption and currency stability would also improve the ranking of the country in industry surveys.
• *Improving competitiveness.* Working to reduce the cost of inputs, increase the productivity of labor and improve infrastructure would help to make the industry more cost competitive, thereby enabling it to become more resilient to periodic falls in copper prices and enabling current investment to be translated into much higher output.

The combination of the two would help to:

• *Increase investment.* A more conducive environment for investment and a more competitive industry could increase the inflow of investment beyond current high levels. The appetite to find and develop new sources of copper has never been higher. It is also likely that improving the attractiveness of the country will help to attract investors with longer time horizons and deeper products than some it has attracted in the past.

• *Increase output and economic growth.* With the right conditions in place, the industry could not only fulfill the government’s target of 1 million tonnes per year, but, by 2020, increase output to 1.3-1.5 million tonnes as a result of the opening of new mines through successful exploration. This would make Zambia the world’s second largest producer of copper. The contribution to economic growth would also increase. As a result of higher output and lower input costs the Zambian mining industry should grow at a rate faster than the recently achieved 8 percent a year.

• *Make the industry more resilient.* Improving competitiveness would make the industry less vulnerable to price dips, thus preventing adverse economic and social consequences.

• *Raise exports.* Assuming prices remain in the $6,000 to $8,000 range, export revenues from copper should amount to some $8–12 billion per year. This would represent a major inflow of foreign currency.

• *Increase government revenues.* The higher investment and output should feed through to even greater increases in government revenues, especially if the government and the mining industry could agree on a stable tax regime that better balances the interests of both and the industry feels less more inclined to pay taxes because it can see that they provide large public benefits. Future agreements with the mining companies would not need to give so much away in terms of tax concessions. Revenues from royalties, corporate and employment taxes could be as high as $2.25–4 billion per year.

• *Provide more productive and higher skilled jobs.* Mining is a capital-intensive industry with limited scope for additional job creation, but the quality of jobs the industry provides could be better. It is in the interest of the industry, its employees and government to “up-skill” Zambia’s mining workforce.

• *Improve supply linkages.* It should be possible to increase the industry’s local supply base, spurring the growth of other industries such as manufacturing and creating more employment in those industries.

These measures will benefit the Zambian economy directly. However, for the industry to fulfill its potential to deliver real prosperity to the wider population, good management of the inflow of foreign exchange and tax revenues will be crucial.
6.2.1 Managing the Resource Curse, Transforming the Economy

If nothing is done to change the way that the increased inflows of foreign exchange and government revenues are managed, there is a real danger that the country would suffer the effects of Dutch Disease, if not the full political, economic and social consequences of the resource curse.

The resource curse need not materialize if copper revenues are used to:

- establish counter-cyclical fiscal policies;
- maintain a stable, competitive exchange rate; and
- save and invest sufficiently to compensate for the depletion of the natural asset base.

Moreover, the experience of Chile and other natural resource exporters shows that, longer term, achieving substantially higher levels of prosperity will depend on how effectively Zambia is able to use the revenues generated by copper to transform its economy. Worldwide, higher levels of prosperity are associated with the transformation of the sources of growth from the accumulation of factors of production to growth driven by efficiency and productivity gains and, at very high levels, from innovation. Despite a century of copper extraction, Zambia continues to remain at the earliest stage of transformation.

The evidence for this lack of transformation comes from the World Economic Forum’s Global Competitiveness Report. Zambia ranks 115th out of 139 countries in the 2010–2011 report and is categorized as a factor-driven economy (WEF 2010). It scores particularly poorly on health and education and infrastructure, the basic requirements for competitiveness. In contrast Chile ranks 30th and is well on its way in transitioning from an efficiency-driven economy to one driven by innovation. The country has strong basic requirements, having invested in health and education and infrastructure, and has developed good institutions, sound macro-economic policies to cope with the resource course and a sophisticated financial system.

Thus, measures to improve the competitiveness of the mining industry – particularly measures related to power, roads and public services – are needed for Zambia’s economy to improve its competitiveness and transform the source of growth. These will go a long way to sustaining current and future industries and improving the productivity of the workforce.

Supporting evidence for the need to use the proceeds from copper to develop greater competitiveness and transform the economy comes from exports. The world over, higher levels of prosperity are associated with the ability of an economy to diversify the export base of the country so that it is more resilient against downturns and provides multiple sources of competitiveness and productivity gains for the economy through ‘spillovers’ of technology into other industries.

For instance, prosperity growth in Chile was marked by a reduction on its reliance on copper as a source of exports (Figure 28). The country was able to develop strong exports of wine, fish, horticulture and forestry products and take advantage of its tourism assets. Zambia, in contrast, continues to rely on copper exports and this is a hindrance to the stability of foreign exchange earnings and undermines the ability of exports to serve as catalysts for greater competitiveness and productivity, especially in view of the low linkages with the rest of the economy.
In the long term, the extent to which copper mining contributes to Zambian prosperity will depend upon how effectively the proceeds from copper are used to manage the resource curse and how they are invested to transform its economy.

1 Lusaka Times, November 19, 2007.
2 Assuming a price of $6,000 to $8,000 per tonne.
7 WHAT WOULD IT TAKE TO ACHIEVE THE POTENTIAL?

The JPC Program seeks to define the results that are needed for the potential of Zambia’s copper mining industry to be achieved. This report does not give specific recommendations, but rather highlights the results needed in the three main areas of (1) attractiveness for investment; (2) competitiveness; and (3) using the proceeds of copper to deliver prosperity for Zambians.

7.1 Increasing the Attractiveness for Investment

The government, the mining industry and the representatives of labor and civil society need to arrive at a consensual agreement on what is required to develop the copper mining industry in ways that balance the interests of the industry and the development needs of the country. That resulting compact needs to cover the obligations of the industry and government to each other and to the citizens of Zambia. Holding an open, transparent dialogue could be a starting point.

The compact developed should be comprehensive, covering the following:

- A stable and equitable tax regime that balances the interests of the industry and the state and has the backing of law to ensure its stability.
- The provision of social services in copper mining communities and to miners. A balance between contributions from the government and the mines has to be agreed.
- The government’s policies toward the provision of and investment in infrastructure.
- How to assure greater transparency by both mining companies and government in order to create a more transparent environment in which mining can be conducted. Mining companies should be willing to report production costs, suppliers, social costs, loans and taxes paid. The government should be willing to publish Development Agreements, tax receipts and results of BOZ, ZRA and other institutions’ audits and reports (for example those of the Mines Safety Department). The country should come to be seen as being at the forefront of the Extractive Industries Transparency Initiative.
- How the taxes paid by the mining industry are used to ensure good macro management and investment for the future, including a stable and competitive exchange rate.

The effect of the compact should be to improve the ranking of the country in influential industry surveys such as Behre Dolbear, as follows:

- A transparent agreement between the government, municipalities and mines on social provision results in Zambia’s social issues score (currently 3 out of 10) matching Botswana’s (5) by 2015.
- A stable kwacha, maintained at a competitive exchange rate, results in the currency stability score rising from 2 to match Botswana’s 5 by 2015.
• More transparent and less discretionary concessioning and licensing regimes results in the corruption score improving from 2 to 5 by 2012.

• A transparent tax regime that is able to maintain an effective tax rate of around 40 percent, backed by law. Legislation assures investors that the government will honor the regime and consequently the tax regime score rises from 3 to 6 by 2013.

A similar improvement in Zambia’s ranking would take place in the Fraser Institute survey.

Another desirable outcome would be a much stronger Geological Survey Department in the Ministry of Mines that not only played an active role in the identification of the country’s resources but also was able to advise Government of their potential and provide early indication of future development requirements. A country that has been surveyed properly is likely to attract the right investment and, eventually, sign clearer development agreements, specifying the responsibilities of all parties involved. Such agreements would result in better outcomes for the government, the mines and Zambian people.

### 7.2 Developing a Competitive Industry

The main results required are:

• Mines in the upper quartile of the cost curve that have reached the end of their productive lives are closed.

• Production costs fall such that the other mines currently in the upper quartile of the international cost curve move to the third quartile, providing greater resilience against price dips.

• The newer mines improve their competitiveness and all new mines are comfortably able to meet investment criteria at the production cost benchmark of $2/lb.

Delivering these main results will require a set of underlying results to be achieved, as follows:

• Labor costs are kept in check in dollar terms through less adversarial collective bargaining made possible by greater transparency on both sides and through the government’s intermediation.

• Zambia reduces the gap in labor productivity with Chile and other comparators as a result of an improved national technical and vocational training system and an industry-wide on-the-job training scheme. The on-the-job training scheme is provided by the mining industry, using the best trainers available, and leads to vocational and training qualifications. The government and workers also contribute to the cost of training.

• Power outages no longer take place and the grid extends to new mining areas. Concessions are provided to independent power producers faster and mines are provided with a regulatory framework that enables them to invest in power generation with surplus power sold to the grid.

• Investment in road infrastructure targets the needs of the mining industry in terms of easing transport bottlenecks for existing mines and linking new mines to the road network.
• The cost of fuel falls to South African levels for the mines and for haulers.

• The cost of road transport falls to $0.03–$0.04 per tonne per kilometer as a result of a lower cost of fuel, reduced duty on spares, a better trained workforce and better, less congested roads.

• The railways are improved, through greater investment and better management, thereby reducing the reliance on road transport. The rail system is extended to the new mines with the mines allowed to build and operate their own links between the mine and smelter.

• Better trade facilitation reduces trade transactions costs and the time to cross borders, and the mines report that the time to port falls by half. This contributes to an improvement in Zambia’s ranking in the Doing Business Index.

• A larger, faster growing industry and an improved operating environment for manufacturing attract international original equipment manufacturers to locate in Zambia. The mines are incentivized to undertake vendor development programs. The measures above, such as increasing labor productivity, better road and rail transport and better trade facilitation contribute to improving the operating environment for manufacturing.

• Repair and maintenance and consumable costs fall as a result of better trained Zambian technicians and lower cost, domestic supply of spares and consumables.

7.3 Using the Proceeds of Copper to Deliver Prosperity

The main results that, if achieved, could help ensure that Zambia is able to use the proceeds from copper to deliver prosperity for its people are:

• The potential “curse” of natural resources is addressed through the effective management of foreign exchange and government revenues generated by copper.

• The government uses its revenues to improve the competitiveness of the economy and to transform the basis of growth from factor-driven to efficiency-driven.

• The government and the private sector work together to develop the competitiveness of industries with the potential for diversifying the export base.

7.3.1 Countering the Resource Curse

Zambia could reduce dependence on extractive industries by:

• Maintaining a stable, competitive exchange rate by establishing a mechanism to manage inflows of foreign currency, such as a sterilization fund. Such funds invest some of the inflows abroad until they can be employed productively in the domestic economy without causing currency appreciation.

• Saving in a stabilization fund government revenues generated when prices of copper are higher than expected so that they can be used for countering cyclical downturns.
- Capturing through taxation a larger proportion of income from the mining industry and investing the revenues in infrastructure and public services.

- Ensuring that the country saves more than is needed to counter resource depletion and uses those funds effectively for investment in human and physical capital that enhances productivity.

- Diversifying industries to reduce dependence on copper.

### 7.3.2 Transforming the Source of Growth

Transforming the source of growth is a long-term process. In the immediate future, because Zambia is poorly-placed in attracting investment, the desired outcome should be a successful factor-driven economy that is transitioning to become an efficiency-driven economy such as Botswana’s. The results that would, in turn, contribute to this are:

- Infrastructure is improved, greater macro-economic stability achieved and better provision of healthcare and primary education lead to a more productive work force. These results are needed to address the resource curse also and so should be regarded as basic.

- Institutions are improved to reduce government bureaucracy (trade facilitation is an example).

- Major constraints to doing business (such as access to finance) are addressed.

- The efficiency of the labor and product markets and technological readiness are improved.

### 7.3.3 Diversifying the Export Base

The required result is improved competitiveness of industries with export potential.

### 7.4 Bringing About these Results is Worth Doing

The above list may seem lengthy and demanding at first sight. But what is involved is no more than what progressive governments strive to deliver everywhere: establishing a favorable environment for a vital industry. And, much of what is needed for the copper industry, such as effective macro-economic management, good infrastructure, a productive labor force and a better transport system, will benefit other industries too.

The prize makes it worth doing. Zambia would benefit from much faster growth of the copper industry and benefit from a sizeable increase in government revenues. Those revenues could be used to lay the foundation for a prosperous Zambia.
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