

The survival of mining—conditions of its viability*

by SIR DONALD TEBBIT†

To have been invited to deliver this second CMMI lecture is an honour that I deeply appreciate. But, when I contrast my qualifications for delivering it, with those of Sir Alistair Frame‡, who delivered the inaugural lecture‡ in the series, or with those of other members of the Council, I feel rather an imposter. Far from having been a miner all my life, I have been associated with the mining industry on a part-time basis for a mere eight years. However, I encourage myself with two recollections. The first is the admission of the great Sherlock Holmes that he was often guided to the truth by the erroneous opinions expressed to him by Dr Watson. I may be able to perform a similar service for you. Secondly, I recall that, when I was a member of the Diplomatic Service, I was quite often asked to address representative gatherings of such professional people as the police, architects, dress designers, teachers, doctors, funeral directors, bird fanciers, and so on. Since it would have been pointless to pretend that I was expert in any of their businesses, I used to resort to the technique of announcing as my theme 'A diplomat looks at the police' or whatever profession it was. They fortunately took it as a compliment that their profession was apparently one that diplomats spent a lot of time brooding over. They could also afford to laugh off any criticism that I might make because it could be ascribed to ignorance rather than informed malice. I hope that you will do the same.

I have chosen to discuss with you the conditions that govern the viability of the mining industry. It may strike you as silly even to consider whether there can possibly be any question overhanging the future of mining. After all, we cannot even get to work nowadays, let alone do any, without making use of objects made from the products of the miner's toil. Mining must be one of the oldest professions. Not quite so old as the first surgeon who created Eve out of Adam's rib; or the first architect who created the firmament and brought order out of chaos; or the first politician who created the chaos in the first place. But it is by the advances achieved by the miners and metallurgists that the stages of civilization itself have been determined: the bronze age, the iron age,

and so on. What is more, if the golden age ever existed, or ever comes again, miners will be the ones responsible.

You may not read much about miners in the Book of Genesis, but they are most sympathetically covered in the Book of Job:

'Far from where anyone lives
Or human feet ever travel
Men dig the shafts of mines.
There they live in loneliness
Clinging to ropes in the pits.'

Much has changed since then, but it is still a way of life that, to say the least, is full of challenge.

I should like to suggest that, for mining to be viable today, five conditions have still to be met.

One, there must be a reliable and effective demand for minerals—strong enough to sustain an adequate price structure.

Two, there must be a continuing and accessible supply of mineral deposits to be tapped.

Three, there must be an adequate supply of people prepared and qualified to engage in mining.

Four, mining houses must have access to enough financial and organizational resources to meet the challenge of exploration and mining on an adequate scale, in remote areas, and in the face of modern technological and environmental requirements.

Five, there must be a climate of community opinion, national opinion, and world opinion that at least tolerates and permits mining, and, if possible, encourages it.

These conditions, I submit, have always shaped and governed the growth and well-being of the mining industry, even though the circumstances and manner in which they have done so have constantly changed.

Demand for Minerals

Perhaps we can first consider the demand side of the equation. Demand for metals has, of course, long been subject to a cyclical pattern of peaks and troughs, characterized by soaring and plunging prices. The task of seeking, planning, and operating mines is made much more precarious and chancy by the uncertain background of trade cycles of boom and bust. But these ups and downs, severe and damaging as they can be, especially if one gets the timing of a mining investment wrong, cannot hide the fact that, in historical terms, and even in terms of a medium business view, the mining industry has shown

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‡ Frame, Sir Alistair. Cost-reducing innovations in the mining and metal processing industries. *Trans. Instn Min. Metall. (Sect. A: Min. Industry)*, vol. 95. Jul. 1986. pp. A101-A103.

persistent and often dramatic growth. Between 1900 and 1970, the world output of pig iron grew by eleven times and that of steel by twenty-one times. In fact, in the first fifty years of this century, the world's output of mineral commodities greatly exceeded that achieved in all previous history put together. In general, the increase in demand for minerals is continuing, albeit at a slower rate of increase, and in spite of quite severe recessionary interruptions. For example, steel consumption in 1986 was 20 per cent below what it had been in 1974.

A general increase in demand, and in production in response to it, may also mask considerable differences of experience in different metals. For example, the world production of refined lead increased between 1926 and 1986 by something over three times; the production of refined copper grew by nearly seven times; and that of primary aluminium (starting, of course, from a low base) by nearly eighty times.

There are also significant regional variations in demand. For example, in recent years there has been enormous growth in industrial activity in Japan, Korea, Taiwan, and Hong Kong, contrasting with very slow growth in Continental Europe.

Differences in the patterns of consumption in the industrialized world, on the one hand, and the developing world, on the other, are also becoming more significant. North America, Europe, and Japan still consume the lion's share of the world's metal supplies. The tendency for the rate of growth in consumption to ease off in the industrialized countries is not yet counterbalanced by the increase in metal consumption in the developing countries. In the longer run, however, there must be some comfort in an annual rate of growth in the consumption of metals by the developing countries that is double that of the developed countries in the case of aluminium and treble in the case of copper, lead, and zinc. Nor are the quantities entirely insignificant even now. The share of the developing countries has risen from around 6 per cent of world consumption in the 1960s to around 16 per cent in the early 1980s. These figures would, of course, be higher if the developing countries had more money with which to buy. There must be policy implications in this for the CMMI.

Although demand in the sophisticated industrial economies is at present less buoyant for the traditional than for the recently discovered and more sophisticated metals, we are, I suspect, reaching a phase when a good deal of basic replacement work will have to be undertaken in the older industrialized countries. I recently heard Alistair Cooke explain that, when a water main burst in New York last year, it not only brought movement in the neighbourhood to a standstill but put blocks of flats and skyscrapers out of action for days on end. It was then discovered that the main that had burst had been laid in 1874. If that is the state of affairs in a place as modern as New York, you are probably not exempt in Sydney, and I dread to think what the situation may be below ground in London.

Two factors, in particular, have a depressant effect on total consumption. One of them is substitution. The other is improved technology, which enables less metal to do more work. I do not think that either of these developments can be stopped, or that the mining industry as a

whole would find it dignified or useful to adopt a Luddite attitude towards them. Clearly, when it is possible to make thinner steel sheets that are stronger as well as lighter, or to make one tonne of copper do the work of two by means of miniaturization, this is going to be done. Nor is there any way in which the mining industry can effectively resist environmental pressures akin to that which is gradually eliminating the use of lead in petrol. Whether at the end of the day the net effect of all these tendencies will be to lower the consumption of any metal will depend on the totality of economic circumstances at the time; but these pressures are going, inevitably, to stimulate competitive effort to add quality, especially at the finishing end of the production process, to help to make up for any quantitative losses.

Substitution, too, is often seen as a threat to the demand for metals. Substitution has long been with us and, as it continues, it will take many forms. In this Council we may be less concerned when one metal is substituted for another than we are when plastics, ceramics, and fibres come in place of metals. In neither case, however, is it realistic to suppose that the process can or should be stopped, at any rate in cases where substitution can produce satisfactory performance, or occasionally superior performance, at less cost. It is impossible to foresee how far these trends are likely to go, for it is plain that the limits of chemical manufacture have by no means been reached. I doubt, for instinctive rather than logical reasons, whether restriction or reduction in the use of metals by reason of substitution is likely to be enormous in the aggregate; but it could be painful in individual cases. It does not look to me as if mankind, having advanced from the bronze age via the iron age into the nuclear age, is about to embrace the plastic age. But the mix of manufacturing materials is going to become increasingly strange and increasingly complex, and we must not be too proud to look out for uses in which metals remain, or can become, the most useful and suitable materials, irrespective of traditional values and traditional standards of taste.

Supply of Minerals

So much for demand. What can be said about pressures on the supply side? Are we in danger of exhausting the earth's deposits of minerals? This extension of the Malthusian doctrine seeks to frighten us with the spectre of finite mineral resources being gobbled up by the limitless demands of an ever-expanding world population. In 1972 it was calculated that man's requirements of mineral commodities, including steel, had been growing at an annual rate of nearly 5 per cent, and that the total call on the world's mineral resources would double every fifteen years from then on. This led to the forecast that world metal production would inevitably fall short of requirements, and that the resulting shortages would bring greatly increased metal prices, which, in turn, would have a baleful influence throughout the entire economy. To the relief of everybody (with the possible exception of the mining community!), this scenario has not yet materialized, and I doubt if it ever will. Forecasts are, of course, inherently fallible and can prove ridiculous. Someone fed into a computer all the known facts about Manhattan Island as it was one hundred years ago. He then asked

the computer to work out the state of New York today. The computer replied that the whole area would be buried under six feet of horse manure, and that any human being who managed to claw his way to the surface would immediately be asphyxiated by petrol fumes!

It must be acknowledged that constraints on the supply side, in terms of the extent to which deposits of minerals still exist, are not anything like as narrow as pessimists have predicted. Vast new deposits have been discovered, often in areas that once would have been thought hopelessly inaccessible. It seems hard to remember now how daunting it seemed not so long ago to contemplate the transport of mountains of iron ore from the remote Pilbara to Japan, or to win oil from the snowy wastes of Alaska, from under the North Sea, or from the Bass Strait. Who can believe that the North West Shelf will be able to prevent men from winning its oil, as well as its gas? Methods have already been worked out by which minerals can be extracted from under the oceans, even if these processes have not yet become economic. And who can say that ways will not eventually be discovered of extracting minerals from under the polar ice-caps, and ultimately perhaps from the moon and the planets?

At a less fanciful level, history has shown on this planet that major components of the earth's crust, previously ignored and thought worthless, have become valuable as practical, and even indispensable, technological materials. Bauxite and uranium are but two recent and powerful examples. Such rapid and gigantic leaps into the use of new resources, quite apart from repeated new discoveries of large reserves of traditional minerals, sometimes in concentrations of unprecedented richness, have at the very least postponed substantially the dreaded moment when finite resources obey the logic that they must run out. And we are only beginning to come to terms with the enormous potential of scrap. All in all, the spectre of exhaustion still seems some way off. We seem to have at present known buffer deposits, though happily not buffer stocks, of between thirty and fifty years' supply in most well-known metals, and I have no doubt that these will be replenished by new discoveries and new methods of conversion and regeneration. I do not therefore believe in the Malthusian theory that the cupboard is nearly bare. But if, notwithstanding all this, demand eventually outstrips supply, it will be in the very long run indeed and, as Lord Keynes used to tell his young economists, in the long run we are all dead. I cannot resist the flippant but cheering thought that, in the years leading up to that final terrible dénouement of exhausted mineral supplies, mining houses would enjoy a price bonanza.

Supply and Demand

In these circumstances I think that we can conclude that the first two essential conditions for the viability of the mining industry will continue to be met—albeit imperfectly—for the foreseeable future. In other words, there will continue to be a demand for metals, even if the average rate of growth declines from what it was earlier this century, even if the customer grows more exacting and butterfly-minded, and even if the economists and politicians discover no effective way of avoiding damaging trade cycles.

How will mining companies respond to these problems? Frankly, I think that it is realistic to assume that the cyclical problem is with us to stay. Efforts to prop up the market artificially seem doomed to failure. The collapse of the International Tin Council is but one example. Nor, sadly, is there much encouragement to be derived from reliance on the good sense of producers not to cut each others' throats by oversupply. Until last year, we lived through a spell of disconcertingly low metal prices, caused by eager investment in new output following the buoyant demand of the 1960s. By contrast it does not seem propitious to us now, following the low prices of the 1980s, to invest in new mines intended for early production unless the deposit is extraordinarily rich or conditions are exceptionally favourable. To the extent that this delays the active exploitation of new deposits, it should have a beneficial effect on prices in the medium term.

From time to time mining houses have sought reassurance for themselves by expanding downstream, either carrying refined production further or going on into metal fabrication. This policy is a recurrent theme in the writings of many distinguished figures in mining history. Yet I cannot say that I have found much evidence that downstream expansion has, in practice, proved a particularly successful or effective safeguard, especially when adopted for its own sake. Too often downstream production, when entered into for reasons of theory, proves an expensive and self-defeating method of buying a market. If the price of a metal goes down because of over-supply, the chances are that products of that metal will be in over-supply too, and probably first. A commitment downstream can therefore mean exposure to a second set of unrewarding prices. Expanding downstream can be doubly dangerous if it gives rise to the negative mentality that believes that sales should be guaranteed by protective barriers, rather than won by competitive enterprise. At all events, there have been not a few costly and ill-rewarded downstream investments by mineral houses.

On the other hand, diversification by mining groups has always seemed to me to be a much more promising idea. This may mean diversification in the sense of handling a wider range of metals or it may mean having enterprises in other sectors of industry altogether. To be able to produce a wide range of minerals, rather than just one or two, can be extremely comforting in hard times. It is rare for all metal prices to be equally depressed at precisely the same time. Precious metals may be up when base metals are down, and *vice versa*; fuels, whether coal, gas, oil, or uranium, may also have a differently phased pattern of price and demand; so may chemical products. Remunerative enterprise outside mining can be an even more effective balancing factor, provided, of course, that they are pursued as hard-headed and practical propositions in their own right, and provided that the requisite expertise is available.

You may say that, for a mining house to seek refuge in diversity, presupposes that it must be big. In most cases, this is likely to be the case. The days of the small specialist mining concern are by no means over. Small can be formidable as well as beautiful, but a single-product firm is financially vulnerable in bad times and may well attract predators in good times. Increasingly,

too, the richest deposits are being found in remote places and difficult terrain, all of which postulates huge financial and human resources. I know that our existing mining giants had small beginnings, but it is harder nowadays to envisage a few individuals or a small firm managing to exploit a sizable new resource on its own.

A word about the political hurdles that a modern miner is expected to leap. In these emotional and demagogic days, there are incessant demands in many countries, for environmental and other local reasons, that mining enterprises, in particular, should be regulated, restricted, controlled, or prevented altogether. Demands are also made that international mining houses should refrain from operating, or cease operations, in certain countries for political reasons—South Africa, Chile, and Taiwan are obvious examples. Unfortunately, mineral-rich countries seem especially prone to the sort of regime that provokes external criticism. Leaving aside altogether the merits or demerits of the doctrine of non-interference in the internal affairs of other countries, it seems to me that a mining house has, in practice, little choice but to be quite hard-nosed about its policies in this regard. Mining is a long-term operation. From the discovery of a deposit, through evaluation, planning, the assembly of finance and equipment, construction, and development, right through to the exploitation and exhaustion of a mine, will take a period of twenty years and sometimes much more. During such a long period, political conditions are bound to change. Sometimes regimes and attitudes will spring up that will incur widespread disapproval and may, indeed, merit it. But if a mining company closes down its operations every time something untoward of this nature happens, it will never bring any sizable mining operation to a fruitful conclusion. Normally, and realistically, a mining company can hardly do other than adopt the attitude that it must necessarily mine where minerals are, that it is not ultimately responsible for political conditions, and that it will soldier on as best it can, giving as good a deal as it can to its employees and its shareholders alike and, if possible, setting high local standards for others to emulate.

Another form of political pressure occurs when host governments enforce rigid and unreasoning obedience to idiosyncratic social or religious standards, or insist upon unreasonable economic requirements. Many mining companies, and probably many more oil companies operating in such countries, have found it difficult to lay down for their employees a commonsense middle-of-the-road code of conduct, the observance of which will satisfy fundamentalist host governments without driving expatriate staff berserk. The tendency of such governments to ease the rules for their own ruling classes and for privileged foreigners on the basis of an unspoken exercise of discretion can be even more dangerous than the rigorous enforcement of conformity because the limits of such discretion are obscure and variable, sometimes hypocritical, and can be so easily crossed by accident.

Trying to drive too hard an economic bargain, on the other hand, is not something indulged in only by developing countries; if anything, it is attempted more eagerly and obstinately by sophisticated countries with advanced bureaucracies and democratically responsive ministers. It often takes the form of permitting the mining of a par-

ticular resource only in return for undertaking to develop it in a particular manner and to carry out specific further beneficiation. Such demands are understandable, but can often lead to trouble since their practicality cannot be reliably assessed in advance and can often prove to be thoroughly impracticable at the time of proper evaluation and costing. Unstable and arbitrary tax regimes are another feature by no means restricted to developing host nations. Bargaining with host governments can be so tough that, at the end of the day, there is sometimes going to be no choice but to walk away from a potentially desirable enterprise, rather than accept unreasonably onerous conditions in the vain hope of getting them modified later. Joint equity arrangements with host governments may lie ahead of us and may sometimes be a better alternative. In any event, the attitude of host governments must be listed as a factor capable either of facilitating a project or rendering it non-viable.

Environmental pressures are also becoming tougher year by year and much more expensive to meet. Of course, when we look at what happened at places like Mount Lyell in the last century, we are bound to agree that a more careful and sensitive respect for the environment is necessary. We have rightly come a long way in accepting the obligation to restore and enhance the sites of opencast mines and to control the emission of gases, effluents, and tailings. These are expensive operations but, with good sense and goodwill, a balance can usually be struck if the operator has enough skill and experience and a deep pocket. What I think cannot be countenanced is the arrogance of some hectoring minority interests that think it proper to try to take over the role of government, and to impose conditions or a veto irrespective of the views of government or the majority. The miner is not the enemy of the people. He is a benefactor. Irrational prohibitions are not needed when rational controls and accommodations are available.

Skills and Aptitudes

My third and fourth conditions for the continued viability of mining were that mining houses should dispose of the necessary financial, organizational, and human resources. Given that man's need for minerals will continue, their continued production is bound, in the end, to command a price that will enable that production to occur. But, for reasons connected with human psychology as much as with trade cycles, demand is likely to be somewhat sporadic, and may also be hedged about by expensive and burdensome conditions. It will therefore require not just great mining, metallurgical, and engineering skills but, even more critically, great managerial, financial, and political skill and sensitivity to cope with these challenges. In the end, it will boil down to the quality of people we recruit into the mining fraternity, how we train and use them, and, above all, how we inspire them. If it is generally true that without vision the people perish, it is even truer—and more sharply true—for miners.

Traditionally, the miner was an adventurer, and the adventure will never go out of mining. But, progressively, the qualities of the adventurer have had to be reinforced and sustained by technical skills and disciplines, and the ability to create harmonious communities in remote places, combining the latter with the ability to

respond successfully to the most sophisticated and stressful demands of modern business in great cities. It is not just that the old miners' camps have given way to elaborate and desirable housing estates, the creation and management of which require special resources and skills. It is also that the technical requirements of mining have become far more advanced, and the business requirements immensely stressful and demanding. Some of the required skills and aptitudes will still come from mining schools, universities, and technical colleges; but, increasingly, I believe, mining houses themselves must become as proficient at detecting and developing a wide range of staff abilities as they have traditionally been at detecting and exploiting the resources of the earth.

Francis Bacon said that reading made a full man, conversation a ready man, and writing an exact man. Modern miners require all these virtues and many more. As techniques and machines have improved, hitherto unheard of feats of mining have become everyday occurrences. At the same time and by the same token, the tasks that confront the mining community have become more complex. The miner and his associates have to pay more and more attention to the pressures from the wider world community. Failure in mining is nowadays just as likely to be caused by failures away from the mine as by failures in it.

World Opinion

My final condition for the continued viability of mining lies in the creation of an aura of opinion in the world that will not only permit mining but encourage it. Today, perhaps, we are as far from that desideratum as we have ever been, and perhaps further. I suspect that, in the old days, the miner's public image as a rugged individualist was as good as anyone's—up there with the nurses and the fishermen, and the members of the local football team. Now, I am sorry to say, ordinary people around the world rarely think of miners at all and, when they do think of them, it is too often in the context of some obnoxious allegation or other—environmental indifference, financial greed, exploitation, despoliation, and/or

fecklessness. These accusations are normally the reverse of the truth, but mere denials get no-one anywhere. It is extremely odd that, in the most technological age the world has ever seen, the man in the street hardly ever thinks of miners, except perhaps when the coal miners are on strike. The man in the street's bicycle, motor car, and TV set, the train and aircraft he uses, his golf clubs and the kitchen sink itself, all come to him by courtesy of the mining community. It would be helpful if the public could be persuaded to become better informed about the miner's role as the supplier of most of the amenities of modern life, rather than as the brutal invader and despoiler of beauty spots and sacred sites. In point of fact, I have seen more beauty created and restored by mining enterprises than by anyone since Capability Brown.

Sense of Social Responsibility

I suggest that the positive side of that record needs to be hammered home. In the mining industry, we must perforce think a great deal about production successes, quantities, equipment, and costs, and about the profits without which nobody can long survive. But other things have become necessary to our survival too. Our magazines and our publicity need to feature our aesthetic, environmental, and welfare achievements, and also our economic and social sense of responsibility. We need to play these cards just as much as we play our production records and our financial triumphs. Inside the mining community, we see ourselves as struggling hard to make a success of things and caring how we do it. But outside we are too often seen as grabbing what we want regardless. If this is a myth and a libel, as I for one certainly believe it to be, it is up to us to put more effort into the rehabilitation of our reputation as miners. So long as the mining community receives less than its due in public esteem, so long, and to that extent, will the future viability of its way of life be imperilled. I see this as a particular challenge facing the CMMI, and I hope that you will think it right to take it up.

Gold Fields Didactic Laboratory

Mr Robin A. Plumbridge, Chairman and Chief Executive Officer of Gold Fields of South Africa Limited, said that it was the Group's sincere intention to encourage Namibian ownership in Gold Fields Namibia Limited. An application is being made for a listing on the Johannesburg Stock Exchange, and the company will start with a private placing of a proportion of Gold Fields Namibia's shares with employees, as well as with institutions and business associates resident in the territory.

Mr Plumbridge was speaking at the official opening of the Gold Fields Didactic Laboratory at the University of Namibia. The Didactic Laboratory was established at the University following a donation of R350 000 from The Gold Fields Foundation.

In his speech of thanks, Professor Buitendacht confirmed that this donation enables the University of Namibia to be a leader in Africa in terms of this training, which prepares teachers to help scholars over technological hurdles with insight and enthusiasm. The Didactic Laboratory aims at promoting effective practical training of teaching students, and the systematic and continuous improvement of teacher training.

Mr Plumbridge concluded his address by saying that the future of mankind lies in the education of its children. The Group's association with the University of Namibia is a symbol of Gold Fields' intent to remain in Namibia and its desire to share in the development of the territory's human and natural resources.