Meeting the challenges

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Irish Government policy is to promote investment in mining that is compatible with sustainable development including assured environmental protection.

The concept of sustainable development has received wide attention since the publication, in 1987, of the report of World Commission on Environment and Development (the Brundtland Commission): 'Our Common Future'.
It was defined there as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This is a deceptively simple concept which has lead to a multitude of attempts to tease out its implications, and set out more or less detailed paths to its achievement; none of which has achieved any where near universal acceptance. This is hardly surprising since it is a highly subjective concept. Sustainable development may in, many ways, best be regarded an aspirational goal which should ensure that actions are examined holistically, rather than focusing solely on any of the three main components: economic growth, environmental, and social effects. It also clearly requires processes which permit and encourage wide-ranging dialogue and engagement between legitimate stakeholders. The overall challenge facing any industry is, thus, to achieve reasonably widespread acceptance that it is making real and continuing progress towards sustainability.

The EU Framework

Policies within the EU are of particular importance to Member States such as Ireland, since they set out many of the framework which must be followed nationally in many, such as Environmental Protection. However, other areas of relevance to the mining industry, such as mineral ownership issues remain solely for Member States under the principle of subsidiarity.
The EC Treaty which established the European Community contains provisions (Article 6) which require the integration of environmental protection into Community policies with a view to promoting sustainable development. Following from this, EU industrial policy has stressed the need to adopt an integrated approach, aiming at a high level of economic and social development, combined with a high level of environmental protection. The extractive industry was the first sector to receive specific attention, leading to the publication in 2000 of a Commission Communication: Promoting Sustainable Development in the EU Non-Energy Extractive Industry, which will sets out the Commissionís views on the industry generally within the EU. In endorsing this, the Council of the EU highlighted: the need to ensure a proper balance the three pillars of sustainable development, including better reconciliation of the needs of the industry and environmental protection; the importance of the industry for wealth creation and production of essential raw materials;

- reinforcement of competitiveness;
- the value of voluntary approaches to the environment;
- reinforcement of social dialogue and improvement of working conditions.

A second Communication was also published during 2000: 'Safe Operation of Mining Activities: a Follow Up to Recent Mining Activities'. It makes a number of proposals for further EU actions, especially in the tailings management area.

Modern Irish Mines

Ireland is a relatively small country with a land area of 70,000 km2, which is about 17% of the area of Newfoundland and Labrador. It has a population of 3.8 million. Following a decade of sustained rapid growth. GDP in 1999 was Ä75 billion and per capita figures are now comparable with those of most other EU countries. This has been achieved whilst maintaining an environmental quality which is relatively good in comparison with most other European countries. High rates of growth have inevitably increased pressures on the environment; many of these relate to increased urbanisation but others such as river water quality, waste disposal and protection of natural resources (biodiversity) could be impacted by mining.
Seven base metal mines have been developed since 1965 (Figure 1). This is not large in absolute terms, but Ireland is a small country with a land area of 70,000 km2, which is about 17% of the area of Newfoundland and Labrador. In relative terms, therefore, the success rate of discovery and development of Irish mineral resources has been good.
The three mines, Navan, Galmoy and Lisheen, which are currently being worked have a good deal in common:
They process reasonably high-grade dominantly zinc ores with subsidiary lead, from flat-lying ore bodies;
All are mined by underground methods with conventional flotation to produce zinc and lead concentrates which are exported;
Tailings are disposed of by approximately equal proportions of backfilling and surface storage;
None could be considered to be small: their capital costs >>

<< ranged from US$120m. to $500m. in current terms.

The Economic Pillar

Few industries can claim that their primary justification under sustainable development lies somewhere other than in their economic contribution, and the mining industry in not one of the exceptions. There are two main ways in which it contributes to economic development:
through the production of primary raw materials without which modern society would collapse;
through the conversion of natural resources into wealth both for those who benefit directly, and also for the nation as a whole.
Irish zinc concentrate output represents nearly 40% of the EUís mine production, and contributes nearly 12% of the requirements of zinc smelters with the Union. This is a tangible contribution to the economic pillar of sustainable development. Zinc is internationally traded and this output could be replaced by imports. However, production within the Member Countries of the EU is subject to stricter rules on environmental and social protection than may not be the case in some other countries. Thus, supply of the EU's need for minerals from within its own boundaries is consistent with the principles of good product stewardship.
The value of the output of Irish metal mines in 2000 was of the order of Ä240m, This provides a return to the suppliers of capital; supports 1200 well paid rural jobs (plus some three times this number indirectly); and generates taxes and royalties. Unfortunately, the zinc industry has not been particularly profitable world wide during the last decade and the Irish mines have been no exception to this generality. If the industry is to succeed in Ireland, it must be, therefore, be competitive. Most of the important factors such as metal prices or operating cost inputs are subject to the market, either nationally or internationally and will only at best be influenced very generally by Government policy.
One area of concern which is within Government control is the fiscal regime of royalties and corporation taxes. These must be competitive internationally, if Ireland is to continue to attract its share of exploration investment. At present, the Mineral Development Acts require that royalties must be separately agreed for each new development though the terms are then inserted into a long-term contract.. It is accepted that this process is a cause of uncertainty and can lead to protracted negotiations. In order to attempt improve this position, the Minister for the Marine and Natural Resources announced, at the first NAMS Conference, that consideration was to be given to better pre-determination of royalties. The aim is to balance the competing requirements of ensuring that competitive rates, and ensuring that rents arising from the exploitation of the mineral resources are fairly shared.
A detailed study of taxes and royalties internationally has therefore been undertaken, concentrating especially on zinc-producing countries since this is the main mineral of interest in Ireland. It is being combined with the development of an economic model based around typical Irish deposits which will allow proper comparisons to be made. Work on this is still underway but some preliminary conclusions have emerged from examination of data from 27 countries:
Some form of royalty or quasi-royalty is common though the basis for its assessment is variable, including:
per tonne; ad valorem; 'Mine mouth value', i.e. after allowing for processing including concentrating, which appears to be one of the commoner systems;
Royalty rates range from 1 to 5%.
Tax systems are very variable in detail but there are some clear general points:
Virtually all have special capital allowances allowing rapid claim of exploration and development expenditures;
Allowances for plant, equipment and buildings follow those for general industry and are generally written off over a period of from five to ten years (plant and equipment) or 10 to twenty years (buildings);
Special allowances for rehabilitation are normal;
Other special allowances are not uncommon;
Rates most commonly fall into the range of 30 to 40% of profits.

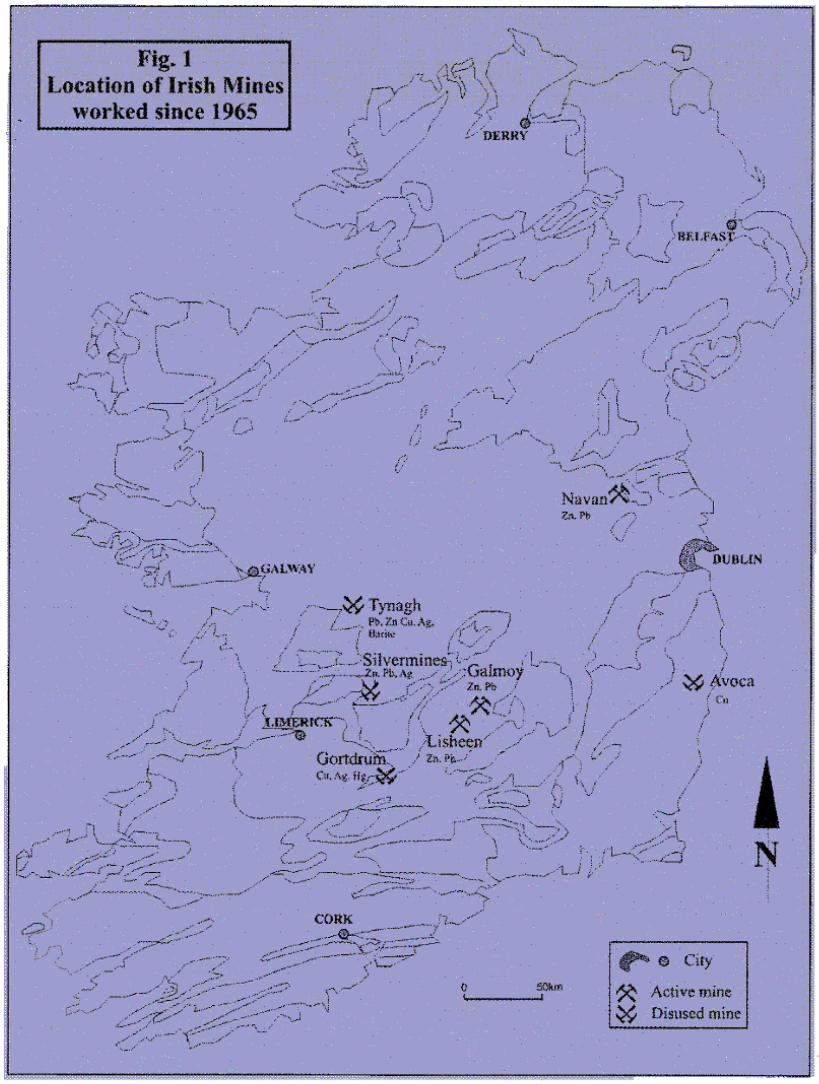


Fig. 1
Location of Irish Mines worked since 1965

Practice

In terms of qualitative comparison, it seems that the corporation tax system for mining in Ireland follows common international practice with accelerated allowances. The rate of 25% is significantly lower than that in the majority of countries examined. However, it is higher than the general Irish corporation tax rate of 12.5% which applies to quarrying. However, in this case there are no special allowances and exploration and development can only be written off over the life of the operation. The Minister for Finance is reviewing the treatment of metal mines, but did not make any changes in the 2001 Finance Act.
Whilst tax rates are low by international standards, recently negotiated royalty rates of 3 to 4.5% of revenue, are at the high end of the range. Whilst this can be defended on the economics of the individual deposits involved, initial examination of the economics of a deposit of around 12 million tonnes of 12% zinc, which would be a typical target in Ireland, suggest that this is unlikely to generate any large rents or 'super-profits'.
A great deal more analysis >>

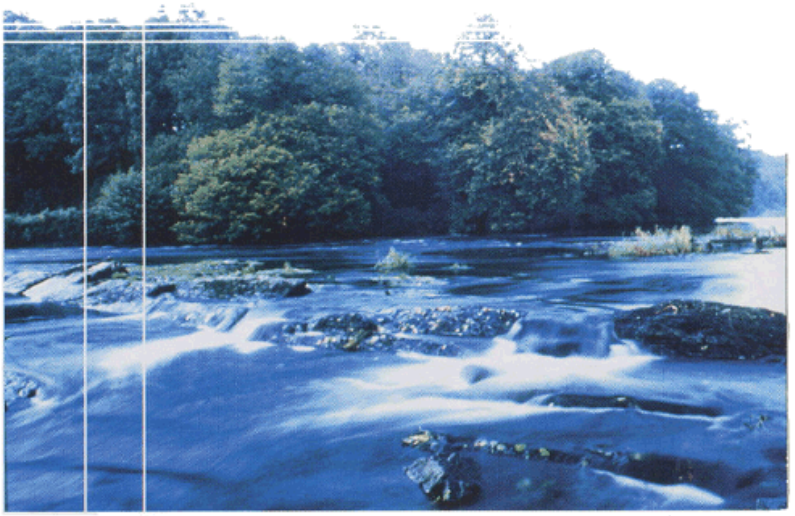
<< will be required before any definite conclusions can be reached, including examination of the combined effect of taxes and royalties. This will include consideration of the net effective tax rate and the likely return to capital using a wide range of scenarios to ensure that any system will be robust to economic changes.
A second area of potential concern is the cost of environmental regulation. The Irish mines have expended Ä42m. on environmental protection over the last decade, and the mine operators has not been argued that this was unnecessary given the sensitivity of the industry. However, concerns have been expressed that inappropriate and very costly measures could be introduced as a reaction to recent pollution incidents in other countries.

The Environmental Pillar

There can be no doubt that the principle issue to be considered under this topic is the management of tailings. There have been two well-publicised and significant mining pollution incidents in Europe within the last two years: those at the AznalcÛllar Mine in Spain in April 1998, and at Baia Mare in Romania in January, 2000. Whilst the causes were different, both involved containment failures at Tailings Storage Facilities. It is not surprising, then, that tailings management has been a major environmental topic within the EU, nor that there has been pressure from a number of quarters for review and if necessary improvement in the EU's systems for ensuring good management of mining wastes.
The Irish system has evolved over many years from following a typical progression from concern mainly with economic development to a greater consideration of the need for environmental protection. The mines which were opened before 1970 the sixties were subjected to only limited control and at least two are now known to be causing significant environmental problems. From the 1970s onwards, increasing attention was given to mitigation of potential impacts, by both regulators and developers, and the permitting system now ensures that detailed consideration is given to pollution prevention and control before, during and after mining. Both Land Use Planning and Environmental Protection Legislation contribute to the process.
Two of the key elements in the system are:
Implementation of the EEC (now European Union) Directive on Environmental Impact Assessment in 1990. This requires the submission of an Environmental Impact Statement which must identify and consider all 'likely significant environmental impacts'. It thus allows detailed consideration of projects through a structured format and encourages informal, voluntary discussion during the design phase of projects.

Protection

Enactment of the Environmental Protection Agency Act, 1992. This introduced an Integrated Pollution Control (IPC) Licensing system for various categories of industrial activity, including metal mining. The IPCL is a single licence, issued by the Environmental Protection Agency. and covers noise, emissions to air and water, and waste management. The main environmental objective in IPCL is to prevent or solve pollution problems rather than simply transferring them from one part of the environment to another. A key aim is to eliminate the risk of harm to the environment taken as a whole by preventing the emission of potentially harmful substances wherever it is practicable or to minimise such emissions where it is not. The EPA uses Best Available Technology Not Entailing Excessive Cost (BATNEEC) as the criterion which must be satisfied if it is to grant a Licence. The emphasis in determining this is placed on pollution prevention and waste minimisation. It also necessitates the adoption of environmental management systems and controls aimed at the prevention, elimination and progressive reductions in emissions. BATNEEC Guidance notes have been published including one for mining. It is couched in relatively general terms which allows proper account to be taken of the individual variations which will always occur between different ore-bodies, even if they are, like Galmoy and Lisheen, only a few kilometres apart.
The Licensing procedure allows for extensive public consultation and participation. Once issued, Licences can be reviewed either at the request of the Licensee or by decision of the Agency.
A number of factors contribute to the effectiveness of this system:
There is flexibility and discretion to allow for site specific solutions so that the inevitable variations between developments can be properly taken into account.
High general default standards are set and the onus is then on the developer to demonstrate that any derogation will not increase pollution or pollution risks.
There is a considerable voluntary element in that the system allows and encourages developers to work out solutions within general principles. For all recent mines, the developers have made proposals in some areas which exceed mandatory standards.
The process, through the requirement for both an EIS and an IPC Licence requires a holistic approach. An example is the use of back filling which has the double benefit of ensuring maximum extraction of a non-renewable resource and storing waste in a way which minimises potential impacts.
Risk management is an inherent part of the process. This allows developers to be reassured that a sensible solution will be accepted, but ensures that explicit analyses are carried out to verify that risks really are being minimised through workable solutions. For example, the use of both underground storage and site selection represent hazard reduction by keeping tailings storage away from situations where a major escapes of tailings could cause a major disaster. Risk, i.e. probability of failure during operations, is minimised by site selection, ensuring that the containment dams are well engineered, and by comprehensive monitoring to give early warning of problems. Finally closure planning and bonding ensure that as far as anything can ever be assured after closure, potential for later problems is minimised.
The flexibility built into the solution through reviewable permits at either the request of the operator or by decisions of the EPA allows responses to be made to changes in circumstances if these arise once the operation has started. This applies particularly to closure since the initial solution is very liable to modification once expertise has been gained.
A central agency for Environmental Protection provides consistency and provides economies of scale in developing and using expertise. There is a high degree of transparency and Public consultation built into the process. In addition, the fact that Land Use Planning decisions are initially made locally helps to ensure that local views are thoroughly taken into account. >>



<< Drawbacks

There are however, some potential drawbacks:
The process is relatively expensive and relatively time consuming. The companyís permitting costs for the Lisheen project are estimated at about US$2.5m. For both the Galmoy and Lisheen mines, it took nearly 6 years from the start of preparation of the EIS until permits were in place;
Good decision making depends heavily on the expertise and judgement of permitting staff and makes considerable demands on their time.
Planning Permissions, IPC Licenses and Mining Facilities are issued by different agencies. These permits need to dovetail properly and each agency has an interest in aspects of the other's work. It is therefore essential that there is a close working relationship between the Agencies and their staff to co-ordinate efforts, not least to maximise the use of scarce resources.
Some of the key issues which arose during the permitting of the Galmoy, and Lisheen mines and of an extension to the Tara Tailings Management Facility were:
Site selection, taking into account both hazard minimisation and cost of different types of land;
Management systems for the prevention of pollution problems including Quality Control and Assurance during construction and independent auditing thereafter;
Closure Planning was of course closely examined but there was additional emphasis on long-term management of the TMF after closure since the EPA Act prescribes a perpetual Licence.
Site stability: a full risk analysis was eventually carried out by the company and independently audited. This demonstrated that the risk of a catastrophic failure had been reduced to that inherent in any well engineered dam and ensured that the location was suitable. The dams are engineered water-retaining structures.
Prevention of Acid Rock Drainage both on surface and underground. The use of backfilling to the greatest possible extent was endorsed as the best option, particularly for the potentially acid-generating tailings. For those mines with potentially acid-generating tailings, artificial liners have been used.
Independent certification of the construction of the Tailings Management Facility (TMF), together with a great deal of monitoring of discharges and of ground and surface water conditions.

high Grade

It is feasible to include a high degree of protection for surface containment partly because:
the ore is quite high grade and can be mined underground so that surface disposal is required for only half of a relatively small volume of tailings, the remainder being backfilled.
there is no shortage of borrow material available locally so that the use of tailings for dam construction can be avoided; a significant part of the facility can be constructed before production starts; increases need only be by large increments.
Existing mines are reasonably large, and the system would be more difficult to apply to small operations without imposing excessive burdens, especially for marginal operations. This is the trade-off for a high level of environmental protection.

The Social Pillar

A principal issue normally considered under this heading is worker health and safety. The mines have accredited safety systems and are in some cases are implementing the internationally accredited DNV ISRS (International Safety Rating system).
A second area receiving increasing attention is community engagement. All the mines carried out local consultation when preparing their EISs. They maintain an 'open door' policy which allows local individuals and groups full access to environmental information and ensures a rapid response to any specific issues raised by the public. Whilst all basic environmental data is available, an area which merits further consideration is that of consistent company environmental reporting. This has been relatively little developed in Ireland in comparison with some other countries, such as Australia. One problem in such reporting is the absence of agreed indicators and measures for sustainable development. Work is in progress under the auspices of the EU's Enterprise Directorate to develop such indicators specifically for the extractive industry in Europe. If this work is successful, it will provide a useful tool for consistent and credible reporting.
A particular area of concern to the Department of the Marine and Natural Resources relates to old mining sites. Some of these are causing problems as a result of unstable workings, and polluted sites. The Department has initiated work aimed at remediation and management and an essential part of this work will be to attempt to find solutions which will be acceptable to the stakeholders involved, including especially the local communities and the site owners. Procedures to ensure their involvement are being built into the studies.

Conclusions

Sustainable Development has existed as a specific concept for about 15 years. But the process which it encapsulates was in train long before that and Irish mining has been progressing towards sustainability for at least 30 years. However, sustainable development is an ideal which can probably never be fully attained and what is required is a process of continual improvement. The trend has been towards increased emphasis on the environmental and social pillars, and also for increased harmonisation of standards across the EU. This trend seems likely to continue, particularly with enlargement of the Union. This is of itself a welcome trend. However, care will need to be taken to ensure that such widespread standards and procedures remain flexible enough to accommodate the differences between mines and countries. It is also important that the economic pillar is not jeopardised by inappropriate measures to support the other pillars. Equally, economic problems cannot of themselves be used as justification for opposition to environmental and social measures.
Mining in Ireland has so far managed a reasonable balance between the economic, environmental and social dimensions of sustainable development and we are confident that this balance can be maintained into the future.

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