The new research and development tax incentive

Consultation paper response

(2009)

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1. THE AUSIMM

The Australasian Institute of Mining and Metallurgy ('The AusIMM') is the leading organisation representing minerals sector professionals in the Australasian region, primarily in the disciplines of geosciences, metallurgy, mining engineering and management. We have more than 9,000 members who work across research, academia, operations, consultancy and the minerals industry technology and services sector. Given their in-depth technical expertise and first hand practical experience of the sector, our members are uniquely placed to comment the process of R&D in the minerals industry. In particular, they are qualified to comment on the effectiveness of the R&D tax incentive on activities that are most likely to produce net benefits for the Australian community.

2. SUMMARY OF RECOMMENDATIONS

Principle 4
Legislation for the new R&D tax incentive will provide support for the scheme's efficient and effective administration.

Recommendations:
1. The current process of self assessment supported by administrative compliance support be retained

2. That industry specific guidelines be developed to assist claimants in understanding how the eligibility criteria will be applied to activities undertaken by them

3. That the Innovation Australia Board consider seeking assistance the societies of The AusIMM in developing industry specific guidelines for minerals sector R&D

4. That the Innovation Australia Board consider seeking assistance the societies of The AusIMM to assist in the effective implementation of the joint administration model in relation to minerals sector R&D

Principle 5
The new R&D tax incentive should target R&D that:
- **(a) is in addition to what otherwise would have occurred; and**
- **(b) provides spillovers – benefits that are shared by other firms and the community – that are large relative to the associated subsidy**

Recommendations:
1. The principle of additionality should not be incorporated into the new R&D tax incentive guidelines

2. The principle of spillover should not be incorporated into the new R&D tax incentive guidelines

Principle 6
Eligible R&D activity will be defined as systematic, investigative and experimental activity that:
- **(a) involves both innovation and high levels of technical risk; and**
- **(b) is for the purpose of producing new knowledge or improvements**

Recommendations:
1. That the current eligibility criteria relating to 'core' R&D remain unchanged; in particular the 'innovative' activities retain their status as legitimate R&D

Principle 7
Supporting R&D will continue to be recognized under the new R&D tax incentive but claims will be subject to new limitations

Recommendations:
1. Revise the definition of "supporting activities" for R&D to one that incorporates an element of necessity, but does not exclude dual purpose activities: "eg predominately for the purpose of supporting R&D"
2. Do not apply differential treatment for 'core' and 'supporting' activities

ADDITIONAL MATTERS – Exclusion (c)

Recommendation:
1. Reword exclusion (c) to remove the current discrimination against the exploration industry

ADDITIONAL MATTERS – Low Emissions Technology Development

Recommendation:
1. Review the proposed changes to eligibility criteria in the context of literature on policy settings necessary for low emissions technology development to ensure that critical technology development is not hindered by the proposed changes

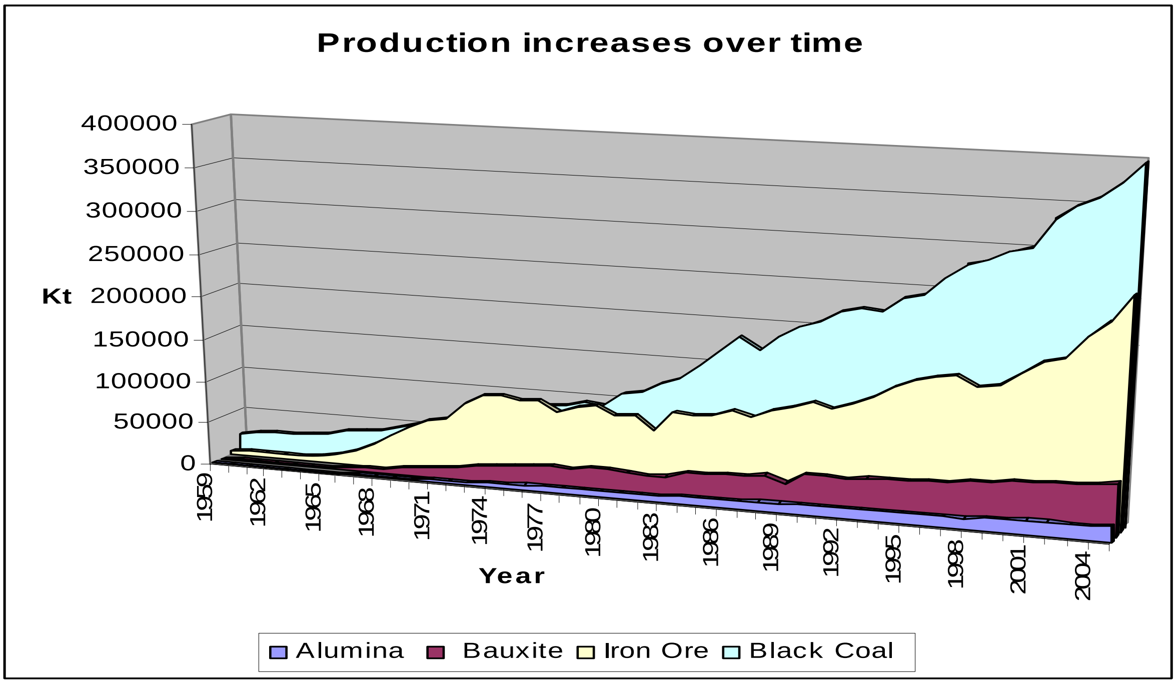
3. THE ROLE OF R&D IN MINING

A strong, continuous commitment to R&D has played a critical role in maintaining Australia's competitiveness as a leading minerals producing nation. In the 2006 Productivity Commission Report on Public Support for Science and Innovation stated: "*Over time the Australian mining industry has built up a competitive advantage [over other mining regions] by applying leading edge technologies, which have improved mining practices, reduced costs and increased productivity*."[1]

Significant process and technology improvements have been necessary not just to meet rising global demand for minerals, but also to meet the challenges of deeper mining and declining ore grades. That is, as mining activity has ramped up globally, easily accessible and exploitable deposits have give way to more difficult to access, extract and process deposits. This has required ongoing innovation in technology, process, management and skills. In particular, these innovations are increasingly directed at a trend towards large-scale mining and processing operations that demand innovative methods to reduce their technical risks and environmental footprint.

[1] See Chapter 6, 'Commercialisation and Utilisation', Productivity Commission, 'Public Support for Science and Innovation Draft Research Report (2 November 2006) at http://www.pc.gov.au/study/science/draftreport/index.html .

Figure 1 Production of Selected Commodities in Australia over time



4. PUBLIC SUPPORT FOR MINING R&D IN AUSTRALIA

Australia's success as a leading edge minerals innovator would not have been possible without our strong history of university-industry-government collaboration and the willingness of leaders in the industry to make significant investments at the development stage. In 2006-07 the mining industry accounted for 22.8% of business spending on R&D, or $3.38 billion.

The Government has shown a strong commitment to minerals R&D. In launching the CSIRO Minerals Down Under Flagship in 2008 Senator Kim Carr highlighted the importance of ongoing support for sustaining our economic prosperity:

"*The future of the minerals industry is vital for Australia's economic future. The industry currently contributes 8.9 per cent of Australia's GDP and generates 50 per cent of Australia's total exports. But this contribution is not guaranteed. Australia must become more efficient and environmentally sustainable at finding, mining and processing minerals to help ensure our future prosperity*."

To this end a number of critical initiatives have been put in place by the current Government, some of which are listed below:

- The creation of the **CSIRO Minerals Down Under Flagship** to help transform the industry with revolutionary new technologies and ideas to solve a range of key technical challenges, with the aim of assisting the Australian minerals industry to exploit new resources with an in-situ value of A$1 trillion by the year 2030, and more than double the size of the associated services and technology sector to A$10 billion per year by 2015.

- The establishment of the **Mining Technology Innovation Centre** in Mackay with a budget of $14 million over four years to provide small and medium sized enterprises

(SMEs) operating within the mining technology field advice to improve their business processes, test new products and find new markets.

- The **Deep Exploration Cooperative Research Centre**, an industry led proposal is currently being developed through AMIRA International with support from CSIRO that aims to solve many of the challenges associated with deep exploration. The Commonwealth Government has agreed to contribute $28 million over the eight year life of the CRC.

The AusIMM applauds the Government for the strong leadership role it has taken in ensuring that the paradigm of government-university-industry collaboration that has resulted in outstanding value-added results for Australia in the past continues and expands into the future.

The staunch support for minerals R&D at exhibited in the above listed measures appears to be at odds with some harsh criticism of business R&D in mining with respect to the R&D tax concession system. In the recent wide ranging innovation review *Venturous Australia*, the mining industry was singled out as abusing this measure through what have been deemed in policy-speak as "whole of mine" claims:[2]

"*In recent years several firms have been successful in the aggressive use of the R&D Tax Concession to make claims for a very large share of expenditure in large one-off projects like mines and civil engineering. These claims have demonstrated that some aspect of the project is new and technically risky. This having been done it has been possible, despite the efforts of the Australian Taxation Office, to claim as much as 80 percent or more of all investment expenditures in the project*."

The concerns raised above led to the recommendation that eligibility criteria for the R&D Tax Concession – now the R&D Tax Credit, be revised. The subsequent consultation paper to which we now respond once again singled out mining and the minerals industry in general as an industry that allegedly plays fast and loose with claims. A highly reductionist example was included to support this allegation:[3]

"*Example 1: Blended Core and Supporting Activities:*

A mining company develops a significant new resource project. The project is for the progressive implementation of new mine, mill and waste management processes over a period of 6 years. All of the activities described by the company are somewhat generic in nature and broadly represent project phases. Most activities are claimed to contain a blend of both core and supporting activities.

Taken together these activities account for a significant percentage of the total mining costs in any particular year. The actual cost of the core R&D activity within one of the blended activities is likely to be a small fraction of the total activity. The blending of core and directly related activities makes it difficult to distinguish core activities from supporting activities, or make appropriate expenditure allocations. The claim is expected to be in the order of $30 million over the life of the project."

Unfortunately, there is insufficient detail in this quoted example to indicate whether any of the existing criteria for eligibility were met. It merely represents an example of an ill-defined R&D activity (the nature and benefits of which are never defined) that encompasses a range

[2] Cutler, T.*Venturous Australia* (August 2008)
[3] ATO, *The new research and development tax incentive consultation paper,* (September 2009)

of related activities that are not necessary for the R&D has potentially deprived the public purse of $30 million dollars.

However the decision to use such an example in the discussion paper throws into sharp relief a number of Government concerns over minerals industry R&D tax claims:

- The scale of expenditure on R&D in the minerals industry leads to large claims
- The value and process of R&D may not be fully understood by administrators of the tax incentive
- The process for implementation of the current criteria has led to claims for items that may not be necessary for the R&D

The consultation paper proposes a number of design principles to address the issues raised. However prior to addressing these principles, an outline of R&D in the minerals industry incorporating realistic case studies has been included in order to provide a more concrete basis for discussion.

5. THE IMPORTANCE OF SCALING UP R&D IN THE MINING INDUSTRY

As mining and downstream processing activities produce a (relatively) homogenous product from a non homogenous natural resource, most R&D in the industry is generally aimed at process innovation that achieves one or more of the following aims:

- More accurately predicting the location and nature of an orebody
- Extracting ore more efficiently
- Processing ore more efficiently
- Reducing the hazards to human health and safety created mining activity
- Reducing the environmental footprint of mining activity

Mining operations and minerals processing plants are large scale systems with integrated and interdependent components, which must be both technically appropriate and appropriately configured in order to function.

Consequently achieving any of the above goals takes far more than an ‘Aha!’ moment in a laboratory (although such a moment may give rise to an idea that might be eventually applied in a mining or minerals processing context). Experience has shown that the journey from concept to commercialization is a necessarily staged process that will take a significant amount of time. Although used in common parlance as a discrete term “R&D” covers several stages which are generically described below.

- **Research:** proof of concept/scientific integrity of concept
- **Development:** further investigation of concept including feasibility of potential applications
- **Demonstration**: proof that the application is feasible at a scale that is of utility in a given industry

The final stage in bringing the product or process “commercialization” is not part of this process. Once a product or process is commercially proven there is no justification for assistance on the basis of additionally or spillover, as this will generally be facilitated by the market. Government policy measures aimed at assisting commercialization are an important part of facilitating innovation, but this is outside of the scope of R&D.

A number of examples drawn from the mining and minerals processing industry are included below to demonstrate the difficulty and time frames involved in taking an idea from concept through to successful demonstration. The also demonstrate the high levels of technical risk involved, and the importance of proper staging of R&D. These examples will also be drawn upon when responding to the various design principles outlined in the consultation paper.

Case Study 1: Sandfill Pillar Mining Project

In the mid 1970s the Sandfill Pillar Mining Project was set up between New Broken Hill Consolidated Limited, CSA Limited and Mount Isa Mines Limited. Technical input was provided over a period of several years by the CSIRO Division of Applied Geomechanics, the University of Melbourne and James Cook University. The project attracted Federal R&D support. The objective was to develop a method for consolidating the backfill in high-rise stopes with cemented material at the lowest possible cost, so that subsequently the supporting pillars could be recovered predictably and safely.

While similar research was going on in other countries, this was at the leading edge of mining engineering and was specific to the situations and available materials in Australia. The Federal funding effectively paid for the experimental filling material including large quantities of Portland cement. Expenses claimed were approximately 5% of mining costs over a three year period.

The work was successful and subsequently many mines in Australia adopted the method. Major mines today, including BHPBilliton's Cannington and Olympic Dam mines, are dependent on cemented backfill to achieve a high recovery of the resource. It is reasonable to conclude that without it at least 10% of the ore now recovered would be left in the ground.

This example illustrates:
1. Successful collaboration between research institutions and the mining industry can lead to striking value added results for industry and Australia
2. Certain concepts developed in the laboratory can only be validated in a mine production setting
3. Expenses claimed as R&D should be quarantined to represent the activities actually necessary to develop the concept – a small percentage of mining activity - very different from "whole of mine"

Case Study 2: Century Zinc, Queensland

The Century zinc/lead deposit in north-west Queensland was developed by CRA Ltd (now Rio Tinto). The mineralogy of the deposit is extremely fine-grained, leading to a need to grind the ore to about one quarter of the product sizing of comparable operations. This need presented technical challenges for ultra-fine grinding, for concentration by flotation, and for dewatering/filtration.

Along with engineering and commercial investigations undertaken during the feasibility study, a 20 tonnes per hour pilot plant, called the Bulk Sample Plant, was built and operating on site early in 1995 to produce concentrate from near surface open cut and underground ore samples. While the plant was expensive, costing of the order of $20 million, it was small compared with the full production plant rated at about 800 tonnes per hour. This was developed to confirm flow sheet design and equipment selection derived from pilot plant testwork and to produce a bulk sample of 5,000 tonnes of concentrate for testing at BudelZink's smelter where smelting trials were conducted in the presence of representatives of other potential customers.

Test results demonstrated that the finely ground nature of the zinc concentrate had no detrimental effects during the smelting process and confirmed that the Century concentrate with its high grade, low iron content and good treatment characteristics will be a highly attractive product in the marketplace.

The bulk sample program was invaluable in providing engineering, metallurgical and cost information for the concentrator design and operation. The work resulted in changes to SAG:Ball mill power ratio, rejection of flotation columns in favour of mechanical agitated tank cells, rejection of high pressure tube press technology for product dewatering in favour of more conventional medium pressure plate and frame filters coupled with a rotary dryer to reduce moisture level below the Transportable Moisture Limit, and the recognition of the need to internally line the concentrate pipeline to protect it from corrosion.

This example illustrates:

1. *Pilot plant operation, though possibly very expensive, can be a vital stage in the successful technical and commercial development of new process technology.*
2. *The pilot stage provides a basis for systematic and investigative studies, as well as for significant engineering design improvement, and can thereby greatly reduce technical and commercial risk for the full commercial plant – indeed it can provide the confidence for commercial people to make the decision to proceed with a high capital cost investment in new technology.*

Case Study 3: BHP Hot Briquetted Iron Project, Port Hedland

BHP saw a commercial market opportunity for the production of hot briquetted iron. This material is made by the gaseous reduction of fine iron ore. The FIOR (fluid iron ore reduction) process had long been operating commercially in Venezuela. BHP chose a further development of this process, called FINMET, which incorporated changes to significantly improve the thermal and economic performance. However, FINMET had yet to be proven at a large commercial scale.

BHP then committed to construction of two (of a planned four) reduction trains in a large plant at Port Hedland, at a cost of more than $1.5 billion. They also commenced building a similar plant in Venezuela. No large pilot or demonstration plant was built. From their research and engineering studies, BHP was confident of success, and that most significant technical issues had been addressed.

Commissioning of the WA plant proved difficult. Recognising the potential difficulty of making R&D tax claims for work on this commercial plant, BHP instituted well-defined and documented programs, supported by substantial laboratory work. These claims were allowed. However, the process problems were never truly overcome. The main reactors suffered major difficulties with internal accretion build-up and internal component failure. Access for maintenance was very difficult on a plant designed to work at extremely high pressure. After a long struggle towards meeting the design objectives, and a tragic fatality during maintenance, the plant was shut down.

This example illustrates

1. *Even apparently simple developments from the base of an established process can involve high levels of technical risk.*
2. *'Savings' made by skimping on the pilot plant stage of development can be illusory, and potentially disastrous when 'slotted in' in modular fashion into a commercial scale plant negatively*
3. *Where legitimate R&D is carried out without appropriate staged trials, the Government can end up wearing significant tax losses for poorly staged, unsuccessful projects (not to mention huge commercial losses that filter down to loss of company tax revenue).*

Case Study 4: Honeymoon Well Nickel Project

The Honeymoon Well nickel deposit in central WA is one of complex sulphides in a narrow, deep structure. In the 1990s, CRA (now Rio Tinto) undertook a large feasibility study that included both mining and metallurgical studies. From extensive orebody evaluation based on much diamond drilling, and from laboratory investigations into effective processing into nickel concentrate, the project looked promising.

However, it was thought prudent to conduct larger scale continuous pilot plant studies at AMDEL in Adelaide. This was based on costly, large diameter diamond drill core samples. Whilst nominally successful, this work encountered significant problems with some of the ore types, and showed that actual metal recoveries in a commercial plant would be lower than those expected in early laboratory testwork. As a result of these results, and of the difficulty in economically mining an orebody of this shape, the project eventually lapsed.

This example illustrates:

1. *Even where a project looks promising from extensive laboratory testwork, systematic investigation at a larger scale (ie pilot plant) is needed to validate results.*
2. *When a project is stopped at this stage due to unsatisfactory results, both the company and the Government (which would have incurred higher losses had the project gone straight to large scale trial) benefit.*

Case Study 5: HIsmelt

HIsmelt is an innovative process to produce molten iron directly from fine iron ore in an intensive high-temperature reactor. It was developed by CRA (now Rio Tinto) commencing with a small (circa one tonne capacity) reactor in Germany in around 1982. In about 1990, the project moved to a larger-scale pilot reactor at Kwinana, WA. This type of process cannot be performed in a laboratory as the process conditions are so extreme, e.g. it operates at about 1600 °C, and there is a need to work with normal production feeds. However, considerable external research by organisations including CSIRO supported the venture with more fundamental studies.

The first Kwinana plant was modelled on the concept used in Germany, but it proved to be difficult to operate for any useful length of time, and the concept of a rotating vessel was far too complex for further scale-up. The concept was changed to a vertical stationary vessel that still applied much the same original internal approach to handling the reduction reactions. This ultimately proved successful.

The next stage was a commercial-scale demonstration plant. After a long further period of development, this plant achieved excellent results. The whole development through to this success took about 26 years. Unfortunately, the plant was shut down in 2008, simply due to business economics: the world market price for iron had collapsed to a level well below the HIsmelt cost of production.

The HIsmelt project is particularly significant as it is one of the few step change technologies that have arisen to increase energy efficiency in iron and steel making – a major source of greenhouse gas emissions - over the last 150 years. The potential impact of this development on global emissions during a time of increasing demand for steel is significant, as HIsmelt uses roughly 25% less energy than conventional processes. [4] Rio Tinto has

[4] Farr, I., ‘Fundamental Technology Change in the Iron and Steel Industry,’ in The AusIMM New Leaders Conference Proceedings 2006: Riding the Boom, (April 2006) p 39.

indicated that had there not been 150 per cent tax concession on R&D at the time that it built its trial plant at Kwinana, the project may not have proceeded to commercialisation.[5]

This example illustrates:

1. *Systematic, investigative and experimental work must often be done at scales much larger than are possible in the laboratory*
2. *The time-scale for successful process development can be very long.*
3. *Tax incentives can be instrumental in making decisions to proceed to large scale trials*
4. *Development of low emissions technologies for key global commodities is unlikely to occur without incentives to ameliorate risk of large scale trials*

Case Study 6: Cockatoo Island Iron Ore Concentration Project

This project, developed in the late 1990s by Portman through Henry Walker Eltin (HWE) as contractor, was designed to treat a reserve of lower grade iron ore dumps that were left by an earlier mining operation.

Testwork was done at a Perth laboratory, and the designed flowsheet was fairly conventional when compared with similar practice worldwide. A process plant of capacity 1Mta was constructed. An R&D tax claim was made for the 'whole of plant' development, on the basis that the process was innovative, and required considerable on-going testwork and process development. In effect, the demonstration plant was the commercial plant. The R&D claim was contested, and after mediation, was reluctantly settled substantially in favour of the claimant. The plant only ran a short time, and HWE later went bankrupt.

This example illustrates:

1. *'Whole of plant' R&D tax claims based on a full commercial operation present considerable problems in defining that portion of the activity which may be reasonably claimed as R&D.*
2. *Whilst development and investigation are frequently performed on commercial operating plant, and should be regarded a genuine R&D, there need to be clear guidelines as to the basis for making such claims, and for the required documentation to substantiate the claims*

Discussion of case studies – scale versus legitimacy

The range of examples above illustrates the importance of properly staged R&D, and that large scale trials and use of existing commercial facilities do not preclude activities from being valid R&D. This is particularly the case for the essential "D" part of R&D.

They also highlight the fact that the scope of R&D activities undertaken at large scale at trial mining activities and processing plants is often not well understood by administrators. Consequently industry specific guidelines on what constitutes legitimate R&D at scale (which *can* be easily identified and quarantined) would greatly assist ensuring that these gaps in understanding are not exploited.

Unfortunately, the discussion by *Venturous Australia* did not focus on improving methods for identifying legitimate R&D activities, but focused only on the scale of mining claims "..*'whole of mine' claims are gaining for themselves a degree of assistance disproportionate to the benefits available to many other innovative projects*."

[5] Rio Tinto, 'Submission to a Background Paper for Stakeholder Consultation on a s National Trading Scheme', (14 November 2005), at http://www.cabinet.nsw.gov.au/emissions/RT.pdf , p 8.

However if the tax concession is industry neutral, it follows that R&D claims for an industry that delivers large scale multi-year projects will be of greater proportion than claims that are smaller scale and have shorter project lives. Scale should not be the issue, rather it should be ensuring that support is given for R&D that is legitimate. The discussion of the design principles below is aimed at ensuring that the scope of claims is limited to valid R&D activities.

Clearly, meticulous record keeping is required particularly when the testwork takes place at a commercial-sized plant. Expenses that could be validly claimed would include assigned staff for R&D purposes; special test equipment and support services (e.g. analytical chemistry); and a suitable proportion of the full plant operating cost e.g. after deducting deemed 'normal' commercial operating costs.

6. RESPONSE TO DESIGN PRINCIPLES

Principle 4
Legislation for the new R&D tax incentive will provide support for the scheme's efficient and effective administration.

The AusIMM supports the principle that the legislation for the new R&D tax incentive should provide an administrative framework that balances the ability of claimants to self-assess their eligibility and entitlements and the scope for administrators to ensure compliance, and that the joint administration model currently employed should continue to apply. As described below, as the leading organisation representing professionals in the minerals sector region, we are keen to assist in this process.

The AusIMM submits that it would be highly beneficial for the Innovation Australia Board to prepare and publish industry-specific guidelines similar to those used in Canada for the Canadian tax concession. Additional guidance about the nature of the activities will facilitate improved compliance and administration of the incentive.

As a professional body with a Code of Ethics and discipline, and with specific societies in the areas of geoscience, mining engineering and metallurgy, The AusIMM would be pleased to offer assistance to the Innovation Australia Board in the form of developing administrative guidelines. We also have the infrastructure to constitute independent panels of experts who are capable of providing general advice on the legitimacy of R&D activities from time to time.

Recommendations:
1. The current process of self assessment supported by administrative compliance support be retained

2. That industry specific guidelines be developed to assist claimants in understanding how the eligibility criteria will be applied to activities undertaken by them

3. That the Innovation Australia Board consider seeking assistance the societies of The AusIMM in developing industry specific guidelines

4. That the Innovation Australia Board consider seeking assistance the societies of The AusIMM to assist in the effective implementation of the joint administration model

Principle 5

The new R&D tax incentive should target R&D that:

(a) is in addition to what otherwise would have occurred; and

(b)provides spillovers – benefits that are shared by other firms and the community – that are large relative to the associated subsidy

The AusIMM is concerned with the recommendation that the tax incentive guidelines should be underpinned by the principles of additionality and spillover, insofar as these principles will be administratively applied. It is stated in the consultation paper that "*in a broad-based entitlement scheme that allows claimants to self assess administrators cannot practically assess whether individual activities provide spillovers and whether the R&D would have occurred in the absence of a subsidy*." If indeed these factors cannot be assessed externally by administrators they should not be incorporated into the legislation.

The AusIMM supports the general principle of additionality but submits however that this is very difficult to assess. Firms make decisions to invest in developing a new technology based on a range of factors, including financial incentives made available to them. For firms which conduct multiple activities it would be difficult to definitively show that an investment in R&D was made in favour of an alternative use of funds primarily because of the R&D incentive.

The AusIMM also supports the general principle that R&D should produce spillovers in the form of benefits to the community and other firms. In fact most firms already indicate the nature of the anticipated spillovers and broad benefits of R&D undertaken upfront in their application. However we do not think that the inclusion of the principle into the design principles would add anything. Moreover, The AusIMM strenuously objects to a design principle that would require firms to demonstrate that the spillover is proportional to the size of the claim. Such a requirement will clearly be more onerous for firms which are eligible for large claims; the results of R&D are by their nature uncertain and this in turn makes it impossible to estimate spillover returns.

Spillovers moreover come in many forms: social, financial, technical, health, safety and environmental. Requiring a spillover to be in some way 'proportional' to the amount of the subsidy would require relative weighting of these various benefits and a crystal ball. We absolutely oppose the integration of such an abstract concept into administrative requirements

Recommendations:

1. The principle of additionality should not be incorporated into the new R&D tax incentive guidelines

2. The principle of spillover should not be incorporated into the new R&D tax incentive guidelines

Principle 6

Eligible R&D activity will be defined as systematic, investigative and experimental activity that:

(a) involves both innovation and high levels of technical risk; and

(b) is for the purpose of producing new knowledge or improvements

The above proposed definition is proposed to replace the current definition in the *ITAA* in which "research and development activities" are defined as follows:

"*(a) systematic, investigative and experimental activities that involve innovation or high levels of technical risk and are carried on for the purpose of:*

(i) *acquiring new knowledge (whether or not that knowledge will have a specific practical application); or*

(ii) *creating new or improved materials, products, devices, processes or services; or*

(b) other activities that are carried on for a purpose directly related to the carrying on of activities of the kind referred to in paragraph (a)."

The major change is the requirement that SIE activities are both innovative and involve high levels of technical risk.

The AusIMM submits that the current definition is well established and well understood by industry. It is unclear how the proposed changes would achieve the stated objective of increasing the likelihood that the activity will produce spillover benefits and be additional to what would otherwise occur. Paragraph 54 of the consultation paper suggests the following rational:

"*Subsidising an activity that is innovative but not risky may, at the margins, lead to additional R&D with benefits extending beyond an individual company. However, it is more likely to do no more than subsidise a company for doing what is already commercially sensible*."

The case studies described earlier in this submission have indicated that for large scale integrated processes, R&D to amend a novel process that may on its face appear to entail low level of technical risk as they involve a marginal shift in process (see case study 3 above) may in fact carry a very high level of risk. Requiring that the R&D involve a high level of technical risk as well as being innovative may lead to discrimination of large scale innovations 'at the margins' which in fact can deliver order of magnitude efficiency savings are amongst the most commercially risky to trial. Such seemingly marginal innovations are particularly subject to spillover as the hard work of configuring the processes involved prior to diffusion cannot be captured by the firm in question.

Paragraph 54 similarly suggests the error in subsidizing risky activities that are not innovative:

"..*Similarly, a subsidy for activities that involve high levels of technical risk but are not inherently innovative may lead to additional activity but is unlikely to deliver benefits beyond an individual company*."

There are already several elements inherent in the existing definition of R&D which require innovativeness (ie that "new" knowledge or process must be created and the activity must be "experimental"), making the suggested change redundant on this point.

It may be a valuable exercise to investigate why innovation was included as a goal in its own right in the first place. It may be that the drafters of the original legislation wanted to ensure that innovation margins that might not otherwise be proven at scale was encouraged by the incentive, as it should be.

Recommendations:
1. That the current eligibility criteria relating to 'core' R&D remain unchanged; in particular the 'innovative' activities retain their status as legitimate R&D

Principle 7
Supporting R&D will continue to be recognized under the new R&D tax incentive but claims will be subject to new limitations

The AusIMM submits that the general wording around eligibility criteria (SIE requirements) is generally adequate and it is primarily the administration of the requirements that should be improved. As previously suggested, industry specific guidelines on R&D activities at different stages of trial would prove very useful.

However it is conceded that the current description of 'supporting activities,' namely "*other activities that are carried on for a purpose directly related to the carrying on of activities*" is quite broad and potentially malleable. The term "directly related" does clearly imply any relationship of necessity between the activity claimed and the R&D. Clearer wording that establishes unambiguously that there is a causal relationship of necessity between the supporting activities and the R&D may provide greater clarity

In paragraph 63 the consultation paper suggests that a possible approach would be to require that the support activity be "*predominately for the purpose of supporting a core R&D activity*" to make allowance for supporting activities that serve an incidental production role. This exemplifies a sensible tightening of the language.

In substance this change in wording would have no effect on those claimants who have tightly controlled, well documented claims. Such wording would establish a relationship of necessity between R&D activity and the supporting activity. Under such a test eligible supporting expenses would include those that were necessary or highly desirable in order for the R&D to be carried out properly.

Whilst The AusIMM supports a tightening of the definition of supporting activities, we absolutely oppose differential treatment under the R&D tax incentive for 'core' and 'supporting' activities. As was illustrated in the above case studies, the classification of activities into 'core' or 'supporting' is inevitably highly subjective and arbitrary, as many activities would indeed be blended.

It is foreseeable that the scope of 'core' versus 'supporting' would be painfully litigated. Moreover, there is no justification for privileging one kind of activity over another, if both 'core' and 'supporting' activities are necessary for the carrying out of valid R&D, which meets the SIE criteria. This would also lead to the privileging of R&D in certain types of industries over others ie those that draw more heavily on supporting activities.

It is important to remember the SIE criteria already tightly limit the activities that are defined as R&D:

- **Systematic:** methodical and with tight technical control and direction of activities
- **Investigative:** designed to provide answers to questions within a clearly scoped avenue of inquiry
- **Experimental:** undertaking a trial of an activity for which the outcome cannot be predicted with certainty

Properly applied these criteria should form an effective mechanism to restrict claims to genuine R&D. The measures suggested for differential treatment for supporting R&D suggest that these expenses are somehow less valid than core R&D expenses. Anyone who has ever undertaken a trial of a new stoping process for a mine, or attempted to design a pilot plant incorporating step change technology will know that these supporting expenses are critical and a valid part of the R&D process. In fact, the transition from fundamental to applied research to development and scale up is the most costly and risky stage of R&D, so much so that the demonstration stage of R&D has been coined "the valley of death."

Clearly, meticulous record keeping is required particularly when the testwork takes place at a large scale plant. Expenses that could be validly claimed would include assigned staff for R&D purposes; special test equipment and support services (e.g. analytical chemistry); and a suitable proportion of the full plant operating cost e.g. after deducting deemed 'normal' commercial operating costs.

Recommendations:
1. Revise the definition of “supporting activities” for R&D to one that incorporates an element of necessity, but does not exclude dual purpose activities: “eg predominately for the purpose of supporting R&D”

2. Do not apply differential treatment for ‘core’ and ‘supporting’ activities

7. ADDITIONAL MATTERS – Exclusion (c)

The AusIMM agrees with the position of the Government that exploration using known technologies purely and simply for the purpose of delineating ore resources or reserves is not R&D. The current wording of the exclusion under Subsection 73B(2C) is as follows:

“*c) prospecting, exploring or drilling for minerals or natural gas for the purpose of discovering deposits, determining more precisely the location of deposits or determining the size or quality of deposits*.”

It is submitted however, that the current wording is too expansive and has created a barrier for proponents of R&D activities relating to the improvement of exploration technologies and processes from accessing the incentive.

It is probable that the exclusion was introduced because of misinterpretation of the word “risk”. The resource industry conducts a very wide range of activities which are systematic investigations, involving creative interpretation of sparse data. The resulting studies involve considerable expense and also considerable risk. However the risk is a commercial risk not a technical risk, and therefore is not eligible as core R&D. For example, when a company undertakes a regional airborne geophysical survey, it will make numerous repetitive traverses across a terrain in a systematic survey. If the survey fails to detect mineralisation, this outcome is most likely because no mineralisation of significant dimensions actually occurred within the detection range of the equipment. This exemplifies commercial risk as distinguished technical risk. Likewise when a company conducts a sequence of carefully designed drillholes and the drilling fails to locate the targeted mineralisation, then the drilling operation succeeded in all its technical goals, and the failure is attributable to the commercial risk relating to the presence or absence of mineralisation at that locality. Commercial risk is a widely understood feature of the resource sector, and it applies equally in other industries including engineering, agriculture, medicine, information technology (software development) and banking and finance.

The R&D tax incentive should be industry neutral. It should not disadvantage one industry over another. It is clear that the R&D eligibility criteria (as now written) clearly distinguish whether an activity in the resource sector qualifies as R&D, regardless of whether it takes place in the context of exploration or some other activity. It is not necessary to specify a broad exclusion for exploration.

The next generation of ore deposits will be under deep cover and require cutting edge systems to accurately discover and delineate them. There are a number of key developments which exhibit either innovation or high technical risk, and clearly constitute genuine R&D that we should be incentivising, such as the following:

- more sensitive and powerful geophysical instrumentation to detect resources under great thicknesses of sediment cover
- small scale data acquisition systems suitable for lowering into deep boreholes
- new geochemical instrumentation designed to differentiate between barren terrains and mineralised terrains
- new drilling methods and downhole measurement devices to capture the maximum amount of information possible

The development of R&D activities for exploration will require some application in a real-time exploration context - these are essentially the same as in production trials for other R&D activities. The exclusion should be removed so that claimants developing exploration R&D are not excessively hindered by the exclusion.

We reiterate our Recommendation 2 under Principle 5: "**The development of industry specific guidelines to assist claimants in understanding how the eligibility criteria will be applied to activities undertaken by them".** Clear and specific guidelines on R&D activities undertaken in the context of exploration would eliminate the need to discriminate against any individual industry activity.

Recommendation:
1. Reword exclusion (c) to remove the current discrimination against the exploration industry

8. ADDITIONAL MATTERS – Low Emissions Technology Development

The Government has indicated that lowering global emissions is a priority. As a major producer of energy and energy intensive commodities, and with a highly developed research infrastructure, Australia can contribute to meaningful emissions reductions through technology development. These opportunities exist both in low carbon power generation, and in increasing energy efficiencies in mineral and metals production.

Developing low emissions technologies for the production of key minerals, metals and energy resources currently consumed in developing countries is particularly critical as people in these countries seek to improve their standard of living and increase their mineral commodity consumption. Figure 2 represents the increase in consumption in key commodities and energy in China over the last five years (all of which are major Australian export commodities). This level of consumption is projected to continue to increase over the coming decades.

Figure 2. China's consumption of energy and mineral commodities other than steel [6]

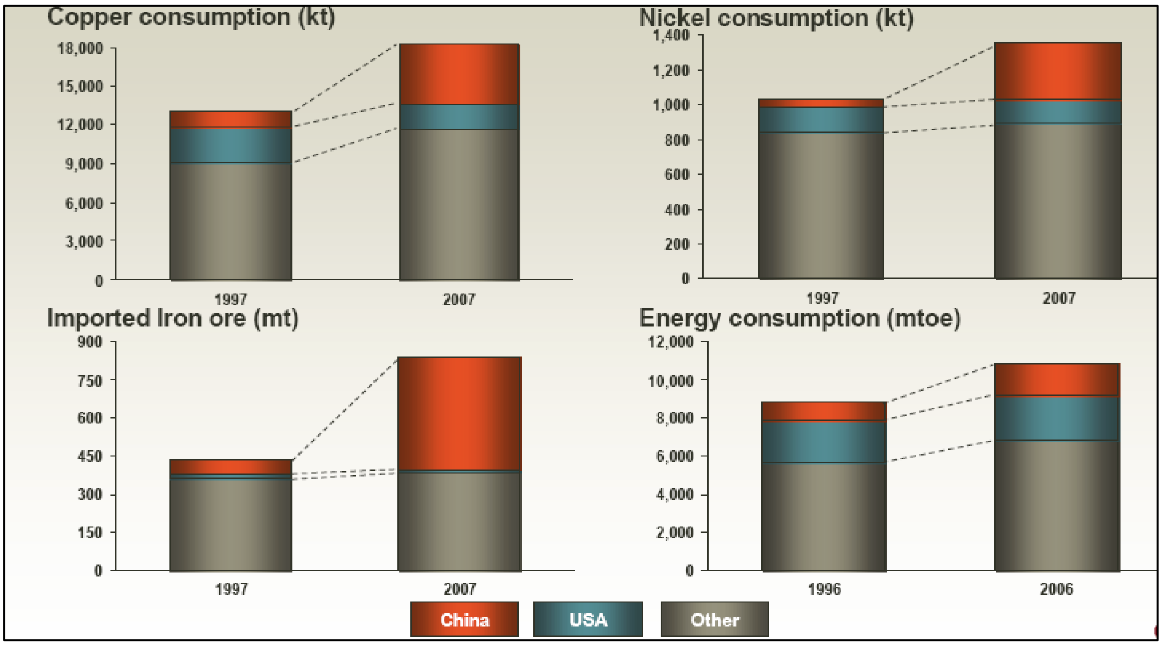
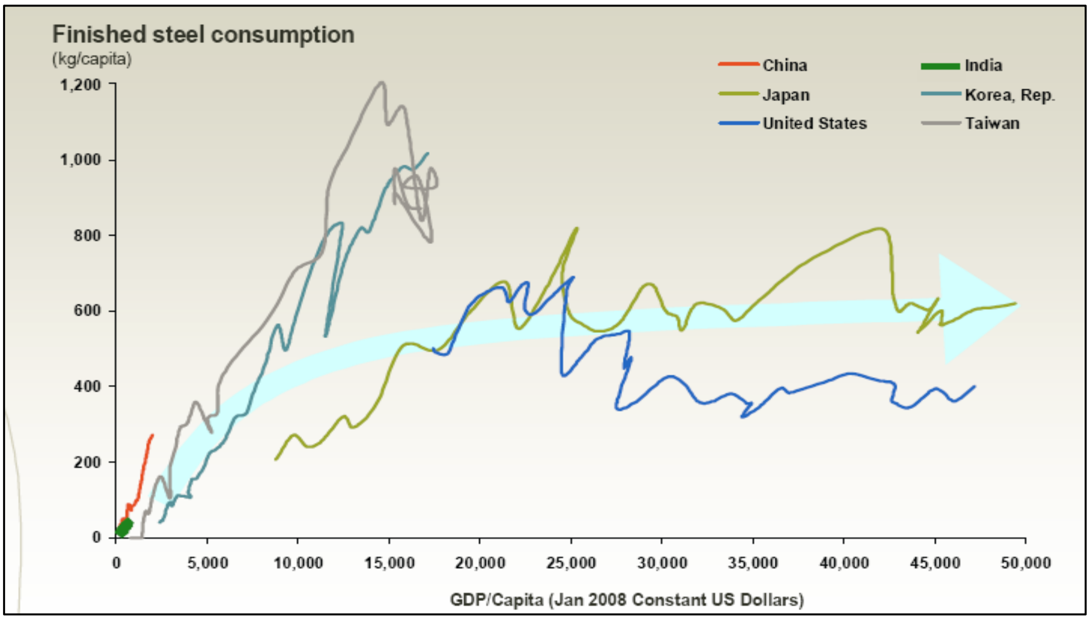


Figure 3 shows the link between finished steel consumption and GDP. Based on the trends in developed nations, China and India can be expected to significantly increase their level of steel consumption as standards of living increase.

Figure 3. Relationship between Finished Steel Consumption and GDP[7]



Recent studies have suggested that energy efficiency improvements have the potential to make the greatest single contribution to greenhouse gas emissions abatement leading up to

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[6] Kloppers, M. *BHP Billiton CEO Address to Melbourne Mining Club* (23 June 2008, Melbourne) http://www.bhpbilliton.com/bbContentRepository/docs/melbourneMiningClubLondon.pdf
[7] Ibid.

2050.[8] The bulk of these efficiency improvements will occur as a result of innovations in industrial processes. These efficiencies will be generated both incrementally (through the application of energy efficiency practices such as heat recovery and new efficient comminution operations) and also through a transformation in the industry that should occur as new processes such as dry granulation are introduced.

The stark reality that taking such technologies from concept to commercialisation will be a costly process was recognised in both Garnaut Draft Report[9] and *Stern Report on The Economics of Climate Change*. The Stern Report suggested that support for the latter stages or low emissions technology R&D technologies tended to be under-resourced globally, and should increase two to five times from current levels of around $34 billion in order to meet the global abatement task.[10] The Stern Report also indicated that the level of public support for latter stages should be higher than for initial public research, as the latter stage of the process was more costly.

If we are to take such reports at face value, R&D cost cutting aimed particularly at large scale industrial innovations, supporting activities relating to in-production trials and winding support back to the laboratory will effectively hamstring Australia's ability to generate low emissions technology solutions.

Recommendation:
1. Review the proposed changes to eligibility criteria in the context of literature on policy settings necessary for low emissions technology development to ensure that critical technology development is not hindered by the proposed changes

[8] ABARE, 'Technological Development and Economic Growth,' Research Report 06.1, (Canberra, January 2006), at http://www.abareconomics.com/publications/2006/RR06_1_ClimateAsiaPacific.pdf p 60.

[9] Garnaut, R., *Draft Report*, (4 July 2008) Chapter 16, p 417.

[10] Stern, N., 'Stern Review Report on the Economics of Climate Change,' *Paper prepared for HM Treasury* (October 30, 2006) at http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm, p 347.