



**Submission to the House Standing  
Committee on Economics  
Inquiry into raising the level of productivity  
growth in the Australian Economy**

**(August 2009)**

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## **A. 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 geoscience, metallurgy, mining engineering and management. We have more than 9,000 members who work across operations, mining technology and services, academia and Government. Given their first hand practical experience of one of our leading sectors, our members are uniquely placed to comment on the policy settings to facilitate growth of productivity, and ways in which mining activity can be leveraged to deliver greater social and economic prosperity to the Australian people.

## **B. PRODUCTIVITY IN THE MINING SECTOR**

The AusIMM wishes to thank the Committee for the opportunity to make this submission. Despite a current pause in investor confidence in many sectors, market fundamentals for industries such as mining remain unchanged. As the BRIC economies continue their trajectory of increasing consumption there will be a corresponding growth in minerals demand. As the world economy rebalances following the global recession, it is timely to reflect on the policy settings needed to ensure our own robust growth in the current global economic climate.

The mining industry has been a significant contributor to both productivity and prosperity for many decades. Typically, has accounted for around 5% of Australia's nominal market sector gross domestic product. In 2006-07, following a surge in commodity prices between 2003-04 and 2005-06, this share increased to 8.5%, stimulating substantial capital expenditure, employment and Government royalties.<sup>1</sup>

The prosperity enjoyed in recent times however does not reflect a substantial increase in productivity in the sector. In fact, multi-factor productivity (MFP) for the mining industry - which can be described as a measure of the amount of output that produced keeping all inputs (usually capital and labour) in fixed supply over the same period - has been weak.

In a recent study conducted by the Productivity Commission, several challenges were identified in accurately measuring MFP for mining, which to an extent explain disconnect between the steady increase in prosperity, as opposed to productivity, in the industry in recent years.

The first was the significant lag time between capital expenditure and generation of output in the mining industry. Empirical and other data suggest (optimistically) that the lead time for new mining projects is, on average, around three years. That is, there is a delay of approximately three years between the commencement of construction of new mining projects, and the project reaching normal output capacity. If we are to further include exploration expenditure as an input, the lead time between exploration and proving up a mineral resource (to the point where it becomes viable) can take ten years or more. As for the new investment is typically recorded immediately in the MFP measure, the lag described above can result in major distortions in MFP for the industry.<sup>2</sup>

A second condition particular to the mining industry which may cause MFP to inadequately reflect prosperity delivered is the volatility of commodity prices. In the midst of a boom when prices are high producers, may exhibit complacency in some efficiency areas, as their key aim is to get the resource out of the ground and onto the market as quickly as possible. Consequently, a rise in commodity prices may actually cause MFP to decrease,

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<sup>1</sup>Productivity Commission, 'Productivity in the Mining Industry: Its Measurement and Interpretation,' *Productivity Commission Staff Working Paper*, (December 2008).

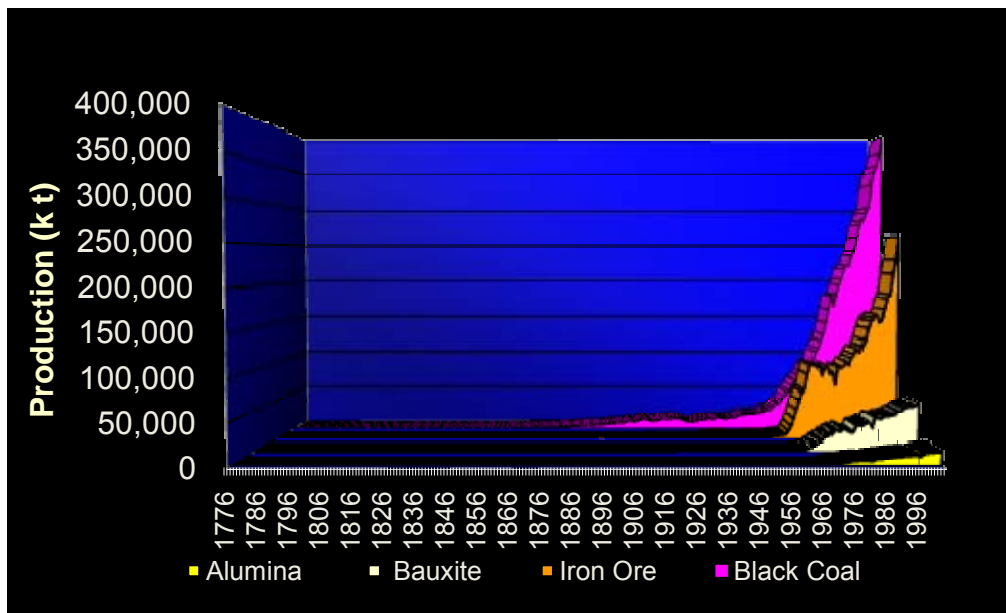
<sup>2</sup> Ibid.

notwithstanding that the volume and value of exports has significantly increased. Similarly, it has been suggested that the decline in world prices may now result in companies running leaner operations and placing the least efficient mines on care and maintenance. Thus MFP may increase notwithstanding that net value of mining exports may decrease.

The third and more significant factor which impacts the relevance of conventional MFP methodology as a measure of efficiency improvements in the industry is the changed nature of inputs over time. Over the past few decades high quality, readily accessible deposits that can be processed using conventional technologies have been gradually depleted. The quality and accessibility of remaining reserves is generally in decline. This means that finding, extracting and processing ore has incurred a steadily higher cost for the same quantity and quality of output. This has a negative impact on MFP, notwithstanding the range of efficiency measures and innovations adopted by the industry to mine deeper and more complex ores. That is, mining is a high tech industry that seeks to continually improve geological technologies and processes for finding new deposits, improving the efficiency and safety of extraction, and raising the efficiency of new and innovative processing technologies.

Despite the challenges of increasing remoteness, depth and depleting quality of ore reserves, the output of the industry has continually increased. This ingenuity of the industry and its participants is clearly not adequately captured by the metrics of MFP, nor the quantum of revenue, investment and employment generated by the industry. The below graph shows the accelerating increase in mining production in Australia across the past two centuries, due to advances in technology, management, skills and work practices.

**Fig 1. Production of Selected Commodities in Australia over time**

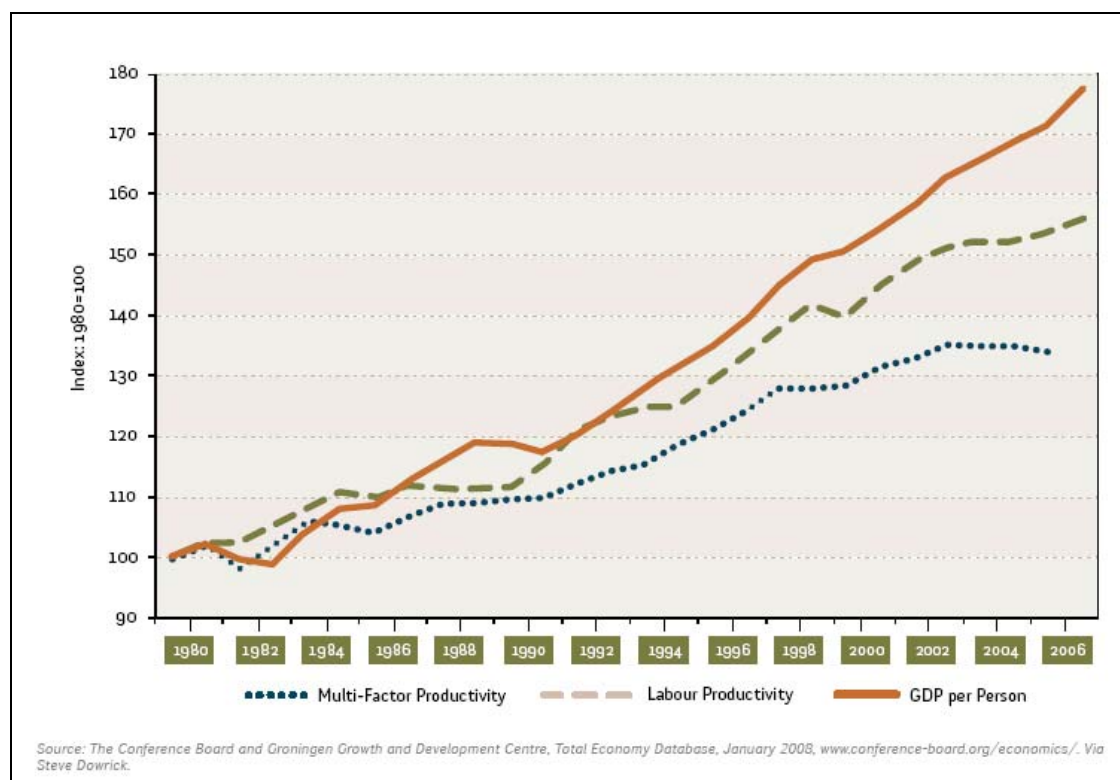


### C. PRODUCTIVITY IN AUSTRALIA

As stated in the terms of reference, the key purpose of this inquiry is to investigate concern over Australia's recent decline in productivity in order to identify key 'levers' which will assist in returning the Australian economy to robust growth.

The recent decline is illustrated in the chart Fig 2, which shows a decline in MFP in the economy overall, despite strong growth in GDP.

Figure 2 Components of Growth in Australian Living Standards<sup>3</sup>



A number of changes can be hypothesised for this decline. Many commentators would suggest that the beneficial impacts of past microeconomic reforms are beginning to wane – measures such as the float of the currency, dismantling the protective wall of tariffs and quantitative import restrictions, making labour markets more flexible and reduced cost of transport.<sup>4</sup> Another hypothesis is that the impacts sudden and accelerated productivity increases initially delivered by computer based technologies are not delivering the same level of efficiency improvements as they did initially. Part of the continuing increase in GDP this decade, notwithstanding slowing growth of productivity in other areas, may be due to the mining boom, which as described above, can skew measurement of MFP.

In the 1980s and 1990s, mining experienced particularly strong productivity growth but this is now levelling out.<sup>5</sup> The AusIMM is of the opinion that key issues that determine productivity, namely technology development, process innovation, skilled human capital and adequate

<sup>3</sup> Cutler and Company, 'Venturous Australia', prepared as part of the *National Review of Australia's Innovation System*, (August 2008)

<sup>4</sup> Gruen, D., 'Australia's Strong Productivity Growth: Will it Be Sustained?' *Reserve Bank of Australia Bulletin* (February 2001)

<sup>5</sup> Ibid.

regulation, all remain salient and there is no room for complacency on these issues in a competitive global economy.

## **D. PRODUCTIVITY, PROSPERITY AND THE MINERALS SECTOR**

It has elsewhere been mentioned that productivity and prosperity are not always the same thing. However, continual growth in the former is critical to maintaining the latter over the medium to longer term.

For our members, who are leading professionals in the mining industry, it is disturbing to hear many of our leading politicians suggesting that the minerals sector is not a sustainable base for Australian prosperity, and that we should look elsewhere to build up a productivity base. For example, in his weekend essay in the *Sydney Morning Herald*, Prime Minister Kevin Rudd wrote:

*“In the past Australia relied almost exclusively on the roller-coaster of the boom and bust of the mining sector on the sharemarket...As leader of the opposition, I often posed the question, what does Australia do if and when the mining boom ends? Our answer, then and now, is that we must prepare for an Australia beyond the mining booms, and we must build a national growth strategy whose central organising principle is productivity growth.”*<sup>6</sup>

The AusIMM agrees wholeheartedly that the central organising principle for future policy must be productivity growth. However any plan for productivity and prosperity growth must recognise the crucial role of future mineral resources demand and our capacity to leverage off this to evolve a range of industries.

The current downturn does not spell the end of the resources boom. As many of our more experienced members know all too well, the current downturn is merely part of a cyclical process of boom and bust that is an endemic to the industry. Recent such developments include the 1970s nickel boom; the 1973-74 bear market; the 1980s gold boom; the 1987 crash, slowdowns in 1994 and 2002; the late 1990s Asian financial crisis; and the recent global economic downturn. In each downturn, the minerals industry undergoes some restructuring but emerges ready for the next “bull” market period. On average, “bull” markets last for 5.4 years while “bear” markets last for 1.3 years.

If we are to take leading commentators such as *Goldman Sachs*, the next bear market is not far away:

*“As the global economy recovers we expect commodity markets to go back to where they were in mid 2008, when severe supply constraints drove rationing, higher prices and higher capital expenditure and thus higher multiples across the global growth complex.”*<sup>7</sup>

This prediction is driven by recognition of the unstoppable momentum of emerging economies such as China, India and less developed countries. to improve their standards of living. Market fundamentals remain the same (1) China is consuming a large share of global consumption and (2) China is short the commodity.<sup>8</sup> The below graph illustrates the rate at which China has increased its global share of key commodities such as copper, nickel, iron ore and energy (see Fig 3).

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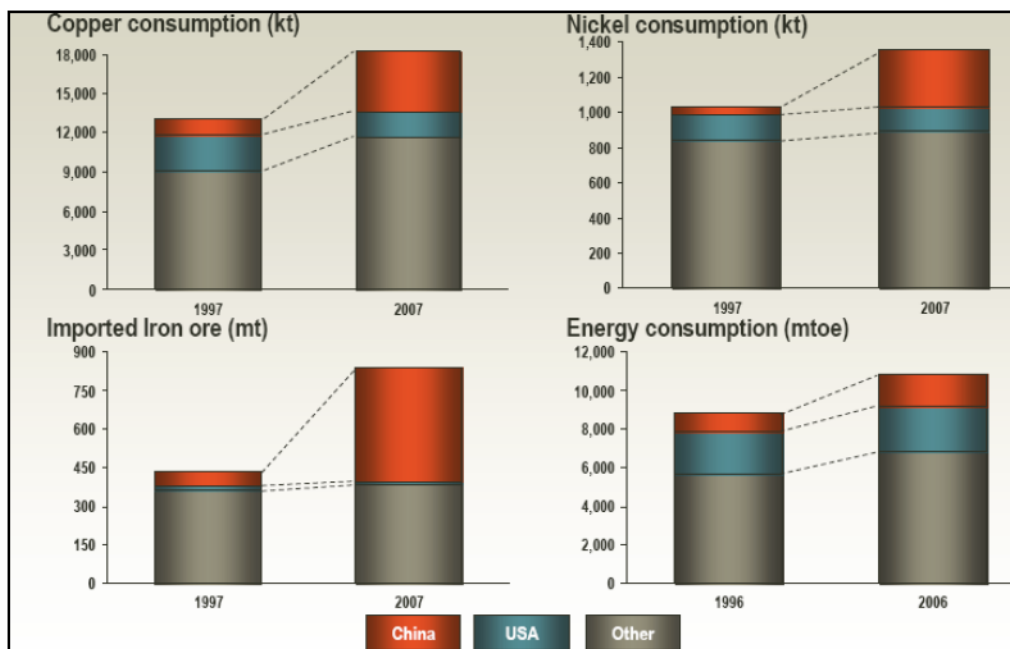
<sup>6</sup> The Hon Rudd, K., Prime Minister, ‘Pain on the Road to Recovery’, *Sydney Morning Herald*, (25 July 2009)

<sup>7</sup> Goldman Sachs, ‘Commodities in Crosshairs – a commodity shortage lies ahead’, *Goldman Sachs Research Roundtable*, (5 August 2009)

<sup>8</sup> Ibid.

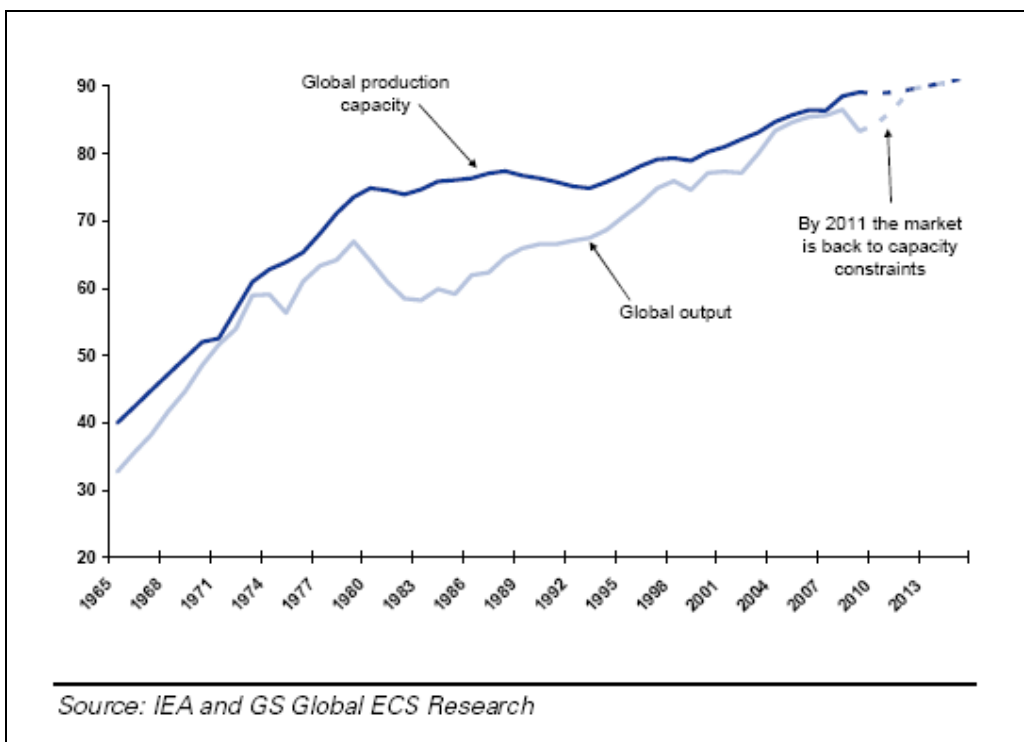


**Fig 3 China's Consumption of Mineral and Energy Commodities<sup>9</sup>**



Goldman Sachs have predicted that by the end of 2010, commodity markets will likely be in exactly the same place that they were in mid-2008, when severe supply constraints forced the rationing of demand through sharply higher prices to keep the markets balanced.

**Figure 4 The impending commodity crisis (million b/d)<sup>10</sup>**



Source: IEA and GS Global ECS Research

<sup>9</sup> Kloppers, M. BHP Billiton CEO Address to Melbourne Mining Club (23 June 2008, Melbourne)

<http://www.bhpbilliton.com/bbContentRepository/docs/melbourneMiningClubLondon.pdf>

<sup>10</sup> Goldman Sachs, 'Commodities in the Crosshairs', *Goldman Sachs Research Roundtable*, (August 5 2009), p 14.

Over the past few decades, the minerals sector has, and will continue to be a driver of Australian prosperity provided we get the policy settings right. With our natural resources endowments, low sovereign risk and pre-existing infrastructure, we are potentially well placed to benefit substantially from the next boom.

It is important to note that as well as contributing directly to prosperity, the minerals boom is also a major driver of growth in supporting service and technology industries. In a global knowledge economy, specialist companies with the ability to value-add through the provision of innovative products and services that increase efficiency of traditional industries are increasingly engines of economic growth in their own right. The export of specialist mining technology and services alone is worth more than \$2 billion per annum. Where once the industry was described as being comprised largely of junior, mid-tier and major companies, there is now an additional category of mining firm, as is evidenced by the following slide from a presentation by former Rio Tinto CEO Tom Albanese at a recent presentation to the Melbourne Mining Club:

**Figure 5 Slide from Melbourne Mining Club Presentation by Tom Albanese, Rio Tinto CEO**

**RioTinto**

## The global future of mining

- Resource sector is increasingly diverse, competitive and global
- Four types of players in today's resource industry:
  - Global Leaders
  - Emerging Majors
  - Aspiring Players
  - Support Specialists
- Dynamic landscape of intense competition and collaboration

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## **D. LEVERS FOR PRODUCTIVITY IN THE MINERALS SECTOR.**

The key issues that require inventive and forward looking policies to deliver productivity growth in the Australian minerals sector are as follows:

- **Exploration**
- **Minerals R&D**
- **Human Capital**
- **Workforce Participation**
- **Technology support for a carbon constrained world**

### **1. EXPLORATION**

*Exploration is the lifeblood of the industry. Orebodies do not advertise their existence, but require a rigorous and risky program of exploration and testing before they can be considered to have reasonable prospects for eventual economic extraction. In this way exploration is similar to R&D in that it requires significant risky upfront investment, with potentially huge rewards for the investors and an economy.*

*Without identification of new resources for development, Australia's capacity to bring new mines online when demand resurges will be severely curtailed. Thus it is of some concern that Australia is outpaced in exploration expenditure by the rest of the world with regards to a number of key commodities. Moreover only 36% of exploration activity in 2006-07 was greenfields exploration – searching for new deposits.<sup>11</sup>*

*In a highly competitive global environment for exploration and mining investment, there is no room for complacency on exploration policy. Encouraging exploration in Australia to ensure we have an inventory of high quality deposits to sustaining a highly productive sector is critical to our future prosperity. Otherwise we risk becoming a declining quarry for the rest of the world*

#### **1.1 Policy Goal: Implement a Flow-Through Share (FTS) Scheme**

As part of its *Plan for a Stronger Resources Sector*, the ALP made an election commitment to implement a FTS scheme during its first term to improve access to finance for junior explorers, an incentive for exploration activity that has proven successful in other mining jurisdictions.

The major rationale for a flow-through share scheme is to rectify a current anomaly in taxation law that adversely affects junior explorers. Currently, the Income Tax Assessment Act (ITAA) provides for a tax deduction for exploration expenditure, presumably on the basis of it being a high-risk activity with recognised benefits to the common economic good. However, junior exploration companies (which make up more than 70% of companies engaged in mineral exploration within Australia) generally do not generate sufficient taxable income to be able to claim the deduction.

A FTS scheme would smooth out this anomaly by allowing companies which cannot use the deduction themselves to pass it through to shareholders, who are then able to use it to offset their own tax liabilities. Thus, a FTS scheme achieves twin objectives of rectifying a tax anomaly and increasing the attractiveness to investors of junior exploration companies

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<sup>11</sup> Huleatt, M. and Jaques, L. 'Australian mineral exploration at record levels', *AusGeo News*, (December 2007) Issue No. 88, at [http://www.ga.gov.au/image\\_cache/GA10851.pdf](http://www.ga.gov.au/image_cache/GA10851.pdf).

(thereby providing those companies with the capital to maintain or increase their exploration activities).

At the request of The Hon Martin Ferguson MP, Minister for Resources Energy and Tourism industry stakeholders including The AusIMM, the Minerals Council of Australia (MCA), the Association of Minerals & Exploration Companies (AMEC) and others developed a workable FTS model. This was submitted to Government in November 2008.

Under the proposed model, based on Australia's franking system, exploration expenditure *that cannot be deducted* will give rise to an Exploration Tax Credit (ETC). Companies can then pass the ETC on to Australian resident shareholders of Australian companies

Due to the current constrained environment for finance, both debt and equity derived, it was strongly urged by stakeholders across the industry that the implementation of a flow-through share scheme take place as a matter of priority. Many companies have shelved their listing intentions because of volatility and a lack of investor support. The quantifiable losses across the short term – jobs, exploration spending and new IPOs – are significant. However what the bare statistics fail to capture are the longer term economic impacts – loss of talent and of geoscientific knowledge about Australia's terrain, and loss of infrastructure. These losses will directly impact upon our ability to restock Australia's mineral inventory through exploration.

The industry has long advocated the introduction of a FTS scheme for Australia, not only because it would ensure that the tax deduction achieves its intended aim, but in order to increase Australia's competitiveness as a destination for exploration and mining investment in a global industry. It would also give Australia policy parity with Canada, which has had a successful flow-through share scheme in place since 2000. The effectiveness of the Canadian scheme can be seen by the fact that, within a year of its introduction, Canada displaced Australia as the second-largest spender on exploration (by region).

When the financial crisis eases, the junior exploration sector will not simply be able to 'pick up where it left off'. It has estimated that without fresh funding, less than half of all junior exploration companies will survive the next twelve months. Fulfilling its election promise to implement a FTS scheme is a key lever to increase Australia's minerals productivity, ensuring that the capital critical for junior explorers to make discoveries continues to flow in a competitive global investment environment.

#### **Policy Recommendation:**

##### **1.1.1 Implement a flow-through tax credit scheme as a matter of urgency**

## **2. MINERALS R&D**

*Excellent R&D infrastructure and policy are critical for maintaining Australia's position as a leading edge minerals innovator. Australia has a strong history of government-university-industry R&D collaboration that has resulted in stunning value added results for industry in the past. A particularly strong role has been played by AMIRA International, a consortium of companies which contracts out pre-competitive research to centres of excellence.*

*Due to consistent public and private investment in research infrastructure in Australia, we have a number of notable world class research facilities. These include Queensland University's Julius Kruttschnitt Mineral Research Centre, the University of Tasmania's Centre for Ore Deposit Studies, the Perth-based Parker Centre, the University of South Australia's Ian Wark Research Institute, the national researcher CSIRO and Cooperative Research Centres (CRCs).*

The AusIMM congratulates the Rudd Governments' explicit recognition and action on the importance of mineral resources as a springboard for innovative industries, and a major innovator in its own right. In particular

- 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 a \$14 million over four years, the **Mining Technology Innovation Centre** in Mackay 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 success of the AMIRA bid for a **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 \$28m over the eight year life of the CRC.
- Explicit recognition throughout the Review of the National Innovation System of the critical role played by the mining industry as an engine of innovation

The AusIMM supports many of the recent findings of the Report on the Review of the National Innovation System,<sup>12</sup> however there are some areas of concern enumerated below, as well as additional areas that require strengthening.

We submit that these areas are critical ensuring that innovation policy and research infrastructure is appropriately adapted to supporting investment in research that will 'make the difference' in terms of Australia's competitiveness as a destination for exploration and mining.

## **2.1 Policy Goal: Ensure changes to R&D Tax Concession supports work undertaken by both SMEs and large mining companies**

The Report on the National Innovation System made several recommendations regarding the R&D tax concession which cause our members some concern. Under Recommendation 8.3:<sup>13</sup>

*"The existing R&D Tax Concession (the 125 percent R&D Tax Concession, the 175 percent Premium, the R&D Tax Offset and the International Premium) should be replaced with a Tax Credit in order to raise the level of business expenditure on research and development by providing a less complex and more predictable support mechanism. A 40 percent Tax Credit should be available to large firms with a refundable Tax Credit of 50 percent available to smaller firms with turnover under \$50 million."*

The AusIMM supports the broadening of eligibility for the refundable credit to medium size enterprises (turnover of \$50 million). We also recognise that in many cases the 50% credit represents an increase, as companies that previously would have used the 125%

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<sup>12</sup> Cutler & Company, 'Venturous Australia', *Report on the Review of the National Innovation System*, DIISR, (Canberra 2008)

<sup>13</sup> Ibid.

concession (or 7.5c in the dollar) will now receive 20c in the dollar if they have a turnover of under \$50 million.

However there is some concern about the effect of the change on large companies, with turnovers greater than A\$50m, and foreign-owned corporations. For these companies the proposed rate of credit at 40 per cent is only equivalent to a 10c in the dollar, or an R&D concession of 133 per cent. While this restores core program value to pre-1996 levels, there are two major problems with this rate. Firstly, it is considerably lower than the return they can generate under the current complex 175 per cent program, up to 22.5 cents per dollar invested, making it an unfair trade-off to ask large companies to make. Secondly, the rate nominated remains below the cost of capital and will only contribute marginally to project economics.

The justification for this reduction in the *Report on the Review of the National Innovation System* was that large companies are not influenced in their decision making by the tax concession; therefore the change would not affect the level of their research expenditure in Australia. However this is not consistent with the evidence that The AusIMM has received from members. AMIRA International has indicated that the deduction figures are an important consideration for its members, who conduct rigorous analysis of R&D proposals.

The Report further criticised access of the concession by the mining industry in an operational context and recommended measures to limit these:

*“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 Panel appreciates that such ventures are both risky and innovative. At the same time it is clear that such ‘whole of mine’ claims are gaining for themselves a degree of assistance disproportionate to the benefits available to many other innovative projects.”<sup>14</sup>*

This statement fails to recognise the often practical nature of mining innovations, as well as the considerable cost and risk involved in testing a hypothesis at the level of operations. That is, due to the large scale nature of mining, for which testing a new process may require adjustment of an entire complex integrated system which can result in millions of dollars of loss.<sup>15</sup> The incentive for companies to undertake these risks are the broader efficiency gains which may be capable of being applied across the broader industry, which in turn may result in significant productivity gains for the entire economy (the goal of the incentive). Thus any changes to R&D tax incentives must recognise the risk and value to the economy of R&D that occurs at the margins.

As well as continuing to recognise the importance of incremental innovation, the importance of step change technologies and the particularly high risks associated with these must continue to be recognised through Government support. Step change technologies are few and far between in the mining industry due to the high risk, the long payback periods and the high failure rate. However, they are critical if the industry is to achieve order of magnitude efficiency improvements, and meet increasingly stringent environmental expectations.

The risk inherent in such projects is evident in the number of projects abandoned before commercial operation. Recent examples include the A\$2 billion, hot briquetted iron project in

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<sup>14</sup> Ibid.

<sup>15</sup> Upstill, G., and Hall., P, ‘Innovation in the minerals industry: Australia in a global context’ *Resources Policy*, Volume 3, Issue 3 (September 2006) pp 137-145 .

the Pilbara, Western Australia and the Australian Magnesium Corporation smelter in Gladstone, Queensland.<sup>16</sup>

The AusIMM submits that, a reduction in the premium tax incentive, or a winding back of eligibility of mining projects for concessions would be highly ill advised given the importance of these projects to increasing productivity of the minerals sector, and our ability to continue production in a water and carbon constrained world.

#### **Recommendations:**

**2.1.1 Maintain a premium tax level incentive for sustained investment in R&D projects by large companies (i.e. ensure the incentive does not drop below current levels)**

**2.1.3 Ensure that any amendment definition of R&D remains industry neutral, and does not add additional uncertainty and complexity into the system**

## **2.2 Policy Goal: Continue support for the CSIRO Minerals Down Under Flagship**

The AusIMM congratulates the Rudd Government on its support for CSIRO Minerals Down Under Flagship (CSIRO MDU). The support is evidence of a keen understanding by the Rudd Government of both of the importance of innovation to mining, and of mining as a driver of new innovation with application across industries. This understanding was evident in the words delivered by Senator Kim Carr at the Flagship Launch in May 2008:

*“Australia can build prosperity and innovation capacity by:*

- *increasing the knowledge-intensity of their resource-based industries;*
- *using their resource endowment to leverage the development of other industries, such as manufacturing, ICT and financial services and;*
- *making the most of the knowledge infrastructure provided by universities and public research organisations to develop new ideas.”*

As described above the minerals sector has the capacity to deliver a range of benefits to the Australian economy across industries. However these benefits contingent upon sustaining a competitive sector here in Australia. In a highly consolidated industry, where developing countries are taking major strides forward to reduce sovereign risk, we are now competing with underexplored regions for exploration and mining investment.

The key to retaining competitiveness is increasing our prospectivity. Prospectivity is a composite concept dependent on the state of science. In order to increase prospectivity we must find new and innovative ways to discover deposits, develop more efficient ways to process lower ore grades (thus broadening the definition of economic deposits), and increase the efficiency of mining methods to bring down the costs of mining. These challenges are currently being tackled head on by CSIRO MDU.

As stated by CSIRO, Australia has substantial hidden mineral assets that can be unlocked with new processes and technologies. The profitable recovery of impure iron ore, low-grade nickel and currently un-mineable mineral sands alone could add A\$750 billion to Australia’s economic resources. The long-term MDU project will help create the technology needed to access and process lower-grade ore bodies and keep Australia at the forefront of the minerals industry. On a social and environmental level, it will deliver better resource utilisation and provide longer economic lives for the remote regions in which minerals wealth tends to occur.

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<sup>16</sup> Ibid.

Ensuring that the CSIRO MDU is sufficiently resourced and focused to continue to produce world class research, and engage global resource partners, is particularly important in the current climate of market uncertainty. It is in uncertain economic times such as these when companies may feel most reticent about investing in new research, or varying an established process. However these are also the times when innovations in process and technology are most critical, as the increase in the marginal profits they can deliver are critical for increased competitiveness, and even survival. A combination of public investment, strategic institutional vision, and private participation are needed to maintain the momentum of value adding mining research at the present time.

**Recommendation:**

**2.2.1 Ensure CSIRO Minerals Down Under Flagship is sufficiently resourced and focused to continue to produce world class research**

**3. HIGHER EDUCATION**

*Despite the short term decline in commodity prices, expectations of skills needs to meet demand over the medium term continue to be high. Recent projections of skills needs undertaken by the Minerals Council of Australia into the next decade have indicated that at least 70,000 additional skilled workers and 7,500 additional professionals will be needed for the minerals sector in 2015.<sup>17</sup> With significant numbers of skilled workers and professionals due to retire, sustaining investment in meeting the future skills needs of the minerals sector remains a priority.*

*Traditional sources of supply of labour such as South Africa, Brazil, China and India are now facing their own growth challenges/labour shortages, and can no longer necessarily be relied upon to 'fill the gaps' for the Australian minerals sector. We need to plan adequately to meet our own professional skills needs.<sup>18</sup>*

*Highly capable graduates and experienced professionals who have a high level of technical capability and sound training are the lynchpin of innovation. It is ultimately their assessments of opportunities and capability improvements that will lead the way to a more competitive industry.*

*The AusIMM applauds the Government's commitment to increasing support for the Higher Education Sector, in particular:*

- \$52 million over four years to raise the stipend in the Australian Postgraduate Award to \$22,500 in 2010.
- \$3 billion over four years in higher education infrastructure

*However, the current cluster funding system, whereby Universities receive a share of the estimated cost of delivering a particular cost per head continues to be inadequate. Not only are the levels of funding for clusters inadequate, but tying funding to student numbers disadvantages small, capital intensive courses in critical fields such as Science and Engineering.*

<sup>17</sup> Chamber of Minerals And Energy Western Australia, 'Staffing the Supercycle: Labour Force Outlook in the Minerals Sector 2005-2015', (August 2006)

<sup>18</sup> See for example, comments from Bhavesh Morar, who said: "One of the most important is to address the skills shortage issue. All companies involved in the mining and construction fields are competing globally for an ever dwindling supply of people. While we are currently continuing to attract overseas skills migration, this may not last. The key is to ensure we have appropriate planning strategies for qualified people being developed domestically." 'Mining Production Levels Under Threat: Deloitte', *Australian Journal of Mining* (Feb 16, 2009)



### **3.1 Policy Goal: Provide adequate support for quality minerals-related higher education**

The number of mining engineering, metallurgy and geoscience departments in universities has been steadily declining. Since 2000, eight minerals departments have closed, three are marked for closure and four have been merged into other degrees.<sup>19</sup>

The steep decline in the number of minerals-related courses is largely due to the funding arrangements instituted under the *Higher Education Support Act 2003* (Cth). The Act provides funding for Universities on the basis of the number of students enrolled in a particular subject. The per student allocation is based on general assumptions about costs of teaching a subject within a 'cluster'; the formula took no account of the differences in course content requirements, infrastructure needs, location or any other course or institution-specific factor. Under this funding formula, small, capital intensive courses such as mining engineering and field and laboratory intensive courses such as geoscience were particularly disadvantaged and for many Universities it was simply not viable to run them.

Several years of inadequate funding has had a serious impact on minerals-related courses. A survey of minerals-related course Heads of Department conducted by The AusIMM in 2007 indicated that these courses were facing major salary pressures, decline in staff numbers, outdated infrastructure and, in some cases, uncertainty about survival.<sup>20</sup>

There is significant concern that the new student-driven funding model will not improve the situation, but only encourage higher education providers to focus their resources on courses with high enrolments (Law, Commerce etc). With no change to the current cluster funding model, and no commitment from the Government that discipline areas of national importance to the economy will be protected, the future of minerals education looks grim.

The Federal Government can no longer afford to ignore the fundamental flaw in funding arrangements – not just for minerals related courses, but for all specialist science and engineering courses, which play an important role in meeting the skills needs of Australian industry.

#### **Policy Recommendations:**

- 3.1.1 Establish mission-based compacts with minerals higher education providers in the areas of mining engineering, metallurgy and geoscience**
- 3.1.2 Review the funding formula established by the *Higher Education Funding Act 2003* (Cth) with a particular view to ensuring adequate support for specialist science and engineering courses**
- 3.1.3 An explicit policy commitment to be made that discipline areas of national importance to the economy will be supported at sustainable levels**

<sup>19</sup> Galvin J. and Carter R., 'Strategic Review of Minerals Council of Australia Tertiary Education Initiatives,' *Minerals Tertiary Education Council of Australia* (May 2003) at [http://www.minerals.org.au/data/assets/word\\_doc/4328/MTEC\\_Review\\_FINAL.doc](http://www.minerals.org.au/data/assets/word_doc/4328/MTEC_Review_FINAL.doc)

<sup>20</sup> The AusIMM, 'The AusIMM Questionnaire Report – New Funding Arrangements for Universities' (July 2007)

## 4. WORKFORCE PARTICIPATION

*Increasing workforce participation is a key lever for increasing productivity. Meanwhile increasing attraction and retention of women is increasingly viewed by mining organisations as a key strategy for addressing the skills shortage. Currently women account for only 18% of the mining workforce, compared with 42% of the total Australian workforce. The numbers of women in technical or operational roles is particularly low, with women comprising only 3% of the site based workforce.<sup>21</sup>*

*A number of companies have targeted recruitment drives aimed at women. However, as women are more likely to be primary carers for children, the lack of suitable, affordable child care for women in mining remains a major barrier to their participation in the sector. The recent Minerals Council of Australia report 'Attracting and Retaining Women in the Australian Mining Industry' found that starting a family was the most common reason women left mining, and that finding a carer was virtually impossible.<sup>22</sup>*

*The AusIMM applauds the Government funded Paid Parental Leave scheme but respectfully makes that a return to the workforce can only be made possible if adequate care is available.*

### 4.1 Policy Goal: Increase equitable participation of women in mining through adequate child care support policies

Both male and female members of The AusIMM have indicated that there is a dire shortage of child care centres in rural and regional Australia. For example, a female mining engineer living in Moranbah, QLD, has indicated that there are only six places per day for children under two for the whole town (population ~10,000).

Not only are there inadequate numbers of child care centres, but those that do operate tend to operate only during 'traditional' working hours and are incompatible with mining rosters. Women who work in professional mining roles are therefore required to look for alternative and costly options such as nannies, or a customised family day care plan.

At roughly \$16 an hour, the costs of child care enabling full time work in the industry will exceed \$30,000 per year, and can account for half of a female professional's after tax salary. These costs are a major disincentive for women to enter into, or stay in mining. One example from our membership was of a mining engineer who paid \$35,000 per annum for full time care for her two children (this included three days per week child care centre and two days per week for a nanny). She has since decided to quit work as a mining engineer and leave the industry, partly because of the cost and partly because of the stress of juggling childcare arrangements.

The pressure felt by families working on mine sites was evident in the responses to *The AusIMM Remuneration and Employment Survey 2008*. This is an annual Survey of all AusIMM members, who are professionals in the mining industry. Of the 506 respondents who identified themselves as carers for a child:<sup>23</sup>

- 12% indicated that costs of caring are a disincentive to continue working in their current role (25.0% of females; 10.6% of males); and

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<sup>21</sup> Minerals Council of Australia, 'Unearthing New Resources – Attracting and Retaining Women in the Australian Mining Industry,' (May 2007) at [http://www.minerals.org.au/data/assets/pdf\\_file/0016/20275/MCA\\_Women\\_In\\_Mining\\_WebVersion.pdf](http://www.minerals.org.au/data/assets/pdf_file/0016/20275/MCA_Women_In_Mining_WebVersion.pdf)

<sup>22</sup> Ibid.

<sup>23</sup> The AusIMM, *The AusIMM Remuneration and Employment Survey Report* (July 2008) at <http://www.ausimm.com.au/publications/epublication.aspx?ID=3420>

- 15.5% indicated that costs of caring are a disincentive to continue to work in the minerals sector (20.8% of female carers; 15.0% of male carers)

The significant impact of child care cost and availability on both general retention and the participation of women is not surprising. At present there is little support for parents in the mining industry. The Child Care Tax rebate is not available for most parents using In-Home care, and the rebate itself is capped at only \$7,500.

Mining companies which wish to pay for their employees' In Home child care costs (or another option) find that their hands are tied, as the Fringe Benefits Tax Exemption is available only for employers who run their own child care centres. The risks and liabilities of running a child care centre, along with limited place availability, make this an unattractive prospect for most mining companies.

It has long been advocated by industry groups that the Fringe Benefits Tax exemption should be available for *all* employer sponsored child care, including In Home care. The case for flexibility has been put forward by PriceWaterhouseCoopers, whose employees faces high costs of inner city child care outside working hours.<sup>24</sup> Organisations such as the WA Police and Department of Defence, which face similar challenges to those of the mining industry, have also indicated the need for a change in existing policy.<sup>25</sup>

An extension of the exemption would also constitute a more general recognition of the reality of the 24 hour global market place, in which an increasing number of roles require people to work non traditional working hours. These include professions such as nursing, that have always been subject to shift work, through to highly paid accounting positions, where career advancement is dependent on being available to meet client needs.

#### **Policy Recommendations:**

- 4.1.1 Investigate options for returning a greater proportion on child care costs incurred by workers in regional Australia through the tax system**
- 4.1.2 Extend fringe benefits tax exemption to all forms of employer sponsored child care**
- 4.1.2 Support the creation of child care centres in rural and regional Australia, with operating hours that reflect the actual needs of local employees**

## **5. TECHNOLOGY SUPPORT FOR A CARBON CONSTRAINED WORLD**

*The AusIMM does not have a position on the causes or degree of anticipated climate change, and have a broad range of views on this topic. However as a professional institute, it is our view that in a carbon constrained world, only technology can deliver global reductions of the kind envisaged by our leaders, without a massive reduction in standards of living in many countries across the world, including Australia.*

*With global electricity production projected to treble by 2050, largely as a result of activities in emerging economies such as China and India,<sup>26</sup> it is clear that a raft of new technologies for producing key commodities will be needed to bring down global greenhouse gas emissions in the coming decades.*

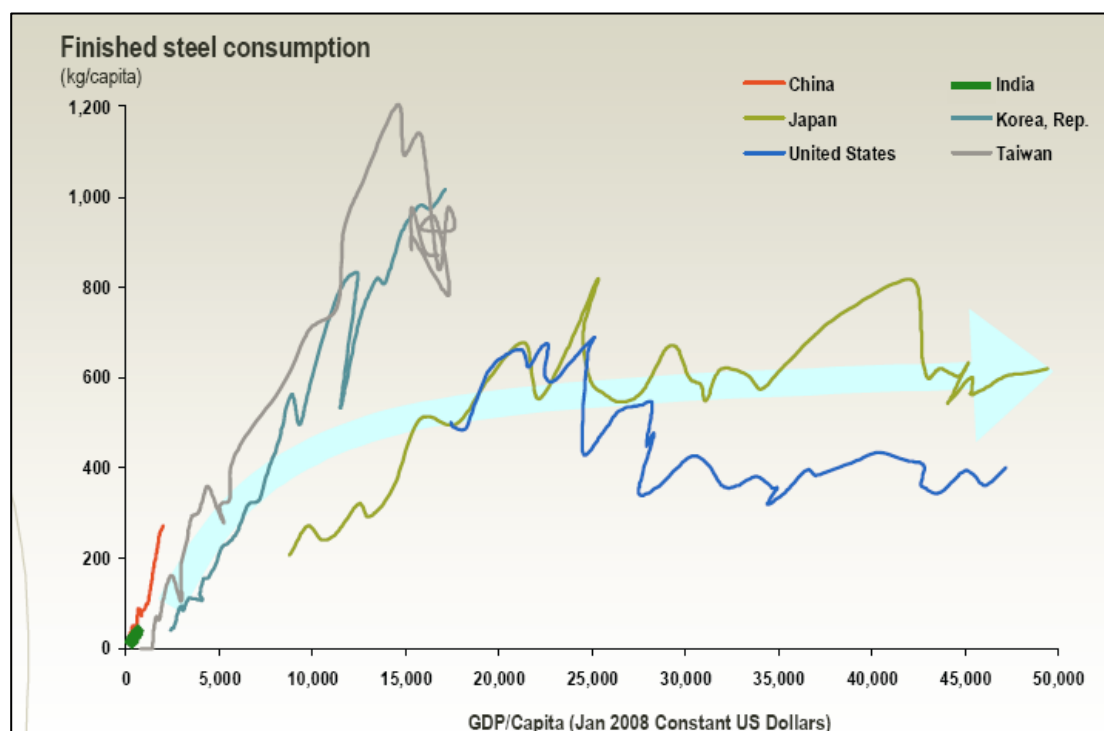
<sup>24</sup> Power, K. 'Parents Under Pressure,' *About the House* (November 2005), pp 23-25 at [http://www.aph.gov.au/house/house\\_news/magazine/ath25\\_Parents.pdf](http://www.aph.gov.au/house/house_news/magazine/ath25_Parents.pdf)

<sup>25</sup> Nicholson, J. 'Tug of War,' *About the House* (December 2006), pp 25-27 at [http://www.aph.gov.au/house/news/magazine/ath29\\_tug.pdf](http://www.aph.gov.au/house/news/magazine/ath29_tug.pdf) .

<sup>26</sup> International Energy Agency, 'Energy Technology Perspectives', OECD-IEA (2006)

Figure 6 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 6. Relationship between Finished Steel Consumption and GDP<sup>27</sup>**



As a major producer of energy and energy intensive commodities, and with a highly developed research infrastructure, Australian technology can play a major role in sustaining productivity in a carbon constrained world. These opportunities exist both in low carbon power generation, and in increasing energy efficiencies in mineral and metals production.

In the area of low carbon power, we have extensive expertise in clean coal research such as coal gasification and carbon capture technology (such as the Zerogen project) and also carbon storage options such as geosequestration. We are also significantly advanced in the development of renewable energy options such as geothermal electricity from hot rocks. As a major exporter of uranium and nuclear technologies, Australia has also played a major part in enhancing safety in the nuclear supply chain by improving practices at home and abroad.

Australia is also at the forefront of energy efficiency improvements in the production of key commodities – from exploration, mining and mineral processing through to metal extraction and refining. The contribution that can be made through energy efficiency contributions should not be underestimated. Recent studies have suggested that energy efficiency improvements have the potential to make the greatest single contribution to abatement leading up to 2050.<sup>28</sup> 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.

<sup>27</sup> Kloppers, above n 8.

<sup>28</sup> ABARE, 'Technological Development and Economic Growth,' Research Report 06.1, (Canberra, January 2006), at [http://www.abareconomics.com/publications/2006/RR06\\_1\\_ClimateAsiaPacific.pdf](http://www.abareconomics.com/publications/2006/RR06_1_ClimateAsiaPacific.pdf) p 60.

*The development and deployment of relevant technologies to allow the minerals sector to operate effectively in a carbon constrained world will not take place in a vacuum. As we have previously indicated to government, a tightly focused, nationally coordinated strategy is needed, consisting of.<sup>29</sup>*

- *A comprehensive technology policy aimed to encourage development of low emissions technologies*
- *A national energy policy that provides certainty for industry over future availability of low emissions base load power.*

## **5.1 Technology neutral support for demonstration and commercialisation of step change low emissions technologies**

The AusIMM acknowledges that there are a number of programs and grants aimed at fostering low and zero emissions technology research. Whilst these initiatives are worthwhile, they are largely focused at the back end of the technology development process, namely, research and development (R&D).

The journey from concept to commercialisation includes each of the following steps: research, development, demonstration, commercialisation and deployment. It is the latter parts of the process that are often the most costly and involve the greatest risk to industry. A carbon price alone of the kind envisaged will not be enough to bring such projects over the line in terms of their profitability.

Most of the policy debate to date has focused on a carbon price, with technology support treated almost as an ancillary issue. If major sectors of the economy are expected to make the transition to a carbon constrained world, appropriate fiscal incentives aimed at ameliorating the risks associated with demonstration and commercialisation of first-of-a-kind plant. As there is no one silver-bullet technology that is going to meet the world's emissions reduction needs, these incentives should be available across industries. We need to go beyond just 'picking winners' at the front end of the R&D process if Australia is to maintain its productivity growth whilst bringing down emissions.

### **Policy Recommendation:**

#### **5.1.1 Put in place technology neutral fiscal incentives to ameliorate risk associated with demonstration and commercial development of first-of-a-kind plant aimed at substantial emissions reduction**

#### **5.2 Provide certainty for industry on the future availability of low cost, low emissions base load power**

The AusIMM indicated that a national energy policy is a critical issue for companies as they plan their strategy to remain competitive in a carbon constrained environment. Companies need to know the matrix of electricity sources that will be available to them in the medium term, in particular low cost, low carbon base load electricity options, in order to determine forward investment strategies.

The smelting industry constitutes one example where information regarding future electricity sources is critical to decisions regarding investment in new technologies. Without access to low carbon electricity, the emissions for any given metal are similar, regardless of processes; therefore there is no need for businesses to consider a shift in processes for new plant with lower direct emissions. However, if low carbon electricity sources are available, a shift in

<sup>29</sup> See 'The AusIMM Submission to the CPRS Green Paper' (September 2008), at [http://www.ausimm.com.au/Content/docs/emissions\\_trading0908.pdf](http://www.ausimm.com.au/Content/docs/emissions_trading0908.pdf)

smelting technologies from carbothermic reduction processes to electrothermic processes can in most cases reduce carbon emissions to minor levels.

This shift would effectively move carbon emission control from the smelting operations to power generation, where it could be most efficiently handled. Without clear and direct information on the future matrix of energy resources that are available, producers will not be able to make efficient decisions as to future plant.

Thus the AusIMM recommend that the Federal Government develop, as a priority, a National Energy Policy that outlines a matrix of electricity sources to be available over the next two decades.

The AusIMM also said that a fully informed and evidence-based debate on the potential of nuclear power in Australia is needed. We do not directly advocate nuclear power, but believe that it would be politically irresponsible to dismiss nuclear power as an electricity source based on historical antipathy. Ultimately a matrix of energy sources (such as carbon with geosequestration, renewables, geothermal and possibly nuclear) will be needed and each must be considered on its merits.

**Policy Recommendations:**

**5.2.1 Develop a National Energy Policy that outlines a matrix of electricity sources likely to be available over the next two decades.**

**5.2.2 Conduct a fully-informed, evidence-based debate on the viability of nuclear power in Australia in a carbon constrained context.**

## **E. SUMMARY OF POLICY RECOMMENDATIONS**

### **1. EXPLORATION**

#### **1.1 Policy Goal: Implement a Flow-Through Share Scheme**

##### **Policy Recommendation:**

- 1.1.1 Implement a flow-through tax credit scheme as a matter of urgency**

### **2. MINERALS R&D**

#### **2.1 Policy Goal: Ensure changes to R&D Tax Concession supports work undertaken by both SMEs and large mining companies**

##### **Policy Recommendations:**

- 2.1.1 Maintain a premium tax level incentive for sustained investment in R&D projects by large companies (i.e. ensure the incentive does not drop below current levels)**
- 2.1.3 Ensure that any amendment definition of R&D remains industry neutral, and does not add additional uncertainty and complexity into the system**

#### **2.2 Policy Goal: Continue support for the CSIRO Minerals Down Under Flagship**

##### **Recommendation:**

- 2.2.1 Ensure CSIRO Minerals Down Under Flagship is sufficiently resourced and focused to continue to produce world class research**

### **3. HIGHER EDUCATION**

#### **3.1 Policy Goal: Provide adequate support for quality minerals-related higher education**

##### **Policy Recommendations:**

- 3.1.1 Establish mission-based compacts with minerals higher education providers in the areas of mining engineering, metallurgy and geoscience**
- 3.1.2 Review the funding formula established by the *Higher Education Funding Act 2003* (Cth) with a particular view to ensuring adequate support for specialist science and engineering courses**
- 3.1.3 An explicit policy commitment to be made that discipline areas of national importance to the economy will be supported at sustainable levels**

### **4. WORKFORCE PARTICIPATION**

#### **4.1 Policy Goal: Increase equitable participation of women in mining through adequate child care support policies**

##### **Policy Recommendations:**

- 4.1.1 Investigate options for returning a greater proportion on child care costs incurred by workers in regional Australia through the tax system**

**4.1.2 Extend fringe benefits tax exemption to all forms of employer sponsored child care**

**4.1.2 Support the creation of child care centres in rural and regional Australia, with operating hours that reflect the actual needs of local employees**

## **5. TECHNOLOGY SUPPORT FOR A CARBON CONSTRAINED WORLD**

**4.1 Technology neutral support for demonstration and commercialisation of step change low emissions technologies**

### **Policy Recommendation:**

**4.1.1 Put in place technology neutral fiscal incentives to ameliorate risk associated with demonstration and commercial development of first-of-a-kind plant or process aimed at substantial emissions reduction**

**4.2 Provide certainty for industry on the future availability of low cost, low emissions base load power**

### **Policy Recommendations:**

**4.2.1 Develop a National Energy Policy that outlines a matrix of electricity sources likely to be available over the next two decades.**

**4.2.2 Conduct a fully-informed, evidence-based debate on the viability of nuclear power in Australia in a carbon constrained context.**