

NATIONAL PEAK MINERALS FORUM

29 April 2010, Australian Museum, Sydney

SUMMARY AND FUTURE DIRECTIONS

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SUMMARY

The National Peak Minerals Forum brought together over 25 stakeholders from government, industry and the research community to discuss the issue of peak minerals in Australia – underlying drivers, the current situation, dominant trends and impacts and the future challenges and opportunities for research, technology and policy.

Building on the report “Peak minerals in Australia: a review of changing impacts and benefits”, the day began with presentations on how peak minerals represents a symbolic change from the current mining of cheap, accessible, easily processed ores, to a future where lower grade, more complex and inaccessible ores remain. Australia’s largest mineral exports are iron ore, gold, copper and alumina, and high-grade reserves are being depleted. Whilst estimating the long-term availability of commodities is difficult, rising production rates shorten resource life, and new greenfields discoveries of high quality ores are not being made. Efficiency gains have offset declining grades to date, but water and energy use is rising. The role of new technology being developed by CSIRO was then explored, including in processing iron ore with phosphorus impurities, using bio-char in steelmaking to reduce greenhouse gases, in heap leaching of nickel laterites and *in-situ* leaching of gold. The impact of the minerals industry on Australia was then discussed, noting the challenges of a stronger dollar and higher interest rates. A sovereign wealth fund was explored as a way to avoid currency appreciation and capture long-term wealth from minerals processing.

There was general acknowledgement that ‘peak minerals’ in Australia will place increasing pressure on the competitiveness of Australian mining, though for most minerals a peak in production had not yet occurred. Turning the discussion toward how best to respond, participants identified four key areas for positioning the minerals industry within a more sustainable Australian economy:

1. **Technological advances** as key factors in the future sustainability of the mining industry.
2. Structures for **long-term decision-making** that can assist the development of effective minerals policy.
3. The establishment of Australia as **minerals services hub**, not simply a quarry for global mineral needs.
4. Ensure impacts from mining are balanced by better and **more even distribution of wealth** from minerals.

Future research in the Mineral Futures Collaboration Cluster will develop quantitative case studies (Fe, Au, Cu, Ni, Li) and build on these stakeholder perspectives to develop strategies for improved resource governance in Australia. These will be explored through multi-stakeholder scenarios processes to be held later in 2010. Further dialogue and research engagement is possible online via a network hosted by ISF at <http://resourcefutures.net.au>.

BACKGROUND TO NATIONAL PEAK MINERALS FORUM

The Mineral Futures Collaboration Cluster (2009-2012) unites five university research institutions all of which have a strong track record of working in the minerals sector, to collaborate with CSIRO on addressing the future sustainability challenges of the Australian minerals industry ([see Mineral Futures Collaboration Cluster](#)).

The National Peak Minerals Forum forms part of the research being lead by the Institute for Sustainable Futures (ISF) at the University of Technology, Sydney on 'Commodity Futures', together with Monash University. This work is investigating the macro-scale challenges, the dynamics, and drivers facing a changing minerals industry in Australia. The ISF research aims to answer the following questions:

- How should Australia manage its mineral endowment to underpin long-term national benefit to 2050?
- How does the phenomenon of peak minerals change the spectrum of impacts, benefits and opportunities for the Australian minerals industry in a global context?
- What data and information is required to inform sustainable resource management?
- What strategies can deliver a vision for an industry embedded within a more sustainable Australia across a range of future scenarios?

Research by other partners in the cluster is focussing on technology futures and regions in transition.

FORUM PRESENTATIONS

The day began with presentations from the following speakers then discussion. All are available to [download](#).

Dr Damien Giurco, Research Director; ISF, UTS and Dr Gavin Mudd, Lecturer; Monash University

Drawing from the report "Peak Minerals in Australia: a review of changing impacts and benefits", this presentation outlined the concept of peak minerals, namely a transition from the processing of cheap/easy ores to more complex and difficult post-peak. Rather than a focus on 'running out' the peak metaphor prompts consideration of the technological, environmental and social impacts arising from processing more complex and difficult ores as additional constraints on mineral production. The presentation concluded that an analysis which evaluates capacity to make a transition, between different sources of mineral products and services, would be useful for understanding the potential for long-term wealth from minerals.

Dr Ian Lambert – Group Leader, Onshore Energy & Minerals; Geoscience Australia

Ian Lambert's presentation engaged directly with the question of declining ore grades and the implications that this might present for Australia. Long and short-term trends for a range of minerals were discussed to raise questions about the extent to which Australia will be prepared for rapid changes in the terms by which the value of our minerals is understood. These included questions about the conventional 'quality' of remaining mineral resources, but also the likelihood that environmental and social impacts for production of particular deposits would become a larger consideration in assessments of mineral quality. Dr Lambert concluded that a peak in some mineral resources could be expected to arise in the event of a failure to reconcile long-term trends with short-term production targets.

Dr Ralph Hackl – Science Director, Minerals Down Under Flagship; CSIRO

The presentation focussed on work by CSIRO within two national research Flagships – Light Metals and Minerals Down Under. Ralph Hackl noted that Australian ores are becoming more challenging to extract and process, with iron ore being a clear example where richer historically rich deposits (e.g. Pilbara) are in decline and research is now focussing on technology development to facilitate processing the abundant deposits of lower quality with phosphorus impurities. His presentation highlighted technologies currently under development for commodities such as gold (in situ leaching) and bauxite/alumina (high silica), and nickel (laterite processing). Dr Hackl concluded that urgent acceleration in the development and adoption of new technologies was needed to avoid peak minerals.

Mr David Richardson – Senior Research Fellow; The Australia Institute

David Richardson presented key points from a paper developed on the macroeconomic implications of a peak in Australia's mineral resources. The presentation noted Australia's comparatively new, but strong, reliance upon minerals for export earnings, and the precariousness of Australia's economic position where high values for commodities are not maintained. The presentation concluded that improvements to the investment of revenues in a sovereign wealth fund from minerals would play a key part in ensuring a long-term benefit.

WORKSHOP PROCESS

The workshop was divided into three general sessions following the introductory presentations.

Participants were first asked to exchange their experience of a sustainability innovation from the mining industry in Australia with another member of the group. This exercise aimed to draw from the group a broad range of stories that would indicate how the minerals industry has acted to implement innovation for greater sustainability, and to build on these innovations to ensure the sustainable development of the industry.



The next step involved sharing these experiences of positive changes in the mining sector and the factors that contributed to success of the innovation. This session aimed to identify patterns of success in relation to different innovations: What themes were common in innovation and success? Did any innovations arise more than once in the group, and were the same or different success factors identified by different people? The groups were also asked to identify visions associated with 'a minerals industry that sits within a sustainable Australian economy', and the priority actions that must be taken to reach these visions.

Table 1, below, provides several illustrative examples of sustainability innovations identified by workshop participants and the root causes of their success.

Table 1: Sustainability innovations and their primary cause of success.

Sustainability innovation	Enablers of success
Alumina residue used in road construction.	Passionate teams; team composition and inter-disciplinarity; embracing change.
Community engagement requirement for mining in Victoria.	Growing recognition of the Social License to Operate; Industry leadership; community pressure.
Carbon-in-pulp process for gold recovery.	Increasing value of gold; cost effectiveness.
Sustainable product design.	Driven by scarcity where necessity drives innovation; government policy/legislation.
Nickel laterite processing.	Declining high-quality sulphide ores; technological advancement; R&D investment.

The final stage engaged the group to select four priority actions (from a larger list in Table 2) which would contribute to realising these visions. These were discussed further in small groups, with each group asked to identify barriers to adoption of the vision, and gaps that needed to be addressed for the vision to be realised. The groups also identified what future changes or opportunities might influence the realisation of the vision. Lastly, groups established ideas and active strategies that would help to achieve the desired vision. Table 3 highlights the four priority actions voted on by participants.

KEY ISSUES AND CHALLENGES

A large part of the workshop focussed on identifying priority actions to take if the Australian minerals industry were to be situated within a sustainable Australian economy. This section provides a synthesis of all the actions identified by the groups (Table 2). It also summarises those actions the group collectively voted on to explore more deeply in relation to barriers, enablers, and strategies for their realisation. It should be stressed that those actions summarised in Table 3 were singled out for the purposes of the exercise conducted during the workshop as being high priority, but we are not seeking to limit our research efforts to these areas alone.

Priority actions to position minerals industry within a sustainable Australian economy

Table 2: Priority actions identified by participants.

Establishment of clear incentives that can support industry developments towards sustainability.
Extensive R&D into mine site remediation. Development of less intrusive mining techniques (e.g. keyhole mining). Technology designed now that meets the needs of the future
More efficient extraction of minerals from co-deposit mines.
Legislative or market-based mechanisms to improve production efficiency.
Development of business models around resource custodianship.
Higher use of waste streams; value drawn from waste via reprocessing/recycling.
Localisation of society around resource flows.
Nationally coordinated research to foster ecological analysis, systems thinking, philosophy to guide decision-making.
Investment in R&D for technologies to help Australia to out-compete countries whose competitive advantage lies in value adding (e.g. Low-cost labour in China).
Sector mind-set change from production to service establishment (e.g. minerals custodianship).
Increased government involvement in diversification of the economy.

Small group exploration of selected priority actions

From the priority actions outlined in Table 2 above, four overarching actions were selected by the group to examine in more detail.

1. **Technological advances** as key factors in the future sustainability of the mining industry.
2. Structures for **long-term decision-making** that can assist the development of effective minerals policy.
3. The establishment of Australia as **minerals services hub**, not simply a quarry for global mineral needs.
4. Ensure impacts from mining are balanced by better and **more even distribution of wealth** from minerals.

Groups were asked to consider: a) the barriers that might impede progress in the areas identified b) the opportunities that action might present in the future, and c) the factors that might enable progress in the areas identified; and lastly, strategies that might be adopted to support these actions (see Table 3). Deeper exploration of the actions listed below was limited due to the limited time frame available for the discussion.

There were several common factors that played out in the barriers, enablers and strategies explored for each of the priority actions. In the case of the barriers, political short-termism was seen as a major factor preventing their realisation. Effective government policy and regulation, plus political transparency were seen as key factors that could enable the realisation of priority actions. A re-evaluation of resource value, better engagement of all stakeholders in decision-making, and shared responsibility between governments and industry in mining activities were identified as important strategies for ensuring priority actions are realised.

Table 3: Deeper exploration of key priority action themes from small group discussions.

	Barriers	Enablers	Strategies
Technological Advancement	<ul style="list-style-type: none"> ▪ Lack of alignment of economic incentives with technological outcomes. <ul style="list-style-type: none"> ○ Slow take-up of current research. ▪ Commonwealth-State fragmentation. <ul style="list-style-type: none"> ○ Lack of innovation in policy drivers. ▪ Short-termism in project funding. 	<ul style="list-style-type: none"> ▪ Policy instruments must match technological developments. ▪ Mechanisms to maintain and generate commitment to technologies. <ul style="list-style-type: none"> ○ Sustainability reporting. 	<ul style="list-style-type: none"> ▪ Research model technology trends. ▪ Challenge industry and governments to: <ul style="list-style-type: none"> ○ Adopt best practice as articulated by this research; ○ Engage with Industry, think tanks and NGOs to achieve multidisciplinary insights.
Structures for long-term decision making	<ul style="list-style-type: none"> ▪ The mining industry as a short-term source of economic gain. ▪ The difficulty associated with value adding to production. ▪ Structures to embrace environmental and social considerations are weak. 	<ul style="list-style-type: none"> ▪ Long-term planning with cyclical approach. ▪ Embrace natural advantage: mine/farm leading service provider. ▪ Many environmental scientists employed in mining. ▪ Greater transparency in govt processes. 	<ul style="list-style-type: none"> ▪ Plan for high, medium and low road scenarios in future. ▪ Investment in the down time as well as boom <ul style="list-style-type: none"> ○ Education ○ Data collection ▪ Ministerial Council as key mechanism to facilitate industry/govt collaboration ▪ Re-evaluation from government in terms of how resource use fits into national policy.
Australia as a services hub, not a quarry	<ul style="list-style-type: none"> ▪ Does downstream processing actually = value-adding? ▪ Comparative advantage still in exporting raw materials? ▪ Mining the best first to repay investment sacrifices future long-term production. ▪ Short-term government decision-making? 	<ul style="list-style-type: none"> ▪ Regulation by government ▪ Diversification of the economy ▪ Value-adding smoothes out boom and bust through sector diversification ▪ Technological exportation ▪ Development of local processing 	<ul style="list-style-type: none"> ▪ Prove the business case for value-adding through a future fund? ▪ Export technologists, not just technologies. ▪ Provide incentives for downstream processing. <ul style="list-style-type: none"> ○ Future fund to support diversification of economy. ▪ Not only going after high-grade ores first to ensure long-term production.
Balancing impacts from mining by better wealth distribution	<ul style="list-style-type: none"> ▪ State/Fed conflict about impacts and benefits and the timeframe over which these are understood. <ul style="list-style-type: none"> ○ Geographical considerations of where impacts and benefits are experienced. ▪ Lack of: <ul style="list-style-type: none"> ○ community engagement ○ value adding. ▪ Basic premises upon which mining may be thought of as 'sustainable'. ▪ Understanding of what 'benefit' is to different groups. 	<ul style="list-style-type: none"> ▪ Investigate different models for sovereign wealth funds, <i>e.g.</i> Norway. ▪ Maximise benefits to regions and differentiate between 'local' and 'total' community benefits. ▪ Develop community engagement in decision-making. ▪ Reassess how site maintenance and remediation are conducted. ▪ Human capital development. ▪ Changes to investment structures and regulation 	<ul style="list-style-type: none"> ▪ Harmonise responsibilities and improve coordination. ▪ Changing investment policy to reduce negative impacts. ▪ Early engagement of communities and increased authority in mine establishment. ▪ Changes to manufacturing and commercialisation policy – funding mechanisms to move projects from research to demonstration. ▪ Shift burden of proof to the operator who must demonstrate that they are leaving the site as they found it. ▪ More engagement between universities and industry including secondments of academics and placement of students to industry.

FUTURE RESEARCH

Mineral Futures Collaboration Cluster

As stated earlier, this work in peak minerals is part of the Commodity Futures stream in a broader program of research supported by the CSIRO's Minerals Down Under Flagship. The broader program of work consists of three integrated projects running from 2009-2012:

- Commodity Futures – investigating the macro-scale challenges, dynamics and drivers of change facing the Australian minerals industry through scenarios and monitoring of peak minerals [Institute for Sustainable Futures, UTS with input from Monash University]
- Technology Futures – investigating the potential social and environmental impacts of, and community responses to, innovative new technologies being developed through the Minerals Down Under Flagship [Centre for Social Responsibility in Mining, The University of Queensland].
- Regional Futures – addressing the inter-linkages between social and economic impacts of new mining technologies at a regional level emphasising land use change in sensitive environmental settings [Curtin University of Technology, CQ University, The Australian National University]

ISF Research in Commodity Futures building on the National Peak Minerals Forum

Outputs from forum will contribute to ISF's two main areas of research.

1. Mineral Futures Scenarios

Our research at ISF will now focus on how Australia can remain a competitive arena for minerals and metals whilst delivering long-term national benefit. It is expected to articulate what the implications of sustainability are for Australian resource extraction and processing: with respect to global production and consumption cycles, the national economy, communities in mineral-rich regions and urban centres. This requires a deliberative, collective response to how our mineral endowment can deliver national benefit across a range of *future scenarios* to 2050. Such scenarios will be developed through multi-stakeholder dialogue and be influenced by factors including changing demand, declining ore grades, the role of peak minerals production, new technology, climate change and industry's social licence to operate. In order to ensure our research is related to global processes already being explored, scenario development link to those from the World Economic Forum Mining and Metals Scenarios (<http://www.weforum.org/en/initiatives/Scenarios/MiningandMetalsScenarios/index.htm>) but also build on these with additional Australia-specific scenarios (later in 2010) drawing on the results of the National Peak Minerals Forum; guided by sustainability principles and seeking national benefit from our mineral resources.

2. Peak Minerals

The next step in this stream of the research will be to answer the question of what data and information is required to inform sustainable resource management? The ISF and Monash University will collect data for a range of strategically important minerals (e.g. Iron, Gold, Copper, Nickel, Lithium) and develop a database that can be used to inform 'peak monitoring'. This information will be the first stage in the process of establishing mechanisms to track peak minerals, and to provide a factual base on which to build mineral governance structures.

HOW WILL STAKEHOLDERS INPUT TO THIS PROCESS

Participants and other interested stakeholders are welcome to continue the dialogue concerning the issues raised at the Forum online at <http://resourcefutures.net.au>. In particular, it is hoped that continuing involvement will help to identify mineral resources suitable to the project of long-term production trends, and the associated impacts for case study commodities.

The establishment of a 'Mineral Futures Reference Group' will also provide a more direct avenue for stakeholders to shape the research and outcomes of ISF work.