Peak Minerals: mapping sustainability issues at local and national scales

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Auckland, 25 June 2010
 Quarry no more: calls for export diversity

MARK COLVIN: As the Rio Tinto staff are tried in China one of the Federal Government’s most senior ministers has raised worries about

Villagers fuming after their common is handed to mine

NICK O’MALLEY, INVESTIGATIONS
April 16, 2010

Falling reserves and rising costs to end South Africa’s golden age

Carol Mortished, World Business Editor

South Africa’s remaining gold reserves are less than half existing estimates and the cost of bringing the dwindling resource into production may be far more than its value, a new report has found.

COAL
India keen to buy Australian mines

New pricing system a bonanza for Fortescue Metals with 19% increase

Ignoring future no way to spend boom

JESSICA IRVINE Economics Writer for The Sydney Morning Herald.
April 16, 2010

Excess stock and strong dollar flatten sales
Miners face ‘inevitable decline’: AIG

Nick Evans
Tuesday, 27 April 2010

THE Australian Institute of Geoscientists has continued its push for a flow-through share scheme in the forthcoming federal budget, saying today Australia’s mining sector faces an “inevitable decline” if steps aren’t taken to encourage more greenfield exploration.

In a report released to day, Market Failure in the Australian Mineral Exploration Industry: The Case for Fiscal Incentives, the AIG says Australia’s current precious and base metals mining production is increasingly reliant on a small number of major deposits which are largely “mature” and in decline, presenting a clear threat to mine production and, in turn, the export earnings of the Australian economy.

Authored by exploration geologists Chris Cairns (Integra Mining), and Dr Jon Hronsky (Western Mining Services) along with mineral economist Richard Schodde (MinEx Consulting), the report says that Australia’s gold and base metals mining industries are not sustainable in the long term.
Overview

1. Background to **Mineral Futures** Collaboration Cluster

2. Overview of **peak minerals metaphor**
   - Challenges and opportunities
   - Case studies

3. Reflections on the role for **technology and policy**

4. **Future research** directions
1. **Peak minerals**
   - Profile impacts: social, environmental
   - Dynamics & indicators to inform response
   - What role for technology and policy?

2. **Foresight**
   - Future scenarios and visions for the minerals industry in a sustainable Australia
   - Link scenarios to technology (P2) and regional futures (P3)

Resource governance for long term benefit
Peak Oil: Hubbert curve a useful metaphor

Energy Services
Peak minerals metaphor: from easy/cheap to complex/expensive

lower costs/impacts*
higher ore grades
shallower mines
simple ores
low mine waste

higher costs/impacts*
lower ore grades
deeper mines
complex/refractory ores
more mine waste

*costs and impacts are social, economic, environmental

Source: adapted from Giurco et al. 2010, Peak minerals in Australia
Peak minerals: Copper - Australia

Source: Mudd and Ward 2008
Are we running out of copper? No!

Source: adapted from Mudd and Ward, 2008
Ore grades declining and waste rock rising: Example of Copper

Source: Mudd, 2010
Energy consumption in mining: intensity is rising

Source: ABARE, 2008 Trends in Energy Intensity in Australian Industry
Peak minerals: Gold - Australia

Source: Mudd and Ward 2008
Multiple peaks: Gold- Australia

Source: J. Laherrere
SUMMARY

To position the minerals industry within a sustainable economy:
1. Technological advances
2. Structures for long term decision making
3. Australia as mineral services hub
4. Impacts balanced by better distribution of wealth
Peak minerals: what role for technology?

Source: Peak Minerals in Australia: a review of changing impacts and benefits, 2010
Responding to peak minerals: realising value from recycling technology

Source: Bolliden 2008
Peak minerals: what is the impact of environmental factors?

Source: Giurco et al 2010

Mineral futures collaboration cluster
Peak minerals: what is the impact of environmental factors?

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Peak minerals: what is the impact of environmental factors?

Source: Giurco et al 2010
How will technology & policy affect social issues?

Source: Giurco et al 2010

Mineral futures collaboration cluster
How will technology & policy affect social issues?

Source: Giurco et al 2010

Mineral futures collaboration cluster
Implications

Declining access to quality stocks

- “While current mineral resource stocks are reasonably healthy, declining resource lives show they are not adequate to sustain strong increases in production”
- “Emerging concerns about peak minerals are not alarmist”

_Ian Lambert, Geoscience Australia, National Peak Minerals Forum 2010._

Addressing rising energy needs (and water ....)

- Minerals-energy nexus – material needs for a renewable energy future (copper, lithium etc) and energy needs for a more sustainable minerals industry (e.g. solar thermal or other renewable)
- New technology will play a significant role, but not exclusively

Environmental and social cut off grade / genuine savings

- When do the social and environmental costs outweigh the benefits?
- How can mineral resources be used to underpin long term national benefit?
Further research

Data
- Quantifying peak minerals and developing indicators

Framework
- Availability
  Criteria 1. Geological characteristics and distribution
- Addiction
  Criteria 2. Centrality and criticality in economic and other systems
- Alternatives
  Criteria 3. Substitutability and recoverability

Which technologies and policies will moderate or exacerbate challenges of peak minerals? Which offer opportunities to realise future value?
For further information

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