Mining and sustainability: experience from Australia

Mendoza, 17 April 2014

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Summary

• Mining generates strong and sustainable benefits for Australia
  ● Exports, revenue, business, employment, technology transfer

• Australia faces difficult issues relating to mining, agriculture, community and governance
  ● E.g., land, water, social licence, cross-sectoral impact, competitiveness

• We have made mistakes, learned, and defined pathways to resolve issues and maximise benefits

• Mining, agriculture and other sectors co-exist, mostly harmoniously and synergistically

• We must continually improve to meet changing stakeholder expectations and respond to new knowledge

• Australia is very happy to share what we have learned and continue to learn
Outline

• Mining and sustainability overview
• Australian mining and mining services sector
• Governance of mining, agriculture and water in Australia
• Managing issues of sustainability
• Water management issues and approaches
• Mining and local economic development
• Some tools and frameworks
• Building education, training and research capacity
Stage 1: Only revenue maximising
Stage 2: Efficient - Enhancing performance through individual activities
Stage 3: Effective - Improve benefits and performance through the connectivity with environments, communities and industry
Stage 4: Sustainable - Embedding sustainability in all decision making and business practices to consider the economic and environmental needs of current generations without compromising the needs of future generations
Australia’s minerals and energy markets remain strong...

Major iron ore exporters

Major thermal coal exporters

Australian LNG production

55 per cent of worldwide LNG capacity is under construction is located in Australia. By 2015-16, Australia’s LNG exports are forecast to increase to 41 million tonnes, an increase of 126 per cent from 2010-11.
Volumes, prices & values of key exports

<table>
<thead>
<tr>
<th>Commodity</th>
<th>2011-12</th>
<th>2012-13</th>
<th>Volume %</th>
<th>World Price %</th>
<th>Value %</th>
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</thead>
<tbody>
<tr>
<td>Iron ore and pellets</td>
<td>A$53.2b</td>
<td>A$63.0b</td>
<td>8%</td>
<td>27%</td>
<td>-16%</td>
</tr>
<tr>
<td>Metallurgical coal</td>
<td>A$26.0b</td>
<td>A$30.7b</td>
<td>12%</td>
<td>-28%</td>
<td>-15%</td>
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<tr>
<td>Thermal coal</td>
<td>A$19.0b</td>
<td>A$17.1b</td>
<td>14%</td>
<td>-11%</td>
<td>11%</td>
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<tr>
<td>Gold</td>
<td>A$16.5b</td>
<td>A$15.4b</td>
<td>5%</td>
<td>-4%</td>
<td>7%</td>
</tr>
<tr>
<td>LNG</td>
<td>A$16.3b</td>
<td>A$12.0b</td>
<td>21%</td>
<td>12%</td>
<td>36%</td>
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<tr>
<td>Crude oil</td>
<td>A$13.3b</td>
<td>A$13.3b</td>
<td>3%</td>
<td>2%</td>
<td>0%</td>
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<tr>
<td>Copper</td>
<td>A$9.1b</td>
<td>A$8.5b</td>
<td>10%</td>
<td>-4%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: Bureau of Resources and Energy Economics
The ‘new normal’ minerals market is still okay, but competitiveness is vital to maintaining growth...

Australia is well located to supply Asia with mineral and energy products
It’s not only about mining: other growth drivers

1. Corporate shift to Australia
2. Service and technology sector growth
3. Trade and foreign investment
4. Agriculture and food sector growth
Australia’s engineering and construction challenge – the largest investment wave since the 1800s gold rushes*

*Reserve Bank, Australia

**WA & NT projects to 2016: USD220 billion+**

Offshore petroleum basins

Pilbara Region
LNG, iron ore, infrastructure

Mid West Region
Iron ore, gold, uranium, nickel,

South West Region
Alumina, mineral sands, gold

Goldfields Region
Gold, nickel, iron ore

**South Australia projects to 2016 USD10 billion+**

Gladstone and North West Economic Triangle
Base metals, bauxite-alumina

**Queensland projects to 2016: USD100 billion+**

Bowen, Surat and Galilee Basins
Coal, CSG, LNG

New South Wales
Coal, gold, base metals

*Reserve Bank, Australia
Western Australia case: investment will result in decades of increased production with lower volatility

Historic and forecast production value* for WA's key resources

Source: ACIL Tasman analysis

* At ten year average prices
Economía de recursos en Australia: mayor a lo que se había medido tradicionalmente

**Valor Añadido Bruto – economía de recursos 2011-12**
Cuota de VAB nominal, año fiscal.
*(ha crecido más del doble en los últimos 10 años)*

18% de VAB

11.5% **directamente** de la extracción y el procesamiento
6.5% **de otros sectores** que proporcionan insumos

**Empleos generados por la economía de recursos 2011-12**
Cuota de empleo total, año fiscal.

10% de empleo

3.25% **directamente** de la extracción y el procesamiento
6.75% **de otros sectores** que proporcionan insumos

Fuente: Rayner & Bishop, Reserve Bank of Australia, 2013
La industria minera y de exploración australiana ya es internacional - como la dimensión de negocios de los intereses estratégicos de Australia

- Canadá: 33 compañías
- Estados Unidos: 42 compañías
- Europa: 53 compañías
- Asia: 31 compañías
- Filipinas: 19 compañías
- Indonesia: 47 compañías
- China: 16 compañías
- Papúa Nueva Guinea: 25 compañías
- Mongolian: 19 compañías
- Laos y Camboya: 14 compañías
- África: 220 compañías
- Latinoamérica: 94 compañías
- Filipinas: 19 compañías
- Papúa Nueva Guinea: 25 compañías

Fuente: SNL Metals and Mining / ASX 2013
Las empresas METS australianas son ahora importantes exportadoras de equipos, tecnología y conocimiento

$27bn
EN EXPORTACIONES DE LAS COMPAÑÍAS METS ENCUESTADAS

Fuente: Austmine 2013
Australia and its States and Territories

‘A nation of colonies’

‘The lucky country’
Government in Australia

- Consists of:
  - Commonwealth
  - States (six plus two Territories)
  - Local Government

- Government responsibilities:

**Commonwealth:** international obligations and treaties; uranium mining; environmental issues of national significance; indigenous issues and Native Title; corporations law; tertiary education

**State:** mineral leases; environmental (including social) assessment, approvals and regulation; mining operational aspects (e.g. health and safety); water policy and regulation; regional planning; infrastructure; mineral royalties; education and training

**Local:** provision of services; local planning and approvals

Coordinated: investment attraction; minerals and energy policy; water policy; environmental assessment and approvals; local content
Mining-relevant government departments

- **Australian Government**
  - Department of Industry (industry policy, geoscience, offshore petroleum, uranium)
  - Department of the Environment (environment assessments and approvals for matters of national significance)
  - Department of Education (universities)
  - National Water Commission (coordination of water policy and management)
  - Infrastructure Australia (coordination and prioritisation of infrastructure)

- **State example - Queensland**
  - Department of Natural Resources and Mines (exploration, mining, oil and gas – promotion and regulation)
  - Department of Environment and Heritage Protection (project assessment and approvals; regulation and oversight)
  - Department of State Development, Infrastructure and Planning (investment attraction and coordination, major projects, infrastructure)
  - Department of Education, Training and Employment (Vocational education and training)
  - Department of Energy and Water Supply (water management and regulation)

- **State example - Western Australia**
  - Department of Mines and Petroleum (exploration, mining, oil and gas – promotion and regulation)
  - Environmental Protection Authority (project assessment and approvals)
  - Department of Environment and Conservation (operations regulation and oversight)
  - Department of State Development (investment attraction and coordination, major projects, infrastructure)
  - Department of Training and Workforce Development (VET)
  - Department of Water (water management and regulation)
Water, mining and agriculture

• Australia is the second driest continent on Earth

• The Australian mining sector uses 4% of national water resources
  ● but can be a significant water user at a local and regional level
  ● coal seam gas production will increase water usage in agriculture regions

• Agriculture uses 65% of national water resources
  ● any increase in agricultural production is constrained by water availability
Water management in Australia (1)

- Australia is the second driest continent on earth
  - In several regions, we have a drying climate

- Three of the largest sectors of the economy – mining, energy and agriculture – are water intensive
  - The community also uses a lot of water

- The world has an interest in how Australia manages its water
  - Global food security and energy security are connected to water security

- Need to understand the full value of water to industries and communities
  - A vital input to economy and lifestyle

- Need to use water efficiently and allocate it to highest unit value uses
Poor water management in the past has led to poor outcomes

- Decisions based on poor information - not understood the consequences
- Inconsistent water planning between jurisdictions and between user sectors
- Over-allocation of water so that more is used by agriculture, mining and communities than is sustainably available
- Poor management of streams, groundwater and land: pollution, land degradation, ecosystem damage
- Low understanding of links between different water sources, of interactions of water with energy, vegetation and types of agriculture; and cumulative impacts of activities
We have learned a lot, applied the lessons, taken difficult decisions and innovated

- Now on the journey to achieving sustainable water management


- Improves water planning, management and allocation to benefit all – ecosystem, communities, industry, economy
- NWI principles: valuing water, preserving it, trading it, using it efficiently and seeking maximum utility from it
- 70 reform actions to manage water sustainably for all users
- Provides greater certainty and transparency, and builds trust

Key features

- Promotes integrated management
- Water allocation plans
- Secure water access entitlements
- Water markets and trading
- Regulatory arrangements that are clear, transparent and efficient, and set out roles and responsibilities
Water management in Australia (4)

• National Water Initiative is well accepted and trusted by stakeholders
  ● Reassures the public and other sectors that sectors can operate safely, appropriately and bring benefits without harm

• National Water Commission has drawn two key lessons:
  ● Water needs to be managed by cooperative action among a wide range of parties whose interests will not always be aligned.
  ● Single integrated management framework:
    – provides a connecting point for competing users
    – works across boundaries of jurisdictions
    – works across sectors
Australian mining industry and water

• Mining industry uses innovative and sophisticated technologies in management systems, recovery, recycling and beneficial use and re-use of waters
• Uses a risk management approach to ensure that climate variability is factored into planning
• But the industry needs to better understand water and its critical value to all parts of its business
• Community and other users have misapprehensions about the impact of mining on water – 2006: Strategic Water Management in the Minerals Industry promotes a strategic approach to water management so that water is better managed and valued as a vital asset for all
• 2014: Water Accounting Framework for the mining industry: consistent and transparent approach to measurement
Australian agriculture and water

- Australia already produces enough to feed around 60 million people each year, and exports around 55% of food production
  - But any increase requires better use of water

- Off-farm irrigation infrastructure improved to reduce water losses – eg, pipelines to replace canals

- On-farm irrigation infrastructure in Australia more efficient and innovative – eg, drip irrigation, soil moisture monitoring

- Agricultural practices improved and new crop varieties introduced

- Water pricing promotes efficient use and facilitates water allocation buy-backs
Mining project assessment, approval, regulation and impact management

- Environmental and Social Impact Assessments – fully transparent; draft reports open for comment; final reports respond to comments
- Economic Impact Assessments are optional but usual for major projects
- Environmental Management Plans for all projects
- Social Management Plans for major projects
- Australian Industry Participation Plans for major projects
GDP contribution of Mining Equipment, Technology and Services (METS) sector has grown faster than mining’s

- **METS output** is growing at 15 to 20% a year
  - 4% of national output in 2002-03
  - 8.4% in 2011-12
  - Est. 9.4% in 2012-13

**METS** contribution to **GDP**
- 6.7% in 2010-11

Many METS are knowledge- and technology-intensive

Source: Australian Treasury and Ed Shan / Minerals Council of Australia 2012
METS is now a very important industry sector to Australia

$ Revenue from the Minerals and Mining Business

$90 Billion

Size of Companies' Revenues ($M, FY11-12)

- $500m+: 10.5%
- $100m-$499m: 12.1%
- $30m-$99m: 14.7%
- $5m-$29m: 30%
- <$2m: 16.4%
- Not reported: 3%

Total No. of Australian Employees from Companies Surveyed

386,000

Mining Lifecycle

- Most METS companies were established in the last... 30 Years
- Percentage of businesses involved in each phase of the mining lifecycle:
  - Operations: 78.2%
  - Design & Construction: 59.2%
  - Feasibility: 17.1%
  - Remediation: 18.5%
  - Exploration: 22.1%
- 46% of companies work in more than one phase, making them extremely flexible

Source: Austmine
...with deep links into the economy

Suppliers Chain

WHERE METS SUPPLIERS ARE LOCATED (%)
- Local (<25km)
- Regional (25–200km)
- State/Territory
- Australia
- Imported

22% of suppliers are offshore

24% sourced locally

19% 13% 22%

NO. OF SUPPLIERS TO METS COMPANIES SURVEYED
23,000

Source: Austmine
Employment growth: driven by mining, but more than just mining jobs – Western Australia example

Source: CCIWA: Building Western Australia’s Workforce for Tomorrow, June 2010
**Taking a broad view: indirect and induced benefits**

**Economic output from mining operation**

**Direct**
- Purchasing expenditure for local goods and services
- Payments to employees

**Local manufacturer or service provider**
- Income of dealer’s employees
- Taxes paid by dealer to the Government

**Local dealer**
- Income of dealer’s employees
- Taxes paid by dealer to the Government

**Indirect**
- Subsequent backward expenditure for local goods and services along the supply chain
- Income of supply chain employees
- Taxes paid by suppliers to the Government

**Induced**
- Household consumption as direct and indirect employees spend their income within the local economy

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In Australia, for every $1 of mining revenue, 40¢ is spent on goods and services: Reserve (Central) Bank

Adapted from Saipem 2011
Case study: Kalgoorlie, Western Australia

- Mining town since 1900s –
  - Gold, nickel sulphide and nickel laterite – long life operations and evolving industry
- 600 km east of Perth
- Region’s population 45,000
- Mining services developed initially because of remoteness
- Strong regional METS clusters (sectoral and geographic)
  - ~200 manufacturing & services sites
- Now a net ‘exporter’ of mining equipment and services to other locations
Case study: Darwin, Northern Territory

- Australia’s most northern and isolated city
  - Major service centre for mining, oil and gas, defence and marine sectors
- Population 110,000
- Mining services developed initially because of remoteness
- Now has a competitive advantage in mining and petroleum services
- Strong regional METS clusters (sectoral and geographic)
  - ~300 manufacturing & services sites
  - Collaborative business culture
- Exporter of METS to other locations, including Indonesia
Kalgoorlie and Darwin: Factors of success

- Long-life customer mining/petroleum operations; diverse markets (Darwin – sector diversity; Kalgoorlie – geographic diversity)

- **Good business and community infrastructure**: serviced industrial land, roads, energy, water, community

- **Skilled resident workforce**: sustainable demographic profile; attractive town amenity

- **Education and training institutions**: public and private secondary schools, and vocational training and education; universities / school of mines (Kalgoorlie)

- **Strong entrepreneurship culture**, support networks, business services

- **Financial institutions** that understand mining and services

- **Supportive, light-handed government interventions**, eg: industry participation policies; partnerships with business to connect customers and suppliers; small business support
Kalgoorlie and Darwin: overcoming obstacles

- Collaborations to overcome small scale and lack of capacity
- Right size contracts and alliances to help build local firms
  - some operations have adopted ‘inside-out’ strategies to help employees become independent services suppliers
- Revise e-procurement and payment processes for small firms
  - companies offer access to global supply chains for good performers
- Government-business partnerships to build supplier-customer linkages, eg
  - Australian Industry Participation National Framework
  - Industry Capability Network; Project Connect
- Infrastructure to support business
  - Government investment and facilitation of business infrastructure through PPPs
People are Australia’s most important asset
Focus on attracting, developing and retaining high-quality talent, not just a focus on hard infrastructure

Education and training institutions: key infrastructure assets
- Crucial to dealing with challenges and opportunities of the 21st Century
- Advanced education integrated with research

Complementary to traditional infrastructure
- Knowledge-intensive and knowledge creating
- Adaptable and capable to deal with uncertainty and to engage with the emerging new global economy

Public sector and industry collaboration
- e.g. Technical colleges; SKM Learning Centre, GE Energy Learning Centre; University research and teaching centres (Rio Tinto, BHP, Chevron, Shell)
- Knowledge spillovers: trained workers move between projects and firms, taking skill set and culture with them

Integrated policy on industry, education and training
Some tools to guide sustainable mining
Los siguientes manuales están disponibles en español:

- Compromiso y Desarrollo con la Comunidad
- Cierre y Terminación de Minas
- Rehabilitación de Minas
- Responsabilidad Ambiental
- Trabajar con Comunidades Indígenas
- Gestión Hídrica
- Guía Para el Desarrollo de Prácticas Innovadoras Sostenibles en la Minería
Mining: Partnerships for Development Toolkit
- International Council on Mining and Metals (ICMM)

• Systematic and objective way to quantify and agree ways to enhance mining’s economic and social contribution
'Mineral Value Management' tool tests expectations across 7 dimensions of value: World Economic Forum

1. Fiscal (tax, royalties etc.) & legal / regulatory environment
2. Employment & skills
3. Environment & bio-diversity
4. Social cohesion, cultural and socio-economic
5. Procurement & supply industry
6. Beneficiation & downstream industry
7. Infrastructure

Direct Mining

Diversification & Multiplier Impacts
Value driven by 2 types of factors

<table>
<thead>
<tr>
<th>Structural</th>
<th>Enabling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inherent nature of a country &amp; its resource base and the extractives industry</td>
<td>Structure &amp; capacity of government and institutional environment</td>
</tr>
<tr>
<td>Country's current stage of economic development and maturity of minerals industry</td>
<td>Capacity &amp; willingness of private sector</td>
</tr>
<tr>
<td>Structure &amp; capacity of government and institutional environment</td>
<td>Levels of trust &amp; collaboration and influence of stakeholders</td>
</tr>
</tbody>
</table>

Source: World Economic Forum
Fair contracts
The benefits of mineral resources will remain elusive if governments and mining companies strike deals that are one-sided and narrowly focused.

Responsible conduct of mining
Even the benefits of fair contracts can be undone if mining is allowed to be conducted irresponsibly.

Optimal use of resource wealth
Ultimately responsibility falls on the Government to ensure that citizens are better off because of minerals are harnessed for sustainable development.

Source: World Bank