



## Australian Alliance to Save Energy (A2SE) Doubling Australia's Energy Productivity

### Energy in Mining

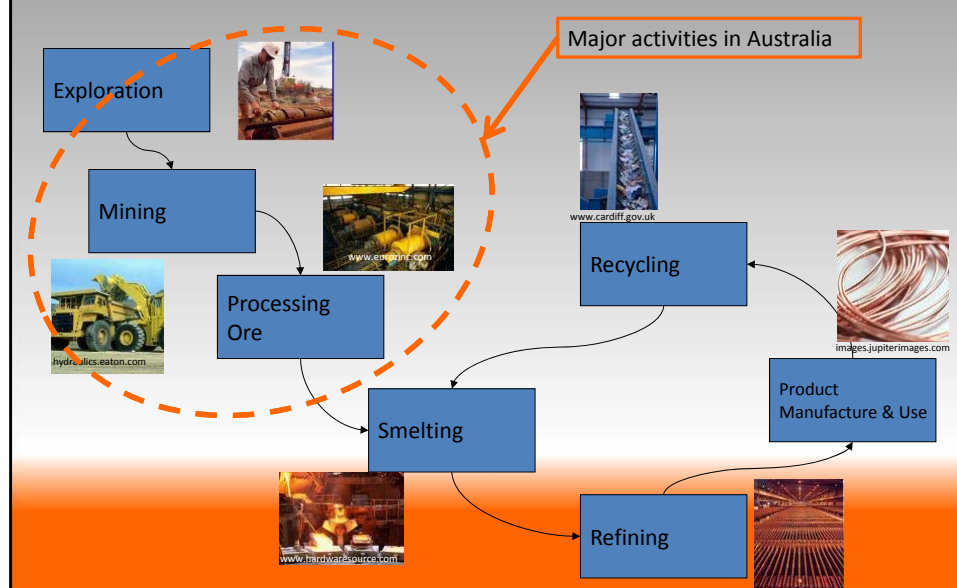
**Glen Corder**

Principal Research Fellow  
Sustainable Minerals Institute  
University of Queensland

CEEC - A not-for-profit company, supported by industry donations



## Mining Life Cycle



# Mining



**Open Cut Mine**

From <http://www.mining-technology.com/projects/cadiavalley/cadiavalley3.html>

From <http://www.newcrest.com.au/our-business/technology/mining-technology/>



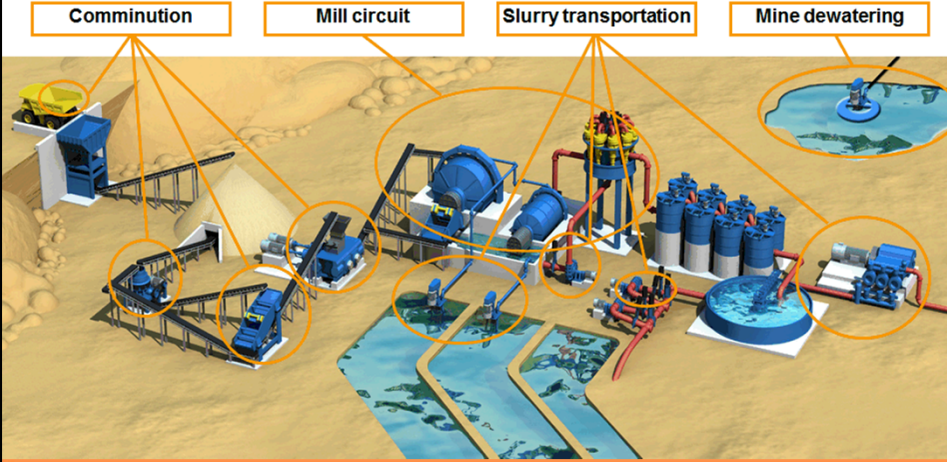
# Minerals Processing

Comminution

Mill circuit

Slurry transportation

Mine dewatering



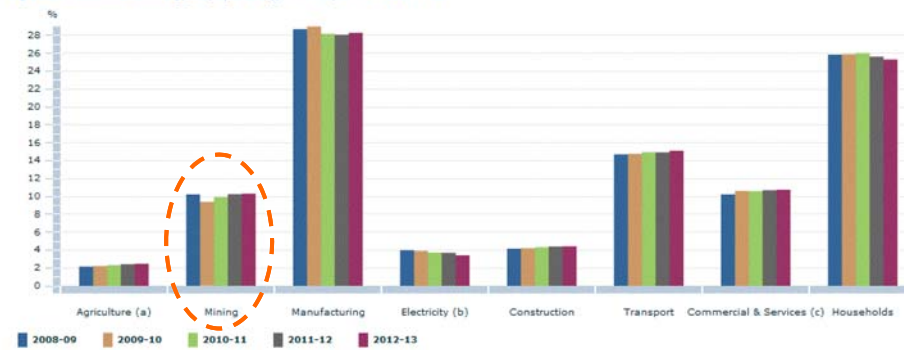
Acknowledgements to Weir Minerals

## Net Energy Usage



Australia's domestic energy consumption 4,139 PJ in 2012-13,  
an increase of 57 PJ from 2011-12.

Figure 1.5 - Domestic net energy use, by industry, Australia, 2008-09 to 2012-13

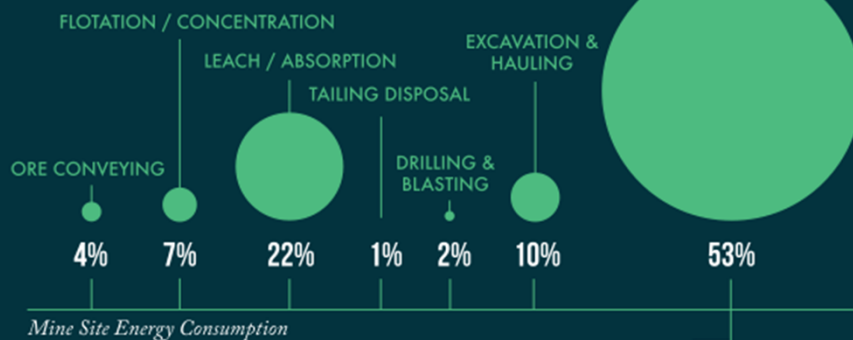


From <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4604.0>

## Energy Usage

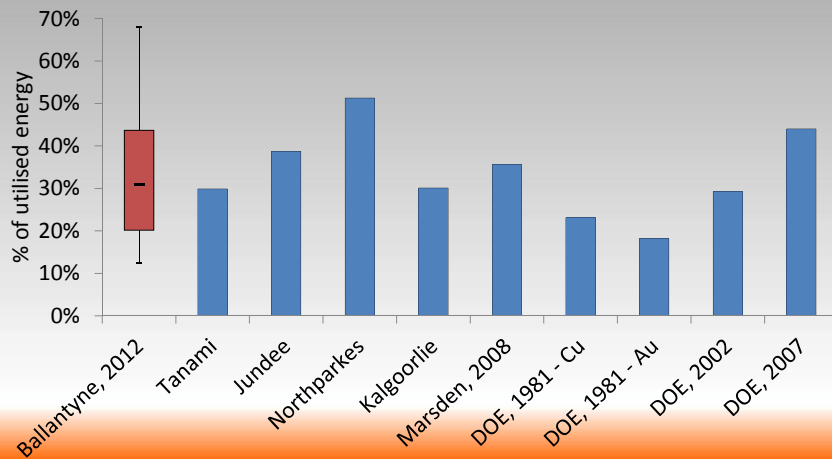


**THIS PROCESS OF GRINDING AND CRUSHING ORE - COMMINUTION - IS ON AVERAGE THE HIGHEST ENERGY STEP IN MINING.**



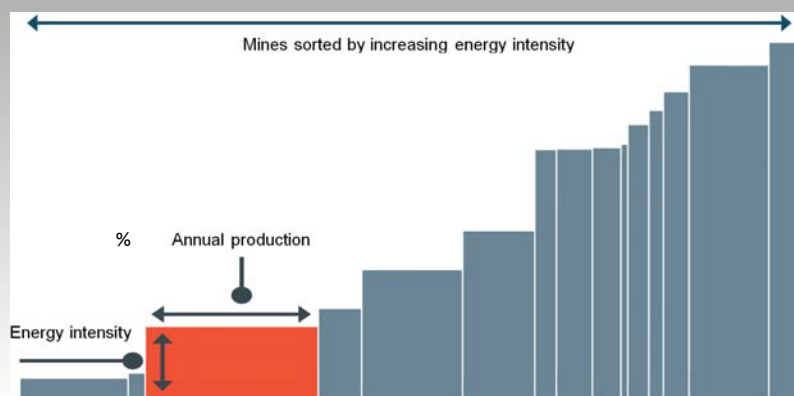
From <http://www.ceecthefuture.org/why-smart-companies-are-focusing-on-comminution/>

## Crushing and grinding energy for copper and gold



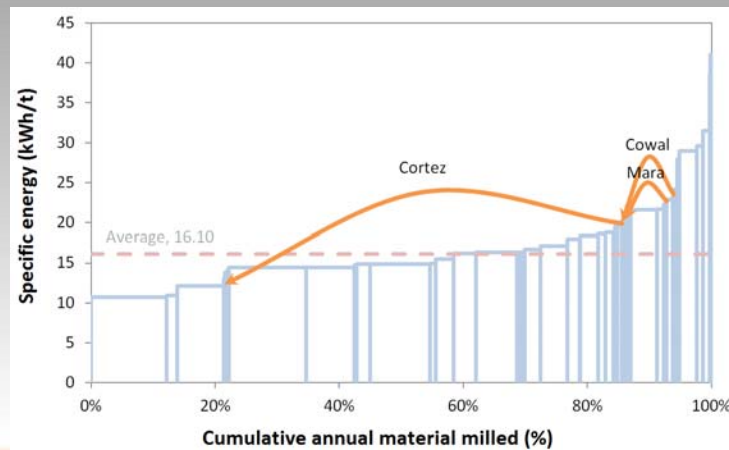
From Ballantyne, G. R., Powell, M. S. and Tiang, M. (2012). Proportion of energy attributable to comminution. In: Peter Hills (Conference Chair), Proceedings: 11th AusIMM Mill Operators' Conference 2012. 11th AusIMM Mill Operators' Conference 2012, Hobart, Tasmania, (25-30). 29-31 October 2012.

## Energy Curve methodology



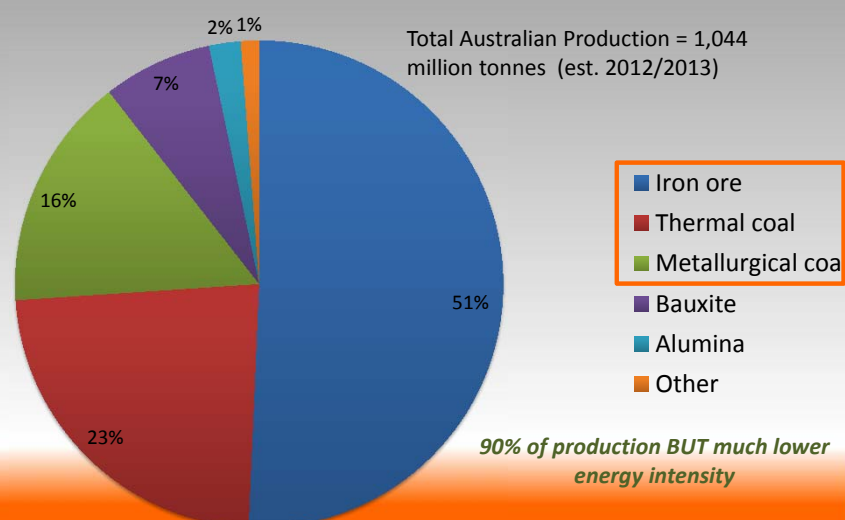
Refer to Ballantyne, G. R. and Powell, M. S. (2014) Benchmarking comminution energy consumption for the processing of copper and gold ores. Minerals Engineering, 65 109-114. doi:10.1016/j.mineng.2014.05.017

## Case study: Barrick Gold



From <http://eex.gov.au/files/2014/06/Improving-Energy-Efficiency-in-Barrick-Grinding-Circuits.pdf>

## Iron Ore & Coal Production



From [http://www.minerals.org.au/focus/minerals\\_economy](http://www.minerals.org.au/focus/minerals_economy)

# Energy Initiatives in Mining




**ICMM**  
International Council on Mining & Metals

**inBrief**

**The role of minerals and metals in a low carbon economy**

Minerals & metals: essential to sustainable development (June 2011)



**Rio Tinto forms new team to step up energy and climate initiatives**



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A key focus will be to ensure energy and climate decisions. The strategy team will support the Group's energy and climate face and strengthen the Group's energy and climate initiatives.

**CEEC**  
THE FUTURE



**ENDURING VALUE**  
THE AUSTRALIAN MINERALS INDUSTRY FRAMEWORK FOR SUSTAINABLE DEVELOPMENT



**BHP Billiton And University College London Launch Natural Resources Initiative**

10 June 2011

BHP Billiton and University College London today announced an agreement to establish an Institute for Sustainable Resources in London, UK and an International Energy Policy Institute in Adelaide, Australia.

From [http://www.riotinto.com/ourcommitment/features-2932\\_3284.aspx](http://www.riotinto.com/ourcommitment/features-2932_3284.aspx)  
 From [http://www.riotinto.com/ourcommitment/features-2932\\_3284.aspx](http://www.riotinto.com/ourcommitment/features-2932_3284.aspx)  
 From [http://www.minerals.org.au/focus/sustainable\\_development/enduring\\_value](http://www.minerals.org.au/focus/sustainable_development/enduring_value)  
 From <http://www.bhpbilliton.com/home/investors/news/Pages/Articles/BHP-Billiton-And-University-College-London-Launch-Natural-Resources-Initiative.aspx>