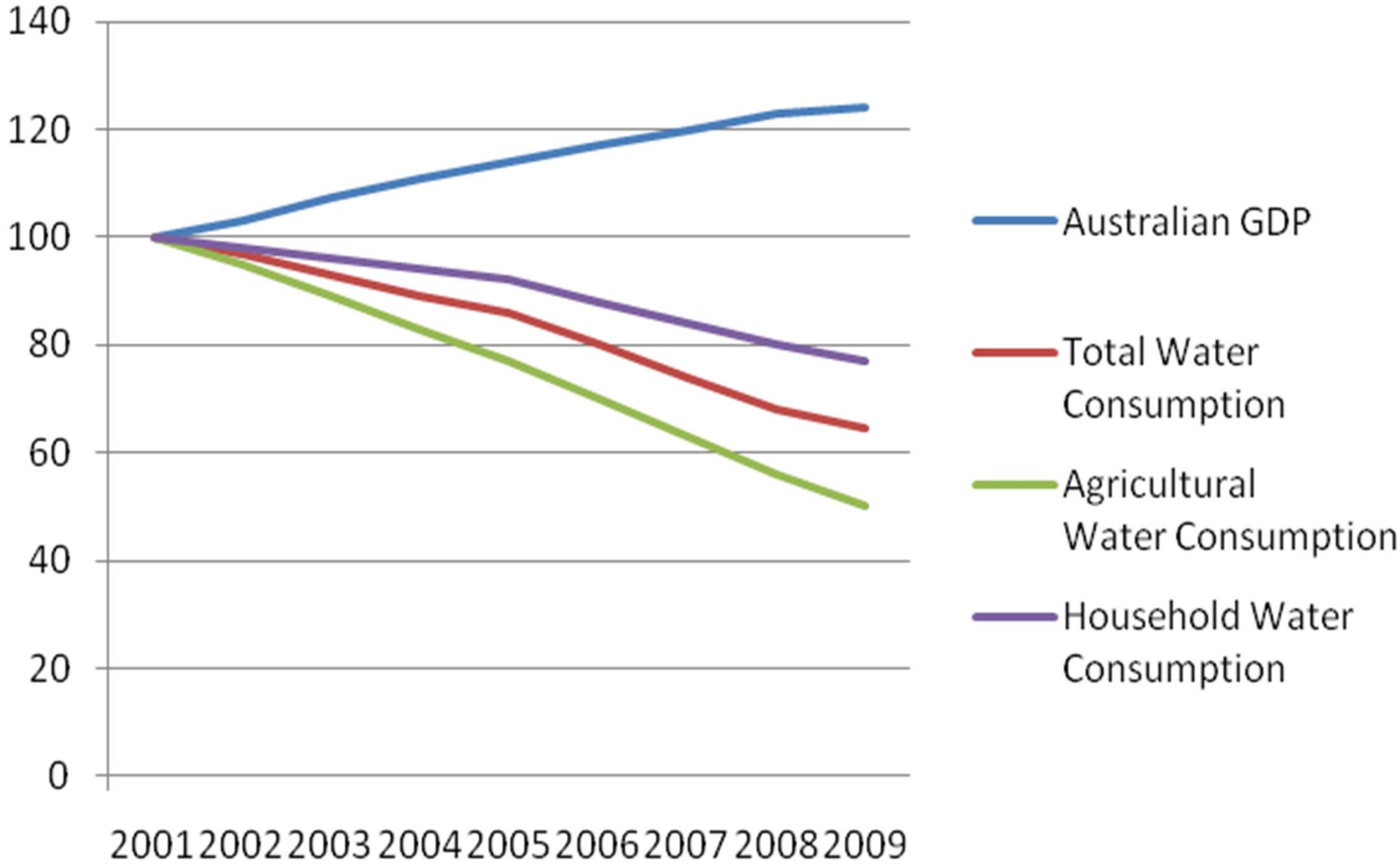
Doubling Energy Productivity – Mining and Agriculture

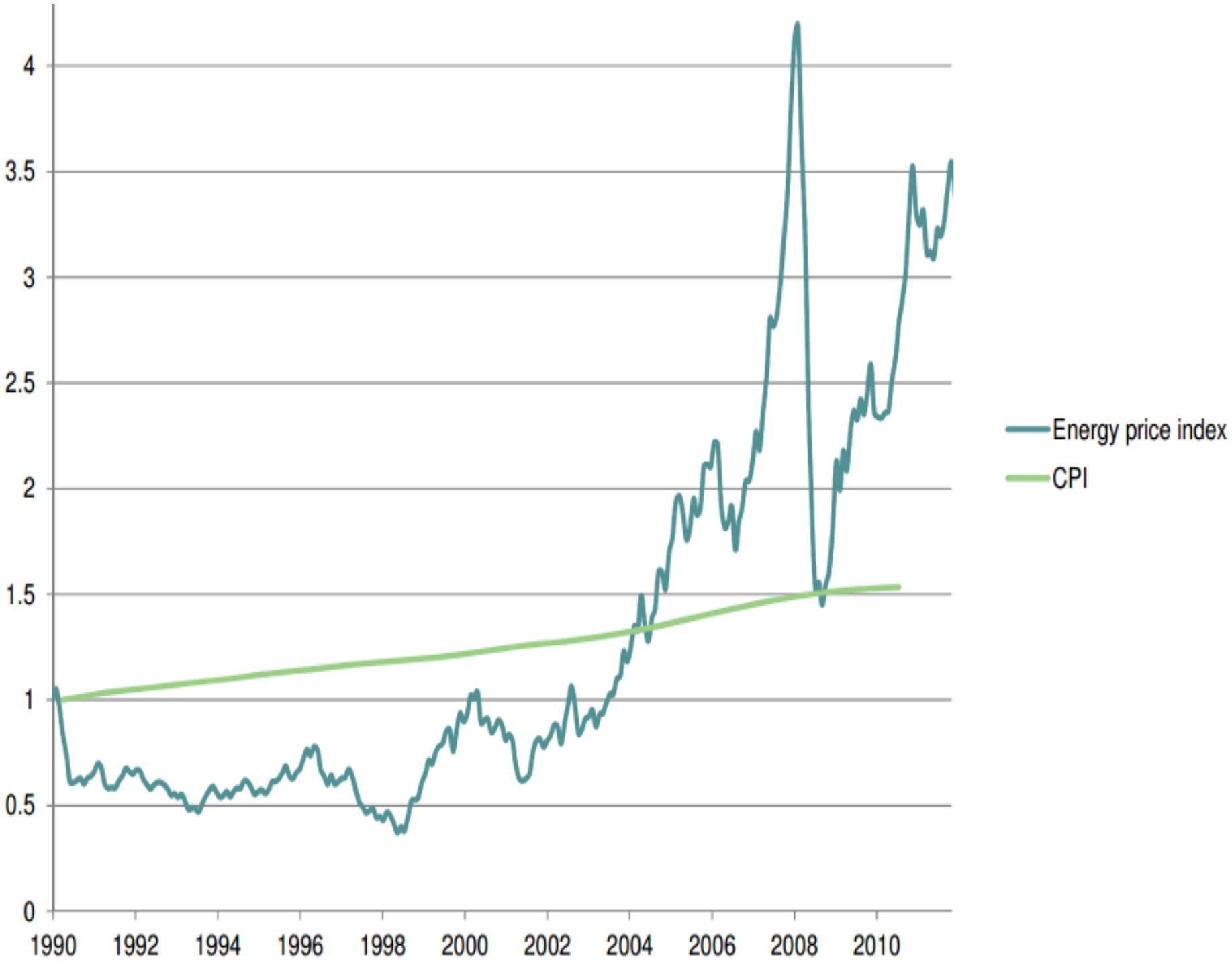
"Energy, resource and environmental efficiency will be key drivers of productivity into the future." Treasury Secretary Dr Martin Parkinson

David Eyre, General Manager, Research & Development, NSW Farmers' Association
Brendan Pearson, CEO, Minerals Council of Australia
Mr Michael Scott, Technical Specialist, CRC Ore
Dr Damien Giurco, UTS
Mary Stewart, CEEC Board member and General Manager, Consulting at Energetics

	2004-2005 (GL)	Industry gross value added ($millions) (2004-2005)	Industry gross value Added ($mill) per GL of water Consumed (2004-5)	2008-2009 (GL)	Industry gross value Added ($mill) (2008-2009)	Industry gross value Added ($millions) per GL of water Consumed (2008-9)
Agriculture	12 191	27153	2	6 996	27739	4
Mining	413	39945	97	508	114580	226
Manufacturing	589	97769	166	677	111044	164
Other Industries	1,106	711667	672	1,327	897496	709
Electricity & Gas	271	14933	55	328	16097	49
Water Supply	2, 083	5101	2	2,396	6288	3
Total	**18,767**	**896568**	**54**	**14,101**	**1173244**	**95**



Smith, M (2012) Green Growth - Unlocking New Sources of Productivity and Jobs Growth @ http://alliance21.org.au/site/assets/media/SC-Green-Growth-EfS-Reform-Agenda-Green-Growth-Unlocking-New-Sources-of-Productivity-through-Education-for-Sustainability.pdf


4
3.5
3
2.5
2
1.5
1
0.5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Energy price index
CPI

MGI Commodity Price Index (years 1999–2001 = 100)[1]

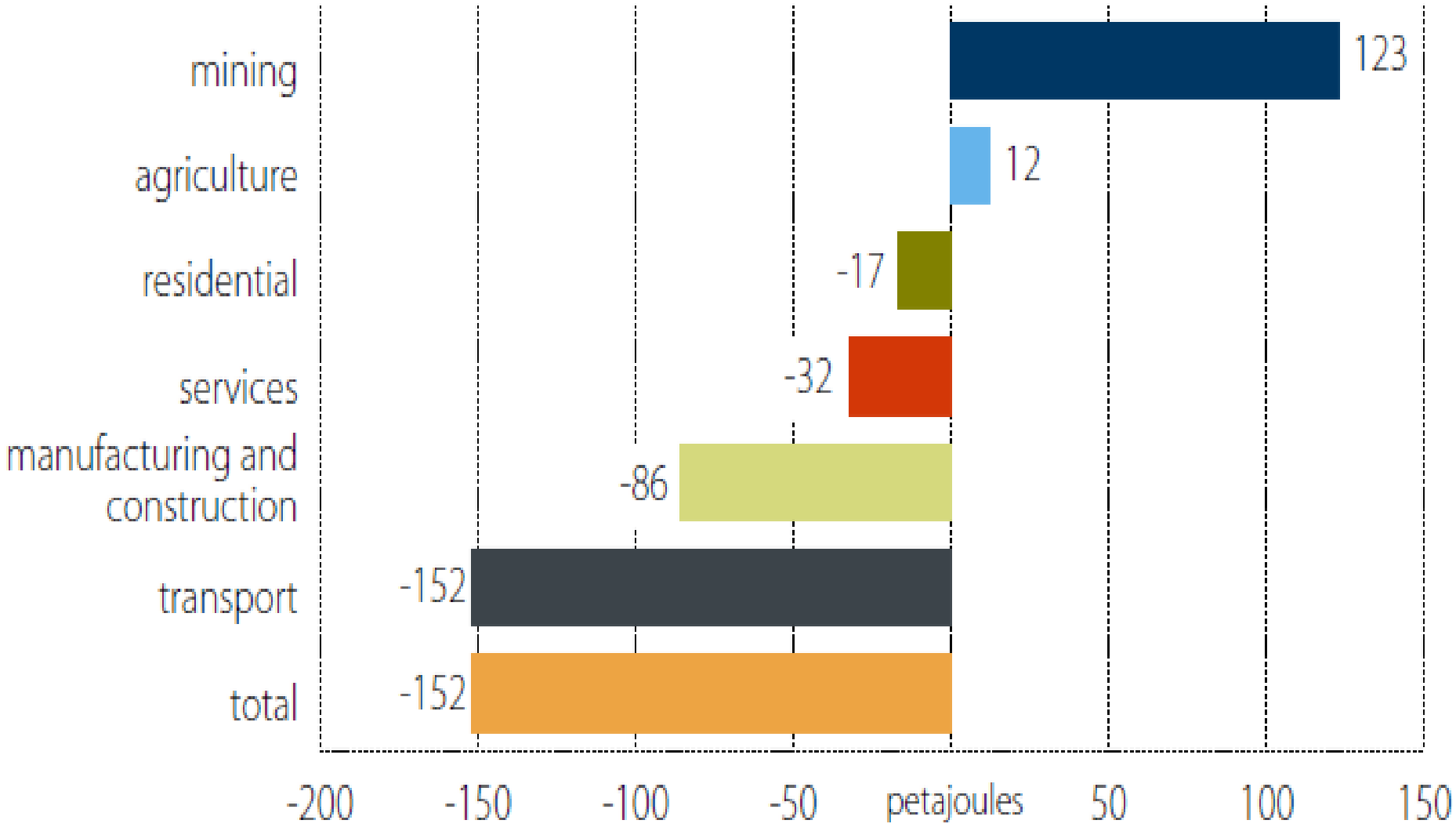


Figure 1: Changes in energy consumption because of the energy efficiency effect 1989–90 to 2007–08. (Source ABARE, ABS, 2010[1])

[1] ABARE-BRS Report 10.08 (2010) End Use Intensity in the Australian Economy at http://adl.brs.gov.au/data/warehouse/pe_abares99001743/RR10.08_energy_intensity_REPORT.pdf

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The bottom line on energy efficiency

A joint initiative of Australian, State and Territory Governments

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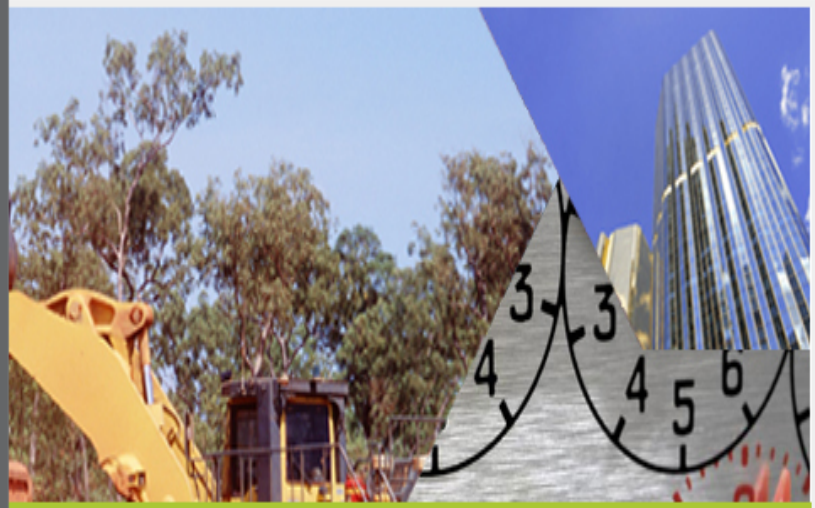

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standards describe best practice for energy auditors.

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Opportunities – Mining

A number of initiatives which can help improve the energy efficiency of the Mining and mineral processing sector are outlined below. These strategies rely on an integrated approach to realise the full potential of the opportunities.

IN THIS SECTION [HIDE]

- Embed energy efficiency into corporate and site management practices
  - Build an energy management team and assign responsibilities
  - Use an energy-mass-balance assessment approach
- Upgrade the ore concentration
  - Undertake resource characterisation
  - Implement selective smart blasting, ore sorting and waste removal
- Adopt an integrated energy efficient comminution strategy
  - Utilise new and more energy efficient grinding technologies
  - Select the coarsest possible grind size
  - Optimise particle size
  - Use more advanced and flexible comminution circuits
- Improve the efficiency of separation processes
- Invest in materials movement energy efficiency opportunities
  - Optimise hauling efficiency in existing truck fleets and mines
  - Consider energy efficiency when upgrading haulage systems
  - Improve the energy efficiency in product transport
- Implement air ventilation and conditioning opportunities
  - Maintain and optimise fan system operations
  - Minimise energy use in air and water flows
- Reduce energy demand and explore waste heat options
- Implement technology specific energy efficiency opportunities
- Implement energy/water efficiency nexus opportunities

Energy efficiency improvements– in haul trucking

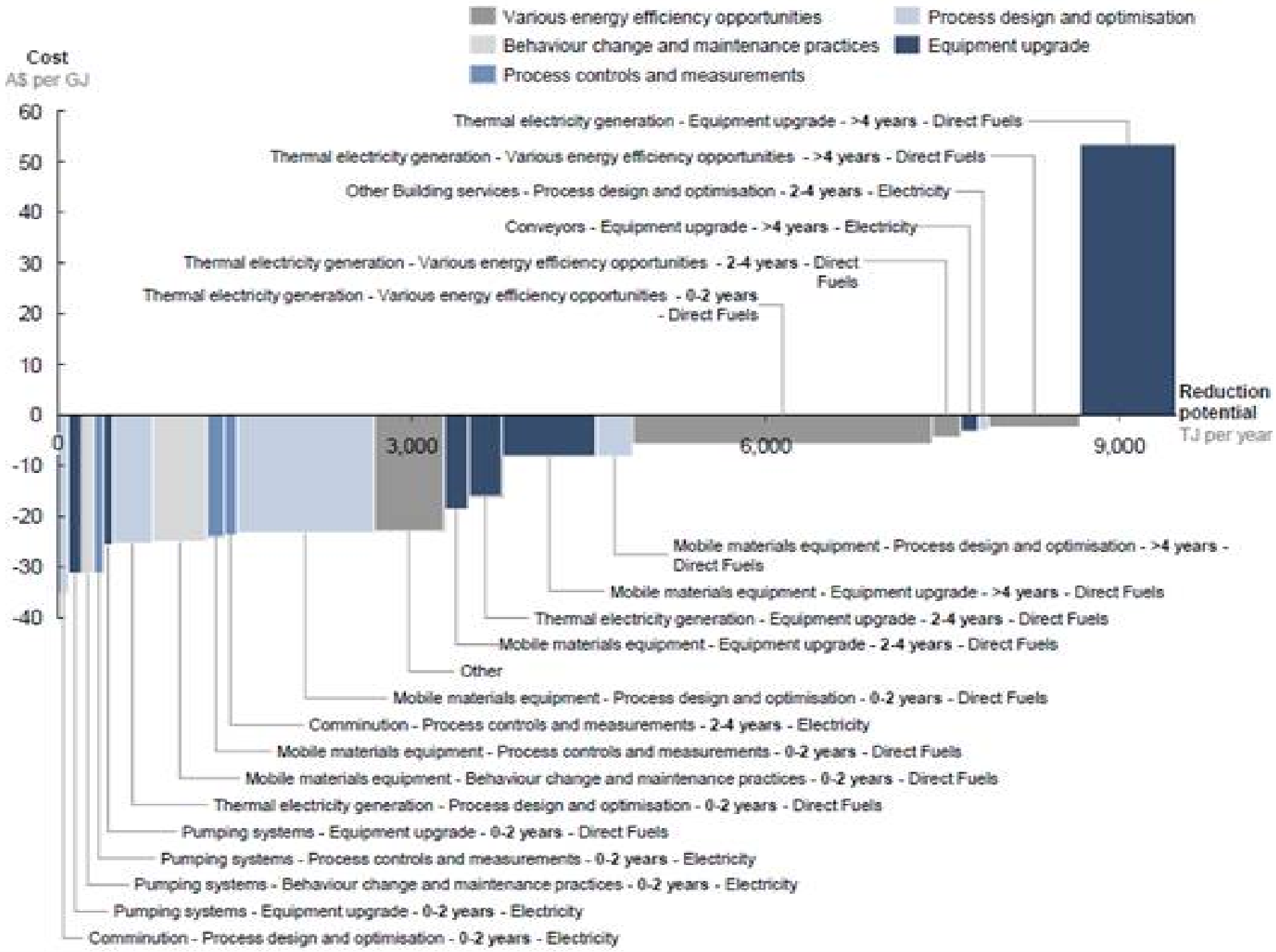
BHPBilliton announced in 2012 that it would move to truckless mines by investing in “in-pit crushers and conveyors”(IPCC) to address rising operational costs from labour /diesel/carbon. IPCCs are much more energy efficient than haul trucks. “*'When you run a truck, it takes 10 to 11 employees for every truck. ...If you go autonomous you get rid of half of those. If you go truckless, and invest in IPCCs, you get rid of all of them. You do this at a time when you see increasing diesel prices, carbon taxes, a number of reasons why getting rid of trucks or using fewer trucks is desirable.*"...

Identify, Quantify & Prioritise Energy Efficiency Opportunities for a Mine

At each specific mine, one specific energy efficiency opportunity will be more important to that sector than others. A resource now exists freely online that

- summarises some of the main energy efficiency opportunities for each mining sub-sector
- is an attempt to prioritise which energy efficiency opportunities provide the largest energy savings and is the most profitable to first invest in.

ClimateWorks Australia and Department of Resources, Energy and Tourism (2012) Industrial Energy Efficiency Data Analysis – The Mining Sector at http://www.climateworksaustralia.org/sites/default/files/documents/publications/climateworks_dret_ieeda_factsheet_mining_20130521.pdf


Various energy efficiency opportunities
Process design and optimisation
Behaviour change and maintenance practices
Equipment upgrade
Process controls and measurements
Cost
A$ per GJ
60
50
40
30
20
10
0
-10
-20
-30
-40
0
3,000
6,000
9,000
Reduction potential
TJ per year
Thermal electricity generation - Equipment upgrade - >4 years - Direct Fuels
Thermal electricity generation - Various energy efficiency opportunities - >4 years - Direct Fuels
Other Building services - Process design and optimisation - 2-4 years - Electricity
Conveyors - Equipment upgrade - >4 years - Electricity
Thermal electricity generation - Various energy efficiency opportunities - 2-4 years - Direct Fuels
Thermal electricity generation - Various energy efficiency opportunities - 0-2 years - Direct Fuels
Mobile materials equipment - Process design and optimisation - >4 years - Direct Fuels
Mobile materials equipment - Equipment upgrade - >4 years - Direct Fuels
Thermal electricity generation - Equipment upgrade - 2-4 years - Direct Fuels
Mobile materials equipment - Equipment upgrade - 2-4 years - Direct Fuels
Other
Mobile materials equipment - Process design and optimisation - 0-2 years - Direct Fuels
Comminution - Process controls and measurements - 2-4 years - Electricity
Mobile materials equipment - Process controls and measurements - 0-2 years - Direct Fuels
Mobile materials equipment - Behaviour change and maintenance practices - 0-2 years - Direct Fuels
Thermal electricity generation - Process design and optimisation - 0-2 years - Direct Fuels
Pumping systems - Equipment upgrade - 0-2 years - Direct Fuels
Pumping systems - Process controls and measurements - 0-2 years - Electricity
Pumping systems - Behaviour change and maintenance practices - 0-2 years - Electricity
Pumping systems - Equipment upgrade - 0-2 years - Electricity
Comminution - Process design and optimisation - 0-2 years - Electricity