

Coal mining cost forecasts **2013-2022**

Extract to indicate general nature of report

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Table 1
Coal Mining Cost Indexes
 Indexes: June 2000=100

As At June	Coal Mining Construction Costs						Coal Mining Operating Costs			
	Australia		Queensland		New South Wales		Open Cut		Underground	
	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch
2000										
2001										
2002										
2003										
2004										
2005										
2006										
2007										
2008										
2009										
2010										
2011										
2012										
2013										
Forecasts										
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
Average Annual Growth										
2003-2008										
2008-2013										
Forecasts										
2013-2018										
2018-2023										

Data available
in report

Source: Macromonitor

During 2009, the global financial crisis impacted on world commodity markets and economies, causing a downturn in some areas of domestic construction and a pause in new minerals project commencements. This led to a decline in many construction input costs and slower growth in others. As shown by our estimates in Table 1, growth in costs during the 12 months to June 2009 was still very strong in most areas, but with significant lower, or negative, cost inflation coming through in 2009/10.

1. Notes on the report

1.1 Introduction

The objective of this report is to provide well researched forecasts of costs which are expected to be experienced in coal construction projects and in ongoing coal operations. We provide forecasts for total Australia, as well as specific forecasts for Australia's two largest coal mining states; Queensland and New South Wales.

The report covers the following:

Chapter 1 provides some background information on the forecasts and our forecasting methodology.

Chapter 2 contains an overview of the outlook for construction activity in Australia, and in the two most important regions for coal construction. We provide this information because the level of construction activity is a key determinant of the rate of construction cost increases. The volume of construction work done determines the demand for the various inputs to the construction process, which plays a big part in the rate of price increases for those inputs. The rate of construction cost increases is significantly higher in boom times, when the demand for input to construction is running high, than it is during downturns.

Chapter 3 provides historical data and forecasts for our Total Coal Mining Construction Cost Index, and also for each individual cost component included in the index.

Chapter 4 contains detailed information on the forecasts for each cost component. This includes a description of the drivers of costs, our forecasting methodology and models, and any important supporting information for each cost item.

Chapter 5 contains data and forecasts for mine operating costs in the coal sector. Operating costs cover materials, wages and plant hire costs. Our coverage here does not include non-mine site costs such as rail or sea freight.

1.2 Our forecasting approach

In examining construction in the coal mining sector, we firstly identified the individual cost items which contribute to costs and then estimated the relative importance of each item. This relative importance is reflected in a set of weights which we apply to each cost item in order to calculate an index of total costs.

With regard to coal mine construction costs, producing good forecasts requires us to break down overall costs into the *basic inputs* to the construction process. This is different to the usual method of cost estimation which involves breaking costs down by type of asset (the different equipment items, access works, site buildings, services, prep plant etc). We, instead, break down the construction costs of all of these assets by a range of *basic inputs*, such as labour costs, specialised services, the various materials (steel, concrete etc.), installed equipment etc. More detail is provided in Chapter 4.

We produce separate forecasts of each of the basic inputs, based on a thorough understanding of the determinants of each input item. We have taken into account drivers of cost increases that are specific to each cost item, and also the drivers that are common across a number of cost items.

The drivers which we believe to be important for each cost item are discussed in Chapter 4. But generally speaking, the item specific drivers include factors such as:

- Specific commodity prices,
- Exchange rates,
- Demand for each input, which, for construction costs, is largely determined by conditions in the construction sector,
- Supply of inputs and the likelihood of shortages emerging in particular areas – of particular concern is the potential for shortages of labour (especially skilled labour) in a range of areas which can drive up wage inflation,
- Costs of inputs to the industries producing the items (such as cost of inputs to materials manufacturing or cost of fuel in the transport sector), and
- Announced price increases from suppliers.

Some other drivers which have a general effect on cost changes, not specific to a particular item, include factors such as:

- The general cycle in construction activity,
- Economic growth and employment growth in the national and state economy,
- General inflationary pressures in the overall economy, and
- World economic growth.

Once we have prepared forecasts for each cost item, we weight them together using an appropriate set of weights, derived in some instances from Australian Bureau of Statistics (ABS) index weighting schemes, and in some instances from Macromonitor's own research.

2. Construction Outlook Summary

2.1 Total Australia

An important driver of coal mining construction costs is demand for the various inputs to the construction process, which is largely determined by the level of construction work. The rate of construction cost increases is significantly higher in boom times, when the demand for inputs to construction is running high, than it is during downturns. Hence, when forecasting construction costs, it is important to understand the likely outlook, not just for coal mine construction work, but also for overall resources construction, civil engineering construction and even building construction, as many of the inputs to coal mine construction are common across these various sectors.

For this reason, we will present, in this chapter, a broad level overview of the construction outlook for Australia, and also a more detailed outlook for the important coal mining regions. This outlook will inform our forecasts of construction costs in Chapters 3 and 4.

Australia has experienced a protracted boom in construction activity since the early 2000s. There was a post-GFC downturn in some areas of activity in 2009/10 (notably residential and commercial building), but overall we have not seen a major downturn for more than a decade.

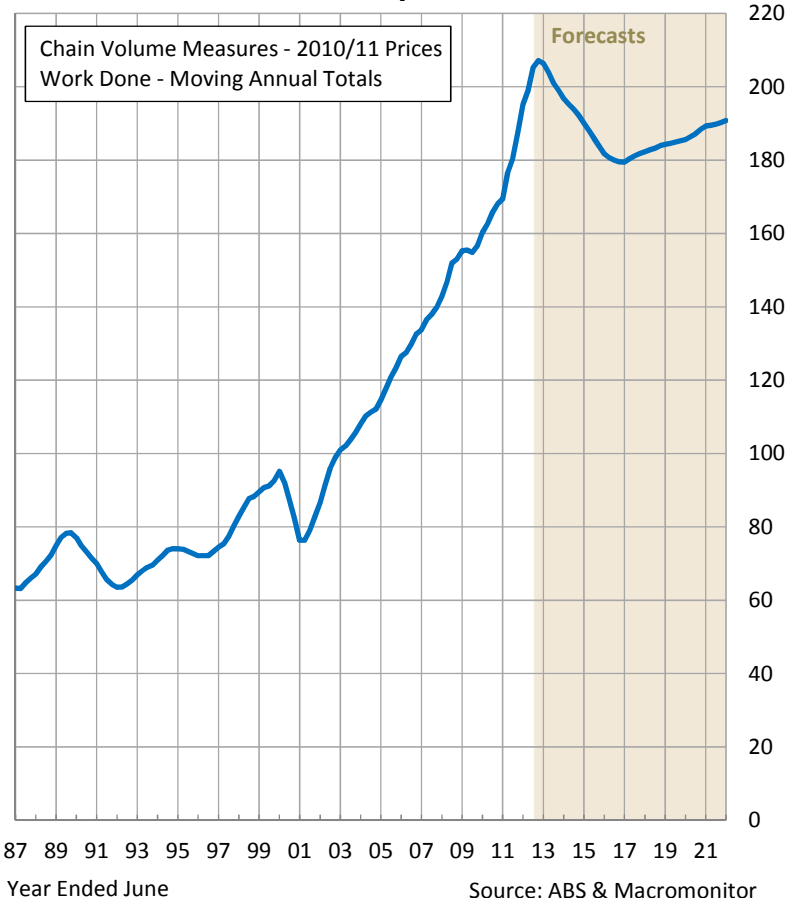
An extraordinary peak level of construction activity is estimated to have been reached during the past 12 months, at over \$200 billion, more than double that of a decade earlier, in constant price terms.

During 2012/13, the last wave of growth in resources sector construction was joined by a tentative recovery in commercial and industrial building, a number of large health sector projects, record high levels of utilities construction and, lastly, the start of an upturn in residential building (more obvious in the higher density dwellings segment).

This is expected to have been the last year of growth in construction work done however, as utilities construction turns down (driven by cuts to electricity investment), the resources investment boom ends, government fiscal policy tightens and commercial building weakens in line with generally poorer economic growth in Australia.

Chart 1

Total Construction Activity - Australia



2.2 Outlook for Important Coal Mining Regions

In examining the outlook for coal sector construction costs, a key driver is the outlook for coal mine construction activity in the important coal mining regions of Australia. In this section, we review the outlook for coal construction in the Hunter Valley and Central Queensland regions.

The need to examine costs on a regional basis relates to the potential differences between cost escalation rates in particular regions, and between the two states we are focussing on in this report; New South Wales and Queensland. Of particular concern at the present time is the impact of large construction projects in Central Queensland, most notably the major LNG projects in Gladstone, along with associated pipeline, gas field and infrastructure development. These projects will have a large impact on demand for resources and costs throughout Central Queensland, where much coal mining construction will take place.

We need to note that the key factors determining the price of any commodity, including the price of labour, are supply and demand. In the construction sector, the demand for input commodities and labour relates simply to the amount of construction work and the commodity/labour intensity of the type of construction being undertaken.

Understanding the availability of supply is the other part of the equation, and this is particularly important with regard to labour costs and potential labour shortages. The starting point is the existing workforce in a particular region, but this can be supplemented by movement of labour between regions and also between industry sectors. People will move to where the jobs are, but they often need an inducement in the form of higher wages. In order to derive forecasts of labour costs, we have undertaken detailed analysis of labour demand by state and region, which is based on the construction outlook described below.

2.2.1 Central Queensland

We expect that Central Queensland will see the most rapid slowdown in construction activity in coming years vs. the other regions analysed. We expect that the impact of a pull-back in new non-building mining investment will be magnified in this region given that it has seen the steepest rise in activity in recent years, with a majority of growth heavily concentrated in large oil/gas and coal projects. Overall activity has been holding up at peak levels in 2012/13 as large projects already underway continue, but this will not persist as many of these existing projects approach completion.

The coal sector continues to experience the largest number of project cancellations and deferrals in 2013, reflecting large falls in prices in the second half of 2012 and weakened medium term demand prospects. We have revised down construction expectations in response to additional project delays and cancellations thus far in 2013.

The annual value of non-building construction work in Central Queensland, in constant 2010/11 prices, tripled in the two years between 2009/10 and 2011/12. Activity has been stable in 2012/13, before a steep downturn that is expected to start in 2013/14. Activity levels, in constant 2010/11 prices, are forecast to fall 42% between 2012/13 and 2015/16. A short-lived bounce in activity is expected around 2017, related to the commencement of several large minerals projects around this time. A gradual recovery is expected towards the end of the forecast horizon, driven by a modest recovery in oil/gas and coal projects.

Chart 4

Non-Building Construction Work Done - Central Queensland Region

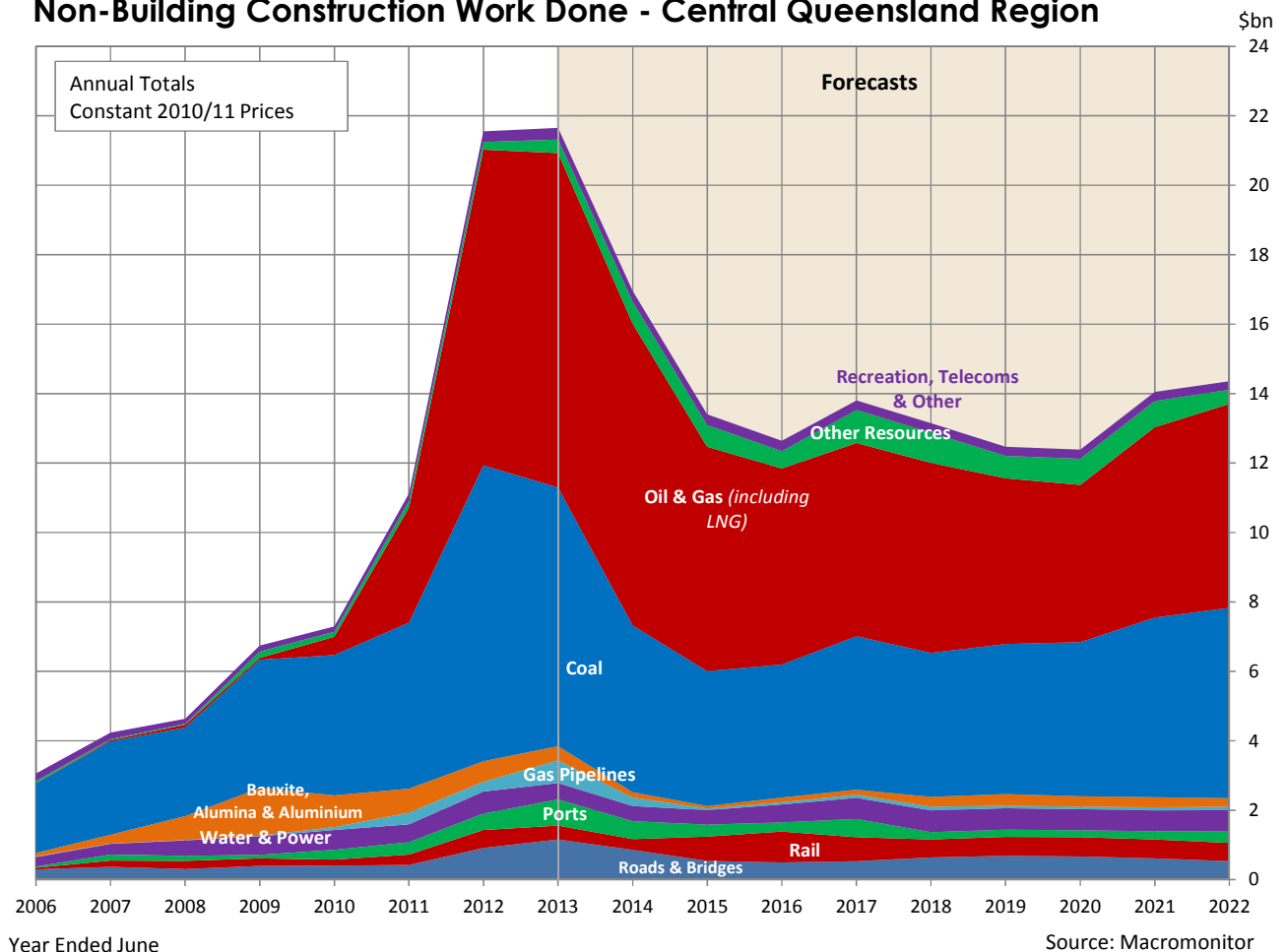


Table 9
Coal Mining Construction Cost Indexes - Australia
 Indexes: June 2000=100

As At June	General Labour		Freight		Concrete		Architectural		Steelwork		Platework		Mechanical Equipment		Piping (Non-Metallic)	
	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch
2000																
2001																
2002																
2003																
2004																
2005																
2006																
2007																
2008																
2009																
2010																
2011																
2012																
2013																
Forecasts																
2014																
2015																
2016																
2017																
2018																
2019																
2020																
2021																
2022																
2023																
Average Annual Growth																
2003-2008																
2008-2013																
Forecasts																
2013-2018																
2018-2023																
Weighting	23.0%		2.0%		3.0%		2.0%		7.0%		6.0%		10.0%		1.0%	

Data available in report

Source: Macromonitor

Table 9 Continued
Coal Mining Construction Cost Indexes - Australia (Continued)
 Indexes: June 2000=100

As At June	Piping (Metallic)		Electrical Equipment		Electrical Bulks		Construction Plant (Avg. of Purchase & Hire Costs)		EPCM Services		Owners Team Salaries		Earthworks		Mobile & Mining Equipment		Total Coal Mine Construction Cost Index	
	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch
2000																		
2001																		
2002																		
2003																		
2004																		
2005																		
2006																		
2007																		
2008																		
2009																		
2010																		
2011																		
2012																		
2013																		
Forecasts																		
2014																		
2015																		
2016																		
2017																		
2018																		
2019																		
2020																		
2021																		
2022																		
2023																		
Average Annual Growth																		
2003-2008																		
2008-2013																		
Forecasts																		
2013-2018																		
2018-2023																		
Weighting	1.0%		0.5%		0.5%		10.0%		15.0%		5.0%		4.0%		10.0%		100%	

Data available in report

Source: Macromonitor

4. Individual Cost Items and Supporting Information

4.1 Summary

This chapter covers each cost item separately, describing our methodology, data sources and the expected outlook.

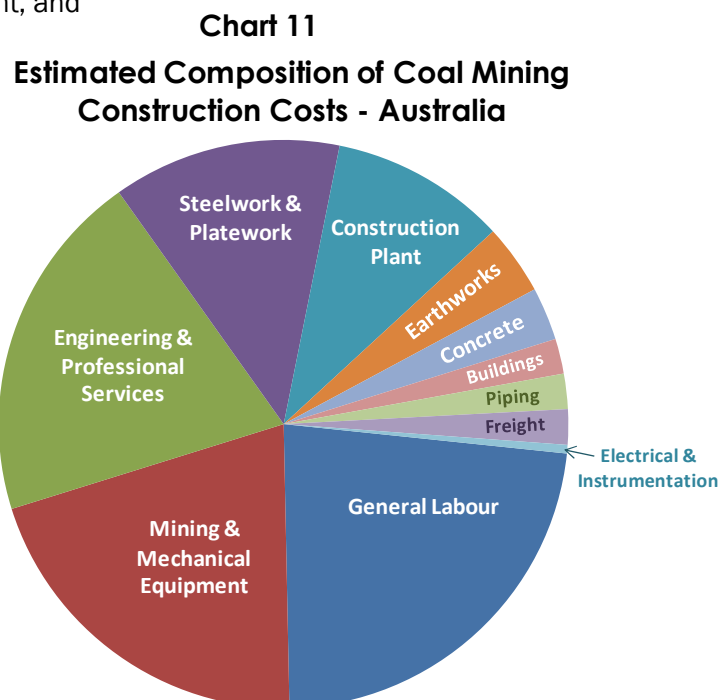
In examining construction costs in the coal mining sector, we firstly identified the individual cost items which contribute to construction costs and then estimated the relative importance of each item. This relative importance was reflected in a set of weights which we apply to each cost item in order to calculate an index of total costs. Coal mine construction can be broken down in a number of ways. When undertaking cost estimations, the most common way to break down total costs is by the type of asset. That is, costs are estimated separately for assets such as:

- Mining equipment – across a wide range of types, such as face units, conveyors (for underground), drills, draglines, dozers, excavators, trucks, etc.
- Underground access – shafts, drifts and ventilation infrastructure,
- Site buildings – warehouses, workshops, admin offices, staff amenities and training,
- Services – power, water & telecoms,
- Coal handling and preparation plant, and
- Other site works.

But our approach is slightly different. We estimate the contributions of each basic input to the construction process. That is, the contribution of:

- General labour,
- Engineering & specialised professional services,
- Each type of material (steel, concrete, pipes etc.),
- Equipment by type, and
- Other basic services such as power and plant.

Each of the asset types has a different mix of inputs. Once we estimated the contributions of each asset type, on average, to coal mining construction, and the contribution of each input to each asset type, we arrived at a set of weights for all of the cost inputs. This is illustrated in Chart 11.



Source: Macromonitor

4.2 Direct Labour

4.2.1 National Level Costs

Direct labour covers field labour or any other direct labour.

The measure of costs which we use to represent this category is the *Wage Price Index* (hourly rates of pay excluding bonuses), for the Mining and Construction Sectors. These data are sourced from the Australian Bureau of Statistics publication, *Labour Price Index, Australia*, catalogue number 6345.0 (although note that the state level data are unpublished).

The *Wage Price Index* measure is constructed by taking a 'basket' of standard occupations/positions in each industry and measuring the normal hourly rate of each and weighting them together in a standard way. This measure excludes the effects of all types of compositional change, including changes in the amount or type of work being undertaken in a given period.

Table 12 on the following page shows the Wage Price Index data, and our forecasts, at the national level. This table also includes a weighted average of construction and mining sectors, to give an indication of wages that apply to resources construction projects.

Furthermore, as a result of the volatility of these data in individual quarters, we also present in Table 12 a trend weighted average wage price series. This trend series is a mid-point, 3 quarter moving average of the annual growth rates. The trend series is the data which we believe gives a good indication of annual growth in wage costs facing resources construction projects.

The 2000s saw an extraordinary increase in employment in both the mining and construction industries. After a temporary set-back in 2009, employment in mining and construction increased strongly during 2010 and 2011.

Chart 12 shows the strength of employment growth in the overall mining and construction sectors, in comparison to other parts of the economy.

Chart 12
Employment by Sector

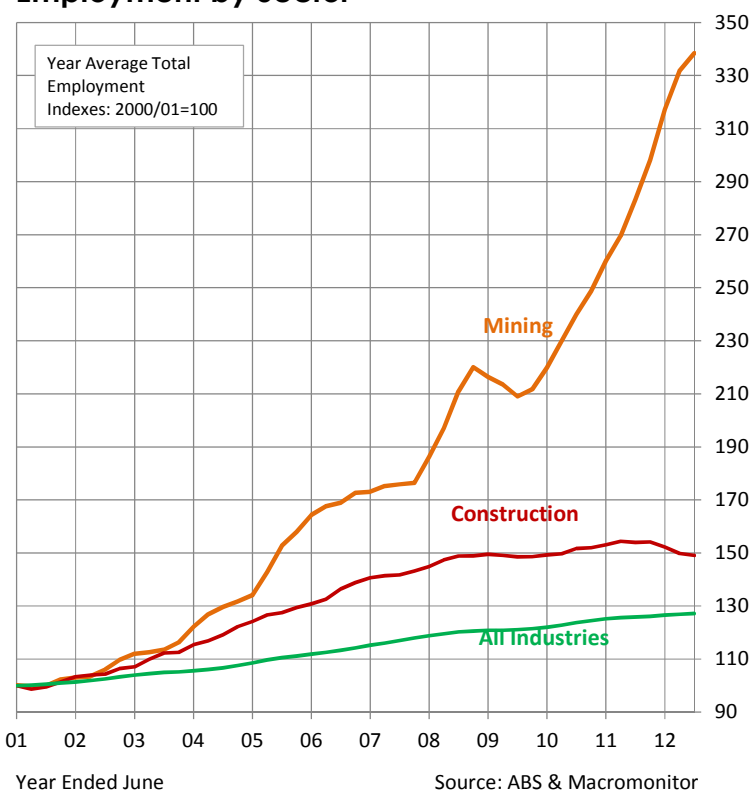


Table 13
Wage Price Indexes - Queensland
Indexes: 2008/09=100

As At June	Construction		Mining		Weighted Average of Construction and Mining Wages		Trend Weighted Average ⁽¹⁾	
	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch	Index	Ann. %Ch
2000								
2001								
2002								
2003								
2004								
2005								
2006								
2007								
2008								
2009								
2010								
2011								
2012								
Forecasts								
2013								
2014								
2015								
2016								
2017								
2018								
2019								
2020								
2021								
2022								
2023								
Average Annual Growth								
2003-2008								
2008-2013								
Forecasts								
2013-2018								
2018-2023								
Weighting	67%		33%		100%		-	

⁽¹⁾ Three-period, mid-point moving average

Source: ABS & Macromonitor

4.3 Concrete

In this section we will cover the three components of total concrete costs; readymixed concrete, reinforcing steel, and formwork. We will cover the outlook for each component separately and then combine them.

4.3.1 Readymixed concrete

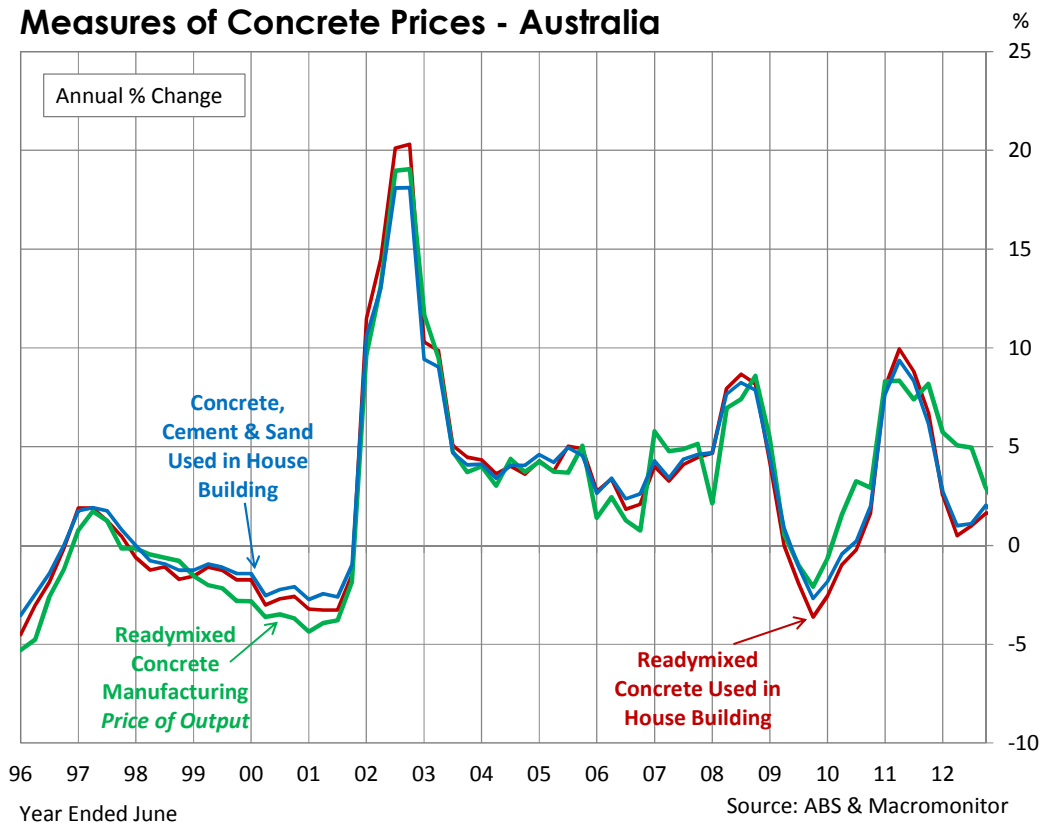
There are three primary data series measuring the cost of readymixed (or premixed) concrete. These three data series are:

- **Price Indexes of Materials Used in House Building – Readymixed Concrete**, from the ABS publication, *Producer Prices Indexes, Australia*, catalogue number 6427.0, Tables 16 & 17,
- **Price Indexes of Articles Produced by Manufacturing Industries – Ready-mixed concrete Manufacturing**, from the ABS publication, *Producer Prices Indexes, Australia*, catalogue number 6427.0, Table 11, and
- **Price Indexes of Materials Used in House Building – Concrete, Cement & Sand**, from the ABS publication, *Producer Prices Indexes, Australia*, catalogue number 6427.0, Tables 16 & 17.

The latter data series does not purely measure readymixed concrete, as it also includes cement and sand. However, this data series is dominated by readymixed concrete and moves in very close alignment with readymixed concrete costs, and it has the important advantage of being available at the state level and not just the national level. Chart 24 below shows the annual percentage change in each of these three series, highlighting their similarity.

Chart 24

Measures of Concrete Prices - Australia



The copper price fell by around 60% through to a trough level in early 2009. From mid-2009 to mid-2011, the copper price rebounded strongly, climbing above US\$9,500 in the first quarter of 2011 before softening during the third quarter of 2011, dropping below US\$7,000/tonne in October 2011. Prices had been fluctuating between US\$7,500 and \$8,500 / tonne since then until March 2013. Recently prices have dropped below this trading range, trading at close to \$6,800 tonne at the time of writing.

We expect that copper prices will remain very volatile over the coming year as the demand picture looks more mixed than recent years: a nascent recovery in the US contrasts with growth rebalancing in China and an attenuated recovery in Europe. Recent mine production suspensions on safety concerns have added a further layer of uncertainty to the market. We expect that prices could dip well below \$7,000/tonne in the coming year, a reflection of downshift in growth levels in No.1 global consumer China, together with high global inventory levels.

Thereafter, we anticipate that copper prices will recover as inventory levels are worked off, highlighting underlying global supply constraints. These constraints include declining ore grades in the world's largest producers such as Chile.

Note that the shift in Chinese policy emphasis away from resource-intensive industrial production, together with anaemic growth expectations for Europe over coming years, are expected to mean that this price recovery is likely to be slow vs. the sharp price rises seen at the start of the previous decade. Average levels of annual global copper demand growth are expected to remain below the average level seen over the past 10 years for the entire forecast

Table 23
Electrical Equipment and Bulks

As At June	Electrical Cable & Wire Manufacturing Costs		Other Electrical Equipment Costs	
	Index '89/90=100	A%Ch	Index '89/90=100	A%Ch
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
Forecasts				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
Average Annual Growth				
2003-2008				
2008-2013				
Forecasts				
2013-2018				
2018-2023				

Data
available
in report

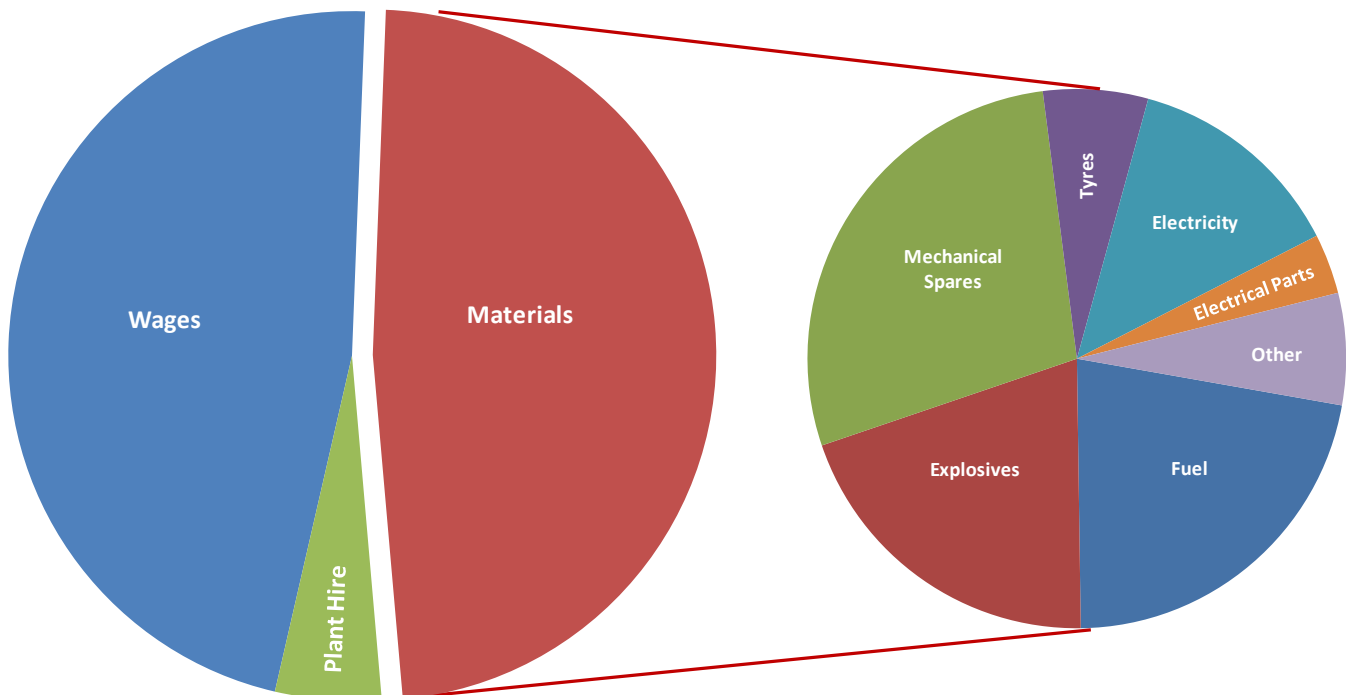
Source: ABS & Macromonitor

5. Operating Cost Indexes

This chapter contains data and forecasts for mine operating costs in the coal sector. Operating costs cover materials, wages and plant hire costs.

The usual composition of open cut coal operating costs is illustrated in Chart 35 below.

Chart 35
Estimated Composition of Open Cut Coal Mine Operating Costs



As with the construction cost indexes, in the case of operating costs, we produce separate forecasts for each component input cost included in the overall index. We then weight these individual cost indexes together, using the appropriate system of weights, to produce an overall index of operating costs. The weights used are presented in Table 27 on the following page.

Different sets of weights were used for the open cut and underground cost indexes, based on weights used by the Australian Bureau of Statistics in their materials costs indexes, combined with weights derived from Macromonitor research.

The forecasts for each individual cost component of these indexes were derived from thorough analysis of the drivers of each cost item.

Table 30
Coal Mine Operating Costs - New South Wales

Indexes: 2001/02=100

As At June	Open Cut						Underground					
	Materials Costs		Wages Costs		Total Operating Costs		Materials Costs		Wages Costs		Total Operating Costs	
	Index	A%Ch	Index	A%Ch	Index	A%Ch	Index	A%Ch	Index	A%Ch	Index	A%Ch
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
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2011												
2012												
2013												
Forecasts												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
Average Annual % Change												
2003-2008												
2008-2013												
Forecasts												
2013-2018												
2018-2023												

Source: ABS, Macromonitor & Various