Jemena Gas Networks (NSW) Ltd

2015-20 Access Arrangement Information

Appendix 6.10

BIS Shrapnel – Input cost escalation report

Public

4 June 2014

Real Labour and Material Cost Escalation Forecasts to 2019/20

– Australia and New South Wales

> FINAL REPORT • APRIL 2014

Jemena Gas Networks (NSW) Ltd

www.bis.com.au

BIS Shrapnel
BUSINESS RESEARCH AND FORECASTING

BIS Shrapnel welcomes any feedback concerning the forecasts or methodology used in this report as well as any suggestions for future improvement.

Job no: E5936

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SUMMARY

- In July 2013, BIS Shrapnel was engaged by Jemena Gas Networks (NSW) Ltd to provide an expert opinion regarding the outlook for labour and a range of material cost escalators relevant to gas distribution networks in New South Wales over a seven year period from 2013/14 to 2019/20 (ie from 1 July 2013 to 30 June 2020). The labour and material cost escalators were used by Jemena to escalate their labour and material costs to develop their operating and capital expenditure forecasts for inclusion in Jemena Gas Networks' revenue proposal to the Australian Energy Regulator (AER) in June 2014.

- BIS Shrapnel expects total wage costs for the Australian Electricity, Gas, Water and Waste Services (EGWWS or 'Utilities) sector — expressed in Average Weekly Ordinary Time Earnings (AWOTE) — will average 4.8 per cent per annum over the seven years from 2013/14 to 2019/20 inclusive, 0.5 per cent higher than the national 'All Industries' AWOTE average of 4.3 per cent per annum over the same seven year period. In terms of *underlying* wages growth in the 'utilities' sector for total Australia — expressed in wage price index (WPI) terms — BIS Shrapnel is forecasting an average of 4.1 per cent per annum (0.5 percentage points higher than the national 'All Industries' WPI average of 3.6 per cent per annum) over the seven years from 2013/14 to 2019/20 inclusive.

- The utilities wage forecasts for NSW are expected to marginally lag the national average over the next three years. However, New South Wales utilities WPI growth is forecast to average 4.4 per cent per annum (0.1 percentage points higher than the national utilities average of 4.3 per cent per annum) over the five years from 2015/16 to 2019/20 inclusive (ie over Jemena Gas Networks' next regulatory period).

- The slightly stronger utilities wages growth in New South Wales in the second half of this decade is due to increased demand for labour from the state's utilities sector. NSW utilities engineering construction is projected to fall in 2013/14 (but remain at historically high levels), before increasing significantly from 2015/16. Construction work done is expected to lift considerably in the second half of the decade as the surplus in generation capacity is slowly eroded through continued population growth and industrial activity, placing greater demands on electricity supply. Utilities investment is a key influence on employment growth in the utilities sector (even though some capital projects are outsourced to the construction sector). The combination of high levels of utility engineering construction and overall construction in the state means increased wage pressures in the NSW utilities sector (relative to other states) over the five years to 2019/20.

- NSW construction wages over the next four years are expected to be stronger than the national average. After underperforming the Australian average for most of the last decade, construction activity in NSW is expected to grow substantially over the three years to 2016/17. Private dwelling construction will be the initial driver, followed by a new round of public sector infrastructure projects. The latter will be driven by a need to make up for underinvestment over the next few years as well as increased ability to finance it as both private funding and Federal funding return. We expect non-dwelling building to remain weak but build momentum in the second half of the decade.

- NSW construction wages will follow the recovery in dwelling construction and the improvement in total construction. Construction wages (in WPI terms) is expected to peak at 4.1 per cent in 2016/17 before easing in line with a moderation in total construction activity.

- Prices of all gas network related materials are forecast to increase over the five year period to 2019/20. Aluminium is expected to experience the strongest price growth, at an average

of 4.8 per cent per annum (in nominal prices, with the assumed removal of the carbon tax). On the other hand, steel and copper are expected to achieve the weakest growth, at 1.5 and 1.2 per cent per annum respectively.

- Many of these materials are influenced not just by commodity-specific supply and demand drivers, but also by movements in the exchange rate. Specifically, movements in the Australian dollar (A$) against the US dollar (US$) can have significant effects on the domestic price of minerals and metals. This is happening at present, as the rapid depreciation of the Australian dollar over the past year will see Australian-denominated commodity prices rise strongly through the 2013/14 financial year, despite weakness in the US$ prices of the same commodities.

- Our labour and material cost escalators are summarised in tables below.

Summary – Labour Cost Escalation Forecasts

(per cent change, year average, year ended June)

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	5 yr Avg (g)	7 yr Avg
	Actuals			Forecasts		Next Regulatory Period						
NOMINAL PRICE CHANGES												
1. Gas Network-Related Labour												
EGWWS AWOTE - New South Wales (a,b)	4.4	1.5	5.1	4.0	3.9	4.0	5.2	5.6	5.5	5.1	5.1	4.8
EGWWS WPI - New South Wales (a)	**3.5**	**3.2**	**3.7**	**3.6**	**3.4**	**3.7**	**4.2**	**4.5**	**4.7**	**4.8**	**4.4**	**4.1**
EGWWS AWOTE - Australia (c)	9.1	2.5	6.1	4.3	4.2	4.4	4.9	5.4	5.6	5.1	5.1	4.8
EGWWS WPI - Australia (c)	4.2	3.5	4.2	3.7	3.6	3.8	4.1	4.4	4.4	4.7	4.3	4.1
2. Contractor Labour Cost Escalation												
Construction AWOTE - New South Wales (d,b)	-4.6	4.3	4.5	3.5	3.6	4.0	4.8	4.7	4.5	4.7	4.5	4.2
Construction WPI - New South Wales (d)	**4.1**	**3.2**	**3.3**	**3.0**	**3.3**	**3.7**	**4.1**	**4.0**	**3.7**	**3.9**	**3.9**	**3.7**
Construction AWOTE - Australia (c)	5.0	3.5	4.3	3.3	3.4	3.8	4.6	4.6	4.8	5.1	4.6	4.2
Construction WPI - Australia (c)	4.0	4.1	3.3	2.9	3.0	3.5	3.9	3.8	3.9	4.1	3.9	3.6
3. Australian Wages												
All Industries - AWOTE (e)	4.2	4.3	4.6	3.3	3.8	4.3	5.0	4.9	4.3	4.8	4.7	4.3
All Industries - WPI (e)	3.8	3.6	3.3	2.7	3.1	3.6	4.0	3.8	3.8	4.0	3.8	3.6
Consumer Price Index (headline) (f)	3.1	2.3	2.3	2.8	2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.6
REAL PRICE CHANGES (h)												
1. Gas Network-Related Labour												
EGWWS AWOTE - New South Wales (a)	1.3	-0.8	2.8	1.2	1.1	1.5	2.7	3.1	3.0	2.6	2.6	2.2
EGWWS WPI - New South Wales (a)	**0.4**	**0.9**	**1.4**	**0.8**	**0.6**	**1.2**	**1.7**	**2.0**	**2.2**	**2.3**	**1.9**	**1.6**
EGWWS AWOTE - Australia (b)	6.0	0.1	3.9	1.5	1.4	1.9	2.4	2.9	3.1	2.6	2.6	2.3
EGWWS WPI - Australia (b)	1.1	1.2	1.9	0.9	0.8	1.3	1.6	1.9	1.9	2.2	1.8	1.5
2. Contractor Labour Cost Escalation												
Construction AWOTE - New South Wales (c)	-7.7	2.0	2.2	0.7	0.8	1.5	2.3	2.2	2.0	2.2	2.0	1.7
Construction WPI - New South Wales (c)	**1.0**	**0.9**	**1.0**	**0.2**	**0.5**	**1.2**	**1.6**	**1.5**	**1.2**	**1.4**	**1.4**	**1.1**
Construction AWOTE - Australia (b)	1.9	1.2	2.0	0.5	0.6	1.3	2.1	2.1	2.3	2.6	2.1	1.6
Construction WPI - Australia (b)	0.9	1.7	1.1	0.1	0.2	1.0	1.4	1.3	1.4	1.6	1.4	1.0
3. Australian Wages												
All Industries - AWOTE (e)	1.0	2.0	2.4	0.5	1.0	1.8	2.5	2.4	1.8	2.3	2.2	1.8
All Industries - WPI (e)	0.7	1.3	1.0	-0.1	0.3	1.1	1.5	1.3	1.3	1.5	1.3	1.0

(a) Electricity, Gas, Water and Waste Services (EGWWS) Average Weekly Ordinary Time Earnings (AWOTE) for Wage Price Index (WPI) for New South Wales.
(b) The ABS stopped producing AWOTE at the state industry level from February 2012. Hence, the increase in AWOTE for 2012/13 at the state industry level is estimated from historical data, changes in the relevant Australian industry AWOTE forecasts as well as known movements in state industry WPI. Similarly, our forecasts for AWOTE are based on our Australian industry wage forecasts and state industry WPI forecasts.
(c) Australian sector wage forecasts provided for comparison.
(d) Construction Sector AWOTE and WPI for New South Wales.
(e) Australian All Industries AWOTE and WPI provided for comparison.
(f) Headline CPI forecasts based on Reserve Bank of Australia forecasts to June 2016 quarter and then Commonwealth Treasury medium term projections.
(g) Average Annual Growth Rate for 2015/16 to 2019/20 inclusive ie for next regulatory period.
(h) Real price changes are calculated by deducting the inflation rate from nominal price changes.

Summary – Material Cost Escalation Forecasts

(per cent change, year average, year ended June)

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	5 yr Avg (i)
	Actuals			Forecasts		Next Regulatory Period					
Nominal Price Changes (With Carbon Tax)											
1. Steel - USA/Europe Average (a)	**-3.0**	**-3.7**	**-9.4**	**9.3**	**4.3**	**3.2**	**2.4**	**9.8**	**-5.9**	**-0.7**	**1.8**
2. Steel - Asia (a)		**-9.5**	**-9.4**	**10.3**	**7.4**	**3.6**	**2.4**	**10.6**	**-6.2**	**-2.4**	**1.6**
3. Aluminium (a)	**-6.2**	**-7.0**	**-7.8**	**7.8**	**2.7**	**8.7**	**7.0**	**14.1**	**-3.1**	**1.0**	**5.5**
4. Brass (a)				**10.7**	**5.4**	**4.6**	**4.8**	**12.1**	**-6.1**	**-2.6**	**2.5**
5. Copper (a)	**-3.3**	**-1.8**	**-7.8**	**6.9**	**1.1**	**1.1**	**2.9**	**11.9**	**-6.1**	**-3.0**	**1.4**
6. Zinc (a)	**-10.1**	**-8.6**	**-5.0**	**16.2**	**11.8**	**9.8**	**7.5**	**12.5**	**-6.3**	**-2.1**	**4.3**
7. Plastics Prices											
a) Nylon-11 (b)	**-0.7**	**2.5**	**2.7**	**9.2**	**3.8**	**1.4**	**2.3**	**9.0**	**-3.7**	**-1.0**	**1.6**
b) HDPE (Polyethylene) (c)	**-0.7**	**2.5**	**2.7**	**9.2**	**3.8**	**1.4**	**2.3**	**9.0**	**-3.7**	**-1.0**	**1.6**
8. Concrete (d)	**5.9**	**6.2**	**4.7**	**1.9**	**6.5**	**7.2**	**2.3**	**0.8**	**1.7**	**3.3**	**3.1**
9. Gas and Fuel Construction Price Index (e)	**-8.3**	**-1.5**	**0.6**	**2.5**	**3.2**	**2.4**	**0.2**	**3.5**	**3.3**	**3.4**	**2.6**
10. General Materials Prices (f)	**3.1**	**2.3**	**2.3**	**2.8**	**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Nominal Price Changes (Without Carbon Tax)											
1. Steel - USA/Europe Average (a)	-3.0	-3.7	-9.6	9.2	4.5	3.1	2.3	9.7	-6.0	-0.9	1.7
2. Steel - Asia (a)		-9.5	-9.6	10.2	7.6	3.5	2.3	10.5	-6.4	-2.6	1.5
3. Aluminium (a)	-6.2	-7.0	-9.1	7.6	3.9	8.1	6.4	13.5	-4.0	0.1	4.8
4. Brass (a)				10.7	5.9	4.4	4.6	12.0	-6.3	-2.8	2.4
5. Copper (a)	-8.4	-1.8	-8.4	6.9	1.6	1.0	2.8	11.8	-6.2	-3.1	1.2
6. Zinc (a)	-10.1	-8.6	-5.7	16.3	12.4	9.6	7.4	12.4	-6.5	-2.3	4.1
7. Plastics Prices											
a) Nylon-11 (b)	-0.7	2.5	2.7	9.2	3.9	1.4	2.3	9.0	-3.7	-1.1	1.6
b) HDPE (Polyethylene) (c)	-0.7	2.5	2.7	9.2	3.9	1.4	2.3	9.0	-3.7	-1.1	1.6
8. Concrete (d)	5.9	6.2	4.2	1.8	7.0	7.0	2.0	0.5	1.4	3.0	2.8
9. Gas and Fuel Construction Price Index (e)	-8.3	-1.5	0.6	2.5	3.4	2.3	0.1	3.4	3.2	3.2	2.4
10. General materials Prices (f)				2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Consumer Price Index (headline, with Carbon tax) (g)	**3.1**	**2.3**	**2.3**	**2.8**	**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Consumer Price Index (headline, without Carbon Tax) (h)				**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Real Price Changes (With Carbon Tax) (j)											
1. Steel - USA/Europe Average (a)	-6.1	-6.0	-11.6	6.5	1.5	0.7	-0.1	7.3	-8.4	-3.2	-0.7
2. Steel - Asia (a)		-11.8	-11.7	7.5	4.6	1.1	-0.1	8.1	-8.7	-4.9	-0.9
3. Aluminium (a)	-9.3	-9.3	-10.1	5.0	-0.1	6.2	4.5	11.6	-5.6	-1.5	3.0
4. Brass (a)				7.9	2.6	2.1	2.3	9.6	-8.6	-5.1	0.0
5. Copper (a)	-6.4	-4.1	-10.1	4.1	-1.7	-1.4	0.4	9.4	-8.6	-5.5	-1.1
6. Zinc (a)	-13.2	-10.9	-7.3	13.4	9.0	7.3	5.0	10.0	-8.8	-4.6	1.8
7. Plastics Prices											
a) Nylon-11 (b)	-3.8	0.2	0.5	6.4	1.0	-1.1	-0.2	6.5	-6.2	-3.5	-0.9
b) HDPE (Polyethylene) (c)	-3.8	0.2	0.5	6.4	1.0	-1.1	-0.2	6.5	-6.2	-3.5	-0.9
8. Concrete (d)	2.8	3.9	2.4	-0.9	3.7	4.7	-0.2	-1.7	-0.8	0.8	0.6
9. Gas and Fuel Construction Price Index (e)	-11.4	-3.8	-1.6	-0.3	0.4	-0.1	-2.3	1.0	0.8	0.9	0.1
10. General materials Prices (f)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real Price Changes (Without Carbon Tax) (j)											
1. Steel - USA/Europe Average (a)	**-6.1**	**-6.0**	**-11.8**	**6.4**	**2.0**	**0.6**	**-0.2**	**7.2**	**-8.5**	**-3.4**	**-0.8**
2. Steel - Asia (a)		**-11.8**	**-11.9**	**7.4**	**5.1**	**1.0**	**-0.2**	**8.0**	**-8.9**	**-5.1**	**-1.0**
3. Aluminium (a)	**-9.3**	**-9.3**	**-11.4**	**4.8**	**1.4**	**5.6**	**3.9**	**11.0**	**-6.5**	**-2.4**	**2.3**
4. Brass (a)				**7.9**	**3.4**	**1.9**	**2.1**	**9.5**	**-8.8**	**-5.3**	**-0.1**
5. Copper (a)	**-11.5**	**-4.1**	**-10.6**	**4.1**	**-0.9**	**-1.5**	**0.3**	**9.3**	**-8.7**	**-5.6**	**-1.3**
6. Zinc (a)	**-13.2**	**-10.9**	**-8.0**	**13.5**	**9.9**	**7.1**	**4.9**	**9.9**	**-9.0**	**-4.8**	**1.6**
7. Plastics Prices											
a) Nylon-11 (b)	**-3.8**	**0.2**	**0.4**	**6.4**	**1.4**	**-1.1**	**-0.2**	**6.5**	**-6.2**	**-3.6**	**-0.9**
b) HDPE (Polyethylene) (c)	**-3.8**	**0.2**	**0.4**	**6.4**	**1.4**	**-1.1**	**-0.2**	**6.5**	**-6.2**	**-3.6**	**-0.9**
8. Concrete (d)	**2.8**	**3.9**	**1.9**	**-1.0**	**4.5**	**4.5**	**-0.5**	**-2.0**	**-1.1**	**0.5**	**0.3**
9. Gas and Fuel Construction Price Index (e)	**-11.4**	**-3.8**	**-1.6**	**-0.3**	**0.9**	**-0.2**	**-2.4**	**0.9**	**0.7**	**0.7**	**-0.1**
10. General materials Prices (f)				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Source: BIS Shrapnel

(a) Price growth in Australian dollars. 'Without Carbon Price' forecasts from Consensus Economics
(b) Castor Oil is the key raw material of Nylon-11. Because we do not have any historical data on Castor Oil, we have approximated Nylon-11 by using HDPE growth rates.
(c) HDPE (Polyethylene) prices are proxied using Manufacturing Wages, General Materials, and Thermoplastic Resin prices. Thermoplastic Resin is primarily driven by Crude Oil.
(d) Concrete price growth in Australian dollars. Forecasts from BIS Shrapnel modelling.
(e) Gas and Fuel Construction Price Index forecasts from BIS Shrapnel modelling.
(f) General Materials are proxied using CPI forecasts.
(g) Headline CPI forecasts based on Reserve Bank of Australia forecasts to June 2015 quarter and then Commonwealth Treasury medium term projections.
(h) Assuming the Carbon Tax is removed on 1 July, 2014
(i) Average Annual Growth Rate for 2015/16 to 2019/20 inclusive ie for next regulatory period.
(j) Real price changes are calculated by deducting the inflation rate from nominal price changes.

1. INTRODUCTION, OUTLINE OF REPORT & DATA SOURCES

In July 2013, BIS Shrapnel was engaged by Jemena Gas Networks (NSW) Ltd (hereinafter referred to as JGN or Jemena) to provide an expert opinion regarding the outlook for labour and a range of material cost escalators relevant to gas distribution networks in New South Wales over a seven year period from 2013/14 to 2019/20 (ie from 1 July 2013 to 30 June 2020). The labour and material cost escalators were used by Jemena to escalate their labour and material costs to develop their operating and capital expenditure forecasts for inclusion in Jemena's revenue proposal to the Australian Energy Regulator (AER) in June 2014.

In keeping with my instructions, I confirm that I have undertaken this engagement having regard to the Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia and the requisite statement to this effect is included in Appendix C. I have been assisted in the preparation of this report by Dr Kishti Sen, Senior Economist at BIS Shrapnel, Daniel Gradwell, Economic Analyst and Husam El-Tarifi, Research Assistant at BIS Shrapnel. Curriculum vitas of all relevant personnel are attached in Appendix D. Notwithstanding the assistance from the other three economists, the opinions in this report are my own and I take full responsibility for them. A brief description of the material upon which I have relied for the preparation of this report follows.

The Australian Bureau of Statistics (ABS) is the primary data source for the consumer price index, wages, employment, real gross value added and investment (including engineering construction) data, and for a range of other economic variables shown in table 2.1. The most recent wages data is December 2013 quarter and the latest industry employment data is November 2013. The December 2013 quarter was the latest available data for real gross value added (at the Australian level only), investment and indeed most of the economic variables in table 2.1. The detailed engineering construction data (by state and by category) have data up to September 2013 quarter. The latest data for Gross State Product (GSP) and real gross value added for state industry sectors was 2012/13. Other inflation and interest rates data were sourced from the Reserve Bank of Australia. Other data and information concerning enterprise agreements and skills shortages was obtained from the Department of Education, Employment and Workplace Relations (DEEWR).

Forecasts of the economic variables in this report were mostly sourced from BIS Shrapnel reports, including *Economic Outlook, Long Term Forecasts: 2013 – 2028 February 2014 Update* report*, Engineering Construction: 2012/13 to 2026/27 and Long Term Building Work Done Forecasts*, plus other unpublished forecasts and from BIS Shrapnel internal research.

Commodity price forecasts including steel and aluminium price forecasts were sourced from Consensus Economics *Energy & Metals Consensus Forecasts* publication. Polyethylene pipe and Nylon-11 price forecasts are based on thermoplastic resin prices, manufacturing wages and transport costs. Concrete price and gas & fuel construction implicit price deflator forecasts are based on our projections of underlying construction activity.

We believe our forecasts are arrived at on a reasonable basis and represent the best forecast possible given latest data, our thorough research and detailed analysis.

The structure of this report is as follows:

- The **Summary** section presents an overview of the outlook for the labour and material cost escalators and a summary table.
- **Section 2** provides an overview of the macroeconomic outlook for Australia and New South Wales, including a brief commentary of the logic and key drivers, plus forecasts of key economic variables. This provides a context for our Australia level and industry wage forecasts.

- **Section 3** discusses BIS Shrapnel's model of wage determination and provides forecasts of national ('all industries') wages and CPI inflation, with the Reserve Bank of Australia and Treasury medium-term projections of CPI inflation. The latter is used to deflate the nominal escalators provided in this report.
- **Section 4** provides an outlook for Jemena's internal labour cost escalation which are based on forecasts of wages growth for the Electricity, Gas, Water and Waste Services industry for Australia and New South Wales.
- **Section 5** provides forecasts of Jemena's external or 'out-sourced' labour cost escalation. As most out-sourced labour is provided by firms in the construction industry, Jemena's external cost labour escalation is based on forecasts of wages growth in the New South Wales construction industry.
- **Section 6** provides an outlook for a range of material cost escalators relevant to the operation and maintenance of gas networks in New South Wales.
- **Appendices,** which includes a note on different wage measures and a description of BIS Shrapnel's wage and exchange rate model.

2. MACROECONOMIC FORECASTS: WORLD, AUSTRALIA AND NEW SOUTH WALES

2.1 Overview

Global economic activity is expected to grow modestly in calendar year 2014 before strengthening over the following two years. In the United States, the expansion is continuing at a modest pace, with gradually strengthening private demand partly offset by accelerated fiscal consolidation. We expect the US economy to grow close to trend through to 2016. Meanwhile, the Euro area is emerging from recession while Japan's economic prospects have improved due to bold stimulus measures announced by Japanese authorities. After picking up sharply in the second half of 2012, growth in China has eased and is expected to stabilise in the 7.0 to 7.5 per cent range over the next three years.

Australia has experienced uninterrupted growth over the past 20 years, recently performing better than most advanced economies due to its trade linkages with Asia, particularly China.

That said, recent growth has been uneven, with marked differences between industries and regions. While resources and resources investment-related activities, importers and those with economic power have done well, most Australian businesses are doing it tough both in terms of revenue and profitability. Many haven't recovered from the GFC (global financial crisis). They are in cost-cutting mode, some to increase profits, some to survive.

Notwithstanding the post-GFC fiscal stimulus, Australia's economic growth following the GFC, and more recently, has largely been underwritten by an investment boom in the resources sector. An investment boom made possible by the high commodity prices and strong Chinese and Asian demand for bulk commodities. The escalation in resources investment resulted in a significant reallocation of resources (capital and labour) away from the non-mining industries to the mining and mining-related sectors. Meanwhile, high commodity prices drove the Australian dollar above parity with the US dollar, creating competitive challenges and enormous pressure on other trade-exposed industries including manufacturing, tourism, education and business services. This further exacerbated the structural change brought about by the surge in resources investment, resulting in unbalanced growth.

Resources investment has now peaked and begun what we think will be an orderly decline, at least for the next few years. We don't expect a collapse. A strong pipeline of work through work in progress will place a floor under construction in the short to medium-term, mainly driven by several large LNG projects in WA, Queensland and the NT and further strength of iron ore. Commodity prices have fallen from peak levels as supply has caught up to demand. However, they remain relatively high historically, enough to support investment decisions for a number of large projects on which decisions will be made over the next few years. Ratification of those projects would support still high levels of activity in the second half of the decade.

Nonetheless, after a long period of positive contributions to economic growth, falls in resources investment will now make negative contributions to growth. Eventually, this process will unwind all the positive stimulus of the investment boom, either gradually or, at some stage, with a sharper correction. The offset is that resources-related investment has substantially increased Australia's capacity to produce and export minerals, contributing to future growth. However, these projects employ a lot more people in the construction phase than in the operational phase. That means that, having tilted the economy to service high levels of resources investment, we now need to rebalance the economy.

Major changes are in prospect, affecting both regions and industrial structure.

The economy is in transition, in a soft patch with underlying growth running around 2.5 per cent compared with 3.5 per cent a year ago, awaiting the switch to a new set of growth drivers.

Meanwhile, there are cyclical forces at play.

- Residential investment is usually the first sector to recover after a downturn, and it has finally picked up strongly.
- Government investment is falling as governments focus on budgets. Hopefully, governments will come to their senses and resume investment in productivity-enhancing infrastructure, both hard and soft.
- The next stage is a more solid recovery in growth and employment underwritten by recovery in non-mining business investment. However, given still low capacity utilisation, it appears to be 18 months to 2 years away.

That means that the Australian economy will remain soft, and employment growth softer, until the structural shift and cyclical upswings underwrite stronger growth in the second half of the decade. The next two years will be characterised by:

- Continued tight business conditions - cutting costs and deferring investment.
- Tight government expenditure
- Further rises in unemployment
- Containment of wage pressures and further labour productivity increases, offsetting the inflationary impact of falls in the dollar
- A sustained period of low interest rates until growth picks up.

We expect the economy to build momentum from late 2015 with growth moving above trend in 2016. Growth could ease in 2017 as interest rates rise, but quickly return to trend reflecting more broadly based balanced growth in the second half of the decade.

The difficult period is now – waiting for a lower dollar and structural change to come through and waiting for non-mining business investment to recover.

Lower interest rates have triggered an initial upswing in residential property and building in undersupplied markets. Total Australian Residential building is well below underlying demand. Alterations and additions remain extremely weak, reflecting the weakness of confidence, but will pick up as the residential recovery proceeds. However, the recovery in residential building by itself is not enough to replace weakening resources investment.

An initial fall in the dollar, triggered by the threat of the end of quantitative easing, has brought it back to the reality of lower commodity prices after a period when weight of money associated with the popularity of Australia as an investment destination boosted the currency. The lower dollar will help ease the pain of domestic trade-exposed sectors, but is not yet low enough to underwrite significant structural change, reversing the structural change as we ‘made room for the minerals boom.’ We think it has further to fall, but later, when commodity prices fall further and interest rate differentials contract. Only then will improved competitiveness of domestic trade-exposed parts of agriculture, manufacturing, tourism, education, finance and business services and, of course, mining help to partially reverse the structural changes we have been through and broaden growth. Rebalancing the Australian economy will take time.

Next cab off the rank is recovery in non-mining business investment. However, there is still excess capacity and business confidence is weak. We expect a recovery in non-mining business investment to come through in about two years, building momentum and underwriting

solid growth through the second half of the decade. Commercial, industrial, retail, hotel and industrial construction are very much part of this story as well as equipment and software investment which will need to catch up after a long delay.

Forget talk of recession. It won't happen in the next few years. After that, it's possible but low probability, and will realistically only happen if there is a sharp fall in mining investment in the second half of the decade. That's not our forecast. Certainly, tight government spending and falling mining investment will make a negative contribution to growth. We expect a continued orderly decline, offset by a strong contribution from net exports, underpinned by resources exports growth averaging 8% per annum over the next three years. Households, having built up a savings buffer, will remain cautious underpinning activity with expenditure matching income. And failing a major shock, growth will pick up as non-mining investment builds momentum.

The real issue is shifting growth drivers and structural change, with substantial differences in performance between industries and regions.

BIS Shrapnel's base case macroeconomic projection for the Australian economy presented in this document charts the 'most likely' outcome. In this base case, the most likely outcome involves an orderly negative impact from falling minerals investment which will be offset through to the end of the decade by rising private investment: first residential, then non-mining business investment, and later by rising infrastructure investment. Meanwhile, the fall in the Australian dollar will lead to offsetting competitiveness and growth impacts, via positive impacts on the tradeables sectors such as manufacturing, tourism, education services, agriculture and mining exports, with the latter boosted over the next decade by historically high levels of resources-related investment. Although there will still be the usual cycles and variable growth among different variables, overall we expect solid and sustained growth over the next decade and beyond.

2.2 Detailed Assumptions and Forecasts

Global Economy

Much of the urgency has gone out of concerns about the global economy. We expect global economic growth to strengthen over the next three years, led by stronger momentum in the United States.

Commodity prices received by Australian producers have fallen, but remain elevated by historical standards.

The United States is midway through that long hard haul post-GFC, with expansion continuing at a modest pace and with gradually strengthening private demand partly offset by accelerated fiscal consolidation. So much so that markets are starting to prepare for the end of quantitative easing. The US economy is set to accelerate, with the recovery being broad based with robust corporate profits and housing picking up. Strengthening of the US labour and housing markets will create a virtuous self-sustaining cycle over the medium term.

In contrast, in the Euro-area, GDP growth will be modest as cost imbalances in the fixed exchange rate structure, further private deleveraging and high unemployment continue to weigh on domestic demand. The austerity shackled euro area is expected to struggle for growth as long-term challenges remain unaddressed: monetary union without fiscal union, persistently tight credit conditions, rigid labour markets, and persistently high unemployment and competitive differences that will continue to drag on growth and dent confidence. Japan on the other hand is expected to receive a short and medium-term lift from unprecedented stimulus. In Japan, exceptional monetary policy stimulus should sustain the ongoing recovery, despite scheduled increases in value-added tax.

Over the next five years, we expect Chinese growth to gently moderate to a "new normal" in comparison to the past five-year period, but otherwise continue to remain strong over the medium to long-term. Meanwhile, India's outlook is also strong over the medium and long-term, in line with more robust growth in foreign demand and further progress on economic reforms. Overall, emerging economies will assume the leadership mantle in driving world growth over the medium to long term, resulting in a substantial increase in share of world GDP.

Global economic activity is expected to grow modestly in 2014, at a rate of 3.7 per cent, before strengthening to 4.1 per cent in 2015 and 4.3 per cent in 2016. Our base-case projection is predicated on the assumption that the crisis in the euro area will continue to be contained.

In response to significant excess capacity and declining inflationary pressures, central banks in some advanced economies have provided additional, substantial unconventional monetary easing while keeping policy rates at historically low levels. These actions have helped to anchor medium-term inflation expectations and support stimulative global financial conditions.

Longer-term, world GDP growth is expected to ease in 2017 to 3.2 per cent as global interest rates rise but quickly rebound in 2018 to 4.0 per cent as the US, Chinese, India and other Asian economies regain their growth momentum.

The Australian Dollar

The Australian dollar has shed 13 per cent over the past year, to sit at a near 3-year low of around US$0.90 at the time of writing. We believe the dollar will drift down and average US$0.87 over the next 2 years. A return to parity appears unlikely.

The recent fall in the currency was driven by doubts about performance of the Australian economy in a lower commodity price / falling investment environment. The most recent rate cut by the RBA reinforced these concerns and created doubts amongst investors about the 'safe haven' qualities of Australian investment.

Now that investor weight of money is largely removed as a driver of the currency's value, the largest risk facing the dollar is the growth outlook in the Asia region, particularly China. Because the currency is so sensitive to commodity price fluctuations, a significant shift in minerals demand (through Chinese growth accelerating or slowing more than expected) will have a direct effect on the value of the dollar. Nevertheless, the current value of the A$ (US$0.90 or 69.0 for the Trade Weighted Index) is about right according to BIS Shrapnel's model of the fundamental drivers of commodity prices and interest rate differentials (vis-à-vis overseas rates), after having been over-valued over 2011/12 and 2012/13. Overall, we believe the Australian dollar will drift down slowly from current levels over the next three years, but continue to fluctuate in a US10cent band between US$0.85 to US$0.95.

Nevertheless, while the recent depreciation to US$0.90 (and to US$0.87 briefly during January 2014) has alleviated some of the pressure on the tradeables sector, many parts of the tradeables sector are still not competitive, particularly against imports. Our assessment is that most parts of Australia's tradeables sectors of manufacturing, tourism and education services and agriculture are internationally competitive at an exchange rate below US$0.80 (although some believe we need a sub-75cent dollar). The Australian dollar has been below this level for most the period since the dollar was floated in 1983, the notable exceptions being the late 1980s, mid 2006 to September 2008 (when the GFC hit) and from mid-2009 to now.

However, we are forecasting the A$ to fall another 10 per cent from mid-2016 to mid-2018, to US$0.77. This mid-decade depreciation will be the result of further sharp falls in commodity prices and a narrowing of the interest rate differentials between Australian and overseas rates, the latter expected in 2017/18. The decline in commodity prices will be driven on the one hand by additional supply coming on-stream in the key Australian exports of iron ore and coal, while,

on the other hand, we expect a softening in global demand after the initial strengthening in world economic growth over 2014 to 2016. Note we are not forecasting a major slowdown in world growth, just a slowing as unsustainable current expansionary settings are wound back.

It's possible that the fall to sub-US80 cent levels could come sooner than early 2018. Exchange rates are notorious for overshooting fundamentals both on the way up and way down. But the key here is that by the second half of the decade, we anticipate the key factor to drive structural change back in favour of the tradeables sectors – an exchange rate below US$0.80 – will be in place.

Longer term, we expect the Australian dollar to average US$0.76. However, if the prospects for the world economy, in particular China and India, remain strong, commodity prices could be sustained at high levels and the Australian dollar could remain around current levels for longer. Alternatively, a shock to the world economy could trigger a sharper fall in commodity prices and the dollar.

Australia's Trade

By far the majority of Australian exports go to Asian markets – China alone accounts for nearly a third of Australia's merchandise exports. This means Australia has been well insulated from low growth in Europe. Hence, as assumed in the main report, external demand for Australia's commodity exports is expected to remain strong over the next five years.

Over the next five years, the total volumes of exports of goods and services are forecast to increase at an average rate of 6.3 per cent per annum, driven by increased capacity from mining investment, strengthening recovery in the global economy, and robust demand from China and India.

Leading the charge is strong growth in **energy, mineral and metals** exports (in constant price terms). These resource export volumes are forecast to increase by 7.8 per cent and 8.0 per cent respectively in 2013/14 and 2014/15, and lift further over the subsequent three years. On average, energy, mineral and metals export volumes are expected to achieve 8.5 per cent compound growth per annum over the next five years, the most robust pace of any five year period on record. In addition, the mining investment boom of the past decade is expected to see the share of energy, minerals and metals exports rise from 54 per cent at the beginning of last decade to above 62 per cent by 2017/18 (in constant price terms).

As world demand picks up, and the Australian dollar falls, over the forecast period, growth of non-commodity manufacturing and services exports (mainly tourism and education) will also gradually improve. Meanwhile, we think rural exports peaked in 2012/13 and will drift lower over the next two years before picking up in the second half of the decade (weather conditions permitting).

Higher import prices (due to the depreciation of the dollar in the second half of calendar 2013) and falling mining investment will see merchandise imports fall in 2013/14. We expect volume of imports of goods and services to pick-up over the subsequent three years in line with strengthening domestic demand.

Overall, we expect net exports to contribute, on average, one percentage point per annum to GDP growth over the next five years.

Australian Economic Outlook

The Australian economy is in transition. Over the last decade, high commodity prices drove an investment boom in the resources sector. The surge in resources investment, in turn, underwrote Australia's strong economic recovery following the global financial crisis. However, the boom in resources investment has now peaked and will gradually shift lower from here, detracting from economic growth.

Chart 2.1: Mining versus Non-Mining Business Investment

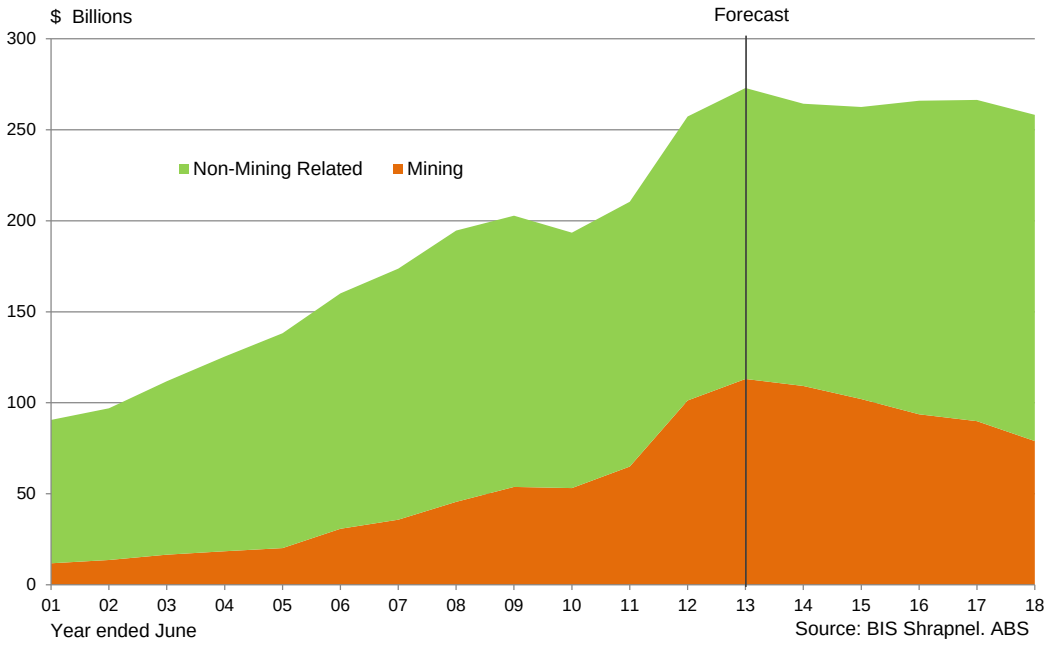


Table 2.1: Construction Work Done
2011/12 Prices, Annual Percentage Change

Category and Sector	2009	2010	2011	2012	2013	Forecast 2014	2015	2016	2017	2018	Average 2014-2018
Building: private	0.2	-5.7	1.6	-0.7	3.2	5.0	10.3	3.0	-3.5	-5.5	1.7
-Dwelling([1])	-0.4	0.5	2.5	-3.7	3.2	5.6	10.6	4.6	-2.7	-5.6	2.3
-Non-Dwelling Buildings	1.1	-16.4	-0.5	5.8	3.2	3.7	9.7	-0.3	-5.1	-5.3	0.4
Building: public	10.5	106.4	7.2	-29.4	-19.7	7.5	-9.7	-6.0	-4.3	7.0	-1.4
-Dwelling([1])	-7.2	167.0	32.3	-53.0	-41.5	6.4	0.1	-3.2	5.7	2.5	2.2
-Non-Dwelling	13.1	99.0	3.1	-24.4	-16.8	7.6	-10.6	-6.3	-5.3	7.5	-1.7
Engineering Construction: private	18.4	-1.7	18.1	53.5	11.0	0.7	-9.5	-9.1	-6.1	-3.8	-5.6
-Mining and Heavy Industry	27.0	4.4	18.5	70.6	8.9	0.9	-7.3	-10.8	-10.6	-9.0	-7.5
Engineering Construction: public	20.3	8.3	1.3	2.4	-2.5	-6.3	-6.0	2.1	7.2	5.1	0.3
-Road Construction	30.0	-5.7	12.9	13.6	-1.0	-12.5	-4.4	-0.9	8.6	11.2	0.0
Total Construction	9.2	3.9	6.9	14.1	4.1	1.4	-2.0	-2.6	-3.0	-2.6	-1.8

1. Total dwellings ie includes new dwellings and Alterations and Additions > $10,000.

Source: BIS Shrapnel, ABS Data

Meanwhile, high commodity prices and the associated high Australian dollar drove a structural change in the economy with a significant reallocation of labour and capital away from trade-exposed industries towards the mining-related sectors. Essentially, the rise in commodity prices and the associated high dollar tilted the economy 'out of balance' — away from the trade-exposed industries towards to the mining-related sectors.

The high dollar also impacted on competitiveness creating enormous pressure on other trade-exposed industries including manufacturing, tourism, education and business services. This, combined with global uncertainty, fiscal consolidation and political uncertainty, contributed to the general pessimistic mood and weak investment growth outside the mining sector. At the same time, dwellings investment and non-mining business investment were flat to falling, and public sector investment has fallen sharply as the post-GFC stimulus wound down.

While Australia's strong increase in activity and low unemployment rate (relative to many advanced economies) is welcome, we still have a long way to go to rebalance the economy and reverse some of the high commodity prices, high dollar-induced structural change and reach what feels like a healthy economy.

Household consumption to grow in line with incomes

Household consumption expenditure growth slowed sharply in the immediate aftermath of the global financial crisis as people cut spending and sharply increased savings. That came after the spending binge of the previous decade when the banks turned mortgages into lines of credit allowing households to borrow against the value of their home to boost current expenditure. And they did, sharply reducing savings ratios. Increased concern about high household debt was brought to a head by the GFC and concerns about job security. The decline in household consumption expenditure growth was more marked than the decline in real household disposable income with the household saving rate rising to its highest level since the 1980s.

Over the past two years, households have stayed cautious, keeping savings high and only very slightly loosening the purse strings. Through this period consumption expenditure has been in line with disposable income.

We expect that to continue over the next few years. Households have built up a considerable savings buffer after several years of high savings ratios. Improved financial security will see expenditure continue to pick up. With the Australian dollar now lower, the ongoing growth in household consumption expenditure is expected to translate into increased retail turnover and activity in Australia over the next few years.

We expect interest rates to remain around current relatively low levels until strength in the broader economy causes the Reserve Bank begin to increase interest rates from late calendar year 2015 and through 2016 back towards neutral levels. This would dampen consumer spending from 2016/17. Overall, household consumption expenditure is forecast to average growth of 2.9 per cent per annum over the five years to 2017/18.

Over the longer term, population growth is expected to be the primary driver of household expenditure. As such, slowing population growth will see household consumption expenditure growth moderate slightly over the following decade, averaging 3.0 per cent per annum between 2018 and 2028. Although the economy is expected to remain healthy through this period, we do not expect a return to the debt-driven increases in consumption that occurred through the late 1990's and early 2000's when growth rates often approached and exceeded 5 per cent.

Table 2.2: Australia – Key Economic Indicators, Financial Years

Year Ended June	2007	2008	2009	2010	2011	2012	2013	Forecasts 2014	2015	2016	2017	2018	2019	2020
Selected Expenditure Categories														
Private Investment														
– Dwellings	-0.2	1.8	-1.4	1.2	2.2	-2.2	-0.1	4.5	8.8	4.4	-2.3	-4.6	3.5	7.5
– New Non-Dwelling Construction (+)	13.1	6.4	12.1	-10.2	11.4	37.2	13.9	-1.1	-4.4	-5.4	-5.8	-5.0	8.7	8.1
– New Non-Dwelling Building (+)	10.7	11.7	-3.9	-14.4	0.5	9.7	9.1	4.3	8.3	2.2	-4.8	-6.5	4.1	12.2
– New Engineering Construction (+)	15.5	1.3	29.2	-7.0	19.0	53.6	15.9	-3.2	-9.7	-9.3	-6.3	-4.1	11.2	6.0
Total New Private Investment (+)	**5.2**	**8.3**	**1.2**	**-2.2**	**5.3**	**14.9**	**4.7**	**-1.0**	**0.2**	**1.1**	**-0.1**	**-2.5**	**6.8**	**9.2**
New Public Investment (+)	**4.7**	**10.6**	**8.1**	**22.6**	**-2.7**	**-4.0**	**-9.6**	**0.3**	**-3.2**	**3.0**	**6.9**	**5.5**	**3.9**	**1.9**
Gross National Expenditure (GNE)	**5.1**	**6.0**	**0.6**	**2.2**	**4.2**	**5.0**	**1.6**	**1.2**	**1.8**	**3.0**	**2.5**	**1.5**	**4.3**	**4.8**
GDP	**3.8**	**3.7**	**1.7**	**2.0**	**2.2**	**3.6**	**2.6**	**2.8**	**2.7**	**3.5**	**3.2**	**3.0**	**4.1**	**4.2**
Inflation and Wages														
CPI (Yr Avg)- RBA/Treasury forecasts (*)	3.0	3.4	3.1	2.3	3.1	2.3	2.3	2.8	2.8	2.5	2.5	2.5	2.5	2.5
Wage Price Index (Jun on Jun)(**)	4.0	4.2	3.8	3.1	3.8	3.7	2.9	2.8	3.2	3.8	4.0	3.6	3.9	4.0
Wage Price Index (Yr Avg)(**)	3.9	4.1	4.1	3.1	3.8	3.6	3.3	2.7	3.1	3.6	4.0	3.8	3.8	4.0
Average Weekly Earnings (Yr Avg)	3.6	4.9	5.5	5.6	4.2	4.3	4.6	3.3	3.8	4.3	5.0	4.9	4.3	4.8
Employment														
– Employment Growth (Yr Avg)	3.0	3.0	1.7	1.0	2.4	1.2	1.3	0.5	1.1	2.1	2.1	0.7	1.8	2.5
– Employment Growth (May on May) (%)	3.3	2.7	0.9	1.6	2.2	1.7	0.9	0.3	1.5	2.3	1.5	0.8	2.3	2.6
– Unemployment Rate (May) (%)	4.3	4.3	5.8	5.2	5.0	5.2	5.6	6.1	6.2	5.7	5.5	5.7	5.2	4.5
Labour Productivity Growth														
– Total	0.8	0.6	0.0	1.0	-0.1	2.4	1.4	2.3	1.6	1.4	1.1	2.4	2.2	1.6
– Non-farm	1.3	0.6	-0.4	1.1	-0.2	2.4	1.5	2.3	1.8	1.4	1.2	2.3	2.1	1.7
Exchange Rates														
– US$ per A$ (Yr Avg)	0.79	0.90	0.75	0.88	0.99	1.03	1.03	0.90	0.87	0.86	0.84	0.77	0.82	0.85

Source: BIS Shrapnel, ABS and RBA

+Expenditure on new assets (or construction work done). Excludes sales (or purchases) of second hand assets.

*Headline CPI forecasts based on Reserve Bank of Australia's forecasts to calendar year 2015 and then Commonwealth medium term projections.

** Based on Ordinary Time Hourly Rates of Pay

Dwellings recovery has begun

Historically low interest rates have finally unlocked strong underlying fundamentals for the housing market. A strong upturn in new residential building has begun. The key is that, Australia wide, home building remains well below demographic demand. This has resulted in an estimated housing stock deficiency of about 80 thousand dwellings as at June 2013 (see table 1.3). Low housing interest rates combined with the chronic deficiency of stock, tight rental vacancies and rising rents have laid the foundations for a solid recovery in new dwellings construction.

The upswing is not uniform between regions. It will be driven by Western Australia, New South Wales, Queensland, and Northern Territory with Victoria, Tasmania and ACT heading into decline as their markets are oversupplied.

At present, overall dwellings investment is being held back by weak alterations and additions activity. After falling for most of the past two years, home renovations are still soft.

The next stage is for strength in the residential market to translate into improvement in alterations and additions, encouraged by improving confidence of both investors and owner-occupiers as well as house price growth. House prices rose by 10 per cent last year.

The upshot is that total dwelling investment will rise in 2013/14, build momentum in 2014/15 and continue to increase in 2015/16. However, higher interest rates will stifle activity from around 2016/17. Nonetheless, the dwelling shortage is so severe that we expect dwelling building to bounce back quickly, posting solid average growth towards the end of the decade.

Non-mining business investment insufficient to offset declining mining investment

Non-mining business investment is expected to remain weak over the next two years as businesses (both weak and strong) remain fixated on cost-cutting. They are deferring investment and discretionary expenditure such as systems upgrades. This is weighing on plant and equipment investment, spending on software development and research and development.

However, private non-dwelling building, driven by warehouses and accommodation especially in New South Wales and Queensland, is expected to post solid gains over the next three years. Private social and institutional building (the other main segment of private non-dwelling building) will benefit from a number of smaller private hospital developments alongside continued investment in aged care facilities over the next five years, only partially offsetting the impact of falling in government social and institutional building.

Meanwhile, private mining investment – including expenditure on building and structures and mining plant and equipment – will turn down from 2013/14, reflecting the recent peak of the mining investment boom (see chart 1.1). Most of this weakness is due to the mining sector transitioning away from investment and towards production. The downturn in mining investment will also impact on associated infrastructure construction such as railways and harbours which will drag down non-mining private engineering construction (see table 1.4).

…but capacity constraints and a lower dollar later this decade will push new business investment into positive territory

With mining investment contracting and non-mining business investment remaining weak, we expect new business investment to fall further over the next two years before recovering. The recovery will be driven by emerging capacity constraints leading to an upturn in machinery and equipment investment.

Across all industries, analysis of capital stock suggests that there remains plenty of excess capital given demand levels, implying capacity constraints are unlikely to become a significant driver of increasing investment over the short-term. Fixed capital formation has been strong in recent years, and demand has not kept up. (In the case of manufacturing it has fallen). Some industries, such as electricity, gas and water, and rental, hiring and real estate services as well as manufacturing have potentially overinvested, This means that the impetus for further growth in investment will not arrive until demand picks up and businesses begin to shift focus away from cost-cutting, and toward servicing growth in demand.

With the economy currently stuck in low gear, we think capacity constraints will not emerge for another two years. This, combined with a catch-up of necessary computer software investment (after a period of deferrals by many companies due to a difficult operating environment post-GFC), will drive an upswing in plant and equipment and intellectual property products expenditure from 2015/16. A lower dollar over this period will also make the manufacturing industry more competitive internationally, further supporting investment in machinery and equipment.

Thanks to jawboning by the Reserve Bank, the dollar fell in the second half of 2013 and has since traded within a relatively narrow range of US 87 to US 90 cents. It is assumed to stay at this lower level over the next three years before falling to around US 85 cents and US 77 cents over 2016/17 and 2017/18 respectively, driven by easing commodity prices and a lower interest rate differential with the United States.

Overall, new business investment is forecast to fall by 1.1 per cent per annum over the next five years but grow strongly by 4.0 per cent per annum for the decade to 2027/28, reflecting catch-up investment after a long period of underinvestment in non-mining industries through much of this decade.

Fiscal restraint will hamper growth

All levels of government are in fiscal repair mode. Expenditure will be constrained by the need to bring budget deficits under control. Long term expenditure commitments are locked in with pressure on government revenue in a soft economy. Because infrastructure spending is easier to cut (through grants to states who do most of the infrastructure spending), infrastructure investment has already been the first casualty of government cost cutting, having fallen sharply over the past two years with another two expected.

This will deny the domestic economy a much-needed source of demand over the next few years, and result in a significant under-investment in infrastructure, hence undermining medium-term economic growth — as occurred during the 1990s.

Public investment will likely pick up in the second half of this decade as mining royalties increase in Western Australia and Queensland. However, the other states will be very dependent on the Commonwealth Government, who in turn might be forced to find new revenue sources or expand the existing ones.

Labour shortages to re-emerge in the second half of 2016

The labour supply will be critical for medium-term economic growth, given relatively low unemployment rates (i.e. there is not a large pool of spare labour currently available). We expect the labour force to grow at slightly below total population growth over the next 15 years — labour supply is currently roughly in line with population growth. This is in contrast to previous decades where the baby boomers, immigration and increased participation rate provided a significant boost to the working age population. In the long term, growth in labour supply is expected to contract as the 65 years and over category grows strongly and total population growth slows.

Employment growth has been subdued since mid-2011 reflecting a weakening in employers' demand for labour due to a prevailing orthodoxy of cost cutting including labour costs. More recently, the downturn in the mining investment — and the transition to less labour-intensive production phase of the mining boom — have also weighed on the demand for labour in mining and mining-related sectors such as employment services firms, engineering & technical services firms and vehicle and equipment leasing providers.

The (subdued) pace of employment growth of 1.1 per cent over the past two years has not kept pace with the growth in the labour force (the number of people working or available and actually looking for work) — which has been around 1.4 per cent annually. This has resulted in the unemployment rate rising from 5.0 per cent in June 2011 to 5.4 per cent in December 2013.

Employment growth will remain weak over the next 18 months as trade-exposed businesses continue to focus on cost-cutting to deal with problems of competitiveness due to the elevated level of the Australian dollar. Other businesses' demand for labour will also be weak due to slower growth in output. With labour force expected to continue to outpace employment growth, the unemployment rate is forecast to rise to above 6 per cent by mid-2015.

It will be a gradual rise in the unemployment rate as we expect the labour force participation rate to drop through 2014 (reflecting decreased incentives to search for work during slowdowns), slowing the growth rate in the labour force to below 1 per cent in the first half of this year.

However, employment growth is expected to pick up from the second half of 2015 and average 2.2 per cent over the subsequent 18 months. This will see the unemployment rate drop to 5 per cent by the end of 2016, before rising to a peak of 6.5 per cent by early 2018 when the economy slows.

Overall, we expect employment growth to average 1.3 per cent per annum over the next five years, and 1.6 per cent per annum in the 10 years to 2027/28, with a restricted labour supply leading to lower employment and GDP growth. The unemployment rate in the 10 years to 2027/28 will average 5.2 per cent.

In the medium to longer term, continued solid employment growth should see the unemployment rate cycle between 4.5 and 5.5 per cent, with any further decrease in the unemployment rate moderated by increases in migration and/or higher interest rates. An unemployment rate much below 5 per cent - which is thought to be the non-accelerating inflation rate of unemployment (NAIRU) - would cause a rise in wage inflation, as employers bid up wages for scarce skilled labour in a tightening labour market.

Main risks to outlook

There is a risk that we could have a bigger collapse in mining investment. Our assumption is for an orderly decline in resources investment but a drastic deterioration in the prospects of mining projects could trigger a bigger fall in mining investment and a recession in Australia. However, we see this as a low probability (tail) event as the Federal Government has scope to loosen fiscal policy to support growth in Australia if needed.

There is a risk that our forecast recovery in non-mining business investment takes longer to come through, which means that the economy will stay softer for longer. If the recovery does not come through, we expect the Reserve Bank to keep interest rates low even longer than our current forecast to support economic recovery.

Longer term, the main risk to Australia's growth prospects relate to the fundamental drivers of growth – lower population growth and a failure for labour productivity growth to maintain its long-term average. However, we expect Australia's relatively high level of income to continue to attract migrants. Furthermore, as the positive benefits of the terms of trade and increased labour supply of the past decade or two start to wane, we expect both governments and businesses to make a more concerted effort to invest in productivity – much as occurred during the 1980s and 1990s.

2.2.1 Medium Term Issues

Life beyond the minerals boom

This economy is far from any sort of medium term steady state. At the moment, it is tilted towards servicing strong levels of minerals investment and, as that investment winds down, will undergo a structural change back towards balanced growth. That means that we can look forward to a continuation of the structural volatility which has characterised the last decade. Structural change and business cycles will continue to dominate prospects for the Australian economy.

The Australian economy is subject to strong internally generated cyclical swings. In addition, Australia's market economy orientation and non-interventionist policy means that the economy has to adjust to short-term external forces beyond our control with little regard to the longer term consequences. The commodities demand and price boom with the associated rise in the Australian dollar driving structural change is a case in point. The financial engineering boom followed by the GFC-induced correction was another.

A decade ago, the Australian economy was just recovering from the overinvestment of the 1980s debt-driven investment boom and the subsequent financial crisis and recession. It took a long time to absorb the excess capacity created during the boom. But capacity constraints eventually drove a recovery in business investment early last decade, spreading through to balanced growth in the economy by mid-decade.

The minerals boom, and the consequent minerals investment boom, left everything else in abeyance. Since that time, underwritten by the strong rise in the Australian dollar, we have built up our capability to service much higher levels of minerals investment at the expense of trade-exposed activity, focused in regions servicing those major projects. The boost to activity from strong mining investment, albeit now on the threshold of trending lower, has been the primary driver of growth in the economy and masked the weakness of other sectors. That was aided by the boost from the Government's GFC (global financial crisis) stimulus package, now still being wound back and lower interest rates.

We went through a process of structural change, shifting labour and operational resources towards mining investment and away from non-mining, and particularly non-mining trade-exposed export and import-competing, industries. This has resulted in a corresponding shift between regions. Those regions servicing mining investment, and the capital cities where much of that took place, prospered largely at the expense of non-mining-related activities and regions.

Many workers involved in those projects work on a fly-in/fly out rotation, boosting associated residential, hospitality, retail and transportation services. The cities servicing those projects have boosted their capacity to undertake design, construction, project management, legal, financial, accounting and other services, requiring increased facilities such as office space to house that activity and flowing on to stimulate the broader economy.

The main transmission mechanism for the shift of resources towards minerals investment was the rise in the Australian dollar. The resultant reduction in international competitiveness underwrote the process of structural change mentioned above, with the hollowing out of trade-exposed industries 'making room for the minerals boom.' Hence the continued loss of industry, regular announcements of job losses and shifting of activities offshore. These businesses are under enormous competitive pressure. Typically, in what has become an increasingly global economy, the decision whether to remain operating in Australia is made when the next major investment or retooling decision has to be made. Hence the protracted adjustment period.

That structural change process is ongoing as the impact of the still too high Australian dollar continues to work its way through the system.

Nor has the weakness only been felt in the non-mining trade-exposed sectors. Much of the rest of the economy, sheltered from the impact of the high dollar, is still suffering from the consequences of the GFC. Weak confidence, revenue and profits continue to impact on business psychology. Further, cost-cutting and cash preservation is deferring and delaying investment. The weakness of non-mining business investment, coupled with long lead times between investment and capacity coming on stream, is setting up Australian industry for a period of tight capacity through the middle of the decade, leading to a surge in investment. But not yet. There is still sufficient capacity to cater for another 18 months to two years of growth, with weak confidence delaying the next round of investment. Hence the current weakness of the non-mining economy.

The 'new normal' of weak demand and profits driving cost-cutting 'productivity initiatives' is a child of the long period of weakness of non-mining-related industries since the GFC. This psychology is self-fulfilling, perpetuating the weakness of confidence, demand and profits. But it also contains the seeds of the next upswing. Eventually, inadequate investment will lead to capacity constraints, underwriting the next phase of investment. Indeed, investment delayed will require a catch-up to increase capacity to levels required to service demand, later adopting new labour-saving technologies to improve efficiency and allow companies to service market shifts. As the cycle moves into the investment phase, the psychology of business will shift from survival to growth mode.

Rolling investment cycles will continue to dominate as drivers of Australia's economic growth

The boost to government investment associated with the stimulus package is now being wound back aggressively.

The extraordinary stimulus to GDP from minerals investment growth is over. That contribution will turn negative from now on as minerals investment recedes from peak levels. Even so, minerals investment remains extraordinarily high, at a level adding substantially to our capacity to produce and export. That is both a strength and a weakness, the risk being that a substantial decline will have a major negative impact on demand and activity.

Next comes a phase of residential investment, with activity strengthening through to the middle of the decade. It has already begun.

After that, the main driver of growth will be non-mining business investment. We do not think it will pick up pace for another year or two. However, once it picks up momentum, it will constitute a long and strong upswing. Some sectors, notably commercial property, look like peaking around the end of this decade. The delay to the commencement of this investment is setting the preconditions for a strong cyclical upswing. Dare we say boom? Followed by a bust next decade?

We are a long way from stable, balanced growth. It looks as though the continuation of strong cycles in investment will continue to drive cyclical shifts in the economy.

The next structural shift

In any case, the next structural shift will come as the dollar falls further. That will again be a painful process involving substantial change at the industry and regional levels, with declining minerals investment offset by strong growth in minerals production and a recovery in other parts of the economy. Most likely, the dollar will fall when commodity prices fall. The extent of structural change will depend on the extent to which the dollar falls. That will offset part of the negative impact of the fall in mining investment and partially reverse the structural change we have been going through, with an improvement in the competitiveness of industries currently hit by the high dollar. It means a boost to manufacturing, agriculture, tourism, education, finance and business services. But we are unlikely to go back to where we started. The question is the extent to which industry lost in the current episode is irreversible. Manufacturing may never recover lost ground — unless new highly capital intensive technologies change the game. Services are likely to be the major beneficiaries.

This economy will look very different in 15 years' time.

2.3 The New South Wales Economy: Past Growth, Current Conditions and Short-to-Medium Term Outlook

The New South Wales economy underperformed the national economy last decade. After growing by an average of 4 per cent through the 1990s (excluding the 1991 recession), the economy grew by an average of 2 per cent per annum during the 2000s decade. This was significantly below trend (estimated to be around 2¾ per cent) and well below the national average of 3.2 per cent. Although the New South Wales economic performance has improved this decade, it still lags its trend and Australian average growth. The New South Wales economy grew by 1.8 per cent in 2012/13, 0.8 percentage points lower than the Australian GDP growth of 2.6 per cent.

A combination of factors contributed to the underperformance of the state economy last decade and early this decade. New South Wales did not benefit from the mining investment boom as

much as the mining intensive states of Western Australia, Queensland and more recently Northern Territory. In addition, the states trade exposed industries such as manufacturing, tourism and education has been affected by the high dollar especially in mid 2007 to September 2008 (when GFC hit) and from mid-2009 to now. During the GFC, non-mining private investment also stalled with commencements collapsing sector by sector. But the biggest drag on the states economic performance has been the weak residential construction segment. So much so that a significant deficiency of stock has built up due to home building remaining well below demographic demand for a long period, particularly since the second half of last decade. We estimate a housing stock deficiency of over 45 thousand dwellings in the state as at June 2013 – or more than one year of underlying demand (see table 2.2).

But New South Wales economy is now lifting its game. We expect the state economy to grow solidly and outperform the national average over the next three years. Initially, growth will be driven by housing investment. We are comfortable that the long-awaited recovery in residential activity in the state has taken root, and that momentum will build from here.

Table 2.3: Residential Stock Deficiency

	Underlying demand (year ended June)		Dwelling completions (year ended June)		Dwelling stock deficiency as at June ('000s)			
Year	2014	2015	2014e	2015f	2012	2013	2014	2015
New South Wales	44,014	46,248	38,494	46,580	35.7	45.3	50.8	50.4
Victoria	49,748	44,602	48,299	48,417	-0.4	0.1	1.5	-2.3
Queensland	36,452	37,966	29,446	34,400	10.7	17.5	24.5	28.1
South Australia	9,055	8,648	9,458	10,488	-2.7	-2.2	-2.6	-4.5
Western Australia	28,099	23,873	24,863	26,741	15.7	29.4	32.6	29.7
Tasmania	1,366	1,208	1,785	1,797	-3.3	-4.2	-4.6	-5.2
Northern Territory	1,717	1,635	2,002	1,952	0.4	0.7	0.4	0.1
A.C.T.	2,930	2,048	4,412	4,132	-0.7	-2.1	-3.5	-5.6
Australia	173,382	166,229	158,761	174,507	55.4	84.4	99.0	90.7

Source: BIS Shrapnel, ABS

We forecast dwelling building to increase solidly over the next two-to-three years, underpinning demand in the wider economy and supporting employment growth. Initially, this is being driven by increases in new building, but we expect alterations and additions activity (which account for more than 40 per cent of dwelling building) to start recovering — albeit from a very low base — reflecting improved confidence of both investors and owner occupiers along with house price growth.

Underlying this view is that population growth has run well ahead of the supply of houses in the state. The recovery in dwelling building will be critical to the state's economic performance, given continued forecast declines in public investment, lower mining-related investment, and the impact of the high Australian dollar on the manufacturing, tourism and other trade-exposed industries.

The upturn in dwelling building will increase demand for the industries that support the dwelling building industry, including real estate agents, professional and business services, some parts of the manufacturing industry, and retail trade. Non-dwelling building is also expected to post solid gains in 2013/14 and 2014/15 underwritten by some large projects. However, the aggregate result masks falling social and institutional (such as education and health) due to lack of government funding as federal and state government are in budget deficit control mode.

Engineering construction is also expected to decline over the next two years due to falls in roads and railways sectors (as some major projects reach completion) along with falls in coal investment. The latter is in line with decline in resources investment across Australia which peaked a year ago. We expect engineering construction to pick up in the second half of the decade as the next round of projects commence.

The depreciation of the A$ since April 2012 has alleviated some of the pressure on the states' tradeables sectors. Nevertheless, at levels above US$0.90, the dollar will still exert competitive pressures on the tradeables sectors. While the Australian dollar expected to drift lower over the next three years, it is still expected to remain closer to US90 cents over the next three years or out of equilibrium from a competitiveness point of view. This means the still too high a dollar will have negative impacts on the state's tradeables sectors and will continue to weigh on the overall prospects for GSP. This includes the rural sector, which will suffer from falling revenues when current high world prices (ie in US dollar terms) for a number of agricultural commodities fall back as global supply increases in response to high prices and drought conditions in the United States pass. However, the prolonged period of the high Australian dollar is likely to lead to further declines in the manufacturing industry, lower levels of manufacturing investment and potentially long-term damage to the state's tourism and education services industries.

Overall, we are forecasting growth in SFD of 2.1 per cent in 2013/14, 3.6 per cent in 2014/15, and 4.1 per cent in 2015/16. A growth performance like that has not been seen in New South Wales since early last decade – the last time dwelling building was increasing. But it is still well below the growth that was sustained during the 1990s.

The forecast cycle in GSP growth is less marked than the cycle in SFD, but still notable, with growth of 2.6 per cent and 3.4 per cent forecast for 2013/14 and 2014/15 respectively. The recovery in growth in New South Wales, combined with some slowing in the mining-intensive states, will see New South Wales growing faster than the overall Australian economy for the next few years.

This should underpin a gradual recovery in employment growth in New South Wales, to 2.1 per cent in 2014/15, which should be sufficient to keep the unemployment rate under 6 per cent. This, combined with ongoing population growth, means that household expenditure will also be an important driver of economic growth in the state over the next two to three years.

Table 2.4: New South Wales – Key Economic Indicators, Financial Years

	Annual Percentage Change											
Year Ended June	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NSW												
Total Construction Activity[(a)]	7.1	6.2	6.9	-0.2	7.3	-1.2	7.1	5.3	1.7	-3.5	1.6	4.6
State Final Demand	-0.1	3.3	2.9	2.0	1.6	2.1	3.6	4.1	3.2	1.4	3.3	4.2
Gross State Product (GSP)	**1.1**	**1.8**	**2.3**	**2.4**	**1.8**	**2.6**	**3.4**	**4.2**	**3.1**	**2.6**	**3.6**	**3.7**
Employment Growth	0.7	0.8	3.1	0.6	1.4	0.4	2.1	3.0	2.4	0.3	1.6	2.4
AUST												
Total Construction Activity[(a)]	9.2	3.9	6.9	14.1	4.2	1.0	-2.4	-2.6	-4.6	-3.7	6.2	5.8
Australian Domestic Demand	1.3	2.2	3.6	5.1	1.9	1.4	1.7	2.8	2.6	1.5	4.1	4.8
Gross Domestic Product (GDP)	**1.7**	**2.0**	**2.2**	**3.6**	**2.6**	**2.8**	**2.7**	**3.5**	**3.2**	**3.0**	**4.1**	**4.2**
Employment Growth	1.7	1.0	2.4	1.2	1.3	0.5	1.1	2.1	2.1	0.7	1.8	2.5

Source: BIS Shrapnel and ABS

(a) Total Construction work done (constant prices), equals sum of new dwellings, building, alterations and additions activity over $10 000, non-residential building and engineering construction by private and public sectors.

New South Wales is more interest rate sensitive than the mining states. This is because, compared to those states, the stock of mortgage debt is higher as a ratio to GDP. Strengthening economic activity over 2015/16 will see the Reserve Bank raise interest rates from late calendar year 2015, to curb inflation and avoid the economy overheating. This will lead to a weakening in output and employment growth in 2017. But the weakening in the economy is likely to be relatively brief. A subsequent easing in interest rates, a lower Australian dollar and strengthening in residential, public and business investment are projected to lead to buoyant economic conditions through the remainder of this decade. Exports of services are expected to respond to the lower Australian dollar, with tourism and professional services supporting growth.

3. INFLATION AND WAGES

3.1 Outlook for Australian Inflation

Inflation surprised on the upside in December

Calendar year 2013 ended on an unhappy note for consumers as consumer prices rose by 0.8 per cent in the December 2013 quarter, bringing the through-the-year rate at 2.7 per cent — the highest annual increase since December 2011 quarter.

Domestic holiday and travel accommodation rose by 6.9 per reflecting Christmas and summer school holidays along with strong demand reflecting a substitution away from international holiday due to a lower dollar. In addition, adverse weather events (particularly the extreme hot weather over spring) caused supply disruptions for fruit and vegetables, which saw fruit and vegetables prices rise by 8.1 and 7.1 per cent respectively. Meanwhile, implementation of higher federal excise taxes on tobacco contributed to a 2.2 per cent rise in tobacco prices in the quarter. Together, these price increases contributed 0.4 percentage points to the December quarter inflation. Fuel prices fell 1.1 per cent in the quarter.

Is transmission of lower dollar to underlying inflation more rapid this time round?

Underlying inflation, which strips out the impact of volatile price changes, rose by 0.9 per cent in the quarter to be up 2.6 per cent through-the-year. The higher then expected rise in underlying inflation was largely due to a lift in tradeables prices. Tradeables inflation excluding volatile items (ie fuel, fruit and vegetables) and tobacco rose by 0.5 per cent (seasonally adjusted) in the quarter.

We think the transmission of a lower dollar to underlying tradeables inflation via the 'second stage' of exchange rate pass-through – from import prices (across the docks) to retail prices – may be quicker than suggested by history.

Our modelling suggests that a 10 per cent rise in import prices (due to depreciation in the currency) would add 0.31 percentage points to underlying inflation over the first year, 0.48 per cent over the second year and 0.36 per cent over the third year before washing out in the fourth year. Overall, a 10 per cent increase in import prices, on average, will lift the underlying inflation by just over one percentage point over a period of three years. Hence, the 0.5 per cent lift in underlying tradeables was more than expected, particularly given the magnitude of the rise in prices of imported consumption goods. Import prices for consumer goods rose 4.9 per cent in the September 2013 quarter and fell 1.1 per cent in December.

. . . some margin repair and noise in the data could have contributed to the rise in underlying tradeables inflation

Although tradeables prices, by definition are sensitive to changes in the Australian dollar, the surprise increase in underlying tradeables may be partly due to some margin repair by retailers. For example, major household appliances increased through-the-year after persistently declining over the past three years despite the relative stability of the Australian dollar.

The higher than expected increase in underlying tradeables inflation may also be explained by an elevated level of noise in the data, which can occasionally occur due to difficulties of measurement or timing of price changes.

Non-tradeables inflation remain high despite weak wages growth

Non-tradeables inflation reflect domestic services inflation hence is more influenced by domestic labour costs rather than the value of the Australian dollar. However, despite weak

Table 3.1: Wages and Prices – Australia
Year Average Growth

Year Ended June	Average Weekly Ordinary Time Earnings[1] $/week	%CH	Wage Price Index All Industries 2011/12=100	%CH	CPI Headline Inflation (BIS Shrapnel forecasts) 2011/12=100	%CH	Official Headline CPI [2] 2011/12=100	%CH
2000	765.4		64.7		69.4		69.4	
2001	804.2	5.1	66.9	3.5	73.6	6.0	73.6	6.0
2002	847.4	5.4	69.1	3.3	75.7	2.9	75.7	2.9
2003	890.0	5.0	71.5	3.5	78.0	3.0	78.0	3.0
2004	931.6	4.7	74.1	3.6	79.9	2.4	79.9	2.4
2005	972.9	4.4	76.9	3.7	81.8	2.4	81.8	2.4
2006	1 017.5	4.6	80.0	4.1	84.4	3.2	84.4	3.2
2007	1 054.1	3.6	83.2	3.9	86.9	3.0	86.9	3.0
2008	1 106.1	4.9	86.6	4.1	89.8	3.4	89.8	3.4
2009	1 166.5	5.5	90.2	4.1	92.6	3.1	92.6	3.1
2010	1 231.3	5.6	92.9	3.1	94.8	2.3	94.8	2.3
2011	1 282.5	4.2	96.5	3.8	97.7	3.1	97.7	3.1
2012	1 338.1	4.3	100.0	3.6	100.0	2.3	100.0	2.3
2013	1 400.3	4.6	103.3	3.3	102.3	2.3	102.3	2.3
Forecasts								
2014	1 446.6	3.3	106.1	2.7	105.0	2.7	105.1	2.8
2015	1 501.1	3.8	109.3	3.1	107.5	2.4	108.1	2.8
2016	1 565.6	4.3	113.3	3.6	110.4	2.7	110.8	2.5
2017	1 644.4	5.0	117.8	4.0	113.8	3.0	113.6	2.5
2018	1 724.4	4.9	122.3	3.8	117.1	2.9	116.4	2.5
2019	1 799.4	4.3	126.9	3.8	120.1	2.6	119.3	2.5
2020	1 886.0	4.8	131.9	4.0	123.3	2.7	122.3	2.5
Compound Annual Growth Rates [3]								
1990-2000	3.8				2.2		2.2	
2000-2010	4.9		3.7		3.2		3.2	
2008-2013	4.8		3.6		2.6		2.6	
2013-2020	4.3		3.6		2.7		2.6	
2015-2020	4.7		3.8		2.8		2.5	

Source: BIS Shrapnel, ABS

(1) Earnings per person for full-time adults. Data is year ended May (available only mid month of quarter).
(2) RBA Forecasts to calendar year 2015. Beyond 2015, Commonwealth Treasury's forecasts are used.
(3) e.g. CAGR (Compound Annual Growth Rates) for 2015-2020 is CAGR for 2015/16 to 2019/20 inclusive (ie next regulatory period).

wages growth, non-tradeables remained unchanged in the December quarter. It rose by 0.8 per cent to be 3.7 per cent higher than a year ago, driven in part by new dwelling purchase by owner occupiers which rose 1.0 per cent in the quarter (+4.1 per cent through-the-year).

Over the past few years, non-tradeables inflation has been pushed higher by the so called 'administrative charges' such as prices of utilities, education, health services, child care, urban transport fares, pharmaceutical products, and property rates and charges. Despite this, non-tradeables remains somewhat stronger than expected especially given the recent weak growth in wages and unit labour costs.

Inflation to remain within the Reserve Bank's target band as weak wages growth finally slows non-tradeables inflation

Looking ahead, we expect economic growth will remain soft for another 18 months at least, as the transition to balanced growth takes time. This means that employment growth will remain subdued, pushing the unemployment rate higher. This, in turn, will put further downward pressure on wage inflation.

Wage growth slowed further in the December quarter. The WPI (wage price index) grew by 2.9 per cent over 2013, the slowest pace since the early 2000s. At present, annual underlying wage inflation as measured by the WPI is 0.8 percentage point below its average for the past decade.

However, we expect that underlying inflation will rise over 2015/16 and be pushed above 3 per cent over 2016/17. The gradual rise in underlying inflation from calendar year 2016 will be driven by rising tradeables inflation, as depreciation of the Australian dollar feeds in to higher import prices and rising domestic services inflation, largely as a result of persistence of high rates of inflation in rents, utilities, child care services and other housing costs.

As the economic recovery gathers momentum through 2016, we believe retailers will rebuild margins and pass on some of the higher import costs of tradeable goods, to consumers. Reduction in spare labour capacity will also add to inflation from mid-2016, via rising wages.

BIS Shrapnel is forecasting headline CPI inflation at 2.4 per cent in June quarter 2015 (in through-the-year terms). Note that we estimate there will be a negative impact of -0.3 to -0.4 per cent on headline CPI in 2014/15 from the Coalition's policy of scrapping the carbon tax and moving to their 'Direct Action' policy.[1] Nevertheless, there is no guarantee electricity, gas and other indirectly affected prices will actually decline, so there is considerable uncertainty surrounding this estimate.

In year-average terms, CPI inflation is forecast at 2.4 per cent in 2014/15 before rising to 2.7 per cent and 3.0 per cent over 2015/16 and 2016/17 respectively. We expect CPI inflation to fall back within the Reserve Bank's 2 to 3 per cent target range in the second half of the decade. But inflation containment will remain a policy challenge beyond the medium term.

[1] We are assuming the carbon tax will not be abolished until July 2014 at the earliest.

Table 3.2: Wages Growth, All Industries, Australia, (by Workforce Segmented by Pay Setting Method)

	Year Average Percent Change												
					Forecast							**Averages**	
Year Ended June	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2003-13	2013-20
Proportion of Workforce by Pay setting Method (a)													
Awards Only	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Collective Agreements	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%	41.9%
Individual Arrangements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100.0%	100.0%
AWOTE													
Awards Only	0.7	3.5	3.4	2.9	2.6	2.7	2.8	3.3	3.3	2.8	2.9	2.6	2.9
Collective Agreements	4.1	4.0	4.0	3.7	3.6	3.5	3.6	3.9	3.9	3.9	4.1	4.0	3.8
Individual Arrangements (b)	7.2	4.4	4.7	5.5	3.2	4.1	5.0	6.1	5.8	4.8	5.5	5.4	4.9
AWOTE (Persons)(c)	**5.6**	**4.2**	**4.3**	**4.6**	**3.3**	**3.8**	**4.3**	**5.0**	**4.9**	**4.3**	**4.8**	4.6	4.4
Wage Price Index													
Awards Only	0.7	3.5	3.4	2.9	2.6	2.7	2.8	3.3	3.3	2.8	2.9	2.6	2.9
Collective Agreements	4.1	4.0	4.0	3.7	3.6	3.5	3.6	3.8	3.9	3.9	4.1	4.0	3.8
Individual Arrangements (b)	2.6	3.7	3.4	3.0	1.9	2.8	3.7	4.2	3.8	3.9	4.0	3.7	3.5
Wage Price Index (Ord. Time)	**3.1**	**3.8**	**3.6**	**3.3**	**2.7**	**3.1**	**3.6**	**4.0**	**3.8**	**3.8**	**4.0**	3.7	3.6
Compositional Effects + Bonuses,etc	2.5	0.4	0.7	1.3	0.7	0.7	0.7	1.1	1.1	0.5	0.9	0.9	0.8

Source: BIS Shrapnel, ABS, DEEWR

(a) Full-time Adult Persons
(b) Indiv Agreements picks up all the compositional effects and bonuses plus all the standard errors of WPI and AWOTE estimates by the ABS
(c) Full-time Adult Persons, excluding overtime

Table 3.3: Methods of Setting Pay, Industry, May 2010 Proportion of Full-Time Adult Employees (%)

Industry (ANZSIC 2006)	Award Only	Collective Agreements	Individual Arrangements	All Methods of Pay Setting
Mining	1.8%	42.1%	56.1%	100.0%
Manufacturing	9.1%	29.3%	61.6%	100.0%
Electricity, Gas, Water & Waste Services	**2.7%**	**67.7%**	**29.6%**	**100.0%**
Construction	6.7%	26.3%	67.0%	100.0%
Wholesale trade	7.7%	11.3%	81.0%	100.0%
Retail trade	16.6%	20.7%	62.7%	100.0%
Accommodation and Food Services	31.7%	23.0%	45.3%	100.0%
Transport, Postal and Warehousing	3.9%	55.9%	40.2%	100.0%
Information Media and Telecommunications	3.6%	29.0%	67.4%	100.0%
Finance and Insurance Services	1.5%	39.9%	58.7%	100.0%
Rental, Hiring and Real Estate Services	13.1%	10.4%	76.5%	100.0%
Professional, Scientific ans Technical Services	2.2%	11.5%	86.3%	100.0%
Administrative and Support Services	15.9%	30.1%	54.1%	100.0%
Public Administration and Safety	1.2%	92.5%	6.3%	100.0%
Education and Training	2.9%	88.9%	8.1%	100.0%
Health Care and Social Assistance	12.3%	66.6%	21.1%	100.0%
Arts and Recreation Services	10.4%	40.1%	49.4%	100.0%
Other Services	15.7%	11.0%	73.3%	100.0%
All Industries 2010 Survey	**8.1%**	**41.9%**	**50.0%**	**100.0%**

Source: ABS

3.1.1 Reserve Bank of Australia CPI forecasts

The Reserve Bank and the Federal Treasury provide the 'official' view of CPI forecasts. The RBA's February 2014 'Statement on Monetary Policy' projects the annual headline CPI rate at 3½ per cent in the June 2014 quarter, before falling to 2¼ to 3¼ range in the December 2014 quarter. According to the RBA, headline CPI inflation is then expected to be in the 2 to 3 per cent range through to June 2016 quarter (RBA current forecasts only extend to June quarter 2016).

The Federal Treasury in their Mid-Year Economic and Fiscal Outlook 2013 projected CPI inflation at 2¾ per cent in 2013/14 and 2 per cent in 2014/15. For the budget forward estimate period (ie 2015/16 and 2016/17), the Federal Treasury forecast CPI inflation at 2.5 per cent

3.2 Outlook for Australian All Industries Wages

3.2.1 Brief description of BIS Shrapnel's wages model

The key determinants of nominal wages growth are consumer price inflation, productivity and the relative tightness of the labour market (ie the demand for labour compared to the supply of labour). Price inflation, in turn, is primarily determined by unit labour costs. Other factors which influence price inflation include the exchange rate, the stage of the business cycle and the level of competition in markets generally.

BIS Shrapnel's model of wage determination is based on the analysis of past and future (expected) wage movements in three discrete segments of the workforce, based on the three main methods of setting pay and working conditions (see tables 3.1 and 3.2):

- Those dependent on awards rely on pay increases given in the annual National Wage case by Fair Work Australia (formerly by the Fair Pay Commission and Australian Industrial Relations Commission). Most of the wage increases in the National wage case over the past decade have been given as flat, fixed amount (ie dollar value) increases, rather than as a proportional increase although the last two increases were given as a percentage increase. At the all industries level, 8.1 per cent of all full-time employees (data excludes those in agriculture, forestry and fishing) have their pay rises determined by this method. In the electricity, gas, water & waste services sector, only 2.7 per cent of workers have their pay set by this method.

- Collective agreements negotiated under enterprise bargaining account for 41.9 per cent of all employees, but 67.7 per cent of electricity, gas, water and waste services employees' wage increases are determined by this method.

- The remaining 50 per cent of all industries employees have their pay set by individual arrangements, such as individual contracts or other salary arrangements (including incentive-based schemes), while the proportion for electricity, gas, water and waste services is currently estimated to be around 30 per cent.

The key influences on the different wage determination mechanisms of each discrete segment are described below:

- Fair Work Australia (the body responsible for setting minimum wages in Australia) is responsible for establishing and maintaining a safety net of fair minimum wages for employees' dependant on Awards. This requires maintenance of employees' cost of living. Hence, in setting minimum wages, Fair Work Australia takes into account the performance and competitiveness of the national economy, including productivity, business

Chart 3.1: Australia – Wages and Prices

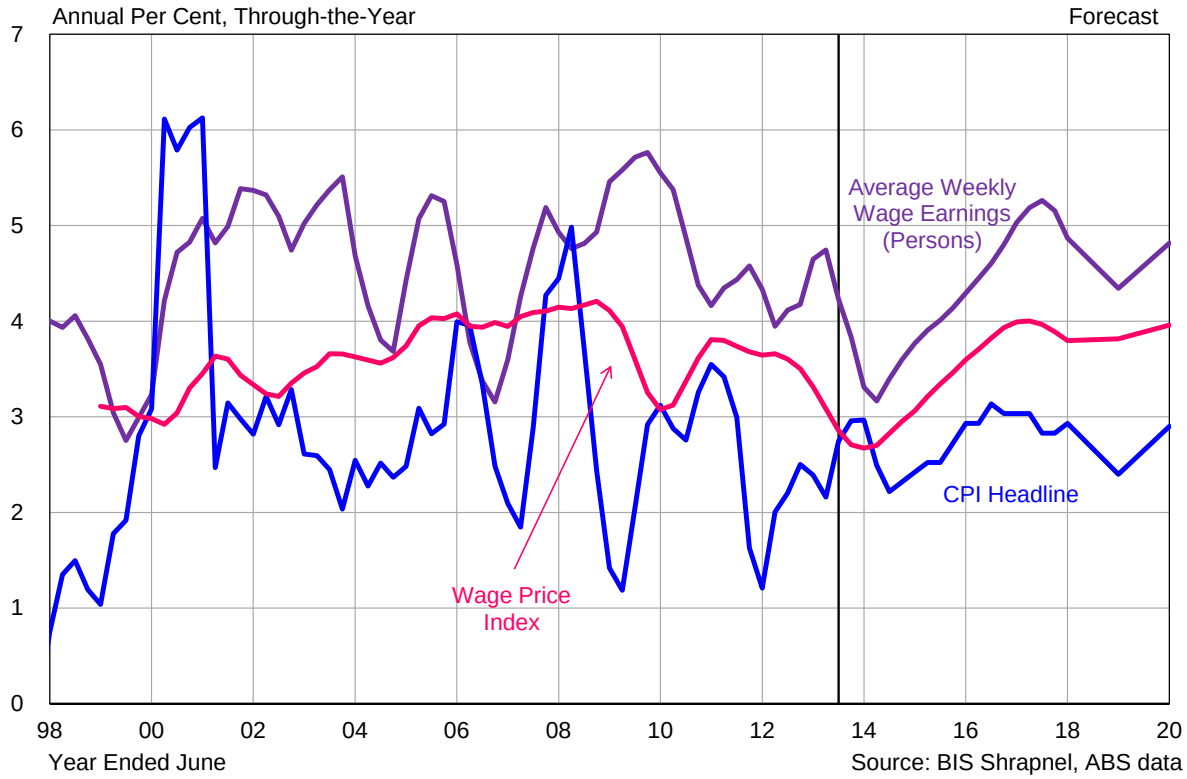
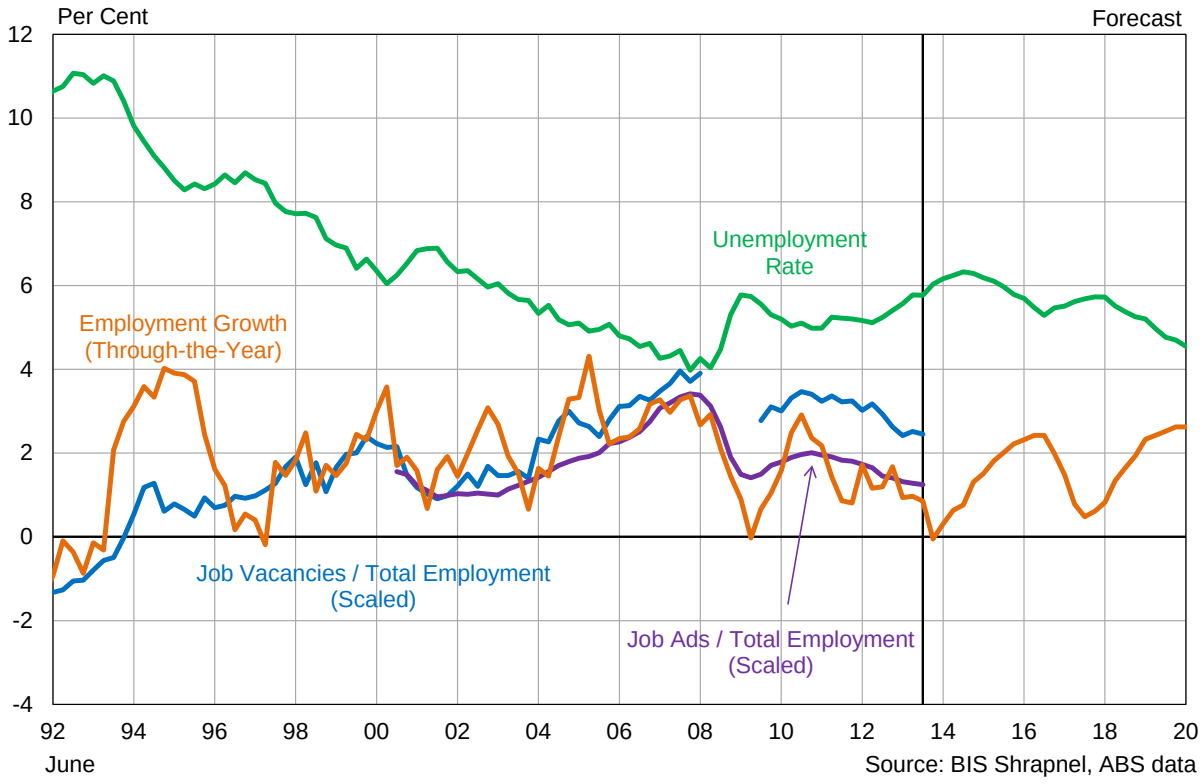


Chart 3.2: Employment and Unemployment



competitiveness and viability, inflation and employment growth. Accordingly, increases in the Federal Minimum Wage (on which a range of mostly lower paid awards are also based) granted by the Fair Work Australia each year are usually set in relation to recent increases in the CPI and with regard to the Fair Work Australia's view of both current and short-term future economic conditions. Fair Work Australia granted a 2.6 per cent ($15.80) increase in minimum wages, effective July 2013. The $15.80 per week increase lifted the Federal Minimum Wage to $622.20 per week.

- Increases in collective agreements under enterprise bargaining are influenced by a combination of recent CPI increases, inflationary expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook, and by the industrial relations 'strength' of relevant unions. Because the average duration of agreements now runs for two-to-three years, BIS Shrapnel bases its near-term forecasts on the strength of recent agreements, which have been 'formalised' over recent quarters. Thereafter, collective agreements are based on BIS Shrapnel's macroeconomic forecasts.
- Increases in individual agreements are primarily influenced by the strength of the labour market (especially the demand-supply balance of skilled labour), inflationary expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook.

3.3 Outlook for Australian All Industries Wages

As mentioned, wages growth slowed considerably in calendar year 2013. The wage price index grew by 2.9 per cent over 2013 — the slowest pace since the early 2000s and equal to the post GFC weakening when WPI growth troughed at 2.9 per cent in the December 2009 quarter.

The marked slowing in wages growth is partly due to the relatively low outcome for the increase in the minimum wage which came into effect in July. Fair Work Australia granted a $15.80 per week increase to $622.20 per week, or a 2.6 per cent increase. Although only 8 per cent of workers directly rely on this award increase, a number of awards and pay settings use this award increase as a benchmark. More importantly, there were much lower increases among those 50 per cent of workers who have their pay set by 'individual agreements'. This may have involved some discounting of pay increases for the 0.25 per cent increase in the superannuation guarantee which came into effect on 1st July.

Among the industry sectors, over recent quarters there has been a significant slowing in wages growth in the mining, wholesale trade, transport, finance and insurance, professional, scientific and technical services (PSTS) and administrative and support services. The slowdown in wages growth in the latter three sectors may be the key factor for the more marked slowdown in wages growth in NSW, because NSW has a higher proportion of employees in these sectors compared to the national average.

Wages growth is expected to remain low during 2013/14, with the WPI forecast to average 2.9 per cent. A modest pick-up to 3.2 per cent is forecast for 2014/15, but this growth is still weak by historical standards (see table 3.2). Wage demands will be muted by rising unemployment and weak employment growth.

We expect a slow build in wage pressures from 2015 as the economy remains soft with the economic recovery only expected to gain traction from late 2015 with a broadening in employment, profits and investment as the next set of economic drivers in particular non-mining business investment slowly comes through.

Meanwhile, lower interest rates should help to stimulate wider economic activity, lifting confidence and spending and encouraging businesses to switch out of cost containment mode.

The acceleration in profits, rising price inflation through 2016 and 2017 and widening skills shortages — with the unemployment rate expected to approach 5.0 per cent by late 2016 — will drive up wages growth during 2015/16. Wages growth (in year average terms) is expected to rise further and peak at 5.0 per cent for AWOTE and 4.0 per cent for Wage Price Index (WPI) in 2016/17.

4. INTERNAL LABOUR COST ESCALATION FORECASTS

We proxy Jemena's internal labour cost escalator by wages growth in the New South Wales Electricity, Gas, Water and Waste Services (EGWWS) industry. In this section, we provide an outlook for EGWWS at the national level followed by a discussion and forecasts of EGWWS industry in New South Wales. Note that our **wages model** is described in **section 3** and **Appendix A**.

At the national level, wages growth in the EGWWS sector is invariably higher than the total Australian national (all industry) average. The wage price index growth has consistently been above the national average since the index's inception in 1997 and averaged 0.6 per cent higher over the decade to 2013 (see table 4.5). While growth in average weekly ordinary time earnings (AWOTE) of the electricity, gas, water and waste services sector has displayed considerably more volatility over the past two decades (mainly related to compositional effects), AWOTE growth in the sector has also usually been higher than the national average over the past two decades (see tables 4.2 and 4.5).

Utilities wages growth will ease over the next two years before converging to the 'all industries' average

As mentioned, wages growth in the utilities sector since 1997 has outpaced the national 'all industries' average. To a large extent, this has been underpinned by strong capital works program in the utilities sector since the beginning of the last decade (resulting in robust employment growth over the same period), strong competition from the mining and construction workers for similarly skilled labour and the powerful influence of unions in the utilities sector.

The mining investment boom has passed its peak and will decline from here but will not collapse. Similarly, we believe utilities engineering construction has reached its peak and will fall over the next three years. This means that two of the drivers of strong wage increases over the past decade will reverse over the next three years resulting in an easing of wages growth in the utilities sector over the next two years.

But still strong demand for skilled labour means wage increases will not drop below the national average . . .

The electricity, gas and water sector is a largely capital intensive industry whose employees have higher skill, productivity and commensurately higher wage levels than most other sectors. With many of the particular skills relevant to the electricity, gas and water sector expected to remain in relatively high demand (as evidenced by the 2013 industry survey conducted by Energy Skills Australia), wage increases are expected to remain higher in this industry than the national average over the next two years, although we expect wage increases in the Utilities sector to converge towards the national 'all industries' average in 2015/16.

In addition, the overall national average tends to be dragged down by the lower wage and lower skilled sectors such as the Retail Trade, Wholesale Trade, Accommodation, Cafés and Restaurants, and, in some periods, also Manufacturing and Construction (see tables 4.1 and 4.2). These sectors tend to be highly cyclical, with weaker employment suffered during downturns impacting on wages growth in particular. The EGWWS sector is not impacted in the same way due to its obligation to provide essential services and thus retain skilled labour.

. . . while powerful unions in utilities sector will also keep wages growth elevated

The key elements of the utilities wage forecast are set out in table 4.4. Table 4.4 shows that collective bargaining dominates the pay setting arrangements in the utilities sector, while the relative absence of workers relying on (often) low-increase awards (set in the National Wage Case) means the overall average for total utilities wages will invariably be higher than the all

Table 4.1: Wage Price Index Growth by Industry Sector and by State

Sector	% of Total Employment Nov 2013	Annual Per Cent Change										Five-Year YE June Average
		Jun '06	Jun'07	Jun'08	Jun'09	Jun'10	Jun'11	Jun'12	Jun'13	Sep'13	Dec'13	
Private		4.0	3.9	4.4	3.6	2.7	3.9	3.8	3.0	2.7	2.5	3.4
Public		4.3	4.2	3.9	4.4	4.0	3.7	3.3	2.8	2.5	2.7	3.7
Industry												
Mining	2.4%	5.9	5.5	6.7	4.2	3.8	4.1	5.2	3.5	3.3	3.1	4.2
Manufacturing	8.1%	3.9	4.1	4.6	2.5	2.6	4.1	3.8	2.8	3.0	2.8	3.2
Electricity, Gas, Water and Waste Services	**1.3%**	**6.4**	**4.0**	**3.5**	**4.7**	**4.7**	**3.7**	**3.7**	**3.9**	**3.5**	**3.3**	**4.1**
Construction	8.8%	5.9	4.2	4.7	4.5	2.9	4.0	4.1	3.2	3.2	2.8	3.7
Wholesale Trade	3.5%	3.7	3.7	4.6	3.3	1.7	4.8	4.8	3.4	2.4	2.2	3.6
Retail Trade	10.9%	3.4	3.1	4.5	3.5	2.8	3.3	2.7	2.7	2.9	2.6	3.0
Accommodation and Food Services	6.7%	3.3	3.0	2.3	3.4	2.0	3.0	3.3	2.6	2.3	2.2	2.8
Transport, Postal and Warehousing	5.1%	4.2	4.1	3.9	4.4	3.2	4.0	3.8	2.9	2.5	2.4	3.7
Information Media and Telecommunications	1.7%	2.8	3.6	3.9	3.0	2.0	3.2	3.5	2.9	2.5	2.3	2.9
Finance and Insurance Services	3.6%	4.0	4.3	3.6	3.2	3.1	4.5	4.1	2.9	2.7	2.6	3.6
Rental, Hiring and Real Estate services	1.7%	3.9	3.0	4.1	3.6	2.5	3.6	3.5	3.1	2.8	2.8	3.2
Professional, Scientific and Technical Services	7.6%	4.3	4.3	5.1	5.1	2.9	4.0	4.6	2.9	1.9	1.8	3.9
Administration and Support Services	3.4%	3.3	3.6	4.9	2.9	2.5	3.7	3.6	2.7	2.8	2.4	3.1
Public Administration and Safety	6.6%	4.2	4.3	3.9	4.5	3.7	3.4	3.6	2.9	2.9	2.9	3.6
Education	7.8%	4.4	4.1	4.0	4.5	3.9	3.8	3.6	2.5	2.4	2.9	3.7
Health Care and Social Assistance	12.2%	4.5	4.3	3.6	3.9	4.0	3.6	2.6	3.3	2.9	2.8	3.5
Arts and Recreation Services	1.8%	3.0	4.4	3.4	3.9	2.8	3.4	3.5	2.9	2.4	2.3	3.3
Other Services	4.1%	3.2	4.0	3.3	3.3	2.3	3.6	3.8	3.0	2.7	2.3	3.2
State/Territory												
New South Wales	31.2%	3.9	3.8	4.0	3.6	3.1	3.7	3.6	2.8	2.4	2.4	3.4
Victoria	25.0%	3.7	3.6	4.2	3.4	2.7	4.1	3.5	3.0	2.9	2.5	3.3
Queensland	20.2%	4.7	4.6	3.9	4.1	3.3	3.9	3.8	2.7	2.7	2.6	3.6
South Australia	6.9%	3.7	4.3	4.6	3.7	2.9	3.3	3.4	3.3	3.4	3.5	3.3
Western Australia	11.7%	4.6	5.2	5.6	4.6	3.4	3.8	4.8	3.5	3.2	3.0	4.0
Tasmania	2.0%	4.1	4.5	3.6	4.2	3.6	3.5	3.2	2.9	2.5	2.2	3.5
Northern Territory	1.1%	3.9	4.3	4.2	3.8	3.4	3.9	3.6	3.2	2.8	2.3	3.6
Australian Capital Territory (ACT)	1.8%	3.8	4.3	4.0	4.1	3.0	3.5	3.9	2.9	2.7	2.3	3.5
Total All[2]	100%	4.2	4.0	4.2	3.8	3.1	3.8	3.7	2.9	2.7	2.5	3.5

Source: BIS Shrapnel, ABS

(1) Measures changes in the price of labour. Ordinary hourly rates of pay (excludes overtime and bonuses)
(2) Excludes Agriculture, Forestry & Fishing

Table 4.2: Australia
AWOTE Growth by Industry Sector

Industry Sector	% of Total Employment Nov 2013	Average Weekly Earnings[1]										Five-Year YE May Average
		$ / Week Nov'13	Annual Percent Change									
			May '06	May '07	May '08	May'09	May'10	May'11	May'12	May'13	Aug'13	Nov'13	
Mining	2.4%	2 470	4.5	6.5	8.1	7.3	7.2	6.5	6.2	6.8	6.4	5.6	6.8
Manufacturing	8.1%	1 291	4.4	4.7	4.2	5.3	1.8	2.8	2.3	3.9	5.0	5.8	3.2
Electricity, gas, water and waste services	**1.3%**	**1 620**	**1.9**	**3.7**	**2.7**	**6.1**	**7.6**	**9.1**	**2.5**	**6.1**	**5.9**	**4.3**	**6.3**
Construction	8.8%	1 451	1.9	4.9	9.2	7.8	7.7	5.0	3.5	4.3	4.6	4.2	5.6
Wholesale trade	3.5%	1 387	6.3	3.7	3.8	5.9	2.2	3.9	11.3	4.6	3.0	1.1	5.6
Retail trade	10.9%	1 032	6.9	3.4	5.6	2.7	5.5	0.9	3.2	4.0	4.2	4.0	3.3
Accommodation and food services	6.7%	1 048	4.9	8.2	3.8	2.5	4.5	3.5	3.7	5.5	7.0	7.5	3.9
Transport, postal and warehousing	5.1%	1 391	2.3	0.6	0.5	4.5	5.3	8.9	7.0	5.9	4.7	3.5	6.3
Information media and telecommunications	1.7%	1 672	4.3	6.3	7.7	4.3	5.4	4.6	3.0	4.8	4.9	4.1	4.4
Finance and insurance	3.6%	1 649	5.0	3.4	3.8	2.8	4.6	6.1	2.0	4.3	3.7	2.3	4.0
Rental hiring and real estate services	1.7%	1 287	7.3	2.4	8.6	6.5	3.8	-2.1	0.4	6.6	6.0	3.6	3.0
Professional, scientific and technical services	7.6%	1 731	7.3	2.5	7.8	5.8	5.6	4.5	4.3	3.2	3.7	4.4	4.7
Administration and support services	3.4%	1 282	6.4	1.6	7.2	7.1	7.4	-0.1	-1.9	7.9	7.4	5.1	4.1
Public administration and defence	6.6%	1 535	4.2	3.7	3.7	5.4	6.7	5.7	3.2	4.7	4.5	4.0	5.1
Education and training	7.8%	1 520	3.8	3.7	3.0	4.6	5.6	4.8	4.6	3.8	3.4	3.0	4.7
Health and social assistance	12.2%	1 368	2.0	3.6	4.4	4.7	6.2	2.5	2.8	5.3	6.7	7.1	4.3
Arts and recreational services	1.8%	1 321	-0.9	-0.6	6.4	7.2	4.1	5.6	3.5	5.5	7.6	8.7	5.2
Other services	4.1%	1 103	5.7	2.0	3.3	6.8	3.1	3.6	2.7	4.2	3.2	1.9	4.1
Total All Industries[2]	100%	1 437	4.6	3.6	4.9	5.5	5.6	4.2	4.3	4.6	4.7	4.2	4.8

(1) Full Time Adult Ordinary Time earnings for persons
(2) Excludes Agriculture, Forestry and Fishing sector

Source: BIS Shrapnel, ABS

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industries average. Table 4.3 shows that the utilities sector has consistently had higher wage increase under collective agreements than the all industries average. Over the past five years, the outcomes from collective agreements have been 0.4 per cent higher, on average, than the all industries average. We expect this trend to continue over the next four years, with the all industries average to also continue to be dragged down by the retail and hospitality industries.

Chart 4.1: Wage Price Index
Total Australia (All Industries) and Electricity, Gas, Water and Waste Services

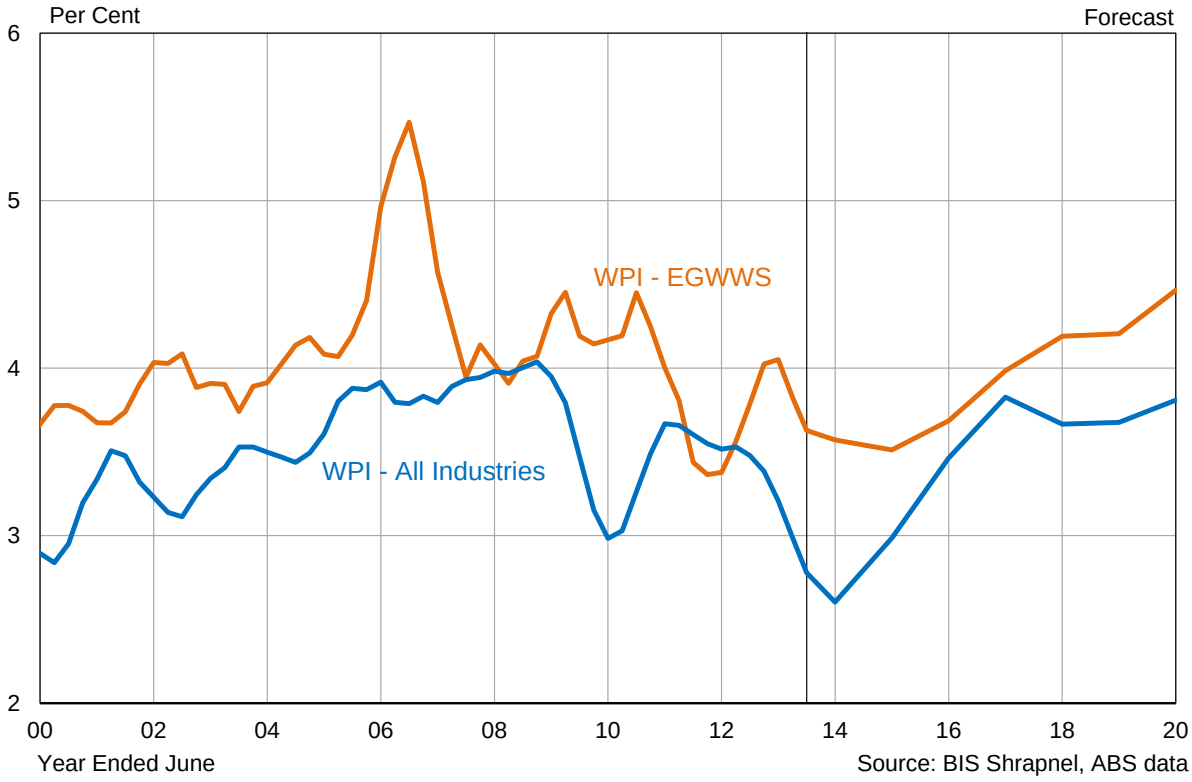


Table 4.3: Federal Wage Agreements – Collective Agreements by Industry
(Average Annualised Wage Increase)

Selected Industry (ANZSIC 2006)	Collective Agreements Average Annualised Wage Increase[1]										Average
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2004-2013
Electricity, Gas, Water and Waste Services	**4.3**	**4.2**	**4.4**	**4.5**	**4.7**	**4.8**	**4.8**	**4.4**	**4.2**	**4.1**	**4.4**
Agriculture, Forestry and Fishing	3.3	3.0	3.0	2.9	3.0	3.7	3.7	3.7	3.8	3.7	3.4
Mining	3.3	3.6	3.7	4.0	4.3	4.4	4.3	4.2	4.5	4.6	4.0
Manufacturing	4.1	4.1	4.2	4.3	4.2	4.1	3.9	3.9	3.9	3.8	4.1
Construction	4.3	4.4	4.9	4.9	4.6	5.3	5.4	4.8	5.2	5.3	4.8
Wholesale Trade	3.9	4.0	3.7	3.6	3.8	4.1	4.0	3.7	3.8	3.8	3.8
Retail trade	3.2	3.4	3.5	3.5	3.5	3.6	3.5	3.4	3.6	3.3	3.4
Accommodation and Food Services	2.8	3.2	3.3	3.4	3.2	3.6	3.9	3.9	3.8	3.7	3.4
Transport , Postal and Warehousing	3.6	3.7	3.7	3.9	4.0	4.2	4.2	3.9	3.9	3.9	3.9
Information Media and Telecommunications	4.2	4.1	3.6	3.2	3.3	3.8	3.8	3.4	3.4	3.5	3.7
Financial and Insurance Services	4.2	4.1	4.1	4.1	3.8	4.0	3.6	3.7	3.5	3.3	3.9
Rental, Hiring and Real Estate Services	4.1	4.1	3.8	4.8	4.5	3.5	3.7	3.9	4.7	4.4	4.1
Professional, Scientific and Technical Services	4.1	4.1	3.8	4.0	4.0	4.5	4.3	4.0	4.1	4.1	4.1
Administrative and Support Services	4.1	4.1	3.8	3.6	3.6	3.8	3.7	3.6	4.2	4.3	3.9
Public Administration and Safety	4.4	4.3	4.0	4.1	4.2	4.3	3.9	3.7	3.6	3.7	4.1
Health Care and Social Assistance	4.0	4.1	4.0	4.0	4.0	4.1	4.0	4.0	3.6	3.4	3.9
Education and Training	4.5	4.7	4.9	4.8	4.9	4.4	4.6	4.6	4.8	3.9	4.5
Arts and Recreation Services	3.5	3.8	3.5	3.8	4.0	4.1	3.5	3.5	3.4	3.3	3.6
Other Services	4.4	4.0	4.0	4.1	4.0	3.9	3.7	3.6	4.5	4.4	4.1
ALL INDUSTRIES	3.9	4.0	4.1	4.1	4.0	4.2	4.1	4.0	4.0	3.7	4.0

[1]Current agreements in June of each year.

Source: Department of Education, Employment & Workplace Relations (DEEWR)

Table 4.4: Electricity, Gas, Water and Waste Services Forecasts – Australia

	Year Average Percent Change												
					Forecast							**Averages**	
Year Ended June	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2003-13	2013-19
Proportion of Workforce by Pay setting Method (a)													
Awards Only	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	1.5%	2.7%
Collective Agreements	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	67.7%	76.2%	67.7%
Individual Arrangements	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	22.3%	29.6%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
AWOTE													
Awards Only	0.7	3.2	3.4	2.9	2.6	2.7	2.8	3.3	3.3	2.8	2.9	2.5	2.9
Collective Agreements	4.8	4.4	4.2	4.1	4.0	3.9	4.0	4.2	4.4	4.4	4.6	4.4	4.2
Individual Arrangements (b)	14.0	18.7	-0.6	10.0	4.9	4.9	5.1	6.1	7.1	7.6	5.9	5.8	5.9
AWOTE (Persons)(c)	**7.6**	**9.1**	**2.5**	**6.1**	**4.3**	**4.2**	**4.4**	**4.9**	**5.4**	**5.6**	**5.1**	**4.8**	**4.8**
Wage Price Index													
Awards Only	0.7	3.2	3.4	2.9	2.6	2.7	2.8	3.3	3.3	2.8	2.9	2.5	2.9
Collective Agreements	4.8	4.4	4.2	4.1	4.0	3.9	4.0	4.2	4.4	4.4	4.6	4.4	4.2
Individual Arrangements (b)	3.7	3.7	1.9	4.6	3.1	3.1	3.5	4.1	4.4	4.5	5.0	4.3	3.8
Wage Price Index (Ord. Time)	**4.3**	**4.2**	**3.5**	**4.2**	**3.7**	**3.6**	**3.8**	**4.1**	**4.4**	**4.4**	**4.7**	**4.3**	**4.0**
Compositional Effects + Bonuses,etc	3.2	4.9	-1.0	1.9	0.6	0.6	0.6	0.7	1.0	1.2	0.4	0.5	0.8

(a) Full-time Adult Persons. Source: BIS Shrapnel, ABS, DEEWR

(b) Because of relatively small workforce (and therefore small sample size) in EGWWS, Indiv Agreements picks up all the standard errors of WPI and AWOTE estimates by ABS.

(c) Full-time Adult Persons, excluding overtime.

The analysis in table 4.4 also shows that pay outcomes in the individual arrangements segment of the utilities sector is also usually higher than the all industries average, although – as explained in Appendix A – some incentives and compositional effects emanating from the collective agreements may be ending up in the individual arrangements segment calculated in the WPI in table 4.4.

Increases in collective agreements under enterprise bargaining are influenced by a combination of recent CPI increases, inflationary expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook, and by the industrial relations 'strength' of relevant unions. Because the average duration of agreements runs for two-to-three years, BIS Shrapnel bases its near-term forecasts of Enterprise Bargaining Agreement (EBA) wages on the strength of recent agreements, which have been 'formalised' or 'lodged' (ie an agreement has been 'reached' or 'approved') over recent quarters.

We expect EBA outcomes to ease over the next two years but remain above inflation and 'all industries' average given that the skilled labour market remains tight and particularly given the recent high enterprise agreement outcomes in the construction sector. This will influence negotiations in the EGWWS sector.

With economic conditions expected to improve from late 2015, we expect a pick up in the pace of formalised agreements over 2015/16 and 2016/17 toward 4.5 per cent per annum.

Despite the relative weakness of the economy over 2008/09 and 2009/10, wages remained elevated in the utilities sector due to the comparative strength of demand for skilled labour, and particularly because of the strength of unions in what is an essential service sector. The industrial relations reality is that there are powerful utilities unions such as the Communications, Electrical and Plumbing Union (CEPU) and Australian Services Union (ASU), which have a history of achieving high wage outcomes for the sector. Other unions active in the sector include the Australian Workers Union (AWU).

BIS Shrapnel analysis shows collective agreements in the EGWWS sector have been on average around 1.5 per cent higher than CPI inflation over the decade to 2010 (excluding the

effects of GST introduction in 2000/01). In the five years to 2010 when the labour market was very tight, collective agreements were on average 1.7 per cent above the CPI. Given the strength of unions in the sector and a still strong demand for skilled labour over the next four years (and possibly beyond) than for most of the 2000s, collective agreements are forecast to remain around 1.5 per cent above the CPI in the forecast period.

Utilities wages growth to strengthen from 2016/17 as demand for skilled labour picks up in line with higher utilities investment

Employment growth in the utilities sector over the past decade (2001/02 to 2011/12 inclusive) averaged 6.7 per cent per annum, the second fastest growth among the 18 main industry sectors behind the Mining sector (11.2 per cent per annum), with Construction employment growth third at 3.9 per cent per annum.

This strong growth in utilities employment since 2002 has been associated with a pick-up in infrastructure and maintenance work as well as an ongoing reversal in the sharp losses in employment seen through the 1990s. Privatisation and rationalisation were the drivers of the job cuts in the 1990s, but in some cases the desire to be streamlined left only a 'skeleton' crew in-house for routine operations and emergency disruptions, while capital and maintenance works (both minor and major) tended to be contracted out. Capital expenditure in the utilities sector during the 1990s was also relatively low, and this may also have contributed to weaker employment.

The emergence of skilled labour shortages across many industry sectors over the 2000s encouraged utilities businesses to boost their in-house response capabilities, while increasing competition has shifted the business focus towards customer service in order to enhance product differentiation with an accompanying increase in employment not directly related to the provision of electricity, gas, and water services. The entrance of new players in the sector (such as new businesses related to renewable energy provision, new private electricity and gas businesses, etc.) has also exacerbated this situation as it has increased demand for all occupations within this sector.

The strong growth in employment in the Utilities, Mining and Construction sectors, and the associated sustained strong demand for skilled labour, contributed to above average wages growth in all three sectors. At the same time, the overall labour market tightened considerably during the 2000s, with the unemployment rate falling from around 7 per cent in 2001 to 5 per cent by 2005, and to 4.0 per cent in early 2008. This saw skilled labour shortages worsen and employers in these sectors bid up wages.

The global financial crisis and the subsequent slowing in the economy over 2008/09 reduced labour demand and wage pressures, but the unemployment rate only rose to a peak of 5.9 per cent in mid 2009.

With the economy expected to grow close to trend in about two years, employment growth will outpace population and labour force growth and the unemployment rate (now around 6.0 per cent) is expected to approach 5.3 per cent by late 2016. Hence, we expect to again witness the re-emergence of skilled labour shortages and competition for scarce labour from 2015/16, particularly from the construction sector, which will push up wage demands in the utilities sector.

We expect wages growth in the electricity, gas, water and waster services to again outpace (albeit marginally) the national average from 2016/17, given increased demand for skilled labour in the sector, reflecting still strong levels of utilities investment across Australia 9ie from a historical perspective).

Table 4.5: Average Weekly Ordinary Time Earnings and Wage Price Index
Total Australia and Electricity, Gas, Water and Waste Services Sector
(Year Average Growth)

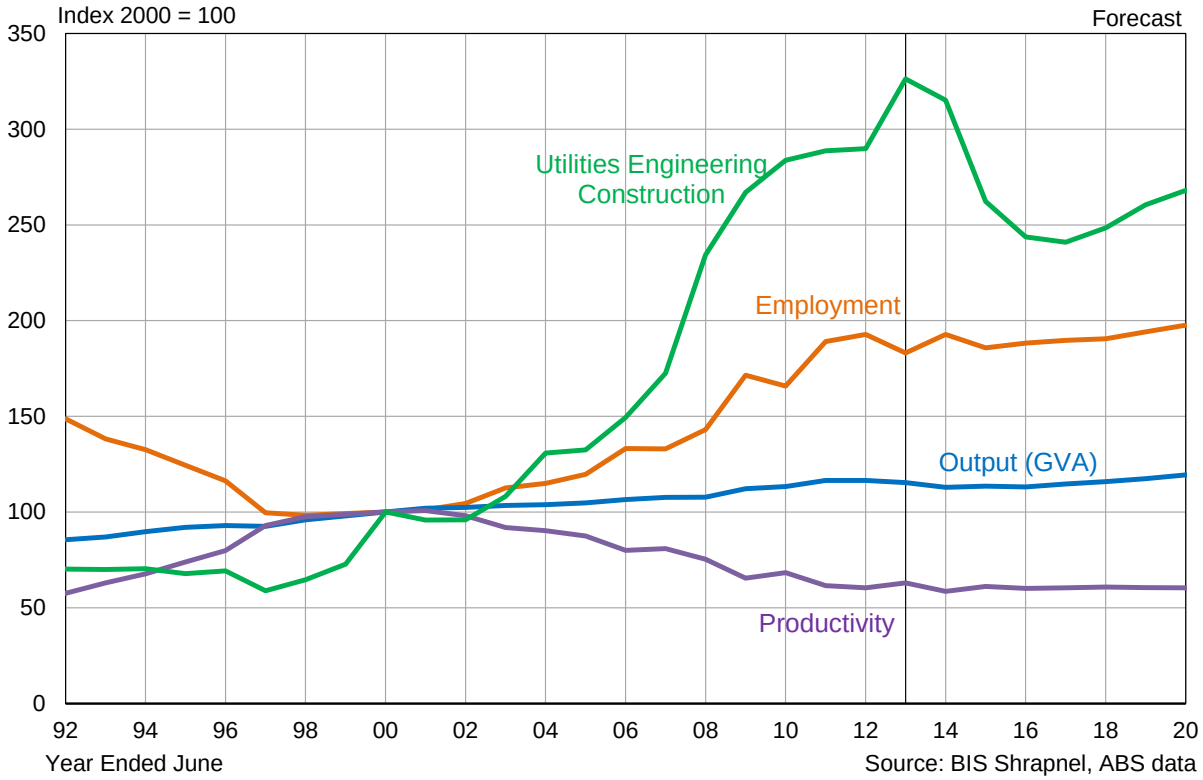
Year Ended June	Average Weekly Ordinary Time Earnings (1)				Wage Price Index (2)			
	All Industries		Electricity, Gas, Water and Waste Services		All Industries		Electricity, Gas, Water and Waste Services	
	$	%CH	$	%CH	Index	%CH	Index	%CH
1990	521.0	6.9	559.2	8.9				
1991	555.4	6.6	585.2	4.7				
1992	580.8	4.6	620.5	6.0				
1993	591.0	1.8	638.3	2.9				
1994	609.1	3.1	657.9	3.1				
1995	634.9	4.2	668.6	1.6				
1996	663.8	4.6	707.6	5.8				
1997	688.5	3.7	748.6	5.8				
1998	716.0	4.0	796.1	6.3	67.5		63.8	
1999	741.4	3.5	827.1	3.9	69.6	3.1	65.7	3.0
2000	765.4	3.2	866.8	4.8	71.7	3.0	68.2	3.8
2001	804.2	5.1	918.5	6.0	74.2	3.5	70.8	3.8
2002	847.4	5.4	981.0	6.8	76.7	3.3	73.8	4.2
2003	890.0	5.0	1,001.3	2.1	79.3	3.5	76.8	4.1
2004	931.6	4.7	1,056.7	5.5	82.2	3.6	79.9	4.1
2005	972.9	4.4	1,090.6	3.2	85.3	3.7	83.3	4.3
2006	1 017.5	4.6	1,110.9	1.9	88.7	4.1	87.6	5.2
2007	1 054.1	3.6	1,151.9	3.7	92.2	3.9	91.8	4.8
2008	1 106.1	4.9	1,182.8	2.7	96.1	4.1	95.7	4.2
2009	1 166.5	5.5	1,255.5	6.1	100.0	4.1	100.0	4.5
2010	1 231.3	5.6	1,350.8	7.6	103.1	3.1	104.4	4.3
2011	1 282.5	4.2	1,473.9	9.1	107.0	3.8	108.7	4.2
2012	1 338.1	4.3	1,510.0	2.5	110.9	3.6	112.5	3.5
2013	1 400.3	4.6	1,602.5	6.1	114.6	3.3	117.3	4.2
Forecasts								
2014	1 446.6	3.3	1,671.5	4.3	117.6	2.7	121.6	3.7
2015	1 501.1	3.8	1,742.4	4.2	121.3	3.1	126.0	3.6
2016	1 565.6	4.3	1,818.8	4.4	125.6	3.6	130.8	3.8
2017	1 644.4	5.0	1,907.7	4.9	130.6	4.0	136.3	4.1
2018	1 724.4	4.9	2,010.6	5.4	135.6	3.8	142.2	4.4
2019	1 799.4	4.3	2,123.0	5.6	140.7	3.8	148.5	4.4
2020	1 886.0	4.8	2,230.8	5.1	146.3	4.0	155.4	4.7
Compound Annual Growth Rates (3)								
1990-2000	3.9		4.5					
2000-2010	4.9		4.5		3.7		4.3	
2008-2013	4.8		6.3		3.6		4.2	
2013-2020	4.3		4.8		3.6		4.1	
2015-2020	4.7		5.1		3.8		4.3	

Source: BIS Shrapnel, ABS

(1) Earnings per person for full-time adults. Data is year ended May (available only mid month of quarter).
(2) Ordinary time hours excluding bonuses.
(3) e.g. CAGR (Compound Annual Growth Rates) for 2015-2020 is CAGR for 2015/16 to 2019/20 inclusive (ie next regulatory period).

We believe investment in the sector, particularly engineering construction, has been the key driver of employment growth in the sector over the past decade. Chart 4.2 illustrates this relationship, and shows employment has a stronger relationship with utilities engineering construction rather than utilities output. We expect employment growth to pick up from 2016/17 in anticipation of increased utilities construction.

Chart 4.2: Australia – Utilities Employment, Output and Investment



Meanwhile, increases in individual agreements will also strengthen from 2015/16

Increases in individual agreements (or non-EBA wages) are primarily influenced by the strength of the labour market (especially the demand-supply balance of skilled labour), inflationary expectations, the recent profitability of relevant enterprises (which influences bonuses and incentives, etc.), current business conditions and the short-term economic outlook.

With economy expected to grow close to trend in two years, we expect higher wages growth in the segment to come through, as employers bid up wages for skilled labour in scarce supply. Businesses will find they must 'meet the market' on remuneration in order to attract and retain staff and we expect wages under individual arrangements to accelerate from 2016/17.

Two other factors which will act to push up wages growth attributable to the individual arrangements segment — that is the compositional effects — include the up skilling of the workforce and, later in the period, the ageing of the workforce. Apprentices, trainees and numbers of new staff have increased markedly over recent years, across the electricity, gas and water sector generally. Given slower growth in employment numbers over the next decade, it is likely that there will be overall up skilling of the existing workforce, which will see a commensurate movement by much of the workforce into higher grades (ie on higher pay), although the 'base' movement — the nominal increase in EBA's — will not reflect this, so this upgrading will end up as compositional increases in the individual arrangements segment.

A related aspect is ageing profile, which will particularly affect the 'professionals' on non-EBA's, who tend to be older and more experienced.

Indeed, the strengthening of non-EBA wages from 2015/16 and the compositional effects from the overall up skilling is expected to result in much stronger growth in individual arrangements over this decade, compared to the last ten years. All the compositional effects from the up skilling of the workforce will fall into the individual arrangements wage setting residual. This is because the electricity, gas and water sector has a relatively small workforce and the individual arrangements segment picks up the standard errors of WPI and AWOTE estimates by the ABS.

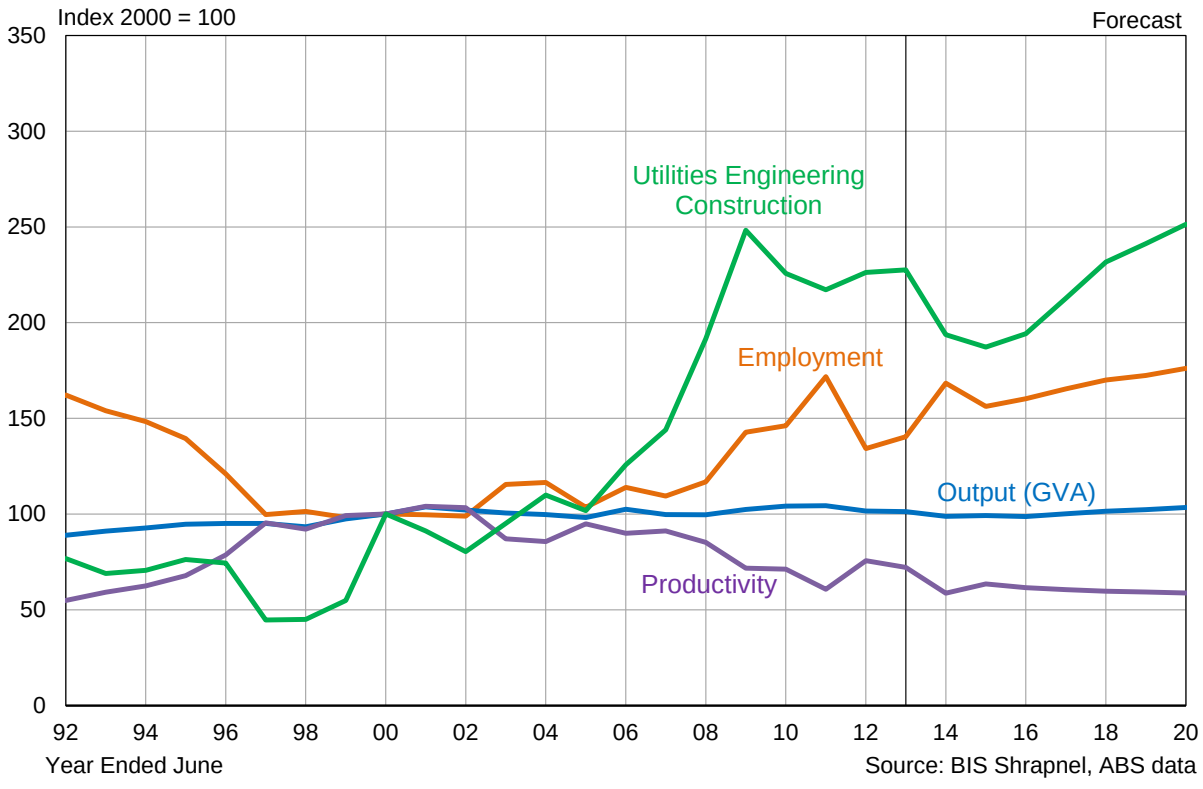
Overall, BIS Shrapnel expects total wage costs for the Australian Electricity, Gas, Water and Waste Services (EGWWS or 'Utilities) sector — expressed in Average Weekly Ordinary Time Earnings (AWOTE) — will average 4.8 per cent per annum over the seven years from 2013/14 to 2019/20 inclusive, 0.5 per cent higher than the national 'All Industries' AWOTE average of 4.3 per cent per annum over the same seven year period (see table 4.5). In terms of *underlying* wages growth in the 'utilities' sector for total Australia — expressed in wage price index (WPI) terms — BIS Shrapnel is forecasting an average of 4.1 per cent per annum (0.5 percentage points higher than the national 'All Industries' WPI average of 3.6 per cent per annum) over the seven years from 2013/14 to 2019/20 inclusive (see table 4.5).

4.1 Outlook for utilities wages growth in New South Wales

The utilities wage forecasts for NSW are expected to marginally lag the national average over the next three years. However, New South Wales utilities WPI growth is forecast to average 4.4 per cent per annum (0.1 percentage points higher than the national utilities average of 4.3 per cent per annum) over the five years from 2015/16 to 2019/20 inclusive (ie over Jemena's next regulatory period, see table 4.6).

The slightly stronger utilities wages growth in New South Wales in the second half of this decade is due to increased demand for labour from the state's utilities sector. Chart 4.3 shows BIS Shrapnel's engineering construction forecasts for the utilities-related segments. NSW

Chart 4.3: New South Wales – Utilities Employment, Output and Investment



utilities engineering construction is projected to fall in 2013/14 (but remain at historically high levels), before increasing significantly from 2015/16. Construction work done is expected to lift considerably in the second half of the decade as the surplus in generation capacity is slowly eroded through continued population growth and industrial activity, placing greater demands on electricity supply. Chart 4.3 also shows that utilities investment is a key influence on employment growth in the utilities sector (even though some capital projects are outsourced to the construction sector). The combination of high levels of utility engineering construction and overall construction in the state means increased wage pressures in the NSW utilities sector (relative to other states) over the five years to 2019/20.

Table 4.6: Electricity, Gas, Water and Waste Services – New South Wales and Australia Year Average Growth

	New South Wales - Nominal				Australia- Nominal			
Year Ended June	AWOTE (1)		WPI (2)		AWOTE (1)		WPI (2)	
	$	A% CH	Index	A% CH	$	A% CH	Index	A% CH
2000					866.8	4.8	68.2	3.8
2001					918.5	6.0	70.8	3.8
2002					981.0	6.8	73.8	4.2
2003					1,001.3	2.1	76.8	4.1
2004					1,056.7	5.5	79.9	4.1
2005					1,090.6	3.2	83.3	4.3
2006					1,110.9	1.9	87.6	5.2
2007					1,151.9	3.7	91.8	4.8
2008					1,182.8	2.7	95.7	4.2
2009	1,325.2		100.0		1,255.5	6.1	100.0	4.5
2010	1,397.8	5.5	103.9	3.9	1,350.8	7.6	104.4	4.3
2011	1,459.9	4.4	107.5	3.5	1,473.9	9.1	108.7	4.2
2012	1,481.7	1.5	111.0	3.2	1,510.0	2.5	112.5	3.5
2013	1,557.3	5.1	115.1	3.7	1,602.5	6.1	117.3	4.2
Forecasts								
2014	1,619.7	4.0	119.2	3.6	1,671.5	4.3	121.6	3.7
2015	1,683.5	3.9	123.3	3.4	1,742.4	4.2	126.0	3.6
2016	1,750.6	4.0	127.9	3.7	1,818.8	4.4	130.8	3.8
2017	1,841.5	5.2	133.4	4.2	1,907.7	4.9	136.3	4.1
2018	1,944.5	5.6	139.3	4.5	2,010.6	5.4	142.2	4.4
2019	2,051.2	5.5	145.9	4.7	2,123.0	5.6	148.5	4.4
2020	2,155.4	5.1	152.8	4.8	2,230.8	5.1	155.4	4.7
Long Term Averages								
2000-2010					4.5		4.3	
2008-2013					6.3		4.2	
2013-2020	4.8		4.1		4.8		4.1	
2015-2020	5.1		4.4		5.1		4.3	

(1) Earnings of persons. Data is year ended May. Source: BIS Shrapnel, ABS

(2) Ordinary time hours excluding bonuses.

5. EXTERNAL LABOUR COST ESCALATION FORECASTS

This section provides forecasts of Jemena's external or 'out-sourced' labour escalation. Given utility service providers outsourced labour is mostly supplied by firms in the construction industry, we proxy Jemena's external labour cost escalation by wages growth (as measured by the WPI) in the New South Wales construction industry. Note that for totally outsourced or 'turnkey' contracts, we propose a gas and fuel implicit price deflator as the preferred escalator. Our forecast of this escalator is discussed in section 6.6.

Methodology

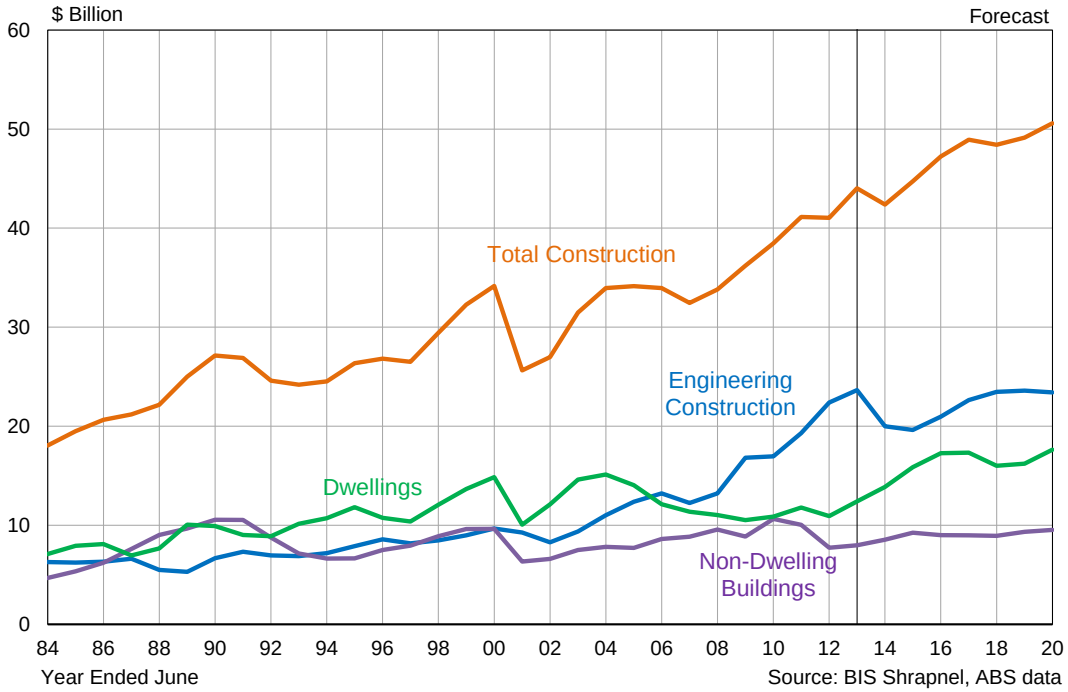
Our research has shown that construction activity (ie work done in the sector) normally has a strong influence on construction wages. Hence, our wage forecasts for external labour are based on BIS Shrapnel's forecasts of construction activity by state (which includes residential and non-residential building, plus engineering construction) as well as predicted movements in the construction wages at the national level.

5.1 Construction Sector Wages Growth in New South Wales

Much like the other states and territories, wages growth in the New South Wales construction sector generally tracks growth in total construction activity, although changes in wages tend to lag construction (in work done terms) by around one to two years.

NSW construction wages over the next four years are expected to be stronger than the national average (see table 5.1). After underperforming the Australian average for most of the last decade, construction activity in NSW is expected to grow substantially over the three years to 2016/17. Private dwelling construction will be the initial driver, followed by a new round of public sector infrastructure projects. The latter will be driven by a need to make up for underinvestment over the next few years as well as increased ability to finance it as both private funding and Federal funding return.

Chart 5.1: Total Construction – New South Wales
Value of Work Done, Constant 2011/12 Prices



However, dwelling investment will underpin the initial growth in construction. The major problem, through last decade, was a significant fall in residential building — the result of over-aggressive infrastructure charges imposed by the government at the beginning of the decade to claw back revenue from developers and landowners.

The housing market has picked up already with the start of what will become a strong surge in residential building. Last decade's under-building led to a significant deficiency of residential stock, underpinning the current upswing and pushing overall construction higher. Non-residential building will also build momentum over the next few years.

NSW construction wages will follow the recovery in dwelling construction and the improvement in total construction. Construction wages (in WPI terms) is expected to peak at 4.1 per cent in 2016/17 before easing in line with a moderation in total construction activity.

Table 5.1: Construction Wages Growth – New South Wales and Australia
Year Average Growth

	New South Wales - Nominal				Australia- Nominal			
Year Ended June	AWOTE ([1])		WPI ([2])		AWOTE ([1])		WPI ([2])	
	$	A% CH	Index	A% CH	$	A% CH	Index	A% CH
2000	781.3		71.2		722.1	4.8	68.5	3.8
2001	771.1	-1.3	74.7	5.0	730.5	1.2	71.3	4.1
2002	835.9	8.4	76.9	2.9	769.6	5.3	73.6	3.3
2003	922.4	10.3	79.3	3.1	832.3	8.2	76.1	3.3
2004	941.7	2.1	81.9	3.3	875.2	5.1	78.9	3.7
2005	988.6	5.0	85.3	4.2	924.6	5.7	83.0	5.2
2006	964.9	-2.4	88.8	4.1	941.8	1.9	87.0	4.9
2007	1,000.4	3.7	92.9	4.6	987.8	4.9	91.3	4.9
2008	1,120.6	12.0	96.8	4.3	1,078.2	9.2	95.6	4.7
2009	1,185.3	5.8	100.0	3.3	1,162.0	7.8	100.0	4.7
2010	1,209.9	2.1	102.5	3.9	1,250.9	7.7	103.3	3.3
2011	1,154.2	-4.6	106.7	4.1	1,313.7	5.0	107.4	4.0
2012	1,204.2	4.3	110.2	3.2	1,359.8	3.5	111.7	4.1
2013	1,258.4	4.5	113.8	3.3	1,418.1	4.3	115.5	3.3
Forecasts								
2014	1,302.4	3.5	117.2	3.0	1,464.9	3.3	118.8	2.9
2015	1,349.3	3.6	121.1	3.3	1,514.7	3.4	122.4	3.0
2016	1,403.3	4.0	125.6	3.7	1,572.2	3.8	126.6	3.5
2017	1,470.6	4.8	130.7	4.1	1,644.6	4.6	131.6	3.9
2018	1,539.7	4.7	135.9	4.0	1,720.2	4.6	136.6	3.8
2019	1,609.0	4.5	141.0	3.7	1,802.8	4.8	141.9	3.9
2020	1,684.7	4.7	146.5	3.9	1,894.7	5.1	147.7	4.1
Long Term Averages								
2000-2010					5.6		4.2	
2008-2013					5.6		3.9	
2013-2020	4.3		3.7		4.2		3.6	
2015-2020	4.5		3.9		4.6		3.8	

(1) Earnings of persons. Data is year ended May. Source: BIS Shrapnel, ABS
(2) Ordinary time hours excluding bonuses.

6. GAS NETWORK RELATED MATERIALS

Table 6.1: Gas Network Related Materials Summary

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	5 yr Avg (i)
	Actuals			Forecasts		Next Regulatory Period					
Nominal Price Changes (With Carbon Tax)											
1. Steel - USA/Europe Average (a)	**-3.0**	**-3.7**	**-9.4**	**9.3**	**4.3**	**3.2**	**2.4**	**9.8**	**-5.9**	**-0.7**	**1.8**
2. Steel - Asia (a)		**-9.5**	**-9.4**	**10.3**	**7.4**	**3.6**	**2.4**	**10.6**	**-6.2**	**-2.4**	**1.6**
3. Aluminium (a)	**-6.2**	**-7.0**	**-7.8**	**7.8**	**2.7**	**8.7**	**7.0**	**14.1**	**-3.1**	**1.0**	**5.5**
4. Brass (a)				**10.7**	**5.4**	**4.6**	**4.8**	**12.1**	**-6.1**	**-2.6**	**2.5**
5. Copper (a)	**-3.3**	**-1.8**	**-7.8**	**6.9**	**1.1**	**1.1**	**2.9**	**11.9**	**-6.1**	**-3.0**	**1.4**
6. Zinc (a)	**-10.1**	**-8.6**	**-5.0**	**16.2**	**11.8**	**9.8**	**7.5**	**12.5**	**-6.3**	**-2.1**	**4.3**
7. Plastics Prices											
a) Nylon-11 (b)	**-0.7**	**2.5**	**2.7**	**9.2**	**3.8**	**1.4**	**2.3**	**9.0**	**-3.7**	**-1.0**	**1.6**
b) HDPE (Polyethylene) (c)	**-0.7**	**2.5**	**2.7**	**9.2**	**3.8**	**1.4**	**2.3**	**9.0**	**-3.7**	**-1.0**	**1.6**
8. Concrete (d)	**5.9**	**6.2**	**4.7**	**1.9**	**6.5**	**7.2**	**2.3**	**0.8**	**1.7**	**3.3**	**3.1**
9. Gas and Fuel Construction Price Index (e)	**-8.3**	**-1.5**	**0.6**	**2.5**	**3.2**	**2.4**	**0.2**	**3.5**	**3.3**	**3.4**	**2.6**
10. General Materials Prices (f)	**3.1**	**2.3**	**2.3**	**2.8**	**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Nominal Price Changes (Without Carbon Tax)											
1. Steel - USA/Europe Average (a)	-3.0	-3.7	-9.6	9.2	4.5	3.1	2.3	9.7	-6.0	-0.9	1.7
2. Steel - Asia (a)		-9.5	-9.6	10.2	7.6	3.5	2.3	10.5	-6.4	-2.6	1.5
3. Aluminium (a)	-6.2	-7.0	-9.1	7.6	3.9	8.1	6.4	13.5	-4.0	0.1	4.8
4. Brass (a)				10.7	5.9	4.4	4.6	12.0	-6.3	-2.8	2.4
5. Copper (a)	-8.4	-1.8	-8.4	6.9	1.6	1.0	2.8	11.8	-6.2	-3.1	1.2
6. Zinc (a)	-10.1	-8.6	-5.7	16.3	12.4	9.6	7.4	12.4	-6.5	-2.3	4.1
7. Plastics Prices											
a) Nylon-11 (b)	-0.7	2.5	2.7	9.2	3.9	1.4	2.3	9.0	-3.7	-1.1	1.6
b) HDPE (Polyethylene) (c)	-0.7	2.5	2.7	9.2	3.9	1.4	2.3	9.0	-3.7	-1.1	1.6
8. Concrete (d)	5.9	6.2	4.2	1.8	7.0	7.0	2.0	0.5	1.4	3.0	2.8
9. Gas and Fuel Construction Price Index (e)	-8.3	-1.5	0.6	2.5	3.4	2.3	0.1	3.4	3.2	3.2	2.4
10. General materials Prices (f)				2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Consumer Price Index (headline, with Carbon tax) (g)	**3.1**	**2.3**	**2.3**	**2.8**	**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Consumer Price Index (headline, without Carbon Tax) (h)				**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Real Price Changes (With Carbon Tax) (j)											
1. Steel - USA/Europe Average (a)	-6.1	-6.0	-11.6	6.5	1.5	0.7	-0.1	7.3	-8.4	-3.2	-0.7
2. Steel - Asia (a)		-11.8	-11.7	7.5	4.6	1.1	-0.1	8.1	-8.7	-4.9	-0.9
3. Aluminium (a)	-9.3	-9.3	-10.1	5.0	-0.1	6.2	4.5	11.6	-5.6	-1.5	3.0
4. Brass (a)				7.9	2.6	2.1	2.3	9.6	-8.6	-5.1	0.0
5. Copper (a)	-6.4	-4.1	-10.1	4.1	-1.7	-1.4	0.4	9.4	-8.6	-5.5	-1.1
6. Zinc (a)	-13.2	-10.9	-7.3	13.4	9.0	7.3	5.0	10.0	-8.8	-4.6	1.8
7. Plastics Prices											
a) Nylon-11 (b)	-3.8	0.2	0.5	6.4	1.0	-1.1	-0.2	6.5	-6.2	-3.5	-0.9
b) HDPE (Polyethylene) (c)	-3.8	0.2	0.5	6.4	1.0	-1.1	-0.2	6.5	-6.2	-3.5	-0.9
8. Concrete (d)	2.8	3.9	2.4	-0.9	3.7	4.7	-0.2	-1.7	-0.8	0.8	0.6
9. Gas and Fuel Construction Price Index (e)	-11.4	-3.8	-1.6	-0.3	0.4	-0.1	-2.3	1.0	0.8	0.9	0.1
10. General materials Prices (f)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real Price Changes (Without Carbon Tax) (j)											
1. Steel - USA/Europe Average (a)	**-6.1**	**-6.0**	**-11.8**	**6.4**	**2.0**	**0.6**	**-0.2**	**7.2**	**-8.5**	**-3.4**	**-0.8**
2. Steel - Asia (a)		**-11.8**	**-11.9**	**7.4**	**5.1**	**1.0**	**-0.2**	**8.0**	**-8.9**	**-5.1**	**-1.0**
3. Aluminium (a)	**-9.3**	**-9.3**	**-11.4**	**4.8**	**1.4**	**5.6**	**3.9**	**11.0**	**-6.5**	**-2.4**	**2.3**
4. Brass (a)				**7.9**	**3.4**	**1.9**	**2.1**	**9.5**	**-8.8**	**-5.3**	**-0.1**
5. Copper (a)	**-11.5**	**-4.1**	**-10.6**	**4.1**	**-0.9**	**-1.5**	**0.3**	**9.3**	**-8.7**	**-5.6**	**-1.3**
6. Zinc (a)	**-13.2**	**-10.9**	**-8.0**	**13.5**	**9.9**	**7.1**	**4.9**	**9.9**	**-9.0**	**-4.8**	**1.6**
7. Plastics Prices											
a) Nylon-11 (b)	**-3.8**	**0.2**	**0.4**	**6.4**	**1.4**	**-1.1**	**-0.2**	**6.5**	**-6.2**	**-3.6**	**-0.9**
b) HDPE (Polyethylene) (c)	**-3.8**	**0.2**	**0.4**	**6.4**	**1.4**	**-1.1**	**-0.2**	**6.5**	**-6.2**	**-3.6**	**-0.9**
8. Concrete (d)	**2.8**	**3.9**	**1.9**	**-1.0**	**4.5**	**4.5**	**-0.5**	**-2.0**	**-1.1**	**0.5**	**0.3**
9. Gas and Fuel Construction Price Index (e)	**-11.4**	**-3.8**	**-1.6**	**-0.3**	**0.9**	**-0.2**	**-2.4**	**0.9**	**0.7**	**0.7**	**-0.1**
10. General materials Prices (f)				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Source: BIS Shrapnel

(a) Price growth in Australian dollars. 'Without Carbon Price' forecasts from Consensus Economics
(b) Castor Oil is the key raw material of Nylon-11. Because we do not have any historical data on Castor Oil, we have approximated Nylon-11 by using HDPE growth rates.
(c) HDPE (Polyethylene) prices are proxied using Manufacturing Wages, General Materials, and Thermoplastic Resin prices. Thermoplastic Resin is primarily driven by Crude Oil.
(d) Concrete price growth in Australian dollars. Forecasts from BIS Shrapnel modelling.
(e) Gas and Fuel Construction Price Index forecasts from BIS Shrapnel modelling.
(f) General Materials are proxied using CPI forecasts.
(g) Headline CPI forecasts based on Reserve Bank of Australia forecasts to June 2015 quarter and then Commonwealth Treasury medium term projections.
(h) Assuming the Carbon Tax is removed on 1 July, 2014
(i) Average Annual Growth Rate for 2015/16 to 2019/20 inclusive ie for next regulatory period.
(j) Real price changes are calculated by deducting the inflation rate from nominal price changes.

Prices of all gas network related materials are forecast to increase on average over the five year period to 2019/20. However, after adjusting for the expected impacts of inflation and the carbon tax, the results are more mixed. Aluminium is expected to achieve the strongest price growth over the forecast period, at an average of 2.3 per cent per annum. On the other hand, copper and steel prices are expected to fall by an average of -1.3 and -1.0 per cent per annum respectively. Given the variety of supply and demand drivers affecting prices of these commodities, each will be discussed in detail in the following section.

As well as individual supply and demand drivers, consumers of these commodities in Australia are also affected by movements in the exchange rate. Specifically, movements in the Australian dollar (A$) against the US dollar (US$) can have significant effects on the domestic price of minerals and metals. This is being seen at present, as the rapid depreciation of the Australian dollar over the past year will see Australian-denominated commodity prices rise strongly through the 2013/14 financial year, despite weakness in the US$ prices of the same commodities.

The reversal of this trend is a key component of the forecast price declines through 2018/19 and 2019/20 as shown in table 6.1. The A$ is expected to appreciate by more than ten per cent over these two years, and this directly flows through to lower commodity prices for Australian consumers.

The remainder of this section identifies and explains the key drivers of prices for each material, and their resultant forecasts.

6.1 Steel

Steel price forecasts are derived from the Consensus Economics Energy & Metals Consensus Forecasts publication. This publication provides steel price forecasts for Hot Rolled Coil in the Asia market, measured in US$ per metric tonne. This methodology (as described in Appendix C) has previously been accepted by the AER, including in the recent SP AusNet 2013-17 determination[2]. However, this previous methodology used the average of Consensus steel forecasts for the USA and Europe markets. BIS Shrapnel believe the Asia market is more appropriate in this situation. This is based on ABS data on the source of steel imports to Australia. As shown in table 6.2, the majority of source-identified steel imports to Australia are from the Asia region, rather than Europe or the USA. As a result, we believe the Asia market price more accurately reflects the prices faced by Australian steel consumers.

Table 6.2: Australia Steel and Iron Imports, 2012/13

Source Country	2012/13 (Tonnes)[1]
China	256,050
New Zealand	112,727
Taiwan	100,822
Singapore	85,113
South Korea	79,659
Japan	63,241
Malaysia	39,041
South Africa	36,600
Sweden	30,612
Spain	21,308

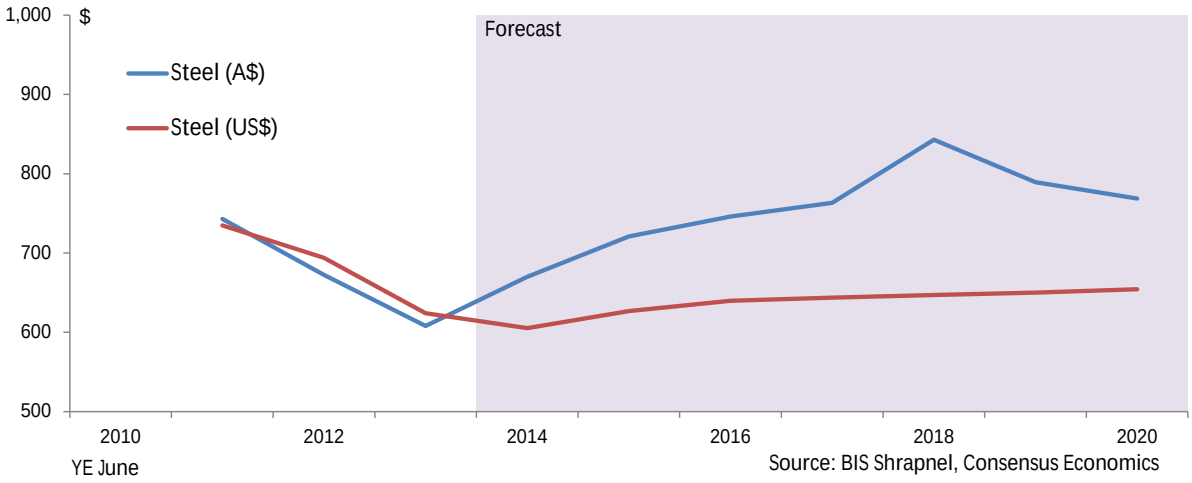
1) Some data are not identified due to confidentiality.

Source: ABS data, BIS Shrapnel

[2] http://www.aer.gov.au/node/4810 Draft Decision, Part 3, pp. 128

Steel prices have fallen over each of the past three years, due to the unsustainable peaks in prices reached prior to the GFC. This effect has now unwound, and steel prices are likely to rise strongly over the near term, and continue to rise over much of the forecast period. However, there are significant differences between the outlook for global steel prices in US$, and A$ terms. These differences (for the Asia market) are shown in chart 6.1.

Chart 6.1: Steel Price



Prices in US$ are expected to essentially move sideways over the next 7 years, as a result of the relatively soft outlook for both iron ore and coal prices. This will be predominantly driven by the changing iron ore industry, where additions to supply will drive prices significantly below todays levels, and have a corresponding effect on steel prices. Prices are expected to tick upward over the final years of the forecast as demand for key inputs strengthen on the back of rising global demand.

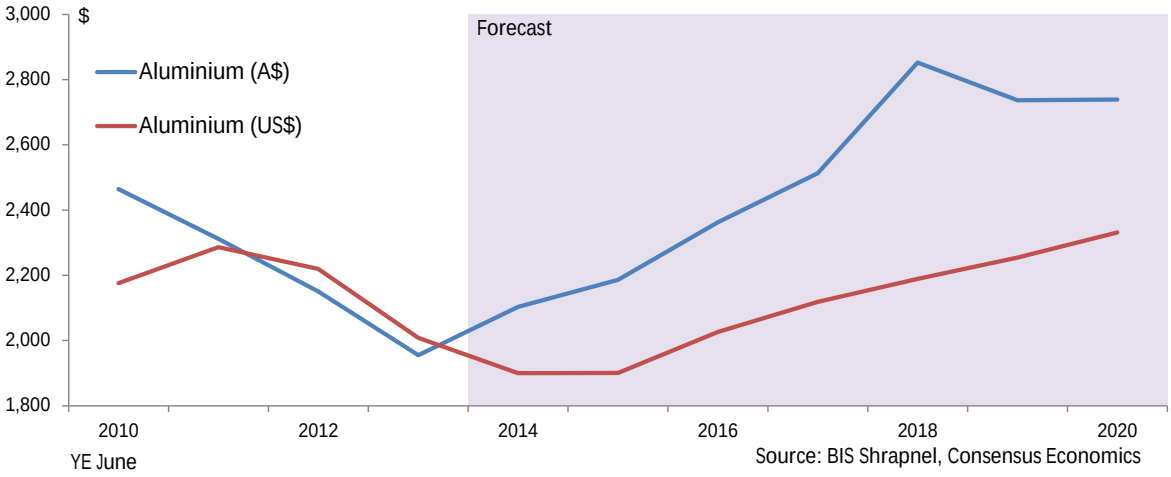
On the other hand, the price faced by JGN in A$ terms will be significantly affected by exchange rate movements. Having decreased by around ten per cent over the past year, the weakness in the A$ will result in particularly strong growth in steel prices over the 2013/14 financial year. The outlook is more stable over the subsequent three years given the relative stability of the exchange rate outlook. However, we anticipate a return to strong growth in A$ steel prices in 2017/18 as the A$ depreciates once more.

Overall, we expect Asia steel prices (in real terms) to actually fall by an average of 1 per cent per annum over the five years to 2019/20. Note that this is different to the forecast provided in August 2013 for two reasons. First, we now recommend that the Asia market be used to forecast Jemena's steel costs, given the relationship between Australia's steel imports with the Asia region. Second, the combined USA/Europe market steel forecasts (which are also provided in table 6.1) are weaker than the Consensus Economics forecasts from August. This is primarily due to strong declines in the USA market price forecasts, given ongoing uncertainty regarding the USA economic recovery.

6.2 Aluminium Prices

Similar to steel, aluminium prices have been falling over the past three years, due to a combination of unwinding record high US$ prices, as well as the strength of the A$. However, we believe the trough in prices has now been reached, meaning prices will continue to climb from here.

Chart 6.2: Aluminium Price



Solid growth is expected in A$ prices over the next five years, rising a cumulative 47 per cent. Over the near term, the primary driver of this will be the significant depreciation of the A$ over the current financial year. This is expected to see A$ aluminium prices rise 7.8 per cent (in nominal terms) in 2013/14, despite falling by 5.4 per cent in US$ terms.

Beyond here, A$ prices will continue to rise, due to both a weaker A$, and rising US$ prices. A rising middle class in China, and an accelerating US consumer economy should lift international consumption. Further, the rising cost of electricity, as the major input to production, will place upward pressure on aluminium operating costs over the medium term. Higher operating costs will discourage additions to smelting capacity and will act to keep a floor on prices. This will contribute to a slowing in the rate of growth in production over the longer term, and ensure prices remain around historically strong levels.

Overall, aluminium prices (real terms, without carbon tax) are forecast to rise at an average of 2.3 per cent per year over the 2015/16 to 2019/20 period. This is stronger than the average of 1 per cent per annum forecast in the preliminary August 2013 report. The reason for this stronger growth profile is the 10 per cent decline in aluminium prices between August 2013 and March 2014. This decline is expected to be only temporary, and prices are expected to rebound to similar levels to those expected in August. However, beginning from the currently lower base means that annual growth will be higher to achieve this level by 2019/20.

6.3 Brass Prices

It is our understanding that brass is produced from two key inputs – copper and zinc. To derive a cost escalator for brass, we therefore forecast these two components individually. We then weight these forecasts according to research that suggests that brass, although consisting of several types with different weightings, generally uses 60 per cent copper, and 40 per cent zinc in its manufacture.

As shown in table 6.3, brass prices are expected to rise at an average of 3.9 per cent per annum through to 2019/20. This is primarily due to strength in the zinc price, which is expected to grow particularly strongly over the near term, recovering from its current trough. The outlook for each component is explained in detail below.

Table 6.3: Brass and Component Prices

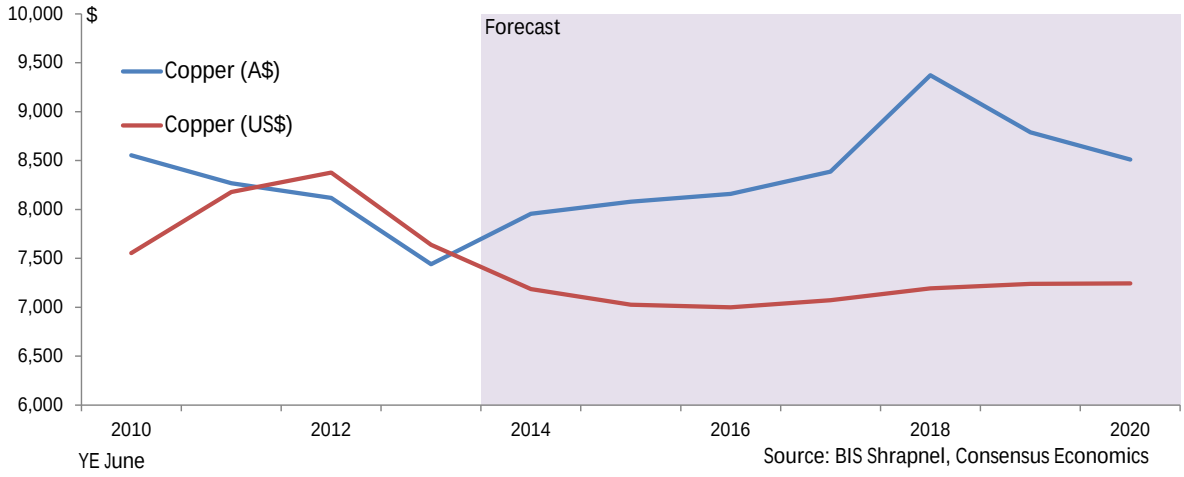
Year Ended June	A$ Copper	A%Ch	A$ Zinc	A%Ch	Brass Index Brass	A%Ch
2010	8553.8		2445.1			
2011	8268.9	-3.3	2197.4	-10.1		
2012	8118.3	-1.8	2008.4	-8.6		
2013	7482.6	-7.8	1907.4	-5.0	100.0	
Forecast						
2014	8001.3	6.9	2217.1	16.2	110.7	10.7
2015	8092.0	1.1	2478.4	11.8	116.6	5.4
2016	8184.6	1.1	2720.6	9.8	122.0	4.6
2017	8424.5	2.9	2926.0	7.5	127.8	4.8
2018	9426.2	11.9	3292.6	12.5	143.3	12.1
2019	8855.8	-6.1	3085.5	-6.3	134.5	-6.1
2020	8593.7	-3.0	3019.8	-2.1	131.0	-2.6
Period Averages and Compound Annual Average Growth Rates						
2014-2020	8511.2	2.0	2820.0	6.8		3.9

Source: Consensus Economics and BIS Shrapnel

6.3.1 Copper

Weak world demand alongside new production capacity saw world copper stocks continue to edge up in 2013, causing copper prices to fall 8.8 per cent in US$ terms.

Chart 6.3: Copper Price



Over the next few years, we expect copper supply will continue to outstrip demand, lifting copper stocks and apply downward pressure on prices. On the demand side, the outlook for Chinese growth is critical due its dominant (43 per cent) world copper consumption share, followed by key advanced economies (US, Germany, Japan and South Korea) and emerging economies (Brazil, India and Mexico). Chinese growth, while expected to remain around 7.5 per cent for the next few years, will still support relatively robust world copper consumption growth.

However, on the supply side, new world production coming on-stream (sourced from Indonesia, Peru and Mongolia) will substantially outpace expected demand growth, seeing copper stocks rise and apply downward pressure on prices. Therefore, over the next couple of years copper prices are expected to gradually fall to below US$7,000/t before briefly rebounding through reduced supply (mothballing more marginal copper operations) and increased world demand by 2016/17.

The A$ is expected to remain around current levels, and indeed slowly trend lower over the next few years, ensuring that copper prices in A$ terms continue to rise, despite the decline in US$ terms. A$ prices are forecast to rise a cumulative 26 per cent over the next five years, before easing back as the A$ climbs back into the mid US$0.80's.

6.3.2 Zinc

Zinc prices have fallen in US$ terms over the past two years due to weak demand and subsequently rising stock levels. This has caused some production to be permanently shut down, or temporarily mothballed, in order to reduce oversupply.

Chart 6.4: Zinc Price

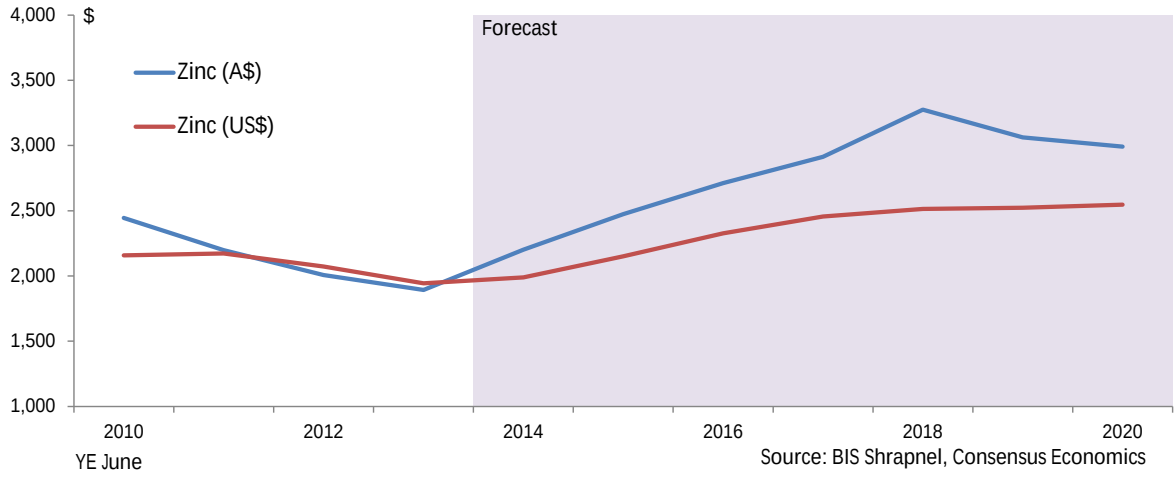


Table 6.4: Commodity Price Forecasts

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	5 yr Avg (c)
	Actuals			Forecasts		Next Regulatory Period					
Nominal Price Changes (A$)											
1. Steel - USA/Europe Average (a)	-3.0	-3.7	-9.6	9.2	4.5	3.1	2.3	9.7	-6.0	-0.9	1.7
2. Steel - Asia (a)		-9.5	-9.6	10.2	7.6	3.5	2.3	10.5	-6.4	-2.6	1.5
3. Aluminium (a)	-6.2	-7.0	-9.1	7.6	3.9	8.1	6.4	13.5	-4.0	0.1	4.8
4. Brass (a)				10.7	5.9	4.4	4.6	12.0	-6.3	-2.8	2.4
5. Copper (a)	-3.3	-1.8	-8.4	6.9	1.6	1.0	2.8	11.8	-6.2	-3.1	1.2
6. Zinc (a)	-10.1	-8.6	-5.7	16.3	12.4	9.6	7.4	12.4	-6.5	-2.3	4.1
7. Oil (a)	19.1	6.3	-2.7	-2.8	0.3	-0.7	0.2	1.3	1.1	0.9	0.6
Exchange Rate (US$/A$) (b)	**0.989**	**1.032**	**1.027**	**0.903**	**0.870**	**0.858**	**0.843**	**0.768**	**0.824**	**0.851**	**0.8**
Nominal Price Changes (US$)											
1. Steel - USA/Europe Average (a)	**8.7**	**0.5**	**-10.0**	**-3.9**	**0.6**	**1.7**	**0.6**	**-0.1**	**0.9**	**2.4**	**1.1**
2. Steel - Asia (a)		**-5.6**	**-10.1**	**-3.0**	**3.6**	**2.1**	**0.6**	**0.5**	**0.5**	**0.6**	**0.9**
3. Aluminium (a)	**5.1**	**-2.9**	**-9.5**	**-5.4**	**0.1**	**6.6**	**4.6**	**3.3**	**3.0**	**3.4**	**4.2**
4. Brass (a)				**-2.6**	**1.9**	**3.0**	**2.9**	**2.0**	**0.5**	**0.4**	**1.8**
5. Copper (a)	**8.3**	**2.4**	**-8.8**	**-5.9**	**-2.2**	**-0.4**	**1.0**	**1.7**	**0.6**	**0.1**	**0.6**
6. Zinc (a)	**0.7**	**-4.6**	**-6.2**	**2.3**	**8.2**	**8.1**	**5.6**	**2.3**	**0.4**	**1.0**	**3.5**
6. Oil (a)	**6.3**	**1.9**	**-2.2**	**10.5**	**4.2**	**0.6**	**2.0**	**11.3**	**-5.8**	**-2.4**	**1.1**

Source: BIS Shrapnel

(a) Price growth in Australian dollars. 'Without Carbon Price' forecasts from Consensus Economics
(b) Exchange rate forecasts are based on BIS Shrapnel internal modelling
(c) Average Annual Growth Rate for 2015/16 to 2019/20 inclusive ie for next regulatory period.

Over the short term, strengthening global demand and a reduction of stock levels will begin to underwrite more solid zinc prices. The recent closure or mothball of production facilities will likely see supply growth outpaced by demand growth, which will apply upward pressure to prices. As a result, prices are expected to increase in US$ terms over the entire outlook period, well and truly offsetting the recent weakness.

The story is similar, and even exacerbated in A$ terms. Successive years of double digit growth rates will see A$ zinc prices climb a cumulative 73 per cent over the next five years.

6.4 Plastics Prices

6.4.1 Nylon-11

Given the absence of historical series of Nylon-11, we are unable to provide forecasts. We have proxied price growth of Nylon-11 by growth in Polyethylene pipes, as described in section 6.4.2.

6.4.2 HDPE (Polyethylene)

Because polyethylene accounts for the majority of price movements in polyethylene pipe, the price movements of crude oil (and therefore polyethylene) is the key driver of polyethylene pipe prices over the outlook period.

Table 6.5: Polyethylene Pipe Prices

Year Ended	Crude Oil (a)		Thermoplastic PPI US$		Exchange Rate		Thermoplastic PPI A$		Labour Costs - Manufacturing		Transport & Other Overhead Costs		Growth in Polyethylene Pipe Prices (c)
June	WTI $US/bbl (e)	%CH	Index	%CH	US$/A$	%CH	Index	%CH	($)	%CH	CPI	%CH	%CH
2004	34.9	8.5	63.2	5.3	0.714	22.0	88.5	-13.7	892.2	4.3	143.5	2.4	-9.4
2005	51.4	47.2	77.5	22.7	0.745	4.4	103.9	17.5	920.0	3.1	147.0	2.4	13.8
2006	67.9	32.0	84.3	8.9	0.747	0.3	112.9	8.6	960.3	4.4	151.7	3.2	7.4
2007	67.0	-1.3	82.1	-2.7	0.786	5.2	104.4	-7.5	1005.8	4.7	156.1	2.9	-4.6
2008	102.7	53.3	87.7	6.8	0.897	14.1	97.8	-6.3	1048.2	4.2	161.4	3.4	-3.8
2009	73.8	-28.2	84.6	-3.5	0.746	-16.9	113.5	16.1	1103.9	5.3	166.4	3.1	13.2
2010	79.0	7.1	85.1	0.6	0.883	18.4	96.4	-15.1	1123.7	1.8	170.3	2.3	-10.8
2011	94.1	19.1	93.6	9.9	0.989	12.0	94.6	-1.9	1155.1	2.8	175.6	3.1	-0.7
2012	100.0	6.3	100.1	7.0	1.032	4.3	97.0	2.5	1181.7	2.3	179.8	2.4	2.5
2013	97.3	-2.7	102.1	2.0	1.027	-0.5	99.4	2.5	1227.6	3.9	184.3	2.5	2.7
Forecast													
2014	94.6	-2.8	99.8	-2.2	0.903	-12.0	110.5	11.2	1274.6	3.8	188.9	2.5	9.2
2015	94.8	0.3	100.1	0.2	0.870	-3.7	115.1	4.1	1321.1	3.7	193.6	2.5	3.9
2016	94.1	-0.7	99.5	-0.6	0.858	-1.4	116.0	0.8	1371.5	3.8	198.5	2.5	1.4
2017	94.4	0.2	99.7	0.2	0.843	-1.7	118.2	1.9	1426.9	4.0	203.4	2.5	2.3
2018	95.6	1.3	100.6	1.0	0.768	-9.0	131.1	10.9	1478.4	3.6	208.5	2.5	9.0
2019	96.6	1.1	101.5	0.8	0.824	7.3	123.2	-6.0	1534.6	3.8	213.7	2.5	-3.7
2020	97.5	0.9	102.2	0.7	0.851	3.3	120.1	-2.6	1597.5	4.1	219.1	2.5	-1.1
							Compound Annual Growth Rates						
1998-03	11.8		1.4		-3.3		4.5		5.1		3.1		7.1
2003-08	26.1		7.9		3.5		-0.9		4.2		2.9		2.0
2008-13	-1.1		3.1		3.4		0.3		3.2		2.7		-1.3
Forecasts													
2013-20	0.0		0.0		-0.8		2.7		3.8		2.5		3.0

(a) Crude oil forecasts are from Consensus Economics
(b) Exchange rates are forecast using BIS Shrapnel's internal methodology
(c) The historical data and forecasts were generated from BIS Shrapnel's input cost model for polyethylene pipe prices.

Source: BIS Shrapnel

The global oil market currently appears evenly balanced, with modestly rising demand matched by new supply coming on-stream in North America, Brazil, and Iraq, offsetting declining production elsewhere. Slight declines in the oil price are expected over the near term, as world supply exceeds growth in demand. Modest growth is then expected over subsequent years as improving worldwide economic growth provides additional demand for oil. Overall, US$ oil prices are expected to still be around today's levels by 2019/20.

However, the weakening A$ will work to offset the effect of this weak price outlook of oil on polyethylene. The recent fall in the A$ will see the polyethylene price increase sharply over 2013/14, and continue to rise (albeit at much slower rates) over the next three years. Despite a mild recovery in the A$ over the final two years of the outlook period, the overall effect of a weaker domestic currency is that polyethylene (as measured by the Thermoplastic PPI) will experience solid price growth over the next seven years, averaging 2.7 per cent per annum in nominal terms.

This will be supported by average annual growth in transport and other overhead costs (CPI, 2.5 per cent) and manufacturing wages (3.8 per cent). The net result is that polyethylene pipe prices are forecast to increase at an average of 3 per cent per annum over the next 7 years. This will be characterised by a peak in 2017/18, before the strengthening A$ drives prices of polyethylene (and therefore pipe) downward over the subsequent two years.

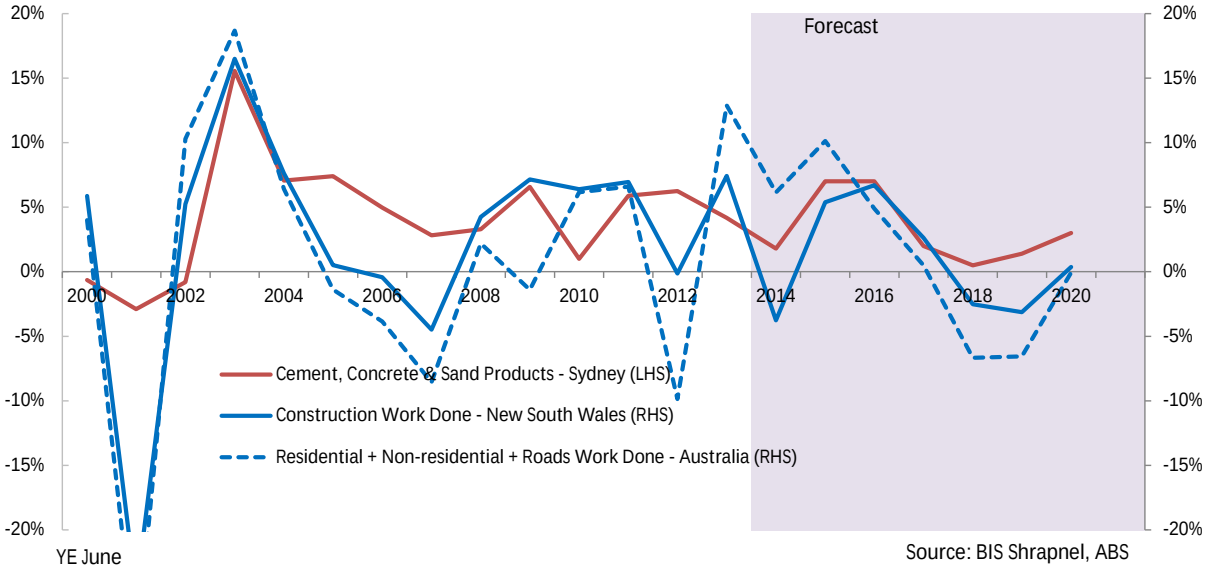
In real terms, with the assumed absence of a carbon tax, polyethylene pipe prices are forecast to fall at an average of 0.9 per cent per annum over the five years to 2019/20. This is weaker than the forecast increase of 0.1 per cent per annum submitted in August 2013. The primary driver of this softer outlook is the oil price. Although near term price forecasts remain very similar to those expected in August, the longer term outlook is slightly weaker, according to Consensus Economics. This is likely due to easing expectations of worldwide energy demand in an increasingly emissions-aware environment.

6.5 Concrete Prices

Sydney region Concrete, Cement and Sand prices lifted strongly in the early 2000s, on the back of a strong upswing in construction activity. Price growth eventually slowed by 2006/07 as construction activity retreated, but prices remained in the positive territory. Thereafter, price growth hovered around 4 per cent, on average, in the years leading up to 2012/13, as construction activity remained at high levels but with supply adjusting to demand.

Prices are set to ease in 2013/14 as we experience a gap in major projects, before accelerating sharply over the following three years, as Sydney construction activity enters a period of considerable strength. We are forecasting concrete, cement and prices to rise by 5.3 per cent per annum on average over this three year period. As demand tapers out, and activity falls, concrete, cement, and sand prices are expected to follow suit, with growth easing to around 1 per cent per annum between 2017/18 and 2018/19. In the final year of our forecast horizon, 2019/20, prices as expected to edge higher, lifting by around 3 per cent across most products as the next round of non-residential building projects get of the ground, driving total construction activity higher.

Chart 6.5: Concrete, Cement and Sand Prices vs Construction Activity



Overall, concrete prices (in real terms) are forecast to increase by 0.3 per cent per annum in real terms over the five years to 2019/20. Note that this is different to the forecast of an average decline in real terms provided in August 2013. The reason for this is a change in data source. Specifically, we are now using a measure of New South Wales prices, as described above, which has replaced the initially proposed nationwide measure. Using data and drivers specific to New South Wales is likely to more closely relate to the prices faced by Jemena.

6.6 Gas and Fuel Construction Price Index

Table 6.6: Gas and Fuels Forecasts

As at	Construction Wages (WPI)		Manufacturing Wages (WPI)		Steel Pipe and Tube (PPI)		Other Fabricated Metal Products		Plant & Equipment Hire (PPI)		Re-Constructed Index (BIS)		Gas & Fuels IPD (ABS)	
June	Index	a%ch	Index	a%ch	Index	a%ch	Index	a%ch	Index	a%ch	Index	a%ch	Index	a%ch
2003	76.1	3.3	80.1	3.7	89.2	2.1	76.5	2.9	80.9	1.3	82.7	2.5	106.0	2.8
2004	78.9	3.7	82.7	3.2	93.2	4.5	78.0	1.9	84.5	4.5	85.9	3.8	108.7	2.5
2005	83.0	5.2	85.8	3.8	108.6	16.6	81.2	4.1	86.9	2.9	94.0	9.4	117.1	7.7
2006	87.0	4.9	89.2	4.0	112.0	3.1	84.4	4.0	88.0	1.2	97.1	3.3	120.6	3.0
2007	91.3	4.9	92.5	3.7	143.8	28.4	88.3	4.6	90.4	2.7	111.9	15.2	138.2	14.6
2008	95.6	4.7	96.6	4.5	151.2	5.2	91.1	3.2	93.4	3.3	117.0	4.6	144.3	4.5
2009	100.0	4.7	100.0	3.5	150.9	-0.2	102.1	12.0	93.5	0.1	119.7	2.3	149.6	3.6
2010	103.3	3.3	102.4	2.3	132.7	-12.1	101.0	-1.1	94.6	1.2	113.2	-5.4	144.6	-3.3
2011	107.4	4.0	106.2	3.7	104.6	-21.2	100.0	-1.0	98.7	4.3	103.7	-8.5	132.6	-8.3
2012	111.7	4.1	110.2	3.8	100.0	-4.4	100.0	0.0	100.0	1.3	103.3	-0.4	130.6	-1.5
2013	115.5	3.3	113.7	3.2	96.1	-3.9	98.7	-1.3	98.0	-2.0	102.3	-1.0	131.5	0.6
Forecast														
2014	118.8	2.9	117.1	3.0	99.9	4.0	103.3	4.7	96.5	-1.5	105.3	3.0	134.7	2.5
2015	122.4	3.0	121.0	3.3	104.4	4.5	105.6	2.3	95.5	-1.0	108.5	3.0	139.1	3.2
2016	126.8	3.5	125.3	3.6	107.0	2.5	106.5	0.8	93.6	-2.0	110.6	2.0	142.4	2.4
2017	131.7	3.9	130.0	3.8	102.7	-4.0	109.7	3.0	93.6	0.0	110.9	0.2	142.7	0.2
2018	136.8	3.8	134.7	3.6	106.9	4.0	112.4	2.5	93.2	-0.5	114.3	3.1	147.7	3.5
2019	142.1	3.9	139.4	3.5	110.8	3.5	115.8	3.0	94.1	1.0	118.0	3.3	152.6	3.3
2020	148.0	4.1	144.7	3.8	114.5	3.3	119.8	3.5	95.5	1.5	122.0	3.4	157.7	3.4

WPI - Wage Price Index
PPI - Producer Price Index
BIS - BIS Shrapnel
ABS - Australian Bureau of Statistics

Source: ABS Data, BIS Shrapnel

Construction wages to soften from recent levels in line with construction activity

Our research has shown that construction activity (ie work done) normally has a strong influence on construction wages. In addition, wages growth reflects 'spare' supply (latent capacity) among the different construction-related skills types.

Booming construction activity since the 2000/01 economic downturn has been a key driver of construction employment and construction wages. In particular, construction sector WPI wages grew at an average rate of 4.3 per cent per annum over 2003–2013, well above the all industry measure at 3.7 per cent per annum.

Over the next five years, construction sector wages are tipped to enter a phase of weaker growth, averaging 3.4 per cent per annum, which is in line with the all industry measure. Our projections are based on spare capacity developing across the industry as national construction activity declines, specifically engineering construction activity, where workers traditionally earn higher salaries than their non-residential building counterparts. However, wages are expected to recover to around the 4 per cent mark by 2018/19, underpinned by a return to stronger levels of construction activity, with most segments of the industry expected to lift during this period.

Manufacturing wages to remain sluggish as the sector contracts

The manufacturing sector has suffered in recent years from Australia's high cost base (relative to competing countries) and the record strength of the A$. Weakness in the industry has culminated in the closure of manufacturing plants and businesses, and has resulted in wage growth below the all industry measure.

This sluggish growth is likely to continue over the outlook period, with average growth in manufacturing wages of 3.5 per cent. The recent announcements of several significant

closures, particularly in the automobile industry, will create excess capacity in the labour market as workers search for new opportunities, and are willing to accept lower pay increases. Wages growth will increase mildly by the end of the forecast period, to a peak of 3.8 per cent. We cannot see any growth past this level due to what is likely to be the ongoing trend decline of the Australian manufacturing industry.

Steel pipes and tubes prices to begin a recovery after recent declines

Steel pipes and tubing form the largest component of the gas and fuel IPD and can be attributed to 40 per cent of the indices movement. The series is predominantly driven by international steel prices (in A$ terms), and also includes the cost of manufacturing the pipe and tube products. Steel pipes and tubes prices showed phenomenal growth over the years to 2007/08, but have since fallen back by nearly 40 per cent.

However, the run of price declines is now thought to be at an end. The weakening A$ is likely to see steel prices increase steadily over the medium term, and this will be transferred to the cost of producing steel pipes and tubes.

Other fabricated metal products will steadily rise

The gas and fuel IPD also includes non-ferrous piping, which we assume mainly includes copper pipes. Copper prices are expected to increase over the next five years, as discussed in section 6.3. This will lead the non-ferrous pipe component of the gas and fuel IPD to increase through the forecast period.

Plant and equipment hire to help slow growth in overall gas and fuel costs

Plant hire and equipment hire rates move closely in line with construction activity. When activity is booming, leasing companies have greater ability to increase their margins, and vice versa. The weak outlook for nationwide construction activity, as discussed above, will see equipment utilisation rates fall from their current record levels, and leasing companies will be forced to lower their prices and margins in order to attract custom. As a result, we anticipate plant and equipment hire rates either falling or flatlining over the next five years, before a mild recovery over the final two years of the outlook period. This particularly weak outlook means that plant and equipment hire rates will be the weakest component of the gas and fuel engineering IPD over the coming years.

Overall, gas and fuel engineering construction costs are expected to experience moderate growth over the next 7 years, averaging 2.6 per cent per annum. Growth will peak over the near term at 3.2 per cent in 2014/15, driven by rising A$ steel prices, and the flow-through effect to steel pipes and tubes manufacturing. Price growth will then slow until later in the outlook period, when the construction sector begins the next upswing, and drives demand and price growth of key components such as construction wages and plant and equipment hire rates.

6.7 General Materials Prices

The general materials include a range of items used in most businesses and organisations, such as stationary, office furniture, electricity, water, fuel, rent, etc. Across the range of items, the average price increase would be similar to consumer price inflation. Accordingly, the appropriate cost escalator for general materials will be the Consumer Price Index (CPI).

6.8 Conversion to Real Prices

All price forecasts are conducted in nominal terms. These are converted to real prices (ie inflation adjusted prices) using the ‘official’ inflation forecasts, as described in section 3.

6.9 Removal of Carbon Tax

To identify the effects of a removal of the carbon tax, BIS Shrapnel has estimated the carbon component of the various material and commodity costs examined in this report. We have done this by taking the product of carbon emission intensity and the carbon price (controlling for any government assistance).

The carbon emission intensity of each commodity is sourced from the Department of Climate Change.[3] This measures emissions as the tonnes of carbon emitted per $ million revenue. Using our time series price data, we convert this to an emission per tonne of output, and multiply this by the prevailing carbon price to quantify the impact of the carbon tax.

Our analysis suggests that the effects of the carbon tax were negligible for most gas network-related materials, with the carbon tax impact for 2013/14 ranging from 1.7 per cent of the total cost for aluminium, to 0.25 per cent for steel. The insignificance of these declines is largely due to the extensive government assistance provided to trade exposed sectors. Note that this assistance will decline over time. This means that the later the removal of the price on carbon, the larger its effect on prices is expected to be. The impact of the carbon price on each material is shown in table 6.1.

Note that although BIS Shrapnel expects the Government to repeal the carbon tax in the 2014/15 financial year, this is not yet certain. Table 6.7 shows BIS Shrapnel's carbon tax price forecasts, in the event that it is not repealed.

Table 6.7: Carbon Price Forecasts

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	5 yr Avg (c)
	Actuals			Forecasts		Next Regulatory Period					
Nominal Price (A$)											
1. Carbon Price (a)			23.0	24.2	6.2	12.5	18.9	25.4	31.9	38.0	25.3
Consumer Price Index (headline, with Carbon tax) (b)	**3.1**	**2.3**	**2.3**	**2.8**	**2.8**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Real Price (A$)											
1. Carbon Price			**23.0**	23.5	5.9	11.5	17.0	22.3	27.3	31.8	22.0

Source: BIS Shrapnel

(a) Price forecasts in Australian dollars, from Australian Treasury.
(b) Headline CPI forecasts based on Reserve Bank of Australia forecasts to June 2015 quarter and then Commonwealth Treasury medium term projections.
(c) Average Annual Growth Rate for 2015/16 to 2019/20 inclusive ie for next regulatory period.

[3] Department of Climate Change, *Carbon Pollution Reduction Scheme Green Paper*, 2008

APPENDIX A: A NOTE ON DIFFERENT WAGE MEASURES AND BIS SHRAPNEL'S WAGE MODEL

Several different measures of wages growth are referred to in this report, each differing slightly both in terms of their construction and appropriateness for measuring different aspects of labour costs. The following provides a brief summary of the main measures, what they are used for and why.

The main wage measures are:

- Average Weekly Ordinary Time Earnings (AWOTE) — earnings gained from working the standard number of hours per week. It includes agreed base rates of pay, over-award payments, penalty rates and other allowances, commissions and retainers; bonuses and incentive payments (including profit share schemes), leave pay and salary payments made to directors. AWOTE excludes overtime payments, termination payments and other payments not related to the reference period. The AWOTE measures used in this report refer to full-time adult AWOTE, and are sourced from the Australian Bureau of Statistics (ABS) catalogue number 6302.0, with BIS Shrapnel forecasts.
- The Wage Price Index (WPI) — a CPI-style measure of changes in wage and salary costs based on a weighted combination of a surveyed 'basket' of jobs. The WPI used in this report excludes bonuses. The WPI also excludes the effect of changes in the quality or quantity of work performed and most importantly, the compositional effects of shifts within the labour market, such as shifts between sectors and within firms. The WPI figures quoted in this report are sourced from ABS catalogue number 6345.0, with BIS Shrapnel forecasts.

Each measure provides a slightly different gauge of labour costs. However, the main distinction between average earnings measures and the wage price index relate to the influence of compositional shifts in employment. The compositional effects include changes in the distribution of occupations within the same industry and across industries, and the distribution of employment between industries. For example, a large fall in the number of lower paid employees, or in employment in an industry with lower average wages, will increase average weekly earnings (all else being equal). While this is a true reflection of the average cost of labour to businesses, it is not necessarily the best measure of ongoing wage inflation (ie trends in wage-setting behaviour in the labour market). Another compositional problem with using the 'all persons' AWOTE is variations in the proportion of male and female employees (particularly as average female AWOTE is lower than average male AWOTE). However, in practice, the data shows only minor differences in the AWOTE growth rates between male and females (or males and all persons) — between -0.2 and +0.2 per cent — since the 1980s or basically since the equal pay legislation was enacted through the 1970s.

The wage price index was specifically designed to get around these compositional problems. It uses a weighted average of wage inflation across a range of closely specified jobs. As it measures the collective variations in wage *rates* made to the current occupants of the *same* set of specified jobs, the WPI reflects pure price changes, and does not measure variations in quality or quantity of work performed. However, like the CPI (Consumer Price Index), the weights are fixed in a base year, so that the further away from that base and the more the composition of the labour market changes over time, the more 'out of date' the measure becomes.

Importantly, the WPI does not reflect changes in the skill levels of employees within industries or for the overall workforce, and will therefore understate (or overstate) wage inflation if the overall skill levels increase (or decrease). The wage price index is also likely to understate true wage inflationary pressures as it does not capture situations where promotions are given in

order to achieve a higher salary for a given individual, often to retain them in a tight labour market. Average weekly earnings would be boosted by employers promoting employees (with an associated wage increase), but promoting employees to a higher occupation category would not necessarily show up in the wage price index. However, the employer's total wages bill (and unit labour costs) would be higher.

For this reason, BIS Shrapnel prefers using AWOTE as the measure that best reflects the increase in wage cost changes (or unit labour costs ie net of productivity increases) for business and the public sector across the economy. On the other hand, wage price index can be used as a measure of *underlying* wage inflation in the economy.

Description of BIS Shrapnel's wage model

BIS Shrapnel's wage model (for both AWOTE and WPI) is based on the analysis of past and future (expected) wage movements in three discrete segments of the workforce, based on the three main methods of setting pay and working conditions (see tables 3.1 and 3.2):

- Those dependent on awards rely on pay increases given in the annual National Wage case by Fair Work Australia (formerly by the Fair Pay Commission and the Australian Industrial Relations Commission). Most of the wage increases in the National Wage case over the past decade have been given as flat, fixed amount (ie dollar value) increases, rather than as a proportional increase. At the all industries level, 8.1 per cent of all employees (data excludes those in agriculture, forestry and fishing) have their pay rises determined by this method. In the electricity, gas, water and waste services sector, only 2.7 per cent of workers have their pay set by this method.
- Collective agreements negotiated under enterprise bargaining account for 41.9 per cent of all employees, but 67.7 per cent of electricity, gas, water and waste services employees' wage increases are determined by this method.
- The remaining 50 per cent of all industries employees have their pay set by individual arrangements, such as individual contracts or other salary arrangements (including incentive-based schemes), while the proportion for electricity, gas, water and waste services is 30 per cent.

Future movements of forecasts of wage inflation are based on the key influences on the different wage determination mechanisms of each discrete segment ie:

- increases in the Federal Minimum Wage (on which a range of mostly lower paid awards are also based) granted by Fair Work Australia (and by the Fair Pay Commission and the AIRC previously) each year are usually set in relation to recent increases in the CPI and with regard to the wage-setting body's view of both current and short-term future economic conditions. For instance, the $21.66 increase granted by the Fair Pay Commission in its decision in mid-2008 (effective October 2008) amounted to a 4.1 per cent increase for those on the Federal Minimum Wage of $522/week. This reflected the marked acceleration in the CPI in the first half of 2008 (to 4.2 per cent in the March quarter and to 4.5 per cent in the June quarter). It also reflected the strong economic conditions apparent around mid-2008 (the unemployment rate was just over 4 per cent). Conversely, the Fair Pay Commission gave no increase in its July 2009 decision, citing as its reasons, the deterioration of economic conditions and what we believe is a spurious link between minimum wage increases and higher unemployment.
- increases in collective agreements under enterprise bargaining are influenced by a combination of recent CPI increases, inflationary expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook, and

by the industrial relations 'strength' of relevant unions. Because the average duration of agreements now runs for two-to-three years, BIS Shrapnel bases its near-term forecasts on the strength of recent agreements, which have been 'formalised' over recent quarters. Thereafter, collective agreements are based on BIS Shrapnel's macroeconomic forecasts.

- increases in individual agreements are primarily influenced by the strength of the labour market (especially the demand-supply balance of skilled labour), inflationary expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook.

Note in table 3.1, wage increases under 'individual arrangements' are calculated by deduction. Data from DEEWR (Department of Education, Employment and Workforce Relations) are used for wage increases under collective agreements.

The limitation of this methodology is that because individual arrangements are calculated as a residual, all of the compositional effects in terms of AWOTE (ie from more or less lower-paid workers being employed in the relevant year) plus all (or most) of the bonuses and incentives from those under award or collective agreements end up in the individual arrangements residual, which distorts the pay increases in this segment. However, the methodology works well for the WPI, particularly at the all industries level, although some compositional problems occur at the sectoral level, particularly for sectors with a relatively small employment base (such as electricity, gas, water and waste services).

Some Deficiencies in Econometric Models of Wage Determination for the EGW Sector

We believe that BIS Shrapnel's institution-based or bottom-up wage model for the EGWWS sector better approximates the underlying (actual) data generating process than a straight application of
an econometric model. As a result, we strongly believe our model of wage determination for the EGWWS or utilities sector is superior to methodology utilising purely econometric regression techniques, in particular linear regression models to forecast wages. This opinion is based on a number of factors, some of which are described below:

- the evolution of the wage determination system from the 1980s and particularly during the 1990s in the utilities sector means that econometric equations struggle with the changes in the relative importance of different factors influencing wages growth that have occurred over the past two-to-three decades. As such, we believe that an econometric equation would struggle to properly model the present complexity of the wage determination processes in this sector.
- BIS Shrapnel's model of wage determination does take account of the present complexity of the wage determination process, both at the national (all industries) level and at the industry sector level. Our methodology and explanation of the macroeconomic influences are, we believe, clear and transparent. We use small sector mathematical models to derive forecasts for discrete segments, rather than an over-riding, overall macroeconomic model.
- BIS Shrapnel believes the use of univariate or multi-equation time series econometric modelling is not the best method for forecasting wages growth in the utilities sector. This is because many regression equations include lagged dependent variables, and econometric models that include lagged dependant variables tend to miss turning points in the cycle, often producing results we know to be spurious. Indeed, the models performed no better (or worse) than a combination of a large range of 'mini' sectoral models overlaid with our expertise and knowledge of key influences.

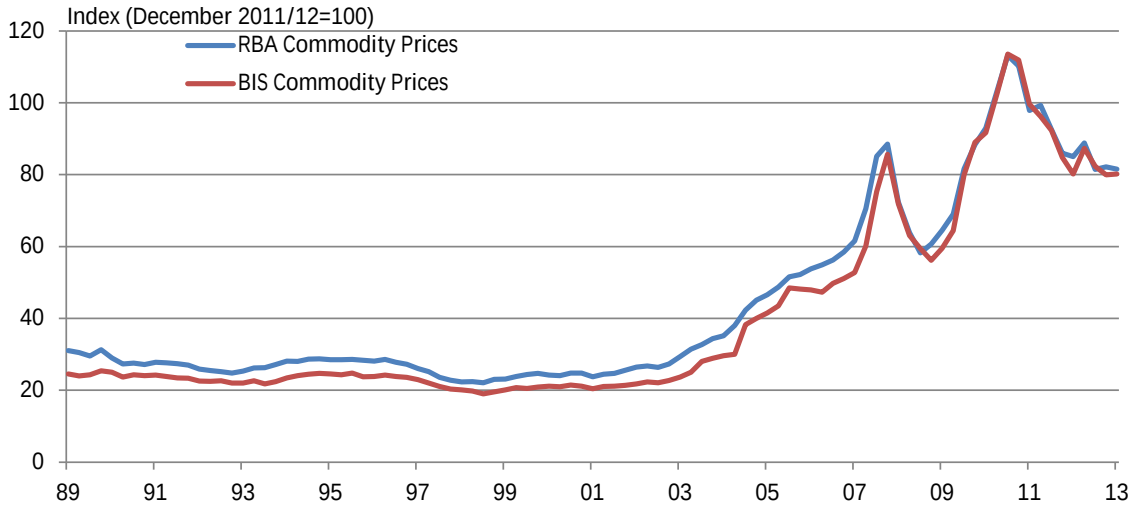
APPENDIX B: EXCHANGE RATE FORECAST METHODOLOGY

BIS Shrapnel's exchange rate forecast is a function of three key drivers:

- Commodity price forecast
- Interest rate differentials between Australia and the US
- 'VIX' volatility index

The commodity price series that we consider is an internal (ie BIS Shrapnel generated) composite commodity price index. This index is a weighted average index of metals and mineral commodity prices and agriculture commodity prices with each commodity price weighted according to the export share of the commodity. Historically, our index closely tracks the RBA's own commodity price index (see accompanying chart). We consider the following metals and minerals in the composite index: LNG and LPG (using the WTI price, US$/bbl), thermal coal (average export price, US$/t), coking coal (average export price, US$/t), aluminium & alumina (London Metals Exchange price, US$/t), copper (LME price, US$/t), gold (US$/oz), iron-ore (average export price US$/t), lead (LME price, US/t), nickel (LME price, US$/t) and zinc (LME price, US$/t). The agriculture commodities included in the composite commodity index include beef (USc/kg), cotton (USc/lb), sugar (USc/lb), wheat (US$/t) and wool (AUDc/kg).

Chart B.1: BIS Shrapnel Commodity Price Index



The quarterly historical data is sourced from the ABARES (Australian Bureau of Agricultural and Resource Economics and Sciences) *Australian Agricultural Commodities* and BREE (Bureau of Resources and Energy Economics) *Resources and Energy Quarterly* and *Australian Mineral Statistics* publications, plus data from the Australian Financial Review.

The other key driver of our exchange rate forecasts is the interest rate differential between Australia and the US interest rates. Here, we take the difference between the 90 day bank bill rate in Australia and the 3-month bank accepted bill rate in the United States. Quarterly historical interest rate data is sourced from the Reserve Bank of Australia.

The final driver is the VIX volatility index. This measures volatility of the US sharemarkets, with the rationale being that a lower level of market volatility increases investor's confidence, and causes them to look outside the US when investing, lowering the US$. This variable has had considerable swings and effects on the exchange rate over time, although when forecasting we assume it returns to its long-term average level, thus reducing the effect on the exchange rate forecast.

Table A1: Exchange Rate Model - Eviews

Dependent Variable: LOG(AUD_USD)
Method: Least Squares
Date: 03/10/14 Time: 14:00
Sample: 1990Q1 2013Q4
Included observations: 96
LOG(AUD_USD)=C(1)+C(2)*_90_DAY_NOM+C(3)*LOG(COMMODITY_PRICES)+C(4)*VIX

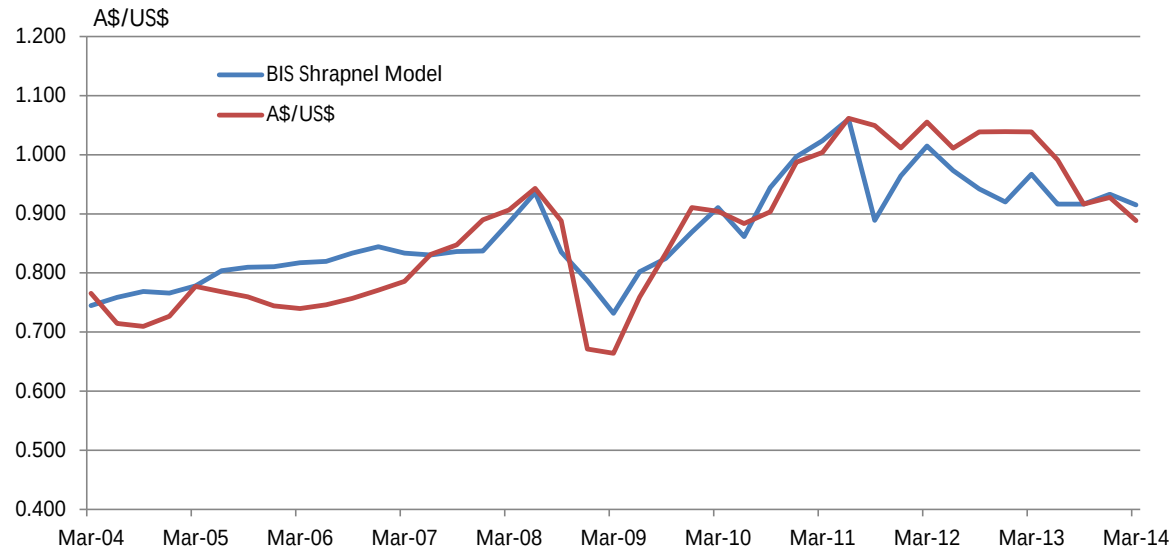
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.210699	0.072530	-16.69232	0.0000
C(2)	0.014862	0.005563	2.671473	0.0089
C(3)	0.279145	0.020127	13.86901	0.0000
C(4)	-0.006428	0.001250	-5.142803	0.0000

R-squared	0.751598	Mean dependent var	-0.291508
Adjusted R-squared	0.743498	S.D. dependent var	0.182816
S.E. of regression	0.092589	Akaike info criterion	-1.880517
Sum squared resid	0.788692	Schwarz criterion	-1.773669
Log likelihood	94.26480	Hannan-Quinn criter.	-1.837327
F-statistic	92.78924	Durbin-Watson stat	0.373012
Prob(F-statistic)	0.000000		

All commodity forecasts are converted into Australian dollars using BIS Shrapnel's in-house methodology as described above. This is used instead of forward exchange rates from the Chicago Mercantile Exchange (CME). There are two primary reasons for this:

- It is difficult to track the historical accuracy of CME futures, also making it difficult to place weight on current expectations.
- BIS Shrapnel's exchange rate model is explicitly included in the report above. It is a simple model, and the resulting forecasts can be readily quantified in terms of the drivers that caused the results. We believe this makes it a more transparent and reproducible forecast than the market-driven CME futures. As shown in chart B.1, the model has a high degree of accuracy, which provides a level of confidence for future forecasts.

Chart B.2: BIS Shrapnel Exchange Rate Model



APPENDIX C: GAS NETWORK RELATED MATERIALS FORECAST METHODOLOGY

Steel, Aluminium, Copper, Zinc and Oil

Steel, Aluminium, Copper, Zinc and Oil price forecasts are derived from the Consensus Economics Energy & Metals Consensus Forecasts publication.

This publication provides price forecasts measured in US$ per metric tonne. Quarterly forecasts are provided for two financial years, followed by calendar year forecasts for the next three years. These are converted into financial years by taking an average of the two relevant calendar year forecasts. For example, the average of the calendar year 2015 and 2016 forecasts becomes the forecast for the 2015/16 financial year. Long term forecasts are provided by a five-year average. We assume a constant growth rate beyond the final annual forecast to yield annual forecasts over the remaining five year period (i.e. for the 2018/19 to 2022/23 period).

These forecasts, which are denominated in US$, are then converted into Australian dollars. Due to the lack of authoritative forecasts over the long term, we apply BIS Shrapnel's internal exchange rate forecasts. Details of our methodology can be found in appendix B.

Brass

It is our understanding that brass is produced from two key inputs – copper and zinc. Forecasts of these commodities are described above. We then weight these forecasts according to research that suggests that brass, although consisting of several types with different weightings, generally uses 60 per cent copper, and 40 per cent zinc in its manufacture.

HDPE (Polyethylene)

To the best of our knowledge, there isn't a long term data series on polyethylene pipe prices that we can model in order to understand its key drivers. Nonetheless, from our discussion with various industry players, we understand that polyethylene is the key input into the production of polyethylene pipes. Our research suggests that the price of polyethylene pipe is driven by three components:

- Polyethylene (75 per cent)
- Manufacturing wages (15 per cent)
- Transport and other overhead costs (10 per cent)

Forecasts for each of these components are provided separately, and when combined, create price forecasts for polyethylene pipe. Transport and other overhead costs are assumed to be in line with by CPI growth, while manufacturing wages are modelling using our in-house methodology.

Because there is not even a historical series of polyethylene prices, we used a Producer Price Index (PPI) published by the US Bureau of Labor Statistics for Thermoplastic Resins and Plastic Materials. As polyethylene is one of the thermoplastic resins, we believe the producer prices for thermoplastic resins and plastic materials are a good proxy for polyethylene prices. We strongly believe that this data series is the best representation of longer term data series that is available to allow for meaningful analysis of polyethylene prices and, by extension, polyethylene pipe prices.

Note that this is different to the AER's previous assertion that the use of a series published by the ABS (SITC Index Number 57, Plastics in Primary forms) *"is likely to provide more reliable information on price changes faced by JGN than the price index used in the revised CEG cost escalator report, which relies on prices of plastics in the United States of America.".*

BIS Shrapnel believes that SITC 57 is not the best measure of polyethylene prices available. This is because SITC 57 is a highly aggregated measure, and includes components as varied as polystyrene and PVC. This means that the measure is unlikely to capture the volatility of sub-components, such as the relevant polyethylene.

Instead, we believe the thermoplastic resin series as described above is the best measure of polyethylene prices. A compound called PE80 is a key component of making polyethylene, and this compound is a thermoplastic resin. As a result of these direct relationships, we believe the measure of US thermoplastic resin prices is the best available proxy of polyethylene prices.

We had previously used econometric modelling to establish a relationship between crude oil prices, and the thermoplastic PPI. However, the AER has rejected all previous attempts to quantify this relationship. To avoid getting bogged down in the econometric details, we believe a better strategy is to simply use the historical correlation between crude oil prices and the thermoplastic PPI.

This correlation, over the past two decades, is 0.76, suggesting a very strong relationship between crude oil and the thermoplastic PPI. We therefore forecast crude oil prices, and apply this correlation to establish thermoplastic price forecasts.

Crude oil prices are derived from Consensus Economic forecasts, and are shown in table 6.3. We note that this is not the same methodology as the AER's currently preferred 'no-change' forecast. We believe that the use of Consensus forecasts is the best forecast available in the circumstances, in the same manner that Consensus forecasts are considered the best available for Steel prices, which are also difficult to predict into the future.

The earliest Consensus Economics forecasts to which we have access is October 2011. At a spot price of US$91.10/barrel, the Consensus forecast for the March 2014 quarter was $98.94. This is particularly close to the realised result of $98.68. This is an increase of over 8 per cent which would not have been allowed for under the AER's 'no change' position. Although this degree of accuracy is unlikely to occur for all given time periods, it highlights that Consensus forecasts have a solid grounding, given the collective expertise of the forecasters involved.

The crude oil price forecasts are converted to forecasts of thermoplastics (as a proxy for polyethylene). This price is then converted into Australian dollars (using BIS Shrapnel's exchange rate forecasts) and combined with out wages and other overhead forecasts, to create forecasts for polyethylene pipe.

Concrete

Historical concrete prices are sourced from the Australian Bureau of Statistics (ABS), publication 6427 Producer Price Indexes, Cement, Concrete and Sand series. This series is used as a proxy for concrete prices because it is available at the State level (i.e. New South Wales). Prices have been steadily rising over the past decade, in line with a particularly strong period in nationwide construction activity, which is a key driver of demand for concrete. Specifically, key industries which support demand for, and therefore prices of concrete include Engineering Construction, Residential Building and Non-Residential Building.

BIS Shrapnel provides detailed forecasts of each of these industries in existing reports[4]. The summation of each of these industries, yielding total construction in Australia, is used as the key driver to forecast future movements in concrete prices. These relationships are shown in chart 6.5.

Gas and Fuel

The gas and fuel engineering construction price deflator measures changes in the construction costs of gas and fuel infrastructure and pipelines as well as other distribution lines. The gas and fuel engineering construction price deflator is measured by the ABS using an input pricing basis where the major components consist of:

- Construction Wages (15 per cent)
- Manufacturing Wages (15 per cent)
- Steel Pipe and Tube (40 per cent)
- Other Fabricated Metal Products (15 per cent)
- Plant and Equipment Hire (15 per cent)

This is one of six unpublished IPD's (obtained under ABS subscription service) which make up the total engineering construction price deflator. Only total Australia IPDs are available for these unpublished IPDs – state breakdowns are unavailable.

These components are regularly forecast individually by BIS Shrapnel, and are summated to recreate and forecast the ABS series. Note that BIS Shrapnel's recreation of the IPD using these components is essentially an input index, whereas the ABS engineering IPD is an output index. The difference between the two likely represents margins along the supply chain, and this is incorporated into the final Gas and Fuel Construction Price Index forecast.

[4] *Engineering Construction in Australia, 2013/14 to 2027/28*, and *Building in Australia, 2013 to 2028*.

APPENDIX D: TERMS OF REFERENCE

To be inserted by Jemena Gas Networks (NSW) Ltd.

APPENDIX E: STATEMENT OF COMPLIANCE WITH EXPERT WITNESS GUIDELINES

I have read the Guidelines for Expert Witnesses in Proceedings of the Federal Court of Australia and confirm that I have made all inquiries that I believe are desirable and appropriate and that no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court.

APPENDIX F: CURRICULUM VITAES OF KEY PERSONNEL

Richard Robinson, B.Comm (Hons),
Senior Economist and Associate Director - Economics

Richard Robinson has been employed with BIS Shrapnel since 1986.

Richard is the company's principal economic forecaster, being largely responsible for the short term economic forecasts presented at BIS Shrapnel's half yearly conferences in March and September. He contributes forecasts and analysis to the regular subscription services, *Economic Outlook* and *Long Term Forecasts*.

Richard regularly analyses and forecasts resources investment and civil engineering construction activity, and production of manufactures, consumer goods and commodities. In this work, he has developed considerable industry expertise in the construction, manufacturing, agriculture, services, commodity and resources sectors of the Australian and state economies.

Richard has also been involved in a wide range of consultancy and private client projects including formulating end-use sector demand models for forecasting product demand, project evaluation studies, cost-benefit analysis, assessments of individual property markets and analysing the consistency of escalators in contracts. Some other projects have included analysing and forecasting freight tonnages; a study of the repair and maintenance market; the preparation of economic arguments for the National Wage Case for a private industry group; regular analysis and detailed short and long term forecasts of economic variables in a number of overseas countries; and contributing discussion papers to CEDA (Committee for Economic Development of Australia).

Kishti Sen, B.A., M.Ec. (Hons), Ph.D.
Senior Economist

Kishti works across both the Economics and Infrastructure and Mining units at BIS Shrapnel. As a senior economist, Kishti contributes to the formulation of BIS Shrapnel's economic forecasts, at the Australia, State, and industry level. In addition, he is a contributing author for BIS Shrapnel's subscriptions services including Economic Outlook, Long Term Forecasts and Engineering Construction in Australia.

As a consulting economist, Kishti has advised blue-chip clients in the Mining, Construction and Utilities industries, investment banks, private equity firms, industry associations and trade unions.

Prior to joining BIS Shrapnel, Kishti worked as a Senior Economist at the Reserve Bank of Fiji where he managed the Policy and Research Team. He was also a senior member of Bank's monetary policy advisory committees. Kishti holds a PhD in Economics from the University of Sydney and has special interest in labour economics, cost escalation, benefit-cost assessments and econometric modelling.

Daniel Gradwell, B.Com (Hons, Economics)
Economic Analyst

Daniel joined BIS Shrapnel in 2010, where he works across both the Economics and Infrastructure and Mining units. Since joining the company, Daniel has worked on a number of projects, including contributing the analysis of consumer demand in the Economic department's recent *Long Term Forecasts* report, forecasting maintenance expenditure for the Electricity Supply and Gas Pipelines sector for the forthcoming Maintenance in Australia 2012 report, analysis and forecasts to the Engineering Construction in Australia, Road Construction

in Australia and Road Maintenance in Australia publications. Daniel has also assisted in the preparation of several cost escalation reports for private clients.

Daniel achieved First Class Honours in Economics at the University of Otago, New Zealand.

Husam El-Tarifi, B.Ec (Hons)
Research Assistant

Husam joined BIS Shrapnel in 2013 after obtaining his Bachelors Degree in Economics with Honours. He works across both the Infrastructure and Mining and the Economics units where he contributes to a number of reports and private client studies.