

RIN09

Cost escalation report



Real Cost Escalation Forecasts to 2023/24

> September • 2017

> Ausgrid

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30 September 2017

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To discuss the report further please contact:

Dr Kishti Sen

ksen@bisoxfordeconomics.com.au

BIS Oxford Economics Pty Limited
Level 8, 99 Walker Street
North Sydney NSW 2060
Australia
Tel. +61 (0)2 8458 4200

TABLE OF CONTENTS

Executive summary.....	1
1. Introduction	4
2. Macroeconomic overview: Australia and new south wales.....	6
2.1 Australian economic overview and outlook.....	6
2.2 New South Wales: current state of play and outlook	9
3. Inflation and wage forecasts	13
3.1 CPI inflation: current conditions and forecasts	13
3.2 Wages outlook	16
4. Expected wage changes for the EGWWS industry	23
4.1 Strong union presence in the utilities sector will ensure collective agreements remain above the all industry average.....	23
4.2 Demand for skilled labour also a key driver of utilities wages	24
4.3 Computer System Design and Related Services wage forecasts	26
5. Materials cost forecasts	32
5.1 Aluminium, copper and oil commodities	32
6. Land value forecasts.....	43
6.1 Historical movements in land values	43
6.2 Forecasts of land values	44
7. Appendix A: Terms of reference	51
8. Appendix B: Statement of compliance with expert witness guidelines.....	52
9. Appendix C: Curriculum Vitaes of Key Personnel	53

EXECUTIVE SUMMARY

On 29 May 2017, BIS Oxford Economics was engaged by Ausgrid to provide price forecasts of labour, materials, construction costs and land relevant to electricity distribution networks in New South Wales. Forecasts of wages will be used by Ausgrid to develop the real price changes over its upcoming regulatory period, which, in turn, will be used by the business to construct its operating expenditure forecasts. Forecasts of price escalation factors for material costs, which are key inputs to various asset classes, construction costs and land values will be used by Ausgrid to develop its forecast capital expenditure over the next regulatory period. Both capex and opex forecasts will be included in Ausgrid's revenue proposal to the AER in January 2018.

Although Ausgrid's next revenue proposal covers the five-year period from 2019/20 to 2023/24 (inclusive), BIS Oxford Economics was asked to provide eight year forecasts covering financial years 2016/17 to 2023/24 to allow for escalation over the full outlook period. Forecasts of both nominal and real price growth of the relevant inputs were provided. Our forecasts are summarised in Fig.1, Fig 2 and Fig. 3.

+3.9%

Expected wage increases for employees in the utilities industry

BIS Oxford Economics expects total wage costs for the Australian Electricity, Gas, Water and Waste Services (EGWWS or 'Utilities) sector — expressed in Wage Price Index — will average 3.9% per annum over the five years to 2023/24, 0.6% higher than the national 'All Industries' average of 3.3% p.a. over the same five-year period.

Utilities wages are forecast to increase by more than the national average because of the following factors:

- 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.
- strong union presence in the utilities sector will ensure outcomes for collective agreements, which cover around 70% of the workforce, remain above the wage increases for the national 'all industry' average.
- increases in individual agreements (or non-EBA wages) are expected to strengthen from current weakness as broadly based economic recovery takes a foothold from early next decade.
- demand for (tight) skilled labour as investment in the sector picks up from late this decade will also be a key driver of wages going forward.
- 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. 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.

New South Wales is Australia's largest state economy. As a result, wage increases in New South Wales tends to track the Australian wage cycle fairly closely. That said, state wage increases can differ from the Australian average

if the state's utilities sector is undertaking a larger volume of work (relative to the national average). In addition, state industry wages can grow faster than the national average if it faces stronger competition from related industries such as the construction sector which employ similarly skilled labour.

BIS Oxford Economics is forecasting wages in the NSW utilities sector to dip below the national average over 2017/18 before converging to and then surpassing the national average early next decade as utilities investment picks up in the state. Overall, we expect wage increases in the NSW EGWWS sector to average 3.9% p.a. over the five years to 2023/24 (i.e. the same as the national average).

Of all the material escalators forecast, only steel beams and sections and hardwood log prices are expected to grow faster than the CPI inflation over Ausgrid's upcoming regulatory period.

Fig. 1. Expected Labour Price Changes for Australia and New South Wales

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

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average (g)
NOMINAL LABOUR PRICE CHANGES	Actuals						Forecasts		Next Regulatory Period					
New South Wales Wage Inflation														
(1) All Industries														
Average Weekly Earnings (a)	2.9	4.8	2.4	2.1	3.9	1.3	2.6	2.9	3.0	3.7	4.3	4.0	3.7	3.8
Average Weekly Ordinary Time Earnings (b)	3.1	4.3	2.6	4.3	2.3	0.6	2.8	3.5	3.1	3.7	4.3	4.3	3.9	3.9
Wage Price Index (c)	3.6	3.1	2.5	2.3	2.1	2.1	2.5	2.6	2.5	3.2	3.5	3.6	3.3	3.2
(2) Electricity, Gas, Water and Waste Services Wages														
Wage Price Index (c)	3.2	3.7	3.0	3.0	1.3	1.3	2.5	3.2	3.4	3.9	4.2	4.2	3.8	3.9
Australian Wage Inflation (d)														
(1) All Industries														
Average Weekly Earnings	4.1	4.3	2.7	1.3	1.7	1.6	2.6	2.8	3.0	3.8	4.5	4.1	3.6	3.8
Average Weekly Ordinary Time Earnings	4.3	4.6	3.0	2.4	1.9	2.0	2.6	3.4	3.3	3.9	4.5	4.4	3.8	4.0
Wage Price Index	3.6	3.3	2.6	2.4	2.1	2.0	2.3	2.6	2.6	3.3	3.7	3.8	3.4	3.3
(2) Computer System Design and Related Services	1.1	7.7	-2.9	4.9	2.4	2.2	2.5	2.7	3.1	3.9	4.6	4.4	4.1	4.0
(3) Electricity, Gas, Water and Waste Services Wages														
Wage Price Index	3.5	4.2	3.2	2.8	2.4	2.2	2.6	3.2	3.3	3.8	4.1	4.2	3.9	3.9
Consumer Price Index (headline) (e)	2.3	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5	2.3
REAL LABOUR PRICE CHANGES (f)														
New South Wales Wage Inflation														
(1) All Industries														
Average Weekly Earnings	0.6	2.5	-0.3	0.4	2.5	-0.4	0.6	0.7	0.5	1.2	1.8	1.5	1.2	1.4
Average Weekly Ordinary Time Earnings	0.8	2.0	-0.1	2.6	1.0	-1.1	0.8	1.2	0.6	1.2	1.8	1.8	1.4	1.5
Wage Price Index	1.3	0.8	-0.2	0.6	0.7	0.4	0.5	0.3	0.0	0.7	1.0	1.1	0.8	0.9
(2) Electricity, Gas, Water and Waste Services Wages														
Wage Price Index	0.9	1.4	0.3	1.3	0.0	-0.4	0.5	0.9	0.9	1.4	1.7	1.7	1.3	1.6
Australian Wage Inflation														
(1) All Industries														
Average Weekly Earnings	1.8	2.0	0.0	-0.4	0.3	-0.1	0.7	0.5	0.5	1.3	2.0	1.6	1.1	1.5
Average Weekly Ordinary Time Earnings	2.0	2.3	0.3	0.7	0.5	0.3	0.7	1.2	0.8	1.4	2.0	1.9	1.3	1.7
Wage Price Index	1.3	1.0	-0.1	0.7	0.7	0.2	0.4	0.3	0.1	0.8	1.2	1.3	0.9	1.0
(2) Computer System Design and Related Services	-1.2	5.4	-5.6	3.1	1.0	0.5	0.5	0.5	0.6	1.4	2.1	1.9	1.6	1.7
(3) Electricity, Gas, Water and Waste Services Wages														
Wage Price Index	1.2	1.9	0.4	1.1	1.0	0.5	0.6	0.9	0.8	1.3	1.6	1.7	1.4	1.5

Source: BIS Oxford Economics, Department of Employment, RBA, ABS Data

- (a) Total Average Weekly Earnings (AWE) for adult persons (i.e. for both full-time and part-time employees). Includes overtime earnings but excludes bonus payments. It is derived by dividing weekly total earnings of all adult employees by number of employees. It is not a strict wage inflation measure but a long historical series allows for the calculation of how employee earnings has changed over time.
- (b) Average Weekly Ordinary Time Earnings for full-time adult persons is AWEs minus over-time earnings. However, bonuses are included.
- (c) Wage price index for total hourly rates of pay excluding bonuses. This is the only series published by the ABS at the state by industry level. It measures quarterly change in combined ordinary time and overtime hourly rates of pay.
- (d) Australian wages provided for comparison.
- (e) Reserve Bank of Australia forecasts to June 2019. Beyond that, we have used the mid-point of the Reserve Bank's 2 to 3 per cent inflation target range as preferred by the AER in their recent revenue determinations.
- (f) Real price changes are calculated by deducting the inflation rate from nominal price changes.
- (g) Expected average wage change for Ausgrid's next revenue determination period i.e. from 2019/20 to 2023/24 inclusive. Average inflation is calculated as a geometric mean of Reserve Bank's inflation forecasts for the next two years and assuming an inflation of 2.5% (the mid-point of the bank's 2 to 3 per cent inflation target) for the next eight years. This methodology has been adopted by the AER in their recent revenue determinations.

Fig. 2. Land Value Forecasts

(Per cent change, as at June)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average (b)
NOMINAL PRICE CHANGES (a)	Actuals					Estimates			Forecasts		Next Revenue Determination Period					
Suburban	9.8	3.3	-0.5	3.5	16.6	13.7	15.9	12.8	8.8	5.3	5.8	6.6	7.4	8.0	6.5	6.7
Industrial	-3.7	-2.5	-2.7	-3.2	8.8	13.9	6.9	6.4	3.7	3.9	4.3	4.1	3.2	2.4	2.2	3.1
CBD	9.8	2.8	4.0	0.1	10.1	4.6	7.9	11.2	10.2	9.2	8.7	7.1	3.3	1.0	0.4	3.9
Consumer Price Index (headline - RBA Forecasts)	2.3	3.1	2.3	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5	2.3
REAL PRICE CHANGES																
Suburban	7.4	0.2	-2.8	1.3	13.9	12.0	14.5	11.1	6.9	3.1	3.3	4.1	4.9	5.5	4.0	4.4
Industrial	-6.1	-5.6	-5.0	-5.5	6.1	12.2	5.5	4.7	1.7	1.7	1.8	1.6	0.7	-0.1	-0.3	0.7
CBD	7.5	-0.3	1.7	-2.2	7.4	2.9	6.5	9.5	8.2	7.0	6.2	4.6	0.8	-1.5	-2.1	1.6

Source: BIS Oxford Economics, Valuer General of NSW, RBA, ABS data

(a) Nominal price changes are calculated by adding the inflation rate to real price changes.

(b) Average for the next revenue determination period i.e. from 2019/20 to 2023/24 inclusive.

However, average increase in headline CPI is calculated as a geometric mean of two-year Reserve Bank forecasts and a 2.5% per annum inflation for the next eight years. This method has been used by the Australian Energy Regulator in their recent revenue determinations.

Fig. 3. Material Cost Escalators

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average (2)
NOMINAL PRICE CHANGES	Actuals						Forecasts		Next Regulatory Period					
Aluminium (1)	-12.9	-10.1	1.8	16.9	-5.6	10.9	3.9	5.1	-1.6	0.7	0.5	0.8	9.7	2.0
Copper (1)	-9.4	-5.9	2.2	-0.3	-11.3	6.2	3.7	7.4	2.3	2.0	-1.8	-1.3	7.5	1.7
Oil (Brent) (1)	10.5	-1.4	12.5	-25.8	-32.3	11.2	9.7	8.4	3.3	2.5	-1.7	-1.3	7.6	2.1
Steel beams and sections PPI	1.6	2.2	-4.7	4.1	0.1	4.4	2.4	-0.5	0.0	3.7	5.5	5.8	3.7	3.7
Concrete, cement and sand - Sydney PPI	6.2	4.2	1.7	2.8	3.6	2.5	7.6	3.5	-0.7	1.0	1.4	1.4	0.5	0.7
Hardwood Log Prices (1)	3.9	2.3	1.3	-1.4	3.1	1.3	3.1	2.7	2.1	2.9	2.9	2.8	2.8	2.7
Electric cable and wire manu PPI	7.6	-3.2	-2.9	-5.5	-6.4	10.7	0.3	1.9	-0.7	-0.2	-1.6	-1.3	2.6	-0.2
Communication equipment manu PPI	4.2	9.9	4.8	5.4	5.4	0.2	0.5	2.9	1.5	2.1	2.1	2.3	3.8	2.4
Electrical switches, relays, etc. IPD (1)	3.1	1.4	9.0	-0.5	2.7	-3.0	-1.7	1.0	-1.4	-1.5	-2.4	-2.2	1.2	-1.2
Software IPD (1)	-3.8	-3.9	-4.6	-4.4	-4.5	-5.1	-4.0	-2.8	-4.0	-4.6	-4.7	-3.5	-2.5	-3.9
Electrical equipment manufacturing PPI	2.0	-3.0	-0.8	-4.0	1.0	3.9	0.0	0.9	0.0	0.7	0.6	0.7	1.8	0.8
Non-hydro electricity construction IPD (1)	3.2	2.5	2.0	-0.2	1.6	3.8	1.0	1.7	0.7	1.6	1.1	1.3	2.7	1.5
Non Residential Building Work Done IPD (1)	1.8	0.1	1.1	2.6	3.0	3.8	4.8	3.9	2.7	2.8	3.3	3.3	3.0	3.0
Consumer Price Index (headline) (3)	2.3	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5	2.5
REAL PRICE CHANGES														
Aluminium (1)	-14.8	-12.1	-0.9	15.0	-6.9	9.1	1.9	2.8	-4.0	-1.8	-2.0	-1.6	7.0	-0.5
Copper (1)	-11.5	-8.0	-0.5	-2.0	-12.5	4.4	1.7	5.1	-0.2	-0.5	-4.2	-3.7	4.9	-0.7
Oil (Brent) (1)	8.1	-3.6	9.5	-27.1	-33.2	9.4	7.6	6.1	0.8	0.0	-4.1	-3.7	4.9	-0.4
Steel beams and sections PPI	-0.7	-0.1	-7.3	2.3	-1.2	2.7	0.4	-2.7	-2.4	1.2	2.9	3.2	1.2	1.2
Concrete, cement and sand - Sydney PPI	3.9	1.9	-1.0	1.1	2.2	0.8	5.5	1.2	-3.1	-1.5	-1.1	-1.0	-1.9	-1.7
Hardwood Log Prices (1)	1.5	0.1	-1.4	-3.1	1.7	-0.4	1.1	0.5	-0.4	0.4	0.4	0.3	0.3	0.2
Electric cable and wire manu PPI	5.2	-5.4	-5.5	-7.1	-7.7	8.8	-1.6	-0.4	-3.1	-2.6	-4.0	-3.7	0.1	-2.7
Communication equipment manu PPI	1.9	7.4	2.1	3.7	4.0	-1.5	-1.4	0.7	-1.0	-0.4	-0.4	-0.2	1.3	-0.1
Electrical switches, relays, etc. IPD (1)	0.8	-0.9	6.1	-2.2	1.3	-4.6	-3.6	-1.2	-3.8	-3.9	-4.8	-4.6	-1.2	-3.7
Software IPD (1)	-6.0	-6.0	-7.2	-6.0	-5.8	-6.7	-5.9	-5.0	-6.3	-6.9	-7.0	-5.9	-4.9	-6.2
Electrical equipment manufacturing PPI	-0.3	-5.1	-3.4	-5.6	-0.4	2.1	-2.0	-1.3	-2.4	-1.7	-1.9	-1.7	-0.7	-1.7
Non-hydro electricity construction IPD (1)	0.8	0.2	-0.7	-1.9	0.2	2.0	-0.9	-0.5	-1.8	-0.9	-1.3	-1.2	0.2	-1.0
Non Residential Building Work Done IPD (1)	-0.5	-2.1	-1.6	0.8	1.6	2.1	2.8	1.6	0.2	0.3	0.8	0.7	0.5	0.5

Source: BIS Oxford Economics, RBA, ABARES, LME, ABS Data

(1) 2017 values are estimates

(2) Expected average wage change for Ausgrid's next revenue determination period i.e. from 2019/20 to 2023/24 inclusive.

(3) Reserve Bank of Australia forecasts to June 2019. Beyond that, we have used the mid-point of the Reserve Bank's 2 to 3 per cent inflation target range as preferred by the AER in their recent revenue determinations.

1. INTRODUCTION

*Project background,
motivation and research
agenda*

On 29 May 2017, BIS Oxford Economics was engaged by Ausgrid to provide price forecasts of labour, materials, construction costs and land relevant to electricity distribution networks in New South Wales. Forecasts of wages will be used by Ausgrid to develop the real price changes over its upcoming regulatory period, which, in turn, will be used by the business to construct its operating expenditure forecasts. Forecasts of price escalation factors for material costs, which are key inputs to various asset classes, construction costs and land values will be used by Ausgrid to develop its forecast capital expenditure over the next regulatory period. Both capex and opex forecasts will be included in Ausgrid's revenue proposal to the AER in January 2018.

Although Ausgrid's next revenue proposal covers the five-year period from 2019/20 to 2023/24 (inclusive), BIS Oxford Economics was asked to provide eight year forecasts covering financial years 2016/17 to 2023/24 to allow for escalation over the full outlook period. Forecasts of both nominal and real price growth of the relevant inputs were provided.

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 B. I have been assisted in the preparation of this report by Richard Robinson, Associate Director Economics at BIS Oxford Economics, Husam El-Tarifi (Economist) and Stella McMullen (Research Analyst) at BIS Oxford Economics. Curriculum vitas of all relevant personnel are attached in Appendix C. Notwithstanding the assistance from the other two economists, the opinions in this report are my own and I take full responsibility for them.

The Australian Bureau of Statistics 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 Fig.4 and Fig. 5. The most recent wages data is for the June 2017 quarter and the latest industry employment data is for the month of May 2017. The March 2016 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 Fig. 4. The detailed engineering construction data (by state and by category) have data up to March 2017 quarter. The latest data for Gross State Product and real gross value added for state industry sectors was 2015/16. Other inflation and interest rate data were sourced from the Reserve Bank of Australia while data and information concerning enterprise agreements were obtained from the Department of Employment.

Forecasts of the economic variables in this report were mostly sourced from BIS Oxford Economics reports, including *Economic Outlook, Long Term Forecasts: 2017 – 2032, Engineering Construction: 2016/17 to 2031/32* and *Long Term Building Work Done Forecasts*, along with other unpublished forecasts and from BIS Oxford Economics internal research and modelling.

Structure of the report

The previous Summary section presents an overview of the outlook for the labour, materials, land and construction costs including numerical forecasts which are presented in summary tables.

Section 2 provides a macroeconomic outlook for Australia and New South Wales. This section also has forecasts of key economic variables plus a discussion of the drivers and logic underpinning the forecasts. Section 2 essentially provides a context for our Australian wage forecasts including wage forecasts by state and by industry.

Section 3 discusses BIS Oxford Economics' model of wage determinations and provides forecasts of national ('all industries') wages and CPI inflation. This section also includes the Reserve Bank of Australia projections of CPI inflation which is used to deflate the nominal wage, land, materials and construction price forecasts included in this report.

Section 4 has wage forecasts for the Electricity, Gas, Water and Waste Services (EGWWS) sector at the Australia level and for New South Wales as measured by the WPI (wage price index).

Section 5 presents material price forecasts relevant to electricity distribution networks.

Section 6 provides expected price movements of land differentiated by suburban, industrial and Sydney CBD.

Appendices, which includes CVS of project key personnel.

2. MACROECONOMIC OVERVIEW: AUSTRALIA AND NEW SOUTH WALES

2.1 AUSTRALIAN ECONOMIC OVERVIEW AND OUTLOOK

Offsetting investment cycles and slow structural change are keeping the economy soft

This is not a steady state economy. Hence the patchy quarterly growth figures which are symptomatic of our soft economy. It'll be like this through the end of the decade before non-mining business investment builds momentum sufficiently to drive stronger growth.

The structural change being underwritten by the lower dollar is just beginning. Rebuilding growth and investment in the dollar-exposed industries, and the subsequent broadening through the non-mining economy, will take time.

This is a reversal of the structural change during the mining boom when the rise in the Australian dollar (to well above parity with the US dollar) drove activity towards industries and regions servicing high levels of mining investment at the expense of non-mining dollar-exposed industries, incidentally making room for the mining boom.

Structural change is slow

Structural change is in any case a slow process. The driving force will be the improved competitiveness associated with a lower dollar.

The dollar is barely low enough to underwrite structural change in some sectors. It would be faster and broader if the dollar were lower. The lower the dollar, the faster the change.

Our behavioural modelling suggests a dollar in a range around \$0.75US on current commodity prices and interest rate differentials. That leaves the dollar a little too high for our liking, crimping growth in dollar-exposed industries. Our estimate is a broad competitiveness range of \$0.60-\$0.72 US.

Even so, we've seen significant recoveries in dollar-exposed industries, particularly tourism and education services. And this is just the beginning. But they're only now starting the investment phase, let alone initiating a broadening of growth through the rest of the economy. Other dollar-exposed industries will benefit, including agriculture, finance and business services, mining and even manufacturing, particularly secondary processing of food. But with the A\$ above US75 cents (or US80 cents recently), it is still too high, hampering competitiveness and growth.

There is progress, but it's slow.

Offsetting investment cycles means investment is flat

Events have moved on, but the basic cyclical drivers in the Australian economy remain intact. To put the current state of play into perspective, we need to recognise that this is not a steady-state economy. The last 15 years have been an unusual period with major structural changes and cyclical shifts, punctuated by the global financial crisis. Just as we are nearing the end of the negative impact of the fall in mining investment, and as infrastructure expenditure and non-dwelling building are picking up pace, the residential boom is coming to an end with construction now starting to fall. Even after eight years, we still haven't recovered from the shock of the GFC. Non-mining business investment has

started to pick up, but it remains patchy. It will need a switch in business psychology to investing for growth before it picks up momentum.

- The mining boom provided a significant boost to growth, initially through the strength of mining investment with a large flow on to the rest of the economy, and later, as capacity came on stream, through the strength of mining production and exports. The end of the mining investment boom came as supply caught up to demand, reversing the investment driver and initiating the current fall in mining investment. The associated fall in the dollar is again underwriting structural change, this time a reversal of the change during the mining boom.
- We are now almost through the fall in mining investment. Equipment investment has stabilised. And we are 85% through a forecast fall of 76% from the peak in mining-related construction. (That excludes aluminium smelters and heavy industry, but includes private harbours, rail and pipelines). It still leaves a negative shock over the next two years as mining construction falls by another 31% from current (lower) levels.
- Public infrastructure investment is two years into a four-year recovery followed by a plateau in spending.
- Non-residential building will be picking up over the next few years, albeit moderately, both in the public and private sectors.
- However, after a strong boom, residential building is on the threshold of a substantial decline. Intervention by APRA and the banks have taken the head off the boom - otherwise it would have gone stronger and longer with a more severe downturn to follow. That has helped to contain the damage of oversupply. Accordingly, we expect a soft landing for the housing market. Nevertheless, we expect the number of commencements to fall by a third and work done on new dwellings to fall by 22% over the next three years, with the consequent impact on growth more than offsetting the improvement in infrastructure and non-residential building.
- The GFC provided a significant shock to the economy, switching business logic away from growth and towards cutting costs and containing non-essential expenditure, with consequent impacts on business investment.
- Non-mining business investment has started to pick up. But it's patchy, with premature surges of investment in bulky goods retail, offices and capital city hotels followed by corrections. Non-mining growth and profits remain weak, impeding the recovery in non-mining business investment. We need an improvement in demand, profits and tighter capacity utilisation to drive a switch in business psychology and for non-mining business investment to pick up momentum sufficiently to be a primary driver of growth.

**Minimal risk
of recession**

The net effect is that construction will still be falling beyond the end of the fall in mining investment. And falling residential building will keep the economy contained for several years yet.

The negative shock to GDP growth from falling mining investment has been offset by:

- Strongly increasing mining production and exports. Fortunately for Australia, much of the mining investment boom increased capacity in high-quality low-cost reserves with demand continuing to increase as capacity came on stream, albeit at lower prices, putting a floor under growth and boosting the balance of payments. Unfortunately, mining production has little flow-on to the rest of the economy, leaving many industries and regions weaker than the aggregate GDP figures suggest. Growth in mining production remains strong, continuing to underpin GDP through this weak period.
- While subdued, private consumption expenditure has continued to underpin growth. Weak wage inflation and household income have constrained expenditure growth. But households are spending more of what they earn (reducing the savings ratio) to maintain expenditure.

The upshot is that the soft growth we've seen in the aftermath of the mining boom will continue for several years yet. Accordingly,

- The labour market is a lot weaker than the unemployment figures suggest with underemployment at historical highs. That's why wages growth remains so weak, constraining household disposable income and hence expenditure and retail sales growth.
- We expect a soft landing for residential property. But the forecast fall in housing construction over the next three years will impact on the economy.
- Inflation remains contained and won't be a problem until next decade.

Overseas, conditions are improving. The US economy remains solid. Europe is recovering after its rolling recessions. The Chinese economy continues to grow, albeit with structural change. We won't have another global financial crisis while ever we remember the last one.

The sea change in the direction of interest rates has been effectively confirmed. The long phase of falling and then low rates post-GFC has given way to a phase of rising rates, with implications for the economy and investment markets.

- The US Fed has come through the first two hesitant cash rate rises with two more rate rises confirming the phase of rising rates.
- That will underpin bond rate rises in the US, flowing on to Australia.
- But the buffer between Australian and US cash rates means that the RBA can set cash rates on domestic policy considerations.

We expect RBA cash rates to stay at current levels until 2020, particularly since housing rates have already risen as banks have (thoughtfully) expanded their margins on housing loans.

Economic recovery will be a long slow process.

Our forecast is that GDP growth will remain below 3% for another three years, until non-mining business investment gains sufficient momentum to become a primary driver of growth. Indeed, the expected synchronisation of investment cycles in the early 2020s will see growth lift to 3.4% in 2021/22.

Structural change and cyclical shifts mean significant industry and regional differences in the performance of different parts of the economy.

Fig. 4. Australia – Key Economic Indicators, Financial Years

Year Ended June						Forecasts						
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Private Investment												
– Dwellings	-1.2	4.8	7.8	10.5	1.6	-1.3	-8.3	-4.5	2.6	5.6	1.2	-3.8
– New Non-Dwelling Construction (+)	10.0	0.0	-12.3	-15.5	-12.4	-4.8	-0.7	0.0	4.2	7.4	3.8	-6.6
– New Non-Dwelling Building (+)	6.7	3.3	5.1	0.1	-5.9	8.7	7.5	0.5	2.9	6.7	1.1	-7.7
– New Engineering Construction (+)	11.5	-1.3	-19.5	-24.1	-17.2	-15.8	-9.3	-0.5	5.8	8.3	7.1	-5.4
Total New Private Investment (+)	4.0	-0.8	-2.1	-4.6	-2.1	-0.5	-1.9	3.2	8.0	7.8	1.4	-2.7
New Public Investment (+)	-3.5	-4.0	-7.4	5.5	8.7	7.7	2.7	0.1	-0.1	2.5	2.8	2.5
Gross National Expenditure (GNE)	1.5	1.0	1.3	1.4	2.1	2.1	1.5	2.9	3.9	4.2	2.5	1.5
GDP	2.6	2.6	2.4	2.7	1.9	2.5	2.3	2.9	2.9	3.4	2.9	2.4
Inflation and Wages												
CPI (Yr Avg)- RBA forecasts (*)	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5
Wage Price Index (Jun on Jun)**	2.9	2.6	2.3	2.1	1.9	2.5	2.6	2.7	3.5	3.7	3.8	3.3
Wage Price Index (Yr Avg)**	3.3	2.6	2.4	2.1	2.0	2.3	2.6	2.6	3.3	3.7	3.8	3.3
Average Weekly Earnings (Yr Avg) ^(A)	4.6	3.0	2.4	1.9	2.0	2.6	3.4	3.3	4.1	4.7	4.8	4.1
Employment												
– Employment Growth (Yr Avg)	1.2	0.5	1.2	2.2	1.4	2.3	0.9	1.1	1.8	2.2	1.4	0.9
– Employment Growth (May on May) (%)	0.8	0.5	1.9	1.7	2.0	1.5	0.8	1.3	2.1	2.0	1.0	1.0
– Unemployment Rate (May) (%)	5.6	5.9	5.9	5.6	5.4	5.9	6.0	5.8	5.2	4.8	5.1	5.2
Labour Productivity Growth												
– Total	1.3	2.1	1.2	0.5	0.6	0.2	1.4	1.8	1.0	1.2	1.6	1.4
– Non-farm	1.4	2.1	1.3	0.7	0.2	0.4	1.4	1.8	1.0	1.3	1.6	1.4

Source: BIS Oxford Economics, 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 December 2018 quarter. Beyond this, we've used the mid-point of Reserve Bank's 2 to 3 per cent inflation target range.

** Based on Ordinary Time Hourly Rates of Pay Excluding Bonuses.

^A Average Weekly Ordinary Time Earnings for Full-Time Adult Persons.

e: estimate

In the medium to longer term, we expect a resumption of reasonably strong population growth to underwrite a higher growth rate in the Australian economy.

Over the next 20 years, implementation of technical advances associated with integration of advances in computing, communications and robotics will cause considerable disruption, improving productivity but providing challenges to the redeployment of displaced workers.

But in the near term, for businesses operating in this overall slow growth context, there are opportunities, but also risks. There is no choice but to carefully navigate our way through a cyclical and structurally changing environment.

2.2 NEW SOUTH WALES: CURRENT STATE OF PLAY AND OUTLOOK

After lagging the national economy over much of the past two decades, New South Wales' economic growth is now running ahead of the national average. The state is benefitting from improved competitiveness – due to a significantly lower A\$ – which is boosting domestic trade exposed industries via increased exports and import substitution. This, in turn, has supported increased business investment, strong employment growth and household consumption expenditure. Combined with record home building and strong growth in government expenditure in the state, these have seen New South Wales skip past the national average in terms of economic performance.

Australia's largest state economy has a number of positive economic drivers

Gross State Product (GSP) growth was 2.6% in 2014/15, 0.2 percentage points higher than Australian Gross Domestic Product (GDP) growth. GSP growth accelerated to 3.5% in 2015/16, 0.8% above Australian GDP growth. Meanwhile, State Final Demand (SFD) has been growing strongly, increasing 3.4% and 4.4% in 2014/15 and 2015/16 respectively, around 2-3% higher than Australian Domestic Demand growth in both years. This outperformance continued into 2016/17, with SFD increasing 3.3% compared to 1.9% for Australian domestic demand.

Much of the state's recent economic growth is attributable to the increase in private residential investment (driven by a chronic undersupply of housing and low interest rates), business and public investment. Even though forecast dwelling completions are now pushing well above the underlying demand (number of houses required given household formation rates), the market remains in a state of undersupply which underpinned further strength in residential investment in 2016/17. New public investment increased 14% in 2015/16, following five years of weakness. Public investment in NSW is ramping up at a faster and more sustained rate than in other states, underwritten by proceeds from asset sales and helped by rising tax revenues driven by residential stamp duties and stronger economic and employment growth.

The privatisation of 49% of the state's electricity network will provide a further boost to long-term funding.

The main negative has been the dramatic decline in private new engineering construction, which has fallen 45% over the three years to 2015/16 inclusive, due largely to the decline in mining and heavy industry construction, with coal-related engineering construction down by 78% since the 2011/12 peak. Steep falls in roads and subdivisions, harbours, water and electricity-related construction also detracted from activity. However, private new engineering construction has rebounded significantly over the past year (jumping 24% in 2016/17) and is on track for further growth. Conversely, private new non-dwelling building has declined over 2016/17, but we expect this to reverse over the next two years.

NSW has the best short to medium term prospects of all states

The biggest surprise over the past year has been the lack of employment growth – February 2017 employment was only 0.1% higher than February 2016 levels. We had expected slower employment growth in 2016/17 following the unsustainably high 3.7% increase in 2015/16, but this slower growth is well below prior expectations. However, job creation has picked up over the months to August 2017.

We believe that the current momentum in the New South Wales economy will only continue to build over the next two years, with the following factors lining up to drive further strong growth:

- Major government infrastructure projects are now under way and will ramp up further over the next two to three years.
- The 30% decline in the Australian dollar (against the US\$) over the three years to 2015/16 is boosting the states tradeables sectors, both in terms of increased exports and import substitution.
- The strength in private non-dwelling building, equipment investment, and software and research and development spending (which form the majority of 'intellectual property products' investment) suggest non-mining business investment has started to recover in the state – a lot earlier than in other states.
- The project pipeline for private non-residential building and private engineering construction indicates further growth in these construction segments over the next three years, although the non-dwelling building segment suffered a temporary decline over 2016/17.
- Population growth has picked up and is predicted to hold at just below the national average over the next two to three years.
- Employment growth is forecast to pick up from here and exceed the national average for the next year.
- The strength of the labour market, increases in population and buoyant property prices have driven – and will continue to drive – solid growth in household consumption expenditure.

After weak growth in 2016/17 (averaging 0.9% growth from the average level in 2015/16) employment growth is forecast to rebound to 2.3% in 2017/18, before easing over the subsequent two years. However, only a small rise in the state's unemployment rate is predicted with the state rate continuing to remain well below the national unemployment rate. In August, the NSW unemployment rate was 5.0% compared with 5.6% for Australia.

The continuing strong growth in private investment and recovery in public investment will boost the states' key finance and property and business services sectors, which collectively account for over 26% of New South Wales GSP and almost 19% of total state employment. These sectors will also derive additional benefits from the revival in non-mining business demand and profits, and ultimately the increased investment. The state's construction sector – which accounts for just under 9% of employment (but only 5% of GSP) – will also grow over the next 2 years, and boost other sectors, such as manufacturing, wholesaling, transport and a range of service industries. NSW services industries will benefit from the broader base of growth across the state and nation, including solid consumer demand.

The significant depreciation of the Australian dollar is driving the nation's structural shift away from mining and mining-related investment and towards a broader base of economic growth. New South Wales' diversified economy is in a good position to reap the benefits of the weaker dollar as improved competitiveness drives growth in the state's key trade-exposed industries, including agriculture, manufacturing, education, and tourism.

SFD growth remained high at 3.3% in 2016/17, and SFD growth is expected to be higher in 2017/18, at 3.5%. As such SFD growth is forecast to remain well above the national growth in Australian Domestic Demand of around 1.5 – 2% over the next two years. Meanwhile, GSP growth is estimated to have eased to 2.1% in 2016/17 as net exports (both international and interstate) made a large

negative contribution to output. However, a pickup in international exports and interstate net exports is expected to realise a smaller negative 'contribution' to overall growth, with GSP growth predicted to increase 2.9% in 2017/18 before both SFD and GSP growth is forecast to ease over 2018/19 and 2019/20, due to declines in residential construction activity. Stronger growth will return in the early 2020s as a synchronised upturn in residential and business and then public investment drives SFD, employment and household spending growth.

Fig. 5. New South Wales – Key Economic Indicators, Financial Years

State Economic Indicators														
Year Ended June	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
New South Wales														
Total Construction Activity(*)	5.9	-1.8	9.2	-4.0	0.7	9.6	7.5	7.0	-0.3	-3.1	0.5	2.8	-1.8	2.8
State Final Demand	3.1	1.6	1.7	2.5	3.4	4.4	3.3	3.5	2.1	2.6	3.6	3.6	1.9	1.0
Gross State Product (GSP)**)	2.6	1.8	1.9	2.4	2.6	3.5	2.1	2.9	2.5	2.7	2.8	3.2	2.5	2.0
Employment Growth (Year Average)	2.5	0.7	1.7	0.5	1.3	3.7	0.9	2.6	1.3	1.0	1.5	1.8	0.9	0.4
Australia														
Total Construction Activity(*)	6.9	14.5	5.8	1.1	-6.3	-4.9	-4.3	-2.0	-3.6	-3.2	1.3	5.3	3.2	5.3
Australian Domestic Demand(**)	3.7	5.1	1.7	1.3	1.1	1.4	1.9	2.2	1.5	2.7	3.9	4.2	2.6	1.5
Gross Domestic Product (GDP)	2.4	3.6	2.6	2.6	2.4	2.7	1.9	2.5	2.3	2.9	2.9	3.4	2.9	2.4
Employment Growth (Year Average)**)	2.4	1.2	1.2	0.5	1.2	2.2	1.4	2.3	0.9	1.1	1.8	2.2	1.4	0.9

Source: BIS Oxford Economics and ABS

* Total construction work done in constant 2014/15 prices as per the ABS Building Activity and Engineering Construction Activity in Australia surveys. Total construction is the sum of new dwelling building (includes alterations and additions activity greater than \$10,000), new non-dwelling building and new engineering construction.

** 2017 values are estimates

3. INFLATION AND WAGE FORECASTS

3.1 CPI INFLATION: CURRENT CONDITIONS AND FORECASTS

Inflation contained despite large depreciation of the Australian dollar

Consumer price inflation has been subdued for three years, despite a substantial depreciation of the Australian dollar between 2013 and 2016. Indeed, fears of deflation plastered the headlines in March 2016, as underlying inflation fell below the Reserve Bank's 2 – 3% target band for the first time since 2012. These fears were unfounded, but underlying inflation has remained below 2% since then.

Tradeables inflation has been especially weak, at just 0.4% in June 2017 and an average 0.6% over the past year. Tradeables inflation excluding the volatile categories of fuel and fruit and vegetables saw deflation of -0.1% in the June quarter. Stagnant world prices for manufactured goods, reduced transport costs, margin compression by exporters, and potential hedging by importers have combined to limit price rises for imported consumer goods. Furthermore, a slight appreciation in the Australian dollar over the past year has contributed to lower import prices, and high levels of retail and supermarket competition have reduced price growth. As a result, baseline tradeables inflation has been especially weak.

Non-tradeables inflation has shown some strength, although dismal wages growth has contained unit labour costs. Additionally, we have seen more of a pick-up in headline inflation due to increases in petrol prices since June 2016.

We do not expect inflation to approach the top of the RBA's 2-3% band for the rest of this decade. We expect the Australian dollar will depreciate over the next two years, from US 77 cents in June 2017 to US 72 cents in June 2019, as commodity prices retreat over 2017/18, the interest rate differential between the US and Australia narrows, and weaker Australian economic growth over 2018/19 weighs on the A\$. This will help stimulate inflation, as it pushes the prices of imported goods higher with a flow-on impact on final consumer prices. The headline rate will also rise at a faster pace, as oil prices come out of their troughs, pushing petrol prices higher. In addition, planned increases in tobacco excise will keep the headline rate elevated over the short to medium term.

The AUD will pick up from the end of FY 2019 as a strengthening in commodity prices is coupled with strong Australian economic growth and rising local interest rates, acting as an inflation buster by making prices of imported goods cheaper. Longer-term, we believe inflation containment will re-emerge as a policy challenge.

Deflation in freight costs has more than offset rises in import prices, but the tide is turning

Freight costs have generally subtracted from inflation over the past two years due to lower petrol prices resulting from sharp falls in oil prices. In the June 2014 quarter, Brent Oil was US\$110 per barrel. In less than two years, Brent Oil collapsed to hit a low of US\$35 per barrel in March 2016. This huge decline drove significant falls in petrol prices across the globe and weakened the Australian CPI.

We believe higher prices of imported consumer durables, including clothing, footwear and furniture, were largely offset by reduced freight costs of transporting these goods from ports to warehouses and to retail stores.

Accordingly, retailers were able to keep their margins despite growing price competition. Lower freight costs also helped keep a lid on increases in prices of domestically produced goods.

However, in the past year we have seen a turnaround in oil prices. In June 2016, Brent Oil prices rebounded – increasing by 33.3%. Following a slight withdrawal in September, prices rose 9.3% in the December quarter and a further 7.9% in the March quarter to reach US\$54 per barrel. The rise in oil prices in the December and March quarters led to increases in automotive fuel prices of 6.7% and 5.7% respectively, contributing 0.2 percentage points to the headline CPI in each quarter, however prices fell 2.5% in the June quarter. The increase in oil prices has also fed through to shipping and freight costs. This manifested itself in final retail prices, adding to broad based inflationary pressures. However, oil prices fell back again in the June quarter and we are expecting further declines in September, before oil and fuel prices return to growth.

Food inflation surprisingly low

The supermarket price war continues to hold back food inflation, even though adverse weather conditions have driven up some fresh fruit and vegetable prices

Adverse weather conditions in major growing areas have resulted in shortages of certain fruits and vegetables, and consequently higher prices. Vegetable prices rose 13.1% through the year to March, and fruit prices have risen 12.2% over the same period.

Despite the destruction of crops caused by Cyclone Debbie in March, fruit and vegetable prices fell 1.7% in the June quarter due to lower prices for seasonal fruits and the ongoing supermarket price war holding back price growth. High levels of competition in the retail sector are also holding back inflation. We may see further weakness in fruit and vegetable prices as some of the produce prices pushed up by Cyclone Debbie reverse in the next two quarters.

Meanwhile, non-tradeables inflation is stronger, despite weak wages growth

Non-tradeables inflation reached a strong 2.7% in the June 2017 quarter, despite weak demand and wages growth. The rises have largely come from one-off factors and key service sectors, including education, the recent increase in excise tax for cigarettes and tobacco, housing, and seasonal items such as pharmaceutical products. The March 2017 quarter showed the wage price index slowing to 1.9% growth through-the-year – the lowest level on record – while Average Weekly Ordinary Time Earnings increased by 2.2% in the December 2016 quarter.

3.1.1 CPI inflation forecasts

Headline CPI expected to rise at a faster pace as oil prices rebound ...

We are forecasting the Brent Oil price in \$US to fall for the next quarter, before continuing its slow and steady recovery. This will contribute to a measured climb in automotive fuel prices, and subsequently headline inflation. We may also see some flow on effects on underlying inflation.

... significant increases in utility prices will boost headline inflation...

We expect a significant increase in utilities prices will boost headline inflation in the September quarter, and potentially beyond as the jump in wholesale energy prices is passed on to consumers.

... and hefty increases in tobacco excise will keep headline rate inflation elevated

Also putting upward pressure on the headline rate will be further planned increases in tobacco excise over the next three years. Tobacco excise are legislated to increase by 12.5% each year on September 1 2017 through to September 1 2020. This combined with the bi-annual indexation of the tobacco excise to average weekly ordinary time earnings, and aligning the tax treatment of roll your own tobacco and cigarettes, will add significantly to the headline CPI.

However, softness in the economy will offset pressures on headline inflation ...

Offsetting these inflationary pressures will be soft growth in output, wages, employment and household incomes over the next two years, and contained inflationary expectations.

... Overall, inflation will stay within the Reserve Bank's target band for the next decade

We are expecting inflation to stay within the Reserve Bank's target band for the next decade. Overall, soft growth in output, wages, employment, and household incomes will continue to contain underlying inflation, despite a weakening Australian dollar over the next 24 months. It is our view that inflation will gradually increase to 2.9% in June 2022 as economic growth increases, employment and wage growth strengthen, and inflationary pressures begin to build. Falling oil prices over the next quarter will slightly weaken headline inflation. However, we are forecasting a rebound beginning in the December 2017 quarter. This will result in a measured bounce back in fuel prices. Additionally, headline inflation will be boosted by further hikes in tobacco taxes and some pass through of higher import prices from the depreciation of the A\$. Accordingly, we are expecting headline CPI to rise to reach 2.9% in 2022.

Inflation containment will re-emerge as a policy challenge in the long run

Headline CPI inflation is forecast to average 2.6% per annum over the decade to 2032. This is slightly higher than the mid-point of the Reserve Bank's 2 to 3% target range.

In the future, declining population growth and an ageing population may result in a reduction of the labour supply. This means we may see both temporary skilled and general labour shortages emerge, as demand for labour continues to rise, and a transitory increase in wage inflationary pressures. However, in the long-term, the labour market will adjust back to equilibrium – as higher wages attract additional workers (from home and abroad) into the labour market. Hence, although demographic changes may lead to periods of cost-push inflation in the future, these periods will be transient and the labour market will adjust in the long run, especially as the progressive nature of the changes allows time for adaptation.

Have low inflation expectations become entrenched?

Inflation expectations influence realised inflation. Inflation rates in advanced economies have been low and under many central bank's targets since the GFC. This has caused declines in inflation expectations. Such an extended period of low inflation could result in low inflation expectations becoming entrenched, as people expect that future inflation will remain low. Furthermore, as central banks have consistently met their inflation targets, they have

increased their credibility to meet such targets and lowered long-term inflation expectations. Low and anchored inflation expectations may have changed the shape in the Phillips curve, resulting in a substantial decline in its slope. There have even been cries that the Phillips curve, which demonstrates the inverse relationship between inflation and unemployment, is “broken”. If central banks have successfully anchored inflation expectations lower, this may mean inflation remains contained in the future. However, prolonged deviations of inflation from the target may eventually de-anchor expectations. It is our view that inflation expectations are more anchored to 2.5% than they were 5-10 years ago. Hence, when inflation containment re-emerges as a policy challenge in the future, the monetary response needed to steer the economy back to equilibrium will be a lot smaller than what it once was

3.2 WAGES OUTLOOK

The key determinants of nominal wages growth are consumer price inflation, productivity, the relative tightness of the labour market (i.e. the demand for labour compared to the supply of labour), and compositional changes in the labour market following the end of the mining investment boom. Price inflation, in turn, is influenced by unit labour costs – referred to as ‘wage-push inflation’ or more broadly ‘cost-push inflation’. Other factors which influence price inflation include the exchange rate, the stage of the business cycle and the level of competition in markets generally.

Wages growth now at its slowest pace in two decades – and will remain soft

Wage growth in Australia remains very weak, due to spare capacity in the labour market and lower inflation outcomes and expectations. In March 2017, wages growth through-the-year slackened to 1.9% - its lowest recorded level. However, this suggests that we are at the bottom of the current wage cycle, with wage increases for employees stabilising in the past three quarters. In 2016/17, year average growth for the WPI is expected to have fallen to 2.0%, while Average Weekly Ordinary Time Earnings is lifted from 1.9% in 2015/16 to 2.3% in 2016/17.

Trends in wage growth by pay-setting method have diverged in recent years. Aggregate wage growth has slowed significantly since December 2012 due to a collapse in wage increases awarded to the 47% of non-managerial full-time workers who are on individual agreements (contracts) with their employers. In contrast, workers subject to collective agreements have maintained wage rises above 3% pa. However, with union membership at an all-time low, the proportion of the full-time non-managerial workforce on collective agreements has fallen from 42% in 2010 to 37% in 2016. Workers on individual agreements, whose wage rises respond more to prevailing labour market conditions, have been at the mercy of slackness in labour market and the end of the mining investment boom.

Low wages growth is both a product of and key cause of low underlying inflation. Low wages are keeping business costs down and thus muting upward price pressures, while a significant section of pay deals are being set in line with CPI inflation – especially for employees on awards.

Spare capacity in the labour market is a fundamental contributor to low wage growth.

The unemployment rate and underemployment rate are key indicators of the amount of slack in the labour market. The unemployment rate has been trending down in recent quarters, but it remains above the NAIRU, (the Non-

Accelerating Inflationary Rate of Unemployment or the 'natural rate of unemployment') of around 5%, and therefore represents spare capacity in the labour market. Compounding this, Australia's underemployment rate¹ is now at historic highs – averaging 8.7% over the past year. The high underutilisation rate – the sum of unemployment and underemployment – reflects considerable slack in the labour market, which limits the bargaining power of workers and reduces pressure on wages. Spare capacity is likely to continue due to weak demand and investment, as well as the continued casualisation of the workforce.

Spare capacity in the labour market is most apparent in the mining industry. During the mining investment boom, wages in mining and mining-related industries soared, with mining wages reaching peaks of 6.7% annual growth in 2008 and 5.2% in 2012. Since moving to the less labour intensive production phase, workers have faced pay cuts, employment has dropped, and workers have been forced to move into lower paying jobs outside of the mining industry, which has also led to a skills mismatch between workers and jobs. This transition has caused a sharp reduction in wage growth in these industries, with growth in mining wages slowing to 0.6% y/y in March 2017 and the construction, professional services, and transport sectors also seeing steep reductions.

Additionally, the compositional shifts within the labour market following the end of the mining investment boom have weighed on total wage growth in Australia. Workers have been pushed out of mining – an industry with comparatively high wages – and into lower paid industries; this structural change in employment away from mining has weighed on total wage growth.

The latest data suggests that we are at the bottom of the current wage cycle, with wage increases for employees stabilising over the past three quarters. We are forecasting wage growth will be largely stable over the next 18 months and then begin to accelerate, in line with improvements in the labour market. WPI inflation is expected to rise 2.5% through the year to June 2018. We expect wage growth will level off over 2018/19 in response to weakening in economic growth, lower CPI and a rising unemployment rate.

Stronger growth in wages is anticipated in 2019/20 as economic growth strengthens and the unemployment rate falls – with the unemployment rate forecast to fall below 5% by the end of 2021. Indeed, we are expecting improvements in employment, profits and investment from early next decade as non-mining business investment and other positive forces drive economic growth. Reduced slack in the labour market, meaning workers can bargain for better pay rises, combined with rising price inflation next decade will push up wages growth over between 2019/20 and 2021/22. Wages growth (in year average terms) is expected to rise further and peak at 3.7% for WPI (4.5% for AWOTE) in 2021/22 – which would be the strongest result in WPI terms in nearly a decade. This is still lower than the 4.1% annual growth average for WPI over 2005/06 to 2008/09, when the unemployment rate was between 4.2% and 5.0% and employment growth was strong.

**We expect
that wage
growth has
levelled off,
and we will
now rise out
of its trough**

¹ Underemployment comprise all employed persons who are willing and available to work additional hours, and were not fully employed (worked less than 35 hours) in the reference week.

In the long run, wage growth is determined by productivity growth and inflation.

We expect that WPI growth will level off at its long run level of around 3.6% from 2022, driven by stable non-farm productivity growth of around 1.3% and inflation of around 2.6%.

Over the next decade and beyond, slowing growth in the labour supply may result in the emergence of both transient skilled and general labour shortages that temporarily drive up wages. However, these shortages will be transitory and the labour market will adjust in response to this shortage, through increased net overseas migration or a rise in the participation rate e.g. through delayed retirement.

Over the long term, there are three other key forces worth mentioning. Firstly, a greater global supply of workers and increased cross-national labour market connectedness may erode the bargaining power of workers in developed countries, contributing to lower wages. De-unionisation will also continue to decrease the bargaining power of workers, contributing to temporary periods of lower wage growth. Thirdly, there is a risk that further automation of the workforce may reduce employment and lead to wage losses. Negative effects are expected to be unevenly distributed, with blue-collar workers seeing the worst effects. However, some jobs will benefit from increased automation, so it is difficult to predict at an aggregate level what the impact will be. A literature review suggests that one more robot per thousand workers reduces wages by 0.25 – 0.5%, based on industrial robot usage between 1990 and 2007 on US local labour markets.

BIS Oxford Economics Wage Growth Model

BIS Oxford Economics' model of wage determination is based on the analysis of expected future wage movements in the three main methods of setting pay, as each discrete pay setting method has its own influences and drivers (see Fig. 7). The main pay setting categories and their key determinants are:

- Employees under awards have their pay determined by Fair Work Australia in the annual National Wage case. When determining pay increases, Fair Work Australia aim to maintain the standard of living of those employed on awards by providing a safety net of fair minimum wages. Hence, they focus on the overall performance of the domestic economy, taking into account productivity, business competitiveness, inflation and employment growth. This means that increases in the Federal Minimum Wage are usually based on recent CPI growth along with Fair Work Australia's view on short term future conditions for the Australian economy. From 1 July 2016, the minimum wage has increased by 2.4% following a 2.5% rise on 1 July 2015. This brings the Australian minimum wage to \$672.70 per week. At the all industries level, 16% of all non-managerial full-time employees (data excludes those in agriculture, forestry and fishing) have their pay rises determined by this method.
- For employees under collective agreements (representing 37% of all employees), their pay is determined through enterprise bargaining, and wage increases are influenced through a combination of recent CPI, inflationary expectations, profitability levels of relevant enterprises, business conditions, and the short term economic outlook. Workers unions can also play a significant part in negotiations, especially unions with a good position in industrial relations through strong membership. With the average duration of these agreements currently two to three years, BIS Oxford Economics use the most recent agreements formalised in recent quarters as a basis for our near term forecasts. Beyond that, collective agreements are based on our expectations of economic conditions.
- The remaining 47% of employees have their pay set by individual arrangements, whether it be individual contracts or some other form of salary agreement, which may include incentive based schemes. Similar to the minimum wage and collective agreements, inflation and inflationary expectations have a strong influence on agreements, as well as the strength of the labour market. Individual arrangements are skewed towards more skilled workers, so the balance between demand and supply in skilled labour can be a large influence.

Fig. 6. Wages and Prices: Australia, year-average growth

Year Ended June	Average Weekly Ordinary Time Earnings ⁽¹⁾		Wage Price Index (All Industries)		Official Headline CPI ⁽²⁾	
	\$/week	%CH	Index	%CH	Index	%CH
2000	765.4		71.7		69.4	
2001	804.2	5.1	74.2	3.5	73.6	6.0
2002	847.4	5.4	76.7	3.3	75.7	2.9
2003	890.0	5.0	79.3	3.5	78.0	3.0
2004	931.6	4.7	82.2	3.6	79.9	2.4
2005	972.9	4.4	85.3	3.7	81.8	2.4
2006	1 017.5	4.6	88.7	4.1	84.4	3.2
2007	1 054.1	3.6	92.2	3.9	86.9	3.0
2008	1 106.1	4.9	96.1	4.1	89.8	3.4
2009	1 166.5	5.5	100.0	4.1	92.6	3.1
2010	1 231.3	5.6	103.1	3.1	94.8	2.3
2011	1 282.5	4.2	107.0	3.8	97.7	3.1
2012	1 338.1	4.3	110.9	3.6	100.0	2.3
2013	1 400.3	4.6	114.6	3.3	102.3	2.3
2014	1 442.2	3.0	117.6	2.6	105.0	2.7
2015	1 477.3	2.4	120.4	2.4	106.8	1.7
2016	1 505.0	1.9	123.0	2.1	108.3	1.4
2017	1 535.8	2.0	125.4	2.0	110.1	1.7
Forecasts						
2018	1 576.3	2.6	128.3	2.3	112.3	2.0
2019	1 630.3	3.4	131.6	2.6	114.8	2.2
2020	1 683.8	3.3	135.0	2.6	117.7	2.5
2021	1 749.1	3.9	139.4	3.3	120.6	2.5
2022	1 828.5	4.5	144.6	3.7	123.7	2.5
2023	1 909.6	4.4	150.0	3.8	126.7	2.5
2024	1 982.3	3.8	155.1	3.4	129.9	2.5
Compound Annual Growth Rates ⁽³⁾						
1990-2000	3.9				2.1	
2000-2010	4.9		3.7		3.2	
2010-2017	3.2		2.8		2.2	
2017-2024	3.7		3.1		2.4	
2019-2024	4.0		3.3		2.5	

Source: BIS Oxford Economics, ABS

(1) Average Weekly Ordinary Time Earnings for full-time adults. Data is year ended May (available only mid month of quarter).

(2) Headline CPI forecasts based on Reserve Bank of Australia forecasts to December 2019 quarter. Beyond this, we've taken the mid-point of the RBA's 2-3% target range as preferred by the AER.

(3) CAGR (Compound Annual Growth Rates) for 2019-2024 is CAGR for 2019/20 to 2023/24 inclusive (ie next Revenue Determination period).

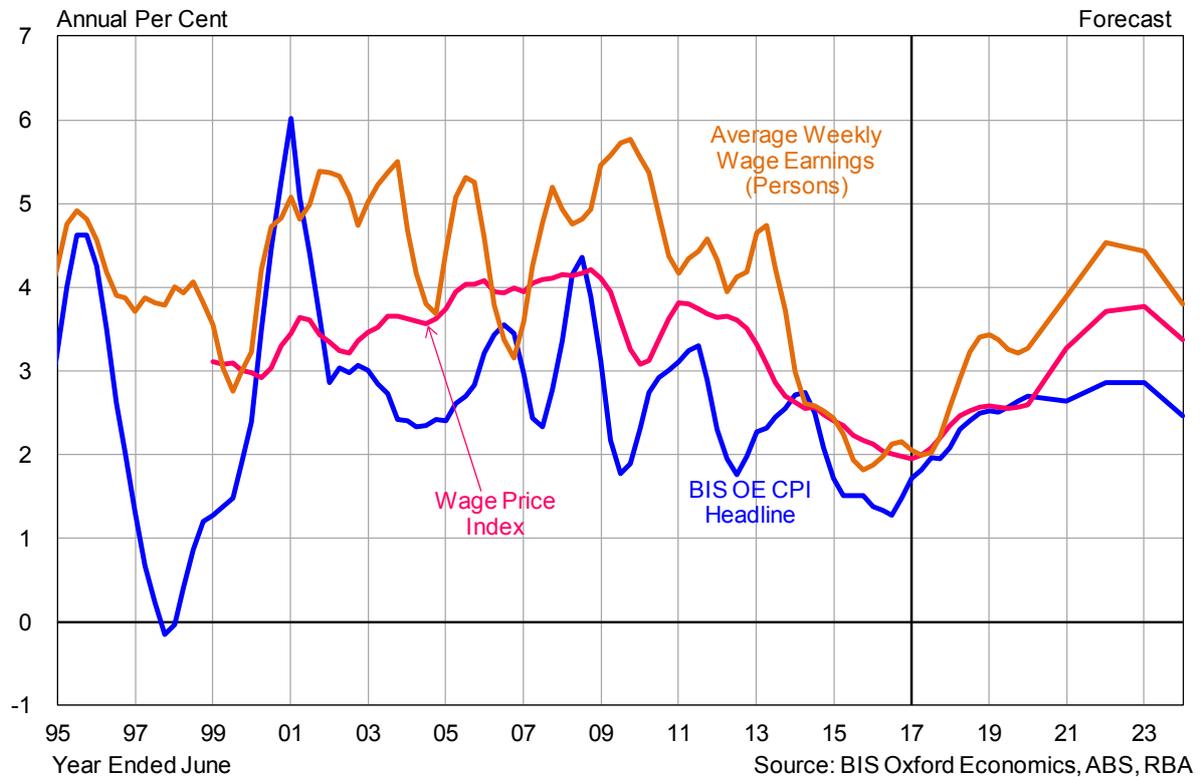
Fig. 7. Methods of Setting Pay, Industry May 2010

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 and 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

Fig. 8. Australia: Wages and Prices



Source: BIS Oxford Economics, ABS, RBA

Fig. 9. Employment and Unemployment

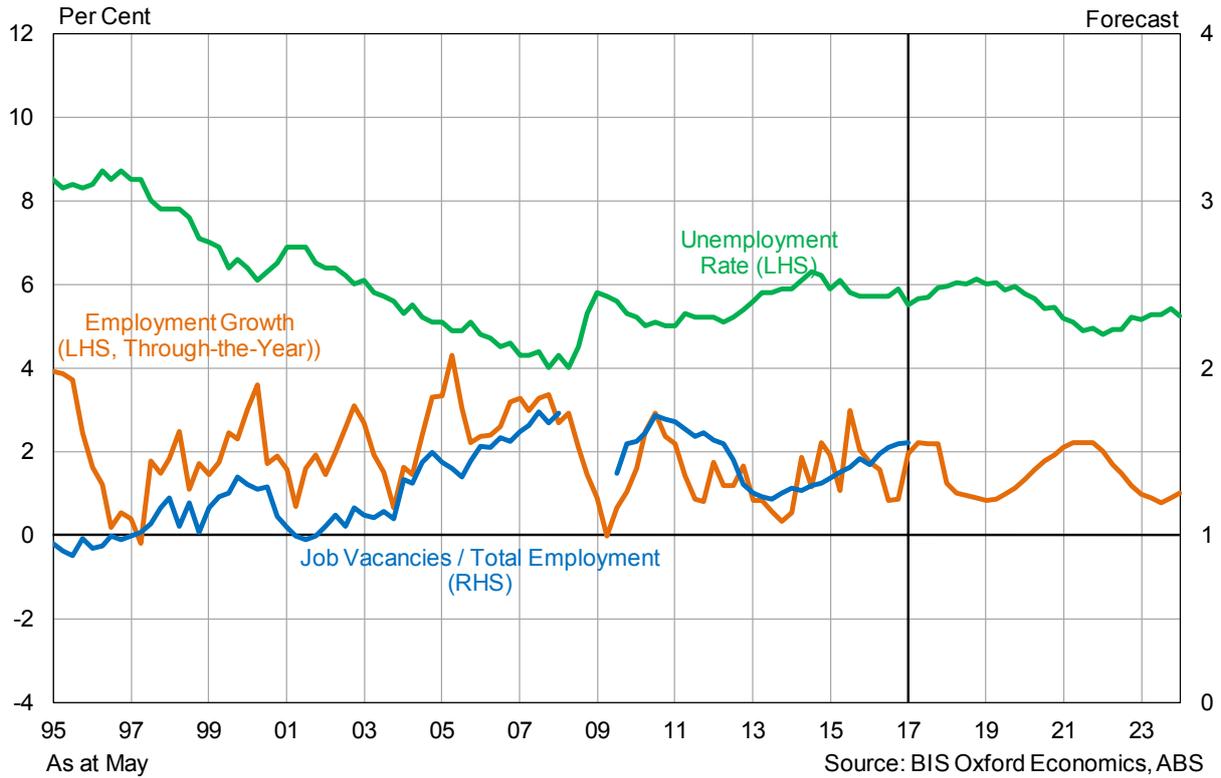


Fig. 10. Wages Growth All Industries: Australia

(By Workforce Segmented by Pay Setting Method)

Year Ended June	% of Workforce in 2010	Year Average Per Cent Change										Forecasts						Average 2018-24	Average 2020-24
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024			
Wage Price Index																			
Awards Only	8.1%	0.7	3.5	3.4	2.9	2.6	3.0	2.5	2.4	3.3	2.7	2.6	2.7	2.9	3.1	2.9	2.9	2.9	2.8
Collective Agreements	41.9%	3.9	3.8	3.8	3.6	3.5	3.3	3.2	3.2	3.1	3.2	3.2	3.3	3.6	3.8	3.7	3.4	3.5	3.5
Individual Arrangements	50.0%	2.8	3.8	3.5	3.1	1.9	1.5	1.1	0.8	1.4	1.9	2.0	3.3	4.0	3.9	3.2	2.8	3.3	3.3
Wage Price Index (a)	100%	3.1	3.8	3.6	3.3	2.6	2.4	2.1	2.0	2.3	2.6	2.6	3.3	3.7	3.8	3.4	3.1	3.3	3.3
Compositional Effects + Bonuses, etc		2.5	0.4	0.7	1.3	0.4	0.0	-0.2	0.1	0.3	0.9	0.7	0.6	0.8	0.7	0.4	0.6	0.6	0.6
AWOTE (b)	100%	5.6	4.2	4.3	4.6	3.0	2.4	1.9	2.0	2.6	3.4	3.3	3.9	4.5	4.4	3.8	3.7	4.0	4.0

Source: BIS Oxford Economics, Haver Analytics, Department of Employment

(a) Ordinary time hourly rates of pay for full-time adults.

(b) Average Weekly Ordinary Time Earnings for Full-time Adults (excludes overtime but includes bonuses).

4. EXPECTED WAGE CHANGES FOR THE EGWWS INDUSTRY

In this section, we provide an outlook for the WPI (wage price index) for the EGWWS (electricity, gas, water and waste services) sector at the national level. In addition, we provide a discussion and forecasts of the WPI for New South Wales EGWWS industry.

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% higher over the decade to 2013 (see Fig 11, Fig 15 and Fig 17). 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 six years (see Fig 12 and Fig 15).

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.

In addition, 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. Further, 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 Fig 11 and Fig 12). 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 the need to retain skilled labour.

4.1 STRONG UNION PRESENCE IN THE UTILITIES SECTOR WILL ENSURE COLLECTIVE AGREEMENTS REMAIN ABOVE THE ALL INDUSTRY AVERAGE

Strong Union presence in the industry.

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).

The key elements of the utilities wage forecast are set out in Fig 14. This 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 generally be higher than the all industries average. Over the past five years, the outcomes from collective agreements have been 0.9% higher, on average, than the all industries average, at 3.4% compared to 2.5%. We expect this trend to continue over the outlook period, with collective agreements achieving average increases of 3.7% for the utilities sector, compared to 3.1% for all industries.

BIS Oxford Economics analysis shows collective agreements in the EGWWS sector have been on average around 1.5% 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% 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 1.2% above the 'official' CPI over the forecast period.

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

We expect EBA outcomes to show modest growth over the next two years but remain above inflation and the 'all industries' average given that the demand for skilled labour remains strong and particularly given the recent high enterprise agreement outcomes in the construction sector. This will influence negotiations in the EGWWS sector, as some skills can be transferable. A mild recovery in EBA outcomes will occur over subsequent years as the labour market begins to tighten, unemployment falls and business profitability improves. However, forecast growth in wage agreements of around 3.7% per annum remains below that experienced over much of the past decade.

4.2 DEMAND FOR SKILLED LABOUR ALSO A KEY DRIVER OF UTILITIES WAGES

Employment growth in the utilities sector over the 2003/04 to 2013/14 inclusive averaged 5.4% per annum, the second fastest growth among the 18 main industry sectors behind the Mining sector (11% per annum), with Health and Social Assistance employment growth third at 4.1% per annum.

We believe investment in the sector, particularly engineering construction, has been the key driver of employment growth in the sector over the past decade. Fig. 18 illustrates this relationship, and shows employment has a stronger relationship with utilities engineering construction rather than utilities output.

As well as the pick-up in infrastructure work, this strong growth in utilities employment has also been associated with 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 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% in 2001 to 5% by 2005, and to 4% in early 2008. This saw skilled labour shortages worsen and employers in these sectors bid up wages.

That being said, the global financial crisis and the subsequent slowing in the economy over 2008/09 reduced labour demand resulting in excess capacity. This, in turn, has since kept a lid on wage pressures.

However, with the economy expected to return to balanced and trend growth early next decade, employment growth will outpace population and labour force growth and the unemployment rate is expected to drop below 5% by early next decade. Hence, from early 2020s, we expect to again witness the re-emergence of skilled labour shortages and competition for scarce labour particularly from the construction sector, which will push up wage demands in the utilities sector.

Individual agreements will strengthen from their current weakness

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.

Wage growth from individual agreements rose by just 1.7% over the year to June 2015 and slowed to 0.3% last year, reflecting general weakness in the economy and the full-time labour market. However, this is expected to turn around from this year, albeit gradually. Stronger increases are expected from the beginning of next decade in line with a strengthening economy. 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 continue to rise through the middle of the next decade.

Utilities wage growth is forecast to continue to outpace national 'all industries' average

Overall, BIS Oxford Economics 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 4.2% per annum over the five years to 2023/24, 0.2% higher than the national 'All Industries' AWOTE average of 4% per annum over the same five-year period (see Fig.15). In terms of underlying wages growth in the 'utilities' sector for total Australia — expressed in wage price index (WPI) terms — BIS Oxford Economics is forecasting an average of 3.9% per annum (also 0.6 percentage points higher than the national 'All Industries' WPI average of 3.3% per annum) over the five years to 2023/24.

Our AWOTE forecasts are higher due to compositional effects. 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 (i.e. on higher pay), resulting in higher earnings per employee.

Wages in the New South Wales utilities sector are expected to grow in line with the national utilities sector average over Ausgrid's upcoming regulatory period.

4.3 COMPUTER SYSTEM DESIGN AND RELATED SERVICES WAGE FORECASTS

Commonly known as IT consulting, the Computer System Design and Related Services industry includes firms that primarily provide clients with IT expertise. Industry services include writing, modifying, testing or providing user support for software. Industry companies also plan and design computer systems that integrate computer hardware, software, cloud and telecommunications technologies. The industry does not include non-customised software publishing activities.

Wages data for this industry is sourced from ABS publication Australian Industry (Cat No 8155). However, back data is provided for all employees only. To make the series more relevant for Ausgrid's business, we generated a wage series in terms of \$/hr based on the part-time and full-time proportions included in the monthly labour force data at the sub-industry level.

Forecasts of wages is based on our expectations of employment growth in the industry, which, in turn, is largely driven by the industry's revenue growth.

Over the next five years, the Computer System Design Services industry is expected to benefit from greater capital expenditure on software and existing computer system upgrades. These upgrades will include hardware, software and cloud technology in sectors such as education, training, finance, transport, retail, and health and medical services. However, the industry will be subject to greater domestic and international competition in product development and pricing. As competition from international firms grows, domestic consultants are anticipated to focus on more specialised services that overseas firms cannot compete on. With greater IT adoption and business confidence anticipated to improve from 2018/19, industry revenue is forecast to improve over the next three years with annual growth expected to peak at 4.2% in 2019/20 before easing slightly during the early part of the next decade.

Employment growth is expected to follow the recovery in profits with annual growth forecast to approach 2% by 2019/20. Accordingly, we expect wages to slowly rise from this year peaking at 4.6% in 20121/22 before falling back to 4.1% by 2023/24. Over Ausgrid's upcoming regulatory period, we expect ICT wages to grow by 4% p.a.

Fig. 11. Wage Price Index Growth by Industry Sector and by State

Sector	% of Total Employment May'17											Five-Year Average (YE June)
		Jun'12	Jun'13	Jun'14	Jun'15	Jun'16	Sept'16	Dec'16	Mar'17	Jun'17		
Private		3.7	3.4	2.6	2.3	2.0	1.9	1.9	1.8	1.8	2.4	
Public		3.2	3.2	2.8	2.6	2.5	2.4	2.3	2.3	2.3	2.7	
Industry												
Mining	1.9%	4.4	4.5	2.8	2.3	1.6	1.3	1.2	1.0	1.0	2.4	
Manufacturing	7.4%	3.8	3.2	2.9	2.7	2.4	2.2	2.1	2.0	2.0	2.6	
Electricity, Gas, Water and Waste Services	1.0%	3.5	4.2	3.3	2.8	2.4	2.4	2.3	2.3	2.2	3.0	
Construction	9.0%	4.1	3.3	3.0	2.1	1.6	1.6	1.6	1.6	1.7	2.3	
Wholesale Trade	3.3%	4.4	4.4	2.2	2.2	1.9	1.9	1.9	2.0	1.8	2.5	
Retail Trade	10.1%	2.9	2.5	2.6	2.2	2.4	2.4	2.2	2.0	1.9	2.3	
Accommodation and Food Services	7.3%	3.4	2.5	2.3	2.6	2.3	2.3	2.3	2.3	2.3	2.4	
Transport, Postal and Warehousing	5.1%	3.5	3.5	2.5	2.4	2.2	2.2	2.1	2.1	2.0	2.5	
Information Media and Telecommunications	1.8%	3.7	2.9	2.4	2.5	2.2	2.1	2.0	1.9	1.9	2.4	
Finance and Insurance Services	3.6%	4.0	3.2	2.7	2.7	2.6	2.4	2.2	2.1	2.1	2.6	
Rental, Hiring and Real Estate services	1.7%	3.8	2.8	2.7	2.3	1.6	1.4	1.3	1.3	1.3	2.1	
Professional, Scientific and Technical Services	8.5%	4.5	3.5	1.9	1.9	1.6	1.6	1.5	1.5	1.4	2.1	
Administration and Support Services	3.3%	3.3	3.3	2.5	1.9	1.4	1.3	1.3	1.3	1.4	2.1	
Public Administration and Safety	6.6%	3.1	3.5	2.9	2.2	2.2	2.1	2.1	2.2	2.2	2.6	
Education	8.0%	3.7	2.8	2.9	3.0	2.7	2.5	2.5	2.4	2.4	2.8	
Health Care and Social Assistance	13.0%	2.9	3.3	2.9	2.7	2.5	2.4	2.4	2.4	2.4	2.8	
Arts and Recreation Services	1.8%	3.7	2.9	2.7	3.0	2.4	2.2	2.1	2.0	2.0	2.6	
Other Services	4.1%	4.2	3.2	2.4	2.2	2.2	2.2	2.1	2.0	1.9	2.4	
State/Territory												
New South Wales	31.7%	3.6	3.1	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.4	
Victoria	25.8%	3.5	3.3	2.7	2.7	2.3	2.2	2.0	1.9	1.9	2.6	
Queensland	19.7%	3.7	3.0	2.7	2.4	2.0	1.9	1.9	1.9	2.0	2.4	
South Australia	6.7%	3.4	3.3	3.3	2.5	2.3	2.3	2.2	2.2	2.2	2.7	
Western Australia	11.2%	4.3	4.0	2.8	2.2	1.9	1.8	1.7	1.5	1.4	2.4	
Tasmania	2.0%	3.4	3.2	2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.5	
Northern Territory	1.1%	3.8	3.3	2.7	2.6	2.2	2.2	2.1	2.1	2.2	2.6	
Australian Capital Territory (ACT)	1.8%	3.3	3.7	2.4	1.7	1.7	1.8	1.9	1.9	1.8	2.3	
Total All^(1,2)	100%	3.6	3.3	2.6	2.4	2.1	2.0	2.0	2.0	2.0	2.5	

Source: BIS Oxford Economics, Haver Analytics

(1) Measures changes in the price of labour. Ordinary hourly rates of pay (excludes overtime and bonuses)

(2) Excludes Agriculture, Forestry & Fishing

Fig. 12. AWOTE Growth by Industry Sector: Australia

Industry Sector	% of Total Employment Jun'17	Average Weekly Earnings ⁽¹⁾												Five-Year YE Jun Average
		\$ / Week Jun'17	Annual Percent Change (year-on-year)											
			Jun '07	Jun '08	Jun'09	Jun'10	Jun'11	Jun'12	Jun'13	Jun'14	Jun'15	Jun'16	Jun'17	
Mining	1.9%	2 551	6.5	8.1	7.3	7.2	6.5	6.2	6.8	4.2	1.5	1.7	0.6	3.0
Manufacturing	7.4%	1 329	4.7	4.2	5.3	1.8	2.8	2.3	3.9	4.8	4.3	1.0	-1.5	2.5
Electricity, gas, water and waste services	1.0%	1 783	3.7	2.7	6.1	7.6	9.1	2.5	6.1	2.0	0.7	3.5	4.3	3.3
Construction	9.0%	1 555	4.9	9.2	7.8	7.7	5.0	3.5	4.3	2.1	2.2	1.4	2.2	2.4
Wholesale trade	3.3%	1 490	3.7	3.8	5.9	2.2	3.9	11.3	4.6	0.5	0.3	0.9	2.5	1.8
Retail trade	10.1%	1 124	3.4	5.6	2.7	5.5	0.9	3.2	4.0	2.5	4.0	4.2	0.8	3.1
Accommodation and food services	7.3%	1 099	8.2	3.8	2.5	4.5	3.5	3.7	5.5	3.9	-0.1	2.3	2.6	2.8
Transport, postal and warehousing	5.1%	1 557	0.6	0.5	4.5	5.3	8.9	7.0	5.9	1.8	2.8	5.2	1.4	3.4
Information media and telecommunications	1.8%	1 851	6.3	7.7	4.3	5.4	4.6	3.0	4.8	1.7	1.0	4.2	4.3	3.2
Finance and insurance	3.6%	1 833	3.4	3.8	2.8	4.6	6.1	2.0	4.3	1.1	4.3	4.6	1.6	3.2
Rental hiring and real estate services	1.7%	1 433	2.4	8.6	6.5	3.8	-2.1	0.4	6.6	-1.1	-1.7	5.7	5.1	2.9
Professional, scientific and technical services	8.5%	1 806	2.5	7.8	5.8	5.6	4.5	4.3	3.2	3.8	2.7	-1.1	2.2	2.2
Administration and support services	3.3%	1 352	1.6	7.2	7.1	7.4	-0.1	-1.9	7.9	1.7	-1.5	-0.4	4.9	2.5
Public administration and defence	6.6%	1 592	3.7	3.7	5.4	6.7	5.7	3.2	4.7	3.5	0.9	1.8	1.5	2.5
Education and training	8.0%	1 682	3.7	3.0	4.6	5.6	4.8	4.6	3.8	3.3	2.7	2.4	3.6	3.2
Health and social assistance	13.0%	1 508	3.6	4.4	4.7	6.2	2.5	2.8	5.3	3.9	2.4	2.5	3.4	3.5
Arts and recreational services	1.8%	1 459	-0.6	6.4	7.2	4.1	5.6	3.5	5.5	4.6	-1.0	3.6	6.0	3.7
Other services	4.1%	1 206	2.0	3.3	6.8	3.1	3.6	2.7	4.2	-0.4	0.8	5.5	3.8	2.8
Total All Industries⁽²⁾	100%	1 543	3.6	4.9	5.5	5.6	4.2	4.3	4.6	3.0	2.4	1.9	2.0	2.8

(1) Average weekly ordinary time earnings for full-time adult persons.

Source: BIS Oxford Economics, ABS

(2) Excludes Agriculture, Forestry and Fishing sector

Fig. 13. Federal Wage Agreements – Collective Agreements by Industry

Average Annualised Wage Increase, Year-ended December

Selected Industry (ANZSIC 2006)	Average Annualised Wage Increase ⁽¹⁾												Average 2005-2016
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Electricity, Gas, Water and Waste Services	4.3	4.3	4.3	4.6	4.6	4.5	4.2	4.1	3.7	3.6	3.3	2.9	4.0
Agriculture, Forestry and Fishing	2.8	3.0	2.9	3.4	3.7	3.3	3.5	3.5	3.5	3.1	2.9	2.8	3.2
Mining	3.6	3.7	3.9	4.2	4.2	4.1	4.2	4.4	4.3	4.1	3.2	2.7	3.9
Manufacturing	4.2	4.1	4.1	4.0	3.9	3.7	3.7	3.8	3.6	3.3	3.0	2.8	3.7
Construction	4.5	4.7	4.7	4.6	5.1	5.2	4.5	5.0	5.0	4.9	4.0	3.1	4.6
Wholesale Trade	4.1	3.5	3.6	4.0	4.0	3.7	3.6	3.6	3.6	3.2	3.0	4.4	3.7
Retail trade	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.2	3.2	3.0	3.1	2.9	3.3
Accommodation and Food Services	3.3	3.4	3.2	3.4	3.9	3.7	3.7	3.5	3.3	3.0	2.9	3.0	3.4
Transport, Postal and Warehousing	3.9	3.8	3.9	4.0	4.1	3.8	3.6	3.7	3.7	3.5	3.3	3.2	3.7
Information Media and Telecommunications	3.1	3.1	3.2	3.6	3.6	3.4	3.3	3.4	3.4	3.3	2.8	2.8	3.2
Financial and Insurance Services	4.2	4.1	3.7	3.8	3.6	3.4	3.4	3.1	3.1	3.1	3.0	2.9	3.4
Rental, Hiring and Real Estate Services	4.4	4.5	4.6	4.3	3.5	3.7	3.8	4.2	4.2	4.1	3.4	3.4	4.0
Professional, Scientific and Technical Services	4.0	3.7	3.9	4.3	4.2	4.1	4.0	4.0	4.0	3.9	3.5	3.1	3.9
Administrative and Support Services	3.5	3.4	3.5	3.6	3.5	3.6	3.6	4.1	4.0	3.9	3.6	3.2	3.6
Public Administration and Safety	4.4	4.0	4.0	4.1	3.9	3.6	3.5	3.6	3.5	3.5	3.2	2.8	3.7
Health Care and Social Assistance	3.9	4.1	3.9	3.9	4.0	3.8	3.8	3.2	3.0	3.1	3.0	3.3	3.6
Education and Training	5.0	4.5	4.8	4.2	4.3	4.3	4.4	3.9	3.5	3.7	3.7	3.4	4.1
Arts and Recreation Services	3.8	3.6	3.8	4.0	3.8	3.3	3.2	3.3	3.2	3.3	3.2	2.8	3.4
Other Services	3.4	3.7	3.8	3.6	3.6	3.6	3.6	4.0	3.6	3.2	2.9	2.9	3.5
ALL INDUSTRIES	4.2	4.0	4.0	3.9	3.9	3.9	3.8	3.6	3.5	3.4	3.2	3.2	3.7

1) Current agreements in December of each year.

Source: Department of Employment

Fig. 14. Electricity, Gas, Water and Waste Services Forecasts – Australia

Year Ended June	% of Workforce in 2010	Year Average Per Cent Change (a)																	
												Forecast						Average	Average
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2018-24	2020-24	
Awards Only	2.7%	0.7	3.2	3.4	2.9	2.6	3.0	2.5	2.4	3.3	2.7	2.6	2.7	2.9	3.1	2.9	2.9	2.9	2.8
Collective Agreements	67.7%	4.6	4.2	4.1	3.9	3.6	3.3	3.2	3.0	3.1	3.5	3.5	3.7	4.0	4.2	4.0	3.7	3.7	3.9
Individual Arrangements	29.6%	4.2	4.1	2.1	5.0	2.4	1.7	0.5	0.3	1.4	2.5	2.7	4.0	4.6	4.4	3.8	3.3	3.3	3.9
Wage Price Index (Ord. Time)	100%	4.3	4.2	3.5	4.2	3.3	2.8	2.4	2.2	2.6	3.2	3.3	3.8	4.1	4.2	3.9	3.6	3.9	
Compositional Effects + Bonuses, etc		3.2	4.9	-1.0	1.9	-1.2	-2.2	1.1	2.1	0.5	0.5	0.4	0.2	0.4	0.3	0.3	0.4	0.3	0.3
AWOTE (Persons)(a)	100%	7.6	9.1	2.5	6.1	2.0	0.7	3.5	4.3	3.1	3.7	3.7	4.0	4.5	4.5	4.2	4.0	4.2	

(a) Average Weekly Ordinary Time Earnings for Full-time Adult Persons (excludes overtime but includes bonuses).

Fig. 15. 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
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
2014	1 442.2	3.0	1,635.0	2.0	117.6	2.6	121.1	3.2
2015	1 477.3	2.4	1,646.0	0.7	120.4	2.4	124.5	2.8
2016	1 505.0	1.9	1,704.4	3.5	123.0	2.1	127.5	2.4
2017	1 535.8	2.0	1,777.3	4.3	125.4	2.0	130.3	2.2
Forecasts								
2018	1 576.3	2.6	1,832.8	3.1	128.3	2.3	133.7	2.6
2019	1 630.3	3.4	1,900.5	3.7	131.6	2.6	137.9	3.2
2020	1 683.8	3.3	1,970.4	3.7	135.0	2.6	142.5	3.3
2021	1 749.1	3.9	2,048.3	4.0	139.4	3.3	147.8	3.8
2022	1 828.5	4.5	2,140.8	4.5	144.6	3.7	154.0	4.1
2023	1 909.6	4.4	2,237.2	4.5	150.0	3.8	160.5	4.2
2024	1 982.3	3.8	2,331.7	4.2	155.1	3.4	166.8	3.9
Compound Annual Growth Rates ⁽²⁾								
2000-2010	4.9		4.5		3.7		4.3	
2010-2017	3.2		4.0		2.8		3.2	
2017-2024	3.7		4.0		3.1		3.6	
2019-2024	4.0		4.2		3.3		3.9	

Source: BIS Oxford Economics, ABS

(1) Earnings per person for full-time adults. Data is year ended May (available only mid month of quarter).

(2) CAGR (Compound Annual Growth Rates) for 2019-2024 is the annual growth for 2019/20 to 2023/24 inclusive i.e. next Revenue Determination period.

Fig. 16. EGWWS WPI – New South Wales versus Australia, Year Average Growth

Year Ended June	EGWWS Wage Price Index		EGWWS Wage Price Index		Consumer Price Index (^)	
	New South Wales		Australia		Australia	
	Index	%CH	Index	%CH	Index	%CH
1999			65.7	3.0	67.8	1.3
2000			68.2	3.8	69.4	2.4
2001			70.8	3.8	73.6	6.0
2002			73.8	4.2	75.7	2.9
2003			76.8	4.1	78.0	3.0
2004			79.9	4.1	79.9	2.4
2005			83.3	4.3	81.8	2.4
2006			87.6	5.2	84.4	3.2
2007			91.8	4.8	86.9	3.0
2008			95.7	4.2	89.8	3.4
2009	100.0		100.0	4.5	92.6	3.1
2010	104.0	3.9	104.4	4.3	94.8	2.3
2011	107.6	3.5	108.7	4.2	97.7	3.1
2012	111.1	3.2	112.5	3.5	100.0	2.3
2013	115.1	3.7	117.3	4.2	102.3	2.3
2014	118.6	3.0	121.1	3.2	105.0	2.7
2015	122.1	3.0	124.5	2.8	106.8	1.7
2016	123.8	1.3	127.5	2.4	108.3	1.4
2017	125.4	1.3	130.3	2.2	110.1	1.7
Forecasts						
2018	128.5	2.5	133.7	2.6	112.3	2.0
2019	132.6	3.2	137.9	3.2	114.8	2.2
2020	137.1	3.4	142.5	3.3	117.7	2.5
2021	142.4	3.9	147.8	3.8	120.6	2.5
2022	148.4	4.2	153.9	4.1	123.7	2.5
2023	154.7	4.2	160.5	4.2	126.7	2.5
2024	160.7	3.8	166.8	3.9	129.9	2.5
Compound Annual Growth Rates						
2000-2010			4.3		3.2	
2010-2017	2.7		3.2		2.2	
2017-2024	3.6		3.6		2.4	
2020-2024	3.9		3.9		2.5	

Source: BIS Oxford Economics, ABS

(^) Headline CPI forecasts based on Reserve Bank of Australia forecasts to December 2019 quarter. Beyond this, we've taken the mid-point of the RBA's 2-3% target range.

Fig. 17. Wage Price Index - Australia All Industries and Electricity, Gas, Water and Waste Services

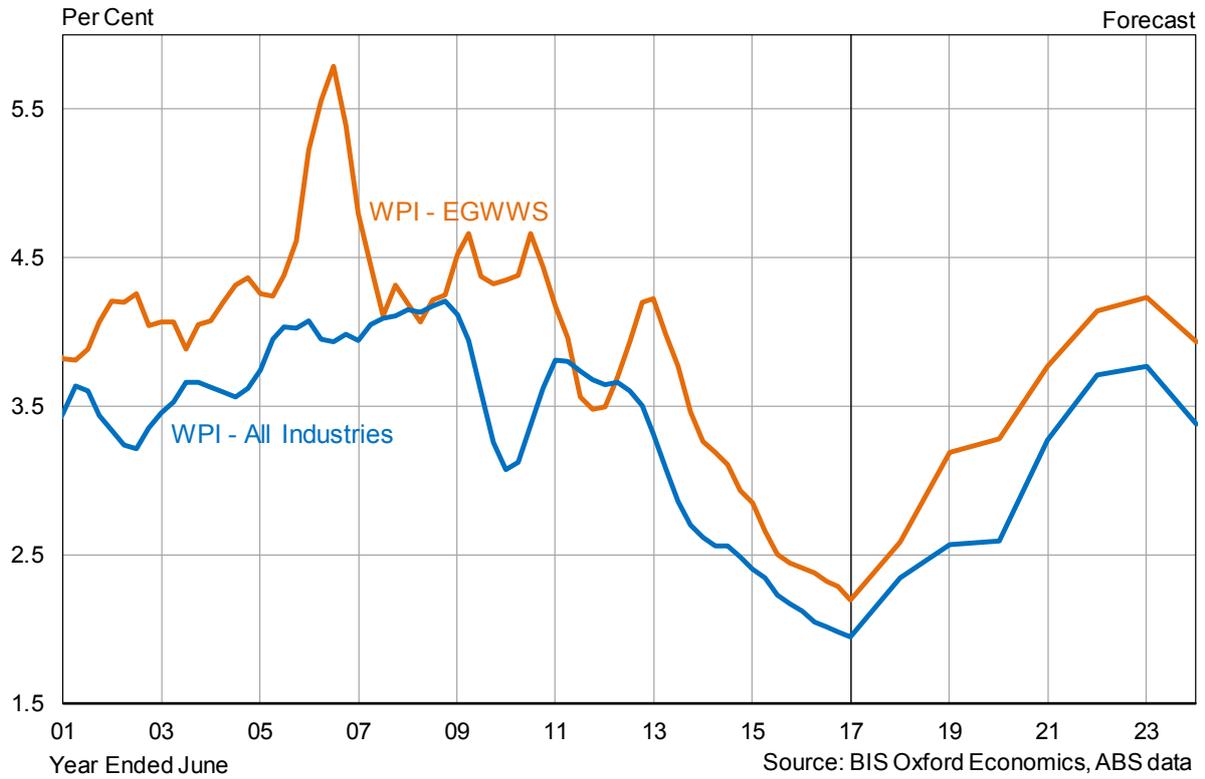
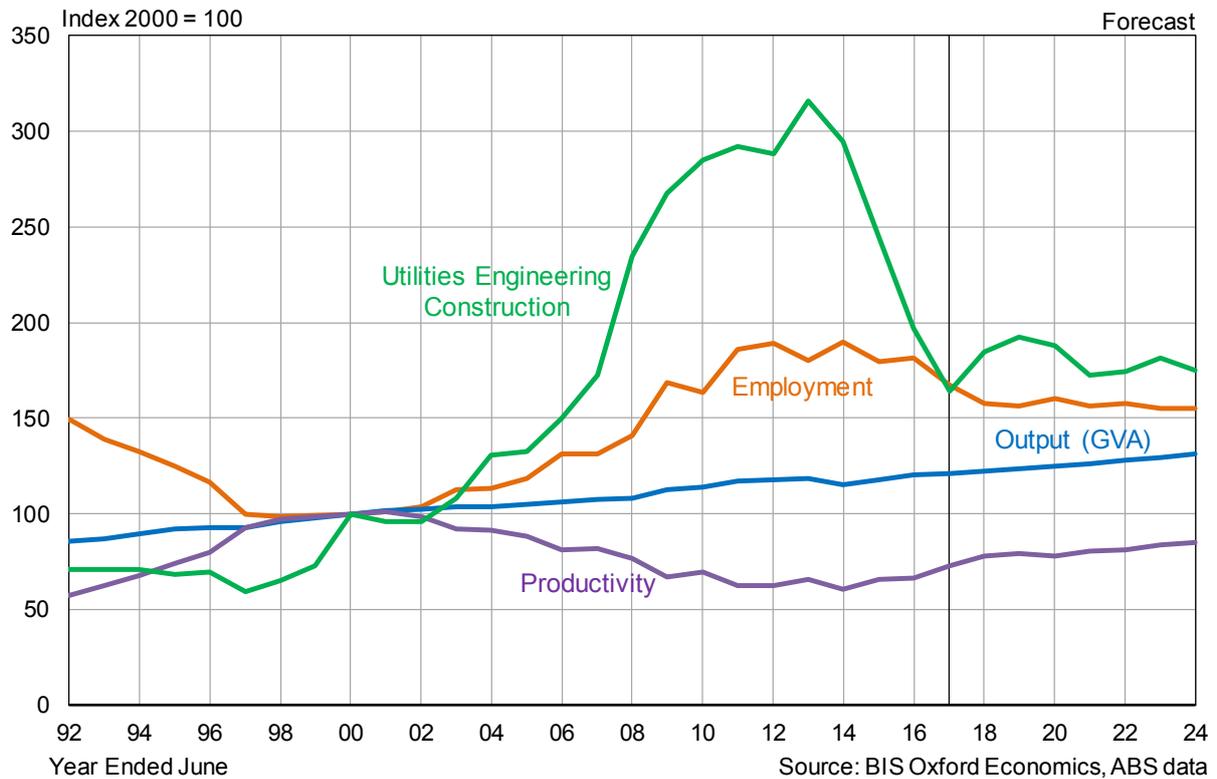


Fig. 18. Australia – Utilities Employment, Output and Investment



5. MATERIALS COST FORECASTS

Ausgrid asked BIS Oxford Economics to provide price escalation factors for key inputs to various asset classes including aluminium, copper, oil and steel. In addition, Ausgrid requested BIS Oxford Economics to generate construction (both engineering and non-residential building) cost forecasts over its upcoming regulatory period. Forecasts of key capex input cost categories are summarised in Fig. 19 below.

Fig. 19. Material Cost Escalators – Summary Table

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average ⁽²⁾
NOMINAL PRICE CHANGES	Actuals						Forecasts		Next Regulatory Period					
Aluminium ⁽¹⁾	-12.9	-10.1	1.8	16.9	-5.6	10.9	3.9	5.1	-1.6	0.7	0.5	0.8	9.7	2.0
Copper ⁽¹⁾	-9.4	-5.9	2.2	-0.3	-11.3	6.2	3.7	7.4	2.3	2.0	-1.8	-1.3	7.5	1.7
Oil (Brent) ⁽¹⁾	10.5	-1.4	12.5	-25.8	-32.3	11.2	9.7	8.4	3.3	2.5	-1.7	-1.3	7.6	2.1
Steel beams and sections PPI	1.6	2.2	-4.7	4.1	0.1	4.4	2.4	-0.5	0.0	3.7	5.5	5.8	3.7	3.7
Concrete, cement and sand - Sydney PPI	6.2	4.2	1.7	2.8	3.6	2.5	7.6	3.5	-0.7	1.0	1.4	1.4	0.5	0.7
Hardwood Log Prices ⁽¹⁾	3.9	2.3	1.3	-1.4	3.1	1.3	3.1	2.7	2.1	2.9	2.9	2.8	2.8	2.7
Electric cable and wire manu PPI	7.6	-3.2	-2.9	-5.5	-6.4	10.7	0.3	1.9	-0.7	-0.2	-1.6	-1.3	2.6	-0.2
Communication equipment manu PPI	4.2	9.9	4.8	5.4	5.4	0.2	0.5	2.9	1.5	2.1	2.1	2.3	3.8	2.4
Electrical switches, relays, etc. IPD ⁽¹⁾	3.1	1.4	9.0	-0.5	2.7	-3.0	-1.7	1.0	-1.4	-1.5	-2.4	-2.2	1.2	-1.2
Software IPD ⁽¹⁾	-3.8	-3.9	-4.6	-4.4	-4.5	-5.1	-4.0	-2.8	-4.0	-4.6	-4.7	-3.5	-2.5	-3.9
Electrical equipment manufacturing PPI	2.0	-3.0	-0.8	-4.0	1.0	3.9	0.0	0.9	0.0	0.7	0.6	0.7	1.8	0.8
Non-hydro electricity construction IPD ⁽¹⁾	3.2	2.5	2.0	-0.2	1.6	3.8	1.0	1.7	0.7	1.6	1.1	1.3	2.7	1.5
Non Residential Building Work Done IPD ⁽¹⁾	1.8	0.1	1.1	2.6	3.0	3.8	4.8	3.9	2.7	2.8	3.3	3.3	3.0	3.0
Consumer Price Index (headline) ⁽³⁾	2.3	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5	2.5
REAL PRICE CHANGES														
Aluminium ⁽¹⁾	-14.8	-12.1	-0.9	15.0	-6.9	9.1	1.9	2.8	-4.0	-1.8	-2.0	-1.6	7.0	-0.5
Copper ⁽¹⁾	-11.5	-8.0	-0.5	-2.0	-12.5	4.4	1.7	5.1	-0.2	-0.5	-4.2	-3.7	4.9	-0.7
Oil (Brent) ⁽¹⁾	8.1	-3.6	9.5	-27.1	-33.2	9.4	7.6	6.1	0.8	0.0	-4.1	-3.7	4.9	-0.4
Steel beams and sections PPI	-0.7	-0.1	-7.3	2.3	-1.2	2.7	0.4	-2.7	-2.4	1.2	2.9	3.2	1.2	1.2
Concrete, cement and sand - Sydney PPI	3.9	1.9	-1.0	1.1	2.2	0.8	5.5	1.2	-3.1	-1.5	-1.1	-1.0	-1.9	-1.7
Hardwood Log Prices ⁽¹⁾	1.5	0.1	-1.4	-3.1	1.7	-0.4	1.1	0.5	-0.4	0.4	0.4	0.3	0.3	0.2
Electric cable and wire manu PPI	5.2	-5.4	-5.5	-7.1	-7.7	8.8	-1.6	-0.4	-3.1	-2.6	-4.0	-3.7	0.1	-2.7
Communication equipment manu PPI	1.9	7.4	2.1	3.7	4.0	-1.5	-1.4	0.7	-1.0	-0.4	-0.4	-0.2	1.3	-0.1
Electrical switches, relays, etc. IPD ⁽¹⁾	0.8	-0.9	6.1	-2.2	1.3	-4.6	-3.6	-1.2	-3.8	-3.9	-4.8	-4.6	-1.2	-3.7
Software IPD ⁽¹⁾	-6.0	-6.0	-7.2	-6.0	-5.8	-6.7	-5.9	-5.0	-6.3	-6.9	-7.0	-5.9	-4.9	-6.2
Electrical equipment manufacturing PPI	-0.3	-5.1	-3.4	-5.6	-0.4	2.1	-2.0	-1.3	-2.4	-1.7	-1.9	-1.7	-0.7	-1.7
Non-hydro electricity construction IPD ⁽¹⁾	0.8	0.2	-0.7	-1.9	0.2	2.0	-0.9	-0.5	-1.8	-0.9	-1.3	-1.2	0.2	-1.0
Non Residential Building Work Done IPD ⁽¹⁾	-0.5	-2.1	-1.6	0.8	1.6	2.1	2.8	1.6	0.2	0.3	0.8	0.7	0.5	0.5

Source: BIS Oxford Economics, RBA, ABARES, LME, ABS Data

(1) 2017 values are estimates

(2) Expected average wage change for Ausgrid's next revenue determination period i.e. from 2019/20 to 2023/24 inclusive.

(3) Reserve Bank of Australia forecasts to June 2019. Beyond that, we have used the mid-point of the Reserve Bank's 2 to 3 per cent inflation target range as preferred by the AER in their recent revenue determinations.

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5.1 ALUMINIUM, COPPER AND OIL COMMODITIES

Forecasts for aluminium, copper and oil commodity prices have been sourced from the Energy & Metals Consensus Forecasts as the AER prefers the use of broad based market forecasts of commodities. 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 subsequent three years to 2021. Long term forecasts are provided as a five-year average. We have connected the annual and five-year average points using a linear growth path to yield annual forecasts over the remaining three-year period (i.e. for the 2021/22 to 2023/24 period).

These forecasts are denominated in US\$. Hence, we have converted them to Australian dollars. Due to the lack of 'official' forecasts over the long-term, we have applied BIS Oxford Economics in-house exchange rate forecasts. See Fig. 20 for a comparison of exchange rate forecasts by different agencies.

Fig. 20. US\$/A\$ Exchange Rate Forecast Comparison

	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
BIS Oxford Economics	0.728	0.754	0.740	0.738	0.749	0.791	0.844	0.801	0.740
ABARES ¹	0.728	0.754	0.733	0.738	0.740	0.740	0.740		
Office of the Chief Economist	0.728	0.744	0.740	0.735	0.720	0.720	0.720		
OECD	0.728	0.743	0.746	0.741					

1: Longer term assumptions between 2018/19 and 2021/22 are from March quarter edition of the Agricultural Commodities publication

We have sought out other exchange rate forecasts in order to provide a 'consensus' forecast, including exchange rate assumptions from The Office of the Chief Economist (OCE) and ABARES.

Our own exchange rate forecasts are higher than the assumptions presented from external sources. We note that these differences tend to be later in the forecast period, where it appears others assume a flat line beyond a certain point. Our own forecasts are model driven over a longer time period – based on factors including commodity prices and interest rates.

We note that our higher exchange forecasts mean the Australian dollar commodity forecasts would be more conservative than if ABARES or OCE assumptions were adopted. This would occur due to the percentage growth forecast between 2018/19 and 2021/22.

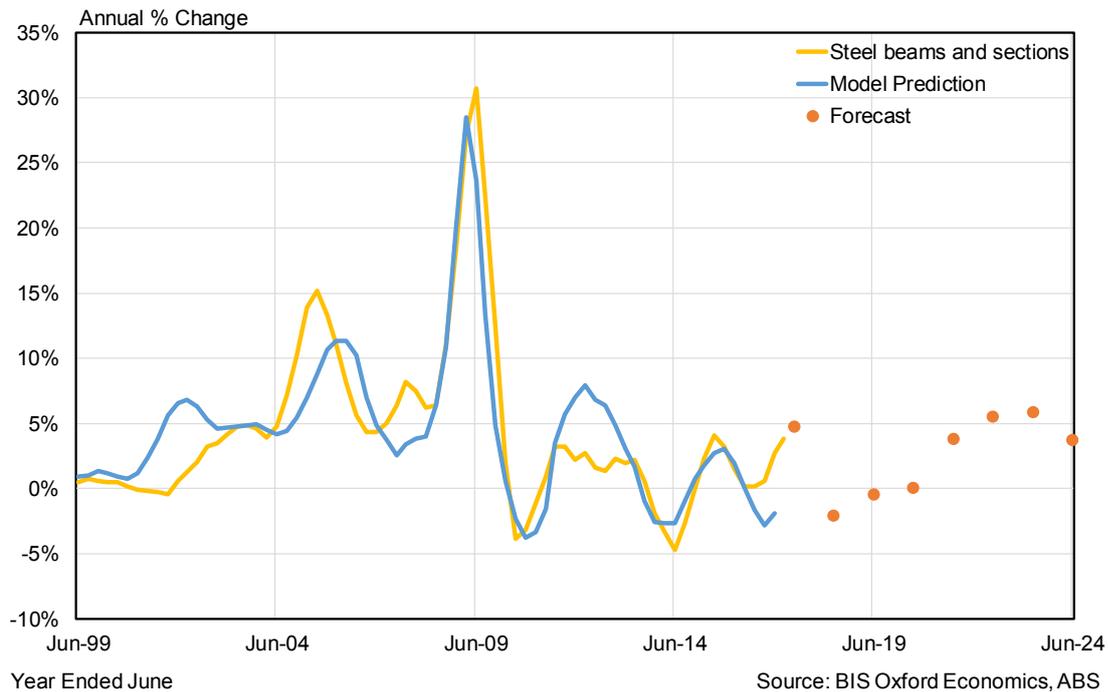
Steel Poles

We selected the "Steel Beams and Sections" producer price index (PPI) as a benchmark for steel prices relevant to Ausgrid's business. We believe this is an appropriate benchmark as it excludes reinforcing steel (used in concrete) and sheet metal products. Hence, we expect the steel products PPI to be a good proxy for the price of steel used in the construction of metal poles.

The Steel Beams and Sections PPI was forecast via the application of a statistical model, driven primarily by changes in the prices of three key inputs: coking coal, iron ore, and wages.

As with other market driven commodities, we explicitly used consensus forecasts of coking coal and iron ore. We converted US\$ prices to A\$ using our own 'in-house' exchange rate forecasts. For the third input into the PPI (wages), we used our company wage forecast.

Fig. 21. Steel Prices (nominal)



Over the 2019/20 to 2023/24 regulatory period, we forecast real price growth of 1.2% per annum. This is driven broadly by growth in iron ore, coking coal, and wage price growth.

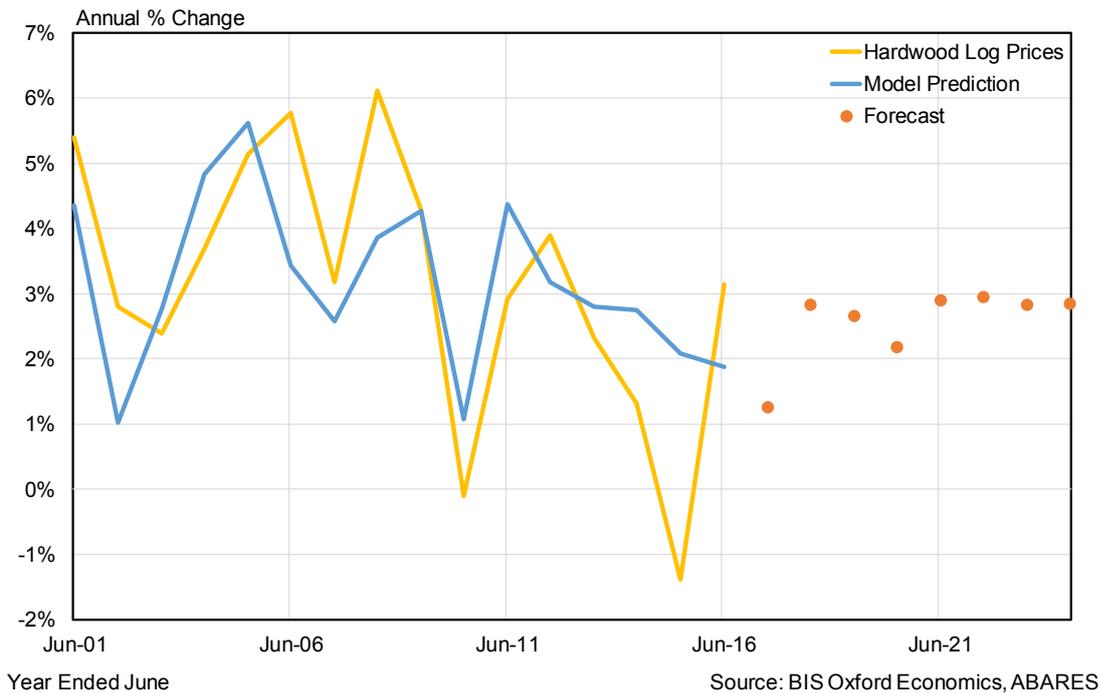
Wood Poles

Wood prices faced by the distributors are subject to quotas on the wood available for poles, and this quota is inversely related to activity levels in the construction industry. For example, a booming construction sector, in particular new residential building, is likely to reduce the quota of wood available for poles, and apply upward pressure on prices.

The Hardwood Log Price Index within the Australian Forest and Wood Products statistics from ABARES was utilised as a proxy index to escalate the timber poles cost price index. We have back data to June 2000. In addition, we have an in-house econometric model for timber pole prices driven by the private dwelling implicit price deflator (IPD), which indirectly is a function of residential construction activity. The outlook for prices over the near-term is also affected by appreciation/depreciation of the Australian dollar. Although the wood used by the distributors is domestically produced, hardwood is also imported from North America and Asia. Despite not being used by the distributors, these imports can still have an effect on Australian prices, by changing the relative competitiveness. A strong Australian dollar makes imported products more competitive, and may lower demand levels for domestic produce, and vice versa. Hence, the value of the Australian dollar has been taken into account when analysing movements in wood prices.

Forecasts of these inputs in conjunction with the econometric model coefficients have been utilised to escalate the Hardwood Log Price Index over the forecast horizon.

Fig. 22. Wood Prices (nominal)



Over the 2019/20 to 2023/24 regulatory period, we forecast real price growth of 0.3% per annum. The majority of the growth is driven by expected moderate price increases in building materials via the private dwelling implicit price deflator. This, in turn, results from BIS Oxford Economics’ dwelling building forecasts.

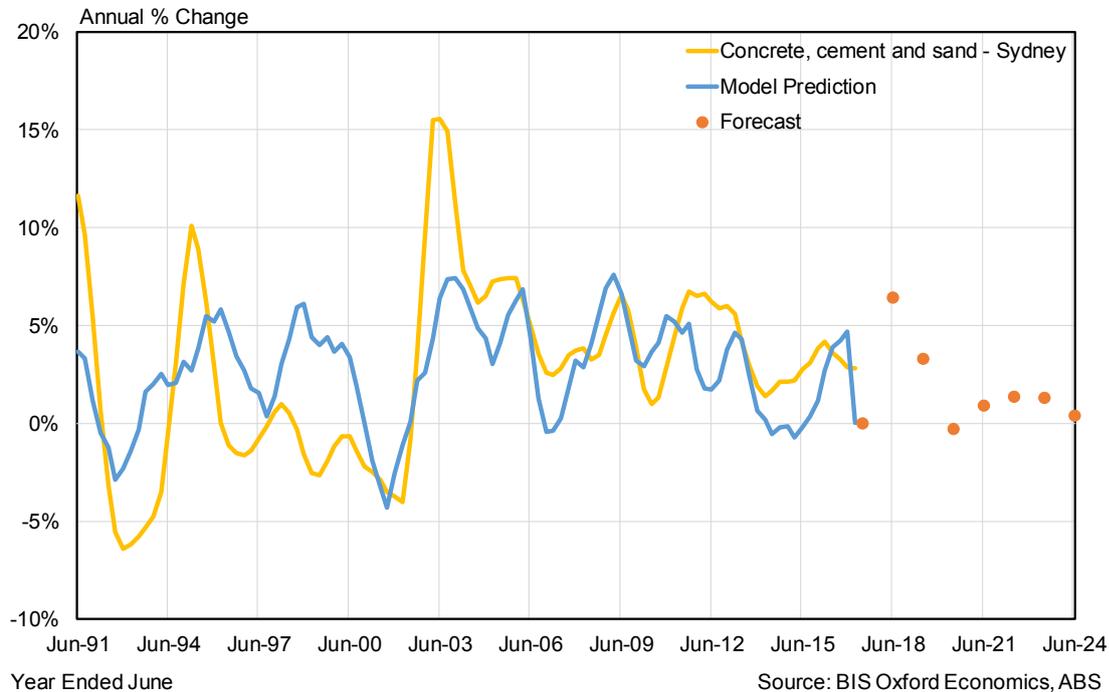
An environment of low interest rates combined with a deficiency of stock laid the foundations for the strong upturn in new dwellings investment that commenced in 2013/14. However, with the exception of NSW, in particular Sydney, most markets are now at or near oversupply. This, combined with constraints on lending, should see a decline in residential work done in 2017/18. We estimate national dwelling commencements in 2016/17 around 215,000, down from the 234,000 peak in 2015/16. Growth in work done terms has been decelerating for some time now and activity is set to decline between 2017/18 and 2019/20. A recovery is forecast from this point, coinciding with the latter half of Ausgrid’s upcoming regulatory period. This should see demand for building products rise resulting in tightness in material supply markets and higher wood prices.

Concrete Poles

The Sydney concrete, cement and sand PPI within the ABS Producer Price Index (Cat No 6427) has been used as a proxy index to escalate the concrete poles cost price index. An econometric model was prescribed to estimate historical relationships and to produce price forecasts of concrete poles. Prices tend to track demand for concrete, cement and sand products, which primarily arise from the construction industry. Specifically, key sectors which support demand for and therefore drive prices of concrete include Engineering Construction (especially the roads sector), Residential Building and Non-

Residential Building. BIS Oxford Economics maintains detailed forecasts of each of these industries by category and by state.

Fig. 23. Concrete Prices (nominal)



Over the 2019/20 to 2023/24 regulatory period, we forecast real price growth of -1.7% per annum. This negative outlook results from a broadly weak forecast for construction activity, especially in the engineering construction and non-dwelling building sectors.

Communication cable, metering, switchgear and communication equipment

Communication cable and communication equipment price increases tend to be related to wage costs, exchange rates, and copper prices. We have selected two ABS proxies for these series: the “Electric cable and wire manufacturing” and “Communication equipment manufacturing” series within the ABS Producer Price Index (Cat No 6427).

We examined the use of detailed import price data for specific product classes (e.g., metering equipment) but found these series to be too noisy (i.e. volatile). We therefore deferred to the use of more aggregated data, such as the “Electrical switches, relays, etc. IPD”.

The ABS publishes import data for metering and switchgear in both current and constant prices for the “Electrical switches, relays, etc” data series (ABS Cat No 5302). We derived an implicit price series for this and used it as a proxy for metering and switchgear. For electronic equipment the “electrical equipment manufacturing” PPI (ABS Cat No 6427) was used.

Fig. 24. Electric cable prices (nominal)

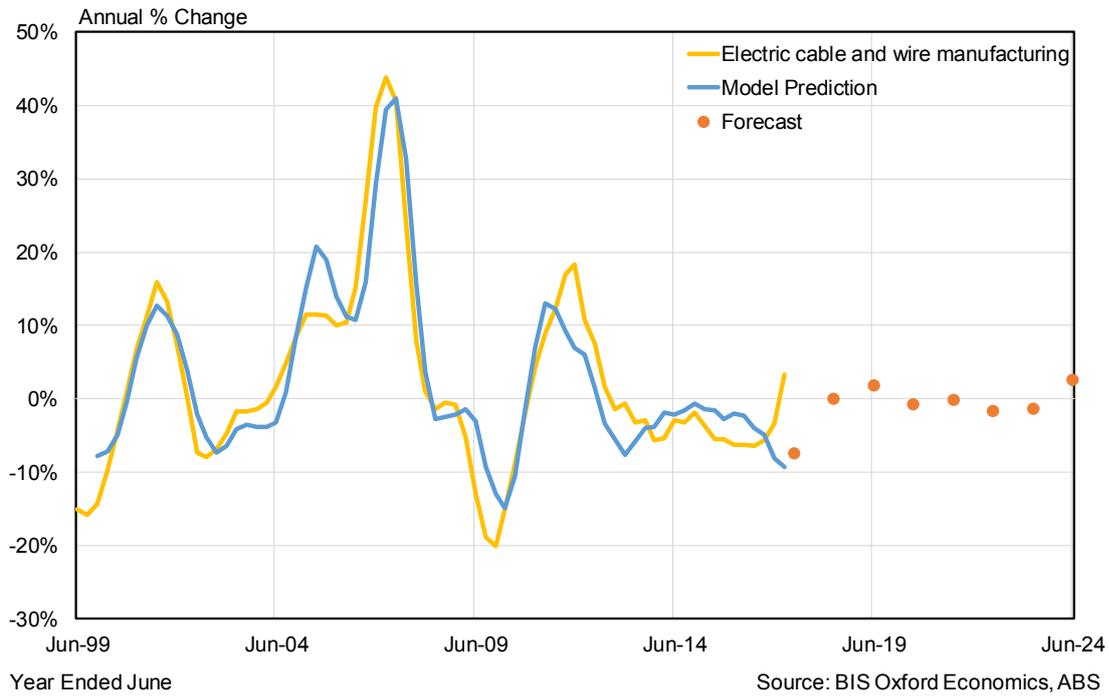
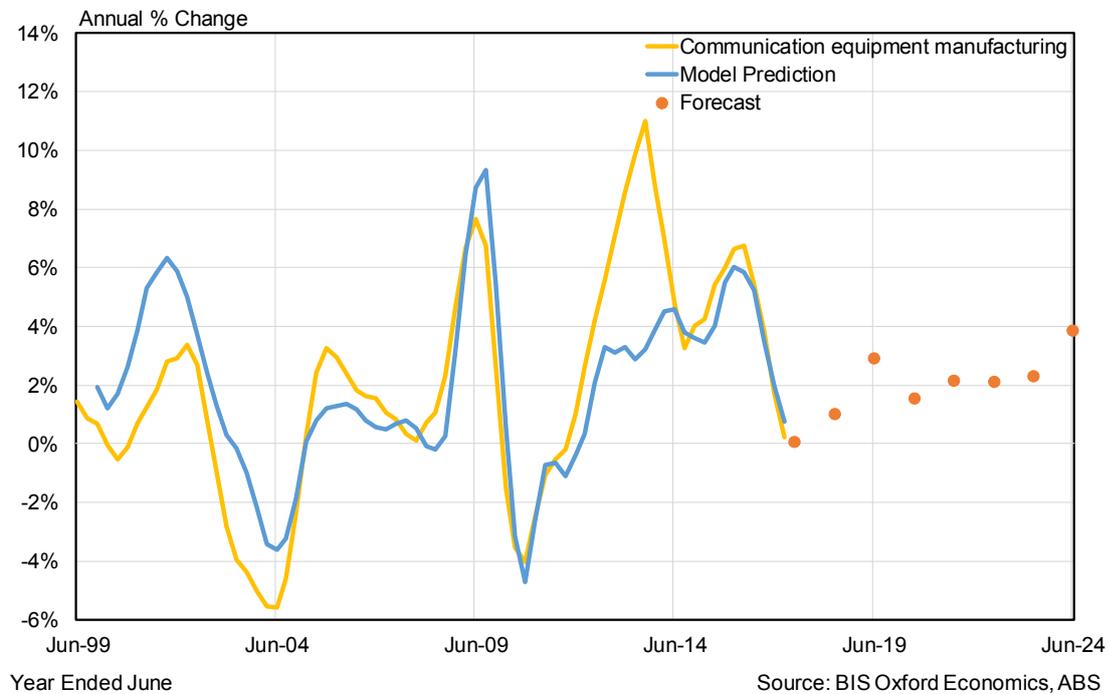


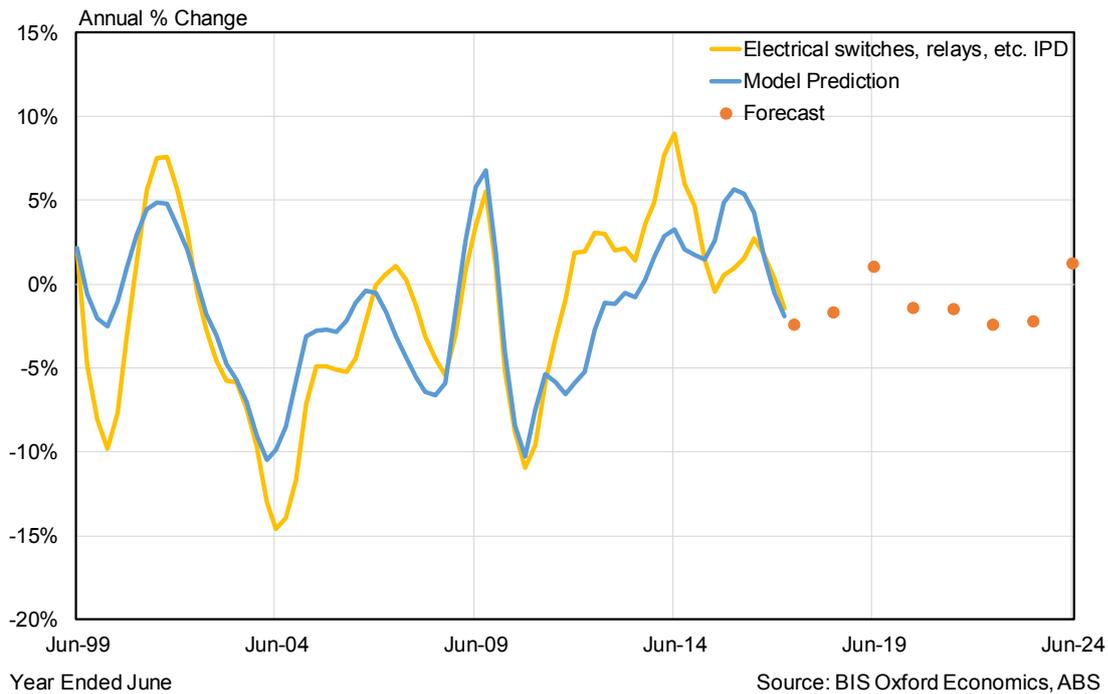
Fig. 25. Communications equipment prices (nominal)



Over the 2019/20 to 2023/24 regulatory period, we forecast real price growth of -2.4% per annum for the electrical cable and wire manufacturing series. Electrical cable prices have tended to be relatively volatile but over a longer period of time have been weak in comparison to the CPI.

On the other hand, communications equipment price increases have tended to be stronger in recent years. That being said, we are forecasting real price growth to be flat over 2019/20 to 2023/24 inclusive (i.e. a 0% rise p.a. on average) due to weak growth in copper prices.

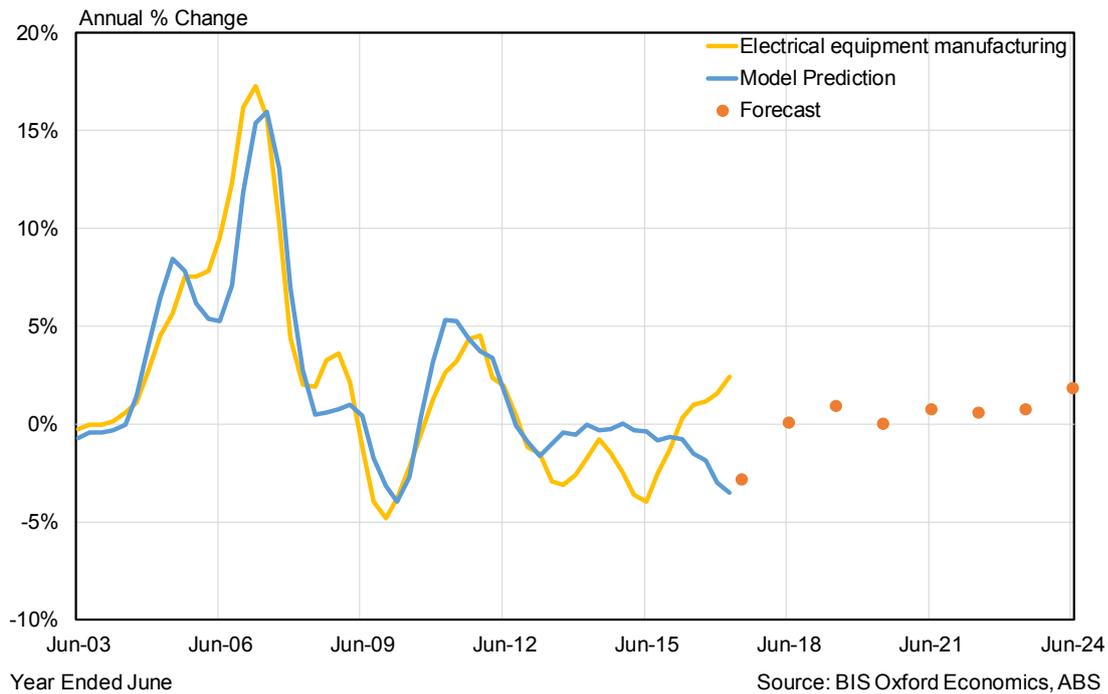
Fig. 26. Electrical switch prices (nominal)



Similar to electric cable prices, we forecast real price growth of -3.5% per annum for the electrical switches series between 2019/20 and 2023/24. Note that electrical switch prices growth, on average, have been below the CPI inflation since 1987.

While recent electrical equipment manufacturing price rises have tended to be stronger, future price increases are also expected to remain below CPI inflation. Between 2019/20 to 2023/24, we forecast real price growth of -1.6% p.a. Again, this is largely driven by weak growth in copper prices.

Fig. 27. Electrical equipment prices (nominal)

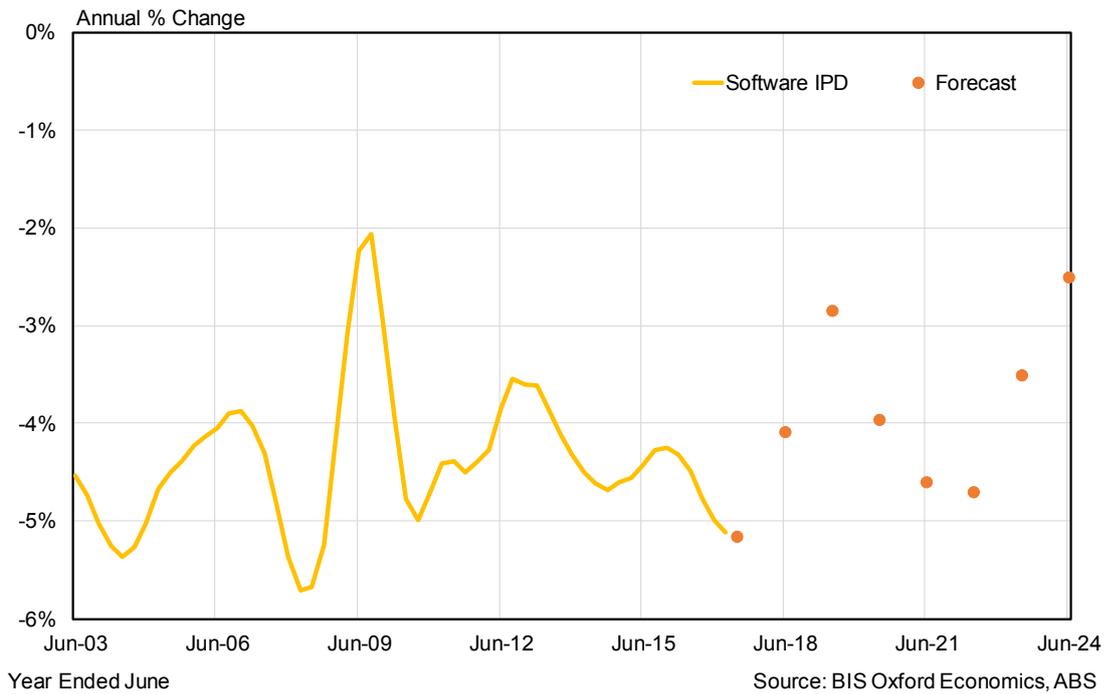


Software

For number of years, software price changes have been tracking below CPI inflation. Prices declined by -4.2% on average over the decade to 2014/15. This has been driven by rapid technological advancement and higher efficiency of supply chains. Movements in the Australian dollar have also contributed to changes in software price growth. When the A\$ was generally above parity over the three years to 2012/13, price declines in software averaged around -4%. However, as the A\$ depreciated over the past three years, price declines in software surprisingly increased in magnitude.

While we expect higher import price rises to come through in the near-term, limiting pressure on the magnitude of price declines, we believe prices over the longer term will be falling although the rate of decline will slow. A lower rate of increase in technological innovation and a lower Australian dollar averaging around US\$0.75 over the next decade (compared to around US\$0.89 over the past decade) will place further upward pressure on prices.

Fig. 28. Software prices (nominal)

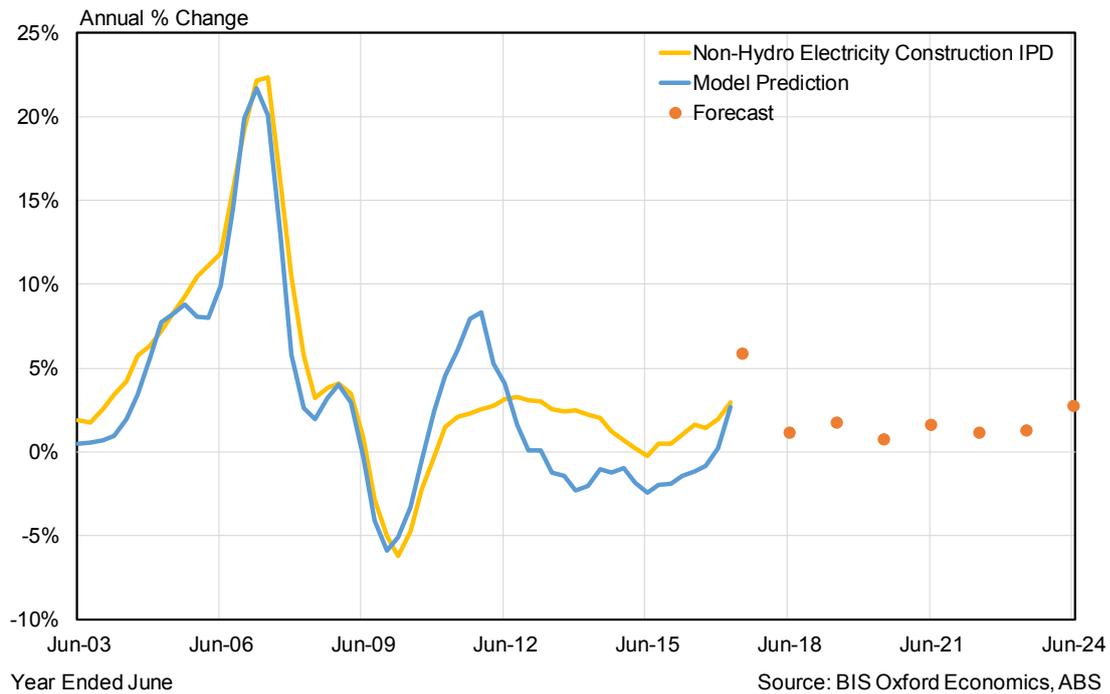


Construction costs

The Non-Hydro Electricity Construction IPD obtained from the ABS as a special request is a measure of construction costs in the electricity sector (which covers transmission, distributions and generation related construction). The ABS has provided us with some guidance as to the weightings of the key inputs that one should apply in order to build the index from ‘ground up’. Note that the IPD is an output index and hence includes contractor margins along the supply chain. An input based index does not include contractor margins and therefore will not correlate perfectly with the ABS IPD measure. Nonetheless, the approximation is fairly good as it picks up all the turning points in the construction cost cycles.

Forecasts of construction costs have been based on our wage forecasts for the construction sector together with our forecasts of the main raw materials for the manufacture of the other key inputs (such as copper, steel and wages) of the overall index. Where possible, we sourced the commodity price forecasts from Energy and Metals Consensus Forecasts publication.

Fig. 29. Non-hydro electricity IPD (nominal)



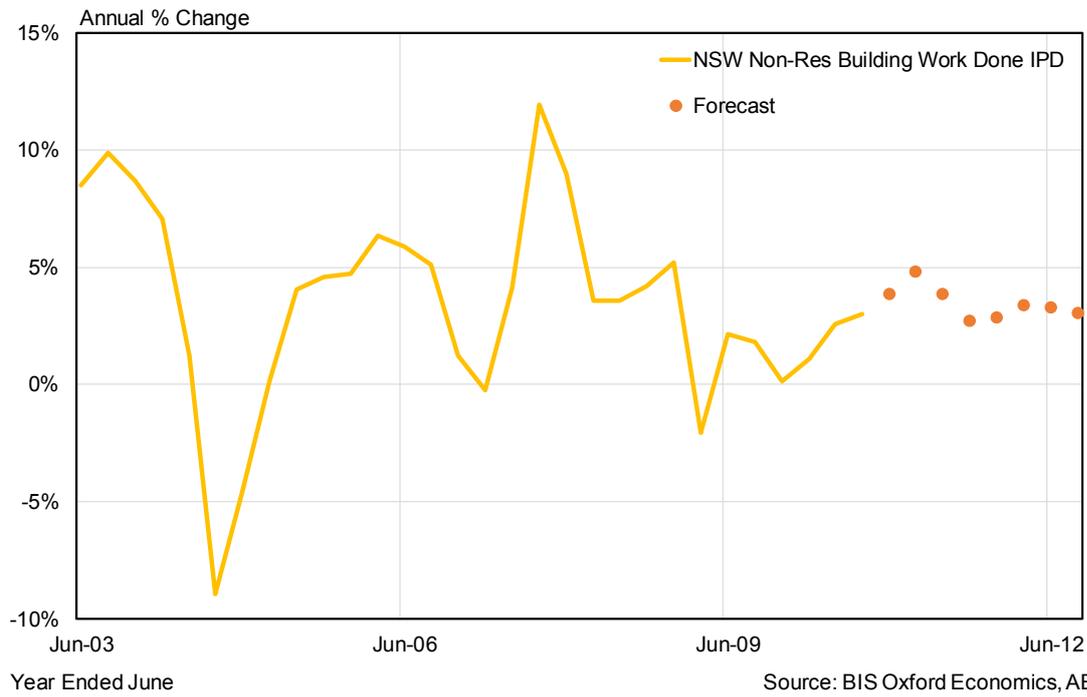
Over the 2019/20 to 2023/24 regulatory period, we forecast real price growth of -0.9% per annum for the series.

The Non-Residential building work done IPD obtained from the ABS is related to the cost of a subset of construction work– specifically excluding residential building and non-building construction (roads, infrastructure, poles and wires, etc). This is most typically related to work done on offices, retail, schools and hospitals.

This price series is to a large degree driven by the level of activity in the non-dwelling building sector. More demand for building specific skills and materials typically leads to higher prices.

Our forecasts of non-dwelling building costs broadly track our forecasts of non-dwelling building activity (ie, work done).

Fig. 30. NSW Non-Residential Building Work Done IPD (nominal)



6. LAND VALUE FORECASTS

For this report, we have adopted regression models to develop escalation factors for suburban, industrial and CBD land values. Each of these models was estimated using the historical land price data obtained from the New South Wales government's Valuer General. The definitions of the three land types used in this report are:

- Central business district (land values in the Sydney CBD defined as the suburb of Sydney within the City of Sydney LGA)
- Suburban (residential land values in the Sydney Metropolitan area will be used as a proxy for suburban land values)
- Industrial (large industrial sites in the Sydney, Newcastle, Wollongong region)

Suburban (home sites) and industrial (large sites) land comprise the Sydney metropolitan region and cover 63% of New South Wales population according to Census 2011. The Sydney CBD is within the Sydney metropolitan region and comprises 0.2% of the New South Wales population. The CBD is the largest centre of employment, with 8.3% of the New South Wales population employed in the CBD. The remaining 37% of the state's population reside on rural (rural home sites and hobby farms) and agricultural (wheat and grazing) land.

Data from the Valuer General was preferred over the ABS data published as part of its National Accounts series due to a clearer distinction between property classes and geography.

6.1 HISTORICAL MOVEMENTS IN LAND VALUES

All three property value series display a high degree of cyclicity over their available history (see Fig. 29).

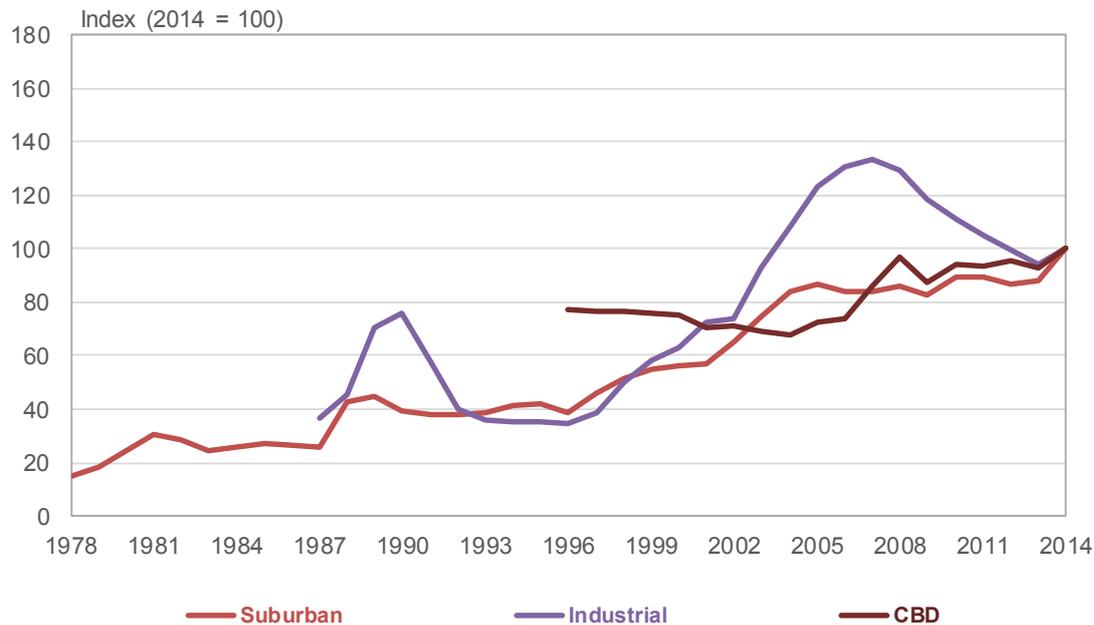
There have been two distinct cycles over this period:

- The first upswing occurred in the second half of the 1980s and was the result of a boom/bubble in asset prices in the aftermath of the 1987 stock market crash that led to wide spread overbuilding.
- The second started in the late 1990s, initially with a boom in residential construction and investment. This was later joined by industrial property via the boom in financial engineering post 2003.

Each boom was followed by a bust: the first resulted in the early 1990s recession, which was characterised by severe falls in asset prices, particularly amongst commercial property in metropolitan areas around Australia. The second bust was caused by the GFC, when a crisis in financial markets led to a large correction in property prices across all sectors bar residential.

The main difference to the first downturn was that most property markets were not oversupplied when the GFC hit.

Fig. 31. Real Property Value Indices



Source: NSW Valuer General, BIS Oxford Economics

6.2 FORECASTS OF LAND VALUES

Recent back data and forecasts of the three land types discussed in this report are provided Fig. 30 below.

Fig. 32. Land Value Forecasts

Per cent change, as at June

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average (b)
NOMINAL PRICE CHANGES (a)	Actuals					Estimates			Forecasts		Next Revenue Determination Period					
Suburban	9.8	3.3	-0.5	3.5	16.6	13.7	15.9	12.8	8.8	5.3	5.8	6.6	7.4	8.0	6.5	6.7
Industrial	-3.7	-2.5	-2.7	-3.2	8.8	13.9	6.9	6.4	3.7	3.9	4.3	4.1	3.2	2.4	2.2	3.1
CBD	9.8	2.8	4.0	0.1	10.1	4.6	7.9	11.2	10.2	9.2	8.7	7.1	3.3	1.0	0.4	3.9
Consumer Price Index (headline - RBA Forecasts)	2.3	3.1	2.3	2.3	2.7	1.7	1.4	1.7	2.0	2.2	2.5	2.5	2.5	2.5	2.5	2.3
REAL PRICE CHANGES																
Suburban	7.4	0.2	-2.8	1.3	13.9	12.0	14.5	11.1	6.9	3.1	3.3	4.1	4.9	5.5	4.0	4.4
Industrial	-6.1	-5.6	-5.0	-5.5	6.1	12.2	5.5	4.7	1.7	1.7	1.8	1.6	0.7	-0.1	-0.3	0.7
CBD	7.5	-0.3	1.7	-2.2	7.4	2.9	6.5	9.5	8.2	7.0	6.2	4.6	0.8	-1.5	-2.1	1.6

Source: BIS Oxford Economics, Valuer General of NSW, RBA, ABS data

(a) Nominal price changes are calculated by adding the inflation rate to real price changes.

(b) Average for the next revenue determination period i.e. from 2019/20 to 2023/24 inclusive.

However, average increase in headline CPI is calculated as a geometric mean of two-year Reserve Bank forecasts and a 2.5% per annum inflation for the next eight years. This method has been used by the Australian Energy Regulator in their recent revenue determinations.

Fig. 33. Forecast Real Property Value Escalations, Index

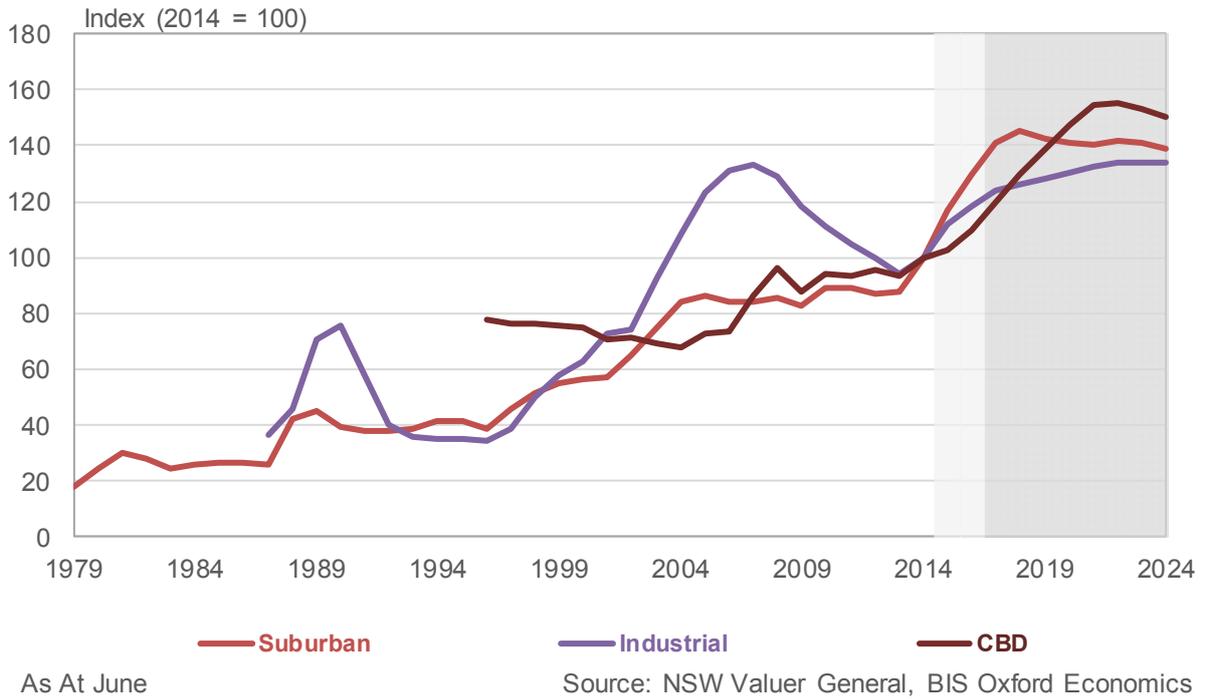
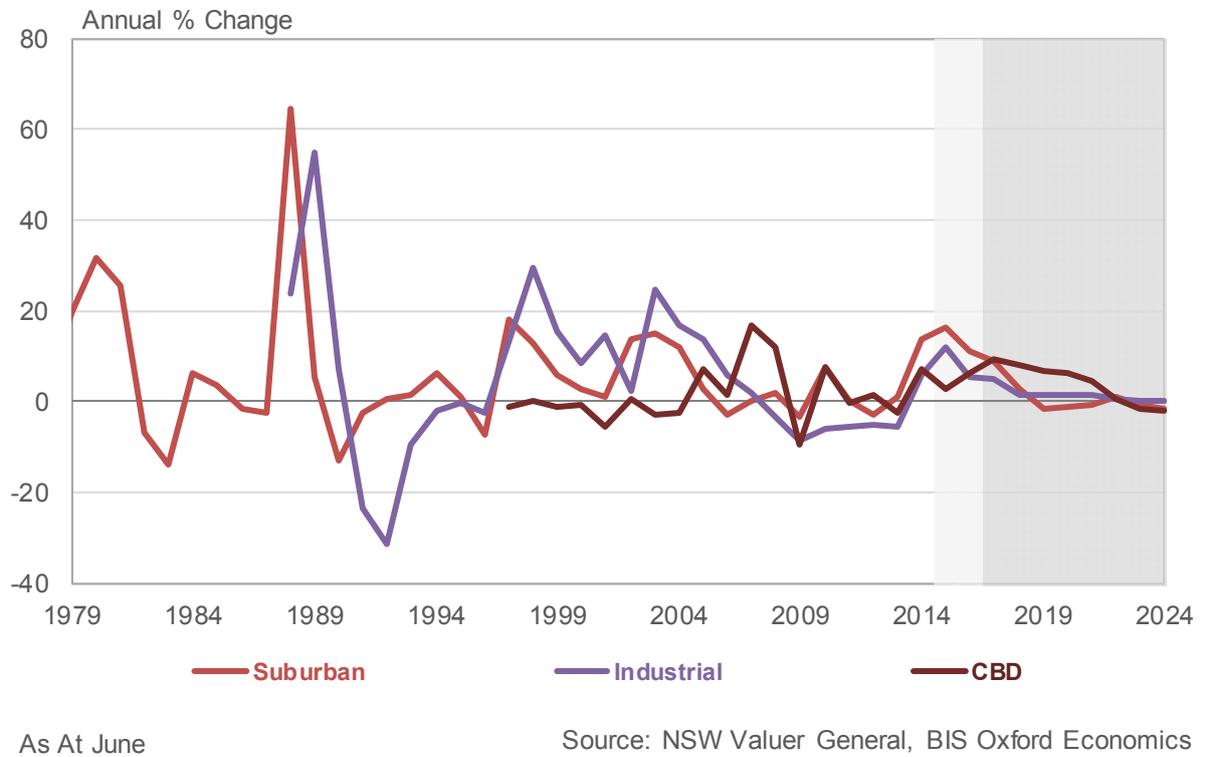


Fig. 34. Forecast Real Property Value Escalations, % Change



6.2.1 Suburban land values

Suburban land values in metropolitan Sydney are determined by real dwelling commencements (NSW) and real Sydney house prices. Residential land values in metropolitan Sydney is used as a proxy for suburban land values.

Our estimated suburban land value model is presented below::

$$res_syd(t) = -37,653.95 + 0.55 res_syd(t-1) + 0.02 real_res_comm_nsw(t) + 409.64 real_hprice_syd(t) + 112,840.85 dum_88$$

Where: $t = \text{time}, t-1 = \text{lag of 1 year}$

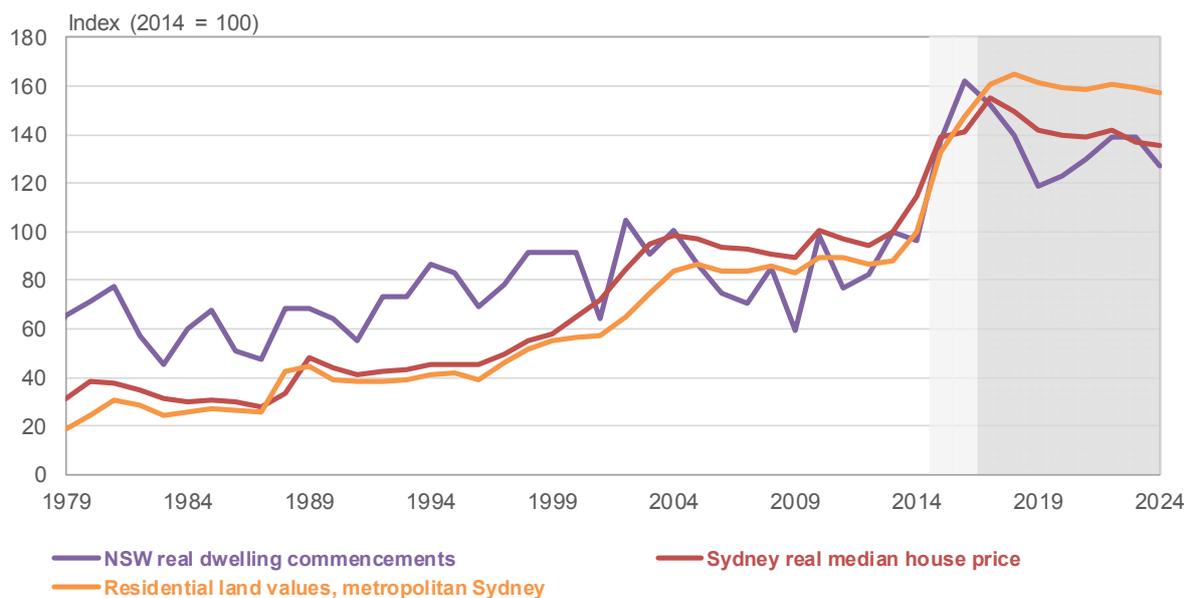
res_syd = Sydney residential land value

$real_res_comm_nsw$ = real value of NSW residential commencements

$real_hprice_syd$ = real house prices, Sydney

dum_88 = dummy variable for 1988 to capture the impact of the late 1980s housing bubble

Fig. 35. Real residential land value escalations, regression variables



As At June

Source: ABS, NSW Valuer General, BIS Oxford Economics

For most of last decade and early this decade, home building in Australia was well below underlying demand. This led to a large deficiency of stock. However, strong underlying demand, which hit a high of 186,000 in 2011/12 compared to 157,000 p.a. for the preceding 10 years, finally unlocked the fundamentals for strong residential investment and laid the foundation for a recovery in dwellings building.

Dwelling commencements picked up to 164,000 in 2012/13 (from 145,000 in 2011/12) before escalating to a peak of 232,000 in the year-ended March 2016. While strong underlying demand drove the initial upturn, the very high level of

dwelling stock deficiency (or undersupply) in the three eastern states and Western Australia between 2012 and 2015, combined with low interest rates and stabilisation of the unemployment rate below 6%, elongated the upswing in residential building.

We believe all markets with the exception of New South Wales, in particular Sydney, and Victoria are either in oversupply or are close to a balanced market. Sydney still has a significant pent up demand.

However, the removal of pent up demand across Australia will be the key driver of the downturn in dwelling commencements over the next few years. In New South Wales the downturn will be driven by the housing affordability constraint which will be as bad in Sydney as in mid-2008 when housing interest rates were 9.75%, compared to the current 5.25%. This will continue to stifle first home buyer demand. In addition, as price growth slows over 2017/18 in response weaker investor demand due to prudential regulatory actions against investors, more investors will likely exit the Sydney and Victorian markets when the prospect for capital growth evaporates. Hence, the downturn will happen across all markets.

In Sydney, the median house price eclipsed the \$1 million mark in the June quarter 2015 (\$1,051,900), up by 60% from the June 2011 median. Although affordability has become increasingly strained, indicators for the Sydney market remain positive. Sydney's residential vacancy rate was a very tight 1.7% in March quarter 2017. Strong population growth from rising net overseas migration and a continued low net interstate migration outflows have kept underlying demand elevated. With the upturn in new dwelling completions coming through in response to the stronger market, higher than underlying demand, the large stock deficiency has begun to be eroded.

Investor demand, a large component of Sydney's demand, has recovered strongly in the last two quarters. While first home buyers have been increasingly priced out of the market, the much larger upgrader segment has also continued to rise. As a result, the estimated median house price is expected to reach \$1,200,000 at June quarter 2017, representing a 11.2% rise over 2016/17. The June 2017 median is expected to represent a high water mark for the Sydney market this cycle.

Underlying demand in New South Wales is forecast to remain at elevated levels over the three years to 2019/20, at 49,300 dwellings per annum. This is slightly higher than the past five years of 48,700 dwellings per annum, and well up on the five year average of 36,400 per annum in the five years to 2011/12. However, new dwelling commencements are now exceeding underlying demand, with development activity concentrated in the apartment sector.

Rental income growth has slowed, and will continue to remain limited as new supply is added to the rental market. With rental yields are now at record lows, and affordability strained and upside to Sydney prices being reduced, this will begin to discourage investors. This will compound the impact of the rises to investor lending rates, more onerous qualifications for investor finance, and APRA directives to reduce the percentage of interest only loans being issues. Investor demand, which has accounted for more than 50% of residential finance in recent years, is expected to begin to weaken again over 2017/18.

Moreover, pressures in the Sydney market will be eased as the high underlying dwelling deficiency will continue to be eroded. As a result, our forecast is for a 1.7% contraction in Sydney's median house price in 2017/18, taking the median house price to \$1,180,000 at June 2018.

Conditions are likely to remain soft as dwelling completions continue to increase and the New South Wales dwelling deficiency diminishes. At the same time, sluggish economic growth will impact on sentiment in the market, keeping income growth contained and causing purchasers to become more cautious. The cumulative impact of these factors are expected to see Sydney's median house price decline by a further 3% over 2018/19, before some improvement to the economic outlook resulted in a modest median house price rise (+0.9%) in 2019/20. Given that New South Wales is expected to remain in underlying deficiency in this time, the downturn is likely to be shallow. Nevertheless, Sydney's forecast median house price of \$1,150,000 at June 2020 will be just 4% below the forecast peak June 2017 median. Stronger price increases are forecast for the first half of next decade at the next housing cycle runs its course.

We're forecasting suburban land values to increase by 4.4% p.a. in real terms over Ausgrid's next regulatory period.

6.2.2 Industrial land values

The value of large industrial sites in metropolitan Sydney is strongly linked to the capital value of industrial property. Large vacant sites are almost exclusively found in Sydney's Outer industrial region, in a corridor that stretches from Richmond in the north to Camden in the south, and is flanked by Sydney's Central West to the east and the Blue Mountains in the west.

The preferred equation is specified as:

$$ind_syd_{(t)} = -435,535 + 0.94 ind_syd_{(t-1)} + 374.20 real_values_nsyd_{(t)}$$

Where: $t = \text{time}$, $t-1 = \text{lag of 1 year}$

$ind_syd = \text{Sydney industrial land value}$

$real_values_nsyd = \text{real values of outer northern Sydney property}$

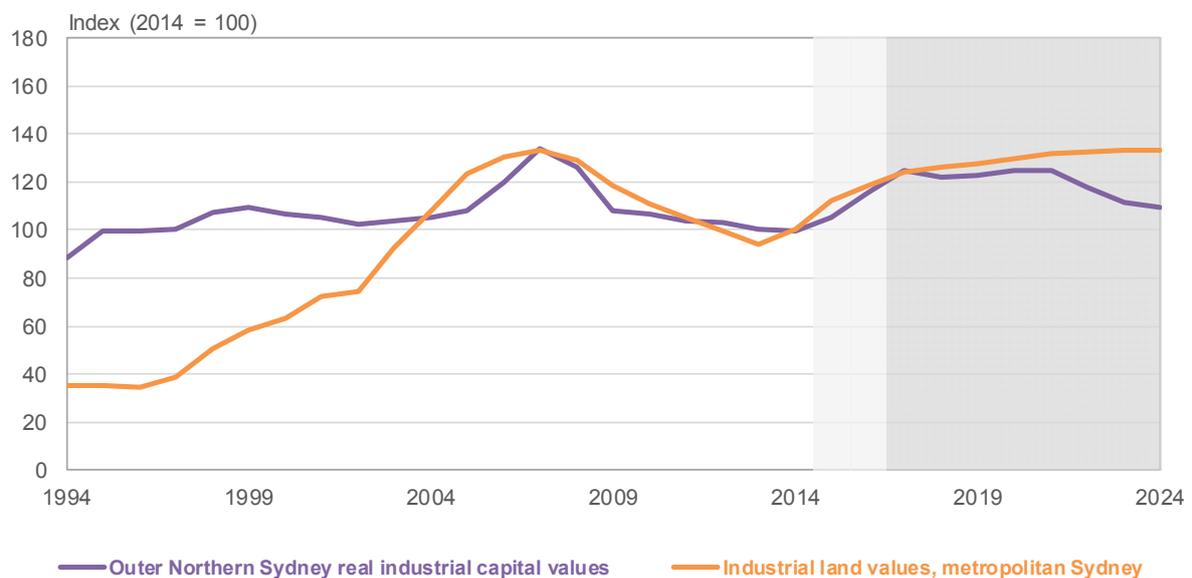
The regression suggests that industrial land values will increase at an average rate of 1% in real terms between 2019 and 2024.

Currently, Sydney's industrial land values are in the midst of a solid cyclical upswing from the trough of 2012/13. A pickup in demand for industrial property is being driven by strong growth in the NSW economy, and particularly investment, boosting warehouse demand. Factory demand is also picking up, further helped by the low Australian dollar. Meanwhile, new supply has been slow to come onstream. These positive fundamentals are expected to push up land values over the next few years to early next decade, when the market is expected to be better balanced, and growth in values begin to soften.

Industrial markets across Australia and, indeed, around the world are facing the prospect of a major disruption as a result of rising interest rates. While the

timing and magnitude of the rises are not set in stone, they will affect many parts of the market, including investment, construction, and demand for new premises. On the ground, underlying demand for investment property will remain cyclical. Underlying demand will closely follow the fortunes of the NSW economy. The state is entering a growth phase that we think will be sustained for much of the period to 2021/22. Sydney has sufficient stocks of industrial land to last for several decades, but most is un-serviced and yet to be zoned. Stocks of serviced, ready-to-build land would only last between two and four years at current take-up/construction rates. However, developers are in the process of bringing new estates on line ahead of demand, likely avoiding potential bottlenecks.

Fig. 36. Real industrial land value escalations, regression variables



As At June

Source: ABS, NSW Valuer General, BIS Oxford Economics

6.2.3 CBD Land Values

We used historical data on land values for a single retail shop in a prime location in the suburb of Sydney as a proxy for CBD land values. This data was sourced from the most recent historical data from the NSW Valuer General and the 2011 Blue Book. An earlier consistent time series is not available, nor are alternative measures of CBD land values.

Demand for and supply of land determine CBD land prices. Land prices rise with increasing demand and decreasing vacancies. Because we do not have CBD office or apartment space prices or forecasts available, we developed a supply/demand pricing model for land in the CBD. This kind of model is an alternative to generally accepted appraisal methodology, such as a land extraction method, which was used in our models of industrial and suburban land values.

The Sydney CBD workforce and CBD office absorption represent demand for land in the Sydney CBD, and Sydney CBD vacancy rate was used to measure contemporaneous supply.

The model suggests an average annual growth rate in the category of CBD land values of 2.5% for the financial years 2018/19 to 2023/24. CBD land values will see strong growth till 2021/22, before entering a downswing. Growth will be driven by a spike in office absorption and a growing CBD office workforce.

7. APPENDIX A: TERMS OF REFERENCE

To be inserted by Ausgrid

8. APPENDIX B: 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 from this report.

9. APPENDIX C: CURRICULUM VITAE OF KEY PERSONNEL

Kishti Sen – Senior Economist

Kishti Sen is a senior economist at BIS Oxford Economics and is responsible for monitoring the Australian economy. In addition, he contributes to the modelling and production of economic forecasts for Australia and works on a variety of macro-related consultancy projects. Kishti is also the co-author of BIS Oxford Economics monthly Economic Outlook publication for Australia.

Prior to joining BIS Oxford Economics in 2007, Kishti was with the Reserve Bank of Fiji for 15 years where he held the position of Research Assistant/Research Analyst/Economist/Senior Economist and Senior Manager through internal rotations and staff promotions. As a senior economist, he built and managed the Reserve Bank's research and analytical work programme. In addition, he was a member of several high profile policy and forecasting committees including the Macro Policy Committee — the think tank for fiscal policy — and the Monetary Policy Committee which advised the Governor directly on interest-rate settings.

Kishti has a PhD in Economics from the University of Sydney.

Richard Robinson – Senior Economist and Associate Director - Economics

Richard Robinson has been employed with BIS Oxford Economics since 1986.

Richard is the company's principal economic forecaster, being largely responsible for the short term economic forecasts presented at BIS Economics' 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).

Richard holds a Bachelor's Degree in Commerce with Honours from the University of Wollongong.

Husam El-Tarifi – Economist

Husam works across the Economics, the Infrastructure and Mining and the Asset Sales units at BIS Oxford Economics where he regularly contributes to the firm's renowned reports and is particularly valued in working through large datasets.

Husam has worked on privately commissioned studies for the finance, infrastructure, not-for-profit, government, utilities and mining sectors. He has been involved in the construction of a wide variety of quantitative models and has also provided model audit and validation services.

Husam joined BIS Oxford Economics in 2013 after obtaining his Bachelor of Economics degree with honours from the University of New South Wales.

Stella McMullen – Economic Analyst

Stella joined BIS Oxford Economics in 2016 after studying Economics and Mathematics at the University of Auckland, New Zealand. Stella works across Economics, Infrastructure and Mining and Asset Sales units.