BIS OXFORD ECONOMICS

DRAFT DECISION PAPER - FORECASTING PRODUCTIVITY GROWTH FOR ELECTRICITY DISTRIBUTORS

PREPARED BY BIS OXFORD ECONOMICS FOR ENDEAVOR ENERGY PTY LTD

DECEMBER 2018

BIS Oxford Economics

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5 December 2018

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1. PRODUCTIVITY GROWTH

SUMMARY

- BIS Oxford Economics was engaged by Endeavor Energy to provide our views on forecasting labour productivity growth for the utilities sector and review the Deloitte Access Economics' (DAE) utilities labour productivity growth forecasts as presented in Table 9 of Australian Energy Regulator's (AER) Draft decision paper.

- As canvassed in our past submissions to the AER, our position is that the labour productivity cannot be applied to the Wage Price Index (WPI). We still believe that if a labour escalator is to be adjusted for productivity improvements (which incidentally is still the favoured outcome of the AER), then Average Weekly Ordinary Time Earnings (AWOTE) is the most logical choice. In addition, we believe that the WPI can only be adjusted for labour productivity if the matching labour productivity measure excludes workforce composition effects.
  - WPI is a measure of underlying wage inflation in the economy or in a specific industry, as the WPI only measures changes in the price of labour and is not intended to capture labour productivity.
  - The WPI, therefore, reflects pure price changes, but does not measure variations in the quality or quantity of work performed i.e. it holds labour composition effects and the associated skill levels/grades fixed as at the base year (2008/09). AWOTE is a better measure of the change in overall costs per employee – and therefore overall labour costs for an enterprise - because it takes into account movements of employees to higher grades, changes in compositional effects from entry/exits of higher skilled/lower skilled (i.e. higher paid/lower paid) workers in an enterprise or industry, and also the payments above base rates of pay, such as bonuses, incentives, penalty rates and other allowances that are a normal part of an employees' earnings over the quarter or year. Accordingly, AWOTE can be adjusted for productivity.
  - Despite the limitations of the WPI, the AER have indicated its preference for the WPI, largely because of the volatility of AWOTE caused by 'significant' compositional problems with AWOTE.

- The AER has not been applying a productivity adjustment to labour price increases – effectively applying a 'zero' productivity increase to its wage escalation decisions (i.e. WPI increases) - for a number of years now. BIS Oxford Economics does not believe that there is a compelling case to change this situation, and that a productivity adjustment should **not** be applied to movements in the WPI across the electricity sector.
  - Contrary to assertions by the AER, labour productivity across the whole utilities sector has declined over recent years. The average annual quality adjusted labour productivity growth-presented in the Draft decision paper does not include data for 2017/18. Based on the calculated average adjustments from 2011/12 to 2016/17 and the actual unadjusted labour productivity for 2017/18, we estimate the quality adjusted labour productivity growth was -5.9 per cent in

2017/18. In the most recent 5-year period from 2012/13 to 2017/18 inclusive, quality adjusted productivity declined by an average of -0.4 per cent per annum. As such, the lack of labour productivity improvement over the past five years appears to refute one of the AER's key justifications to force a change in how they forecast productivity and apply it.

- The productivity measure should not view Opex or Capex in isolation from each other. Using the 'classic' output/employment productivity measure, average productivity growth is 1.7 per cent, compared to the 3.0 per cent average Opex MPFP from the period 2012-16 (as presented in the Draft decision paper). In addition, we forecast that Capex in the electricity sector to fall, restricting future productivity gains.
- Over the medium-to-long term, BIS Oxford Economics expects that productivity growth in the electricity sub-sector will mainly come from the generation sector, rather than the transmission or distribution sub-sectors. This will be derived from transfer from coal power stations to renewable sources, which are less labour intensive. In addition, the shift to solar power and batteries in households will negatively impact the overall level of output for the electricity industry, limiting productivity gains in the electricity sector in terms of output/employment.
- The key objective of maximum reliability within the utilities sector, and not maximum output, means that the utilities sector does operate like most of the 'market' sectors. Therefore, we believe that the 'classic' output/employment productivity measure is not suitable for the electricity sector.

- BIS Oxford Economics forecasts labour productivity growth in the utilities sector over 2019/20 to 2023/24 to be 0.9 per cent per annum, materially lower than DAE's forecast of 1.5 per cent per annum for the same period.
  - We have noted that there are variations between the two forecasts within each year.
  - DAE have not provided forecasts for output and employment, or the weights that were used in developing their utilities labour productivity growth forecast. Therefore, we are unable to comment on DAE's application of their documented methodology or the assumptions used in developing their forecasts.
  - We support the consistent application of the long-term average or over-the-cycle methodology to both productivity and labour price measures.
  - With regard to the AER's 'Option 5', described in section 4.5 of their paper, if a labour input weight of 59.7 per cent was applied to the 0.9 per cent forecast, this would give an opex productivity growth of 0.5 per cent per annum (after applying the -0.05 per cent 'quality adjustment' to the unadjusted productivity forecast).

1.1 INTRODUCTION

BIS Oxford Economics has been engaged by Endeavor Energy Pty Ltd to provide expert opinion on aspects of the Australian Energy Regulators' (AER) *Draft decision paper Forecasting productivity growth for electricity distributors November 2018* (Draft decision paper) to use the Opex productivity growth forecast of 1.0 per cent for the next regulatory determination for each electricity distributor. The AER, in its draft decision, argue that monitoring of Opex productivity performance suggests that electricity distributors have improved their productivity performance over the 2012 to 2016 period. This has resulted in their view that the method for forecasting Opex productivity going forward should be reconsidered, and that the previous rationale for applying zero productivity growth does not reflect recent market trends.

Specifically, Endeavor Energy Pty Ltd has asked BIS Oxford Economics for our views on forecasting labour productivity growth and the Deloitte Access Economics' (DAE) quality adjusted labour productivity growth forecasts for the utilities industry as presented in *Table 9* of the AER's Draft decision paper.

1.2 WPI CANNOT BE ADJUSTED FOR LABOUR PRODUCTIVITY

The Wage Price Index cannot be adjusted for productivity as it reflects pure price changes and does not measure variations in the quantity or quality of work performed.

The AER, in the *Expenditure forecast assessment guideline for electricity distribution November 2013* paper*,* advised that their preferred approach for assessing labour price changes over a forecast period is to use the Wage Price Index (WPI) published by the Australian Bureau of Statistics (ABS), and that the labour price measure should be consistent with the treatment of forecast productivity changes. The net impact of labour price changes and labour productivity should reflect the pure price change. For Opex, a single productivity measure is applied to the forecast rate of change, reflecting labour productivity changes[1].

As noted by the ABS, the WPI measures changes in the price of labour services resulting from market pressures and is unaffected by changes in the quality and quantity of work performed (i.e. quality and quantity are held constant). More specifically, WPI is not impacted by change in the composition of the labour forces, hours worked, or changes in characteristics of employees (i.e. changes to skills level and work performance)[2]. This is supported by the advice the ABS provided to DAE, that the WPI is **not** intended to capture change in labour productivity[3], although DAE note that due to difficulties in measurement, there may be an 'insubstantial' portion of productivity in WPI.

The AER indicate that the WPI will remain the preferred labour price index, to the extent that expenditure forecasts are adjusted using a productivity measure

[1] AER (Nov 2013) *Expenditure forecast assessment guideline for electricity distribution*. Pg. 68

[2] ABS (Sep 2018) 6345.0 – Wage Price Index, Australia, *About this release*.

[3] Deloitte Access Economics (Jul 2018) Labour Price Growth Forecasts prepared for the Australian Energy Regulator.

that matches that labour price[4]. We believe that if WPI is to be adjusted for productivity improvement, then the productivity measure must exclude workforce compositional and upskilling effects. As we have previously advised AER, we believe that workforce compositional and upskilling effects is significant in the utilities sector (and other sectors), as enterprises regularly promote staff to a higher grade for increased skill levels, and/or provide bonuses or incentive payments, which are linked to a range of objectives such as upskilling, additional training, productivity targets and so forth. Therefore, by not excluding workforce composition in the productivity measure, one would be overcorrecting for productivity improvements.

AWOTE is a better labour cost measure as the WPI does not reliably measure the changes in total labour costs which an enterprise or organisation incurs, because the WPI does not reflect the changes in skill levels of employees within an enterprise of industry.

We believe that if a labour escalator is to be adjusted for productivity, which is AER's direction as advised in the Draft decision paper, then the AWOTE is the most logical choice. We acknowledge that the WPI is the preferred measure for AER, as the inclusion of compositional labour changes captured in AWOTE increase volatility, making it more difficult to forecast[5]. However, AWOTE is consistent with the 'classic' productivity measure (i.e. output/ employment), as average weekly earnings is designed to measure the average earnings in Australia, which can be affected by changes in both the level of earnings per employee and the composition of the labour force[6]. Specific to AWOTE, the ABS states that included in ordinary time earnings are[7]:

> *"workplace and enterprise bargaining payments, and other agreed base rates of pay, over-award and over-agreed payments, penalty payments, shift and other allowances, commissions and retainers, bonuses and similar payments related to the reference period, payments under incentive or piecework, payments under profit sharing schemes normally paid each pay period, payment for leave taken during the reference period, all workers' compensation payments made through the payroll, and salary payments made to directors."*

Comparing the two measures, the WPI also does not reliably measure the changes in total labour costs which a particular enterprise or organisation incurs, because the WPI does not reflect the changes in the skill levels of employees within an enterprise or industry. As skills are acquired, employees will be promoted to a higher grade or job classification, and with this promotion will move onto a higher base pay. So the change in the cost of labour over, say a year, includes increases in the base pay rates (which the WPI measures) and the higher average base pay level. The AWOTE captures both these elements, while the WPI only captures the first element. Basically, promoting employees to a

[4] AER (Nov 2013) Expenditure forecast assessment guideline for electricity distribution. Pg. 68
[5] AER (Nov 2013) Expenditure forecast assessment guideline for electricity distribution. Pg. 68
[6] ABS (May 2018) 6302.0 – Average Weekly Earnings, *Summary*
[7] ABS (May 2018) 6302.0 – Average Weekly Earnings, *Glossary*. Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/glossary/6302.0

higher occupation does not necessarily show up in the WPI, but the employer's total wages bill (and average unit labour costs) is higher, as reflected in AWOTE.

1.3 LABOUR PRODUCTIVITY HAS FALLEN OVER THE PAST 5 YEARS

The average annual quality adjusted labour productivity growth has fallen by an average of -0.4% over the past five years from 2012-13 to 2017-18 inclusive

The AER Draft decision paper highlights that the quality adjusted labour productivity fell in the period 2003-04 to 2011-12 before rising again in the period 2011-12 to 2015-16. It is this recent improvement in productivity performance which the AER uses as justification to reconsider changing their approach to forecasting productivity growth, stating "evidence now suggests that distributors across the industry have improved their productivity performance since around 2012" (page 5, AER Draft Decision paper). However, in terms of quality adjusted labour productivity, the utilities industry's performance has actually gone backwards over recent years.

Using the Table 6: Labour Productivity indexes (a) (b) from the ABS[8], BIS Oxford Economics have cross referenced the data presented in AER's Draft decision report[9]. The analysis presented by the AER indicates that quality adjusted labour productivity has improved since 2012 for the utilities sector, and that the average productivity growth from 2011-12 to 2015-16 was 2.0 per cent, as per Table 8 (page 20) in section 3.3 of the Draft Decision paper. Updated data (as presented in Table 1.1) indicates that the quality adjusted labour growth from 2011-12 to 2015-16 was actually 1.3 per cent for the utilities sector (not 2.0 per cent). By comparison, the 'classic' output/employment productivity measure indicates an average growth rate of 1.7 per cent over the corresponding period.

The latest ABS data for quality adjusted labour productivity includes data to 2016/17. To calculate the movement in quality adjusted productivity in 2017-18, we used the actual output/employment measure for 2017-18 (which was -5.9 per cent) and the average 'quality adjustment' for productivity over the previous 19 years (which was -0.05 per cent). To estimate the quality adjustment for labour productivity for the utilities sector, we have calculated the value of the quality adjustment as the difference between the quality adjusted labour productivity growth and the 'classic' output/employment productivity growth rates (presented in Table 1.1). The average quality adjustment over the 19-year period from 1998-99 to 2016-17 was -0.05 per cent, and a similar -0.12 per cent if the latest 5-year period from 2012-13 to 2016-17 inclusive is used. When applied to 2017/18, we estimate the quality adjusted labour productivity growth to be -5.9 per cent.

Including this latest data, average quality adjusted productivity from 2011-12 to 2017-18 shows a modest increase of 0.9 per cent from the period 2011-12 to 2017-18, down from the 1.3 per cent from 2011-12 to 2015-16 period quoted by

[8] ABS (January 2018) 5260.0.55.002 – Estimates of Industry Multifactor Productivity, Australia. Table 6

[9] We note the values in the AER report are slightly different and reference 2011-12 to 2015-16. We have presented the averaged as 2011-12 to 2016-17, which reflect the latest available data from the ABS.

the AER (note that the AER appears to have erroneously showed an exaggerated 2.0 per cent growth in Table 8). However, if the latest five-year period average is utilised, then average quality adjusted productivity shows a decline of -0.4 per cent across the utilities sector.

The point here is that the average over different periods can vary widely, largely due to the extreme volatility in year-to-year productivity movements. In table 1.1, we have shown averages for different periods, some of them to be consistent with the tables provided in the AER's draft decision paper (in particular, Tables 2 and 8). However, consistent with the approach of the AER of discussing recent trends and also consistent with the AER approach of selecting five-year regulatory periods, we believe the more appropriate metric to focus on when discussing *recent* trends is the most recent five-year period, which is 2012-13 to 2017-18. As such, this latest period does **not** show an improvement in quality adjusted productivity, but a **decline** of -0.4 per cent on average over the past 5 years. Similarly, if a longer period was to be used, such as the past 20 years, then the average decline over the past two decades is -2.1 per cent per annum.

Therefore, the lack of labour productivity improvement over the past five years appears to refute one of the AER's key justifications to force a change in how they forecast productivity and apply it.

Table 1.1: **Quality Adjusted and 'Classic' Productivity in the Utilities Industry**

Year Ended June	Quality adjusted labour productivity		GVA/Employed Persons		Quality Adjustment*
	Index	A%Ch	'000$/E	A%Ch	%
1998	157.7		421.4		
1999	151.8	-3.8	429.0	1.8	-5.6
2000	157.8	4.0	434.5	1.3	2.7
2001	158.9	0.7	438.6	0.9	-0.3
2002	153.2	-3.6	431.9	-1.5	-2.1
2003	145.7	-4.9	400.0	-7.4	2.5
2004	142.1	-2.5	395.8	-1.0	-1.4
2005	136.5	-3.9	383.6	-3.1	-0.9
2006	127.8	-6.4	352.0	-8.3	1.9
2007	126.3	-1.1	356.4	1.3	-2.4
2008	117.4	-7.1	333.9	-6.3	-0.7
2009	108.7	-7.4	291.4	-12.7	5.3
2010	107.0	-1.6	303.7	4.2	-5.8
2011	98.3	-8.1	272.9	-10.2	2.0
2012	95.8	-2.6	269.1	-1.4	-1.2
2013	102.6	7.1	284.4	5.7	1.4
2014	94.0	-8.4	262.9	-7.6	-0.9
2015	101.1	7.6	282.9	7.6	0.0
2016	100.0	-1.0	286.4	1.3	-2.3
2017	106.0	6.0	300.3	4.8	1.2
2018	99.7	-5.9	282.7	-5.9	-0.1
Average Annual Growth Rate					
1999-2018	-2.1		-2.0		-0.1
1999-2004	-1.3		-1.5		0.3
2004-2012	-4.8		-4.6		-0.2
2006-2012	-4.6		-4.2		-0.5
2006-2016	-2.3		-1.8		-0.5
2012-2016	1.3		1.7		-0.4
2012-2018	0.9		1.0		-0.1
2013-2018	-0.4		0.1		-0.4

Source: ABS, BIS Oxford Economics

* Quality Adjustment measure by A%Ch Quality Adjusted labour productivity minus A%ch GVA/Employed Persons. For FY2018, we have used the average of the 1999-2017 period.

1.4 PRODUCTIVITY GROWTH SHOULD BE APPLIED ACROSS THE WHOLE ELECTRICTY SECTOR

Due to the direct correlation between Opex and Capex, productivity growth should be measured across the entire electricity sector and applied to a whole entity (i.e. not just to Opex).

AER's Draft decision paper supplied historical productivity for Opex MPFP. We agree that Opex MPFP growth between 2012 and 2016 is likely to include a degree of 'catch-up'. However, we believe that total labour productivity should be applied across the entire electricity sector and a whole entity, and not just Opex. Comparing the total quality adjusted labour productivity for the entire utilities sector, the annual average productivity growth is 1.3 per cent, compared to the 3.0 per cent average Opex MPFP between 2012 and 2016 9Tabel 2 of AER Draft Decision paper).

BIS Oxford Economics believes that Opex and Capex cannot be viewed as being mutually exclusive. Capital expenditure directly impacts the level of output and the ability to increase Opex productivity within the utilities sector, particularly in terms of labour-saving or labour-enhancing investment, or increased undergrounding mentioned in the AER paper. Specific to the productivity outlook for the overall utilities sector, BIS Oxford Economics is currently forecasting that Capex will decline over the next six years from present high levels, which is likely to constrain productivity improvements going forward.

1.5 DAE'S ESTIMATES OF LABOUR PRODUCTIVITY

Components of DAE's labour productivity forecast is not provided, making it difficult to comment on the application or assumptions used for forecasting labour productivity growth in the utilities sector.

DAE's numerical forecasts for labour productivity growth, as presented in the AER Draft decision paper, shows that labour productivity in the utilities sector will grow, although the speed of growth is expected to decelerate. Over the five years from 2019/20 to 2023/24, DAE expect that average labour productivity growth in the national utilities industry to be 1.5 per cent per annum, the same as national All Industries labour productivity.

DAE measure labour productivity over an entire economic cycle, and volatility in the underlying productivity data is minimised by creating a composite productivity measure based on national, industry and State-specific productivity movements[10]. DAE labour productivity estimates for an industry at a national and state level are based on a combination of[11]:

- GDP / Employed persons in Australia;
- GSP / Employed persons in a given State; and
- National sectoral GVA / employed person in Industry in Australia.

[10] The relative movements in the smaller and more volatile States and industries is lessened.

[11] Deloitte Access Economics (Jul 2018) Labour Price Growth Forecasts prepared for the Australian Energy Regulator. Pg. 28

These three values are weighted based on factors reflecting the volatility of the various data. When setting the weights for estimating labour activity[12]:

- Larger States give a larger weight to their overall State estimates as they are less likely to be volatile from quarter to quarter.
- Movement within sub-industries are considered. Specific to the utilities industry, DAE explain that as the utilities sector is made up of electricity, gas and water, and that not only does the sector see very volatile trends in productivity measure, these trends may be caused by the changing importance of the three sub-industries. As such, the weight on utilities for the productivity calculation is lower than for other industries.

In their *Labour Price Growth Forecasts prepared for the Australian Energy Regulator*, DAE did not provide specific forecasts for output, employment or the weights used in development their composite productivity measure. Therefore, we are unable to comment on the components, or the application of the described methodology (including assumptions), that underpin their labour productivity growth forecast.

The use of over-the-cycle or long-term averages for measuring productivity should also be considered in the labour price measure.

However, we have noted that DAE argue that *"because so many factors can influence productivity, it is often best measured over an entire economic cycle."*[13] Given that limited information is provided by DAE on its underlying methodology, one can assume that DAE has applied an economic cycle methodology as opposed to an annual methodology to generate their productivity forecasts - a methodology that the AER previously rejected for application to AWOTE.

The AER in their Final decision on Envestra's Access Arrangement for South Australian gas distribution network, stated that:

> *"Real cost escalation forecasts require detailed estimates of annual input cost changes. Averaging the forecasts necessarily deviates from the expected costs at any point in time, and therefore reduces the efficiency of the forecast.*
>
> *For this reason, the AER considers the application of six year average rates produces forecasts that are neither made on a reasonable basis, nor the best forecasts possible in the circumstances."*[14]

The AER should be consistent in the application of long-term averages to generate forecasts. Given the AER's acceptance of DAE's over-the-cycle methodology (which is tantamount to long-term average rates), we believe the AER should also allow the application of average 'over-the-cycle' rates to the labour price measure[15].

We agree with use of over the cycle methodology. The utilities sector is a small sector and is therefore prone to sampling variability in the labour force and wages samples by the ABS. To smooth the volatility in the utilities data, we

[12] Deloitte Access Economics (Jul 2018) Labour Price Growth Forecasts prepared for the Australian Energy Regulator. Pg. 28
[13] Deloitte Access Economics (Jul 2018) Labour Price Growth Forecasts prepared for the Australian Energy Regulator. Pg. 78
[14] AER (June 2011), Final decision – Envestra ltd Access arrangement proposal for the QLD gas network. p. 217.
[15] AER (Nov 2013) Expenditure forecast assessment guideline for electricity distribution. Pg. 68

support the consistent use of long-term averages or over the cycle methodology.

1.6 BIS OXFORD ECONOMICS' VIEW OF PRODUCTIVITY

BIS Oxford Economics forecast average annual productivity growth for the Utilities sector to be 0.9 per cent from 2019/20 to 2023/24, compared to 1.5 per cent forecast by DAE.

The utilities sector has one of the highest levels of sectoral productivity – as measured by real Gross Value Added (GVA) per employed person – among the 18 industry sectors, with only Mining and Finance & Insurance Services having higher productivity. Utilities' productivity is more than double the national average according to ABS data for Australia (as presented in Table 1.2).

Utilities productivity suffered a steep decline over 2001 to 2014 due to a combination of strong employment growth (mainly due to rising investment) and weak growth in GVA in Australia. Low productivity is set to continue in part because GVA (output) growth is expected to remain low, with low output a function of low demand caused both by high prices and energy-saving (and water-saving) measures, and also because households and some businesses (rather than the Utilities industry) increasingly providing their own electricity via rooftop solar and batteries. While there remains a need to maintain a skilled workforce to ensure the reliability of service, employment levels are expected to show little growth (compared to the past 5 and 20 years) over the next six years, primarily due to lower levels of employment in the generation sector due to more renewables in the generation mix and the closure of the Liddell Power Plant, and also because of a reduction in capital expenditure. It is likely that employment related to electricity distribution and particularly opex will increase.

Over the five years from 2019/20 to 2023/24, we expect that average labour productivity growth (using the classic GVA/employment measure) in the national utilities industry to be 0.9 per cent per annum (Table 1.2). Note in table 1.2 we are using compound annual growth rates, while table 1.1 uses 'geometric' averages, which can lead to slight differences. The 0.9 per cent projection is materially lower than DAE's 1.5 per cent forecast for the utilities sector. Our All Industries productivity forecast of 1.2 per cent is also somewhat lower than DAE's 1.5 per cent over the same period.

With regard to the AER's 'Option 5', described in section 4.5 of their paper, if a labour input weight of 59.7 per cent was applied to the 0.9 per cent forecast, this would give an opex productivity growth of 0.5 per cent per annum (after applying the -0.05 per cent 'quality adjustment' – see section 1.3 of this report).

Productivity growth in the electricity sector will be within the Electricity Generation sub-sector, not in Distribution or Transmission.

The move towards renewable energy, which requires less labour per output, in place of coal powered power stations will be a key driver of productivity growth in the Electricity sector. However, we believe that this productivity growth will not be reflected across the Electricity Distribution of Transmission sub-sectors. Further, productivity growth in these subsectors will be constrained by households moving to solar and batteries, ultimately reducing the output (GVA)

for the industry, and a reduction in capital expenditure within the electricity sector.

Table 1.2: **BIS Oxford Economics Productivity Forecasts – National All Industries and Utilities**

Year Ended June	Australia - All Industries						Electricity, Gas, Water and Waste Water Services (utilities)					
	GDP		Employment		Productivity		Gross Value Added		Employment		Productivity	
	$m (15/16)	A%Ch	'000	A%Ch	'000$/E	A%Ch	$m (15/16)	A%Ch	'000	A%Ch	'000$/E	A%Ch
1998	956,325		8,431.4		113.4		32,965		78.2		421.4	
1999	1,004,314	5.0	8,587.9	1.9	116.9	3.1	33,849	2.7	78.9	0.9	429.0	1.8
2000	1,043,916	3.9	8,780.5	2.2	118.9	1.7	34,497	1.9	79.4	0.6	434.5	1.3
2001	1,064,096	1.9	8,972.6	2.2	118.6	-0.2	35,150	1.9	80.2	0.9	438.6	0.9
2002	1,106,693	4.0	9,087.2	1.3	121.8	2.7	35,621	1.3	82.5	2.9	431.9	-1.5
2003	1,139,735	3.0	9,308.0	2.4	122.4	0.5	35,691	0.2	89.2	8.2	400.0	-7.4
2004	1,185,336	4.0	9,455.1	1.6	125.4	2.4	35,694	0.0	90.2	1.1	395.8	-1.0
2005	1,223,153	3.2	9,716.3	2.8	125.9	0.4	36,110	1.2	94.1	4.4	383.6	-3.1
2006	1,257,819	2.8	9,983.8	2.8	126.0	0.1	36,693	1.6	104.3	10.8	352.0	-8.3
2007	1,305,332	3.8	10,281.4	3.0	127.0	0.8	37,153	1.3	104.3	0.0	356.4	1.3
2008	1,353,078	3.7	10,595.4	3.1	127.7	0.6	37,287	0.4	111.7	7.1	333.9	-6.3
2009	1,379,094	1.9	10,780.3	1.7	127.9	0.2	38,928	4.4	133.6	19.6	291.4	-12.7
2010	1,407,406	2.1	10,883.5	1.0	129.3	1.1	39,418	1.3	129.8	-2.9	303.7	4.2
2011	1,441,903	2.5	11,145.7	2.4	129.4	0.0	40,355	2.4	147.9	13.9	272.9	-10.2
2012	1,498,022	3.9	11,282.7	1.2	132.8	2.6	40,417	0.2	150.2	1.6	269.1	-1.4
2013	1,537,561	2.6	11,427.5	1.3	134.5	1.3	40,640	0.6	142.9	-4.9	284.4	5.7
2014	1,576,897	2.6	11,496.2	0.6	137.2	1.9	39,672	-2.4	150.9	5.6	262.9	-7.6
2015	1,613,972	2.4	11,641.5	1.3	138.6	1.1	40,234	1.4	142.2	-5.7	282.9	7.6
2016	1,659,604	2.8	11,904.7	2.3	139.4	0.6	41,147	2.3	143.7	1.0	286.4	1.3
2017	1,693,663	2.1	12,077.9	1.5	140.2	0.6	41,294	0.4	137.5	-4.3	300.3	4.8
2018	1,743,009	2.9	12,443.1	3.0	140.1	-0.1	42,103	2.0	149.0	8.3	282.7	-5.9
Forecasts												
2019	1,799,604	3.2	12,701.9	2.1	141.7	1.1	42,861	1.8	151.0	1.4	283.8	0.4
2020	1,848,195	2.7	12,853.6	1.2	143.8	1.5	43,504	1.5	152.4	0.9	285.5	0.6
2021	1,902,569	2.9	13,017.1	1.3	146.2	1.6	44,200	1.6	152.4	0.0	290.0	1.6
2022	1,960,497	3.0	13,253.0	1.8	147.9	1.2	44,951	1.7	151.8	-0.4	296.2	2.1
2023	2,016,840	2.9	13,526.7	2.1	149.1	0.8	45,536	1.3	153.0	0.8	297.6	0.5
2024	2,065,878	2.4	13,679.4	1.1	151.0	1.3	46,082	1.2	155.0	1.3	297.3	-0.1
Compound Annnual Growth Rates												
1999-2018	2.9		2.0		1.0		1.2		3.4		-2.2	
1999-2004	3.4		1.9		1.4		1.1		2.7		-1.6	
2004-2012	3.0		2.2		0.7		1.6		6.6		-4.7	
2006-2012	3.0		2.1		0.9		1.6		6.3		-4.4	
2006-2016	2.8		1.8		1.0		1.2		3.3		-2.0	
2012-2016	2.6		1.4		1.2		0.4		-1.1		1.6	
2012-2018	2.6		1.6		0.9		0.7		-0.1		0.8	
2013-2018	2.5		1.7		0.8		0.7		0.8		-0.1	
Forecasts												
2018-2024	2.9		1.6		1.3		1.5		0.7		0.8	
2019-2024	2.8		1.5		1.3		1.5		0.5		0.9	

Source: BIS Oxford Economics, ABS

1.7 UTILITIES OBJECTIVE IS MAXIMUM RELIABILITY

The utility sector's key objective of maximum reliability means that the 'classic' output/employment productivity measure is not suitable for the electricity sector.

Notwithstanding our outlook, consistent with our various submission to the AER, our position is that a 'classic' output/ employment is not the 'correct' productivity measure for any gas, electricity, water and waste service business. The classic productivity measure is more applicable to most of the 'market' sectors where to achieve high productivity, businesses aim to run their operation at maximum capacity where all inputs (such as labour and capital) are fully utilised and the highest production (output) of goods and services is achieved.

However, most of the 'businesses' in the utilities cannot run at maximum capacity all the time – 'maximum' (or high) utilisation is only achieved at peak times during the summer and winter peaks (i.e. only a few days per year) and then only for a few hours on those days. There are also large daily fluctuations in demand. Furthermore, the aim of utilities businesses is maximum reliability. Accordingly, a significant proportion of the work undertaken by utilities' workforces involve replacing and refurbishing old assets to maintain maximum reliability rather than adding new capacity. This also means that the utilities sector does not conform to 'normal market' investment/output relationships.

1.8 CONCLUSION

BIS Oxford Economics believe that the WPI cannot be adjusted for productivity as it reflects pure price changes and does not measure variations in the quantity or quality of work performed. If WPI is to be adjusted for productivity improvement, then the productivity measure must exclude workforce compositional and upskilling effects. However, we believe that should the AER implement a labour escalator adjusted for productivity, which is AER's direction as advised in the Draft decision paper, the use of AWOTE is a more logical option.

Notwithstanding this, we are of the view that there is no compelling argument for a productivity adjustment to be applied across the electricity sector, particularly within the electricity distribution and transmission sub-sectors:

- The average annual quality adjusted labour productivity growth - presented in the AER paper does not include data for 2017/18. Based on the calculated average adjusted from 1998/99 to 2016/17 (or even 2011/12 to 2016/17), we estimate the quality adjusted labour productivity growth to be -5.9 per cent in 2017/18.Considering the most recent five-year period from 2012/13 to 2017/18 inclusive, quality adjusted labour productivity actually declined by an average of -0.4 per cent per annum. This refutes the suggestion by the AER that there has been an improvement in the productivity of the utilities sector, and as such, is therefore justification to continue to apply a zero productivity increase to labour prices going forward.
- The productivity measure should not view Opex or Capex in isolation from each other. Using the 'classic' output/employment productivity

measure, average quality adjusted productivity growth was 1.3 per cent, compared to the 3.0 per cent average Opex MPFP (as presented in the Draft decision paper). In addition, BIS Oxford Economics forecast that Capex in the electricity sector to fall, restricting future productivity gains.

- Productivity growth in the electricity sector will come from the transfer from coal power stations to renewable sources, which are less labour intensive. However, the shift to solar power and batteries in households will also impact the overall level of output for the electricity sector.
- We believe that the aim of maximum reliability, and not maximum output, means that the utilities sector does operate as most of the 'market' sectors. Therefore, we believe that the 'classic' output/employment productivity measure is not suitable for the electricity sector as the sector does not conform to 'normal market' investment/output relationships.

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