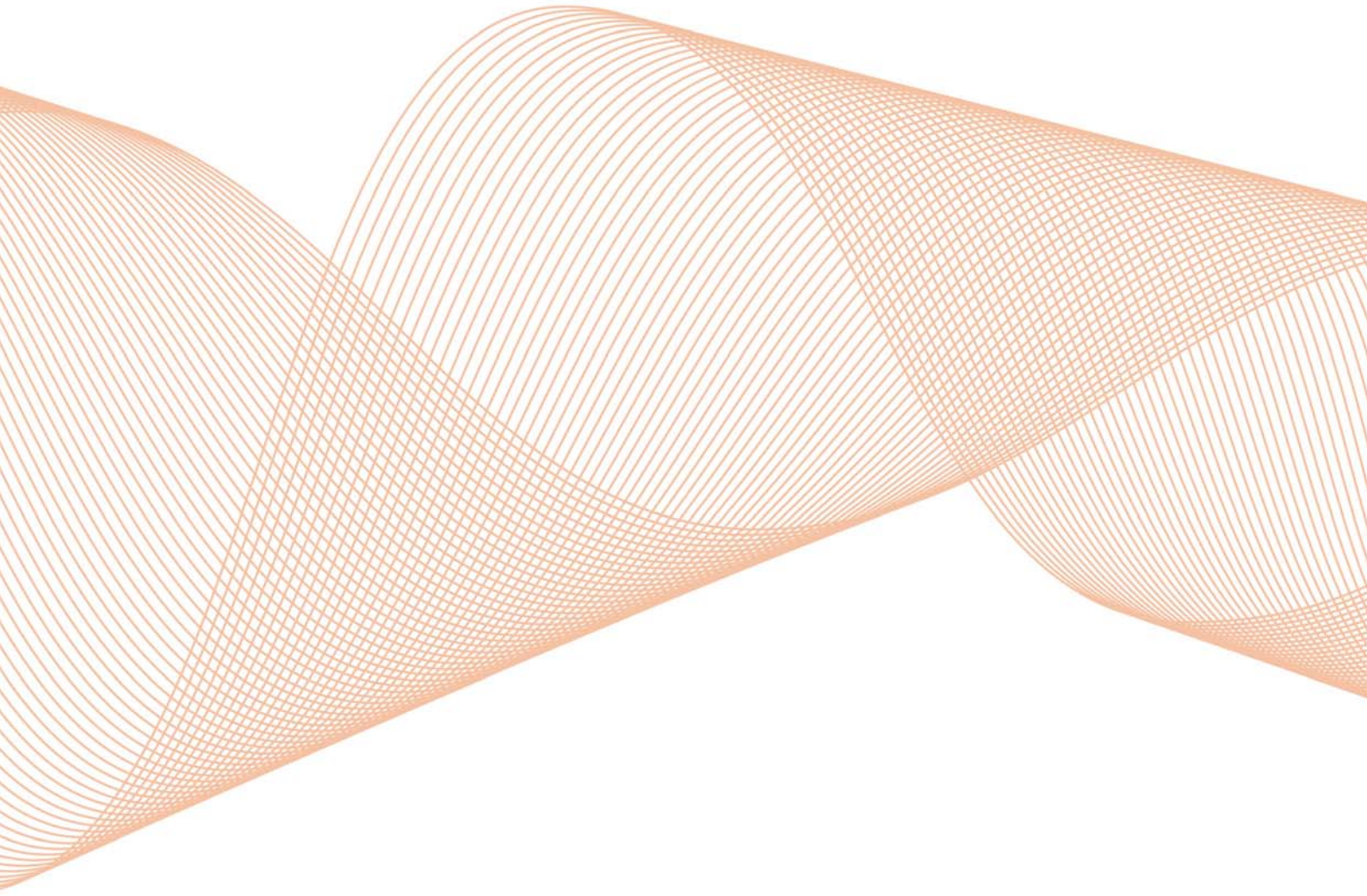
Appendix W.1 – CEG Report – Western Power Escalation Factors

September 2011



Escalation factors

A report for Western Power

September 2011

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Executive Summary

1. CEG has been commissioned by Western Power to provide an expert report determining material and labour escalators for Western Power's capital and operational expenditures for the revised access arrangement for the AA3 period.

2. Western Power has requested that cost escalation factors be developed for the period 2011/12 to 2016/17 in financial years, in real terms as at 31 December 2011 (financial year 2010/11) for the following inputs for Western Australia:

   - labour costs, including:
     - Western Power internal labour costs;
     - external labour costs; and
     - labour costs (including contracting costs) for the electricity, water and gas sector.
   - material costs, including:
     - aluminium;
     - copper;
     - zinc;
     - crude oil; and
     - steel.
   - other factors, including:
     - exchange rates; and
     - inflation.

3. This report determines cost escalators for all of the above inputs. However, we are informed that Western Power's external labour costs involve contracting similar personnel to those that would otherwise be employed directly in the electricity gas and water sector. This means that external labour costs are likely to be driven largely by the same underlying factors. Consequently, we have provided one labour cost forecast which is reflective of both internal and external cost developments.

4. In order to estimate a set of escalation factors to extend forward Western Power's costs, it is necessary to form a view about the future movements of wages and commodity prices. The methodology which we have adopted in this report is to source predictions of prices for the relevant inputs, in the form of either futures prices or expert forecasts, and to rely on this data to develop escalation factors. Where futures prices are available and sufficiently liquid, we have used these in preference to

forecasts on the basis that these represent the best forecast of prices made by informed market participants.

5. In general, the methodology applied in this report to estimate escalation factors is characterised by a high degree of transparency over the input data to estimate escalation factors.

6. The use of futures prices to calculate escalation factors in the regulatory context was first proposed by CEG on behalf of ElectraNet in early 2008.[1] It was adopted with minor amendments by the AER in its final decision in that matter.[2] The same basic methodology, the details of which have developed further over time, has subsequently used by the AER in all subsequent electricity and gas determinations.

7. CEG's estimates of Western Power's escalation factors are set out in Table 1 below.

Table 1: Escalation factors for Western Power, real

Financial year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Aluminium	-0.9%	2.8%	4.1%	3.9%	3.3%	2.6%
Copper	-5.3%	-0.8%	-0.8%	-1.7%	-2.4%	-3.1%
Zinc	-8.6%	2.2%	3.5%	4.4%	3.8%	3.1%
Crude oil	-0.2%	2.1%	1.6%	1.0%	0.7%	0.4%
Steel	-1.3%	-2.6%	0.7%	4.1%	3.4%	2.7%
Labour	1.9%	1.5%	3.1%	3.7%	3.1%	3.1%

8. The above estimates do not include any impact of the Government's recently announced carbon tax.

1. Introduction

9. Western Power has engaged CEG to provide advice on the development of annual escalation factors for its operating and capital expenditure programs. The terms of reference for this engagement are set out at Appendix B.

10. Escalation factors, properly derived, can be used to project forward the value of base objects into the future. An example of a base object may be the average wages of a full time employee in the electricity, gas and water (EGW) sectors over the 2010/11 financial year. Planning of future projects may be conducted on the basis that a certain number of such employees may be required over a period of time during the

[1] CEG, *Escalation factors affecting capital expenditure forecasts: A report for ElectraNet*, January 2008.

[2] AER, *ElectraNet transmission determination 2008-09 to 2012-13*, April 2008, pp. 36-46.

next regulatory period. Escalation factors for EGW wages can be used to determine the expected cost of the labour input to this project.

11. The methodology for determining escalation factors has increasingly become more refined. This is evident in the progression of energy network determinations made by the AER since 2008.[3] Although there are still areas of dispute between energy network businesses and the AER, there is general agreement in regards to the use of forecasts for EGW labour, aluminium, copper, steel and crude oil.

12. In Western Australia, the most recent regulatory decision on the calculation of escalation factors[4] is based on work originally conducted by Access Economics in 2008[5] and subsequently updated.

13. In this report, we review the foundations for the methodology that has been applied in the context of the electricity determinations by both the ERA and the AER, and re-estimate escalation factors based on the most recently available data.

14. We have been provided with a copy of the Federal Court guidelines "Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia" dated 5 May 2008. We have reviewed those guidelines and our report has been prepared consistently with the form of expert evidence required by those guidelines.

15. This report has been prepared by Dr Tom Hird, a Director of CEG and based in its Melbourne office. Dr Hird has been assisted in the preparation of this report by Daniel Young, an economist in CEG's Sydney office, and Johanna Hansson, an economist in CEG's Melbourne office. Curricula vitae are set out at Appendix B to this report.

16. In preparing this report, we have made all the inquiries that we believe are desirable and appropriate and no matters of significance that we regard as relevant have, to our knowledge, been withheld.

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[3] See for example the below sample set of AER decisions that illustrate the refinement of the same basic methodology:

- AER, *ElectraNet transmission determination 2008-09 to 2012-13*, April 2008, pp. 36-46;
- AER, *New South Wales distribution determination 2008-09 to 2012-13*, April 2009, Appendix L;
- AER, *Final decision: Jemena Gas Networks: Access arrangement proposal for the NSW gas networks 1 July 2010 – 30 June 2015,* June 2010, pp. 78-87; and
- AER, *Victorian electricity distribution network service providers: Distribution determination 2011-2015*, October 2010, Appendix K.

[4] ERA, *Final decision on proposed revisions to the access arrangement for the South West Interconnected Network*, December 2009.

[5] Access Economics, *Material and labour cost escalation factors*, April 2008..

2. Methodology

17. In order to escalate forward Western Power's operating and capital expenditure it is necessary to obtain or develop forecasts of either:

    i) the price of goods and services directly purchased by Western Power for the purpose of delivering its expenditure programs; or

    ii) the price of inputs used in the production of goods and services directly purchased by Western Power for the purpose of delivering its expenditure programs.

18. This task would best be achieved by examining forecasts of prices for all inputs purchased by Western Power (category (i) above). Unfortunately, such forecasts generally do not exist. For example, while there are 'off the shelf' forecasts for labour costs in the Australian economy as a whole, there are no such forecasts available for the electricity, gas and water sector in WA. Similarly, there are few if any forecasts of the cost of equipment purchased by Western Power (such as transformers, copper cable, switch gear etc).

19. The lack of such forecasts for most goods and services purchased by Western Power reflects the specialised and heterogeneous nature of these goods and services – such that there is insufficient demand for forecasts of these prices and no active trading in 'futures' for these goods and services. For example, there is no formal 'futures market' for transformers.

20. However, for many of these inputs used in the production of equipment/services purchased by Western Power there are raw material forecasts and/or futures prices that can inform forecasts for the prices of the inputs themselves. Specifically:

    i) futures prices and forecasts for aluminium and crude oil can be used to inform forecasts for the value of these materials as components of Western Power's expenditures;

    ii) forecasts of the price of steel, and labour can be used to project forward the value of these components of Western Power's expenditures; and

    iii) forecasts of general cost movements (e.g. consumer price index or producer price index) can be used to derive changes in the cost of other inputs used by Western Power or its suppliers that not captured above (e.g. office equipment etc).

21. This high-level approach has previously been proposed by CEG in its reports for electricity businesses[6] and has been accepted by the AER in its Final Determinations for ElectraNet, Transend and the New South Wales electricity network businesses and Jemena Gas Networks.

22. The necessary steps required to develop a forecast for the escalation of an expenditure program are as follows:

Step 1 Break down the expenditure program into different cost categories for which there are cost forecasts (or for which cost forecasts can be derived);

Step 2 Source/derive relevant cost forecasts; and

Step 3 Calculate a weighted average escalation factor using weights derived in Step 1 and forecasts from Step 2.

23. In order to complete Step 2 where there are no futures or forecasts available for a particular good or service (e.g. transformers) it may be necessary to derive a forecast for that good or service from other forecasts. The methodology taken in deriving a forecast is similar to the above – the only difference being the starting point is not a breakdown of the costs of the overall capex program but a breakdown of the costs of the equipment in question. It can be described as follows:

Step 2A Breakdown the cost of production for that good/service into component inputs parts for which there are forecasts available (e.g. steel, aluminium and labour)

Step 2B Source the relevant input cost forecasts

Step 2C Calculate a weighted average escalation factor using weights derived in step 2A and forecasts from step 2B

24. The remainder of this section sets out a number of considerations that guide the approach set out above.

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[6] See:

- CEG, *Escalation factors affecting capital expenditure forecasts: a report for ElectraNet*, January 2008;
- CEG, *Escalation factors affecting expenditure forecasts: a report for NSW electricity businesses*, April 2008;
- CEG, *Escalation factors affecting expenditure forecasts: a report for NSW and Tasmanian electricity businesses*, January 2009; and
- CEG, *Escalation factors affecting expenditure forecasts: a report for Jemena Gas Networks*, June 2009.

2.1. Preference of futures over forecasts

25. In coming to our estimates of Western Power's future escalation factors we have had regard to various predictions of how prices may change in the future. These predictions have been obtained from two general sources: futures market prices and expert forecasts.

26. In CEG's opinion the most reliable forecast for input prices is provided by prices determined in the futures market – provided that the relevant market is sufficiently liquid. That is, the most reliable predictor on a particular date in the future is the price at which market participants are willing to commit to trading on that day. If there was a better estimate of future prices, then investors could expect to profit by buying/selling futures until today's futures price reflected the best estimate of spot prices of the relevant future date.

27. A preference for futures market prices over professional forecasts to determine future escalation factors represents a departure from the methodology applied in the second access arrangement for the South West Interconnected Network. For the purposes of the second access arrangement, the ERA relied upon cost escalators provided by Access Economics. Access Economics provided forecasts specifically determined for the use in the access arrangement, drawing upon underlying results from their own general macroeconomic modelling, rather than futures market prices.

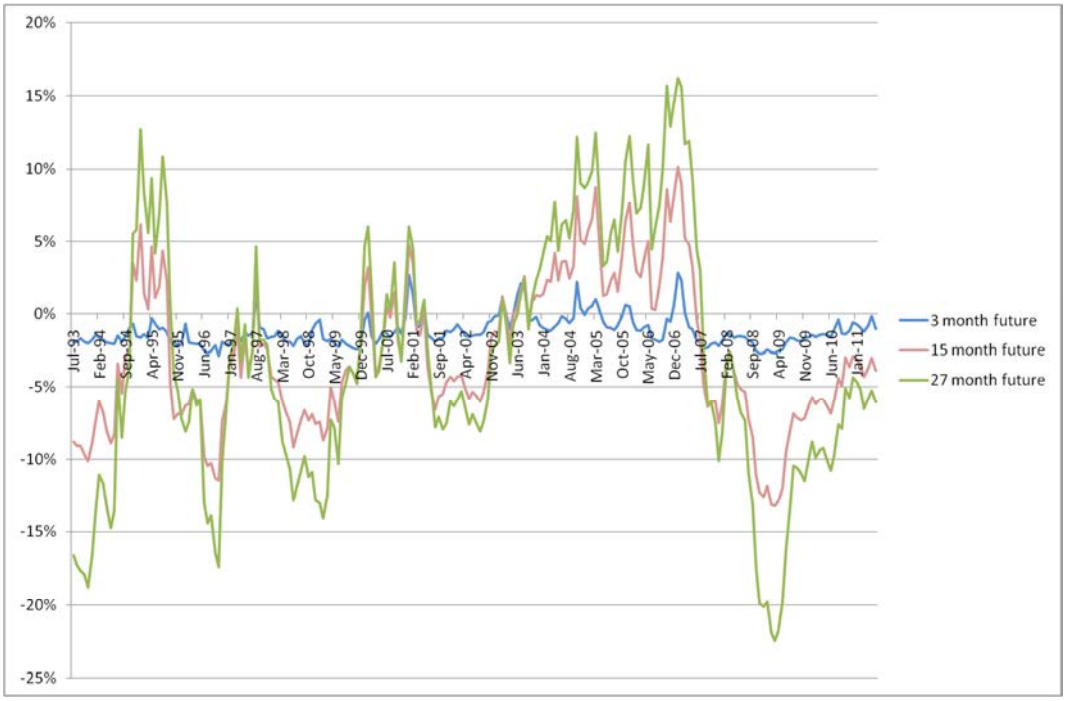
28. Of course, futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur. In fact, futures prices have spectacularly underestimated refined aluminium prices in the lead up to the global financial crisis and overestimated these prices in the immediate wake of the global financial crisis. However, they nonetheless provide the best estimate of future spot prices given the currently prevailing information.

29. An important reason why futures markets are more reliable than professional forecasters is that in order to participate in a futures market (and help set the price in that market) you must be willing to risk real money. This is a standard proposition in finance theory, not just limited to futures markets for base metals and oil. The International Monetary Fund also makes the same point when it states:

> *"While futures prices are not accurate predictors of future spot prices, they nevertheless reflect current beliefs of market participants about forthcoming price developments. Bowman and Husain (2004) find that futures-prices-based models produce more accurate forecasts than the models based on historical data or judgment, especially at long horizons."*[7]

[7] IMF, *World Economic Outlook*, April 2007, p.8

Figure 1: Actual prices less prices predicted by LME futures – Aluminium



Source: Bloomberg

30. As described above, over most of the 1990's, futures prices were a reasonable predictor of aluminium spot prices – sometimes over-estimating and sometimes under-estimating actual future spot prices. However, between 2002 and 2007 15 and 27 month futures prices systematically underestimated spot prices (i.e. failed to anticipate the increase in spot prices and overestimated the rate at which they would subsequently fall). Since 2008 the opposite is true and futures prices systematically overestimated spot prices.

31. In the following two graphs, it is evident that futures prices of copper and zinc have at times underestimated spot prices, particularly at 15 and 27 months.

Figure 2: Actual prices less prices predicted by LME futures – Copper

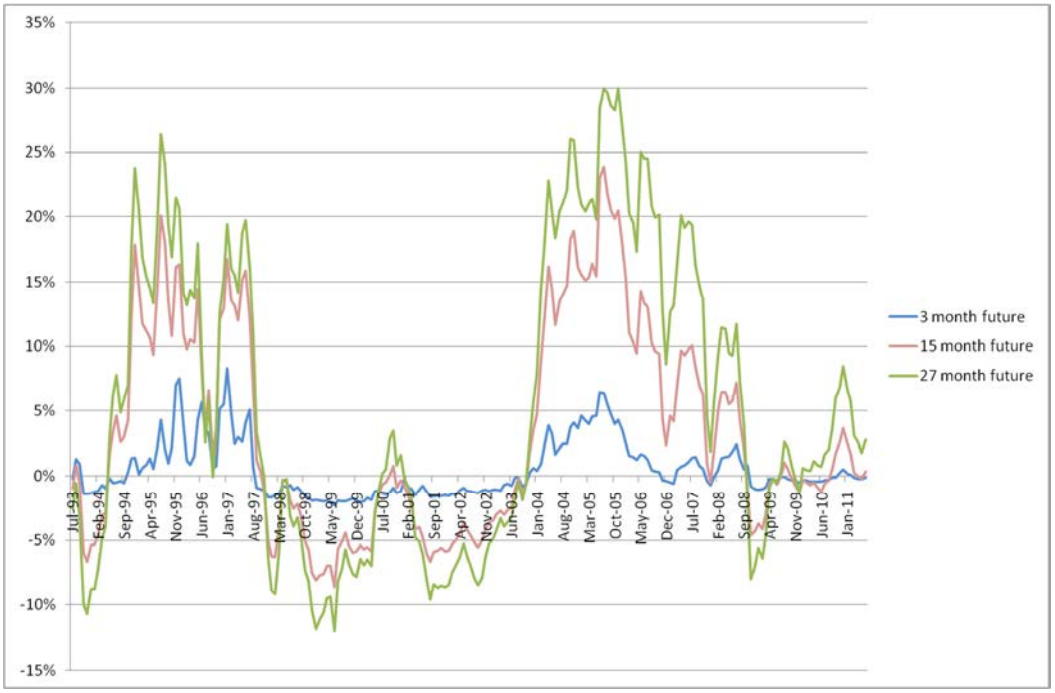
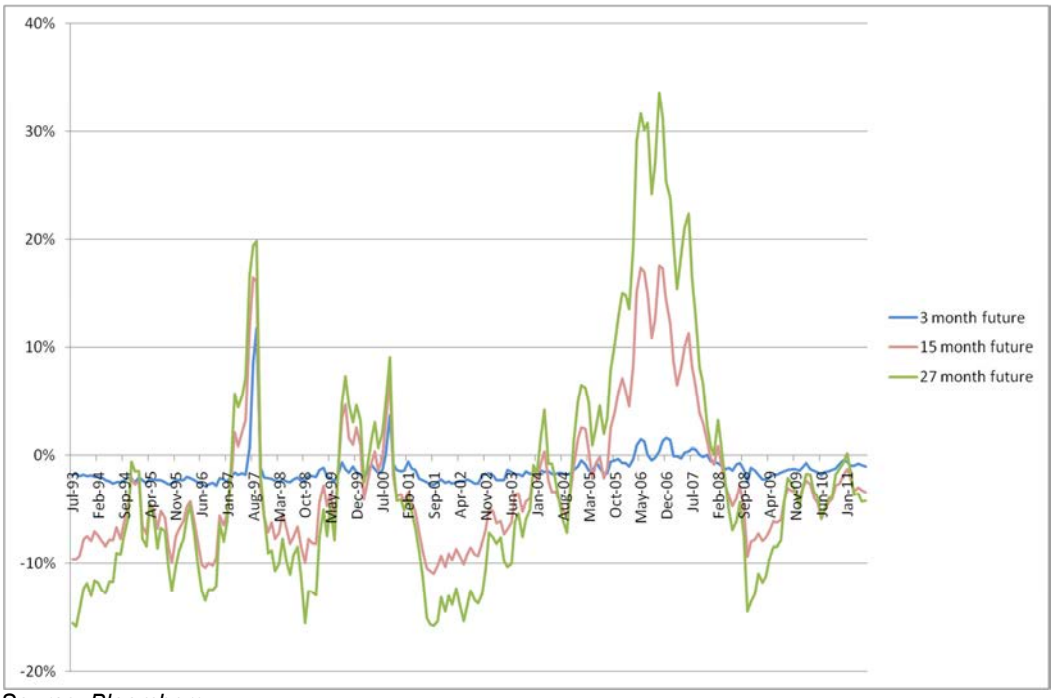


Figure 3: Actual prices less prices predicted by LME futures – Zinc



Source: Bloomberg

2.2. Real versus nominal escalation

32. It is our understanding that the escalation factors that are to be applied to both operating and capital expenditure must escalate the real price of the underlying good or service as outlined in the terms of reference, and not the nominal price. However, it is not always possible to obtain forecasts of future price movements that are expressed in real terms.

33. For wage costs we have relied on Macromonitor forecasts of nominal wage growth. Macromonitor specialises in sectoral analysis of the construction and utility sector – focusing its forecasts on wages and prices in this sector. It does not regard general inflation forecasting (i.e. forecasting the prices of all domestically consumed goods and services including the Australian dollar price for imports) as one of its core skills. Consequently, we have deflated Macromonitor's nominal forecasts of wages growth in the utility sector by an inflation forecast based on RBA data. The derivation of this forecast is very simple and is explained in Box 1 below.

34. Similarly, where we have relied on futures markets to derive forecasts of particular prices (e.g. aluminium) we have deflated these by an inflation forecast based on RBA data. This is because futures contracts tend to be written in nominal terms and it is not possible to 'see' the inflation expectations of the parties of that contract.

Box 1: Derivation of forecast CPI index based on RBA forecasts

The RBA issues a Statement on Monetary Policy four times a year, the most recent is the May 2011 statement. Since February 2007, the RBA has released as part of these statements its forecast of CPI changes over the next two to three years. An example of the most recent forecasts is shown below.

Table 6.1: Output Growth and Inflation Forecasts[a]
Per cent

	Year-ended						
	Dec 2010	June 2011	Dec 2011	June 2012	Dec 2012	June 2013	Dec 2013
GDP growth	2.7	2½	4¼	4¼	3¾	3¾	3¾
Non-farm GDP growth	2.1	2½	4½	4	3¾	3¾	3¾
CPI inflation	2.7	3½	3¼	2½	3	3	3¼
Underlying inflation	2¼	2½	3	3	3	3	3¼
	Year-average						
	2010	2010/11	2011	2011/12	2012	2012/13	2013
GDP growth	2.7	2½	3¼	4½	4¼	3¾	3¾

(a) Technical assumptions include A$ at US$1.07, TWI at 78 and Tapis crude oil price at US$126 per barrel
Sources: ABS; RBA

Source: Reserve Bank of Australia Monetary Statement May 2011

In combination with the historical Australian Bureau of Statistics (ABS) series for CPI, the RBA forecasts naturally lend themselves to the creation of a forecast index, based on the following steps:

1. Obtain historical CPI from the ABS, currently available up to and including the March quarter 2011
2. Estimate the June and December 2011 forecast index numbers based on the actual index numbers for June and December 2010 and the change in CPI forecast by the RBA
3. Estimate the subsequent June and December forecast index numbers based on the forecast index numbers for the previous June and December, increased by 2.50 percent
4. Calculated all forecast March and September quarter indices by interpolating between the relevant June and December quarters

The use of 2.50 percent as a long-term forecast of inflation is selected as it is the mid-point of the RBA's target range of between 2 and 3 percent. We note that this methodology is also the approach utilised in the AER's modelling of escalation factors.

2.3. Forecasting foreign exchange movements

35. An important determinant of future equipment prices is the future value of the Australian dollar. This is clearly true of imported equipment but is also true in relation to the purchase of domestically produced equipment that may nonetheless be sold on a world market and in relation to the input costs for domestic suppliers (e.g. the cost of copper and aluminium for Australian producers of electrical cable).

36. In the context of Western Power escalation factors, it is normally the case that commodities traded on the international markets are priced in terms of United States dollars, and generally futures and forecasts of these commodities are also based in these terms. This means that we must establish a forecast of the value of the Australian dollar, in terms of the United States dollar, over the relevant horizon so that forecasts of commodity prices can be expressed in Australian dollar terms.

37. For the purpose of this report, we have sourced forward rates from Bloomberg until 2018/19[8]. To ensure accuracy, we have averaged daily historical FX forward calculations from one to seven years into the future over the month of June 2011.

2.4. Timing of escalation factors

38. Issues of timing are critical to determining escalators that can consistently be applied for this purpose. An escalator provides an estimate for the increase in price for an input from one period to another. For consistency it is important that the escalation factors that are applied to the base planning objects must:

    i) be derived in a way that is consistent with the base period in which these costs have been measured;

    ii) be derived in a way that is consistent with their intended use in forecasting future costs in specific periods; and

    iii) avoid overlapping periods or 'gaps' such that escalation is either not properly accounted for or is double counted.

39. It is our understanding that escalation factors are used to inflate the base planning objects for opex and capex to the end of each financial year in the next regulatory period. Furthermore, it is our understanding that Western Power base planning

[8] In the long term, if contributed rates are unavailable for any tenor(s) at the end of the forward rates, then Bloomberg calculates those rates using the default swap curve. The rate for the forward tenor(s) is derived by finding discount factors for each of the two currencies for the period between the spot settlement date and the forward settlement date. In the case of USD and AUD, the forward rates are calculated in this way at six year forward rates and beyond, and thus applies to the 2017/18 and 2018/19 forecasts.

objects for both operating and capital expenditure have been costed as an average over the 2010/11 financial year. Given these considerations, the escalators that take these objects forward must be based in the periods consistent with the costing of the objects that they take forward, as required by (i) above.

40. Consistent with the base period for costing and the purpose of the escalation, escalation factors that take forward operating and capital expenditure must escalate from average costs over a financial year to average costs over the next financial year – in the sense that inflating opex and capex to the mid-point of a financial year is intended to be representative of the entire financial year. We refer to this type of escalator as 'financial year' escalation factor.

41. This methodology, and the terminology associated with it, has been accepted by the AER in the context of its final determinations for the New South Wales and Tasmanian electricity businesses and subsequent decisions.

42. Finally, it is important that escalation factors do not either omit or double-count price changes over a particular period of time. Whilst all these criteria may seem trivial, it is our experience that achieving timing consistency is one of the most difficult and contentious issues in the development of escalation factors.

2.5. Quarterly indexation using annual escalators

43. Some of the forecasts that we have regard to in deriving escalation factors, such as those provided by Macromonitor, express forecast changes as *change in average prices from one financial year to the next.* These lend themselves naturally to use as financial year escalation factors, as described above.

44. However, sometimes forecasts expressed in this way cannot be so readily used. For example, the methodology used by the AER in its final determinations for the New South Wales and Tasmanian electricity businesses assumed that forecasts provided by Econtech for EGW wages would only be applied after the expiry of each firm's enterprise bargaining agreement (EBA). In some cases, this transition was made at the start of the calendar year, which meant that the forecasts could not straightforwardly be applied to the data in order to project it forward.

45. In the context of these final determinations, the AER accepted the views of its consultant Econtech, that its forecasts could be used to construct a quarterly index that could then be used to estimate forecasts or escalators based on alternative timing assumptions. Econtech proposed a four-part equation[9], an example of which is:

[9] Econtech, *Updated labour cost growth forecasts,* 25 March 2009, p. 23-24

$$Index\ Sept\ 09 = (2 * Index(07 - 08) + 7 * Index(08 - 09) - Index(09 - 10)/8$$

$$Index\ Dec\ 09 = (9 * Index(08 - 09) - Index(09 - 10)/8$$

$$Index\ Mar\ 09 = -(Index(07 - 08) + 9 * Index(08 - 09))/9$$

$$Index\ Feb\ 09 = -(Index(07 - 08) + 7 * Index(08 - 09) + 2 * Index(09 - 10)/8$$

46. The main rationale behind the choice of these formulae was that the quarterly index derived by their use was consistent with the annual forecasts from which they were estimated. We note that this set of formulae is not the only method by which such an index could be constructed, but we regard it as reasonable for its purpose.

47. The AER used these formulae in its NSW final determinations and, we believe, in subsequent decisions. We apply them generally to any forecast expressed in this way, such as Macromonitor's forecasts of EGW wage costs. We also employ these formulae, translated by two quarters, to convert forecasts expressed in average calendar year terms into a quarterly index. For example, United States inflation forecasts from the Congressional Budget Office are expressed in these terms.

2.6. Precision and accuracy

48. There is always a high degree of uncertainty associated with predicting the future. Although we consider that we have obtained the best possible estimates of Western Power's future costs at the present time, the actual magnitude of these costs at the time that they are incurred may well be considered higher or lower than we have estimated in this report. This is a reflection of the fact that while futures prices and forecasts today may well be a very precise estimate of correct expectations of the future, they are at best an imprecise estimate of future values[10].

49. This lack of precision of forecasts is recognised in our methodology in at least two ways. Firstly, when we estimate future costs at times between estimates obtained from futures prices or forecasts, these are always calculated using linear interpolation, rather than fitting a more complicated functional form. Secondly, all escalation factors recommended are reported to one decimal place only.

50. Although the spreadsheet modelling underlying the calculation of these escalation factors may, in some cases, predict quarterly or even monthly values of labour or commodity prices in the future, we do not represent that it is possible to generate precise estimates for these values. Rather, this modelling approach is used because

[10] See, for example, Figure 1 above.

futures prices and forecasts often themselves make predictions for a particular quarter in the future, so we must adopt a similar structure to incorporate these predictions.

51. Finally, we note the distinction between precision and accuracy. Although these is considerable imprecision in predicting the future, this is not a reason to estimate escalation factors that are artificially biased upward or downward, even if this bias is relatively small.

52. At Appendix A we describe why a transition between Western Power's actual wages data and forecasts of future EBA wages must be carefully made to avoid bias in the escalation factors. We consider this to be an issue of accuracy, rather than precision, since it involves making efficient use of the data available to come to the best forecast escalation factors given the circumstances.

3. Forecasts of labour cost inputs

53. The following section sets out the specific considerations that have been made regarding the derivation of labour cost escalation for Western Power's expenditure programs. These considerations guide the data sources and methodology that have been selected in each case.

54. For the purpose of forecasting future labour costs, Western Power has requested that CEG develop escalation factors for wages in the WA EGW sector to be applied to its internal and external wages costs. CEG has commissioned forecasts from Macromonitor for the growth of labour costs in the EGW sector in Western Australia.

55. We consider that it is reasonable to use actual measures of changes on staff costs where these are available in preference to the much broader measures that are available for the entire EGW sector. This is consistent with recent findings of the Australian Competition Tribunal in respect of Ergon's labour cost escalators.[11] In that decision the Tribunal ruled that it was reasonable for Ergon to use committed increases under its Union Collective Agreement as a forecast of labour costs.

56. We have therefore used actual salary increases paid by Western Power where these are available, in this case up until 1 October 2010. Thereafter, we have used salary increases outlined in the Western Power + CEPU Union Collective Agreement 2008, which operates until 1 October 2013[12]. Escalation factors beyond this horizon are based on professional forecasts provided by Macromonitor and specific to the electricity, gas, water and waste services sector in Western Australia[13]. Relying on salary increases determined in the Western Power + CEPU Union Collective Agreement for internal Western Power workers is in our opinion the closest proxy for Western Power labour costs for the years in which increases have been specified. This is because the increases have been derived with largely the same underlying factors in mind as those which determine the EGW index, however with a focus on electricity.

57. We have determined one set of cost escalators for both Western Power's internal and external labour costs, rather than two separate sets of escalators. This is because internal and external labour costs are largely driven by the same underlying factors.

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[11] See Application by Ergon Energy Corporation Limited (Labour Cost Escalators) (No 3) [2010] ACompT 11 (24 December 2010), particularly paras 15-16, 28, 56-60.

[12] Western Power + The Communications, Electrical, Electronic, Energy, Information, Postal, Pluming and Allied Services Union of Australia, Western Power + CEPU Union Collective Agreement 2008.

[13] Macromonitor, Forecasts of Labour Costs – Electricity, Gas, Water and Waste Services Sector – Western Australia, Report prepared for Western Power July 2011.

58. Macromonitor outlines three measures of labour costs, including average weekly ordinary time earnings (AWOTE), the wage price index (WPI) and unit labour costs. The future labour forecasts provided in this report are based on the AWOTE measure of labour costs. This is because the AWOTE measure includes the effects of compositional changes, including changes in the mix of skill categories and the mix of occupational categories with different pay scales. Specifically, the Macromonitor AWOTE forecasts include an assumption that the long run trend to a relatively more highly skilled workforce will continue. The AWOTE measure is therefore an appropriate measure to apply to total employment. One could only reasonably apply the WPI to total employment if one was able to assume that the composition of the workforce would not change – an assumption that is at odds with past experience and Macromonitor's forecast.

59. There is a further important reason to prefer AWOTE to WPI measures in the current context. In order to understand this reason it is useful to describe the difference between the WPI and AWOTE as measured by the ABS within the context of the following scenario. Assume, consistent with current reality, that high levels of demand for workers from internal growth in the EGW sector and from industries that compete for EGW workers (eg, construction and mining) leads to a need to pay higher wages to retain/attract staff. Imagine that the mechanism that businesses in the EGW sector used to achieve that effective wage growth was to accelerate career progression – by promoting workers faster than they otherwise would in the absence of high labour demand. This effect will be captured in the AWOTE measure of wage growth but not in the WPI measure.

60. This is because faster rates of progression increase the average cost per worker but not the average cost per category of worker – with the latter the only effect measured by the WPI.

61. The WPI measure excludes the effects of any compositional changes, including changes in the mix of skill categories or changes in the mix of occupation categories with different pay scales. Therefore, the WPI measure is most appropriate as an escalator of a specific occupational classification. If applied to the total wage bill for a business the WPI is only appropriate if the mix of occupational categories is expected to remain constant.

62. The third labour cost measure used in the Macromonitor report is the unit labour cost measure, also known as productivity adjusted labour costs. Labour productivity is defined as output per unit labour. This can be thought of as a measure of changes of productivity within a skill or occupational group, or across skill and occupational groups. Calculating unit labour costs involves adjusting nominal wages for changes in productivity. However, as only a total labour productivity (rather than labour productivity within skill or occupational groups) is available to us, AWOTE, rather than WPI, must be used to derive unit labour costs.

63. Macromonitor advises caution in connection with these calculations, as each of the series are sourced from different ABS collections. Macromonitor also notes that there are a wide variety of factors which can influence measured labour productivity, including changes in the type of work undertaken and the amount of capital input or the productivity of capital, and these factors need to be taken into account when making projections of labour productivity and in turn labour unit costs.

64. By way of example, ABS measured labour productivity will appear higher after a significant increase in periods of high demand that make use of spare capacity in the network (with the effect that output is increased per worker). But this does not mean that a smaller workforce is now required to operate the network. In fact, the opposite is more likely to be true – more employees are likely to be needed with the network operating at closer to full capacity. All the ABS measured productivity improvement in this example tells us is that there are some (potentially temporary) economies of scale being experienced. Moreover, even if ABS measured productivity, which can have very positive and very negative swings, were an indication of the need to employ fewer/more workers this would be best accounted for in the forecast of the labour force – not in the forecast of wages per worker.

65. To summarise, CEG relies on the AWOTE measure of labour costs, because this measure includes the effects of compositional changes in the industry. This is desirable on the reasonable assumption that Western Power's workforce is experiencing the same compositional changes as the industry as a whole.

66. The reliance on the AWOTE measure represents a departure from the ERA's most recent decision, in which the labour cost escalators were based on ABS Labour Price Index data.[14] The consultant that derived the future labour cost escalators, Access Economics, recommended that the forecasts of wage growth specific to Western Australian utilities workers would be the most appropriate to apply for future wage expectations for both internal and external workers.

67. Transitioning from modelling wage increases based on actual data, as occurring once a year, to an index based on quarterly changes in wages can result in a biased estimate of wages escalation. That is, we are transitioning from an index that measures actual wage-setting processes, where Western Power pays its employees four quarters of wage increases 'up front', to a stylised framework that assumes it can spread these increases out over a year. Under such a transition, even if the actual wage outcomes and the wages forecasts are perfectly consistent, escalation factors may be underestimated. Appendix A contains a full discussion of the nature of this problem and the solutions that CEG has applied to resolve this bias.

[14] The Labour Price Index is simply a version of the Wage Price Index including movements in non-wage costs such as superannuation, public holiday leave etc.

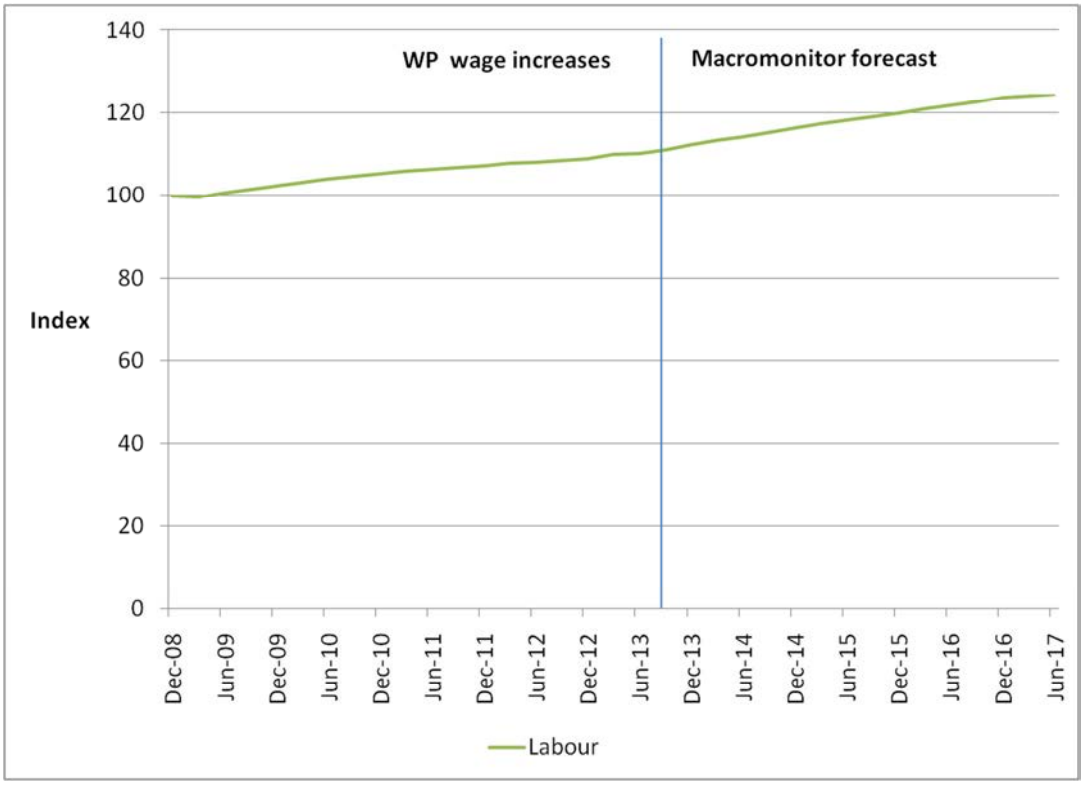
68. Table 2 below shows the financial year and calendar year escalation factors that we calculate using this methodology.

Table 2: Escalation factors for labour components, real

Financial year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Labour	1.9%	1.5%	3.1%	3.7%	3.1%	3.1%

69. The below figure shows the price trend implied by the escalation factors for labour, which is expected to increase steadily.

Figure 4: Price levels for labour components



December 2008 = 100
Source: Bloomberg & Consensus Economics

4. Forecasts of material cost inputs

70. The following section sets out the specific considerations that have been made regarding the derivation of material cost escalation for Western Power's expenditure programs. These considerations guide the data sources and methodology that have been selected in each case.

71. As noted in the methodology section, CEG's preference is for futures market prices over professional forecasts; to the extent futures market prices are available. This represents to some extent a departure from the methodology applied in the second access arrangement, where future material cost escalators were forecasted by Access Economics. Access Economics used in all instances, except for raw copper and aluminium, the most closely matched prices series produced by the Australian Bureau of Statistics as an indicative series. To determine the future cost escalators for raw copper and raw aluminium, Access Economics using spot prices in Australian dollars as their indicative series. Access Economics then forecast these using their own judgement and internal models.

4.1. Aluminium, copper and zinc

72. It is important to be clear when we talk about movements in 'the' price of aluminium, copper or zinc that we are really talking about movements in the price of the metal in question at a particular stage in its production process.

73. For example, in the case of aluminium, we are referring to a refined metal to a particular specification. The prices quoted in the section are prices for aluminium traded on the London Metals Exchange that meet the specifications of that exchange. Specifically, prices are per tonne for 25 tonnes of aluminium with a minimum purity of 99.7 percent.[15]

74. The prices quoted are not necessarily the prices paid for aluminium equipment by manufacturers. For example, producers of electrical cable purchase fabricated aluminium to be used in their manufacturing processes. This fabricated aluminium has gone through further stages of production than the refined aluminium that is traded on the LME. Its price can be expected to be influenced by refined aluminium prices but these prices cannot be expected to move together in a 'one-for-one' relationship.

75. The absence of a one-for-one relationship between the prices of refined aluminium traded on the LME and the price paid by manufacturers for fabricated materials as inputs to their production process does not mean that the use of the LME prices to estimate escalation factors is invalid. The correct application of Step 2A, the

[15] See London Metals Exchange website for more details of contract specifications.

assignation of component weights to the escalation factors derived from the forecast LME prices, can ensure that these escalation factors are used in a way that is consistent with the underlying objects that they represent.

76. Similarly, the prices quoted for copper and zinc are prices traded on the London Metals Exchange that meet the specifications of this exchange. Again, although there is not necessarily a one-for-one relationship between these prices and the price paid for copper or zinc equipment by manufacturers, this is the correct application of Step 2A, as explained above.

77. We have obtained LME prices for all of aluminium, copper and zinc, averages over the month of June 2011. The LME's longest dated future for these products is 27 months, allowing us to forecast prices out to and including September 2013 by interpolating between the future prices. However, available futures prices do not extend out to the end of Western Power's access arrangement period (i.e. to 2016/17).

78. In this case we have two choices. We can assume that aluminium, copper and zinc prices will remain constant in real terms from September 2013 onwards or we can have regard to professional forecasts.

79. Consensus Economics surveys professional forecasters on a range of economic variables. They regularly perform surveys of forecasters' opinions on future commodity prices, the most recent of which was conducted in April 2011.[16] Consensus Economics provide quarterly forecasts out to September 2013 in nominal US dollar terms.

80. Consensus Economics also provides a 'long-term' forecast in nominal and real US dollar terms. Unlike with the shorter term forecasts, Consensus does not disclose how many or which institutions contributed to the forecasts nor does it give any information on the range of forecasts. Moreover, it is unclear what the definition of 'long-term' is – Consensus Economics only states that they summarise *"long term 5-10 year forecasts in nominal and real (inflation adjusted) dollar terms"*[17]. For these reasons, we must treat the Consensus Economics forecasts with some caution.

81. Consistent with the methodology employed previously by the AER[18], we have assumed that these long-term forecasts apply to a horizon of 7.5 years from the month in which they were made. That is, for forecasts made in April 2011, we assumed that long-term forecasts are for the month of October 2018.

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[16] Consensus Economics, *Energy & Metals Consensus Forecasts,* April 18, 2011.

[17] Ibid, p. 5

[18] See for example AER, *New South Wales distribution determination 2008-09 to 2012-13*, April 2009, Appendix L.

82. Forecasts of the price of aluminium, copper and zinc between the end of the LME forecasts in September 2013 and the Consensus Economics forecast in October 2016 can be generated by interpolating between these price points. However, as described above, the escalation factors beyond 2013 must be treated with caution due to their reliance on the Consensus Economics mean forecast.

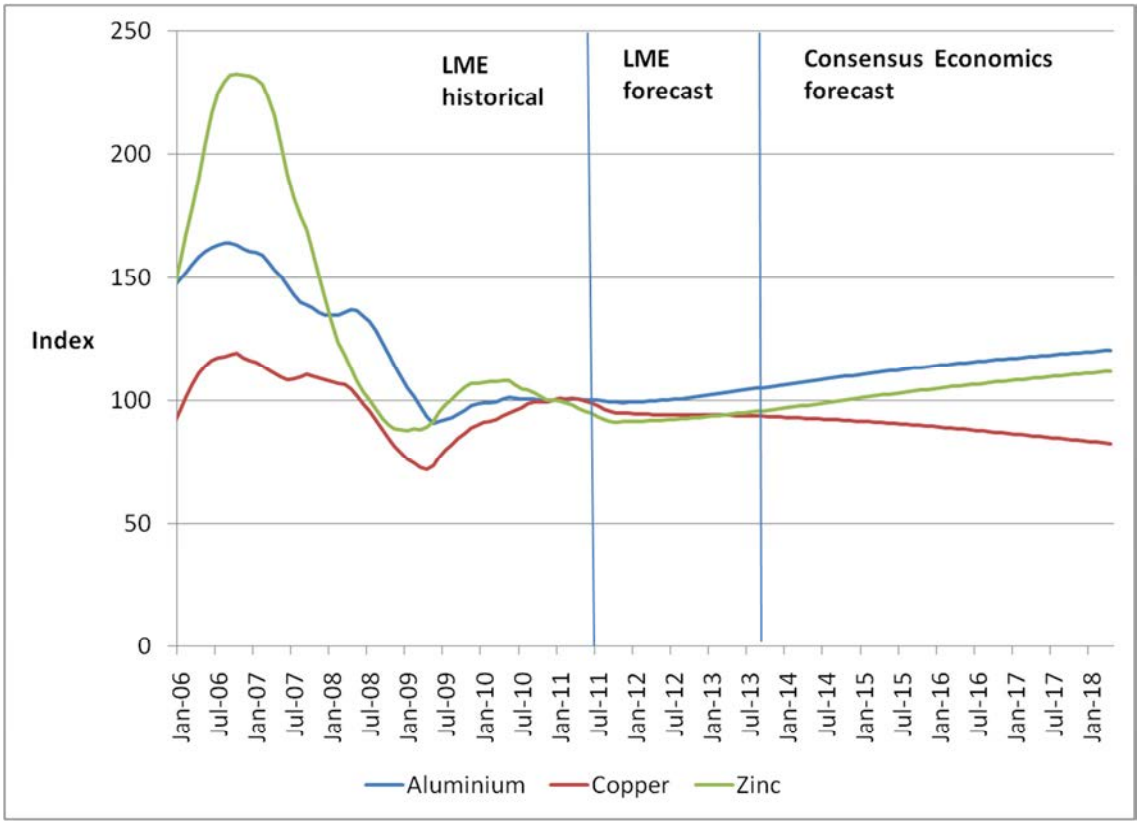
83. We use the approach described above to produce a monthly series of aluminium, copper and zinc prices, which may then be averaged to estimate financial year escalators out to 2016/17. These escalators are shown in Table 3 below.

Table 3: Escalation factors for aluminium, real

Financial year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Aluminium	-0.9%	2.8%	4.1%	3.9%	3.3%	2.6%
Copper	-5.3%	-0.8%	-0.8%	-1.7%	-2.4%	-3.1%
Zinc	-8.6%	2.2%	3.5%	4.4%	3.8%	3.1%

84. The below figure shows the price trend implied by the escalation factors for aluminium, copper and zinc respectively. The price for aluminium and zinc is forecast to increase steadily, whereas the price for copper is forecast to remain relatively steady.

Figure 5: Price levels for aluminium, copper and zinc, real



December 2010 = 100
Source: Bloomberg & Consensus Economics

4.2. Crude oil

85. In order to derive estimates of historical and forecast changes in crude oil prices we have followed largely the same approach as for aluminium copper and zinc. Historical data on crude oil prices have been sourced from the US Department of Energy (DoE).[19] Crude oil futures (NYMEX Crude Oil Light) have been sourced from the Chicago Mercantile Exchange. We have averaged NYMEX prices over the 20 days to the 30 June 2011 for use on the estimation of escalation factors.

86. NYMEX futures are available up to December 2018 and, consequently, these can be relied on to develop forecasts of future prices without the use of forecasts from Consensus Economics or other professional forecasters. We have combined forecasts calculated on the basis of linear interpolation between each average futures

[19] http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm. Consistent with the approach used by the AER, we have used monthly prices for West Texas Intermediate crude.

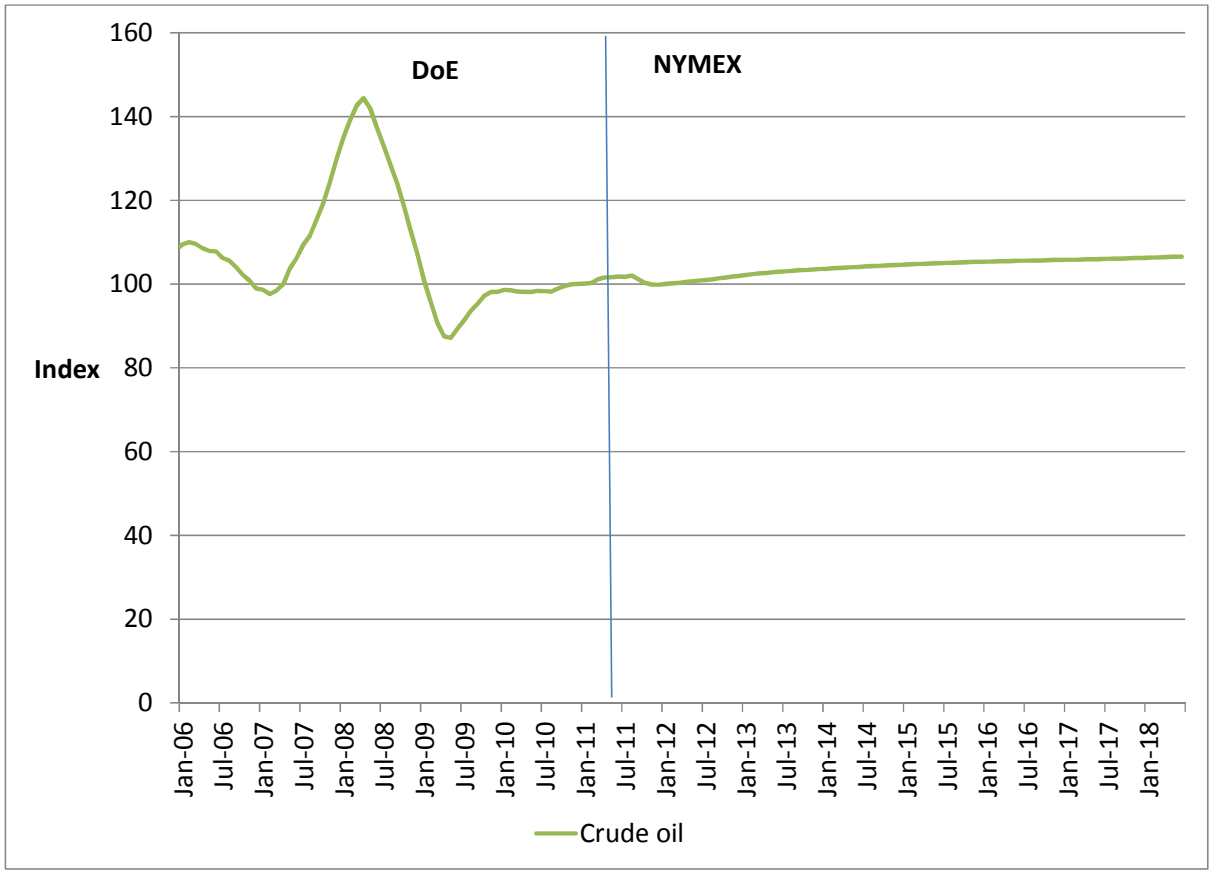
price with the historical data sourced from DoE. These calculations give rise to the escalators for crude oil shown in Table 4 below.

Table 4: Escalation factors for crude oil, real

Financial year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Crude oil	-0.2%	2.1%	1.6%	1.0%	0.7%	0.4%

87. The below figure shows the price trend implied by the escalation factors for crude oil. The price for crude oil is expected to increase steadily out to the end of Western Power's access arrangement period.

Figure 6: Price levels for crude oil, real



December 2010 = 100
Source: Bloomberg & Consensus Economics

4.3. Steel

88. A component of Western Power's expenditure is associated with the purchase of products using steel. For example, construction of transformers and substations.

89. Again, it is important to draw a distinction between the steel products used by Western Power and the steel 'at the mill gate'. Just as is the case with aluminium, the steel used by Western Power has been fabricated and, as such, embodies labour, capital and other inputs (e.g. energy).

90. While there is not necessarily a one-for-one relationship, it is still relevant to consider what is expected to happen to 'mill gate' steel prices. The LME has recently developed a futures market for steel billet, with futures trading to a horizon of 15 months. This market is increasing in volume and is gaining some acceptance within the industry as a measure of price. However, we do not consider that these prices are as representative of the overall market for steel as LME prices for aluminium. That is, we consider that this market may not be sufficiently liquid to use LME steel prices in preference to expert forecasts.

91. Consensus Economics also provides forecasts for hot-rolled coil (HRC) for Europe and the United States – it does not publish forecasts for Asian steel prices. These forecasts are in an identical format to those for aluminium, with quarterly short term nominal forecasts and a long term forecast. It is important to note that HRC is a more processed form of steel than billet, and commands a premium over the prices reported on the LME.

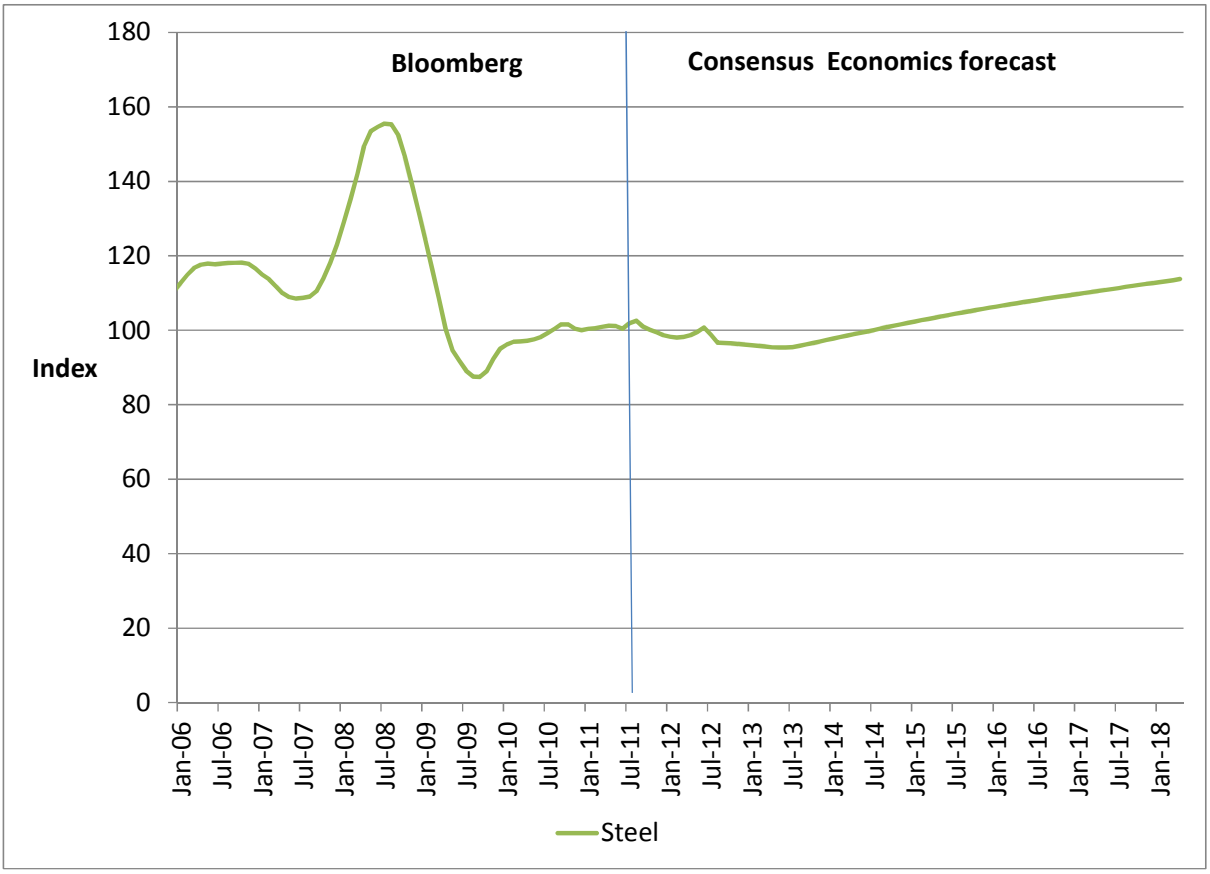
92. The escalation factors derived on the basis of short term and long term Consensus Economics forecasts are shown in Table 5 below.

Table 5: Escalation factors for steel, real

Financial year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Steel	-1.3%	-2.6%	0.7%	4.1%	3.4%	2.7%

93. The below figure shows the price trend implied by the escalation factors for steel. The price for steel is expected to increase steadily out to the end of Western Power's access arrangement period.

Figure 7: Price levels for steel, real



December 2010 = 100
Source: Consensus Economics

Appendix A. Derivation of escalation factors for labour

94. This section describes in greater detail the derivation of the escalation factors for labour employed by Western Power, as reported in section 3 above. Whist the appendix is self-contained; it can more easily be understood in conjunction with the spreadsheet accompanying this report, where the calculations described here are set out in full.

95. Western Power has provided CEG with a history of average salary increases for all employees, as outlined in the table below. The most recent change, 2010/11 will remain in effect until 30 September 2011. Western Power has also committed through their 2008 Collective Agreement to increase the rate of pay on 1 October 2011 and 1 October 2012 by 4.5 percent or by the corresponding full year ending June CPI for Perth, whichever is greater.

Table 6: Nominal wage changes for Western Power's staff

Date	Fulltime employees	Average salary	Change
1 October 2009	2758	$81,252	
1 October 2010	2896	$86,516	6.5%
1 October 2011	2959	$91,633	5.9%
1 October 2012	2959	$95,756	4.5%
1 October 2013			4.5%

96. Since these are nominal increases, it is reasonable to treat these as increases to a nominal index of wages at the dates that they occur and to deflate this nominal index to create a real index that can be used for the purpose of estimating real escalation factors. We have created a quarterly nominal index of Western Power's salaries and deflated this index by the quarterly index of inflation, the derivation of which is described at section 2.5.

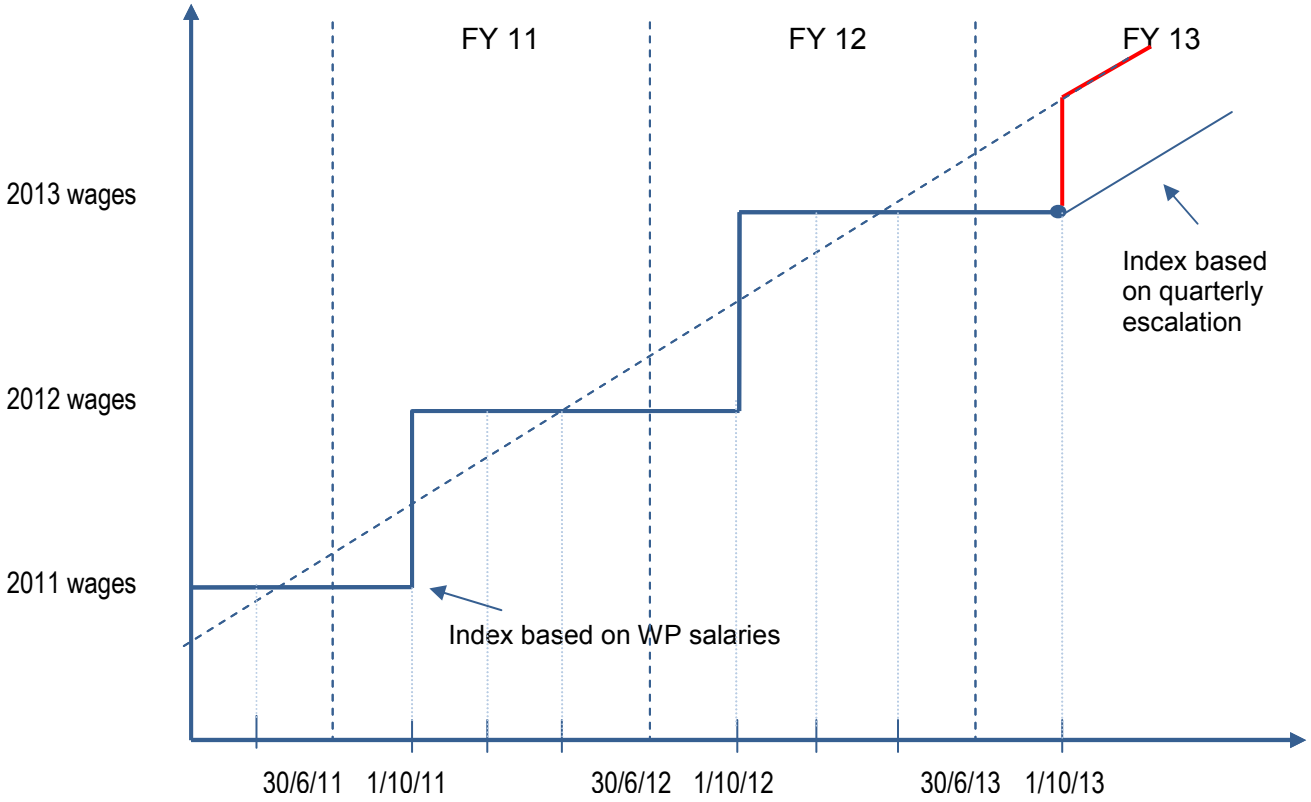
97. Beyond the period in which actual salary increases are available, the index of wages can be extended by using professional forecasts. For the purpose of labour escalation factors we have sourced professional forecasts from Macromonitor. Specifically, Macromonitor has forecast salary increases in the Western Australian EGW sector by Average Weekly Ordinary Time Earnings (AWOTE).

98. Macromonitor presents forecasts of wage increases expressed in terms of change from the average wages in one financial year to another. The timing of these forecasts therefore lend themselves to the use of the AER/Econtech formulae, described in section 2.5, to derive a quarterly index based on the average annual forecast wage changes. We use this quarterly index, so derived, to extend forward the index based on actual Western Power outcomes beyond 1 October 2013.

99. However, the timing and nature of this transition to forecasts must be carefully considered since, if implemented at the wrong time or incorrectly, the transition from an index based on wage increases once a year to an index based on quarterly changes in wages can result in a biased estimate of wage escalation. That is, we are transitioning from an index that measures actual wage-setting processes, where Western Power pays its employees wage increases four quarters of increase 'up front' at the start of October, to a stylised framework that assumes it can spread these increases out over a year. Under such a transition, even if the actual Western Power outcomes and the wages forecasts are perfectly consistent, escalation factors may be underestimated.

100. For example, if the transition from Western Power wages to Macromonitor's forecasts is made at the expiry of Western Power's EBA agreement on 30 September 2013 then the escalation factor for the following financial year will underestimate the correct level of wages escalation, relative to what would have been estimated if the index based on Western Power increases were extended. This is demonstrated by the stylised diagram below.

Figure 8: Illustration of potential error transitioning to labour quarterly index



101. As the above figure illustrates, transitioning to a quarterly index after 1 October 2013 without applying a step change from that date will underestimate levels of wages in after this point in time. However, it should also be noted that applying a full year of wage increase on 1 October 2013 would cause wages following this date to be too high (i.e. above the dotted line).

102. The correct method of transition, in order to accurately calculate the 2013 financial year escalator, is to apply as at 1 October 2013 a quarter of a year of escalation in a step change. Ideally this would be based on Western Power's agreed EBA increases at that date, but since an EBA has not been agreed for that period, an equivalent value can be constructed using the forecasts of EGW wages from Macromonitor. This can be done by increasing the Western Power index by a quarter of the salary increases forecast for the following four quarters. This will give the same answer as if there was no transition.

Appendix B. Terms of reference

BACKGROUND:

Western Power (WP) is the electricity distribution and transmission network service provider in Western Australia (WA). Western Power owns and operates the transmission and distribution network which forms the South West Interconnected Network (SWIN). The terms and conditions on which users (typically generators and retailers) can obtain access to the SWIN are described in Western Power's access arrangement.

WP is subject to economic regulation under the *Electricity Network Access Code 2004* (Code) which is administered by the Economic Regulatory Authority (ERA). WP is currently preparing its AA3 access revisions proposal for submission to the ERA on 30 September 2011.

The relevant provisions relating to the economic regulation of electricity distribution and transmission networks in WA are found in the Code, which is available at http://www.energy.wa.gov.au/cproot/1370/2/ENAC%20%20Unofficial%20consolidated%20version.pdf. Key code provisions relevant to this proposed engagement include:

- Non capital costs (opex) – Cl 6.40 ... the non-capital costs component of approved total costs for a covered network must include only those non-capital costs which would be incurred by a service provider efficiently minimising costs.
- Capital costs (capex) – Cl 6.52(a) the new facilities investment does not exceed the amount that would be invested by a service provider efficiently minimising costs, having regard, without limitation, to:
    - whether the new facility exhibits economies of scale or scope and the increments in which capacity can be added; and
    - whether the lowest sustainable cost of providing the covered services forecast to be sold over a reasonable period may require the installation of a new facility with capacity sufficient to meet the forecast sales

WP seeks the services of a suitably qualified independent expert to forecast relevant real labour and material cost escalators over the forecast period 2011/12 to 2016/17. WP seeks forecasts that represent the expert's view of the best estimate in the circumstances and that it has been arrived at on a reasonable basis consistent with what a reasonable person acting prudently would expect over the forecasting period.

PROJECT SCOPE:

The independent expert will provide an opinion report that is suitable for reliance by the ERA when conducting its functions under the Code that:

1. sets out an input cost forecasting method (or methods) consistent with recent regulatory determinations made by both the Australian Energy Regulator (AER) and the ERA and where possible relies upon futures data to infer materials cost expectations
2. determines if the cost categories specified are increasing higher than CPI and substantiate the drivers and recommended rate to a standard consistent with requirements under the Access Code and in line with the Guidelines for the Access Arrangement Information
3. discloses any external information (not considered Intellectual Property) relied on in reaching conclusions
4. applies this method to relevant data for WP's forecasting period 2011/12 to 2016/17 in June – July financial years, in real terms as at 30 June 2012 for the following inputs for Western Australia:
    - labour costs
        - Western Power's internal labour costs
        - external labour costs (including contracting costs) for the electricity water and gas sector
    - materials costs
        - steel prices
        - core steel (if available)
        - aluminium prices
        - copper prices
        - oil prices
        - zinc prices

OTHER RELEVANT INFORMATION:

Western Power information

The expert will be expected to work closely with Western Power in the preparation of the report to understand our cost inputs and how we will use the forecast outputs.

The expert is encouraged to draw upon the following information which WP will make available:

- Template setting out the preferred format for escalators
- Documentation detailing Western Power's EBA
- Spreadsheet containing Western Power's materials weightings
- Other information required that the expert requests that Western Power can reasonably access
- Other information to be considered

The expert is also expected to draw upon the following additional information:

- Recent AER and ERA determinations on input cost escalation and associated expert reports relied upon by the regulators and submitted by network service providers

TARGET COMPLETION DATES:
The independent expert will:

- be involved in a kick-off workshop with Western Power by 24 June 2011
- provide forecasts to Western Power by 15 July 2011
- provide a draft report to WP by 1 August 2011
- provide the final report by 12 August 2011
- be available to provide responses to the ERA following the submission of the AA (this will include an update of the forecasts if requested by the ERA)
- be available as an expert witness where necessary

RESOURCES:
The expert will be expected to liaise closely with Western Power and review other sources of information, such as, the work of other experts, regulatory proposals and advice.
DELIVERABLE:

At the completion of its task the expert will provide an independent expert report that includes the findings for each element of the scope of works defined in Section B above. The report will:

- be a standalone document of a professional standard that can be submitted to and relied upon by the ERA for the purpose of assessing WP's AA3 revision proposal
- be able to be made available to the public and be in an appropriate format to be accessible on the internet
- address where possible recent deliberations on cost escalation by the AER and ERA
- is prepared in accordance with the Federal Court Guidelines for Expert Witnesses set out in Attachment 1 and acknowledges that the expert has read the guidelines
- summarises the expert's experience and qualifications and attaches curriculum vitae
- identifies any person and their qualifications, who assists you in preparing the report or in carrying out any research or test for the purposes of the report
- summarises WP's instructions and attaches these term of reference
- carefully sets out the facts that the expert has assumed in putting together the report and the basis for those assumptions.

Appendix C. Curricula vitae

Tom Hird

Tom Hird is a founding Director of CEG's Australian operations. In the three years since its inception CEG has been recognised by Global Competition Review (GCR) as one of the top 20 worldwide economics consultancies with focus on competition law. Tom has a Ph.D. in Economics from Monash University. Tom is also an Honorary Fellow of the Faculty of Economics at Monash University and is named by GCR in its list of top individual competition economists.

Tom's clients include private businesses and government agencies. Tom has advised clients on matters pertaining to: cost modeling, valuation and cost of capital.

In terms of geographical coverage, Tom's clients have included businesses and government agencies in Australia, Japan, the UK, France, Belgium, the Netherlands, New Zealand, Macau, Singapore and the Philippines. Selected assignments include:

Recent

Expert evidence to the Australian Competition Tribunal on the cost of debt for several regulated Australian electricity and gas network businesses.

Advising NSW, ACT and Tasmanian electricity transmission and distribution businesses on the cost of capital generally and how to estimate it in the light of the global financial crisis.

Advising electricity and gas network operators in SA, NSW and Tasmania on estimating escalation factors used to forecast future capital and operating expenditure for regulatory purposes.

Advice to T-Mobile (Deutsche Telekom) on cost modeling in the mobile telecommunications market.

Expert testimony to the Federal Court of Australia on alleged errors made by the Australian Competition and Consumer Commission (ACCC) in estimating the cost of capital for Telstra (the incumbent telecommunications provider).

Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER.

Advising Telecom New Zealand on issues associated with the cost of providing the New Zealand universal service obligation (TSO).

Industry modeling of the seaborne iron ore market for Japanese Steelmakers in the context of BHPB's initial merger proposal for Rio Tinto and subsequently its proposed Joint venture with Rio Tinto.

Advice to Webb Henderson on setting reserve prices for auction of digital radio spectrum.

2007

Advising the Victorian gas distributors in relation to their response the ESCV's draft decision on the cost of providing gas network services (four reports).

Advising the Energy Networks Association on the appropriate estimation technique for the risk free rate used in CAPM modeling.

Advising on the cost of capital for Victorian electricity distributors' metering operations.

Earlier

Advising the ACCC on the market modeling of the electricity generation sector.

Advising Melbourne water utilities on the potential reform to the process for establishing and maintaining Bulk Water Entitlements.

Advising the ENA on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the debt margin for long dated low rated corporate bonds.

Advising the Australian Competition and Consumer Commission, Australia on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

Tom Hird | Director | C E G

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Daniel Young

Daniel Young is an Economist with CEG, based in its Sydney office. Daniel has a Masters degree in Economics and a Bachelors degree in Operations Research from Auckland University. He has worked as a professional economist for 5 years. Prior to joining CEG, Daniel was an Analyst at NERA Economic Consulting.

Daniel has extensive experience across a wide range of matters relating to economic regulation, antitrust issues and commercial damages in Australia and overseas. He has worked for clients in the electricity, gas, rail, mining, telecommunication, and finance sectors.

Daniel has particular expertise in relation to the implementation of economic principles in computer modelling and has created models for telecommunications costs, electricity pricing, demand response and competition in electricity generation that have been applied in Australia and overseas. Selected assignments include:

Recent

Analysis of the debt risk premium for regulated energy network businesses in Australia as part of regulatory processes and in support of appeals on these matters to the Competition Tribunal.

Preparation of a revenue model relied upon by an independent price expert to set prices for AAT's car terminals on the eastern seaboard of Australia.

Preparation of reports for Optus relating to the regulatory valuations of Telstra's fixed line network, outlining improvements to the approach used.

Providing assistance and research in support of the preparation of reports on the implications on competition of the proposed iron ore joint venture between BHP Billiton and Rio Tinto.

Assisting in the preparation of reports for Australian electricity and gas network businesses estimating the rate of inflation for regulatory purposes and calculating and forecasting materials escalators.

Econometric testing using Australian data of the specification of the Sharpe CAPM equation for the ENA in relation to the AER's cost of capital review.

Providing advice to a European firm regarding the implications on competition in the UK electricity generation market of a number of proposed corporate transactions.

Prior to 2008

Estimating the likely response in the demand for electricity to the increased proliferation of time of day and critical peak tariffs as part of the MCE's cost/benefit analysis of the introduction of smart meters.

Analysing the results of the 2006 household survey of electricity, gas and water consumption in the Sydney region and preparing a report summarising these on behalf of IPART.

Undertaking research for the Australian Railways Association into charging regimes for rail and road access across a number of Australian jurisdictions. Critiquing econometric modelling of the effect of road charges on rail

Advising the electricity regulator in Macau about efficient tariff reform using modelling of the short run and long run marginal cost of supply in Macau.

Assisting in determining the market gas price on behalf of Santos in arbitration for two major gas supply contracts.

Developing a modelling framework for the ACCC to understand the increased incentives of merged generators in the NEM to engage in strategic withholding of capacity.

Estimating the long run marginal cost of Integral Energy's distribution network and applying this to improve the efficiency of tariffs.

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Johanna Hansson

Johanna Hansson joined CEG as an Economist in early 2010, and is based in its Melbourne office. Johanna has a Masters degree in Economics and two Bachelor degrees in Economics and Management from Uppsala University. She has conducted extensive academic research on behalf of both the Swedish Competition Authorities and the Swedish Energy Market Inspectorate. Prior to joining CEG, Johanna also interned for several month in the Competition Policy Practice at Frontier Economics in their head office in London.

Johanna has experience across a wide range of matters relating to economic regulation, antitrust issues and commercial damages in Australia and overseas. She has worked for clients in the electricity, gas, water, transport and telecommunications sectors.

Recent selected assignments include:

2011

Preparing a report on behalf of Commercial Radio Australia (CRA) to respond to ACMA's options paper on revisions of Commercial Radio Standards.

Providing expert advice to the Vanuatu government in respect of the correct country risk premium to apply in the context of a dispute and arbitration to determine the cost of capital for UNELCO.

Advising regulated gas businesses ActewAGL and Jemena Gas Networks in the preparation of their appeals to the Australia Competition Tribunal against the AER's decision.

Advising Everything Everywhere on appeal of Ofcom's determination on wholesale mobile voice call termination.

Preparing and presenting a model of the Australian Amalgamated Terminal's (AAT) costs in order to estimate efficient cost-recovery prices as part of a regulatory process overseen by a price expert.

2010

Preparation of expert reports advising Envestra of the risk-free rate, debt risk premium and equity beta to be used in its original and revised access arrangement proposals.

Preparation of an expert report for Vector, New Zealand, responding to the Commerce Commission's proposed input methodologies for estimating the cost of capital.

Developing mobile cost models for Digicel in three Pacific Island jurisdictions for submission in regulatory proceedings. Estimating benchmarks for Digicel for mobile termination prices using econometric analysis for two Pacific Island jurisdictions.

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