Escalation factors affecting expenditure forecasts

A report for Jemena Asset Management

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Executive Summary

1. CEG has been commissioned by Jemena Asset Management (JAM) to estimate cost escalation factors in order to project forward the costs of providing services to ActewAGL Distribution for the 2010-11 to 2014-15 regulatory period. JAM has requested that cost escalation factors be developed for:

   - labour paid under enterprise bargaining agreements (EBA);
   - labour paid under individual contracts;
   - aluminium;
   - steel;
   - plastics (nylon-11/polyethylene); and
   - concrete.

2. JAM has also requested that CEG separately estimate the extent to which the planned introduction of an emissions trading scheme (ETS) is likely to affect the escalation factors for aluminium, steel, nylon-11/polyethylene and concrete.

3. The terms of reference for this engagement stipulate that these cost escalation factors should be consistent with the National Gas Rules, and in particular Rule 74(2), which states that any forecast or estimate:

   (a) must be arrived at on a reasonable basis; and

   (b) must represent the best forecast or estimate possible in the circumstances.

4. We consider that the estimates presented in this report and the methodologies that we use to derive them are consistent with these requirements.

5. In order to estimate a set of escalation factors to extend forward JAM's costs, it is necessary to form a view about the future movements of wages and commodity prices. The methodology that we have adopted in this report is to source predictions of future prices for these inputs, whether in the form of futures prices or expert forecasts, and to rely on these data to develop escalation factors. Where futures prices are available and are sufficiently liquid, we have used these in preference to forecasts on the basis that these represent the best forecast of prices by informed market participants.

6. Issues of consistency in timing are crucial to the development of escalation factors, because their function is to project forward prices or costs from one period to another. Due to the way that spending forecasts are used in regulatory modelling, the escalation factors required to project forward operating and capital expenditure must be made on a different basis. Operating expenditure must be projected forward to the

mid-point of each financial year, using the forecast change in average costs between financial years, or 'financial year' escalators. On the other hand capital expenditure must be projected forward to the end of each financial year, using the change in average costs over each calendar year, or 'calendar year' escalators. Our understanding is that all of JAM's operating costs and some of its capital costs are based on prices prevailing over the 2009-10 financial year, with the remaining capital costs based in the 2008-09 financial year.

7. In general, the methodology applied in this report to estimate escalation factors is characterised by a high degree of transparency over the use of input data to estimate escalation factors and is broadly consistent with the methodology applied by the Australian Energy Regulator (AER) in its calculation of escalation factors for its Final Determinations for the New South Wales and Tasmanian electricity businesses.

8. CEG's estimates of JAM's escalation factors are set out in Table 1 below.

Table 1: Escalation factors for JAM, real

Financial year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
EBA EGW labour	1.8%	1.3%	2.1%	1.9%	1.6%	1.8%
Contract EGW labour	1.8%	1.4%	2.1%	4.0%	4.4%	4.1%
Aluminium	-7.9%	9.9%	9.0%	7.7%	6.6%	5.9%
Steel	-18.0%	8.4%	6.3%	1.5%	0.9%	0.8%
Polyethylene	0.6%	2.0%	1.1%	0.3%	0.2%	0.2%
Concrete	3.0%	1.5%	3.4%	3.0%	1.8%	0.9%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
EBA EGW labour	1.1%	2.3%	2.2%	2.0%	1.7%	1.7%
Contract EGW labour	1.6%	1.5%	1.6%	3.1%	4.4%	4.3%
Aluminium	-14.1%	12.5%	9.2%	8.6%	7.0%	6.2%
Steel	-21.5%	9.9%	6.5%	3.8%	1.0%	0.9%
Polyethylene	-2.6%	4.5%	1.5%	0.7%	0.2%	0.2%
Concrete	2.7%	0.7%	2.7%	3.6%	2.3%	1.3%

9. We have separately estimated the effect that the Commonwealth Government's proposed ETS will have on the escalation factors for commodities. This analysis is based on the Australian Bureau of Statistics Input-Output tables, which allow us to track the extent to which an increase in the price of carbon dioxide emissions will have on the price of final outputs over a range of industries. The effect of increasing emissions prices between 2009-10 and 2014-15 on the escalation factors estimated above is shown in Table 2 below.

Table 2: Effect of emissions trading scheme on escalation factors

Financial year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Aluminium	0.0%	0.0%	0.3%	0.4%	0.1%	0.0%
Steel	0.0%	0.0%	0.7%	1.2%	0.1%	0.1%
Concrete	0.0%	0.0%	0.5%	0.8%	0.1%	0.1%
Polyethylene	0.0%	0.0%	0.3%	0.5%	0.1%	0.1%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Aluminium	0.0%	0.0%	0.1%	0.4%	0.3%	0.0%
Steel	0.0%	0.0%	0.3%	1.1%	0.7%	0.1%
Concrete	0.0%	0.0%	0.2%	0.7%	0.5%	0.1%
Polyethylene	0.0%	0.0%	0.1%	0.4%	0.3%	0.0%

10. Given the lack of certainty over future emissions prices and the nature of industry relationships in the future, the estimates reported in Table 2 are necessarily approximate. Nonetheless, we believe them to be reasonable and the best estimate possible in the circumstances.

1. Introduction

11. JAM has engaged CEG to provide advice on the development of annual escalation factors for the services that JAM provides under operating and capital expenditure programs to ActewAGL Distribution (AAD). The terms of reference for this engagement are set out at Appendix D.

12. 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 sectors over the 2007/08 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 next regulatory period. Escalation factors for EGW wages can be used to determine the expected cost of the labour input to this project.

13. The methodology for determining escalation factors has become significantly refined over the course of the South Australia, New South Wales and Tasmanian electricity network determinations. Although there are still areas where the businesses are in dispute with the AER, at a high level there is general agreement as to the best approach to calculate escalation factors for:

    - EGW labour;
    - aluminium;
    - steel; and
    - crude oil.

14. In this report, we review the foundations for the methodology that has been applied in the context of the electricity determinations and re-estimate escalation factors based on the most recently available data. Furthermore, we propose methodologies for calculating escalation factors for additional inputs relevant to the gas context, including:

    - concrete; and
    - plastics (nylon-11 or polyethylene).

15. JAM has also asked CEG to estimate the effect that the proposed ETS will have on its escalation factors. We have used forecasts of the price of emissions under a trading scheme, combined with Australia-wide input-output tables published by the Australian Bureau of Statistics, to estimate the effect that the ETS will have on prices in these industries.

16. 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.

17. 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. The qualifications of Dr Hird and Mr Young are set out at Appendix C to this report.

18. 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.

2. Description of methodology

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

    a. the price of goods and services directly purchased by JAM for the purpose of delivering its expenditure programs to AAD; or

    b. the price of inputs used in the production of goods and services directly purchased by JAM for the purpose of delivering its expenditure programs.

20. This task would best be achieved by examining forecasts of prices for all inputs purchased by JAM (ie, category a) above). Unfortunately, with the exception of labour costs, such forecasts generally do not exist. For example, while there are forecasts for labour costs in the New South Wales electricity, gas and water sector, there are few if any forecasts of the cost of equipment purchased by JAM (such as pipes, meters and regulators, etc).

21. The lack of such forecasts for most goods and services purchased by JAM 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 plastic pipes.

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

    c. futures prices and forecasts for aluminium and crude oil can be used to inform forecasts for the value of these materials as components of JAM's expenditures;

    d. forecasts of the price of steel, concrete and labour can be used to project forward the value of these components of JAM's expenditures; and

    e. forecasts of general cost movements (eg, consumer price index or producer price index) can be used to derive changes in the cost of other inputs used by JAM or its suppliers that not captured above (eg, energy costs and equipment leases etc).

23. This high-level approach has previously been proposed by CEG in its reports for electricity businesses[1] and has been accepted by the AER in its Final Determinations for ElectraNet, Transend and the New South Wales electricity network businesses.

24. 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 the relevant cost forecasts;
- Step 3 – calculate a weighted average escalation factor using weights derived in Step 1 and forecasts from Step 2.

25. In order to complete Step 2 where there are no futures or forecasts available for a particular good or service (eg, gas regulators) it may be necessary to derive a forecast for that good or service from other forecasts. The methodology taken in deriving a forecast for, say, gas meters 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 gas meters. 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 (eg 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.

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

2.1. Preference of futures over forecasts

27. Consistent with the approach approved by the AER in its recent New South Wales and Tasmanian electricity Final Determinations, in coming to our estimates of JAM'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.

[1] 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; and CEG, *Escalation factors affecting expenditure forecasts: a report for NSW and Tasmanian electricity businesses*, January 2009.

28. 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 of prices 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 were 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 on the relevant future date.

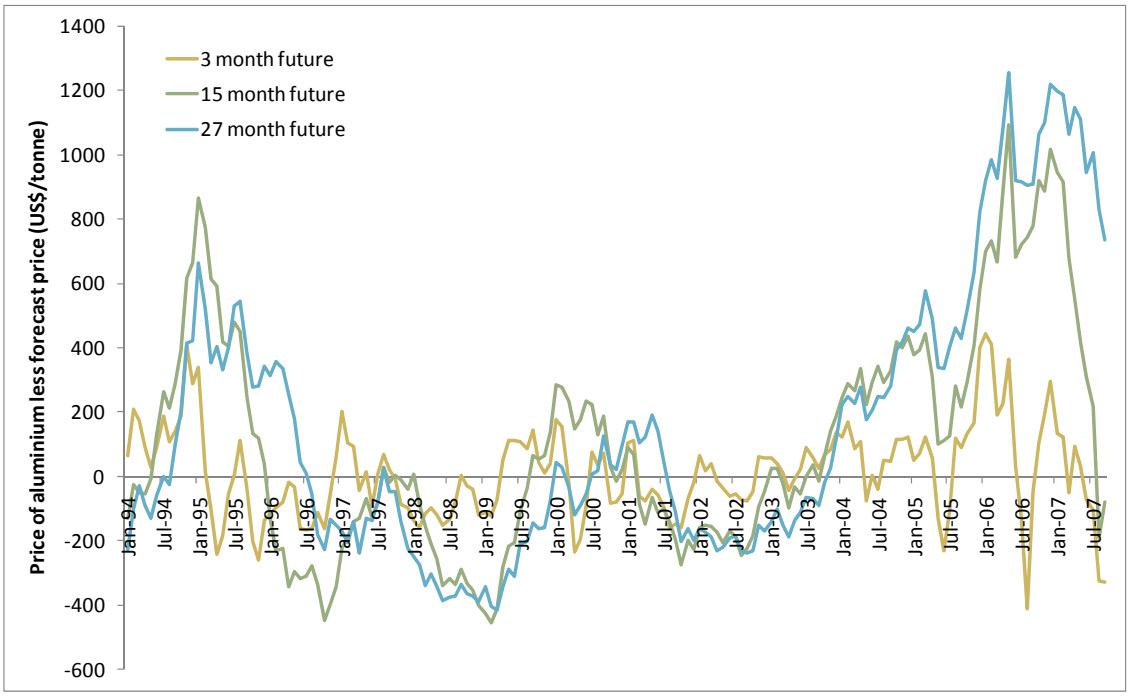
29. Of course, futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur. In fact, futures prices have spectacularly underestimated refined aluminium prices in the last few years (see below graph). However, they nonetheless provide the best estimate of future spot prices. 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.

30. 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."*[2]

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

Figure 1: Actual prices less prices predicted by LME futures (nominal, US$/tonne)



31. The graph above shows that, over most of the 1990's, futures prices were a reasonable predictor of aluminium spot prices. However, during the first half of the current decade futures prices have systematically underestimated spot prices (ie, failed to anticipate the increase in spot prices and overestimated the rate at which they would subsequently fall).

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, not the nominal price. This is because the future costs of JAM are expressed in real terms in the AER's regulatory modelling and are re-inflated in the context of that model. However, it is not always possible to obtain forecasts of future price movements that are expressed in real terms.

33. For wage, construction and concrete costs we have relied on professional forecasters' opinions of the future level of price escalation. Where the forecaster is also an acknowledged macro-economic forecaster we have used its forecasts of inflation to derive an associated real forecast from its nominal forecast. Where the forecaster is a sectoral specific forecaster (rather than a macro-economic forecaster) we have used

our own estimate of expected inflation derived on the basis of the Reserve Bank of Australia's (RBA) forecasts. The derivation of this forecast is very simple, aligns with the method utilised in the AER's spreadsheet modelling for the New South Wales and Tasmanian Final Determinations, and is explained in Box 1 below.

34. For example, in the following section we present real wage cost forecasts from Econtech, BIS Shrapnel and Macromonitor. Econtech and BIS Shrapnel have acknowledged expertise in macro-economic forecasts and we have derived real wage forecasts by deflating their nominal wage forecasts by the forecasts of inflation that it has made on a consistent basis.[3]

35. By contrast, 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 (ie, forecasting the prices of all domestically consumed goods and services including the Australian dollar price of 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.

36. Similarly, where we have relied on futures markets to derive forecasts of particular prices (eg, for aluminium) we have deflated these by a 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 to 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 of which is the May 2009 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.

[3] Note however, that for consistency with a regulatory model that re-inflates real forecasts by an estimate of Australia-wide inflation, we consider it necessary that an Australia-wide measure of inflation has been used to deflate a professional forecaster's nominal forecasts. For example, we understand that Econtech reports real forecasts of labour costs in New South Wales and other states that have been deflated using state-specific measures of inflation. Where possible, we have adjusted these real forecasts, using that forecaster's estimate of inflation in that state and over Australia as a whole, to achieve consistency with the regulatory framework.

Table 16: Output and Inflation Forecasts[a]

Percentage change over year to quarter shown

	Dec 2008	June 2009	Dec 2009	June 2010	Dec 2010	June 2011	Dec 2011
GDP	0.3	−1¼	−1	½	2	3¼	3¾
Non-farm GDP	0.0	−1½	−1	½	2	3¼	3¾
CPI	3.7	1½	2¼	2½	2	1½	1½
Underlying inflation	4.3	3¾	3¼	2½	2	1½	1½

(a) Actual data to December 2008. Underlying inflation refers to the average of trimmed mean and weighted median inflation. For the forecast period, technical assumptions include A$ at US$0.75, TWI at 61, cash rate at 3.00 per cent, and WTI crude oil price at US$65 per barrel and Tapis crude oil price at US$67 per barrel.

Sources: ABS; RBA

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:

- obtain historical CPI from the ABS, currently available up to and including the March quarter 2009;
- estimate the June and December 2009 forecast index numbers based on the actual index numbers for June and December 2008 and the change in CPI forecast by the RBA;
- estimate subsequent June and December forecast index numbers based on the forecast index numbers for the previous June and Decembers and the change in CPI forecast by the RBA;
- beyond the horizon of the RBA forecasts, estimate June and December forecast index numbers based on the forecast index numbers for the previous June and December, increased by 2.50%; and
- calculate all forecast March and September quarter indices by interpolating between the relevant June and December quarters.

The use of 2.50% as a long-term forecast of inflation is selected as being the mid-point of the RBA's target range of 2-3%. We note that the entirety of this methodology is consistent with the approach utilised in the AER's spreadsheet modelling for the New South Wales and Tasmanian Final Determinations.

2.3. Forecasting foreign exchange movements

37. 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 (eg, the cost of aluminium and steel for Australian producers of gas meters and regulators).

38. In the context of JAM's escalation factors, it is normally the case that commodities traded on 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.

39. The fact that there is a recognised link between commodity prices and the value of the Australian dollar is particularly important to this project as it means that cost reductions associated with falling commodity prices can be expected to be at least partially offset by concurrent depreciation in the Australian dollar. This link between the Australian dollar and commodity prices is accepted by both the RBA and in academia. The RBA has recently sought to explain record high Australian dollar values in relation to high levels of commodity prices.

> *"The continued strength in commodity prices, together with higher interest rates in Australia than abroad, helped underpin the Australian dollar's rise to multi-year highs against the US dollar and on a trade-weighted basis in July, before the currency depreciated somewhat following the disturbances in credit markets. It has also contributed to the larger increase in the Australian stock market than in other major markets, as the share prices of resource companies have been particularly strong."*[4]

40. Similarly, the link between the Australian dollar and commodity prices has been confirmed in academic studies such as that by Hatzingkolaou and Polasek (2005) who state that their empirical results:

> *"…strongly supports the widely held view that the floating Australian dollar is a 'commodity currency'."*[5]

[4] RBA, *Statement on Monetary Policy*, August 2007, p.2

[5] Hatzinkolaou, D., and Polasek, *Journal of Applied Economics*, Vol VIII, No. 1, May 2005, pp.81-99.

41. On this basis it is important to use a forecast for the Australian dollar that is consistent with the forecast for commodity prices used. Certainly, it would be inconsistent to adopt an assumption of dramatic falls in commodity prices without also forecasting a similarly dramatic reduction in the value of the Australian dollar.

42. However, it is notoriously difficult to forecast even short term movements in exchange rates, let alone long-term movements. Futures markets for the Australian dollar are relatively thin beyond a few months and these short dated futures are, in any event, driven by differences in risk-free interest rates across countries.[6] It is not possible to use futures markets to forecast out the value of the Australian dollar in 2015.

43. Although a number of organisations provide forecasts of the Australian dollar over a short horizon, the only long term forecasts of the Australian dollar we are aware of are provided by Econtech in its ANSIO reports. For the purpose of this report we adopt the Econtech forecasts to convert United States dollar forecasts for commodity prices to the Australian dollar price of those commodities.

2.4. Timing of escalation factors

44. 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.

45. It is our understanding that escalation factors are used for two purposes:

    - to inflate the base planning objects for capex to the end of each financial year in the next regulatory period; and
    - to inflate the base planning objects for opex to the mid-point of each financial year in the next regulatory period.

[6] That is, futures reflect the difference in those interest rates such that it is possible for bond holders to 'lock in' the same risk free rate in their home currency by holding foreign bonds. This phenomenon is known as covered interest parity.

46. Furthermore, it is our understanding that JAM's base planning objects for capital expenditure have been costed as an average over the 2008-09 financial year, with some objects costed in the 2009-10 financial year. Operating expenditure objects have been costed in the 2009-10 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 is required by i above.[7]

47. Consistent with the base period for costing and the purpose for escalation, escalation factors that take forward operating expenditure must escalate from average costs over a financial year to average costs over the next financial year – in the sense that inflating opex 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 a 'financial year' escalation factor.

48. For similar reasons, capex must be taken forward using escalation factors that measure the differences in average costs between calendar years. This is because regulatory modelling typically treats capex as an amount that is added to an asset base at the end of the financial year, and so financial year escalators cannot be used to project these forward. We refer to escalators that project forward objects from average costs over a calendar year into the next calendar year as 'calendar year' escalators.

49. We understand that this methodology and the terminology associated with it has already been accepted by the AER in the context of its Final Determinations for the New South Wales and Tasmanian electricity businesses.

50. 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

51. Many of the forecasts that we have regard to in deriving escalation factors, such as those provided by Econtech and 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.

52. 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 Econtech forecasts

[7] For example, to escalate an object based in 2008-09 to 2010-11, JAM should apply the 2009-10 and 2010-11 escalation factors. However, if the object were based in 2009-10, only the 2010-11 escalation factor should be applied.

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 Econtech forecasts could not straightforwardly be applied to the data in order to project it forward.

53. 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,[8] an example of which is:

- Index for September 09 = (2 * Index(07-08) + 7 * Index(08-09) – Index (09-10))/8
- Index for December 09 = (9 * Index(08-09) – Index (09-10))/8
- Index for March 09 = – (Index(07-08) + 9 * Index(08-09))/9
- Index for February 09 = – (Index(07-08) + 7 * Index(08-09) +2 * Index (09-10))/8

54. 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 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.

55. The AER used these formulae in its Final Determinations in respect of Econtech forecasts for EGW wages, general labour and construction. However, the formulae are not specific to use with Econtech forecasts, and in this report we apply them generally to any forecast expressed in this way, such as Macromonitor's and BIS Shrapnel'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

56. 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 JAM's future costs at the present time, the actual magnitude of these costs at the time that they are incurred may well be considerably 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 current expectations of the future, they are at best an imprecise estimate of future values.[9]

[8] Econtech, *Updated labour cost growth forecasts*, 25 March 2009, pp.23-4

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

57. 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.

58. Although the spreadsheet modelling underling 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 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.

59. Finally, we note the distinction between precision and accuracy. Although there 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.

60. At Appendix A we describe why a transition between actual EBA EGW 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 use efficient use of the data available to come to the best forecast escalation factors given the circumstances.

3. Forecasts of component cost inputs

61. The following section sets out the specific considerations that have been made regarding the derivation of escalators for JAM's expenditure programs. These considerations guide the data sources and methodology that have been selected in each case.

3.1. JAM's EGW labour costs

62. For the purpose of forecasting future labour costs, JAM has requested that CEG develop separate escalation factors for its EGW labour costs that it pays to staff who are paid:

- under its enterprise bargaining agreement (EBA); and
- under individual contracts.

63. CEG has commissioned forecasts from BIS Shrapnel and Macromonitor for the growth of EBA and individual contract wages in the EGW sector in New South Wales. We are also aware of Econtech forecasts for nominal wage growth across the EGW sector in New South Wales. Although JAM operates in ACT, we understand that its EBA is a national agreement through Jemena, and that the majority of JAM's non-EBA staff which provide services to AAD are located in Sydney. Consequently we consider that using New South Wales specific forecasts is likely to be reasonable for the purpose of escalating JAM's EGW labour costs.

64. We consider that, following the AER's approach in its Final Determinations for the New South Wales and Tasmanian electricity businesses, it is reasonable to use actual measures of changes in staff costs where these are available in preference to the much broader measures that are available for the entire EGW sector. We have therefore used actual salary increases paid by JAM where these are available. Escalation factors beyond this horizon are based on professional forecasts.

65. For EBA EGW wages, we have used the average of the BIS Shrapnel EBA, Macromonitor EBA and Econtech EGW forecasts to extend forward the JAM data and create an index with which to estimate EBA EGW escalation factors. We have applied the Econtech data on the basis that the large majority of staff within the EGW sector as a whole, for which the Econtech forecast applies, are paid under EBAs.

66. However, we do not use the Econtech EGW forecasts in relation to individual contract EGW wages. Since relatively small proportion of the EGW workforce is paid under these arrangements, it is unlikely that the more general Econtech forecasts will be representative of these salaries. Accordingly we have used only the specific BIS

Shrapnel and Macromonitor individual contract EGW forecasts to project forward actual JAM data in order to derive these escalation factors.

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 JAM pays its employees wage increases four quarters of increase 'up front', to a stylised framework that assumes it can spread these increases out over a year.[10] 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.

68. Table 3 below shows the financial year and calendar year escalation factors that we calculate using this methodology.

Table 3: Escalation factors for labour components, real

Financial year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
EBA EGW labour	1.8%	1.3%	2.1%	1.9%	1.6%	1.8%
Contract EGW labour	1.8%	1.4%	2.1%	4.0%	4.4%	4.1%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
EBA EGW labour	1.1%	2.3%	2.2%	2.0%	1.7%	1.7%
Contract EGW labour	1.6%	1.5%	1.6%	3.1%	4.4%	4.3%

3.2. Aluminium

69. It is important to be clear when we talk about movements in 'the' price of aluminium that we are really talking about movements in the price of aluminium at a particular stage in its production process – namely refined metal to a particular specification. The prices quoted in this 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%.[11]

70. The prices quoted are not necessarily the prices paid for aluminium by equipment manufacturers. For example, producers of meters 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

[10] Although Jemena's wage increases appear to have been paid every three quarters, rather than each year, the most recent EBA increase will apply for an entire year from 1 July 2009 to 30 June 2010.

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

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.

71. 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 metals as inputs to their production process does not mean that the use of LME prices to estimate escalation factors is invalid. The correct application of Step 2A, the 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.

72. We have obtained LME prices for aluminium averaged over the month of April 2009. The LME's longest dated future for these products is 27 months, allowing us to forecast prices out to and including July 2011 by interpolating between futures prices. However, available futures prices do not extend out to the end of AAD's regulatory period (ie, to the year ended June 2015). In this case we have two choices. We can assume that aluminium prices will remain constant in real terms from July 2011 onwards or we can have regard to professional forecasts.

73. 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 2009.[12] In relation to aluminium prices there is a wide variety of forecasts. These forecasters provide quarterly forecasts out to September 2011 in nominal United States dollar terms.

74. Consensus Economics also provides a 'long-term' forecast in real United States 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 *"long term 5-10 year forecasts in real (inflation adjusted) 2008 dollar terms"*.[13] For these reasons we must treat these forecasts with some caution.

75. Consistent with the methodology employed previously by the AER, 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 2009, we assume that the long-term forecasts are for the month of October 2016.

76. Forecasts of the price of aluminium between the end of the LME forecasts in July 2011 and the Consensus Economics forecast in October 2016 can be generated by

[12] Consensus Economics, *Energy & Metals Consensus Forecasts: Minerals Monitor*, 27 April 2009.

[13] Ibid, p.5

interpolating between these price points. However, as described above, the escalation factors beyond 2011 must be treated with caution due to their reliance on the Consensus Economics mean forecast.

77. We use the approach described above to produce a monthly series of aluminium prices, which may then be averaged to estimate financial year escalators out to 2015. These escalators are shown in Table 4 below.

Table 4: Escalation factors for aluminium, real

Financial year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Aluminium	-7.9%	9.9%	9.0%	7.7%	6.6%	5.9%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Aluminium	-14.1%	12.5%	9.2%	8.6%	7.0%	6.2%

3.3. Steel

78. A component of JAM's costs is associated with the purchase of products using steel. For example, valves and some facility component incorporate significant amounts of steel.

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

80. 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.

81. Consensus Economics also provides forecasts for hot-rolled coil (HRC) for Europe and the United States – Consensus 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 real 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.

82. We understand that it is likely to be the case that suppliers of equipment to JAM may not necessarily purchase HRC as an input to their manufacturing processes, and that steel pipe is more commonly used as a benchmark in this industry. However, there is significantly better price information available for HRC, in the form of the Consensus forecasts, than there is for steel pipe. We regard the use of HRC price forecasts to estimate escalation factors as a reasonable alternative to prices for steel pipe on the basis that, over time, the costs of producing these products are likely to move together. Although there may be short-term variance caused by factors specific to the production of steel pipe, we regard it as reasonable to forecast steel prices on this basis and that this is the best available forecasting methodology in the circumstances.

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

Table 5: Escalation factors for steel, real

Financial year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Steel	-18.0%	8.4%	6.3%	1.5%	0.9%	0.8%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Steel	-21.5%	9.9%	6.5%	3.8%	1.0%	0.9%

3.4. Crude oil

84. JAM has not specifically requested escalation factors for crude oil. However, as we explain at section 3.5 below, we find it useful to estimate these to the extent that they prove of assistance in estimating escalation factors for plastics such as nylon-11 and polyethylene.

85. In order to derive estimates of historical and forecast changes in crude oil prices we have followed largely the same approach used for aluminium. Historical data on crude oil prices have been sourced from the US Department of Energy (DoE).[14] 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 24 April 2009 for use in the estimation of escalation factors.

86. NYMEX futures are available up to December 2017 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

[14] 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 6 below.

Table 6: Escalation factors for crude oil, real

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Crude oil	1.8%	10.7%	5.0%	1.6%	1.4%	0.7%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Crude oil	-11.8%	22.4%	7.5%	2.9%	1.2%	1.5%

3.5. Nylon-11 and polyethylene

87. Plastic piping, particularly nylon-11, is an important input into JAM's expenditure programs and we understand that many smaller diameters of pipe purchased by JAM are made using this material. Internationally, there is only limited futures information available for nylon-11, and none for more than one or two months into the future. There is no evidence that these futures markets are liquid or accepted as an international benchmark for the price of nylon-11. We are also unaware of any forecasters tracking the price of nylon-11.

88. Furthermore, we understand that there is only a single supplier of nylon-11 in Australia. In these circumstances, where there is very limited amount of independent and transparent pricing information for the product, we would normally consider that the best proxy for the future price of nylon-11 may be obtained by examining the pricing of JAM's contract with its supplier for evidence of future pricing provisions, perhaps in the form of benchmarking against other products or indices. However, we have been informed by JAM that this information is not available for future years.

89. We consider that a next best alternative for deriving escalation factors for nylon-11 is to use a proxy escalation factors developed for a close substitute. We understand that:

- polyethylene is a substitute for the use of nylon-11 for use in gas mains;
- other gas network providers in Australia use polyethylene pipes in preference to nylon-11; and
- JAM itself uses polyethylene for some of its larger diameters of gas pipeline.

90. For these reasons, we are satisfied that it is likely to be reasonable to approximate the future price of nylon-11 with the future price of polyethylene. This does not mean that we expect these prices to be the same, or even similar, at every point in the future – merely that the competitive pressures that determine how the prices of these inputs change are likely to be related over the medium term. As a proxy for the future price of

nylon-11 we consider using the price of polyethylene to be superior to the alternative, which is to assume zero real escalation.

91. Like nylon-11, we are unaware of significant futures trading in polyethylene. The LME has established futures prices for thermoplastics, including polyethylene, but these extend only to a horizon of two months, making them unhelpful for the purpose of calculating escalation factors. Whilst we are aware of limited futures trading of polyethylene elsewhere, no market appears to offer the degree of liquidity or long term pricing horizon to be useful.

92. Similarly, we have been unable to locate reliable forecasts of plastics prices from professional forecasters. For example, Consensus Economics does not cover polyethylene in its Minerals Monitor.

93. However, we understand that there is a pricing relationship between crude oil and plastics, to the extent that crude oil is an important component in the manufacture of thermoplastics such as polyethylene. We have obtained a long term monthly pricing history for crude oil and thermoplastic resins from the United States Bureau of Labor Statistics from July 1991 to February 2009[15] and have used this history to obtain econometric estimates of the relationship between these commodities. A discussion of the methodology used is discussed in Appendix B to this report.

94. The relationship estimated in Appendix B has been used to generate an index of future polypropylene prices on the basis of the index of crude oil prices that underlies the crude oil escalation factors discussed at section 3.4. The nature of this relationship, in broad terms, is that approximately 17% of the variation in the price of crude oil is passed over a period of three months to polypropylene. This is unlikely to be an accurate measure at any particular point in time due to other factors, such as specific market conditions, that also affect the price of polyethylene. However, it represents the best representation of the longer term data that we have obtained. In this sense, we regard it as reasonable to forecast average polyethylene prices on this basis, and that this is the best available forecast in the circumstances.

95. Table 7 below shows the escalation factors derived on the basis of this relationship. As we state above, these may also be used as a proxy for escalation factors for nylon-11.

[15] See www.bls.gov. The series we used are 0662 and 056, available from the commodity prices component of the BLS's producer price index.

Table 7: Escalation factors for polyethylene, real

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Polyethylene	0.6%	2.0%	1.1%	0.3%	0.2%	0.2%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Polyethylene	-2.6%	4.5%	1.5%	0.7%	0.2%	0.2%

3.6. Concrete

96. Concrete is used extensively in the installation and maintenance of gas pipelines, primarily through the restoration of road and pavement surfaces following work on pipelines themselves.

97. We have commissioned a forecast for the future prices of concrete from Macromonitor. This forecast has been provided as the year-ending price of concrete, up to and including 2016. Deflating these forecasts using RBA inflation and using linear interpolation between these points, we have created a real index of concrete prices up to June 2016. The escalation factors derived from this forecast are set out in Table 8 below.

Table 8: Escalation factors for concrete, real

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Concrete	3.0%	1.5%	3.4%	3.0%	1.8%	0.9%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Concrete	2.7%	0.7%	2.7%	3.6%	2.3%	1.3%

4. Effect of emissions pricing on escalation factors

98. CEG has estimated the escalation factors above for aluminium, steel, polyethylene and concrete using futures or forecast prices that, to the best of our knowledge, do not include the potential costs relating to an ETS. The Commonwealth Government has proposed an ETS, the broad outline of which is set out in the 2009 Budget. Such a scheme is likely to affect prices of the material inputs to JAM's expenditure programs, because these are all commodities or goods that require significant amounts of energy and/or fossil fuels to produce. In this section we estimate the extent to which the escalation factors that we calculate in section 3 above should be increased to capture the likely effect of the ETS.

99. The Commonwealth Government is proposing that the ETS will commence in 2011-12 with an unlimited number of permits made available at the price of $10 per tonne of carbon dioxide emissions.[16] In the following years, a cap will be enforced and the price of emissions will be set by the market under the trading scheme. We have obtained recent estimates of the market price for carbon dioxide emissions from a report commissioned by the electricity market operator, NEMMCO, from Acil Tasman.[17] The emissions prices we assume in this analysis are summarised in Table 9 below.

Table 9: Expected emissions prices, 2009-10 to 2014-15

Financial year	CO_2 emissions price ($/tonne)
2009-10	n.a.
2010-11	n.a.
2011-12	$10
2012-13	$26
2013-14	$28
2014-15	$30

Source: Acil Tasman, Budget 2009

100. The effect that these emissions prices will have on JAM's expenditure on materials will depend upon the extent to which these materials embody carbon dioxide emissions released during their manufacture and transport. In order to estimate this effect, we

[16] See Statement by the Minister for Climate Change, 2009 Commonwealth Budget, 12 May 2009. Available online at: http://budget.australia.gov.au/2009-10/content/ministerial_statements/climate_change/download/ms_climate_change.pdf

[17] Acil Tasman, *Fuel resource, new entry and generation costs in the NEM*, April 2009, p.23

have used the Australian Input-Output tables for 2004-05, issued by the Australian Bureau of Statistics (ABS).[18]

4.1. Input-output tables

101. These input-output tables track the supply and use of products in the Australian economy and show the inter-relationships between industries. As such, they provide a useful indication of the extent to which manufacturers of materials such as those used by JAM use outputs from the fossil fuel industries as inputs into their production processes.

102. For the purposes of this analysis, we have assumed that carbon dioxide emissions enter the economy in the form of coal, crude oil and natural gas that are burnt in order to generate energy and heat to produce other products. This is necessarily an approximation, since we ignore wood or other products that may contribute to carbon emissions. However, we consider that for the materials that are being considered in this report, these alternative sources of emissions are unlikely to be material.

103. The input-output tables break the economy down into 109 industries. This means that there is significant agglomeration of activities. Relevantly for this exercise, the ABS includes mining and exploration industry for coal (1101) and oil and gas (1201) but do not separate these out into the categories above. In our opinion, the industries most relevant to the outputs that we are trying to measure are:

- basic non-ferrous metals and products, 2702, (aluminium);
- iron and steel, 2701, (steel);
- plastics, 2509, (nylon11 or polyethylene); and
- cement, lime and concrete slurry, 2063, (concrete).

104. None of the industries that we have used is necessarily perfectly suitable for the commodity that we match it to. However, this data limitation cannot be overcome because the input-output tables are not available in finer detail. Whilst this limitation influences the precision of our estimates, in our opinion they remain the best estimates of the impact of emissions prices that are possible in the circumstances.

105. We have used total requirement coefficients from the input-output tables to measure the total direct and indirect inputs requirements for each industry in terms of the outputs of other industries, based on prices prevailing in 2004-05. The results of these for the relevant industries above are summarised in Table 10 below.

[18] ABS, *Australian National Accounts: Input-Output Tables – Electronic Publication, 2004-05 Final*, Catalogue No. 5209.0.55.001.

Table 10: Proportion of fuels outputs as inputs to relevant industries, by value 2004-05

	Plastic products (2509)	Cement, lime and concrete slurry (2603)	Iron and steel (2701)	Basic non-ferrous metals and products (2702)
Coal (1101)	0.3%	0.3%	0.8%	0.2%
Oil and gas (1201)	2.0%	7.4%	2.7%	2.8%

Source: ABS

106. Whilst Table 10 above describes the importance of coal and oil and gas in the production of aluminium, steel, polyethylene and concrete, this information by itself is not enough to estimate the effect of an emissions price on the outputs of these industries. We also require information about the emissions intensity of these fuels per dollar in order to estimate the effect of expected emissions prices.

4.2. Emissions intensity of fuels

107. We have sourced estimates of the carbon intensity of fossil fuels from a research paper at the Commonwealth Parliamentary Library.[19] These carbon intensities are reported at Table 11 below. We note that they are broadly consistent with the carbon intensities of fuel burnt at power stations around Australia, as reported by the Acil Tasman report.

108. We also report at Table 11 below data about the price of fuel. This is required because in order to estimate the effect of emissions prices on the price of fuel, we need to understand the importance of emissions per dollar of fuel. The price data in Table 11 have been obtained from the Acil Tasman report for NEMMCO, the Parliamentary Library Research Paper and ABARE's national energy projections.[20] We have used estimates of wholesale prices, rather than retail prices, on the assumption that this is likely to most representative of the price paid for these fuels by other industries which use them as intermediate inputs, for example the electricity generation industry.[21]

[19] Roarty, M. (2008) *Australia's natural gas: issues and trends*, Research Paper No. 25 2007-08. Available online at: http://www.aph.gov.au/library/Pubs/rp/2007-08/08rp25.htm

[20] ABARE, *Australian energy: national and state projections to 2029-30*, December 2006.

[21] The Acil Tasman report identifies prices paid by electricity generators for black and brown coal. We have used prices that represent charges to third parties, rather than the costs of vertically integrated miner-generators.

Table 11: Emission intensity of fossil fuels

Fuel	Emission intensity (kg CO_2 / GJ energy)	Price ($ / GJ)	Emission intensity ($ / kg of CO_2)
Black coal	93.3	1.50	60.4
Brown coal	90.7	0.60	155.5
Petroleum	68.2	15.00	4.5
Natural gas	50.9	3.50	14.5

Source: Parliamentary Library, Acil Tasman, ABARE

109. As we show at Table 10, the ABS does not report industry outputs in its tables down to the level of black coal or brown coal and it does not distinguish between oil and gas. We have therefore averaged the emissions intensity of these fuels together on the basis of domestic Australian consumption in 2004-05, to be 74.2 $/kg of emissions for coal generally and 5.7 $/kg of emissions for oil and gas combined.[22]

4.3. Effect of emissions prices on escalation factors

110. Based on the emissions prices reported at Table 9, the emissions intensity by fuel at Table 11, the use of these fuels in producing outputs at Table 10 and the changed prices for the materials since 2004-05, we can estimate the effect that increasing emissions prices will have on final prices for aluminium, steel, polyethylene and concrete over the period from 2009-10 to 2014-15. The extent to which these escalation factors should be increased to cover the expected price for emissions is set out in Table 12 below.

Table 12: Effect of emissions trading scheme on escalation factors

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Aluminium	0.0%	0.0%	0.3%	0.4%	0.1%	0.0%
Steel	0.0%	0.0%	0.7%	1.2%	0.1%	0.1%
Concrete	0.0%	0.0%	0.5%	0.8%	0.1%	0.1%
Polyethylene	0.0%	0.0%	0.3%	0.5%	0.1%	0.1%
Calendar year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Aluminium	0.0%	0.0%	0.1%	0.4%	0.3%	0.0%
Steel	0.0%	0.0%	0.3%	1.1%	0.7%	0.1%
Concrete	0.0%	0.0%	0.2%	0.7%	0.5%	0.1%
Polyethylene	0.0%	0.0%	0.1%	0.4%	0.3%	0.0%

[22] Based on energy consumption by fuel reported by ABARE for 2004-05. See ibid, p.37

111. We acknowledge that many simplifying assumptions have been made in order to estimate these factors. These assumptions were necessary given the complexity required to track the use of emissions in the production of JAM's inputs. Whilst the emissions escalation factors we report above are necessarily imprecise, we consider them to be reasonable and the best estimates possible in the circumstances.

Appendix A. Derivation of escalation factors for EGW labour

112. This section describes in greater detail the derivation of the escalation factors for EBA and non-EBA EGW labour employed by JAM, as reported at section 3.1 above. Whilst the appendix is self-contained, it can most easily be understood in conjunction with the spreadsheet accompanying this report, whether the calculations described here are set out in full.

A.1. EBA EGW labour costs

113. JAM has provided CEG with a history of EBA salary increases that are outlined in Table 13 below. It is our understanding that the most recent EBA remains in effect until 30 June 2010.

Table 13: Nominal wage changes for JAM's EBA staff

Date	Change
1 July 2005	3.0%
1 March 2006	3.0%
1 November 2006	3.0%
1 July 2007	4.0%
1 March 2008	2.5%
2 September 2008	3.0%
1 July 2009	4.0%

114. 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 JAM's EBA salaries and deflated this index by the quarterly index of inflation, the derivation of which is described at section 2.2.

115. Beyond the period in which actual EBA salary increases are available, the index of EBA wages can be extended by using professional forecasts.[23] We have access to three sets of forecasts for this purpose:

- the BIS Shrapnel forecasts for New South Wales EGW wages under EBAs;

[23] Although, as per our discussion at section 2.2, this will be a real quarterly index of wages, since we consider it desirable, in general, to utilise Econtech's nominal wage forecasts in conjunction with its forecast for inflation.

- the Macromonitor forecasts for New South Wales EGW wages under EBAs; and
- the Econtech forecast for New South Wales EGW wages generally.

116. As noted in the body of this report, although JAM operates in ACT, we understand that its EBA is a national agreement through Jemena, and that the majority of JAM's non-EBA staff providing services to AAD are located in Sydney. Consequently we consider that using New South Wales specific forecasts is likely to be reasonable for the purpose of escalating JAM's EGW labour costs.

117. The BIS Shrapnel and Macromonitor forecasts appear to more precisely measure the object that JAM intends to escalate in this case. However, we understand that approximately 85% of the EGW sector workforce has its wages set under EBAs. Therefore it is likely to be the case that the Econtech forecasts will be reasonably representative as a forecast of EBA wage increases. We believe on this basis that it is reasonable to give the BIS Shrapnel, Macromonitor and Econtech forecasts equal weight in the construction of the EBA wage escalation factors.

118. BIS Shrapnel, Macromonitor and Econtech all present forecasts of wage increases expressed in terms of change from the average wages in one financial year to another and hence they can be averaged together without adjustments for differences in timing. The timing of these forecasts also lend themselves to the use of the 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 EBA outcomes beyond June 2010.

119. 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 wages escalation. That is, we are transitioning from an index that measures actual wage-setting processes, where JAM pays its employees wage increases four quarters of increase 'up front' at the start of July, to a stylised framework that assumes it can spread these increases out over a year.[24] Under such a transition, even if the actual EBA outcomes and the wages forecasts are perfectly consistent, escalation factors may be underestimated.

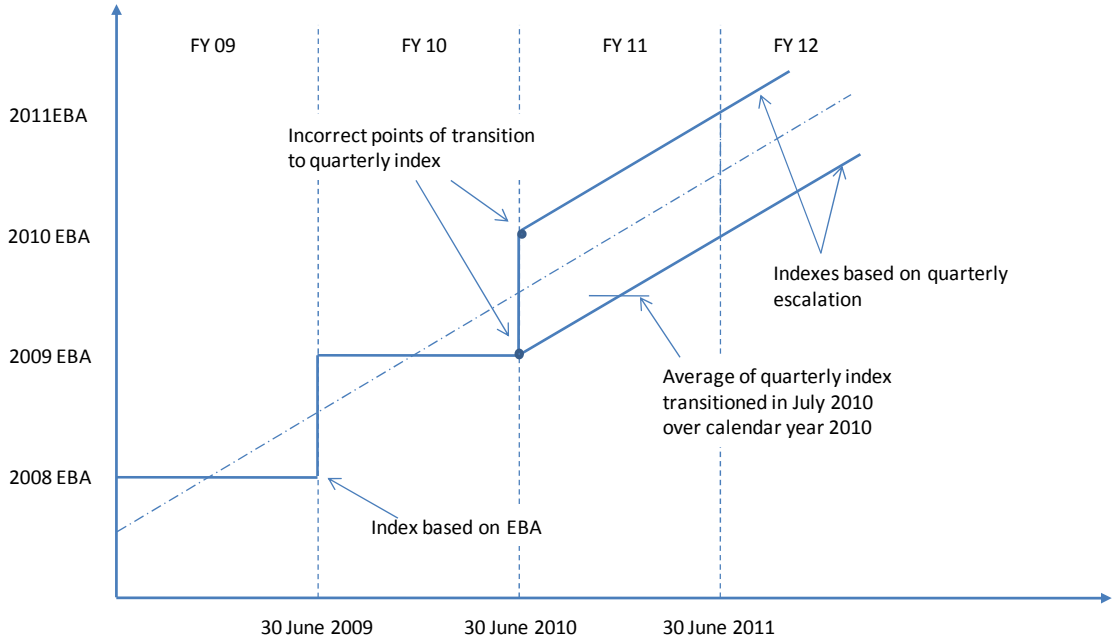
A.1.1. Estimating financial year escalators

120. For example, if the transition from EBA outcomes to forecasts is made at the expiry of JAM's EBA on 30 June 2010 then the escalation factor for the following financial year will underestimate the correct level of wages escalation, relative to what would have

[24] Although Jemena's wage increases appear to have been paid every three quarters, rather than each year, the most recent EBA increase will apply for an entire year from 1 July 2009 to 30 June 2010.

been estimated if the index based on EBA increases were extended. This is demonstrated by the stylised diagram at Figure 2 below.

Figure 2: Illustration of potential for error transitioning to EBA quarterly index, financial year escalators



121. As Figure 2 indicates, transitioning to a quarterly index after 30 June 2010 without applying a step change from that date will underestimate the average level of wages in the 2011 financial year. However, applying a full year of wage increase on 1 July 2010 will cause wages in the subsequent financial year to be too high.

122. The correct method of transition, in order to accurately calculate the 2011 financial year escalator, is to apply as at 1 July 2010 half a year of escalation in a step change. Ideally this would be based on JAM's EBA at that date, but since an EBA has not been agreed for that period, an equivalent value can be constructed using the forecasts of EBA wages. Under the assumption (implicit in Figure 2 above) that JAM pays EBA increases half in advance and half in arrears relative to a quarterly industry index, the relevant half year increase to apply at 1 July 2010 is the half of the 2010 calendar year forecast wages increase. This will give the same answer as if there were no transition.

123. The financial year escalation factors that these considerations give rise to are shown in Table 14 below.

Table 14: Escalation factors for EBA EGW labour, financial year, real

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
EBA EGW labour	1.8%	1.3%	2.1%	1.9%	1.6%	1.8%

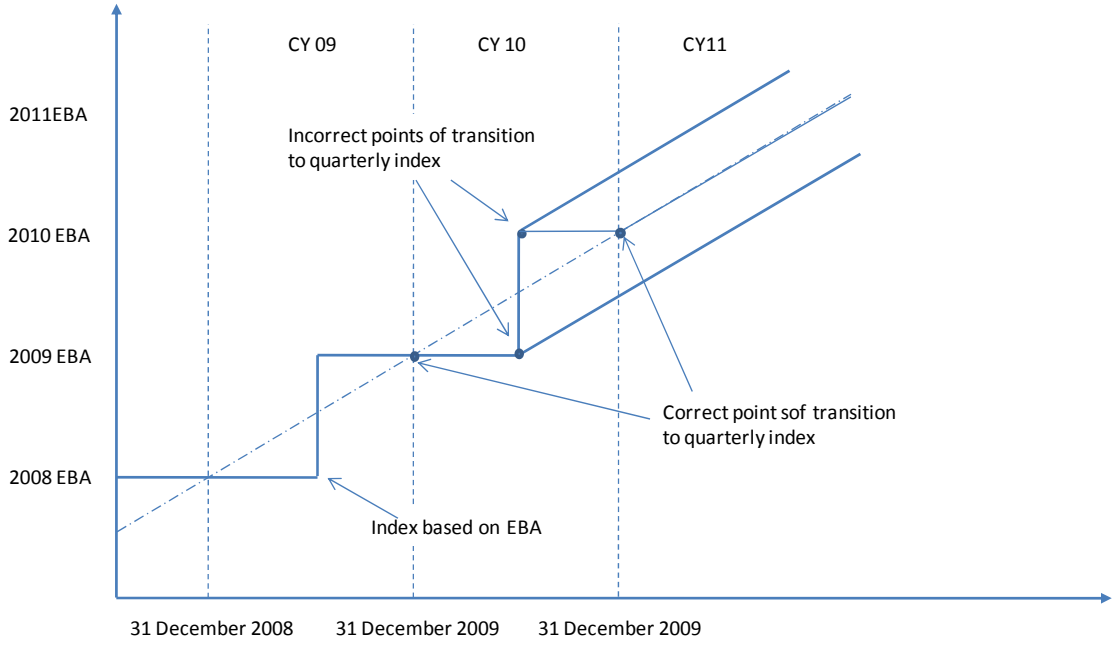
A.1.2. Estimating calendar year escalators

124. Although the methodology described above can be used to estimate financial year escalation factors that are unbiased with respect to a single, consistent underlying view regarding the rate of change of EBA wages, the same methodology does not yield consistent calendar year escalators.

125. For example, in order to accurately measure the escalation of wages to the 2010 calendar year from the 2009 calendar year, it is necessary to assume a full year of wage increases in July 2010 or the equivalent thereof – since this is the timing of increases that we assume JAM to experience going forward. The solution in respect of financial year escalators is to apply half a year escalation in July 2010 and follow this with two quarters of escalation to the end of the calendar year. However, it is clear that this solution will underestimate the 2010 calendar year EBA wages escalator because it does pays the increases in the September and December quarters 'too late'.

126. As Figure 3 below demonstrates, unbiased calendar year escalators can be derived by transitioning to quarterly forecasts on 1 January. In this context, it makes most sense for this transition to occur on 1 January 2010, since this uses all the actual EBA data available from JAM which, as we stated earlier, should receive preference over more generalised forecasts due to its greater specificity.

Figure 3: Illustration of potential for error transitioning to EBA quarterly index, calendar year escalators



127. The escalation factors derived from application of the methodology described above are shown in Table 15 below.

Table 15: Escalation factors for EBA EGW labour, calendar year, real

Calendar year	2009	2010	2011	2012	2013	2014
EBA EGW labour	1.1%	2.3%	2.2%	2.0%	1.7%	1.7%

A.2. Individual contract labour costs

128. JAM has provided CEG with a history of salary increases for non-EBA staff that are outlined in Table 16 below.

Table 16: Nominal wage changes for JAM's non-EBA staff

Date	Change
1 January 2005	4.5%
1 January 2006	5.5%
1 January 2007	6.5%
1 January 2008	5.0%

129. As with EBA wages changes, these are nominal increases, so we have constructed a nominal wage index using these data that extends to the end of the 2008 calendar year. This series has been deflated using a quarterly index of inflation based on RBA forecasts.

130. Beyond the period in which actual EBA salary increases are available, the index of EBA wages can be extended by using professional forecasts. We have access to three sets of forecasts for this purpose:

- the BIS Shrapnel forecasts for New South Wales EGW wages for non-EBA staff;
- the Macromonitor forecasts for New South Wales EGW wages on individual contracts; and
- the Econtech forecast for New South Wales EGW wages generally.

131. We understand that employees on individual contracts comprise approximately 15% of the workforce in the EGW sector and that these comprise almost all staff that are not paid under EBAs. Since this is a relatively small component of the overall workforce, we consider that the Econtech forecast relating to the entire EGW sector is unlikely to represent a good forecast of wages for these workers, whereas the BIS Shrapnel and Macromonitor forecasts are specific to this group. In order to extend forward the series based on actual wage changes, we have chosen to give equal weight to the BIS Shrapnel and Macromonitor forecasts.

132. The same considerations that applied to EBA EGW wages, regarding timing when transitioning between actual wage outcomes paid annually and a quarterly index of average wage increases, apply here. However, in this case the situation is slightly different, since historically JAM has paid salary increases to non-EBA staff on 1 January each year, rather than on 1 July as we assume is the case going forward for EBA staff.

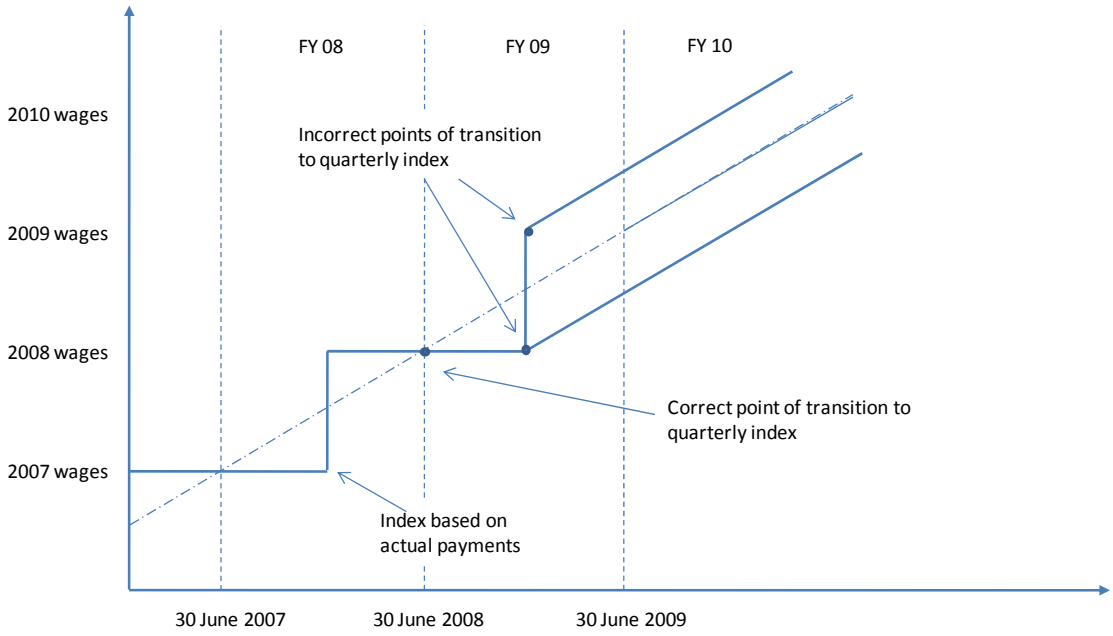
133. Accordingly, the methodologies for deriving unbiased financial year and calendar year escalators are reversed.

A.2.1. Estimating financial year escalators

134. In order to estimate unbiased financial year escalators, the transition from an index based on actual wage outcomes to an index based on forecasts must occur at 1 July 2008, taking into account that the most recent actual wage data is for the 2008 calendar year.

135. This logic can be easily understood in the context of Figure 3 above by relabelling the horizontal axes to shift the dates by two quarters, reflecting the timing of wage increases for JAM's non-EBA staff. This is shown in Figure 4 below.

Figure 4: Illustration of potential for error transitioning to individual contract quarterly index, financial year escalators



136. The escalation factors that are derived using the correct point of transition, as described in Figure 4 above, are shown in Table 17 below.

Table 17: Escalation factors for contract EGW labour, financial year, real

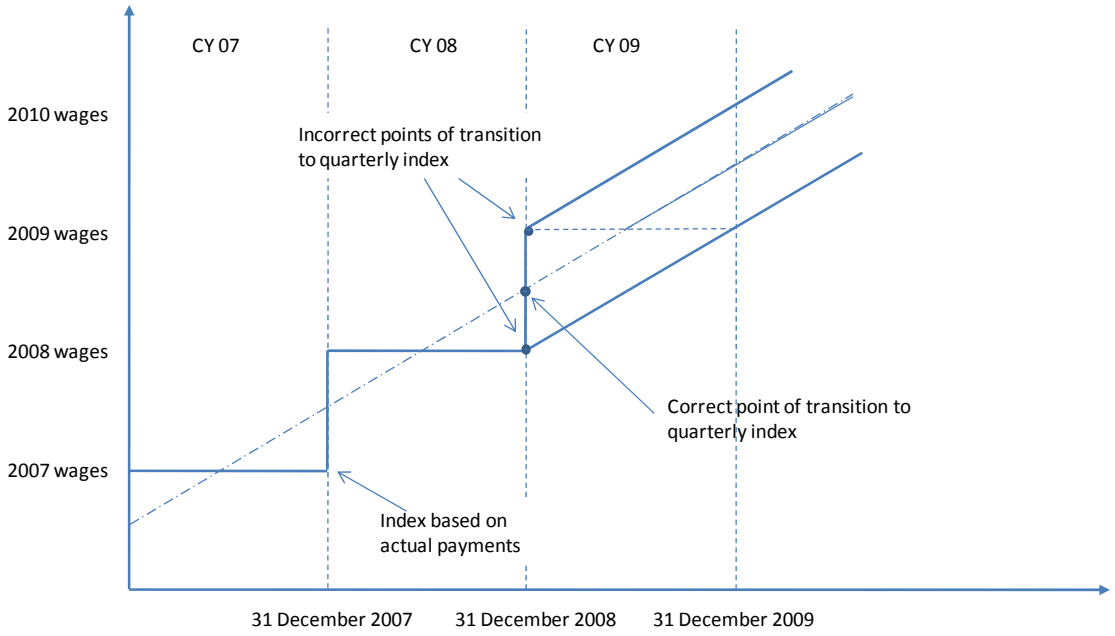
Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Contract EGW labour	1.8%	1.4%	2.1%	4.0%	4.4%	4.1%

A.2.2. Estimating financial year escalators

137. To estimate calendar year escalators, the actual wage index must be extended to the end of 2008, and half a year of escalation as a 'step increase' is applied at this time.

138. This logic can be easily understood in the context of Figure 2 above by relabelling the horizontal axes to shift the dates by two quarters, reflecting the timing of wage increases for JAM's non-EBA staff. This is shown in Figure 5 below.

Figure 5: Illustration of potential for error transitioning to individual contract quarterly index, calendar year escalators



139. As is the case for EBA EGW wages, we consider that the appropriate half-year increase to apply at 1 January 2009 is based on the forecast for the year surrounding this point, under the assumption that wage increases are paid half in advance, half in arrears. In this case, we use the half the total escalation over the 2008-09 financial year, as estimated by the Macromonitor forecast. Table 18 below shows the calendar year escalation factors that are estimated using this methodology.

Table 18: Escalation factors for contract EGW labour, calendar year, real

Calendar year	2009	2010	2011	2012	2013	2014
Contract EGW labour	1.6%	1.5%	1.6%	3.1%	4.4%	4.3%

Appendix B. Relationship between crude oil and polyethylene pricing

140. We have obtained an extensive monthly price history of crude oil and polyethylene, as represented in Bureau of Labor Statistics commodity statistics. This dataset extends from July 1991 to February 2009, or 212 observations. These data may be downloaded from the BLS website using produce price index codes 056 (Crude petroleum – domestic production) and 0662 (thermoplastic resins and plastics materials).

141. In order to establish the extent of any historical relationship between movements in the prices of crude oil and polyethylene that can be extended into the future, we investigated a number of hypotheses and selected the regression that provided the best fit based on the BLS data.

142. All of the tests that we undertake assumed a linear relationship between changes in the price of polyethylene (the dependent variable) and changes in the price of crude oil, including lagged changes, as the dependent variable. We did not seek to adopt an alternative functional form and we did not seek to introduce other variables to control for other factors, such as economic growth.

143. Amongst the factors that were investigated were:

- whether or not an intercept term was suggested by the data; and
- whether there was any contemporaneous relationship between changes in crude oil and polyethylene prices and if not, what the lag was in the transmission of changes in the crude oil price to changes in the polyethylene price.

144. *A priori*, we did not expect an intercept to be statistically significant, and this was confirmed by the data in a number of tests.

145. We did not find any significant relationship between contemporaneous changes in the price of crude oil and polyethylene. This is consistent with expectations since, as crude oil is an input to the production of polyethylene, one would expect price changes to follow crude oil, rather than occur simultaneously.

146. Having investigated the statistical significance of including lagged changes to the price of crude oil to explain changes to the price of polyethylene, the results suggest that the best fit is obtained with three months of lagged price changes. That is, using an iterated inclusion of lagged crude oil price changes, the coefficients on the lags are statistically significant up to (but not including) the fourth lag. The full results of the statistical tests that were conducted are included in the spreadsheet that accompanies this report.

147. The relationship between changes in the price of crude oil and polyethylene that provided the best fit is described by the equation below.

$$\Delta PE_t = \alpha_1(\Delta PE_{t-1}) + \alpha_2(\Delta PE_{t-2}) + \alpha_3(\Delta PE_{t-3}) + u_t$$

where *t* indexes a month from 1 to 208, representing October 1991 to February 2009.

148. An abbreviated summary of the results of estimating this equation are set out in Figure 6 below.

Figure 6: Results of regression between prices changes for polyethylene and crude oil

Regression Statistics	
R Square	0.156
Adjusted R Square	0.143
Standard Error	0.025
Observations	208

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Crude oil lag 1 month	0.052	0.018	2.835	0.005
Crude oil lag 2 month	0.064	0.019	3.441	0.001
Crude oil lag 3 month	0.053	0.019	2.812	0.005

149. The interpretation of these results is that movements in the price of crude oil explains approximately 16% of the variation in the price changes of polyethylene, and that this relationship is significant at lags of 1, 2 and 3 months.[25] We have used the coefficients as estimated in the figure above to estimate changes to the price of polyethylene on the basis of past and future changes to the price of crude oil.

[25] Estimating the same equation with a fourth lag returns a coefficient on the fourth lag with an associated p-value of 0.59 – a statistically insignificant result.

Appendix C. Curricula vitae

Tom Hird

Tom Hird is a founding Director of CEG's Australian operations. 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 has 18 years professional experience in the economic analysis of markets and the provision of expert advice in regulatory, business strategy and policy contexts.

Prior to forming CEG Tom was an Associate Director at NERA economic consulting and prior to that was a senior officer in the Australian Commonwealth Treasury.

Tom's clients include private businesses and government agencies, including the World Bank and national regulators. Tom has advised clients on matters pertaining to: valuation, regulatory cost modeling, cost of capital, competition policy issues, merger clearance processes, restraints of trade, vertical and horizontal effects of transactions, access to bottleneck facilities.

Tom's industry experience spans the aviation, electricity and gas transport, electricity generation, finance, ports, rail transport, retailing, industrial packaging, telecommunications and tourism sectors. In terms of geographical coverage, Tom's clients have included businesses and government agencies in Australia, Europe, New Zealand, Macau, Singapore and the Philippines. Selected assignments on valuation and general competition issues include.

2008/09

Advised the following businesses on the development of cost modeling for regulatory reviews in the Australian regulated monopoly energy sector: EnergyAustralia, Integral Energy, TransGrid, ContryEnergy, Transend, Jemena Gas Networks, ETSA, Ergon and Energex.

Advising Optus and the 'G9' group of competitive carriers on the competition and the development of a regulatory framework and model to allow cost recovery for the builder/owner of a new FTTN broadband network. This included drafting of a special access undertaking with Clayton Utz.

2007

Advising Envestra on appropriate value of payments for the use of intangible assets held in Origin Energy. The analysis includes the identification of relevant proxies in other markets.

Advising the Victorian gas distribution businesses on the issues relating to the estimation of the cost of capital for regulated businesses.

2006

Advising the Australian Energy Regulator on the appropriate measurement of cost and valuation of gas pipeline assets associated with the Roma to Brisbane pipeline system.

Advising the ACCC on estimation of the cost of capital and appropriate compensation for hedging costs.

Advising Melbourne water businesses on the potential for reform to the regulatory/competitive framework in that sector.

2005

Advising the ACCC on the competition effects of proposed mergers in the Victorian electricity generation market.

2004

Advising the Australian Competition and Consumer Commission, Australia on the valuation of the Moomba to Sydney pipeline system

Tom Hird | Director | C E G

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| E: tom.hird@ceg-ap.com

Detailed Project Experience

Market Design and Competition Analysis

2008 **Gilbert + Tobin, Australia**
BHPB proposed merger with Rio Tinto
Providing expert statement on the likely impact of a merger in the mining industry (combining mines both domestically and internationally).

2008 **Gilbert + Tobin, Australia**
Confidential merger – Industrial Packaging
Providing expert opinion to Gilbert + Tobin on the competitive implications of a merger involving their client in the industrial packaging sector.

2008 **Vivendi, European Union**
Damages in Mobile Telephony Market
Providing expert critique of a proposed damages claim being brought by Deutsche Telecom against Vivendi in relation to alleged unlawful activity in a Polish mobile telephony joint venture.

2007 **SingTel Optus, Australia**
Mobile Termination
Advising on a range of competition matters relating to mobile termination.

2007 **"G9" Group of Telecommunications Carriers**
Regulatory Undertaking to Build and Operate a FTTN Network in Australia
Advising the G9 on competition analysis associated with the construction and operation of a FTTN network. Developing an regulatory Undertaking under the Australian Trade Practices Act describing the proposed operation of the FTTN. Providing an expert report on the economic benefits associated with the proposed undertaking.

2007 **Gilbert + Tobin, Australia**
Merger Analysis – New Steel Drum Manufacture
Providing expert opinion to Gilbert + Tobin on the competitive implications of a merger involving new steel drum manufacture.

2006 **Melbourne Water Industry, Australia**
Market Design – Bulk Water Sector
Developing reform proposals to facilitate the introduction of tradeable bulk water rights to the Melbourne system – including the specification of operational market rules.

2006 **Australian Competition and Consumer Commission, Australia**
Merger Analysis – Electricity Industry
Providing expert opinion to the Australian Competition and Consumer Commission (ACCC) on the competitive implications of a merger.

2006 **Confidential, Australia**
Section 46 of the TPA - Telecommunications
Providing expert opinion in relation to an action under Section 46 of the Trade Practices Act.

2006 **Australian Competition and Consumer Commission, Australia**
Merger Analysis - Transport Industry
Providing expert opinion to the Australian Competition and Consumer Commission (ACCC) on the competitive implications of proposed merger between Toll and Patrick.

2006 **World Bank, Philippines**
Competition Policy in the Philippines
Providing advice to the World Bank on the development of competition policy in the Philippines including a examination of industry case study relating to the impact of restrictions on competition in the aviation industry.

2005 **Confidential, Australia**
Merger Analysis - Telecommunications Industry
Providing expert opinion to the merging firms on the competitive implications of that merger.

2005 **AirServices Australia (ASA), Australia**
Review of Pricing Conduct
Providing expert opinion to ASA on pricing for its services at Australian Airports. Including an examination of allegations that pricing contravened National Competition Agreements.

2001-05 **TransGrid, Australia**
Market for transmission
Analysis of the design of the National Electricity Market (NEM) and its implications for efficient investment in generation and transmission assets.

2005 **Confidential, Australia**
Competition Assessment of Pricing Strategy
Advising a large corporate on the economic implications of the Trade Practices Act for its pricing conduct.

2005 **Australian Competition and Consumer Commission, Australia**
Competition Assessment of Electricity Generation Merger
Advised the ACCC on the competition concerns (and potential remedies) associated with a specific proposed merger of electricity generation interests.

2004 **Australian Competition and Consumer Commission, Australia**
Competition Impact of Exclusive Rights to Content
Provided a public report to the ACCC on the competition concerns (and potential remedies) associated with the use of exclusive rights to content by incumbent telecommunications infrastructure owners.

2004 **Australian Competition and Consumer Commission, Australia**
Empirical Evidence of Predatory Pricing in Telecommunications
Provided the ACCC with an expert report that developed an imputation test framework and empirical model to test allegations of predatory pricing of broadband services.

2003-04 **Singtel Optus, Australia**
Expert Report on Market Definition and Existence of Market Power in Mobile Termination
Provided Optus with an expert report on the appropriate market definition to use in analysing competition between mobile network operators in providing terminating access.

2003-04 **Singtel Optus, Australia**
Expert Economic Advice on Competition Complaint
Providing Optus advice on a confidential competition complaint relating to the exercise of market power by one of Optus' competitors.

2001-03 **Qantas**
Advice on Competition Law and Predation Allegations
Provided input into NERA's advice in relation to allegations of anticompetitive behaviour under section 46 of the Trade Practice Act.

2002 **National Competition Council (NCC), Australia**
Exploitation of Market Power by a Gas Pipeline
Provided a report to the NCC in which we developed a number of tests for whether current transmission prices were evidence of the exploitation of market power by a gas transmission pipeline. Also provided a separate report that applied these tests. This analysis was used to inform the NCCs decision on whether to recommend the pipeline in question be subject to regulation under the Australian Gas Code.

2002 **Screenrights, Australia**
Advice on methodologies used to estimate the value of retransmitting copyright content contained in local free-to-air broadcast.

Cost of Capital Issues

2008 **Joint Industry Associations, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transport services in the context of a five yearly reveiew performed by the Australian Energy Regulator.

2008 **Telecom New Zealand, Australia**
Cost of Capital
Advising Telecom New Zealand on the appropriate estimation of the cost of capital associated with capital assets used to provide its universal service obligations.

2008 **Queensland Rail, Australia**
Cost of Capital
Advising QR on the appropriate estimation of the cost of capital associated with capital assets used to provide rail transport services

2008 **Transend, Australia**
Cost of Capital
Advising Transend on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission services.

2008 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission and distribution services.

2008 **ActewAGL, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

2007 **Electranet, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

2007 **Envestra, SP Ausnet and Alinta, Australia**
Cost of Capital
Three expert reports in response to the Victorian Essential Services Commission's cost of capital decision for Victorian gas distributors. Issues covered included: estimation of the appropriate equity beta, the appropriate form of the CAPM to be used, the use of non-CAPM asset pricing models, the estimation of the risk free rate from Government bond data.

2007 **Energy Networks Association, Australia**
Cost of Capital
Two expert reports with Professor Grundy identifying and quantifying the existence of a bias in the use of Australian Government bond yields as a proxy for the CAPM risk free rate.

2006 **ACTEW Corporation, Australia**
Cost of Capital
Advising on the cost of capital for ACTEW's water and waste water operations.

2006 **AER, Australia**
Cost of Capital
Advising on the cost capital issues in relation to the RBP pipeline access arrangement.

2006 **Integral Energy, Australia**
Cost of Capital
Advising on the cost of capital for Integral's retail operations.

2005 **Energy Networks Association, Australia**
Debt Margin
Advising on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2005 **The Victorian ESC, Australia**
Cost of Capital
Advice on the cost of capital for electricity distribution network assets.

2005 **Prime Infrastructure, Australia**
Weighted Average Cost of Capital
Provided a report for Prime Infrastructure critiquing the QCA's draft cost of capital decision for Queensland electricity distribution.

2004 **The Australian Competition and Consumer Commission, Australia**
Cost of Capital
Provided a report advising on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

2004 **ETSA Utilities, Australia**
Weighted Average Cost of Capital
Provided a report for ETSA examining the use of historical proxy betas.

2004 **ActewAGL, Australia**
Weighted Average Cost of Capital
Provided a report for ActewAGL estimating its weighted average cost of capital for regulated activities (gas distribution).

2004 **TransGrid , Australia**
Debt Margin
Provided a report critiquing CBASpectrum's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2004 **Prime Infrastructure, Australia**
Weighted Average Cost of Capital
Provided a report for Prime Infrastructure the weighted average cost of capital for its regulated activities (coal shipping terminal).

2004 **ActewAGL, Australia**
Debt Margin
Provided a report for ActewAGL advising on the appropriate calculation of debt margins for BBB+ ten year bonds.

2003 **Electricity Transmission Service Providers, Australia**
Expert Report on the Use of Historical Proxy Betas
Critique of the ACCC's statistical interpretation of historical proxy beta in its review of the Statement of Principles for the Regulation of Transmission Revenues.

2003 **Orion, New Zealand**
Cost of Capital
Critique of Associate Professor Lally's advice on the Cost of Capital for New Zealand Electricity Distribution.

2003 **TransGrid, Australia**
Expert Report on TransGrid's WACC
Advising TransGrid on the appropriate weighted average cost of capital (WACC) for its regulated assets

2003 **EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2002 **Rail Access Corporation, Australia**
Hurdle Rates of Return
Advising rail access corporation on the appropriate hurdle rates of return that should be applied when assessing competing investments.

2002 **Integral Energy, Australia**
Return on Capital
Advising Integral Energy on what risk adjusted regulatory return on capital is necessary to provide sufficient incentive to invest in new infrastructure assets.

2001 **TransGrid, Australia**
Advice on ACCC's Powerlink WACC decision
A report critically appraising the ACCC's decision regarding Powerlink's weighted average cost of capital (WACC).

2001 **Optus, Australia**
Affidavit on Telstra's PSTN WACC
Providing expert testimony to the Australian Competition Tribunal on Telstra' use of the CAPM model to determine an appropriate rate of return on PSTN assets.

2001 **Australian Competition and Consumer Commission, Australia**
International Comparison of WACC Parameters
Preparation of a report on international and domestic WACC parameters and the potential impact of variations in declared WACCs on incentives to invest in various regulatory jurisdictions.

General Regulatory Analysis

2007/08 **Digicel, PNG and Samoa**
Mobile telecommunications regulation
Advising Digicel on ongoing issues in mobile telecommunication regulation in PNG and Samoa.

2007/08 **Envestra, Australia**
Related party transaction
Expert statement assessing the reasonableness of an alleged related party transaction entered into by Envestra to outsource its operating and maintenance activities to Origin Energy.

2008 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2008 **Transend, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2008 **Electranet, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2007 **Vodafone, Fiji**
Mobile telecommunications regulation
Advising Vodafone Fiji on estimating the cost of mobile termination in Fiji.

2007 **T-Mobile, UK**
Mobile termination cost modelling
Advise T-Mobile on BT's appeal of the UK Commerce Commission's determination on teh cost of mobile termination (specifically in relation to the treatment of 3G spectrum).

2007 **GSME, Europe**
USO reform
Developing and drafting of submission to the European Commission by the GSME on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

2007 **SingTel Optus, Australia**
FTTN
Advise SingTel Optus on all regulatory and competition issues associated with the construction of a FTTN network. Issues include – costing, form of price controls, capital raising and the cost of capital, drafting of undertakings, expert reports submitted to the regulator (Australian Competition and Consumer Commission).

2007 **Communications Alliance, Australia**
USO reform
Developing and drafting of submission to Government by the Communications Alliance (an industry body covering incumbent and new entrant fixed and mobile carriers) on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

2006-07 **GDSE, Macau, SAR PRC**
Efficient Electricity Tariff Reform
Advise the Macau regulator (GDSE) on efficient tariff reform for the vertically integrated generation and network provider. This involved estimating the LRMC on maximum demand and translating this into efficient tariff designs given relevant constraints (eg, metering constraints).

2005-06 **Integral Energy, Australia**
Efficient Electricity Tariff Reform
Advise Integral Energy on its LRMC of meeting growing network demand and on how this could be reflected in efficient tariff design (including design of critical peak pricing).

2005 **Telecom New Zealand, New Zealand**
Modelling of New Entrant Costs for TSO
Provide expert reports on the correct methodology for calculating the cost of providing the TSO (universal service obligation) using new entrant costs.

2005 **Telecom New Zealand, New Zealand**
Operating Cost Benchmarks
Advised Telecom on appropriate operating cost benchmarks for telecommunications services

2005 **TransGrid, Australia**
Capital Expenditure Indexation
Advised TransGrid on the development of a price index to reflect movements in the unit costs of inputs into its capital expenditure program.

2005 **TransGrid, Australia**
Forecast of Capital Expenditure
Advised TransGrid on appropriate adjustments to forecast capital expenditure to take account of material increases in demand for investment in future Australian electricity infrastructure.

2005 **TransGrid, Australia**
ACCC's Capital Expenditure Regime
Advised TransGrid on the ACCC's proposed regulatory regime to apply to capital expenditure.

2005 **Actew, Australia**
Financing of New Infrastructure
Advised Actew on options for financing new infrastructure.

2004 **Telecom New Zealand, New Zealand**
Avoided Retail Cost Study
Developing an avoided cost study associated with Telecom's fixed line retail activities.

2004 **TransGrid, Australia**
Fair Sharing of Efficiency Gains
Provided a report to TransGrid advising on whether the ACCC's draft decision was consistent with the National Electricity Code's requirement that there be a 'fair sharing' of efficiency gains.

2004 **Australian Competition and Consumer Commission, Australia**
Asset Valuation Report
Provided an expert report to the ACCC on the calculation of depreciated optimised replacement cost (DORC) in the context of the EAPL's appeal of the ACCC's valuation of its Moomba to Sydney pipeline.

2004 **ESCOSA, Australia**
Incentive Regulation
Provided ESCOSA with a report on the appropriate mechanism to provide ETSA Utilities with an incentive to achieve cost reductions in operating and capital expenditure.

2004 **Perisher Blue Ltd, Australia**
Review of Municipal Services
Assisted PBL with its submission to IPART on the review of municipal services (roads, waste, water and sewerage) at the Perisher Blue Resort.

2004 **TransGrid, Australia**
ACCC Regulatory Review
Assisted TransGrid in drafting its Application to the ACCC for regulated revenues and in its response to the ACCC's draft decision.

2003 **Telecom New Zealand, New Zealand**
Expert Report on Efficient Recovery of CSO Costs
Provided Telecom with a report stepping through all the information necessary to administer CSO costs in a manner consistent with "Ramsey efficient" pricing. The purpose of this was to inform the NZ Commerce Commission of the practical difficulties associated with pursuing such an outcome.

2003 **EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2003 **Optus, Australia**
Critique of Telstra's Access Undertaking for PSTN Services
Advising Optus in relation to the reasonableness of Telstra's cost modelling assumptions underlying its access undertaking for PSTN services.

2003 **Optus, Australia**
Indicative Pricing Principles
Advising Optus in relation to appropriate pricing principles the ACCC should adopt when establishing indicative prices for access to PSTN services.

2003 **Optus, Australia**
Estimation and Recovery of Telstra's Access Deficit
Provided a report to the ACCC on behalf of Optus addressing the appropriate measurement of any 'access deficit' that may exist between the cost to Telstra of its access network and the revenues associated with that network. Also examined the most appropriate recovery methodology for any access deficit.

2003 **Rail Infrastructure Corporation, NSW, Australia**
Expert Report on Hurdle Rates of Return
Advising RIC on the appropriate WACC each division should use as a hurdle rate of return when assessing competing capital projects.

2003 **Telecom New Zealand, New Zealand**
Expert at Commerce Commission Hearing
Provided expert testimony to the NZ Commerce Commission on the appropriate calculation of a wholesale discount for regulated services.

2002 **Telecom New Zealand, New Zealand**
'Intelligent' Wholesale Benchmarking Report
Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted wholesale prices in the United States for differences in cost drivers (in terms of the cost of capital and labour) compared to New Zealand.

2002 **Telecom New Zealand, New Zealand**
Interconnection Pricing
Advised Telecom New Zealand on the potential forms of price control the New Zealand Commerce Commission could adopt in regulating PSTN interconnection prices.

2002 **Telecom New Zealand, New Zealand**
'Intelligent' Interconnection Benchmarking Report
Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted interconnection prices in Europe, Australia and the United States for differences in cost drivers (in terms of switching and transmission economies of scale, transmission link lengths and the cost of capital and labour) compared to New Zealand.

2002 **SPI PowerNet, Australia**
Design of Efficiency Carryover Mechanism
Advised SPI PowerNet on the appropriate design of an efficiency carryover mechanism intended to share efficiency gains between a regulated business and its customers.

2002 **SPI PowerNet, Australia**
ReOptimisation of Transmission Assets
Advised SPI PowerNet on the appropriate approach to calculating the value of assets previously optimised out of its regulatory asset base and now being "un-optimised" due to greater utilisation levels of those assets.

2002 **SPI PowerNet, Australia**
Strategic Adviser on Revenue Reset Application
Advised SPI PowerNet on a range of high level issues in relation to their regulated revenue reset application, including appropriate drafting and consistency of argument throughout the document. Presented aspects of SPI PowerNet's application to the ACCC and in an ACCC sponsored regulatory public forum.

2002 **Telecom New Zealand, New Zealand**
Review of Interconnection Benchmarking Report
Advised Telecom New Zealand on issues arising out of an Interconnection Benchmarking report commissioned by the Commerce Commission of New Zealand for the purpose of setting interim interconnection charges. This role included the submission of a report to the Commerce Commission and presentation of the findings of that report at a Commerce Commission hearing.

2002 **Australian Pipeline Trust, Australia**
Expert Advice on CPI Indexation
Advised APT in relation to a dispute with customers on the appropriate CPI indexation adjustment of prices for the impact of the GST required under the Trade Practices Act.

2002 **EnergyAustralia, Australia**
Pricing Strategy Under a Price Cap
Advised EnergyAustralia on the commercial implications for pricing strategies under a weighted average price cap.

2001 **IPART, Australia**
Minimum Standards in Regulation of Gas and Electricity Distribution
Advised the NSW regulator on the appropriate role of minimum standards in regulatory regimes and how this could be practically implemented in NSW.

2001-03 **Rail Infrastructure Corporation, New South Wales**
Preparation of access undertaking
Advised on all economic aspects arising in the preparation of an access undertaking for the New South Wales rail network. Issues arising include: pricing principles under a `negotiate and arbitrate' framework, asset valuation, efficient costs, capacity allocation and trading, and cost of capital.

2001 **Australian Competition and Consumer Commission, Australia**
Determination of Local Call Resale Prices
The ACCC's expert regarding the determination of local call resale prices from Telstra's fixed line network. This involved the application, and manipulation, of the Australian incumbent's (Telstra's) regulatory accounting framework to determine appropriate wholesale prices.

2001 **All NSW electricity distribution businesses, Australia**
Form of Price Control
Advice on the economic efficiency implications of various forms of price control that can be applied under the National Electricity Code.

2001 **Wesfarmers, Australia**
Expert Advice on Reasonable Cost Recovery
Advising Wesfarmers in relation to a dispute with customers on reasonable recovery of costs of coal production.

2001 **Integral Energy, Australia**
Pricing Strategy Paper
Advising on appropriate pricing strategy for Integral's electricity distribution business, including advice on an appropriate regulatory engagement strategy.

2001 **TransGrid, SPI PowerNet and GPU GasNet, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2001 **All NSW gas and electricity distribution businesses, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2000 **One.Tel, Australia**
ULL Pricing
Advising OneTel in their arbitration with Telstra on pricing for access to the unbundled local loop.

2000 **Electricity Supply Association of Australia and Australian Gas Association,**
Adjusting the Regulatory Regime for the Impact of Tax Reform
Advised the peak energy bodies on the implications of tax reform on their members under the Trade Practices Act.

2000 **Victorian Department of Treasury and Finance, Australia**
State Business Tax Reform
Advised the Department of Treasury and Finance on State business tax reform including in relation to the relative economic costs associated with payroll, stamp duty and other transaction taxes.

1999 **Independent Pricing and Regulatory Tribunal of NSW**
Various energy regulation issues
Advice on a range of issues in regulation of the NSW energy sector.

1990-99 **Commonwealth Treasury, Australia**
Various economic policy issues
Provided input in the formulation of a number of economic policies. These included: the year 2000 reforms of the Australian indirect and corporate tax regimes; reform of the social

security system and labour market regulation; economic forecasting and monetary policy monitoring; reform to the regulation of the Australian financial system.

Application of Regulatory Test for Network Augmentation

2003 **TransGrid, NSW Australia**
Submission to the ACCC's Review of the Regulatory Test
Advised TransGrid in response to the ACCC's Discussion Paper on the review of the regulatory test. Tom prepared a report which commented both on the ACCC's proposal to amend the regulatory test to improve clarity and to ensure consistency with the provisions in the National Electricity Code, and also on the ACCC's proposed options for incorporating 'competition benefits' in the regulatory test.

2003 **Clayton Utz, TransGrid, NSW, Australia**
Murraylink's Application for Regulated Status
Advised TransGrid and Clayton Utz in responding to Murraylink's Application to the ACCC for regulated status, and, in particular, Murraylink's use of the regulatory test to derive a regulatory asset value.

Advised TransGrid in responding to the ACCC's Preliminary View on Murraylink's Application, and helped draft a further report commenting on aspects of the ACCC's approach.

2001-03 **TransGrid, NSW, Australia**
Application of the regulatory test to network augmentation in the Western Area
Advised TransGrid on the application of the regulatory for intra-regional network augmentation planned for the Western Area of NSW. The application highlighted issues in applying the regulatory test in a situation where an agreed reliability standard is not currently met.

General Policy Analysis

2007 **Menzies Institute, Australia**
Hidden Costs of Stamp Duty
An analysis of the hidden economic costs of state government stamp duty on residential property transactions – including in terms of labour force mobility.

2003 **Betfair, UK**
The Impact of Internet Betting Exchanges on the Racing Industry
Estimated bounds for the price elasticity of demand for wagering in Australia and using these to determine the likely impact of licensing internet betting exchanges to compete with existing TAB wagering operations. Modelled the impact on wagering tax rates required to achieve revenue neutrality under various prices elasticity scenarios.

2002 **Marsh, Australia**
The Impact of Taxation on Levels of Property Insurance
Estimated the number of uninsured households destroyed in the recent NSW bushfires that would otherwise have been insured if the only tax insurance premiums were subject to was GST. The methodology used was based on evidence from studies of the price responsiveness of demand for property insurance in the US and Australian evidence on the proportion of people without home or contents insurance.

Educational Services

2006 **RMIT University, Australia**
Economics Unit for MBA
Developed the course materials for the economics unit in RMIT's MBA course.

Speeches and presentations

2007 **Energy Networks Association, Melbourne**
Setting the cost of capital for Australian energy businesses

2005 **International Telecommunications Society regional Conference, Perth**
Stepping over the Competitive Line

2005 **ACCC Regulatory Conference, Gold Coast**
Exclusive Rights to Content and Competition in Telecommunications

2004 **Office of the Water Regulator, Perth**
Cost Benchmarking – Practical Pitfalls

2004 **ACCC Conference of Regulatory Principles for Electricity Transmission, Melbourne**
Drawing a Line in the Sand on Cost of Capital Issues

2004 **Macquarie Bank, Terrigal**
Internal presentation on regulatory risk across jurisdictions and industries

2003 **ACCC Regulatory Conference, Gold Coast**
Anticompetitive Pricing in Telecommunications

2003 **ACCC Conference on SPI PowerNet Regulatory Decision**
Operation of the efficiency carryover

2002 **International Telecommunications Society regional Conference, Perth**
TSLRIC Regulation and Leverage of Market Power

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, 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 electricity pricing, demand response and competition in electricity generation that have been applied in Australia and overseas.

Recent selected assignments include:

2008/09

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; and

2007

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.

2006

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.

Conducting modelling of the hypothetical cost of entry using alternative technologies to determine Telecom NZ's service obligation.

2005

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.

Daniel Young | Economist | C E G

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Detailed Project Experience

Market Design and Competition Analysis

2008 **Confidential, European Union**
BHPB proposed merger with Rio Tinto
Constructing spreadsheet models of the price effects of a major proposed merger in the European pharmaceutical industry.

2008 **Gilbert + Tobin, Australia**
BHPB proposed merger with Rio Tinto
Assisted in the preparation of an expert statement on the likely impact of a merger in the mining industry (combining mines both domestically and internationally).

2008 **Gilbert + Tobin, Australia**
Confidential merger
Assisted in the preparation of an expert report on the competitive implications of a merger in the industrial packaging sector.

2008 **Vivendi, European Union**
Damages in mobile telephony market
Analysis of the appropriate cost of capital to be used proposed damages claim being brought by Deutsche Telecom against Vivendi in relation to alleged unlawful activity in a Polish mobile telephony joint venture.

2008 **Confidential, United Kingdom**
Estimation of price effect of proposed mergers
Assisted a European firm examining the implications for competition in the United Kingdom electricity generation market of a number of proposed transactions.

2007 **Meerkin & Apel, Australia**
Damages in waste disposal
Prepared an expert report and response examining the reasonableness of assumptions underlying the estimation of damages in a commercial arbitration.

2007 **Freehills, Australia**
Shareholder class action damanges
Prepared estimates of the potential damages faced by Telstra under a class action lawsuit from shareholders .

2006 **Channel Seven, Australia**
Special access undertaking for pay TV
Provided drafting and analytical assistance for an expert report examining the effect of Foxtel's proposed special access undertaking on competition in the market for subscription television services.

2006 **Australian Competition and Consumer Commission, Australia**
Merger analysis
Provided modelling underlying the provision of expert opinion to the Australian Competition and Consumer Commission (ACCC) on the competitive implications of a merger.

2006 **Hong Kong Government, Hong Kong**
Analysis of competitiveness of the auto-fuel industry
Contributed to an analysis of the extent of competition in the auto-fuel retail sector in Hong Kong by estimating the margins of local firms and developing international comparisons as benchmarks.

2005 **Australian Competition and Consumer Commission, Australia**
Merger analysis
Advised the ACCC on the competition concerns (and potential remedies) associated with a specific proposed merger of electricity generation interests.

2005 **Austrac, Australia**
Predatory pricing
Assisted in the preparation of advice to Austrac in relation to alleged breaches of section 46 of the Trade Practices Act.

Cost of Capital Issues

2008 **Joint Industry Associations, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transport services in the context of a five yearly reveiew performed by the Australian Energy Regulator.

2008 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission and distribution services.

2008 **ActewAGL, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

2007 **Electranet, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

Cost Modelling and General Regulatory Analysis

2008-09 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2008 **Transend, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2008 **Confidential, Australia**
Telecommunications cost modelling
Developing a cost model for an Australian telecommunications company.

2008 **Electranet, Australia**
Cost escalation forecasts
Advising on appropriate forecasts for costs faced by these businesses over the forthcoming regulatory period. Used as an input into their regulatory cost modelling.

2007 **Multinet, Australia**
Outsourcing contracts
Assisted in the preparation of an expert report on the prudency of Multinet's outsourcing contracts in the context of the National Gas Code.

2007 **Ministerial Council on Energy, Australia**
Demand response from smart meters
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.

2006-07 **GDSE, Macau, SAR PRC**
Efficient electricity tariff reform
Advising the electricity regulator in Macau about efficient tariff reform using modeling of the short run and long run marginal cost of supply in Macau.

2006-07 **Santos, Australia**
Gas contract arbitration
Assisted in determining the market gas price on behalf of Santos in arbitration for a major gas supply contract.

2005-06 **Integral Energy, Australia**
Efficient electricity tariff reform
Advise Integral Energy on its LRMC of meeting growing network demand and on how this could be reflected in efficient tariff design (including design of critical peak pricing).

2005-06 **Telecom New Zealand, New Zealand**
Modelling of new entrant costs for TSO
Assisted in the preparation of expert reports on the correct methodology for calculating the cost of providing the TSO (universal service obligation) using new entrant costs.

General Policy Analysis

2007 **IPART, Australia**
Statistical modelling of energy and water consumption
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.

2007 **Australian Rail Association, Australia**
Efficient pricing for road and rail
Assisted in the preparation of reports for the ARA on the efficiency of methods for charging for use of road and rail networks. Prepared a critique of an econometric analysis on the benefits of changing the charging methodology.

2004 **Auckland University, New Zealand**
Analysis of healthcare outcomes
Conducted statistical modelling of the relationships between socioeconomic variables and healthcare outcomes using census data.

Appendix D. Terms of reference

Jemena Asset Management

ActewAGL Distribution Access Arrangement Supporting Information

ESCALATION FACTORS - TERMS OF REFERENCE

1 BACKGROUND

ActewAGL Distribution (AAD) is the gas distribution service provider in the ACT and parts of New South Wales (NSW) proximate to or associated with the ACT. Jemena Asset Management (JAM) undertakes the majority of AAD's operating, maintenance, and capital works activities under a Distribution Asset Management and Services (DAMS) agreement with AAD.

The current Access Arrangement for the AAD will expire on 1 July 2010. Previous Access Arrangements were the responsibility of the Independent Competition and Regulatory Commission (ICRC). A newly formed national body, the AER (Australian Energy Regulator) now has the power under the Law and Rules relating to the regulated access to and economic regulation of these gas networks.

AAD is currently preparing a revised access arrangement proposal with supporting information for the Australian Energy Regulator's (AER's) consideration. This revised access arrangement requires AAD to establish cost forecasts. In accordance with Rule 72(c)(i) of the National Gas Rules the projected capital base over the access arrangement period must include: a forecast of conforming capital expenditure for the period and the basis for the forecast; and a forecast of depreciation for the period including a demonstration of how the forecast is derived on the basis of the proposed depreciation method. Further, in accordance with Rule 72(e) of the National Gas Rules, the access arrangement proposal must also include a forecast of operating expenditure over the access arrangement period and the basis on which the forecast has been derived.

When considering approval of AAD's revised access arrangements and cost forecasts, the AER must have regard to:

Section 24(2) of the National Gas Law:

> A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in—
>
> (a) providing reference services; and
>
> (b) complying with a regulatory obligation or requirement or making a regulatory payment.

Rule 74 of the National Gas Rules:

> (1) Information in the nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate.
>
> (2) A forecast or estimate:
>
> (a) must be arrived at on a reasonable basis; and
>
> (b) must represent the best forecast or estimate possible in the circumstances.

Rule 79(1)(a) of the National Gas Rules:

> Conforming capital expenditure is capital expenditure that conforms with the following criteria: the capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services

Rule 79(2) of the National Gas Rules:

> Capital expenditure is justified if:
>
> (a) the overall economic value of the expenditure is positive; or

(b) the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure; or

(c) the capital expenditure is necessary:

(i) to maintain and improve the safety of services; or

(ii) to maintain the integrity of services; or

(iii) to comply with a regulatory obligation or requirement; or

(iv) to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or

(d) the capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

Rule 91(1) of the National Gas Rules:

> Operating expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of delivering pipeline services.

Under the DAMS agreement JAM has agreed to provide certain information needed by AAD to submit its Access Arrangement and comply with a Regulatory Information Notice RIN) served by the AER, including information about the efficiency of proposed operating expenditure.

Accordingly, JAM seeks the opinion of a recognised independent expert to support the determination of cost escalation factors for selected cost categories as specified in the scope.

2 SCOPE OF WORK

The independent expert will provide an opinion on escalation rates for identified cost categories. The escalation factors will be historical and forward looking, covering actuals 2004/05 to 2007/08 and forecast 2008/09 to 2014/15 (July to June financial year) as required for the AAD access arrangement. The forecast period will be 2008/09 to 2014/15 (July to June financial year). The aim is to determine if the cost categories specified are increasing at a higher than CPI rate and to substantiate this rate to a standard capable of satisfying the AER when it applies the NGR criteria to assess operating expenditure and capital expenditure forecasts. JAM's inputs will be important for this exercise (see Section 3 below).

2.1 Identified cost categories

Part 1

1. *Labour Costs*

   a. Enterprise Bargaining Agreement (EBA)
   b. Non EBA staff

2. *Materials Costs*

   a. steel prices
   b. aluminium prices
   c. plastics prices, including nylon, polyethylene (PE)
   d. concrete

Part 2

Assessment of potential carbon price impacts on the above network construction and maintenance materials (as listed above) and contractor and civil construction services (eg plant machinery operation) for the JGN gas networks.

3 INFORMATION FROM JAM

The expert is encouraged to draw upon information JAM makes available. JAM will provide the following information to the expert:

- a spreadsheet template setting out the preferred format that forecast data is to be provided in;
- a general ledger break up of expenditure for opex;
- documentation detailing JAM's current employment agreements for EBA and Non-EBA staff;
- documentation detailing third party contracts and historical cost information for services provided by them;
- third party contracts for JAM including costs relating to restorations (charged by local councils) and traffic control. JAM will provide data on historic restoration charges for the local government areas within which it operates;
- documentation detailing current charges incurred by JAM for material costs, including steel pipes, nylon pipes, PE pipes and any other relevant materials such as transport fuel and paper; and
- other information that the expert requests that JAM can readily access.

4 DELIVERABLES

At the completion of this review the expert will provide an independent expert opinion report for the JGN network which:

- is of a professional standard capable of being submitted to the AER;
- where relevant, is cognisant of and addresses the AER's previous deliberations on cost escalators; and
- is prepared in accordance with the Federal Court Guidelines for Expert Witnesses[1] set out in Attachment 1.

The report should be written in a clear and concise manner. The report should address the defined scope and include:

- data contained in the specified spreadsheet template format;
- detailed account of methodology used in each analysis;
- clear recommendations that require no clarifications;

[1] Available at: http://www.fedcourt.gov.au/how/prac_direction.html.

- detailed account of all information and assumptions (eg: CPI) including the source of that information and assumptions;
- to the extent the expert has drawn on historical data sets that differ from published Australian Bureau of Statistics (ABS) data, an explanation of any difference from the ABS information;
- consistent presentation of values and numbers (eg: real terms); and
- a short (5 to 10 minute) presentation on the expert findings to a JGN access review steering committee meeting.

5 TIMETABLE

The independent expert will conduct a 'kick-off' meeting with JAM staff on 24 April, then complete a draft report (Milestone 1). JAM will provide feedback on the draft report (Milestone 2). The independent expert will deliver the final report (Milestone 3). JAM may seek a presentation of results (either just to itself or to itself and AAD) and will advise the consultant around the time of Milestone 3.

ATTACHMENT 1: FEDERAL COURT GUIDELINES

Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia

This replaces the Practice Direction on Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia issued on 11 April 2007.

Practitioners should give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see **- Part 3.3 - Opinion** of the *Evidence Act 1995* (Cth)).

M.E.J. BLACK
Chief Justice
6 June 2007

Explanatory Memorandum

The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence (footnote #1), and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

Ways by which an expert witness giving opinion evidence may avoid criticism of partiality include ensuring that the report, or other statement of evidence:

(a) is clearly expressed and not argumentative in tone;

(b) is centrally concerned to express an opinion, upon a clearly defined question or questions, based on the expert's specialised knowledge;

(c) identifies with precision the factual premises upon which the opinion is based;

(d) explains the process of reasoning by which the expert reached the opinion expressed in the report;

(e) is confined to the area or areas of the expert's specialised knowledge; and

(f) identifies any pre-existing relationship (such as that of treating medical practitioner or a firm's accountant) between the author of the report, or his or her firm, company etc, and a party to the litigation.

An expert is not disqualified from giving evidence by reason only of a pre-existing relationship with the party that proffers the expert as a witness, but the nature of the pre-existing relationship should be disclosed. Where an expert has such a relationship the expert may need to pay particular attention to the identification of the factual premises upon which the expert's opinion is based. The expert should make it clear whether, and to what extent, the opinion is based on the personal knowledge of the expert (the factual basis for which might be required to be established by admissible evidence of the expert or another witness) derived from the ongoing relationship rather than on factual premises or assumptions provided to the expert by way of instructions.

All experts need to be aware that if they participate to a significant degree in the process of formulating and preparing the case of a party, they may find it difficult to maintain objectivity.

An expert witness does not compromise objectivity by defending, forcefully if necessary, an opinion based on the expert's specialised knowledge which is genuinely held but may do so if the expert is, for example, unwilling to give consideration to alternative factual premises or is unwilling, where appropriate, to acknowledge recognised differences of opinion or approach between experts in the relevant discipline.

Some expert evidence is necessarily evaluative in character and, to an extent, argumentative. Some evidence by economists about the definition of the relevant market in competition law cases and evidence by anthropologists about the identification of a traditional society for the purposes of native title applications may be of such a character. The Court has a discretion to treat essentially argumentative evidence as submission, see Order 10 paragraph 1(2)(j).

The guidelines are, as their title indicates, no more than guidelines. Attempts to apply them literally in every case may prove unhelpful. In some areas of specialised knowledge and in some circumstances (eg some aspects of economic "evidence" in competition law cases) their literal interpretation may prove unworkable. The Court expects legal practitioners and experts to work together to ensure that the guidelines are implemented in a practically sensible way which ensures that they achieve their intended purpose.

Guidelines

1. General Duty to the Court (footnote #2)

1.1 An expert witness has an overriding duty to assist the Court on matters relevant to the expert's area of expertise.

1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential (footnote #3).

1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

2. The Form of the Expert Evidence (footnote #4)

2.1 An expert's written report must give details of the expert's qualifications and of the literature or other material used in making the report.

2.2 All assumptions of fact made by the expert should be clearly and fully stated.

2.3 The report should identify and state the qualifications of each person who carried out any tests or experiments upon which the expert relied in compiling the report.

2.4 Where several opinions are provided in the report, the expert should summarise them.

2.5 The expert should give the reasons for each opinion.

2.6 At the end of the report the expert should declare that "[the expert] has *made all the inquiries that* [the expert] *believes are desirable and appropriate and that no matters of significance that* [the expert] *regards as relevant have, to* [the expert's] *knowledge, been withheld from the Court*."

2.7 There should be included in or attached to the report; (i) a statement of the questions or issues that the expert was asked to address; (ii) the factual premises upon which the report proceeds; and (iii) the documents and other materials that the expert has been instructed to consider.

2.8 If, after exchange of reports or at any other stage, an expert witness changes a material opinion, having read another expert's report or for any other reason, the change should be communicated in a timely manner (through legal representatives) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court (footnote #5).

2.9 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report (footnote #5).

2.10 The expert should make it clear when a particular question or issue falls outside the relevant field of expertise.

2.11 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports (footnote #6).

3. Experts' Conference

3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

footnote #1
As to the distinction between expert opinion evidence and expert assistance see *Evans Deakin Pty Ltd v Sebel Furniture Ltd* [2003] FCA 171 per Allsop J at [676].

footnote #2
See rule 35.3 Civil Procedure Rules (UK); see also Lord Woolf "Medics, Lawyers and the Courts" [1997] 16 CJQ 302 at 313.

footnote #3
See *Sampi v State of Western Australia* [2005] FCA 777 at [792]-[793], and *ACCC v Liquorland and Woolworths* [2006] FCA 826 at [836]-[842]

footnote #4
See rule 35.10 Civil Procedure Rules (UK) and Practice Direction 35 – Experts and Assessors (UK); *HG v the Queen* (1999) 197 CLR 414 per Gleeson CJ at [39]-[43]; *Ocean Marine Mutual Insurance Association (Europe) OV v Jetopay Pty Ltd* [2000] FCA 1463 (FC) at [17]-[23]

footnote #5
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565

footnote #6
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565-566. See also Ormrod *"Scientific Evidence in Court"* [1968] Crim LR 240.