# Jemena Gas Networks (NSW) Ltd - Initial response to the draft decision

## Appendix 3b.5

## CEG: Escalation factors affecting expenditure forecasts – a report for ActewAGL – January 2010

19 March 2010

# Escalation factors affecting expenditure forecasts

## A report for ActewAGL

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**January 2010**

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# Executive Summary

1. CEG has been commissioned by for ActewAGL (hereafter ActewAGL) to prepare an update of its escalation report from June 2009 using the same methodology and respond to the Australian Energy Regulator's draft decision in respect of its cost escalation used to project forward the costs of providing services to ActewAGL for the 2010-11 to 2014-15 regulatory period. This commission follows an earlier report that CEG has written for Jemena Asset Management (JAM) noting that JAM provide asset management services to ActewAGL .

2. 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.

3. We consider that the estimates presented in this report and the methodologies that we use to derive them are consistent with these requirements and note that the AER did not raise any concerns with the method in its draft decision.

4. 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. CEG's updated estimates of escalation factors are set out in Table 1 below.

**Table 1: Escalation factors, real**

| **Financial year** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** |
|---|---|---|---|---|---|---|
| EBA EGW labour | 1.9% | 0.0% | 1.4% | 1.6% | 2.2% | 2.2% |
| Contract EGW labour | 1.3% | 1.2% | 1.9% | 3.4% | 4.0% | 3.3% |
| Aluminium | -0.6% | 34.7% | 3.1% | 0.6% | 0.3% | 0.5% |
| Steel | -17.9% | 41.9% | 7.0% | -1.9% | -2.1% | -1.8% |
| Polyethylene | -4.5% | 28.6% | -0.5% | -2.6% | -2.6% | -2.3% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| EBA EGW labour | 1.2% | 1.9% | 1.3% | 1.5% | 1.9% | 2.3% |
| Contract EGW labour | 0.9% | 1.2% | 1.5% | 2.7% | 3.8% | 3.7% |
| Aluminium | -16.7% | 46.7% | 11.9% | 1.4% | 0.2% | 0.4% |
| Steel | -28.5% | 45.6% | 17.0% | 1.7% | -2.4% | -1.9% |
| Polyethylene | -9.1% | 25.7% | 7.7% | -1.9% | -2.8% | -2.4% |

5. 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% |
| 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% |
| Polyethylene | 0.0% | 0.0% | 0.1% | 0.4% | 0.3% | 0.0% |

6. 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

7. ActewAGL has engaged CEG to provide updated advice on the development of annual escalation factors, using the same methodology as in our June 2009 escalation report.

8. 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.

9. In the report, we update the escalation factors that we estimated in our previous report for JAM.[1] To avoid unnecessary repetition we do not replicate the detailed discussions of methodology at Section 2, Section 4 and Appendix A of that earlier report. To be specific, the methodology and input data used to estimate the effective of the carbon pollution reduction scheme have not changed and so we have not included an update to Section 4 of our earlier report.

10. The escalation factors estimated in this report are based on data collected in early December 2009. We also respond to the AER's reasons for its rejection of JAM's proposed escalation factors for wages and plastics.

11. 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.

12. 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 our previous report.

13. 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.

[1] CEG, *Escalation factors affected expenditure forecasts*, June 2009.

# 2. Forecasts of component cost inputs

14. The following section sets out the specific considerations that have been made regarding the derivation of escalators for ActewAGL's expenditure programs. These considerations guide the data sources and methodology that have been selected in each case. The detailed methodology used to calculate these escalation factors is as described in our previous report, except where specifically noted below.[2]

## 2.1. ActewAGL's EGW labour costs

15. For the purpose of forecasting future labour costs, ActewAGL has requested that CEG develop separate escalation factors for its EGW labour costs that JAM incurs on its behalf:

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

16. CEG has commissioned updates to 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 Access Economics forecasts for nominal wage growth across the EGW sector in New South Wales. Although JAM operates in ACT for ActewAGL, we understand that its EBA is a national agreement through Jemena, and that the majority of JAM's non-EBA staff are located in Sydney. Consequently we consider that using New South Wales specific forecasts is likely to be reasonable and consistent with the AER's draft decision for the purpose of escalating ActewAGL's EGW labour costs.

17. 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.

18. For EBA EGW wages, we have used the average of the BIS Shrapnel EBA, Macromonitor EBA forecasts and Access Economics NSW EGW forecasts to extend

[2] See CEG, *Escalation factors affected expenditure forecasts*, June 2009. That the detailed methodology used to estimate the escalation factors in this report has not changed can be readily verified from the accompanying spreadsheet.

forward the JAM data and create an index with which to estimate EBA EGW escalation factors.

19. We have also used the specific BIS Shrapnel and Macromonitor individual contract EGW forecasts to project forward actual JAM data in order to derive these escalation factors.

20. 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.[3] Under such a transition, even if the actual wage outcomes and the wages forecasts are perfectly consistent, escalation factors may be underestimated. Appendix A from our previous report[4] contains a full discussion of the nature of this problem and the solutions that CEG has applied to resolve this bias.

21. 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 based on Macromonitor BIS Shrapnel average and Access Economics, real**

| **Financial year** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** |
|---|---|---|---|---|---|---|
| EBA EGW labour | 1.9% | 0.0% | 1.4% | 1.6% | 2.2% | 2.2% |
| Contract EGW labour | 1.3% | 1.2% | 1.9% | 3.4% | 4.0% | 3.3% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| EBA EGW labour | 1.2% | 1.9% | 1.3% | 1.5% | 1.9% | 2.3% |
| Contract EGW labour | 0.9% | 1.2% | 1.5% | 2.7% | 3.8% | 3.7% |

*Source: Macromonitor and BIS Shrapnel, CEG analysis*

22. In its draft decision on ActewAGL's proposed access arrangement, the AER accepted the methodology described above to calculate future escalation factors, but preferred to use the forecasts that it commissioned from Access Economics on the basis that these were more up to date than the Macromonitor, BIS Shrapnel and Econtech forecasts used in ActewAGL's proposal.[5] We agree that the AER is in a position, by

[3] 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.

[4] CEG, *Escalation factors affected expenditure forecasts*, June 2009.

[5] AER, Draft *decision: Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network*, November 2009, p. 37

virtue of responding to business' proposals, that it is able to procure more up to date forecasts than those used by the businesses in its decisions.

23. When this occurs in a final decision the business' are left with no opportunity to respond to the forecasts utilised by the AER. This would not be problematic if the difference between the AER's forecasters views and those of other forecasters was when the forecast was made.

24. However, we note that the differences between the Access Economics forecasts and those of Econtech, Macromonitor and BIS are clearly not driven by how up to date they are. The earlier forecasts of Econtech (March 2009), Macromonitor (March 2009) and BIS (May 2009) were all made during the depths of the global financial crisis at a time when forecasts for economic activity were at their lowest point and when forecasts for general labour market conditions were similarly at their lowest point.

25. A good market indicator of expectations of overall economic activity is the value of the Australian ASX200 index. If a protracted period of slow growth is expected then expected company profits, and the value of equity, will be low and vice versa. In March 2009 the ASX200 index was at its lowest point since 2003. Since then it has increased by 49% at the time of writing (16 December 2009). Clearly, since the time of the previous forecasts commissioned by CEG for JAM the overall expectations of economic activity in Australia have increased.

26. Nonetheless, the more recent Access Economics forecasts are lower than the earlier estimates by the three independent forecasters used in our original report. They are also lower than the more recently updated forecasts by Macromonitor and BIS. It is clear that Access Economic's takes a view on wage growth in the EGW sector that is different and lower than the view taken by the other three forecasters.

27. It is equally clear that this difference of opinion is the primary driver of the difference in the estimates – not when the estimates were made. The AER's decision to stop sourcing forecasts from Econtech and instead source forecasts from Access Economics results in lower forecasts. A simple change in contractor by the AER should not have this affect. That is, the compensation for regulated businesses should not depend on the whether the AER happens to pick a contractor to provide a wage forecasts from the bottom or the top of the distribution of possible forecasts.

28. In our view, it is appropriate to have regard to the average of credible forecasts. The numbers in this report are based on an average of Macromonitor, BIS Shrapnel and Access Economics forecasts. We have not used forecasts from Econtech as the AER has since stopped commissioning these forecasts in favour of procuring forecasts from Access Economics. Based on past forecasts, had we had Econtech forecasts they would have been more aligned with the Macromonitor and BIS forecasts.

## 2.2. Aluminium

29. 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%.[6]

30. 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 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.

31. 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.

32. We have obtained LME prices for aluminium averaged over the month of November 2009. The LME's longest dated future for these products is 27 months, allowing us to forecast prices out to and including February 2012 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 March 2012 onwards or we can have regard to professional forecasts.

33. 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 October 2009.[7] In relation to aluminium prices there is a wide variety of forecasts. These forecasters provide quarterly forecasts out to March 2012 in nominal United States dollar terms.

34. 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

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

[7] Consensus Economics, *Energy & Metals Consensus Forecasts: Minerals Monitor*, 26 October 2009.

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) 2009 dollar terms"*.[8] For these reasons we must treat these forecasts with some caution.

35. 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 October 2009, we assume that the long-term forecasts are for the month of April 2017.

36. Forecasts of the price of aluminium between the end of the LME forecasts in February 2012 and the Consensus Economics forecast in April 2017 can be generated by interpolating between these price points. However, as described above, the escalation factors beyond 2012 must be treated with caution due to their reliance on the Consensus Economics mean forecast.

37. 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 | -0.6% | 34.7% | 3.1% | 0.6% | 0.3% | 0.5% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| Aluminium | -16.7% | 46.7% | 11.9% | 1.4% | 0.2% | 0.4% |

## 2.3. Steel

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

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

[8] Ibid, p.5

40. 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.

41. 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.

42. We understand that it is likely to be the case that suppliers of equipment to ActewAGL 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.

43. 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 | -17.9% | 41.9% | 7.0% | -1.9% | -2.1% | -1.8% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| Steel | -28.5% | 45.6% | 17.0% | 1.7% | -2.4% | -1.9% |

## 2.4. Crude oil

44. ActewAGL has not specifically requested escalation factors for crude oil. However, as we explain at section 2.5 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.

45. 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).[9] Crude oil futures (NYMEX Crude Oil Light) have been sourced from the Chicago Mercantile Exchange. We have averaged NYMEX prices over the month of November 2009 for use in the estimation of escalation factors.

46. 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 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 | 7.3% | 38.1% | 2.0% | -1.0% | -1.1% | -0.6% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| Crude oil | -15.6% | 59.8% | 11.7% | 0.0% | -1.3% | -0.8% |

## 2.5. Nylon-11 and polyethylene

47. Plastic piping, particularly nylon-11, is an important input into ActewAGL's expenditure programs and we understand that many smaller diameters of pipe purchased by ActewAGL 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.

48. Furthermore, we understand that there is only a single supplier of nylon-11 in Australia. We consider that a best means 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;

[9] 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.

- other gas network providers in Australia use polyethylene pipes in preference to nylon-11; and
- ActewAGL itself uses polyethylene for some of its larger diameters of gas pipeline.

49. 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.

50. 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.

51. 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.

52. 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 October 2009[10] 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 A to this report.

53. The relationship estimated in Appendix A 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 2.4. The nature of this relationship, in broad terms, is that approximately 22% 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,

[10] 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.

we regard it as reasonable to forecast average polyethylene prices on this basis, and that this is the best available forecast in the circumstances.

54. 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.

**Table 7: Escalation factors for polyethylene, real**

| **Financial year** | **2009-10** | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** |
|---|---|---|---|---|---|---|
| Polyethylene | -4.5% | 28.6% | -0.5% | -2.6% | -2.6% | -2.3% |
| **Calendar year** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** |
| Polyethylene | -9.1% | 25.7% | 7.7% | -1.9% | -2.8% | -2.4% |

55. The AER has identified what it describes as two errors with the methodology used by CEG in our first report for ActewAGL in estimating the escalation factors for nylon-11/polyethyelene.[11] The AER disagreed with the notion that a strong link could be drawn between the price of crude oil and the price of nylon-11. The AER stated that:[12]

> *"...neither ActewAGL's submission nor the CEG cost escalators report present evidence to support a relationship between nylon-11 and crude oil prices other than the fact that nylon-11 and polyethylene are substitutes."*

56. The AER also noted that in using the US Bureau of Labor Statistics data to estimate an econometric model, CEG was using a relationship derived using prices expressed in nominal United States dollar terms to apply to crude oil escalators expressed in real Australian dollar terms to estimate escalation factors for nylon-11/polypropylene. The AER did not consider this approach to be appropriate.

57. Whilst holding these concerns, the AER noted that:[13]

> *"...it would be difficult to create a better econometric model without entering into detailed analysis of the markets for crude oil, thermoplastic resin, polyethylene and nylon-11."*

[11] AER, Draft *decision: Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network*, November 2009, p. 37

[12] Ibid, p. 37

[13] Ibid, p. 37

58. Despite this view, the AER decided that it would utilise real escalation factors of zero percent for the purpose of escalating this part of ActewAGL's expenditure over the regulatory period.

59. In respect of the AER's concern relating to the application of the regression coefficients, we agree that it is more appropriate for the results of the regression to be applied to crude oil price movements that are expressed in nominal United States dollar terms. We have made this change in updating our methodology. We consider that the AER has identified a change that would lead to a clear improvement in the accuracy of our estimated escalation factors. However, we do not believe that the previous methodology would have resulted in systematic bias (such as double counting of inflation).

60. We do not believe that the AER's concerns in regard to the price relationship between crude oil and nylon-11 justify setting aside the escalation factors estimated in the CEG report. We accept that the relationship between crude oil and nylon-11 is indirect and relies on the extent of competitive dynamics between polyethylene and nylon-11. This is a reason to consider that the escalation factors under this assumption may be quite imprecise. However, assuming zero real escalation without any supporting evidence or conceptual rationale is likely to be less precise.

61. In the quote noted at paragraph 57 above, the AER acknowledges that there is no other reasonably simple method for arriving at estimates for the escalation path of nylon-11. Given the requirements under Rule 74(2) that the estimate used be made on a reasonable basis and be the best estimate possible in the circumstances, it is not clear on what basis the AER decided that a path of zero real escalation was a better estimate for the future prices of nylon-11 than the estimates presented by CEG.

# 3. Impact of CPRS on escalators

62. The AER has rejected the inclusion of CEG's estimates of the impact of the Governments' Carbon Pollution Reduction Scheme (CPRS) on the escalation factors estimated by CEG. We summarise the reasons provided for this as follows:

- Uncertainty about the final form of the scheme makes it more appropriate to include any compensation for the effect of the CPRS in the form of a pass through event;
- ActewAGL has proposed a pass through for costs relating to the CPRS; and
- The CEG escalators already include the expected effect of the CPRS which will be embodied in the futures forecasts used as a basis for CEG's escalators.
- Where CEG's escalators are not based on futures prices, and therefore do not already include the impact of the CPRS, the impact of the CPRS is likely to be immaterial.

### 3.1. Accounting for the existence of a pass throughs

63. We agree with the AER that there is material uncertainty about the final form of the scheme. We note that since our last report the Australian Senate has rejected the relevant legislation and the Government has publicly undertaken to bring the legislation back before the Senate early in the new year with media speculation that the Government may call a double dissolution of Parliament if the legislation is rejected again. It follows that there is uncertainty regarding both the timing and the nature of any future carbon tax/permit scheme.

64. We agree with the AER that this makes compensation for the direct impact of the Scheme on ActewAGL (ie, direct liabilities of ActewAGL) best accommodated via a pass through mechanism that is triggered if and when the legislation comes into effect.

65. However the indirect costs to AcetwAGL (eg, the impact on the cost of ActewAGL's inputs) are a different matter and should not be compensated for through a pass through provision. These costs cannot be definitively estimated even after the CPRS is introduced but rather will have an impact through a long and complex set of interactions in the supply chain that can only ever be modelled (ie, not directly observed).

66. In our view the uncertainty around the introduction of the CPRS is no greater than the uncertainty around all of the other factors that feed into our forecasts (including the continued economic growth of the Australian economy and of the economies of our major trading parties). We consider that the expected cost of all of these effects should be best included in the benchmark revenues rather than in a pass through mechanism.

67. However, we agree with the AER that there would be double counting if ActewAGL was including in its pass through mechanism compensation for both direct liabilities under the CPRS and the indirect impact on its costs. However, we understand that ActewAGL only seeks a pass through for its direct costs relating to the CPRS and we therefore consider that indirect inputs costs should be compensated through the use of these CPRS escalators.

### 3.2. CEG escalators already include the effect of the CPRS

68. We do not agree with the contention that the futures prices used by CEG already include the impact of the CPRS. The futures prices (and professional forecasts) used by CEG to develop its escalators were all based on US dollar prices in world markets for the relevant basic commodities (aluminium, steel, and crude oil). Even if investors in these markets fully factored in the expected impact of the Australian CPRS on world prices this would have no substantive effect on these prices.

69. However, the work performed by CEG related to the impact of the CPRS on the transformation of these basic commodities into the finished products purchased by ActewAGL (aluminium products, steel products and nylon-11 (polyethylene used as a proxy)). This was based on estimates of carbon intensity in the relevant industries (plastic products, iron and steel, and basic non-ferrous metals and products). We submit that this impact is not captured in our escalators prior to the inclusion of the CPRS adjustment.

### 3.3. The impacts are not material

70. The AER states in relation the impact of the CPRS on polyethylene:

> *Polyethylene is one material cost escalator proposed by ActewAGL which does not have a futures market. Even though there is no futures market, the AER considers that the potential cost increase relating to the introduction of the CPRS is unlikely to be material.*

71. We consider that the AER is correct that the impacts we have estimated are unlikely to be large. We have estimated only a relatively small impact of the CPRS on Aluminium, Steel and Polyethylene escalators - with these effects only having an impact from 2011-12 onwards. Moreover, we do not expect that a significant proportion of ActewAGL's expenditure to be escalated by these factors. Therefore, we would expect this to have only a small impact on ActewAGL's costs.

72. Indeed, it may be that it would not be significant enough to pass the materiality threshold for a pass through (which is a further reason for not dealing with it in this manner). However, whether the effect is large or small is less important than whether it has been estimated on a reasonable basis and is the best estimate possible in the circumstances. We consider that our estimates meet these criteria.

# Appendix A. Relationship between crude oil and polyethylene pricing

73. 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 October 2009, or 220 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).

74. 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.

75. 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.

76. 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.

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

78. 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.

79. 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.

80. 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 216, representing October 1991 to October 2009.

81. An abbreviated summary of the results of estimating this equation are set out in Figure 1 below.

**Figure 1: Results of regression between prices changes for polyethylene and crude oil**

| *Regression Statistics* | |
|---|---|
| R Square | 0.221 |
| Adjusted R Square | 0.209 |
| Standard Error | 0.021 |
| Observations | 216 |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* |
|---|---|---|---|---|
| Crude oil lag 1 month | 0.061 | 0.014 | 4.295 | 0.000 |
| Crude oil lag 2 month | 0.058 | 0.014 | 4.100 | 0.000 |
| Crude oil lag 3 month | 0.045 | 0.014 | 3.137 | 0.002 |

82. The interpretation of these results is that movements in the price of crude oil explains approximately 22% of the variation in the price changes of polyethylene, and that this relationship is significant at lags of 1, 2 and 3 months.[14] 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.

[14] Estimating the same equation with a fourth lag returns a coefficient on the fourth lag with an associated p-value of 0.07 – a marginally statistically insignificant result.