Appendix A4

CEG Report, “Escalation Factors Affecting Capital Expenditure Forecasts”, 18 January 2008

Escalation factors affecting capital expenditure forecasts

A report for ElectraNet

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1. Description of Method

ElectraNet has asked CEG to advise on the development of annual escalation factors for its capital expenditure program. In order to perform this task it is necessary to obtain or develop forecasts of either:

a) the price of goods and services directly purchased by ElectraNet; or

b) the price of inputs used in the production of goods and services directly purchased by ElectraNet.

Ideally, it would be possible to examine forecasts of prices for all inputs purchased by ElectraNet (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 South Australian electricity sector there are few if any forecasts of the cost of equipment purchased by ElectraNet (such as transformers, switchgear, high voltage conductor and cable etc).

The lack of such forecasts for most goods and services purchased by ElectraNet 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 high voltage transformers.

However, forecasts do exist for many of the inputs used in the production of equipment/services purchased by ElectraNet. For example, the transformers purchased by ElectraNet have themselves been produced using labour, capital and materials (eg, fabricated steel, copper, oil, energy etc). For many of these inputs there are raw material forecasts and/or futures prices that can inform forecasts for transformers themselves. Specifically:

a) Forecasts/futures prices for refined copper can be used to inform price forecasts for the fabricated copper used in transformers;

b) Forecasts/futures prices for crude oil can be used to inform price forecasts for the insulating oil used in transformers;

c) Forecasts of labour costs can be used to inform forecasts of the labour costs for equipment manufacturers;

d) Forecasts of the price of steel at the 'mill gate' can be used to derive forecasts of the cost of the fabricated steel used by ElectraNet;

e) Forecasts in financial markets of the profit margins earned by equipment manufacturers can be used to inform forecasts of the return on capital charged by equipment makers; and

f) 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 transformer manufacturers not captured above (eg, energy costs, land and equipment leases etc).

At a high level, this is largely the approach taken by SKM in developing forecasts for the costs of SP AusNet's capital program[1] and accepted by the AER in its draft decision on ElectraNet's capital program.[2]

The necessary steps required to develop a forecast for the escalation of a capex program are as follows.

Step 1- break down the capex program into different cost categories for which there are unit cost forecasts (or for which unit cost forecasts can be derived);

Step 2 – source/derive the relevant unit cost forecasts;

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

In order to complete Step 2 where there are no forecasts available for a particular good or service (eg, for transformers) 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, transformers 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 a transformer. It can be described as follows:

Step A – breakdown the cost of production for that good/service into component inputs parts for which there are forecasts available (eg, steel, copper and labour);

Step B – source the relevant unit cost forecasts;

Step C – calculate a weighted average escalation factor using weights derived in Step A and forecasts from Step B.

The remainder of this report:

1. Details the relevant direct and indirect inputs to ElectraNet's capital program for which there are credible forecasts that CEG is aware of. That is, performs Step 1 above;

[1] SKM, Escalation Factors affecting Capital Expenditure Forecasts, 21 February 2007.

[2] AER, Draft Decision: ElectraNet Transmission Determination 2008-09 to 2012-13, 9 November 2007.

2. Describes the properties of each forecast, eg, when they were made, who they were made by, for what purpose they were made and any relevant statistical properties such as the standard deviation of forecasts. Selects and explains the choice of point estimate for each forecast. That is, Step 2 above;

3. Derives forecasts for equipment/services for which there are no direct forecasts available; and

4. Contrasts the detailed approach taken by CEG with that taken by SKM.

2. Inputs into ElectraNet's Capital Program

ElectraNet's capital program involves the purchase of a number of goods and services. These include:

- Direct purchase of labour services from employees;
- Indirect purchase of labour services from external contractors who provide labour intensive services (such as electrical design services, and civil design services);
- Civil construction services;
- Equipment purchases (eg, transformers, switchgear, conductor and cable, secondary systems, etc);
- Fabricated steel used in construction of substations and other structures; and
- Other inputs.

Clearly, labour is the dominant input into the first two categories of services purchased by ElectraNet. Labour is also an important input into all of the other purchases made by ElectraNet. That is, civil construction service providers also use labour as do equipment and steel manufacturers. Similarly, electrical equipment manufacturers also tend to use a number of other common inputs due to their electrical properties (such as copper and aluminium).

For the purpose of this report we have identified the following inputs (direct and indirect) into ElectraNet's capital program for which there are forecasts available:

- specialised labour purchased by ElectraNet;
- general labour purchased by electrical equipment manufacturers;
- raw copper;
- raw aluminium;
- crude oil;
- hot rolled coil steel (ie, steel at the mill gate before fabrication);
- suppliers' margin (ie, return on and of capital assets owned by the supplier); and

- other inputs (for which a general cost escalation forecast can be used).

This categorisation of costs is similar although not identical to the categorisation used by SKM in its report for SP AusNet.

3. Forecasts of Component Cost Inputs

3.1. A note on real versus nominal escalation

In the following sections we present both real (wage costs, construction costs and steel costs) and nominal forecasts (all other categories) for particular cost categories.

For wage and construction costs we have relied on professional forecasters' opinions. For each forecaster, we have used that forecaster's real forecasts or, if not published, we have used that forecaster's CPI forecasts to derive an associated real forecast from a nominal forecast. For example, in the following section we present real wage cost forecasts from Econtech and BIS Shrapnel. BIS Shrapnel has forecast real wages growth while Econtech has forecast only nominal wages growth. In the case of Econtech, we have derived a real forecast by deflating the Econtech nominal wage growth by the Econtech forecast inflation growth (published in Econtech's December 2007 ANSIO (Australian National, State and Industry Outlook Forecast Horizon: Dec Qtr 2007).

However, where we have relied on futures markets to derive forecasts of particular prices (eg, for copper) we have only presented nominal forecasts. 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.

In order to deflate these nominal forecasts we recommend use of 'best estimate' inflation forecasts. As explained in our companion report, we believe that the best estimate of expected inflation should be derived by having regard to all credible inflation forecasts.

Our best estimate for inflation each year out to 2013 is provided in Table 1 below. This is derived as the mean of the inflation forecasts provided in Table 2 of our companion report for ElectraNet.[3]

Table 1: CEG inflation forecasts (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Year ended June	2.1%	2.9%	2.7%	2.4%	2.5%	2.6%	2.6%

We also note that for the year to June 2007 actual CPI growth was 2.07%. We use this actual figure to derive real forecasts for the year to June 2007.

[3] CEG, A Methodology for Estimating Expected Inflation, 17 January 2008.

3.2. Forecast SA EGW labour cost movements

The AER has considered two forecasts for the cost of labour in the South Australian Electricity Gas and Water sector (the sector within which ElectraNet competes for labour). These forecasts are provided by BIS Shrapnel and Econtech. Both forecasters are predicting strong positive growth in average weekly ordinary time earnings in the SA EGW sector. Their forecasts are provided below.

Table 2: Real AWOTE in the SA EGW sector (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Econtech	5.1%	1.4%	2.5%	5.4%	4.9%	3.7%	2.3%
BIS Shrapnel	4.0%	2.5%	2.6%	3.6%	3.3%	2.6%	3.2%

As can be seen in Table 2 above, with the exception of 2008, Econtech has the highest forecast in each year. In order to gauge the extent to which this variation masks an absolute difference we can examine the differences in labour costs over the five years from year ended June 2009 to year ended June 2013.

Table 3: Cumulative labour costs 5 year to 2013 (year ended June 2006 =100)

Econtech	20.0%
BIS Shrapnel	17.0%

Table 3 illustrates, for each forecast, the impact of escalation on total labour costs over the five years to 2013. For example, imagine that $1 worth of labour services was purchased in the year 2006. If there was no escalation in unit costs (or change in productivity) then purchasing the same amount of labour services over the five years to 2013 would cost $5 (ie, remain at $1 pa). However, under the Econtech forecast, cost increases will result in $6.05 needing to be spent (or 20% more than if no escalation in unit costs occurred).

The BIS Shrapnel forecast is the most conservative in the sense that its adoption will result in the lowest forecast of real labour costs for ElectraNet.

Table 4: Relative Impact on Forecast Labour Expenditure over 5 years (BIS = 1.00)

BIS	1.00
Econtech	1.17

Table 4 is simply the ratio of the figures in Table 3 relative to the BIS estimate. It describes the difference in the estimated cost of purchasing a constant quality adjusted amount of labour services in each year from 2008 to 2013. It states that the real cost of purchasing that labour will be 17% higher under the Econtech forecasts than under the BIS Shrapnel forecasts.

Notwithstanding the above, we understand that ElectraNet proposes to solely rely on the BIS Shrapnel forecasts (consistent with its original proposal).

3.3. Forecast of refined copper prices

Production of copper used in electrical equipment has many stages. Each stage of copper production is tradable, for example a copper mine may mine the ore and produce copper concentrate which it then sells on to a custom smelter, the smelter may then produce blister copper which is copper ingot of about 98% purity. However most of today's technologies require virtually pure copper, or copper of 99.95% purity. As a result, smelted copper needs to be refined.

This copper must then be transformed into the particular specifications required for any given piece of equipment. For example, in the case of copper cabling used in the electricity sector it must be transformed into cable with particular electrical characteristics and this process involves capital, labour and energy. It must also be combined with other materials such as insulating material.

It is important to be clear when we talk about movements in "the" price of copper we are really talking about movements in the price of copper at a particular stage in its production – namely refined copper to a particular specification. The prices quoted in this section are prices for copper traded on the London Metals Exchange that meets the specifications of that exchange. Specifically, prices are per tonne for parcels of copper of 25 tonnes of "Grade A" quality conforming to BSEN 1978:1998.[4]

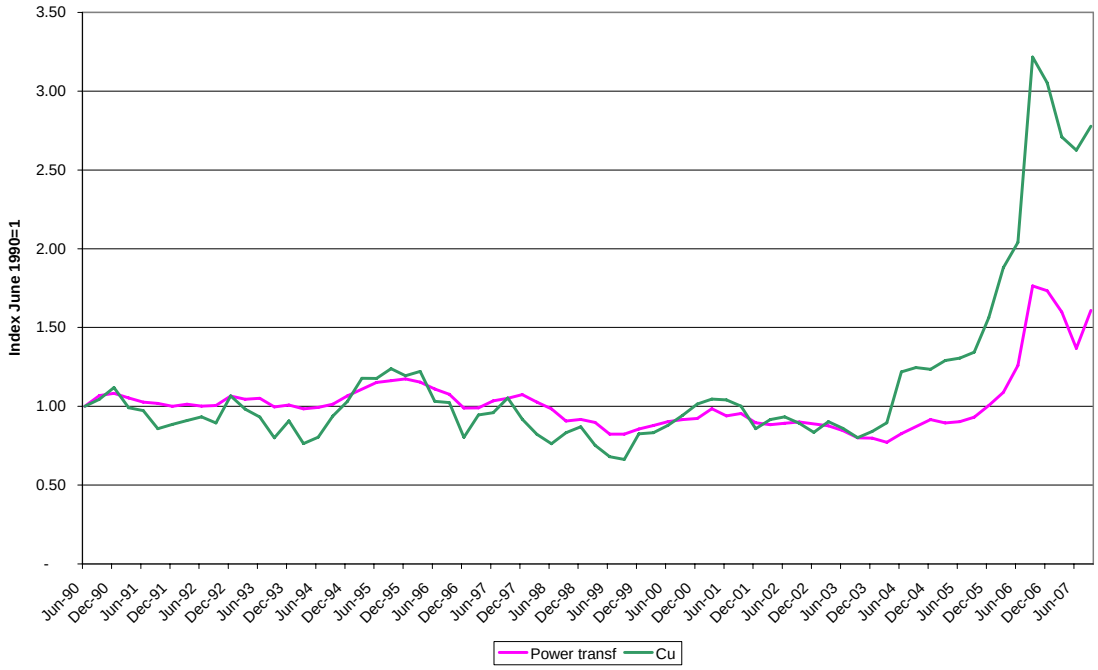
The prices quoted are **not** the prices paid for copper by electrical equipment makers. For example, producers of transformers purchase fabricated copper to be used in their manufacturing processes. This fabricated copper has gone through further stages of production than the refined copper traded on the LME. Its price can be expected to be influenced by refined copper prices but it cannot be expected to move 'one-for-one' with refined copper prices. Similarly, the cost of producing 'copper cable' is much more than the cost of refined copper that is used in its production. As discussed above, that refined copper must itself be transformed into cable and must be combined with other materials. It would therefore be a serious error to assume that 'copper cable' moves one-for-one with the price of refined copper.

This issue can be illustrated by comparing the change in the LME copper price (converted into Australian dollars) with the change in the price of copper used in production of power transformers (as published by the ABS[5]). From when the ABS publication started in March 1990 to September 2007 refined LME copper prices rose 169%. However, over the same period, the price of copper used in transformers rose only 56%. Thus, far from there being a one-for-one relationship between these factors there is more like a one-for-three relationship. The following graph illustrates the relevant time series for these variables.

[4] www.lme.com

[5] ABS series ID A2314301X

Figure 1: Refined copper prices versus prices for fabricated copper used in the production of transformers



In CEG's opinion the most reliable forecast for copper 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.

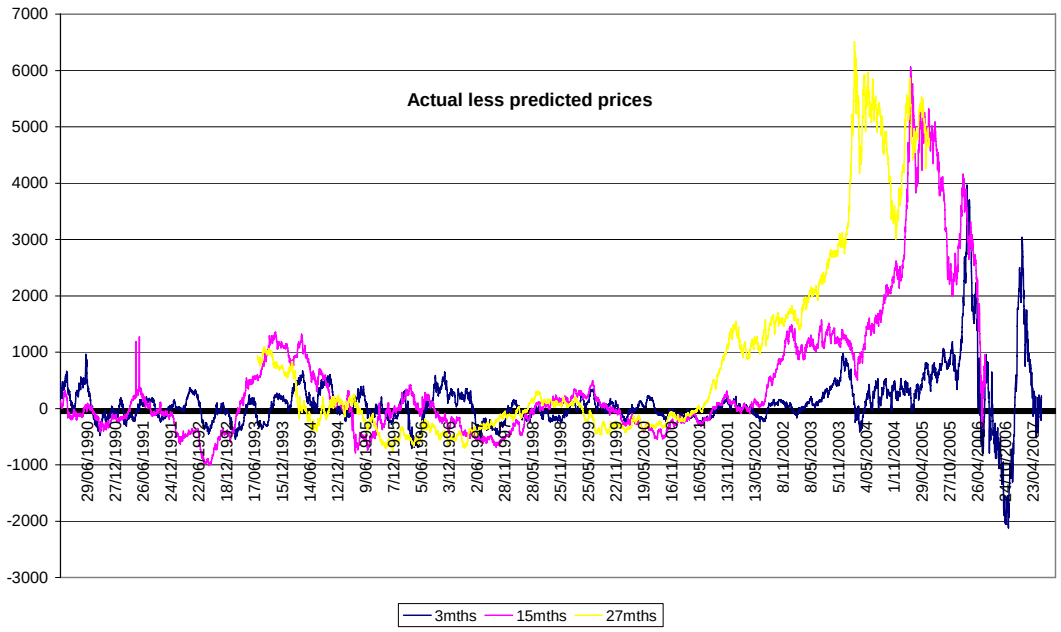
Of course, futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur. In fact, futures prices have spectacularly underestimated refined copper prices in the last few years (see below graph). However, they nonetheless provide the best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

This is a standard proposition in finance theory not just limited to futures markets for base metals. The IMF 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."[6]

Figure 2: Actual prices less prices predicted by LME futures



The above graph shows that, over most of the 1990's, futures prices were a reasonable predictor of future 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).

Given that ElectraNet's cost estimation was undertaken in the year ended June 2006 it is appropriate to use refined copper prices in this year as the relevant benchmark. This effectively assumes that the June 2006 cost estimates are influenced by the average copper price in the year preceding. That is, the price estimate for transformers at June 2006 was influenced by average prices over the preceding year. This is obviously more realistic than assuming that transformer prices in June 2006 were a function of copper prices in June 2006.

The table below details average LME refined copper prices in USD and AUD out to the year ended June 2009. The LME's longest dated future for refined copper is 27 months, allowing us to forecast prices out to and including April 2010. We show this as an additional column in Table 5.

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

Table 5: LME copper prices (year ended June)

	2006	2007	2008 (e)	2009 (f)	2010 *(f)
USD/tonne	5,060	7,089	7,325	6,775	6,600
AUD/tonne	6,774	9,026	8,418	7,690	
USD		40.1%	3.3%	-7.5%	
AUD		33.2%	-6.7%	-8.7%	

** The longest dated future available from the LME data prices copper for 2 April 2010 at US$6,600/tonne*

The prices in Table 5 are actual prices up to the year ended June 2007 and are estimates and forecasts up to the year ended June 2009 – which is as far out as future prices that are available on the LME website allow us to calculate. Arguably, less weight should be given to longer dated futures due to declining liquidity at longer time horizons. Nonetheless, for the purpose of this report we have ignored such differences in liquidity/reliability. The price for 2008 is calculated as the average of the price on 2 July 2007 and the forecast price on 1 July 2008. The forecast price on 1 July 2008 is calculated in the following manner:

- The forecast price for 2 April 2008 is calculated as the 3 month future price prevailing on 2 January 2008 (which gives a predicted price on 2 April 2008);
- The forecast price for 2 April 2009 is calculated as the 15 month future price prevailing on 2 January 2008;
- The forecast price for 1 July 2008 is calculated as straight line interpolation between these prices.

Similarly, the average price in the year ended June 2009 is similarly calculated as the average of the forecast price on 1 July 2008 and 1 July 2009. The forecast price on 1 July 2009 is also calculated by straight line interpolation between forecast prices implied by 15 and 27 month futures.

In order to calculate the AUD price for copper we convert using the contemporaneous exchange rate. For forecasts we have used the Econtech forecasts of the AUD/USD exchange rate as published on page 110 of their "Australian National, State and Industry Outlook" quarterly forecasts most recently published on 21 December 2007. These forecasts are provided in the below table.

Table 6: Econtech exchange rate forecasts

	2007	2008	2009
Forecast on 1 July	0.849	0.884	0.878
Average over year ended 1 July		0.867	0.881

As can be seen from Table 5, the price of refined (LME) copper in the year ended June 2009 is expected to be above the price of refined copper in the year ended June 2006.

This is true whether that price is measured in USD or AUD (using the Econtech exchange rate forecasts). This is largely due to the increase in copper prices in 2007 with the market expecting less than fully offsetting price reductions beyond 2007. Beyond 2009 the price fall in the AUD price of copper is expected to be lower than the price fall in USD terms due to an anticipated devaluation in the AUD. (Falling commodity prices are generally associated with a falling Australian dollar as discussed in section 3.9 below. This generally acts a 'shock absorber' for Australian purchasers of commodities – ie, commodity price rises are offset by currency appreciations and vice versa.)

The above forecasts rely on futures prices. However, available futures prices do not extend out to the end of ElectraNet's regulatory period (ie, to the year ended June 2013). In this case we have two choices. We can assume that copper prices will remain constant from 2010 onwards or we can have regard to professional forecasts.

In our view, given the volatility of metals prices, a reasonable approach would be to assume that prices remain constant in real terms. However, it is relevant to nonetheless examine the forecasts made by professional forecasters. Consensus Economics surveys professional forecasters on a range of economic variables. They have recently performed a survey of forecasters' opinions on future commodity prices. In relation to copper prices there is a wide variety of forecasts. These forecasters provide quarterly forecasts out to March 2010. In March 2010 the highest forecast is by Bloomsbury Minerals (7,250 real USD per tonne) while the lowest is by Scotiabank (2,865 real USD per tonne).

This obviously creates a difficulty in interpreting this data. For example, what weight should be given to different forecasts? Should some outlier forecasts be excluded? Should forecasters be judged on past performance etc. These questions are largely imponderable and any answers will inevitably be subjective (just like the forecasts). For the purpose of this report we work only with the mean of all forecasts. For March 2010 this mean forecast is 5,278 real USD per tonne. These are in USD prices as at October 2007. Assuming 2.5% annual inflation from then to March 2010 this USD 5,278 figure becomes USD 5,602. The implied future price at 2 April 2010 of USD 6,600, calculated from LME data, is 18% higher than this. For the reasons outlined above we regard the futures price as the better estimate.

However, beyond April 2010 there are no futures prices available (and even if there were they would likely suffer from low levels of liquidity). By contrast, beyond March 2010 Consensus Economics does provide a single mean estimate of 'long term' USD copper prices. This forecast is for a price of USD 3,620 real inflation adjusted dollars per tonne.

Unlike with shorter term forecasts, Consensus Economics does not disclose how many or which institutions contributed to the forecasts nor 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) 2007 dollar terms".[7] For these reasons we must treat these forecasts with some caution. In our opinion the best way to exercise this caution is to treat the 'long term' forecasts as relating to 10 years (rather than the 7.5 year middle of the range provided) and to adjust this forecast by the same percentage that the March 2010 mean forecast differs from the April 2010 futures prices (18%). That is, increase the USD 3,620 figure by 18% to USD 4,265 then add 10 years of inflation at 2.5% to get USD 5,459. If we do both of these things we are able to add an extra date to our Table 5 above.

Table 7: LME copper prices plus Consensus Economics 'Long Term' forecast

	2006	2007	2008 (e)	2009 (f)	2017* (f)
USD/tonne	5,060	7,089	7,325	6,775	5,459
AUD/tonne	6,774	9,026	8,418	7,690	

** Long term forecast calculated as at 1 October 2017.*

It is then possible to apply straight line interpolation between April 2010 and 2017 to give forecasts for the copper price over the period from year ended June 2006 to year ended June 2013. This is provided in the below table (noting that Econtech exchange rate forecasts are used to derive AUD prices following the same methodology as described above).

Table 8: Annual escalation factors to June 2013 derived from futures prices and Consensus Economics forecasts (year ended June)

	2006	2007	2008 (e)	2009 (f)	2010 (f)	2011 (f)	2012 (f)	2013 (f)
USD/tonne	5,060	7,089	7,325	6,775	6,651	6,487	6,334	6,182
AUD/tonne	6,774	9,026	8,418	7,690	7,632	7,556	7,483	7,390
USD % change		40.1%	3.3%	-7.5%	-1.8%	-2.5%	-2.3%	-2.4%
AUD % change		33.2%	-6.7%	-8.7%	-0.8%	-1.0%	-1.0%	-1.2%

Table 8 above provides escalation factors derived using a combination associated with refined copper prices over the period 2006 to 2013. Over that period the average annual escalation factor is 0.92% pa (ie, the price of AUD 6,774 in year ended June 2006 escalates to AUD 7,390 in 2013 at an average rate of 0.92% pa). These escalation factors are in nominal terms.

As described above, the escalation factors beyond 2010 must be treated with caution due to their reliance on the Consensus Economics mean forecast. An alternative cautious approach would be to assume a zero escalation factor beyond 2010.

3.4. Forecast of refined aluminium prices

The same issues discussed above apply to the use and derivation of forecast aluminium prices. Just as copper cable embodies many more inputs than 'refined

[7] Consensus Economics, Energy & Metals Consensus Forecasts: Minerals Monitor, 22 October 2007

copper' (including capital and labour) so does aluminium conductor constitute more than refined aluminium.

In order to derive our estimates of historical and forecast changes in refined aluminium prices we have followed the same approach and used the same data sources (LME and Consensus Economics). Rather than repeating the discussion above we simply provide the relevant data with minimal repetition of discussion.

The table below details average LME aluminium prices in USD and AUD out to the year ended June 2009. As with copper the longest dated future values aluminium in April 2010 – see Table 9 below.

Table 9: LME aluminium prices (year ended June)

	2006	2007	2008 (e)	2009 (f)	2010* (f)
USD/tonne	2,246	2,694	2,608	2,564	2,673
AUD/tonne	3,008	3,428	2,995	2,910	
USD		20.0%	-3.2%	-1.7%	
AUD		14.0%	-12.6%	-2.8%	

** The longest dated future available from the LME data prices copper for 2 April 2010 at US$2,673/tonne*

The prices in Table 9 are actual prices up to the year ended June 2007 and are estimates/forecasts up to the year ended June 2009. The methodology used to derive these is the same as for copper described above. These escalation factors are in nominal terms.

As can be seen from Table 9, the price of refined (LME) aluminium in the year ended June 2009 is expected to be above the average price of refined aluminium in the year ended June 2006. This is true whether that price is measured in USD or AUD (using actual and the Econtech forecast exchange rate forecasts).

Using the same methodology as for copper we use the Consensus Economics 'long term' forecasts to derive an estimate of the aluminium price in 2017 of US$2,798 per tonne (noting that in this case Consensus Economics mean forecast at 2010 of US$2,398 per tonne (nominal) is 9% lower than implied by LME futures).

Table 10: LME aluminium prices plus Consensus Economics 'Long Term' forecast

	2006	2007	2008 (e)	2009 (f)	2017* (f)
USD/tonne	2,246	2,694	2,608	2,564	2,798
AUD/tonne	3,008	3,428	2,995	2,910	

** Long term forecast calculated as at 1 October 2017.*

It is then possible to apply straight line interpolation between April 2010 and 2017 to give forecasts for the aluminium price over the period from year ended June 2006 to year ended June 2013. This is provided in the below table (noting that Econtech

exchange rate forecasts are used to derive AUD prices following the same methodology as described above).

Table 11: Annual escalation factors to June 2013 derived from futures prices and Consensus Economics forecasts (year ended June)

	2006	2007	2008 (e)	2009 (f)	2010 (f)	2011 (f)	2012 (f)	2013 (f)
USD/tonne	2,246	2,694	2,608	2,564	2,656	2,717	2,777	2,837
AUD/tonne	3,008	3,428	2,995	2,910	3,047	3,165	3,281	3,391
USD % change		20.0%	-3.2%	-1.7%	3.6%	2.3%	2.2%	2.1%
AUD % change		14.0%	-12.6%	-2.8%	4.7%	3.9%	3.6%	3.4%

The above table provides escalation factors derived using a combination associated with refined aluminium prices over the period 2006 to 2013. Over that period the average annual escalation factor is 1.7% pa (ie, the AUD price of 3,008 in year ended June 2006 escalates to 3,391 in 2013 at an average rate of 1.7% pa). These escalation factors are in nominal terms.

3.5. Forecast of crude oil prices

In order to derive our estimates of historical and forecast changes in crude oil prices we have followed the same approach and used for copper and aluminium. Historical data on crude oil prices have been sourced from the US Department of Energy (DoE).[8] Crude oil futures (NYMEX Crude Oil Light) have been sourced from TFC commodity Charts.[9]

The table below details average crude oil prices both historically and forecast to 2013. Crude oil futures extend out beyond 2013 and, consequently, these can be relied on completely to develop forecasts of future prices.

Table 12: Crude oil prices (year ended June)

	2006	2007	2008 (e)	2009 (f)	2010 (f)	2011 (f)	2012 (f)	2013 (f)
USD prices	57.4	60.0	82.9	93.7	91.8	91.9	91.4	91.0
AUD prices	76.2	73.2	89.2	106.3	105.3	107.0	108.0	108.8
USD prices		4.4%	38.3%	13.0%	-2.0%	0.1%	-0.5%	-0.5%
AUD prices		-3.9%	21.8%	19.2%	-1.0%	1.6%	0.7%	0.6%

The prices in Table 12 are actual prices up to the year ended June 2007 and are estimates/forecasts up to the year ended June 2013. The prices in 2006 and 2007 are the average of weekly prices in those years as published by the US DoE. Prices in 2008 onwards are simple averages of the forecast prices on 30 June in the preceding year and 30 June in the marked year (for example, the reported price in 2013 is the

[8] http://tonto.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm. We have used the All Countries Spot Price FOB Weighted by Estimated Export Volume (Dollars per Barrel).

[9] http://futures.tradingcharts.com/marketquotes/index.php3?market=CL downloaded on the 6th January 2008.

average of the forecast prices in June 2012 and June 2013). These escalation factors are in nominal terms.

3.6. Forecast construction costs

CEG is aware of two forecasts for construction costs in Australia by Econtech[10] and Macromonitor[11]. We are unaware of any construction cost forecasts specific to the South Australian context. Both forecasters are predicting strong positive growth in construction costs. Their forecasts are provided below.

Table 13: Construction cost forecasts real (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Econtech (Aus)							
Non-residential	3.2%	0.7%	0.5%	0.9%	0.8%	1.4%	2.0%
Total engineering	8.1%	0.2%	0.6%	1.3%	1.1%	1.2%	1.7%
Macromonitor (Aus)							
Non-residential	3.8%	4.1%	3.1%	1.7%	-3.2%	-1.9%	
Total engineering*	6.4%	4.5%	3.0%	0.1%	-0.1%	0.5%	
Electricity engineering*	10.2%	7.0%	4.5%	-2.2%	0.2%	1.0%	
Total utilities**	8.0%	4.9%	3.2%	-1.2%	-0.1%	0.8%	

**Table 30 page 129 ** Table 38 page 152*

As can be seen from the above table, Macromonitor tends to have a higher forecast for unit cost increases in the early years than does Econtech.

The selection of the most appropriate forecast depends on the purpose to which ElectraNet is going to use it. Were ElectraNet to apply the escalation factor to its total capex program then the most appropriate escalation factor would probably be Macromonitor's forecast for engineering construction in the electricity sector.

However, we understand that ElectraNet intends to use a more granular 'bottom up' approach to its escalation factors (consistent with the structure of this report). Specifically, we understand that ElectraNet has classified some of its expenditure as 'general' building, civil and electrical construction and it is this expenditure that is to be escalated using a construction cost forecast.

In which case, it may be that using the electricity engineering forecast will 'double count' the relatively higher level of wage growth expected in the electricity sector relative to other construction sectors.

[10] See http://www.cfc.acif.com.au/analysis2.asp. It is not obvious when these forecasts were last updated, however, the linked page above was dated 15 November on the 8th of January. On this basis we assume that the forecasts were updated on this date.

[11] Macromonitor, Australian Construction Outlook 2008, November 2007.

On the basis of the above we consider that the total engineering construction cost forecast is the most appropriate forecast to use. We consider that this is more appropriate because it is the category within which all construction within the electricity sector falls.

We propose taking an average of the two available forecasts. The escalation factors that result are summarised in the below table.

Table 14: Construction cost escalation real (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Total engineering	7.2%	2.3%	1.8%	0.7%	0.5%	0.9%	1.7%

It is worth noting that all of the forecasts referred to above are dated from November 2007 and presumably rely on data that is available from even further back in time. As a result, they do not reflect the most recently available information on actual construction activity and input cost movements.

All of the above forecasts predict a moderation in the rate of growth in construction costs in the second half of 2007 and first half of 2008. By contrast, the most recent evidence suggests that cost pressures in construction have been accelerating in the six months to December 2007.

On the 8th of January 2008 the Australian Industry Group released the results of its monthly survey of construction businesses.[12] In this survey there has been a clear acceleration in reported cost pressure in the second half of 2007. Over this six month period reports of cost increases from survey participants increased by 10% relative to the first half of calendar 2007. Similarly, reports of cost increases were 16% higher in the December quarter compared to the March quarter of 2007.

This suggests that far from abating construction costs are currently accelerating. Consequently, it appears likely that the above escalation factor for the year end June 2008 is likely to be an underestimate.

3.7. Forecast for fabricated steel costs

An important component of ElectraNet's costs is associated with the purchase of products using transformed steel. For example, fabricated steel is used to house transformers and to mount them in substations. Structural steel products are also used in the construction of towers and substations.

Once more, it is important to draw a distinction between the steel products that ElectraNet actually buys and the steel 'at the mill gate'. Just as is the case with copper and aluminium, the steel that ElectraNet actually uses (eg, steel used in towers and

[12] AIG/HIA, Performance of Construction Index, December 2007. This index surveys 120 construction firms asking them about their experience and expectations of activity and cost changes.

transformers) has been fabricated and, as such, embodies both labour, capital and other inputs (eg, energy).

Based on information from the ABS 2001/02 input-output tables for the Australian economy 'raw' steel (the output of the 'iron and steel' industry is a small (in the order of 15%) component of the direct expenses of those industries that transform this steel into the types of products that ElectraNet buys. By contrast, labour expenditure is in the order of 24% to 30% of total costs. This is illustrated in the table below.

Table 15: Input costs as a percentage of total value of output

	Structural metal products (2703)	Sheet metal products (2704)	Fabricated metal products (2705)
Compensation of employees (P1)	31%	23%	24%
Iron and steel (2701)	16%	13%	15%

Source: ABS Input-Output Tables 2001/02

In any event, since 2005/06 there has been a dramatic increase in steel prices in Asia. According to MEPS International[13] the price of steel (at the mill gate) in Asia has increased by 34% between December 2005 and December 2007. Of course, for the reasons described above, this does not mean that steel products purchased by ElectraNet have necessarily risen by 34% over this period – given that they also embody substantial labour and capital above and beyond that embodied in steel prices. However, in combination with rising real labour costs it does suggest that one would expect to see at least a moderate real increase in the prices of the steel products purchased by ElectraNet.

This expectation is borne out by estimates from the ABS of changes in the relevant producer price indices. Specifically, the ABS estimates that prices of "fabricated metal products" (274-276) increased by 4.0% over the year to June 2007 (relative to a 2.1% CPI increase). This index covers all transformed metal products. More specifically, the price of "structural steel fabricating" (2741) products (a sub category of fabricated metal products) is estimated to have increased by 5.0% over the same period. Clearly, this embodies a positive real increase of 2.9% but well short of the increase in the price of steel reported by MEPS.

While there is clearly a much less than fully proportional relationship, it is still relevant to consider what is expected to happen to 'mill gate' steel prices. There are currently no futures markets for steel products although we do note that the LME is exploring developing such a market. There are, however, forecasts for steel prices available from Consensus Economics. Consensus Economics mean forecast for steel prices is for moderate price increases out to March 2010 (7.7% in the US and 2.8% in Europe over that period – Consensus Economics does not publish forecasts for Asian steel prices).

[13] http://www.meps.co.uk/world-price.htm

On the basis of the above one could reasonably expect that rising real labour costs and relatively steady steel prices would be expected to result in a continuation of the 2.9% increase in real transformed/fabricated steel product prices reported by the ABS above. A conservative approach would be to assume that beyond 2007, the prices of steel products purchased by ElectraNet remain constant in real terms. This approach is summarised in the table below.

Table 16: Real escalation for steel products (year ended June)

2007	2008	2009	2010	2011	2012	2013
2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

These are our proposed escalation factors for steel products from 1 July 2006 thought to 30 June 2013, to be used in the calculation of the overall cost escalation factors for ElectraNet.

3.8. Forecast for producer's margins and wage costs

In addition to the above commodity costs (copper, steel, aluminium and crude oil) ElectraNet's suppliers use at least two further important inputs – labour and capital. Ideally, forecasts for the cost of labour (used by suppliers) and the return on capital (received by suppliers) would also be incorporated into such analysis. If ElectraNet were to factor in the impact of movements in these components of their costs, we believe that they would materially add to its estimated real escalation factors.

For example, Econtech is predicting that wages in the general economy will experience material real increases over the relevant period. These are detailed in the below table.

Table 17: Econtech real AWOTE across the Australian economy (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Wages	1.7%	1.8%	1.6%	2.4%	1.9%	1.8%	2.0%

Similarly, it is highly likely that producers' margins will increase in real terms over the period to 2013. An important factor in determining the cost of equipment is the balance between supply and demand in world equipment markets. This balance appears to have tipped significantly in the favour of producers in the last year and is forecast to continue to do so for the immediate term. This applies across the board for the suppliers of specialised electricity distribution and transmission equipment.

Relevant market commentary includes:

- In relation to ABB, maker of power transformers and switchgear:

  "The new five-year targets unveiled on Wednesday reflect the fact that the Swiss-Swedish engineer is sitting pretty in several of its markets. ***Strong demand for power products and systems is anticipated for years to come.*** *The developed world has to update ageing power grids, add capacity and*

connect new renewable sources of power to existing networks. For emerging markets to continue industrialising requires the building of a whole energy infrastructure."[14] [Emphasis added.]

"Backlog increasing further: Like for like sales growth was 19% compared to 16% expected. The order backlog rose to $22.2bn from $20.4bn at the end of Q2. The twelve months rolling book to bill ratio stays at the elevated level of 1.20x reached at the end of Q2 (1.19) and is likely going to be one of the best in the sector."[15]

- In relation to Prysmian, maker of electrical cable:

  "We continue to believe Prysmian deserves to trade in-line with the average target multiple we use for the sector of 10x 09E EV/EBITA, which gives our December 08 price target of €27. Its higher cyclicality is offset by its high exposure to ***strong Energy infrastructure markets****."*[16] [Emphasis added.]

  *"****Against a backdrop of growing investments in power transmission infrastructures by utilities*** *and an upturn in the telecoms cable market (optical fibre cables in particular), Prysmian has successfully reaped the opportunities presented by the market, to combine a rise in sales and profitability."*[17] [Emphasis added.]

- In relation to Schneider, maker of switchgear:

  "We raise our Dec 08 target price for Schneider to €102 from €100. We believe Schneider deserves to trade in line with the sector average multiple to reflect is ability to continue to restructure its portfolio of companies and products and its ***exposure to electrical infrastructure build-out****."*[18] [Emphasis added.]

  "'The initial impact of synergies and the deployment of additional efficiencies plans have driven a remarkable improvement in profitability,' in a 'booming market', it said. Sales in the full-year at the unit are seen at 3.5 bln usd and are expected to generate current EBITA of around 430 mln and EBITA of 390 mln. Looking further ahead, Schneider Electric said it revises certain targets for 2009 upwards and now expects sales at the unit of 4.3-4.5 bln usd, representing

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[14] UK Financial Times, http://www.ft.com/cms/s/1/c5badc6a-5b8b-11dc-bc97-0000779fd2ac.html

[15] JPMorgan analyst report on ABB, October 2007.

[16] JPMorgan analyst report on Prysmian, November 2007.

[17] Prysmian description of market conditions, 2 December 2007, http://www.prysmian.com/about-us/key_figures.html

[18] JPMorgan analyst report on Schneider, October 2007.

average annual organic growth of 11-13 pct. and EBITA of 650-750 mln, for a margin of 15-17 pct."[19]

- In relation to Siemens Energy Division, competitor of both ABB and Schneider:

  Revenue is expected to grow at the *"square of GDP"* and "*margins to increase despite low margin project backlog."*[20] The total market is expected to increase at 11% pa compounding from 2006 to 2010.[21]

  "PTD [Power Transmission and Distribution operations for Siemens] completed a year of continuous earnings improvement with Group profit of €225 million for the fourth quarter... Higher revenue enabled all divisions within PTD to increase their earnings, and the Group achieved its best quarterly Group profit margin of the year. ***In a strong global market for secure, high-efficiency power transmission and distribution, PTD delivered revenue of €2.283 billion, up 24% from the prior-year quarter.*** *Orders for the quarter rose 12% above the prior-year level, to €1.882 billion, including a major order in the U.S."*

  "PTD's full-year results follow the same trends as in the fourth quarter. Group profit more than doubled, to €650 million, on improving margins and higher revenue. Revenue rose 18% year-over-year, to €7.689 billion, while orders climbed 23%, to €9.896 billion. Among numerous major orders were large new contracts in the Middle East and China, taking PTD's full-year book-to-bill ratio up to 1.29."[22]

3.9. Forecasting movements in the AUD

An important determinant of future equipment prices is the future value of the Australian dollar. This is clearly true of imported equipment (such as high voltage switchgear) but is also true in relation to the purchase of domestically produced equipment that is nonetheless sold on a world market (eg, power transformers) and in relation to the input costs for domestic suppliers (eg, the AUD cost of copper for Australian manufacturers of cable).

However, it is notoriously difficult to forecast even short term movements in exchange rates let alone long-term movements. Futures markets for the AUD are relatively thin beyond a few months and these short dated futures are, in any event, driven by

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[19] Schneider advice to investors as reported in http://uk.biz.yahoo.com/28112007/323/schneider-electric-sees-fy-current-opg-margin-critical-power-ops.html

[20] Siemens, Annual Analyst Briefing: Tap the potential of Siemens, 9 November 2007, p.25, http://w1.siemens.com/en/investor/index.htm

[21] Ibid, p.9

[22] Siemens Earnings Release, Munich, 8 November 2007.

differences in risk free interest rates across countries.[23] It is not possible to use futures markets to forecast out the value of the AUD in 2013.

Some economic forecasters do provide forecasts of exchange rates going out more than one year. Econtech has forecast a depreciation of the AUD as described above. BIS Shrapnel has a more aggressive depreciation forecast (which is consistent with BIS Shrapnel's more aggressive inflation forecast).

Consensus Economics compiles the average of such forecasts with the longest dated average forecast for the AUD/USD exchange rate being 0.809. This is 8.0% lower than the exchange rate prevailing on the date (12 November 2007) that the Consensus Economics performed their survey. With the exception of the New Zealand dollar, this is the largest forecast depreciation in an Asia Pacific countries currency against the USD (with most other countries' currencies forecast to appreciate against the USD). Arguably, the RBA has indicated some expectation of AUD depreciation as explaining its willingness to build up foreign exchange while the AUD is at record levels.

> *"With the Australian dollar reaching a 23-year high against the US dollar, the Reserve Bank has continued its purchases of foreign exchange in recent months."*[24]

An expectation of depreciation may reflect the fact that the AUD is currently at record highs against the USD and that predicted future falls in commodity prices (such as the price of copper discussed above) may lead to the AUD falling back relative to other currencies.

The fact that there is a recognised link between commodity prices and the value of the AUD 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 AUD. This link between the AUD and commodity prices is accepted by both the Reserve Bank of Australia (RBA) and in academia. The RBA has recently sought to explain record high AUD 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*

[23] 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.

[24] RBA Statement on Monetary Policy, November, 2007, p.30

other major markets, as the share prices of resource companies have been particularly strong."[25]

Similarly, the link between the AUD 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'."*[26]

On this basis it is important to use a forecast for the AUD 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.

The only long term forecasts of the AUD we are aware of are provided by Econtech in their December 2007 ANSIO. For the purpose of this report we adopt these forecasts to convert USD forecasts for commodity prices to the AUD price of those commodities. We note that Econtech is predicting only small changes in the value of the AUD.

Table 18: Econtech AUD/USD exchange rate forecasts (1 July of relevant year)

2007	2008	2009	2010	2011	2012	2013
84.9	88.4	87.8	86.5	85.2	84.1	83.2

Adopting the Econtech forecasts is a conservative approach given that the AUD is currently at record highs against the USD. Adopting a more dramatic forecast depreciation in the AUD would result in a significantly higher estimate of the AUD price of equipment.

3.10. Year ended December escalation

The escalation factors reported in the sections above are for the year ended June. We understand that ElectraNet's unit costs have been derived as at June 2006. We also understand that the AER's PTRM model requires capex forecasts to be in real dollars as at end December of the relevant year (ie, mid-year terms) and that these should all be expressed in dollars of December 2007.
We report year ended December escalations in this fashion below. We first apply 18 months escalation to take June 2006 unit costs to December 2007. Each following year shows the effect of 12 months further escalation over the following year to December.

[25] RBA, August Statement on Monetary Policy http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/statement_on_monetary_0807.html

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

In order to convert the year ended June escalation factors we have applied the following transformations. June 2006 unit costs are transformed to December 2007 unit costs by calculating one and a half years escalation in the following fashion:

(1+ Year ended June 2007 escalation)*(1+Year ended June 2008 escalation)^{½}

Escalation over the year ended December 2008 has been calculated by taking the (geometric) average of year ended June 2008 and year ended June 2009 escalations – as set out below:

(1+ Year ended June 2008 escalation) ½*(1+Year ended June 2008 escalation)^{½}

Table 19 and Table 20 below summarise our estimates of the year ended June and year ended December escalators calculated using the above adjustment.

Table 19: Summary of escalation factors (year ended June)

	2007	2008	2009	2010	2011	2012	2013
Copper (nominal)	33.2%	-6.7%	-8.7%	-0.8%	-1.0%	-1.0%	-1.2%
Aluminum (nominal)	14.0%	-12.6%	-2.8%	4.7%	3.9%	3.6%	3.4%
Crude oil (nominal)	-3.9%	21.8%	19.2%	-1.0%	1.6%	0.9%	0.7%
Steel (real)	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EGW wages (real)	4.0%	2.6%	2.7%	3.7%	3.4%	2.7%	2.4%
Construction costs (real)	6.4%	2.3%	1.8%	0.7%	0.5%	0.9%	1.8%

Table 20: Summary of escalation factors (year ended December)

	18 mths to Dec 2007	12 mths to Dec 2008	2009	2010	2011	2012
Copper (nominal)	28.7%	-7.7%	-4.8%	-0.9%	-1.0%	-1.1%
Aluminum (nominal)	6.5%	-7.9%	0.9%	4.3%	3.8%	3.5%
Crude oil (nominal)	6.0%	20.5%	8.6%	0.3%	1.3%	0.8%
Steel (real)	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%
EGW wages (real)	5.4%	2.6%	3.2%	3.5%	3.0%	2.5%
Construction costs (real)	7.6%	2.1%	1.2%	0.6%	0.7%	1.3%

Table 21 below provides our year ended June (shown earlier in Table 1) and year ended December forecasts of inflation (derived in the same fashion as described above). These are derived as the average (mean) of all forecasts of the relevant year provided in Table 2 of our companion report for ElectraNet.[27] It also indicates our estimate of inflation for the 18 months ended December 2007 (derived from the year ended June figures in the same fashion). We recommend using these forecasts of

[27] CEG, A Methodology for Estimating Expected Inflation, January 2008.

inflation to calculate the real escalation factors for copper, aluminium and crude oil from the nominal escalators shown in Table 19 and Table 20 above.

Table 21: CEG inflation forecasts

	2007	2008	2009	2010	2011	2012	2013
Year ended June	2.1%	2.9%	2.7%	2.4%	2.5%	2.6%	2.6%
Year ended December	2.5%	2.8%	2.6%	2.4%	2.5%	2.6%	2.5%
18 months ended December	3.6%						

4. Critique of SKM Cost Escalators

As discussed previously, we consider that, at a high level, SKM's approach to escalating capital costs is robust. That is, we consider that it is appropriate to breakdown the capex program into different categories for which there are credible cost forecasts and to take a weighted average of these. However, we do not believe that SKM has appropriately justified its forecasts for individual cost categories.

In section 5 of its 21 February 2007 report "Escalation Factors affecting Capital Expenditure Forecasts" SKM sets out its methodology. SKM identified five market prices that it considers to be important in determining the change in capital infrastructure cost for an electricity network business. These are prices for:

1. metals (aluminium, copper and steel);
2. oil;
3. labour;
4. foreign exchange; and
5. construction.

In its report, SKM further identified producer's margins (or "supply and demand influence") as a sixth factor affecting costs.

For the first four items, SKM estimated the projected growth (or 'escalation') in prices for the years from 2003 to 2013 and has tabulated these in appendix B of its report. A description of the sources that it relied on to derive these estimates are set out in the remainder of section 5 and in appendix A of SKM's report. However, SKM does not provide any forecasts for item five above.

We address SKM's forecasts each of these separately below. However, a key theme is that it is impossible to ascertain how SKM arrived at its forecasts (and even its estimates of historical price movements). SKM details a number of sources to which it has "had regard". However, to the extent we can ascertain, the SKM forecasts are no the same as any of these. Moreover, SKM does not describe or attempt to justify any methodology it has used in transforming other expert's forecasts into its own forecasts.

4.1. Metals

At section 5.2.1.2 of its report, SKM referenced forecasts of aluminium and copper prices that it obtained from the IMF's September 2006 issue of the World Economic Outlook. The IMF projections include a probabilistic assessment of future aluminium and copper prices reflecting the variation around the expected results derived from its

statistical modelling. SKM attempts to compensate for previous metal price forecasts that underestimated actual price increases by selecting the 87.5 percentile from the IMF data. SKM states:

> *"Therefore, SKM is of the view that to use the 50 percentile forecast figures in Figure 18 and Figure 20 would be most likely too conservative and understate the values for aluminium and copper. For this reason, SKM has chosen the 87.5 percentile values for use in its forecast modelling for the period 2006 to 2013."*

Notwithstanding this statement, the escalation factors used by SKM in appendix B of its report do not match the IMF 87.5 percentile forecasts. The table below compares forecasts used by SKM and those reported by the IMF.

Table 22: Projected metals prices, 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
Aluminium prices							
IMF prices (US$/tonne)	2447	2317	2252	2242			
IMF % change from	-3.59%	-5.33%	-2.79%	-0.45%			
SKM estimated change	-4.70%	-5.44%	-3.90%	-3.23%	-0.86%	-0.22%	-0.33%
Copper prices							
IMF prices (US$/tonne)	5895	4830	4160	3942			
Change from previous year	-3.21%	-18.06%	-13.87%	-5.24%			
SKM estimated change	-6.51%	-16.78%	-13.60%	-7.06%	-4.11%	-4.68%	-5.04%

Sources: IMF World Economic Outlook September 2006; SKM. Note: Reported IMF projections are 87.5 percentile estimates

There are two striking differences between these forecasts. First, SKM is predicting faster falling prices for both aluminium and copper than the IMF (in the case of aluminium this is true in every year). Second, SKM is forecasting out further than the IMF.

Based on the information in the SKM report it is impossible to understand why this is the case. In the main body of its report SKM only discussed IMF projections in relation to copper and aluminium. In appendix A, SKM also stated that it has relied on ABARE and Wachovia Bank data in estimating its own forecasts of metals prices. However, SKM has not otherwise referenced its use of ABARE or Wachovia Bank data and has neither identified the particular publications that it has relied upon nor provided any explanation of how these data have been used in arriving at its estimates of the future movements of aluminium, copper and steel prices. It is therefore impossible to know how these might have influenced the SKM forecasts.

It is also worth noting that SKM does not state that it has had regard to traded futures prices when determining its forecasts. This is despite these prices being readily available and updatable and the IMF acknowledging, in the same document that SKM

refers to, that that futures prices tend to perform better than model based forecasts (such as those generated by the IMF's model).

> *"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."*[28]

Finally, SKM's forecasts for 2007 have been proven wrong by actual events. It is not clear that SKM has updated its forecasts to take account of this. Specifically, SKM has relied on 2006 metals price data from the IMF and forecast prices from 2007 to 2013. Actual metals price data obtained from the LME indicates that the average price of copper and aluminium over calendar year 2007 was US$7,117 per tonne and US$2,638 per tonne respectively.[29] These represent increases (and particularly large increases for copper prices) from the 2006 prices estimated by SKM, compared to the decreases predicted by SKM. For example, compared to the IMF 87.5 percentile forecast of US$5,895 above the actual price of US$7,117 represents a 21% higher level. Given that SKM was itself predicting 3% lower prices than the IMF this suggests that SKM's prices are 24% lower than actual prices.

With respect to steel, SKM does not clearly identify any sources used for its projections of steel prices.

4.2. Crude Oil

In section 5.2.2.1 of its report, SKM states that:

> *"SKM has used forecasts for possible oil prices in the period to 2013 provided by ABARE and the World Bank which have speculated that oil prices will effectively decrease."*

Again, SKM has not referred to any specific documents, publications or data that it has used in arriving at its estimates. It has also not described any methodology that it may have applied in using this information. We have therefore been unable to review SKM's estimates of the future movements in oil prices, which are shown in Table 23 below.

Table 23: Projected oil prices, 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
SKM estimated change	-6.77%	-5.93%	-5.30%	-7.39%	-4.68%	-4.19%	-4.49%

Source: SKM

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

[29] These statistics have been calculated as the simple average of each of LME's 12 official cash mean settlement monthly prices for primary aluminium and copper respectively. These prices are available free from the LME website – see http://www.lme.com/dataprices_historical.asp.

Again, we note that SKM's projections of oil prices require updating to reflect the significant increase in oil prices during 2007, rather than the decrease predicted by SKM. For example, US DoE statistics indicate that the price of Tapis Crude increased from US$65.57 per barrel in the last week of 2006 to US$97.60 per barrel in the last week of 2007.[30]

4.3. Construction

We have reviewed section 5.2.4.2 of SKM's report, where it discussed future trends relating to construction costs. SKM's discussion is limited to a discussion of construction activity and does not refer at all to the size of the effect that this might be expected to have on future prices.

We believe that SKM is correct to focus on construction costs as an important driver of costs. For this reason, we believe that SKM's methodology would be improved if a separate category of 'construction' costs were identified by ElectraNet and these costs are escalated by the forecasts in this report.

4.4. Foreign Exchange

SKM noted in appendix A.2.2 that it relied "in conjunction with other authorities" on ABARE for its foreign exchange forecasts. As has been the case with most other forecasts that SKM has relied upon, it has not identified any particular document or data series that it has referred to for this purpose. It has also not identified any methodology that it has used to amend or otherwise transform these data. We note that SKM has not identified in its report the "other authorities" that it has obtained foreign exchange forecasts from.

4.5. Summary

In summary, of the five factors that SKM identified as being important for determining the future capital costs of electricity network businesses, it has only referenced data sources for future aluminium and copper prices and its own estimates do not reflect these sources. For steel, oil, labour and foreign exchange prices, SKM has noted organisations that it obtained data from but has not specified what data it has used or how these data were used to derive its own estimates.

Key issues that impact on the robustness of SKM's forecasts include:

- SKM has not properly identified its data sources;

[30] See http://tonto.eia.doe.gov/dnav/pet/hist/wepctapisw.htm.

- SKM's forecasting methodology is not explained, nor is there any explanation as to how SKM has adjusted its source data to arrive at its forecasts; and

- The data sources used by SKM that could be identified are outdated and do not reflect the movement in prices in 2007. Further, the actual 2007 price movements were at odds with (and generally higher than the predictions of SKM.

In our opinion, SKM's estimates of future electrical plant prices should therefore be used with caution, and may not represent reasonable forecasts of these prices.