

ActewAGL - Cost Escalation Factors

ACTEWAGL

Commodity Price Forecasting

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Appendix A. Institutions that use composite cost indices for material decisions

Executive Summary

ActewAGL has engaged Jacobs to assist in preparing its response to Australian Energy Regulator's (AER)'s position with respect to Commodity Price Forecasting as set out in its Draft Determination. This report provides context to Jacobs' methodology for developing real, composite, cost escalators for network assets which had previously gained acceptance from the AER in electricity revenue proposals and determinations. This report also provides direct responses to statements (extracts) from AER's draft decision of ActewAGL's Revenue proposal 2015-16 to 2018-19.

In previous decisions for electricity network service providers, the AER has allowed and through its decisions set a precedent for costs related to capital and operational expenditure provisions to be escalated in real terms using relevant weighted baskets of cost indices. Prior to this the Australian Consumer Price Index (CPI) was used by the AER to represent cost escalation in relation to network material costs. AER's change in approach to use of CPI over the last 5-10 years and adoption of use of weighted cost reflective indices better reflected the cost escalations typically faced by Network businesses, enabled improved forecasting technique for expenditure forecasting.

The method which up until the issue of the most recent AER draft determination was accepted and used by the AER involves the modelling of the change in equipment prices through combining independent forecast movements in the real price of input commodities, with weightings for relative contribution of each commodity to the final equipment cost. This in turn generates real cost forecasts for the regulatory control period under review. AER's recent draft decision is seen as a departure in approach to this robust method for forecasting escalation factors specifically developed to capital and operating costs in question.

The AER's decision to revert to the use of CPI, an index based on a predicted forecast change in a basket of consumer goods, in place of more robust commodity prices is considered a retrograde step in terms of economic regulation. That said, if the AER's comment relates solely to use of exchange rate forecasts in developing utility cost indexation forecasts, then Jacobs concurs that exchange rate fluctuations are more difficult to project over the medium term than commodity price movements. However, we consider the difficulties in forecasting exchange rates in itself is not a sufficient reason to reject the use of commodity price forecasts. We consider our analysis on the merits of using commodity price forecasts outweigh the inaccuracies of exchange rate movements -- especially in a context where the AER's proposed alternative is to use the CPI. We consider that, given the successful application of commodity price forecasting over several years by both the AER and other economic regulators in Australia and in other jurisdictions, there is a requirement on the AER to demonstrate that CPI is a more robust alternative to the methodology proposed by ActewAGL in order for ActewAGL to accept that price escalation based on CPI is adequate for its business.

Robust forecasts are generally developed through applying experience and research, whilst they may not be precise; the outturn is usually within the envelope forecast. Taken to the extreme, the AER's position would suggest there is no merit in attempting to forecast commodity prices because no forecast can be accurate. If this position is to be adopted, then the AER is effectively saying there is no merit in planning, since planning must be based on both historical and forecast data. Indeed, it would also suggest that it is not appropriate to apply CPI forecasts because, by default, CPI forecasts have potential for inaccuracies.

As such, the AER's statement, that because of potential errors, there is no value in applying cost forecasts (other than CPI) can be deemed to be a *non sequitur*: using the premise that there are potential inaccuracies with commodity forecasts to conclude that escalation should not be applied is inappropriate. Rather, we consider it more appropriate to decide whether or not to apply commodity escalation on the basis of whether the relevant projections are more often right (in terms of being in the vicinity of percentage changes in actual price movements over time) than wrong. Further, we note future CPI assumptions are also forecasts, but based on a basket of goods that is not representative of electricity DNSPs' cost bases.

Jacobs firmly considers the AER's indicated position on the lack of veracity of use of composite escalators based on weighted indices appropriate to specific capital cost building blocks and specific operational cost expenditures, drawing on price component forecasts from reputable and established bodies such as the ABS, BIS Shrapnel (and other metals market forecasting houses) is at odds with general thinking in economic regulation and economic modelling in general applied in developed (and developing) nations.

Jacobs has developed, applied and reviewed (e.g. through established back-casting methods) its method for producing such composite indices for over a decade. These methods have previously been accepted by the AER, are applied and accepted as being robust by other regulators, utilities throughout Australia and in other jurisdictions, international banks, and other investors.

The current approach being proposed by the AER fails to adequately address market conditions in deriving forecasts, and is inconsistent with its previous decisions. We do not consider that the AER has contemplated (or at least expressed) adequate reasons for departure from previously accepted methodologies. Jacobs firmly believes, in line with other reputable forecasters in the private and public sectors, that using a composite basket of weighted indices, appropriate and specific to the cost item in question, to forecast price movements of that cost item is both robust and more reliable than use of a single index based on projections of price movements in a non-representative basket of consumer goods. We also consider the use of composite indices that are validated through back-casting and whose weightings are periodically adjusted for variances in long term escalation of the constituent indices is less prone to bias than applying a forecast single non-specific escalator such as movement in forecast CPI.

As the Regulator the AER should not accept unsubstantiated statements, comments or views, nor should the AER give unsubstantiated statements, comments and views. We consider that the AER has not substantiated their departure from the previous forecasting approach.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to provide ActewAGL with a report on Commodity Price Forecasts as input to their 2014-19 Regulatory Proposal in accordance with the scope of services set out in the contract between Jacobs and ActewAGL. That scope of services is described in email exchanges dated 29 to 31 December 2014 and 5 to 6 January 2015 between Jacobs and ActewAGL and was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs's Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party

1. Introduction

ActewAGL engaged Jacobs to prepare a report on Commodity Price Forecasting in response to the Australian Energy Regulator's (AER) Draft Determination position on real cost escalation. The AER has stated in its Draft Determination that it rejects the use of real cost escalation on the basis of potential forecasting inaccuracies, a potential bias in the weighting of commodities, and general, but unsubstantiated questioning of the robustness of the forecasting approach.

In response it is worth noting that regulatory proposals are required to be developed according to a building block methodology, requiring annual predictions of forecast capital and operational expenditure. An integral aspect of developing suitable forecasts of annual capital and operational expenditure is the production of a set of reasonable assumptions with respect to the rate of annual material (on a building block basis) and labour cost escalation.

The approach of developing and using cost escalation factors based on commodity price indices to develop real material cost forecasts gained acceptance by the AER through cost escalation factors developed for a number of transmission and distribution entities since 2006 including Power and Water Corporation (NT), SP AusNet, Aurora Energy and Powerlink. The demonstration of the validity of this technique during the commodity boom, when copper and steel prices (primary cost components of transformers, distribution cable etc. escalated at a rate significantly higher than CPI, and subsequently, post commodity boom, have fallen from their peak.

In its 2009 final decision for the NSW Electricity Distribution Businesses, the AER stated:

In light of these external factors, it was considered that cost escalation at CPI no longer reasonably reflected a realistic expectation of the movement in some of the equipment and labour costs faced by electricity network service providers (NSPs). It was also communicated by the AER at the time of allowing real cost escalations that the regime should systematically allow for real cost decreases. This was to allow end users to receive the benefit of real cost reductions as well as facing the cost of real increases.¹

Consistent with the above statement, the AER continued to have regard for material cost escalation in its final decision of the Victorian Electricity Distribution Network Service Providers for the 2011 - 2015 determination in October 2010. Specifically,

Materials cost escalation - Consistent with appendix K, the AER's final decision is to apply the steel escalators to the unit costs of public lighting poles and brackets, 89 weighted by 45 per cent to reflect only the purchase price for steel.²

In its 2010 determination on the South Australian Electricity Distribution Business, the AER's recommendation for materials cost escalation included the use of London Metals Exchange (LME) forward contract prices for 63 months and 123 months for aluminium and copper.³

The AER's position and statements therefore are at odds with its previous position (and the position adopted by other economic regulators) and is therefore somewhat of a surprise to ActewAGL. Particularly as the AER is on record as having accepted and validated the superiority of the material and labour cost escalation approach over CPI and that it has applied such methods for cost escalation in past regulatory periods.

Techniques using a weighted basket of indices to develop escalation indices specific to DNSP and TNSP utility capital component building blocks weighted indices are widely applied throughout Australia and internationally (e.g. UK). Cost escalation factor forecasts have also been used in recent years by the Independent Market Operator in WA to determine the Maximum Reserve Capacity Price and the Queensland Competition Authority (QCA) has been applying cost escalation factors for price monitoring, benchmarking of capital and operating costs, and in undertaking expenditure prudence and efficiency reviews of the south east Queensland water entities. Similarly, the Queensland government has recently applied such weighted indices to determine a 20

¹ AER, NSW DNSP Final Decision 2009, p. 478. <http://www.aer.gov.au/content/index.phtml/itemId/728076>

² AER Final decision - Victorian electricity distribution network service providers Distribution determination 2011-2015, October 2010

³ AER Final decision - South Australian Distribution Determination 2010-11 to 2014-1, May 2010

year capex programme for SunWater's irrigation assets as part of an asset transaction process. Jacobs is also aware that international bodies such as the IMF and World Bank utilise commodity price escalators and projections in their economic analysis.

In developing commodity price cost escalation factors, Jacobs follows an approach that has been applied and accepted by regulators (including the AER), governments, financial institutions in Australia and in other jurisdictions. The method has been applied extensively for electricity transmission and distribution assets for close to a decade. Such techniques have also been applied by Jacobs and others (consultants, regulators, governments) for water assets, generation plant, rail infrastructure, port infrastructure, wind generation, and recently on behalf of the Indonesian government when forecasting the cost to develop geothermal projects, representing US\$bn of investment and set future geothermal feed in tariffs, representing tens of US\$bn of future price support mechanisms. Appendix A provides a list of known institutions that use composite cost indices for material decisions.

Actively researching the cost of infrastructure works, particularly in the electricity industry, for a number of years, Jacobs has developed a material cost escalation modelling process which captures the impact of forecast movements of specific input cost drivers on future electricity infrastructure pricing, providing robust material cost escalation rates.

Labour cost escalation factors are based on information that is available in the public domain and current Enterprise Bargaining Agreements that may be in place, recent AER decisions for electricity utilities, and any other publically available labour factors that can be identified. Consideration of influencing factors such as the impact of carbon pricing mechanisms introduced under the Australian Government's Clean Energy Future initiative are also included.

By default, no forecast can be guaranteed. However, forecasting is an essential aspect of planning and budgeting for the future. Whilst no forecast is precise it is made robust by basing it on an understanding of influencing factors, experience and research. As mentioned, during the recent commodity boom Jacobs was able to successfully demonstrate that DNSP capital costs are strongly linked to commodity prices of steel, copper and aluminium. This linkage has not changed and supports the development of a robust forecast of real material costs.

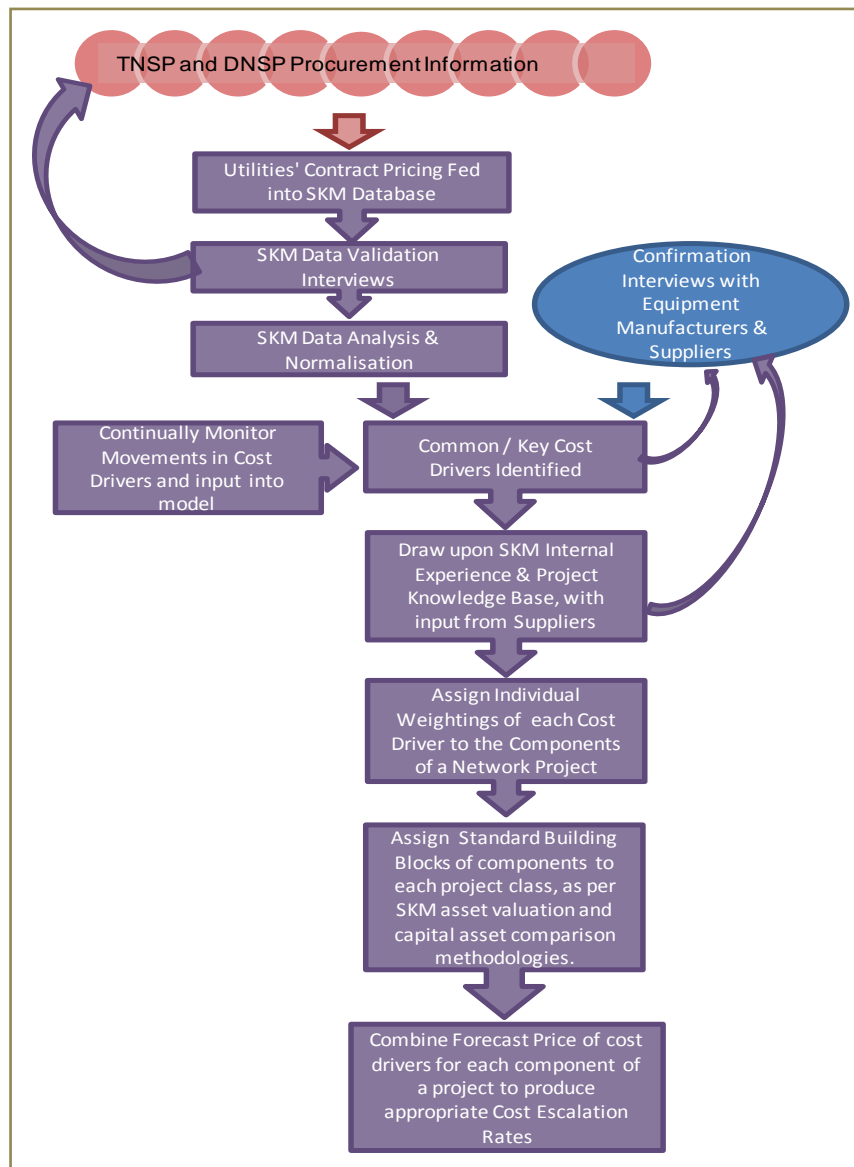
This report demonstrates the value of commodity price forecasts to develop future capital cost escalators in line with the AER's building block approach to capex modelling. It describes the process Jacobs follows in developing cost escalators, including the key cost drivers, particularly for the electricity industry, the weighting and forecast movements of the input cost drivers, and the capturing of influencing factors such as exchange rate and carbon price impacts. It further demonstrates that application of weighted indices, based on experience and research, reduces bias in forecasting as the index is developed specifically for the building block in question and, as such, removes bias that would otherwise be introduced by use of a single, non-building block component escalator such as the consumer price index (CPI).

The report challenges, in the strongest terms, the AER's assertion: that there is no value in ActewAGL using commodity price forecasts to develop capital component building block specific weighted indices, applying commodity price forecast to form forward looking capital cost escalators. In short, Jacobs is firmly of the view that the use of weighted indices, based on established commodity price escalation forecasting methods that are applied internationally, that are developed specifically for the utility capital component building block in question, is, in the medium to long term, and on the whole, less prone to bias and results in capital cost escalation projections that are more likely to represent actual future cost escalations than would be the case if a single non-representative and non-specific forecast escalator such as CPI is used.

2. Development of Commodity price cost escalators

Jacobs' method for developing real cost escalators for network assets, and which has gained acceptance from the AER in electricity revenue proposals and determinations, is presented in Figure 2.1.

Figure 2.1 : Jacobs Cost Escalation Model



2.1 Key Cost Drivers

The key material cost drivers can generally be classified under the cost categories of commodities (steel, copper, aluminium), labour and foreign exchange.

In terms of commodities Jacobs has been able to successfully demonstrate, through use of back casting employing its building block indices and through use of monitoring and comparing actual costs at a point in time, with Jacobs previously forecast costs, that DNSP material costs are strongly linked to the commodity prices of steel, copper and aluminium. The historical and forecast movements of these commodity prices, supported by other related commodity prices such as iron ore and oil are used to populate Jacobs' model.

Price data are extracted from a number of sources to provide robust input on commodity, labour and foreign exchange price movements and are listed in Table 2.1. These cost drivers are updated quarterly or as market data is publicly available. The escalation factors developed are based on the most up-to-date information available to Jacobs at the time of compilation.

Table 2.1 : Underlying cost drivers

Cost Drivers	Used For	Source
Aluminium, copper, iron ore, oil, steel	Primary equipment, protection & control, structure, conductor, miscellaneous materials	ABARE, International Monetary Fund, LME, World Bank, Wachovia, Brent, CRUspi, Consensus Economic, Energy & Metal Monitor
CPI, general labour, utility labour, civil works	Installation, erection, commissioning, foundation, civil, structure, fittings, labour, insulators	ABS, Australian Treasury, Reserve Bank of Australia, Construction Forecasting Council, Econtech labour cost forecasts, Deloitte Access Economics
Site labour	Installation, erection, commissioning, survey, clearing & access	Econtech labour cost forecasts, Deloitte Access Economics
Foreign exchange (US\$ to AU\$ or other)	Monetary denomination conversion (in forecast), procurement	Reserve Bank of Australia, Australian Treasury, forecast subscribed from Reuters, HSBC and NAB

2.2 Weighting the Input Cost Drivers

Developing the specific weighting by which each of the input cost drivers are considered to influence the total cost of the various asset categories is achieved through an application of information that exists within the Jacobs model as well as from client input and input from major supplies – such as transformer manufacturers.

An understanding of the appropriate application of weighting for each cost driver to each item of plant and equipment has been developed by Jacobs over time for the electricity and water industries. This understanding draws on the results of a series of strategic surveys⁴ of Australian electricity utility plant and equipment cost carried out by Jacobs, in-depth discussion with the manufacturers and suppliers, a detailed understanding of rise and fall clauses in client procurement contracts, and advice from Jacobs' team of professional estimators, economists and engineers. The weightings applied are periodically adjusted to take account of any divergence in the cost escalation of constituent components of utility assets over time. This is an important step in ensuring that no bias is introduced into the weighting process in the long term.

Network asset categories cost are disaggregated into the respective underlying commodity component cost items and the escalation rate of each individual cost driver is applied proportionally, to understand the effect of escalation of each cost driver to the overall asset costs.

Over the last ten years Jacobs has undertaken a substantial number of assignments across a number of DNSPs and TNSPs and other utilities (water, rail etc.) developing these composite indices. Drawing on the data obtained during these assignments and referencing market price survey data provided by the various Australian DNSPs Jacobs has been able to refine the commodity weightings to develop material cost escalators that minimise, if not negate, bias, compared to other techniques.

2.3 Forecast Movements of the Key Cost Drivers

When developing forecasts for the future annual market price position of the various materials key cost drivers, Jacobs applies the methodology of interpolation between the spot market prices, all available forward contract prices, and credible forecast for future pricing developed by reputable sources specialising in the analysis and forecasting of the cost driver in question.

⁴ During the 2006 and 2010 Multi-Utility Procurement Studies, nine (9) and eight (8) Australian transmission and distribution study participants respectively provided JACOBS with confidential price and contract information for the purchase of common items of plant, equipment and materials.

The emphasis within this process is to include as much recent and credible information as is available to Jacobs at the time of developing the forecast cost driver movements.

2.4 Influence of Exchange Rates

The Jacobs methodology for developing cost escalation rates also accounts for the effect on the market price of any cost driver influencing the costs incurred by an Australian utility. This is achieved by transferring the historic and future prices into Australian Dollar terms from whichever foreign currency they have been quoted in on the markets.

As many of the forecast prices for cost drivers appear on world market quoted in a foreign currency (typically US\$) the Australian Dollar's relative position to the currency, at the time of interest, in which the product is traded will, in itself, influence the cost of finished goods to an Australian utility.

2.5 General notes

- The model is very much Australia focussed in terms of foreign exchange indicators, market drivers, and cost drivers.
- The cost escalation model is based on material and manufacturing, and does not include labour cost modelling (outside of manufacturing).

3. Commodity Price Indices

ActewAGL's annual revenue requirements are shaped by, among other things, the business' forecast capital and operating expenditures in each year. Capital expenditure includes the costs of building material (e.g. steel, copper, aluminium, and to a lesser degree, concrete) to renew or augment the transmission/distribution network. Operating expenditure includes allowances for maintenance, which also cover metal costs for repairs.

Forecasts of commodity prices inform the profile of capital and operating expenditures over the five-year regulatory period. Commodity prices can change markedly in such times. For example, the unit price of nickel, a key input for producing steel, has fluctuated between USD 6-13/lb over the last five years as demonstrated in Figure 3.1.

Figure 3.1 : Nickel Price movements (INFOMINE, 2014)⁵.



Commodity-price forecasting companies sometimes consider it appropriate to use historical data to inform their expectations on future prices. In this context, the AER's position that no real cost escalation should be applied because of inaccurate commodity-price forecasts suggests historical data should be ignored – we do not share that view.

Accounting for commodity-price variability is important for ActewAGL's determination of its annual revenue requirements and associated tariffs. The impact on revenue requirements will be heightened where metal costs form a large share of capital or operating expenditure. The need to accurately capture the effects of cost escalation (or changes) is pronounced in those instances.

While the AER says that the forecasting commodity prices is marked by 'potential inaccuracy', we note that the 'potential for inaccuracy' is true of any forecasting technique -- including the forecasting of CPI. As such we do not consider that it is logical to discount a previously established an accepted method on 'potential inaccuracies'. Such a position should only logically be adopted if it has been demonstrated by the AER that CPI

⁵ Source: <http://www.infomine.com/investment/metal-prices/nickel/5-year/>

better reflected utility cost price movements in the long term than a weighted basket of applicable indices. Indeed, we consider that one way to address or ameliorate inaccuracies in any particular forecast index is through using composite indices (which are typically a mix of different commodity, labour and other costs). Composite indices can compensate for individual commodity spot fluctuations by means of a portfolio averaging effect.

For instance, we note Aurizon Network (the central Queensland coal network service provider) has proposed to use a Maintenance Cost Index (MCI) to forecast⁶ its maintenance expenditure for its 2013/14 to 2016/17 regulatory period. The proposed MCI is made up of five components (i.e. consumables, labour, fuel, accommodation, and other). The consumables category has a 30% share in the MCI. One index relevant for measuring the cost of consumables is the Australian Bureau of Statistics' (ABS') fabricated metal producer price index⁷, which would be closely linked to metal commodity prices. As metal prices only influence part of the MCI, the other MCI components can potentially overcome the effect of 'inaccurate' commodity-price forecasts. This argument holds strongest where the non-commodity-related MCI components are believed to be forecast with a high degree of accuracy.

The Queensland Competition Authority's (QCA) recent draft decision accepted Aurizon Network's proposed MCI approach in principle, with proposed adjustments to what costs the MCI should cover, and how costs should be escalated⁸. This shows that other Australian regulators support the use of composite indices to forecast parts of a regulated entity's operating expenditure⁹.

In summary, we consider there is merit in using commodity-price forecasts to inform ActewAGL's capital/operating cost profiles because:

- it can lead to more accurate annual revenue requirements being determined
- any 'potential inaccuracy' in the forecasts can be addressed or ameliorated via composite indices
- other regulators have supported the use of composite indices to forecast a regulated entity's expenditure.

The AER commented as follows on page 6-151 of their draft Determination:

'The consultants have adopted a high level approach hypothesising a relationship between these commodity inputs and the physical assets purchased by ActewAGL. Neither the consultants' reports nor ActewAGL have successfully attempted to explain or quantify this relationship, particularly in respect to movements in the prices between the commodity inputs and the physical assets and the derivation of commodity input weightings for each asset class.'

As explained and described in the earlier sections of this report, Jacobs, in developing commodity price cost escalation factors, follows an approach that has been accepted by the AER in past revenue determinations and is applied and accepted by regulators, governments, financial institutions in Australia and in other jurisdictions.

Jacobs recognises, through its work in undertaking several power network utility cost surveys over some fifteen years that there are a number of specific influences that may affect the procurement of assets for an electricity utility such as: the performance of suppliers; outsourcing and contracting strategies used by utilities; tender processes, pre-existing purchasing agreements, service agreements, scales of economy due to the size of the utility, supply/demand dynamics (e.g. during and immediately after severe weather events), or the nature of a capital expenditure program, or revised asset specifications due to amended asset management practices, global supply/demand dynamics of major cost input elements such as steel, copper, aluminium and, more

⁶ BIS Shrapnel produced the forecasts for Aurizon Network.

⁷ Source: ABS Catalogue No. 6427.0 Producer Price Indices, Australia, Table 12. Output of the Manufacturing industries, division, subdivision, group and class index numbers, Fabricated Metal Product

⁸ Manufacturing, Series ID A2305805K, Page 122 of QCA's draft decision (<http://www.qca.org.au/getattachment/9e1f80ed-7c00-446d-8043-bf6a3c1d8f22/QCA-Draft-decision.aspx>)

⁹ Jacobs advised the QCA on the reasonableness of Aurizon Network's proposed MCI: <http://www.qca.org.au/getattachment/d32b79e1-c50f-4e17-a3d6-406eae22ff90/Jacobs-Review-of-AN-s-MCI.aspx>

locally, labour. Each of these influences will be particular to a utility, and may vary between regulatory periods depending upon the utility's operational focus and general market conditions.

To demonstrate a link between movements in commodity prices and indicative movements in asset costs, Jacobs has undertaken some back-casting of material cost escalation factors for other electricity distribution utilities, using known cost indices for aluminium, copper and steel for the past 5 years, together with a review of prevailing market conditions both in Australia and globally. As would be anticipated, these back-casted material cost escalation factors reflected the market cycles; however, these "actual" cost escalation factors do not consider any external market or utility-specific influences that may have impacted on actual asset prices, and are therefore not intended to represent actual price movements experienced by an electricity distribution utility during the past 5 years. For example, equipment manufacturers during this period would have had to consider whether changes in raw material costs were one-off events or more permanent changes, and suppliers would have had to evaluate the extent to which any fluctuations in equipment costs were passed on to their customers; in this case, the electricity utilities.

Jacobs has maintained a consistent position with that previously espoused by the AER that the cost escalation model is considered commercial-in-confidence and that we are therefore not at liberty to share the actual weightings of the commodity inputs we apply with the AER.

4. Jacobs Experience

Jacobs (previously SKM) has developed extensive experience over the last ten years, both at the transmission and distribution level, in analysing the impact of movements in commodity prices and labour on the costs of network assets. The experience was gained through undertaking numerous assignments for both Australian based and overseas Utilities, and the AER.

The relevant assignments are listed below and demonstrates the significant amount of research and analysis that has gone into developing and maintaining Jacobs' modelling process and capturing the likely impact of input cost drivers on future electricity infrastructure

TransGrid - 2013

Jacobs (then SKM) was engaged to development both real and nominal material cost escalation factors for various elementary commodities that forms TransGrid's capital asset base for the period 2014-19, including consideration of the carbon pricing mechanism. In addition to the usual USD/AUD foreign exchange rate, EUR/AUD and JPY/AUD were also forecasted.

Power and Water Corporation - 2013

Jacobs (then SKM) was engaged to development real and nominal material cost escalation factors for nominated asset categories as defined in the Regulatory Information Notice issued by the Utilities Commission for the period 2014-19, including consideration of the carbon pricing mechanism. In addition, a cost escalation factor was generated for operational expenditure.

SP AusNet - 2012

Jacobs (then SKM) was engaged to forecast real material cost escalation indices for commodities, construction costs and labour for the period 2014 - 2020 to support the transmission regulatory submission, including consideration of the effect of the recently introduced carbon pricing mechanism.

Independent Market Operator (IMO), WA – annually from 2007 to 2012

Jacobs (then SKM) was engaged to developed a range of escalation indices to forecast generation and transmission capex and fixed opex components of the Maximum Reserve Capacity Price in WA for annual price determinations.

Powerlink - 2011/12

Jacobs (then SKM) was engaged to generate material escalation factors for the period between financial year 2011 and financial year 2017 used to support Powerlink Queensland's proposal for the 2012/13 - 2016/17 regulatory control period, with the model updated for revised regulatory submission.

Aurora Energy - 2011/12

Jacobs (then SKM) was engaged to development cost escalation rates for Aurora's submission to the AER, including an update of the model for revised regulatory submission.

Joint VIC DNSPs (JEN, UED, SP AusNet, CP & PC) - 2010

Jacobs (then SKM) provided updates of cost escalation rates modelled for the Victorian Distribution companies. These updated rates were included in revised submissions to the AER.

Country Energy Gas Networks – 2010

Jacobs (then SKM) was engaged to provide a Due Diligence of the Country Energy regional Gas network in Wagga Wagga (NSW). A section of this study involved reviewing the modelling undertaken to develop cost escalation rates for plant and equipment within the Gas industry.

Ergon Energy – 2010

Jacobs (then SKM) was engaged to provide an update of cost escalation rates developed the previous year. The effect of rapid movements in a number of underlying cost drivers was required to be modelled in order to provide a more recent set of outputs.

ENERGEX – 2010

Jacobs (then SKM) was engaged to provide a set of suitable cost escalation rates for ENERGEX's capex and opex programs of work. ENERGEX had received an unsatisfactory response from the AER in relation to the cost escalation rate modelling proposed by its consultants during its initial regulatory submission, and engaged Jacobs to provide modelling for its revised submission. ***The Jacobs rates were received favourably by the AER.***

CitiPower / PowerCor - 2009

In a separate engagement, Jacobs (then SKM) developed materials cost escalation rates for the CP / PAL opex programs.

Joint VIC DNSPs (JEN, UED, SP AusNet, CP & PC) - 2009

Jacobs (then SKM) was engaged by the Joint Victorian Distribution Network Service Providers to provide capex escalation rates for their regulatory submissions. The outputs were tailored to individual asset categories nominated by each of the participants.

ETSA Utilities – 2009(a)

Jacobs (then SKM) was engaged to provide an independent review of the cost escalation rates within the South Australian DNSP's Opex models. This project has been initiated as part of ETSA Utilities' preparation for the submission of its revenue proposal to the AER.

TRANSCO (Philippines) – 2009

Jacobs (then SKM) was engaged to apply its cost escalation modelling experience to escalate TransCo's internal asset unit rates to current pricing levels

ETSA Utilities – 2009(b)

In a separate assignment, Jacobs (then SKM) was engaged to provide inputs to the development of materials cost escalation rates within the South Australian DNSP's capex model, as part of ETSA Utilities' preparation for the submission of its revenue proposal to the AER.

Transend Networks – 2009

Jacobs (then SKM) was engaged to investigate the long-term average transmission network materials and labour cost escalation rates in Tasmania.

ElectraNet – 2009

Jacobs (then SKM) was engaged to apply its cost escalation modelling experience to escalate ElectraNet's internal opex model unit rates to current pricing levels.

Ergon Energy – 2009

Jacobs (then SKM) was engaged to provide an update of cost escalation rates developed the previous year. The effect of rapid movements in a number of underlying cost drivers was required to be modelled in order to provide a more recent set of outputs. The resulting cost escalation rates were to be included as part of Ergon Energy's official revenue proposal to the AER.

Ergon Energy – 2008

Jacobs (then SKM) was engaged to map key cost drivers within its model, to internal opex cost estimation unit rates within Ergon Energy models.

Ergon Energy – 2008

Jacobs (then SKM) undertook Stage 2 of the Ergon assignment relating to Electricity Industry Labour, Commodity and Asset Price & Cost Indices. During this period the Jacobs cost escalation model underwent extensive enhancements.

Transend – 2008

Jacobs (then SKM) was engaged to provide cost escalation factors in order to promote Transend's most recent asset valuation which was based in June 2006 AUD\$ terms, to June 2008 amounts as part of the TNSP's regulatory proposal. The established Jacobs Capex Cost Escalation Model was again utilised for this assignment.

TransGrid – 2008

Jacobs (then SKM) reviewed TransGrid's Capex model, corrected errors in their methodology, and provided an independent validation for use during TransGrid's revenue proposal to the AER.

ActewAGL - 2008

Jacobs (then SKM) was engaged to provide an independent assessment of the escalation factors that apply to Actew AGL's capital works programmes and projects going forward over the period 2007/8 (the base year) to 2013/14 (the final year of the next regulatory period). This was included in Actew AGL's submission to the AER.

Ergon – 2008

Jacobs (then SKM) undertook Stage 1 of the Ergon assignment relating to Electricity Industry Labour, Commodity and Asset Price & Cost Indices.

AER – 2007/2008

In July 2007, Jacobs (then SKM) was engaged by the Australian Energy Regulator (AER) to review the regulatory revenue proposal submitted by ElectraNet for their next regulatory reset period 2008 to 2013.

During this assignment the Jacobs' model was both updated and enhanced through consideration of elements presented by ElectraNet. ***The AER again accepted the Jacobs view to cost escalation index design.***

SP AusNet - 2007

Jacobs (then SKM) was engaged by SP AusNet to analyse the likely drivers of cost escalation on capital expenditure forecasts over the remaining two years of their current determination (2006/07 and 2007/08), and for the next regulatory reset period (2008/09 to 2012/13, commencing 1 April 2008).

The SP AusNet assignment set the precedent for above CPI escalation of capex costs. ***The AER accepted the Jacobs methodology noting that it produced robust figures for the purpose intended.***

ENERGEX - 2007

Jacobs (then SKM) was engaged by ENERGEX to provide forward estimates of budget figures relating to the ENERGEX Program of Works.

ENERGEX - 2005

Jacobs (then SKM) conducted a multi-utility study of equipment procurement strategies and prices, which examined current market and contract costs for a variety of assets including power transformers, circuit breakers, current and voltage transformers and conductor.

5. AER's Position and Comments

Jacobs' response to the AER's summarised statements is set out below:

- **AER comments on page 6-114 of their Draft Determination that:**

'Recent reviews of commodity price movement show mixed results for commodity price forecasts based on futures prices. Further, nominal exchange rates are in general extremely difficult to forecast and based on the economic literature of a review of exchange rate forecast models, a "no change" forecasting approach may be preferable.'

Based on our review of the AER's draft decision, it appears the above statement relates to changes in either commodity prices or nominal exchange rates (or both).

We consider the statement, in so far as it relates to commodity price escalation forecasts, inaccurate. Commodity price movements, including metal prices, have been forecast for many decades by the LME. The exchange's years of experience suggest a high level of credibility and certainty in developing these forecasts.

BIS Shrapnel¹⁰ accurately predicted the current drop in commodity prices including for steel, aluminium, copper which is most relevant to DNSPs. Its current forecast is that there will be a recovery in these commodity prices from 2016/17 onwards. This aligns with CEG's forecasts, which draw on a range of commodity price forecasts to produce a mean forecast within an envelope forecast. Jacobs' market intelligence from its mining-industry partners corresponds with these findings.

Indeed, as country growth forecasts are well known and reasonably accurate, and as available capacity to supply commodities (and the change in that capacity over a given period, given the time taken to bring on new capacity) is relatively well known, then the demand-supply balance is well known. This, coupled with a good understanding of commodity price elasticity, allows reasonably accurate forecasts of commodity prices to be made.

By default, no forecast can be guaranteed but it is an essential aspect of planning and budgeting for future activities. Robust forecasts are generally developed through applying experience and research, as the LME's and other commodity exchange forecasts are. Whilst they may not be precise, the outturn is usually within the envelope forecast.

Taken to the extreme, the AER's position would suggest there is no merit in attempting to forecast commodity prices because no forecast can be accurate. If this position is to be adopted, then the AER is effectively saying there is no merit in planning, since planning must be based on both historical and forecast data.

If, however, the AER's comment relates primarily to exchange rate forecasts, then Jacobs concurs that exchange rate fluctuations are more difficult to project over the medium term than commodity price movements. That said, we consider the difficulties in forecasting exchange rates, in itself is not a sufficient reason to reject the use of commodity price forecasts. We consider our analysis on the merits of using commodity price forecasts outweigh the inaccuracies of exchange rate movements -- especially in a context where the AER's proposed alternative is to use the CPI, our critique for which is set out below.

- **AER comments on page 6-114 of their Draft Determination that:**

'It is our view that where we are not satisfied that a forecast of real cost escalation for materials is robust, and we cannot determine a robust alternative forecast, then real cost escalation should not be applied in determining a service provider's required capital expenditure.'

Jacobs (previously SKM) has produced, and continues to produce, commodity, insurance, wage, electricity forecasts that have been and are adopted by:

- utilities (electricity, water, rail)
- regulators (we note the AER adopted MMA's forecasts in the past), QCA and others

¹⁰ http://www.bis.com.au/reports/economic_outlook_r.html

- the State and Australian Governments.

Most recently, we advised the QCA on forecast costs regarding the regulation of water (i.e. Gladstone Area Water Board and SEQ water utilities including SunWater) and rail companies (i.e. Aurizon Network). We also advised the Queensland Government on forecast costs related to proposed asset transactions.

During the commodity boom, Jacobs successfully demonstrated that DNSPs' capital costs were (and are) strongly linked to commodity prices of steel, copper and aluminium. We do not consider that this linkage has changed, nor do we consider it logical to challenge an established commodity forecasting industry as being of no value.

Many industries, banks, governments utilise such forecasts for planning and budgeting purposes. We also note the International Monetary Fund (IMF) and World Bank draw on commodity price forecasting. It seems unusual the AER would take such a dismissive position on such forecasts, without substantiation or providing a reasonable alternative.

- **The AER comments on page 6-115 of the their Draft Determination that:**

'We accept that there is uncertainty in estimating real cost changes but we consider the degree of the potential inaccuracy of commodities forecasts is such that there should be no escalation for the price of input materials used by ActewAGL to provide network services.'

We note the AER does not substantiate the statement, nor indicate the level of inaccuracy to which it refers. Hence, the statement lacks definition. Whilst we agree commodity forecasts, by definition, cannot always be accurate, they can be valuable for planning purposes. If this were not the case, then the commodity forecasting industry would not still be in existence from its foundation over a century ago.

It would be helpful if the AER substantiated its statement with analysis and supporting data. We seek to clarify whether the AER is asserting that there is only an even chance the forecast is correct, or at least of the right order of magnitude, or of the correct sign (i.e. positive or negative growth). Substantiating a decision to not adopt forecasts (which are often considered valuable for network planning activities) requires the AER to make that clarification.

The AER's statement can be deemed to be a non sequitur: using the premise that there are potential inaccuracies with commodity forecasts to conclude that escalation should not be applied is inappropriate. Rather, we consider it more appropriate to decide whether to apply commodity escalation on the basis of whether the relevant projections are more often right (in terms of being in the vicinity of percentage changes in the CPI) than wrong.

Indeed, we note future CPI assumptions are also forecasts, but based on a basket of goods that is not representative of electricity DNSPs' cost bases.

- **The AER comments on page 6-115 of the their Draft Determination that:**

'In previous AER decisions, namely our Final Decisions for Envestra's Queensland and South Australian networks, we took a similar approach. This was on the basis that as all of Envestra's real costs are escalated annually by CPI under its tariff variation mechanism, CPI must inform the AER's underlying assumptions about Envestra's overall input costs. Consistent with this, we applied zero real cost escalation and by default Envestra's input costs were escalated by CPI in the absence of a viable and robust alternative. Likewise, for ActewAGL, we consider that in the absence of a well-founded materials cost escalation forecast, escalating real costs annually by the CPI is the better alternative that will contribute to a total forecast capex that reasonably reflects the capex criteria. The CPI can be used to account for the cost items for equipment whose price trend cannot be conclusively explained by the movement of commodities prices. This approach is consistent with the revenue and pricing principles of the NEL which provide that a regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing direct control network services.'

We consider that the AER has failed to substantiate the direct link between material cost escalation factors for network and system assets, and the principle of applying CPI to tariff variation or revenue and pricing

mechanisms based on overall input cost movements. There are a range of costs that can contribute to the overall expenditure for a utility (of which network operating and capital expenditure is a part), for which it can seek to earn revenue through pricing and tariff mechanisms.

The Jacobs material cost escalation factor modelling considers the forecast movements in material costs for specific main asset types used in electricity distribution networks based on movements in primary cost drivers such as commodity prices, and these factors are used in forecasting escalation in annual capital expenditure forecasts. Escalation in operating expenditure forecasts will be related directly to any provisions in a current Certified Work Agreement concerning agreed movements in labour costs, or market based forecasts for labour cost escalation provided by reputable companies such as BIS Shrapnel.

Jacobs has long argued that CPI is not a reasonable proxy for cost movements in electricity asset material costs, as CPI relates to a basket of domestic goods. However, Jacobs agrees with the AER that it is appropriate to apply CPI as the cost escalation factor for non-network and general costs, such as consumables, plant and vehicles,

Therefore, and in accordance with the provisions of the National Electricity Law, the network operator should be provided with the opportunity to recover the efficient costs directly related to providing network services, recognising the primary cost drivers relevant to the primary network assets, which the AER has previously agreed consider movements in commodity prices.

- **The AER comments on page 6-151 of their Draft Determination that:**

'The limited number of material inputs included in ActewAGL's material input escalation model may not be representative of the full set of inputs or input choices impacting on changes in the prices of assets purchased by ActewAGL. ActewAGL's materials input cost model may also be biased to the extent that it may include a selective subset of commodities that are forecast to increase in price during the 2014-2019 period'

The Jacobs model is based on the following primary factors which are considered to influence cost movements:

- Base metals such as copper, aluminium and steel
- Oil
- Construction costs
- Foreign exchange

These cost drivers were selected following a multi-utility strategic procurement study which researched contract information for main items of plant equipment and materials (such as power transformers, switchgear, cables and conductors) together with contract cost information for turn-key substation and overhead line projects (including plant equipment, materials, construction, testing and commissioning).

All of the modelling done by Jacobs during the past decade for Australian electricity distribution utilities has been based on these primary inputs, and this basis and approach has been accepted by the AER during this time. Whilst there may be other commodities such as nickel, zinc, tin and lead that could potentially contribute to movements in asset material costs, from our research Jacobs considered these were secondary factors only.

Drawing on extensive data and information gained over the last ten years through numerous assignments undertaken for the AER and Electricity Distribution Businesses, Jacobs has been able to periodically adjust and refine the commodity weightings applied in its model to make sure no bias is introduced into the weighting process.

The cost escalation model used by Jacobs for ActewAGL is identical to that used in developing material cost escalation factors for other electricity distribution utilities, and generates material cost escalation factors that are asset specific rather than utility specific. This is done so that any other known external

factor that may affect asset costs specific to ActewAGL would be separately identified and any such impact separately quantified.

For ActewAGL, the cost escalation factors provided by Jacobs were installed cost escalation factors, and considered any labour escalation specific to ActewAGL (including consideration of provisions of the Certified Work Agreement).

In summary, Jacobs firmly considers the AER's indicated position on the lack of veracity of use of composite escalators based on weighted indices appropriate to specific capital cost building blocks and specific operational cost expenditures, drawing on price component forecasts from reputable and established bodies such as the ABS, BIS Shrapnel (and other metals market forecasting houses) is at odds with general thinking in developed (and developing) nations.

Jacobs has developed, applied and reviewed (e.g. through established back-casting methods) its method for producing such composite indices for over a decade. These methods are applied and accepted as being robust by regulators (including the AER), utilities throughout Australia and in other jurisdictions, international banks, and other investors.

We firmly believe, in line with other reputable forecasters in the private and public sectors, that using a composite basket of weighted indices, appropriate and specific to the cost item in question, to forecast price movements of that cost item is both robust and more reliable. We also consider this practice less prone to bias than applying a forecast single non-specific escalator such as CPI movements. This is because the CPI tracks a basket of consumer goods rather than costs relevant to electricity DNSPs.

Appendix A. Institutions that use composite cost indices for material decisions

Institutions that used composite cost indices for material decisions

International Institutions	Geography	Use - Details
International Monetary Fund (IMF)		IMF publishes a monthly commodity index representative of the global market. This is used for a number of transactions and price forecasts.
World Bank		The World Bank has a commodity index designed to be representative of developing countries, does not include advanced economies' trade for the purposes of constructing the index. Consequently, certain commodities and weightings will vary from the IMF index and sources of market information will also vary.
OFGEM - Regulator	UK	Producer Price Index with adjustments
Transpower	New Zealand	Weighted Escalation Model for Costing CAPEX and maintenance projects LME Copper price (USD) LME Aluminium price (USD) Hybrid of World Bank steel price index and Asia Hot-Rolled Coil (USD) World Bank Metals and Mineral Price Index Construction - PPI – Outputs, for Heavy and Civil Engineering industry
Australian Institutions	Geography	Use - Details
Independent Market Operator	Western Australia	Maximum Reserve Capacity Price
Queensland Competition Authority	Queensland	Monitoring and Benchmarking Capital and Operating Costs Prudency and Efficiency Review of South East Queensland Water Utilities
Queensland Government	Queensland	SunWater Irrigation Assets - 20 year Capital Expenditure Program
AER, NSW DNSP Final Decision 2009	NSW – All Distribution Networks in NSW	AER stated in its final decision that “cost escalation at CPI no longer reasonably reflected a realistic expectation of the movement in some of the equipment and labour costs faced by electricity network service providers (NSPs). It was also communicated by the AER at the time of allowing real cost escalations that the regime should systematically allow for real cost decreases. This was to allow end users to receive the benefit of real cost reductions as well as facing the cost of real increases”.
AER final Determination – Victorian Utilities 2010	Victoria – all distribution utilities in Victoria	AER's final decision was to apply the steel escalators to the unit costs of public lighting poles and brackets, weighted by 45 per cent to reflect only the purchase price for steel affecting the materials cost escalators
AER Final decision – South Australian Distribution Determination 2010-11 to 2014-15 Issued May 2010).	AER – South Australia	AER's recommendations included the use of London Metals Exchange (LME) forward contract prices for 63 months and 123 months for aluminium and copper. ETSA used an alternative forecast (less volatile) forecast using Consensus Economics long term forecasts instead and used updated data in calculating its materials cost escalation rates.